UNITED STATES
NUCLEAR WASTE TECHNICAL REVIEW BOARD

# ENVIRONMENT AND PUBLIC HEALTH PANEL MEETING

Ramada St. Tropez
Monte Carlo Room
Las Vegas, Nevada

April 24, 1990

BOARD MEMBERS PRESENT

Melvin W. Carter, Chairman
D. Warner North
John E. Cantlon
Don U. Deere - not present
Donald Langmuir - not present
Dennis L. Price - not present
Ellis D. Verink - not present
Clarence R. Allen - not present

William W. Coons, Executive Director

# I N D E X



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

DR. MELVIN CARTER: Good morning. On behalf of the

Nuclear Waste Technical Review Board and especially its panel on Environment and Public Health, I'd like to welcome you to this particular meeting which is the second meeting of this panel. Our first meeting was held in mid-September in Washington, D.C. last year, and our next meeting, by the way, we're tentatively scheduling a public meeting of the Environment and Public Health Panel of the Board in Reno, Nevada, in about mid-October. The dates, I believe, will be the 15th and 16th, but that's being developed at the moment and there will be announcements out about it, of course, on a timely basis.

Now, I'd like to introduce the other members of the panel. To my extreme right is Dr. Warner North. Dr. North is a principal in Decision Focus in Stanford, California. He's also on the faculty at Stanford University. His field is risk analysis. And, to my immediate right is Dr. John Cantlon. John is vice-president of Michigan State University and head of its graduate programs. And, to my left is Dr. Jack Parry. He's on the professional staff of the Board and he also serves as our consultant to this particular panel.

Now, we certain welcome you. We have a three day meeting. We'll get into more of the details as we go along. Today's meeting, of course, will be held exclusively in this room. There's schedules available and, I believe, handouts as far as most of the presentations. The other aspect of the

meeting, brief CV's are contained towards the rear of the handout material. So, at least, the DOE folks and their contractors that will participate in the meeting are identified there. So, we'll have rather brief introductions as we go along. If you want additional information on the speakers, I would refer you to that particular document.

And now, I'd like to introduce Gerry Parker, Chief of the Environmental Compliance Branch of DOE, OCRWM, for a few welcoming remarks. Gerry?

MR. GERALD PARKER: Yes, thank you very much, Dr. Carter.

The Department does welcome the opportunity to meet again with the Environment and Public Health Panel. In the way of introduction, I have brief comments on three topics, Dr. Carter, the first of which is the involvement of the State of Nevada and the Native Americans at the meeting today; secondly, a few comments on the panel itself; and then finally, something about the agenda and what we see as our role in carrying out your purposes here today.

In regard to the State of Nevada and Native American participation, we applaud your formal invitation for their participation and we look forward to hearing their presentations and statements here today.

In regard to the panel, I don't want to embarrass you with plaudits, but after the September meeting, we

reviewed the transcripts and we're very impressed at the depth of the questions from Dr. North and Dr. Cantlon and yourself, Dr. Carter, were very challenging and tough questions and really provided some useful insight to us. Falling along that same theme, we did review your December report, the panel report, as well as the more recent report of the Board as a whole and the Environmental Panel portion of that and again believe that it was very helpful and useful to us in benefitting from your insights.

And, that leads me to the last topic and that is the agenda for today. We've worked closely with your fine staff, especially Dr. Parry, over the last few months to try to shape an agenda and prepare some material for you that would respond to the questions and some of the concerns that we sensed in your two reports. And, to that extent, this morning, Wendy Dixon from our Project Office and I will lead off with some discussion about the management of the program. There were questions about the comprehensive nature of our environmental program and how all the pieces fit together and we'll briefly try to go over some of the coordination and management aspects of our program. And, that will be followed by technical updates by the same environmental scientists that you heard in September on the field work that they're conducting in the environmental area.

And, I guess I would just say in summary that,

hopefully, today's presentations will indicate that indeed the Department of Energy intends to be a good neighbor as we proceed through this several years of site characterization at the Yucca Mountain site and that environmental protection is one of our paramount goals as we do that. Thank you.

DR. CARTER: Okay. Thank you very much, Gerry. I'd like to say one thing for the record and that is flattery will get you nowhere.

MR. PARKER: Can I revise my remarks then?

DR. CARTER: Please do.

All right. Next, I'd like to introduce Carl Johnson. Carl is the scientific and technical director for the Nuclear Waste Project Office for the State of Nevada and he'll be representing that office rather than Bob Loux. Carl, we're very pleased to have you here and we're flexible to some extent as far as schedule is concerned. So, please?

MR. CARL JOHNSON: Thank you, Dr. Carter.

For those people who do not know me, I'm the administrator of technical programs for the Nevada Agency for Nuclear Projects. Our office has the oversight responsibility for the state on the DOE's high level waste program.

Before I get into my opening remarks, I'd like to introduce some people who I've brought with me today who have an involvement in the state's environmental program. There's two members of my staff here; Steve Frishman who is sitting

in the front here who is the technical and policy coordinator in the office, and Charlie Malone, wherever Charlie is there, who is our environmental specialist in our office. Also with us today are Mark Winsor from Environmental Science Associates and also Tom Kucera from Environmental Science Associates. Mark is the project manager for their activities for us and Tom is the field survey coordinator.

ESA is out of San Francisco. They are our environmental contractor responsible for developing the environmental baseline information for the state and also assisting our office in its review of DOE's environmental program. Supporting ESA in its environmental studies is John McLain with Resource Concepts in Carson City. John is a specialist in site reclamation.

All of these people who I've just introduced will be on the field trip tomorrow and will be available to answer any questions or participate in any discussions. Also on the field trip tomorrow will be Dr. Catherine Fowler, a professor of cultural anthropology at the University of Nevada-Reno. She has studied the Native American cultures in southern Nevada and specifically Yucca Mountain. Reports by her and her colleagues have been previously supplied to the Board. Unfortunately, teaching commitments today prevent her from being here.

The Nuclear Waste Policy Act establishes a

procedure for high level nuclear waste repository citing and defines an oversight role for the state containing a candidate repository site. An important aspect of the state's oversight role is assuring that environmental quality is adequately protected by DOE in the course of the repository project. To achieve this objective for the State of Nevada, an environmental oversight program has been initiated by the Agency for Nuclear Projects.

The comprehensive environmental program is designed to provide information needed to objectively decide whether the environment at Yucca Mountain will be adequately protected during site characterization and provide sufficient information upon which to participate in scoping and assess the Environmental Impact Statement which is to be prepared by DOE. Our program will establish a comprehensive, site specific baseline of information that reflects ecological and environmental conditions at Yucca Mountain prior to site characterization. Two, monitor DOE's environmental monitoring and mitigation program and their analysis of significant adverse impacts. And, thirdly, to develop an independent environmental program by extending and converting the baseline field activities into impact monitoring and insure that DOE adequately mitigates and reclamates the site as appropriate and necessary.

As a precursor to this meeting, the state has

provided to the Board a number of reports and other documents that describe in detail the state's environmental program plan and its concerns with the DOE's environmental program. In short, the state is not satisfied that the environmental program proposed by DOE either begins with an adequate assessment of the site conditions prior to alteration, essentially an environmental baseline, nor is sufficiently comprehensive.

The state has commented extensively on DOE's Environmental Assessment, the monitoring and mitigation plan, the radiological monitoring plan, the floodplain assessment, and other documents that address aspects of the environment. The focus of our concern goes back to the Environmental Assessment for Yucca Mountain in which DOE concluded that site characterization would produce no significant adverse impacts to the environment.

Upon detailed analysis, it became apparent to us that the conclusion was not based on a comprehensive package of environmental information about Yucca Mountain, but instead was based on a few reconnaissance surveys supported by overly optimistic assumptions and opinions of environmental conditions. The realization led the state to the position that a comprehensive environmental baseline must be completed prior to the start of site characterization. DOE's position has been and is that no environmental baseline

survey is required because, one, the EIS will only consider the environment after site characterization, essentially disturbed conditions; and, two, the EA was a sufficient baseline for defining impacts from site characterization.

In 1987, the state requested funds from the Nuclear Waste Fund for a baseline survey, arguing that we could not assess adverse impacts from site characterization and appropriate mitigation measures for those impacts without an understanding of pre-disturbance conditions and that such environmental information was necessary for EIS scoping and for assessing the adequacy of the EIS for protecting the environment.

An agreement was reached that funding would be provided for an environmental survey in exchange for a state grant condition which stipulated that:

> "Funding of the requested environmental survey (1) should in no way be construed as a form of admission or acknowledgement by DOE that its environmental protection plans and programs are inadequate or otherwise deficient, and (2) does not constitute an agreement by DOE to withhold the conduct of any and all site characterization activities until the state-conducted survey or any position thereof is completed."

What has followed the agreement has been years of

funding cuts for environmental activities and frustration with the bureaucratic hurdles placed before us in obtaining the required DOE permission to conduct surveys on NTS, Air Force, and BLM lands. Our success has been limited to one three week field survey conducted in the fall of 1989. Current funding levels will prevent any field surveys this fiscal year. We believe that a minimum of one year of seasonal field survey data is required to develop a defensible understanding of environmental conditions at Yucca Mountain. Even more data will be required to develop an understanding of the local ecosystem and evaluate realistic site reclamation strategies.

I know this has been somewhat of a long-winded introduction, but I think it's important for the panel to understand our views on the environment and to have a sense of our frustration with the DOE program and the process. The main purpose of the state's request for time on today's agenda is for the Board to understand the basis of the state's environmental concerns.

With that, I would like to turn the presentation over to Steve Frishman who will present that discussion of our concerns.

DR. CARTER: Let me ask you a couple of questions, Carl, before we have the next presentation.

I presume that the state focuses on or has focused

on specific differences now between what you consider to be a comprehensive environmental program versus what the DOE considers to be a comprehensive environmental program. Assuming that's true, I was interested if you would comment -- I'll probably ask DOE the same question -- on the resolution process. I wonder if you'd take a minute or two to explain the position as far as the state is concerned towards the possible resolution of these specific differences that you might have? In fact, it sounds to me like we need a mitigation program in this area, as well as in the environmental area. So, I wonder if you'd comment on that and then I've got a couple more I'd like to ask you. Carl?

MR. JOHNSON: Well, I think in responding to your comment, I think the quote that I gave in my introductory remarks that comes from our grant condition kind of sums up the current situation and, frankly. I'm not optimistic that that is going to change much, that the Department seems to be adamant in their view of what they think should be done. We are equally adamant in our view based on our knowledge of the environment and the base and the range as to what needs to be done in order to understand what we think is a very complex ecosystem and trying to get some information on that ecosystem which will allow us to make judgments in the future as to how to both monitor and mitigate any possible impacts during the future process here.

DR. CARTER: Okay. The other question I had or one other one, of course, I think most people know that DOE's program, I think -- and, I'm sure in their opinion -- gets looked at by everybody. The state reviews it and critiques it and perhaps criticizes it in a polite way. A number of other groups do the same sort of thing. My question is what sort of independent review does the state's program get? Do you give reciprocity to DOE as far as your program is concerned, letting them take a pot shot at it before it's put together or do you have outside peer review? What's the quality assurance aspects of your program?

MR. JOHNSON: We provide the Department with a copy of our environmental program. As a matter of fact, that formed the basis of the agreement that was reached for funding back in 1988 when it was finally resolved over the funding. So, they do have access to our program.

DR. CARTER: But, it's not for the specific purpose, I presume, of review from a technical standpoint?

MR. JOHNSON: No, it's not. It's from the point of view of providing them the necessary documentation supporting the funding request.

Any other questions?

DR. CARTER: John, Warner, do you have any questions for Carl at this time?

DR. JOHN CANTLON: No, not that this time.

DR. CARTER: All right. Thank you.

MR. JOHNSON: Steve?

MR. STEVE FRISHMAN: My name is Steve Frishman. Many of you know me. A number of the things that I'm going to be talking about today should be familiar to, at least, Gerry and Wendy because they're things that I've been saying for, oh, at least, six years since I was director of the Texas program and involved with an overview of the entire DOE planning process. There shouldn't be anything new here. Most of it is so fundamental we all ought to know it already, but apparently it just doesn't seem to be getting through and into the implementation in a way that we believe is representative of current thinking in environmental science and environmental analysis. I also am going off in a direction that I've noticed that the Board has a great interest in and that's rather than giving all the details of how, let's talk about why and look at some of the basics behind the planning that should go into a program such as this. So, there's my title.

Now, we'll start with something that I believe is probably non-controversial, Key Issue 3, the Department's perception of the overall goal of its environmental program. I don't have any complaint with this and I imagine some of you are quite surprised. Today, I'm going to be talking about the environmental program, not transportation and not

socioeconomics. So, two-thirds of Key Issue 3 are for another meeting and we've already discussed with one of the Board's panels a presentation at some time in the future on those other two areas.

You'll note that under Key Issue 3, the Department has yet to identify the sub-issues. They have continually been deferred. There's no reason for that to happen; they just aren't there yet. Maybe we'll here today that they are, but if they are, it will be the first we've seen them. And, it has been sort of understood all along regarding this note that the key issues will be identified in the EIS scoping process. Well, normally, that's a reasonable approach, but you'll see a little bit later on in my presentation just how unreasonable that is relative to this program and the way it's planned right now.

Site characterization plan refers to Key Issue 3 and explains how data will be collected. It says it will be collected essentially concurrent with site characterization. Concurrent is a temporal term. It doesn't necessarily mean that there are substantive linkages and I think you'll see that there is a problem in that area, as well. The site characterization plan doesn't describe any of it because of the narrow definition of site characterization that has been taken by the Department and that's the geotechnical area as opposed to coordination with the environmental area.

Key Issue 2 also has a number of environmental aspects and those aspects again have been deferred out of the SCP to some other analyses and these are highly isolated in DOE's program at this point. There's a statement of the key issue and then what again the site characterization plan says about that issue. And, it says that most of the components of Key Issue 2 are not within the scope of site characterization as defined and, therefore, they'll be looked at in some other way again.

Now, if we just kind of stand back and look at the major program involved in site characterization, repository citing, potential repository development, I think people who are familiar with the field of environmental studies and analysis can probably come up with exactly this same list that I'm going to put up. Just sit and think about what are the needs of a program such as this? Forget all of the killing forests/writing paper, just what are the needs of a program like this? And, I think this is probably responsive to all of the top level needs that are out there if you understand the Waste Policy Act, if you understand the structure of environmental law in this country, even if you try to apply logic, "Where are we going with the program?", or "Where do we need to go?"

The first comes not only from good sense, but also comes from the Nuclear Waste Policy Act, also comes from

NEPA, the National Environmental Policy Act, also comes very importantly for this program from another unfulfilled area and that's the Department of Energy has already done a lot of work out in the Yucca Mountain area under cooperative agreements with the Bureau of Land Management. Those agreements require reclamation and mitigation. There has been none. Since 1979, there has been none.

Other needs: provide enough information for an acceptable EIS. Well, it's a short sentence, but it's sure a load of work. Provide enough information for the NRC's license application requirements which includes an EIS that is appropriate to the NRC's action regarding licensing, as opposed to the DOE's decision regarding the recommendation of a site. Provide enough information for an acceptable reclamation program that again is the list of sources that I just gave that would require such a thing. And, provide enough information for environmental regulatory compliance in addition to the Waste Policy Act requirements, NEPA's requirements, and those that come with the licensing proceeding; meaning getting permits for the activities that are intended to take place and, first of all, being able to describe those activities sufficiently to be able to apply for a permit and, second, being able to understand the environment that is going to be impacted well enough to describe what you're going to do about it in a permit

application. I think it's all pretty logical, so far. It's just not happened.

This is where I'll go back to some of my early discussions with the Department of Energy in their environmental coordinating group where we really had some wonderful parties and some messages that were unheard and are still unheard. There are three decisions that have been made in this program that appear to me to be what is driving the entire environmental program off in a direction that is not going to fulfill the needs as I just discussed them.

The first one, as Carl mentioned, is the statutory Environmental Assessment, which is not an NEPA Environmental Assessment, determine no significant impacts of site characterization. Carl described a dearth of data that that decision is based on. The decision was essentially a legal decision that was made.

Second is, as Carl mentioned, baseline condition for the EIS will be near the time that site characterization ends. The disturbance that has taken place and is planned to take place during site characterization will be behind that baseline. The disturbed condition will be the baseline condition. And, a just a couple of examples of where we are right now, by our analysis from air photos and some ground truthing, we come up with 638 acres, minimum, already disturbed, most of that under the BLM cooperative agreements

where no mitigation took place, there is no current understanding of what reclamation will be required even though the agreements require it. We've also looked at the myriad discussions of what might go on during site characterization in terms of ground disturbance. Again, the minimum number we can come up with is another 522 acres.

DR. CARTER: Steve, could I ask you a couple of things?

MR. FRISHMAN: Yes?

DR. CARTER: What are the terms of land surface there? Primarily, is this due to roads or --

MR. FRISHMAN: Combination roads, trenches, pits, drilling pads --

DR. CARTER: Okay. But, I presume most of that is roads?

MR. FRISHMAN: Not necessarily. There are a lot of drilling pads around. And, there are different classes of roads, but it's a composite where there was essentially no attention given when the bulldozers went to work to mitigation or to the necessity for future reclamation. It's just sitting there bare ground right now.

DR. CARTER: Okay. The other question, of course, there's been an awful lot of studies done at the Nevada test site and surrounding areas. I would certainly say in the environmental area and in the ecological area. In fact, I guess there's a fairly large ecological study area at the

site that's been investigated for a number of years and obviously it's not on Yucca Mountain, but it's reasonably close. Now, are you discounting all of this information that's available of that sort?

MR. FRISHMAN: We're not discounting that information. What we're saying that site specific information is not there.

DR. CARTER: Okay.

MR. FRISHMAN: And, we're dealing with a relatively large site. We're dealing with a site that has some potentially unique characteristics, such as an apparent relative lack of overgrazing, some different topographic features, and consequences -- the fact that it is western-most in that area, the fact it is a north/south ridge -- there are a lot of relatively unique aspects for any other project, were it private sector, would have to be looked at in terms of site specific information.

DR. CARTER: You mentioned overgrazing. Where does that come from?

MR. FRISHMAN: People running cattle.

DR. CARTER: On Yucca Mountain?

MR. FRISHMAN: There has been relatively little in that area as we can determine historically, but large -- well, if you're aware of a big controversy throughout the west and especially in Nevada is the use of public lands for grazing

of cattle. And --

DR. CARTER: Well, I understand that, but I don't think that's applicable to Yucca Mountain.

MR. FRISHMAN: Well, in Yucca Mountain, the reason --

DR. CARTER: I'm not too sure a cow could get up there.

MR. FRISHMAN: There's a herd out there. We see them every time we're up there.

DR. CARTER: Well, yeah, there are a few wild cows out there. In fact, the EPA has been keeping track of those for about the last 20 or 25 years.

MR. FRISHMAN: Well, if you recall what I said, there's a relative lack of overgrazing.

DR. CARTER: Okay.

MR. FRISHMAN: Which makes it somewhat unique in the area because a good part of the public lands in this state are considered to have been overgrazed. So, we're looking at something that may be approaching pristine, although we know is not. Something that may be approaching pristine to a greater extent than some other areas of public lands. So, we might see some things in the ecosystem there that we may not see in a more disturbed system. And, it's a transitional area at the northern end of a major desert and there are some rather unique aspects to that that our program is just barely beginning to look into.

The final decision that I've mentioned once before

that seems to be driving the program in a direction that causes us a great deal of concern is the deferring of identification of environmental issues until the EIS scoping process which, under the Secretary's restructuring plan, isn't intended to begin until October, 1997. The beginning of scoping has been consistently deferred through this program. Every time you ask, there's a new and later date. Well, this is the newest and latest date that we have. So, we're looking at a possibility of seven years of work, data collection, without purpose or without objective.

Now, if we look at this sketch of the DOE's planning process, I notice that in your report you picked out this same figure. That's one of the reasons why I wanted to put it up here and discuss it a little. If we look at just the top tiers from collect information on down, that's something you've got to do anyway. How you organize it largely has to do with the resources that you have and what blocks of information you feel you need to fill, how you want to go about filling it. But, if we look at the direction of the program as it appears in at least this organization chart, I can see these three decisions that I just mentioned fairly clearly reflect, first of all, the program is aimed essentially entirely at meeting environmental requirements. This causes a problem in all the rest of the thinking about the program as I see it because the environmental issue

overall is seen strictly as a regulatory hurdle. It is not seen as an integral part of a major program. When you decide that it's a regulatory hurdle, the first thing you do is just figure out how high you can jump. But, you don't figure out whether you can make break a new world's record; you figure out what it takes just to get over the hurdle. And, that's about the way this program appears to be designed.

Across the line of identify and define environmental requirements, that's the basis of the program as you can see it. There are some interesting glitches in this, too, and that's that National Environmental Policy Act and CEQ regulations are given essentially the same level of priority as the rest of regulations, even though NEPA is seen as the umbrella environmental legislation and policy of the country. NEPA requirements, such as an EIS, are relegated to about the same level of interest and concern at this point as, for instance, meeting the environmental associated requirements of 10 CFR 60 and DOE orders which incidentally adopt NEPA as an umbrella environmental policy. So, just the structure here tells you a little bit about the thinking that has gone into the design of the environmental program.

Now, if we go down to the next tier, we can look at the boxes and see how they're derived from decisions. Environmental monitoring and mitigation plan was dreamed up as the mechanism to implement the decision that there is no

significant environmental impact of site characterization. It is strictly a watch and go type program. There is no emphasis on looking at the impacts and their effects during site characterization. The emphasis is to find out whether their decision was right or wrong with the assumption being the decision was right, no significant impact.

The environmental regulatory compliance plan is a laundry list that anybody would have to make. Reclamation and implementation plans generally aren't given this level of consideration when you look way up at the top tier. They're subsumed into all other things. They should not be a box unto themselves when you're looking at the major information. They're related to the rest of the work and they're required by NEPA, they're required by the agreements the Department has been working under, and in many cases, they're required by other environmental regulations that the program must conform to. Environmental Impact Statement implementation plan is setting NEPA out there on the side. The problem with that is again primarily this baseline mission.

So, the program design is one that hangs on three decisions, all of which we believe to be pretty damaging to a credible environmental program.

DR. CARTER: Steve, before you change that, I'm not too sure everyone would agree with your characterization of the NEPA and so forth. You know, this is in a fairly early

report in the process and, to me, that what means -- I would have a different interpretation. I don't know whether it coincides with DOE's or not. But, I think all they're saying there those are the sort of mandated things that they have to do. Some of them are very specific, of course, like 40 CFR 191. NEPA, some of the others, like environmental statutes and regulations, that's sort of a catch all. That includes an awful lot of things. I think they're really saying those are the things that they have to abide by legally. And, of course, your interpretation is also, of course, that they don't go beyond that. They're just looking at what is mandated by law and, I presume, the position of the state is that it should be a much broader program than that.

MR. FRISHMAN: Right. And, the way that I look at this is that it is organizational to meet a very specific need which is hop the regulatory hurdle. What I don't see in it is a sensitivity to a hierarchy of policy and it becomes in my mind a difference between form and function. This may be a reasonable form, but it does not satisfy the functional requirements. And, this is where I take off.

The general conclusion up to this point which obviously we don't have concurrence on, these three decisions, as I see it, have resulted in a fragmented program with flaws in literally all of the imaginable areas; the scientific approach, the planning logic, and the responsive-

ness to regulations. I just can't find the redemption in this program that I'm sure some of you believe is there.

Now, if we look at the scientific approach first, let's look at some of the consequences of the approach that has been adopted. The fact that there is no established comprehensive baseline leads to a whole bunch of other problems that are going to plague this program throughout. First of all, you can't get a complete handle on the potential impacts of individual activities because you don't know on an either individual or systems basis what the significance of the area is that you're playing with.

If you move up the line a little bit more and look at a comprehensive impact analysis, it just can't be done. And, I'm not speaking even over long term; I'm speaking over a large area.

Importance of impacts -- which is very much on people's minds because it's quite clear nobody wants to spend any more resources than they have to, so you prioritize -- this is again talked about in NEPA and it's a legitimate approach. But, until you know what you've got and have analyzed it reasonably well, you can't make the judgments about what element is more important than another and where you need to place your primary efforts.

Cumulative impacts can't be analyzed because again you don't know what's there and you don't know how it works

together. Cumulative impacts, as opposed to comprehensive, have a temporal aspect to them and they go out into the future, sometimes leading to reasonable status quo success, sometimes leading to extinction.

The basis for mitigation decisions is not there. You don't know what you had, you don't know what you disturbed, you don't know what's important about it. So, what are you going to mitigate? And, finally, the standards for reclamation don't have any specific basis because again you don't know where you started.

Now, the Board in its recent report made a significant and rather broad reaching statement. "DOE should develop a systems approach to its Yucca Mountain ecosystem studies. Each individual study should be an integral part of an overall ecosystem program. Present studies lack interdisciplinary coordination." We couldn't agree more. This is exactly the core of what we have been talking about throughout our commenting on this program. And, just to add a little additional interest to the Board's statement here, which I think is a very important one, let's look at where that statement probably came from. You'll find some very, very similar language in NEPA and there are a couple of other issues associated with it. I think you can recognize the similarity in language.

There are some other interesting aspects that come

with this. First of all, DOE is not exempted from NEPA during site characterization. There are some limitations that are very narrow limitations in the Nuclear Waste Policy Act, but NEPA is to be applied early to all programs that disturb the environment and that have environmental consequences. There is no exemption even though Carl Gertz has often said that there is one during site characterization. NEPA puts a great emphasis on digging into the issues of environmental analysis early in any program. There's some good reasons for that that NEPA talks about, the same reasons that the Department is most concerned about having to do with delays and potential conflicts. The wisdom of NEPA is start early and you may be able to avoid some of the problems if you do it right. So, early has not been taken care of; coordinated and integrated doesn't appear to have been taken care of.

If we start looking at the planning logic in the program, again we find that you can focus in on what appears to be a driver. Currently, planning is based on meeting requirements of individual statutes and regulations, rather than the broad goal, which is Key Issue 3, and the yet undefined objectives of that. Now, what are the consequences of this?

The first one is a relatively simple one. That's data collection and analysis to resolve issues can't

adequately be planned if the issues haven't been established. What are the objectives? It reminds me of the answer that we have often gotten when we ask what are you really doing in this monitoring and mitigation program in terms of significant impact? And, the answer is essentially if we see one, we'll know it. They are not designing a program to analyze the significance of impacts. It's that if something big crops up unexpected, theoretically it will get caught in the net.

Second, the overriding nature of the policies embodied in NEPA appears to be ignored. This is back to what you were speaking about, Dr. Carter, where NEPA fits in the hierarchy of national policies regarding environmental protection. And, there seems to be a lack of recognition of the overall NEPA compliance necessity. Compliance is in this case essentially a philosophy rather than the word by word and line by line compliance.

DR. CARTER: Now, I don't think exactly what you just said. In fact, I know I didn't. Go ahead?

MR. FRISHMAN: Well, the way I took your original question was what's wrong with putting NEPA in a line with everything else and I'm looking at it, as I described, in a functional way rather than a form one.

DR. CARTER: You use your words and I'll use mine.

MR. FRISHMAN: That will be fine. I think that's what

we're here for.

Also, there is no way that I have been able to discern where the environmental program gets connected up with the site characterization program or even later with a construction program. I recall years ago talking about how I see a divergence between the environmental program and the site characterization program and the longer it goes, the farther away they get. And, it appears that that divergence is still there where the people working in the environmental program are not fully cognizant of the ground breaking program and vice-versa. And, how this is going to come together is a matter of program planning and management.

And, finally, the extent of potentially affected environment is not defined. We don't know on an areal and temporal basis what the impacts of site characterization are and there hasn't been a great deal of thinking about that, at least thinking that enters into the program plans.

And then, we have the other maybe much bigger problem and, in fact, probably the biggest problem that we can imagine within the entire scope of this program and that's how do you write an environmental impact statement for 10,000 years of potential impact? That's all subsumed within this one relatively innocent statement. There doesn't seem to be any real thinking involved in what the scope of the affected environment is and waiting until 1997 to talk to the

citizens about their perception of it is only deferring an inevitable doom, I think, to the entire environmental analysis associated with this program.

Now, if we look at the schedule, this is just a way of sort of coming to what this restructured program looks like. You see, seven to eight years of environmental monitoring which we've talking about with the monitoring and mitigation plan and acquisition of data for input into the issue resolution. Well, here's seven years of collection of data for input into issue resolution and we don't know what the issues are. It has occurred to me that the top tier of issues below Key Issue 3 might just be that list of needs that I put out first and it may be that's a good place to start. That might lead you to something. But, at this point, we don't have anything out there other than we're going to collect a lot of data. And, I think you can see where the Environmental Impact Statement's scoping is. This is meant in NEPA to be an ongoing public process to advise the agency of what the public thinks is very important and ought to be looked at. When you start scoping two years before you write a draft EIS, just how much does that mean? I've been involved in long-term scoping processes, short-term, big projects, little projects.

Two years between scoping and a draft EIS produces essentially nothing but lip service to the scoping process.

In effect, DOE has already laid out its scope and it's going to be the same regardless of the scoping process. And then, the period of time between a draft EIS and a final EIS is probably without precedence for a major project in this country. You can't do it that fast unless you're going to break the law and will see you in Court over that.

The schedule on a graphic basis, we're looking at start of EIS scoping out in this area, draft EIS, and decision to recommend a site. The whole environmental program regarding the EIS is stacked up against a decision. I think we can probably talk about legal precedent just from the standpoint of this schedule and maybe people who have dealt with NEPA for a long time and the concepts of NEPA would have a problem with it.

And, finally, the responsiveness to environmental laws, we're back on NEPA again. In 1983, after the Waste Policy Act passed, the Department of Energy held one of its information meetings in Washington, D.C. And, you know, I spoke at that meeting as director of the Texas program and the major point that I made in my presentation there was the Nuclear Waste Policy Act is new, has a lot of provisions in it for which there really is no precedent. In final form, it was hastily written, had a lot of technical problems or technical errors. My message to that meeting was that you probably won't go down in this program on the Waste Policy

Act because it is so confusing and so new, but if you continue your planning the way I have seen it up to this point, regardless of whether there's a Waste Policy Act or not, you continue your planning the way I've seen it to this point in 1983, you will go down on NEPA and I don't see anything new yet. So, we're now in the situation where just responsiveness at the first turn in national policy, in a national environmental policy, the Department is essentially ducking. And, the impacts of this are, I believe, significant and many of them are things that we've talked about before, the affected environment will be the disturbed environment. Look at DOE's track record on NEPA lawsuits where they have asserted that the base condition is the disturbed condition. It's not a very good one.

The public scoping for the recommendation or for the EIS begins way too late. It's essentially, as I said, lip service to NEPA and the public.

The conclusion that the statutory EA is an adequate basis for environmental planning when it has a dearth of data that is site specific is again a major problem. And, finally, the assumption which is all there is right now from everything that we can see in documentation in this program, the assumption that when it comes time to reclaim, we can do it. We don't know how to do it, we don't know what the principles are, we don't know what the standards are. We do

know we're in a very fragile desert environment where reclamation is considered by most people to be an extremely difficult biological and ecological problem, but the assumption is when we need it, we'll have it.

So, as a basis for meeting environmental requirements which is what the program says it's doing, you're missing a whole bunch of the key components again going all the way back to some early decisions that were made that continue to drive all of the planning. I think I've probably ruined your day enough. Thank you.

DR. CARTER: Steve, let me see if I can kind of summarize and see if you agree. I presume what you're saying, both you and Carl in the environmental area, is certainly that the Yucca Mountain site needs an environmental program. It should be started early. It ought to be comprehensive and integrated. It ought to have a fairly broad scope. And, it should be broader than meeting environmental compliance rules and regulations.

MR. FRISHMAN: One more.

DR. CARTER: All right?

MR. FRISHMAN: It ought to have a baseline.

DR. CARTER: Okay. And, that describes your case?

MR. FRISHMAN: Pretty much so, yes.

DR. CARTER: Okay. Let me ask you a facetious question. Have you ever discussed this apparent mismatch between what

DOE is either doing or not doing with the Nuclear Waste Fund folks that furnish the money? There's been a lot of money spent and the question is it obviously --

MR. FRISHMAN: All right. Let me give you a facetious answer.

DR. CARTER: You're saying it's not been done in this area?

MR. FRISHMAN: Let me give you a facetious answer. Every time we point out that scoping is lip service, we are telling the Nuclear Waste Fund folks that there's a great big problem with this because they are the public, the consumers. We also have put our comments out there in public, in writing, in DOE meetings that are attended by the representatives of that public who are the utilities. They're well aware of our concerns in this area. And, the public who is the Nuclear Waste Fund is being shorted in this program right now by deferring scoping out seven years and having public lands destroyed in a way where there has been no attention to mitigation or reclamation. These are public lands, multiple use, public lands.

DR. CARTER: Okay. Thank you, sir.

All right. We'll now have our next presentation.

MR. CARL GERTZ: Dr. Carter, could I make a comment, please?

DR. CARTER: Sure, Carl. Would you go to the

microphone, please?

MR. GERTZ: Sure. I'm Carl Gertz, DOE's Yucca Mountain project manager, and certainly the state and our office and department have had a disagreement on this issue and we'll continue to debate it in the future. But, I'd just like to make one comment since Steve alluded to a quote of mine about Carl Gertz saying that DOE has been exempted from NEPA. I, to my knowledge, have never said that. What I have said is that the Waste Policy Act exempts DOE from producing an EIS for site characterization. We're exempted from an EIS during the site characterization phase. Certainly, we must comply with aspects of NEPA that are appropriate unless they've been modified by the Waste Policy Act. I'd just like to correct that for the record.

DR. CARTER: Okay. Thank you.

Our next presentation will be given by Mr. Ian Zabarte and we're certainly very pleased to have him with us. And, he represents the Western Shoshone National Council. Ian, we're glad to have you here with us.

MR. IAN ZABARTE: Good morning. I'm a Western Shoshone Indian. My name is Ian Zabarte. I represent the Western Shoshone National Council. I'd like to thank you for this opportunity to express the views and interests of the Council.

Some perspective about the Western Shoshone is

necessary before I proceed with my presentation. Some people ask who we are and they ask us what do we want, as if we can be paid off. I hope to show that there's much potential for our greater involvement in the program. The DOE attempts to discount our desire to be involved at different times. Some of that is done by subcontractors that are trying to meet regulatory requirements. But, I'll go ahead and give you the background of the National Council.

Western Shoshone National Council was organized from the original traditional Western Shoshone Council. The 14 member Council has been unified into actively asserting and defending the rights and homelands of the Western Shoshone Nation. The local government representatives of the National Council include the Battle Mountain Band Council, the Duckwater Shoshone Tribe, the Dann Band, the Duck Valley Western Shoshone Tribe, the Ely Shoshone Tribe, the Elko Band, the Great Basin Western Shoshone Decedents, the South Fork Bank, the Te-Moak Tribe, the Western Shoshone Traditional Cattlemen, the Wells Band, the Yomba Shoshone Tribe, and the Timbisha Shoshone Tribe represented by Pauline Esteves who will be accompanying you on the tour.

The Western Shoshone National Council meets monthly in the center of Western Shoshone territory at Austin, Nevada, and we have a chief elected by the local government representatives. The Western Shoshone National Council has

been at the forefront of defending Western Shoshone lands, resources, and rights since its founding in 1984. The Western Shoshone National Council in 1985 and 1986 was recognized by the United States and four negotiation sessions were conducted. These negotiations were to address resolving Western Shoshone land and rights grievances. In 1986, these negotiations broke down in part to the unwillingness of the United States to assume a realistic and responsible position.

The Western Shoshone National Council has achieved a temporary Federal Court order recognizing Western Shoshone aboriginal treaty and hunting rights. In 1986, the Western Shoshone National Council filed suit in the United States District Court for the District of Nevada against the Director of the Nevada Department of Wildlife and the Departments Director of Law Enforcement. The suit sought recognition of treaty protected aboriginal rights to hunt and fish and in injunction to prohibit the state of Nevada from forcing state game laws against Western Shoshone within the 1863 Treaty of Ruby Valley area. At a pre-trial hearing, Federal District Judge Bruce Thompson urged the Department of Wildlife and the Western Shoshone National Council to stipulate an agreement to avoid a lengthy trial. On January 4, 1988, Judge Thompson signed an order for a preliminary injunction accepting the agreement pending a final determination on the merits of a summary judgment motion.

Under this order, the Western Shoshone National Council created the Western Shoshone Wildlife and Plant Resource Commission which oversees hunting and fishing by Western Shoshone people covering approximately 30,000 square miles in Nevada.

When our elders speak, they usually start at the beginning and stop at the end of what they have to say. This tends to make them seem somewhat extraneous at times, but a good listener will take into account all that's said and know the background of the story being told. And, by ensuring that the story has background, the imagination of the listener is more apt to be involved. Many individuals within the Department of Energy lack the quality of being good listeners. They seem more intent on making Native Americans seem like misguided souls rather than listening to what we have to say and acting on our concerns. I've tried to convey this to the Yucca Mountain Project Office that they need to recognize the Western Shoshone Nation as it actually exists in the identification and characterization of Yucca Mountain and the issues that could disqualify Yucca Mountain as a high level nuclear waste repository, but this has been with very little success.

I do not intend to argue the past, but it is important that I give some history about the Western Shoshone Nation that may affect many of the contemporary issues that

the Council feels it is compelled to resist including the citing of Yucca Mountain as the first United States high level nuclear waste repository. So, therefore, I will start at the beginning.

For thousands of years, the Western Shoshone people have lived in peace and harmony. The Western Shoshone economy was delicately balanced with the environment's ability to reproduce. This type of sustainable economy served all of the people's needs. During this time, the Western Shoshone people governed by the spiritual instructions of the Creator and the natural laws that were fashioned by Mother Earth. Tribal activities followed these ways.

The Western Shoshone people have fought to maintain this quality of life within its homeland since the 1700's. By the time the United States acquired the territory of Nevada in 1848, pursuant to the Treaty of Guadalupe Hidalgo, the Western Shoshone used and occupied approximately 45,000 square miles of land in what is now commonly referred to as Nevada, California, Utah, and Idaho. It was not long after the territory was established that the increased movement of settlers into the area resulted in numerous disputes between Indians and settlers. In response to these disputes, President Abraham Lincoln in 1862 appointed a special commission to negotiate a peace treaty with the Shoshone.

The commissioners were specially instructed by letter of July 22, 1862, that they were not expected to negotiate for the extinction of the Indian title, but for the security of roads over the lands and a definite acknowledgement, as well, of the boundaries of the entire area that the Indians claim.

In 1863, Western Shoshones entered into a formal relationship with the united States by treaty signed at Ruby Valley on October 1, 1863, by the chiefs, principal men, and warriors, and ratified by the United States Congress as amended on October 21, 1869. The Treaty did "define and describe by them", the Western Shoshone leaders, "land or country claimed or occupied by them". In essence, it indicated that this land belonged to the Western Shoshone Nation.

In 1951, certain members of the Shoshone Tribe brought an action before the Indian Claims Commission seeking compensation for the asserted loss of their ancestral lands. One of the co-petitioners in the Indian Claims Commission proceeding was the Te-Moak Bands of Western Shoshone purporting to speak for the entire Western Shoshone Nation. An erroneous claim was filed for lost lands. The complaint alleged that the United States had violated the rights of the Western Shoshone and the provisions of the Treaty of Ruby Valley by disposing of a large part of the land described in the Treaty to settlers and others or seizing or converting a

large part of the said lands to its own use and benefit without any compensation.

In 1962, the Indian Claims Commission held that the Western Shoshone constituted an identifiable group, and that they had exclusive use and occupation of, and therefore, aboriginal title to 22 million acres in Nevada "until the gradual encroachment by white settlers and others, the acquisition, disposition, or taking of their lands by the United States for its own use and benefit or the use and benefit of its citizens, the way of life of the Indians was disrupted and they were deprived of their lands." And, "that the United States without payment or compensation acquired, controlled, or treated these lands as public lands from the date or dates long prior to this action."

In 1966, the Western Shoshone claims' attorneys and the United States stipulated July 1, 1872, as the date of taking for the purposes of valuation. Because the claims were based on contingent compensation to attorneys, the attorneys for the Te-Moak Bands ignored the Treaty of Ruby Valley and pursued a finding that would prove a fictitious taking occurred, so that they could be paid for their effort.

In 1972, the Indian Claims Commission held that the fair market value of the land was $21,350,000 and that the plaintiff was entitled to recover that sum under the Indian Claims Commission Act. In 1974, as a result of the long-

festering dispute between the growing number of Western Shoshone on one hand and their claims' attorneys on the other hand whether to assert, as the claims' attorneys insisted was the only course, that the Western Shoshone lands had been taken by the United States and that substantial compensation was therefore due or assert that the lands had never been taken and were still owned by the Western Shoshone, various groups of Western Shoshone other than the Te-Moak Bands attempted to intervene in the Indian Claims Commission proceedings. The Indian Claims Commission rejected this intervention petition and the Court of Claims affirmed.

In late 1976, the Te-Moak Bands, the asserted representative of the Western Shoshone in the Indian Claims Commission proceedings, reversed course and adopted the unsuccessful intervenor's position that the Western Shoshone retain the ancestral title to their lands and sought recognition of that title, rather than money damages for taking. The Indian Claims Commission denied the Band's request for a stay and entered a final net award in favor of the Western Shoshone. The award was affirmed by the Court of Claims.

On December 6, 1979, the Clerk of the Court of Claims certified the Indian Claims Commission award to the United States General Accounting Office. The certification automatically appropriated the amount of the award and

deposited it for the account of the Western Shoshone in an interest bearing account in the United States Treasury.

By statute, the Secretary of the Interior, in consultation with the Western Shoshones, is required to submit to Congress within a specified period of time a plan for the distribution of the Indian Claims Commission award. As a result of a successful effort by the Western Shoshone to block the distribution of the award, the Secretary has not yet submitted a plan for distribution and the award fund now exceeds $60,000,000.

As the Indian Claims Commission proceedings drew inexorably to their close, the focus of the dispute shifted to a collateral proceeding in the United States District Court for the District of Nevada. In 1974, the United States brought a civil trespass action against Mary and Carrie Dann, two sisters who are members of the Dann Band of Western Shoshone. The United States alleged that the Danns, in grazing livestock on public lands in north central Nevada without permit from the United States Bureau of Land Management were violating regulations issued by the Secretary of the Interior pursuant to the Taylor Grazing Act.

The Danns asserted ancestral Indian title as a defense on the grounds that the lands in issue had been in the possession of their family from time immemorial, and that their ancestral title to the land precluded Bureau of Land

Management jurisdiction. The District Court rejected this defense and held that ancestral title had extinguished by the collateral estoppel effect of the 1962 Indian Claims Commission judgment. The Court of Appeals for the 9th Circuit Court reversed and remanded on the grounds that although the parties had stipulated the taking date of 1872 for the purposes of valuation, the extinguishment question was not necessarily in issue. It was not actually litigated and it has not been decided.

Subsequent events provided the District Court with an independent ground on remand for adhering to its original holding. In its second opinion, the District Court held that the Danns' ancestral title had been extinguished when the Indian Claims Commission award was certified for payment on December 6, 1979. Consistent with that holding, but inconsistent with the 1872 valuation date. The District Court held that the Danns had unextinguished ancestral title to their lands until the certification of the Indian Claims Commission award on December 6, 1979. Accordingly, the District Court dismissed the United States' claims for trespassing damages, but enjoined the Danns from further use of their land without obtaining proper permits from the Bureau of Land Management.

On appeal to the 9th Circuit Court for the second time, the United States appealed the District Court's holding

that 1979, not 1872, was the date of taking. The Danns appealed the District Court's holding of the Indian Claims Commission Act providing for a full discharge of the United States upon payment of the Indian Claims Commission award, had extinguished Western Shoshone ancestral title. The United States argued that the requirement of payment was satisfied by the automatic Congressional appropriation to the Indian Claims Commission award into the Treasury account. The Danns argued that until Congress approved the required distribution plan for the award, there was no payment.

The Court of Appeals held that the payment had not occurred within the meaning of the Indian Claims Commission act on the grounds that until Congress adopted a plan of distribution, there were still significant legal blocks in the way of delivery to the payee and, thus, the ordinary meaning of payment had not been satisfied.

The United States Supreme Court granted certiorari and considered expressly only whether the appropriation of funds into the Treasury account constituted payment under the Indian Claims Commission Act. The Court held it did basing its conclusion on three arguments.

First, the Court concluded from the legislative history that the chief purpose of the Act was to dispose of the Indian claims problem with finality and that to hold that payment does not occur until a final plan of distribution has

been approved by Congress would frustrate the purpose of finality by postponing the preclusive effects of the Indian Claims Commission Act while subjecting the United States to continued liability for claims and demands that touch the matter previously litigated and resolved by the Indian Claims Commission.

Second, the Court concluded from the legislative history that the second purpose of the Act was to transfer from Congress to the Indian Claims Commission responsibility for determining the merits of the Indian claims and that delaying the time of payment to the submission and approval of a final plan of distribution, permitting the Congress one last opportunity to review the merits of the claims litigated before the Indian Claims Commission, would conflict with the purpose of relieving the Congress of the burden of having to resolve these claims.

Third, the Court concluded that the 9th Circuit's construction of the word "payment" gave the word a markedly different meaning than it had under the general common law rule that payment of a debtor, the United States as judgment debtor, to a fiduciary, the United States as trustee for the Western Shoshone, for the benefit of the creditor, the Western Shoshone satisfies the debt. The Court concluded that once the money was deposited into the trust account, payment was effected.

The Supreme Court opinion does not address nor even hint at the existence of the other issues raised by the parties in the briefs necessary to a holding that title has been extinguished. These issues included whether a discharge claim against the United States pursuant to the Indian Claims Commission Act by virtue of the final award, even if payment had occurred, could constitute an extinguishment of title. After holding that payment had occurred, the remainder of the Court's opinion reads in its entirety as follows:

> "The Danns also claim to possess individual, as well as tribal aboriginal rights, and that because only the latter was before the Indian Claims Commission, the final discharge does not bar the Danns from raising individual aboriginal title as a defense in this action. Though we have recognized that individual aboriginal rights may exist in certain contexts, this contention has not been addressed by the lower Courts and, if open, should first be addressed below. We express no opinion as to its merits. The judgment of the 9th Circuit Court is reversed and this case is remanded for proceedings consistent with this opinion."

On remand, the District Court allowed the Danns to file an amended complaint in which they asserted Tribal title to the lands and also maintained individual aboriginal

claims. The Government then moved for a preliminary injunction to compel the Danns to remove livestock from the disputed lands in excess of the numbers which they had formerly been permitted to graze under the Federal grazing permit.

The District Court rejected the Danns' Tribal claim. It explained that they are precluded from asserting the aboriginal title of the Western Shoshone Nation against the United States because of the bar effect of the Indian Claims Commission Act resulting from the payment of the judgment. As to individual aboriginal title, the Court ruled that such rights were established prior to December 6, 1979, although it added that the subsequent effort by individual Western Shoshone to extend their individual occupancy or use could not extend the scope of established use and occupancy rights. The Court held that the Danns in their own right have established an individual aboriginal treaty right to graze 598 head of cattle, plus calves, and 840 head of horses, plus foals, in common with permittees of the Bureau of Land Management upon the public domain. Such grazing rights were not subject to regulation by the Bureau of Land Management, the Court added. The Danns were directed, however, to remove livestock in excess of the numbers allowed by the Court's decision.

Both sides appealed and the Court of Appeals

affirmed in part and reversed in part. The Court first rejected the Danns' petition of Tribal title because of the Indian Claims Commission Act bar that provides that payment resolves all claims and demands touching any of the matters involved in this controversy. Turning to the individual aboriginal title issue, the Court rejected the Government's position that the Danns could not establish title. The Court ruled that the Government's former policy of favoring individual Indian settlements on the public lands allowed individual Indians to acquire title in those lands and that the date upon which Tribal title was extinguished until November 26, 1934, when the lands at issue were withdrawn from further use pursuant to the Taylor Grazing Act. Relying upon the Indian Claims Commission proceedings, the Court concluded that the most appropriate date of extinguishment of Tribal title to those lands was July 1, 1972.

Consequently, overruling the District Court's adoption of the 1979 date for determining the extent of the petitioner's individual aboriginal title rights to graze cattle and horses on range lands, the Court of Appeals ruled that such aboriginal rights must have been acquired prior to the withdrawal of lands from open grazing and their subjection to the regime of the Taylor Grazing Act in 1934 and must have been continuously exercised since that time.

Accordingly, the Court of Appeals concluded that

the individual aboriginal land title of the Danns' is restricted to the land that they or their lineal ancestors who preceded them in interest actually occupied prior to November 26, 1934, and that any such grazing rights are restricted to the number and type of animal which were being grazed in 1934. The Court of Appeals remanded to the District Court to make a requisite finding and entered a decree. As of today, no final decree has been made by the District Court.

As you will agree, this is a lengthy and complicated history of the Indian Claims Commission Act proceedings and the Dann case, but certainly one necessary in realizing the potential for further litigation by the Western Shoshone on the unresolved issues and their possible effects upon the development and characterization of Yucca Mountain. The United States Congress should be made aware of the potential disqualifying condition of site ownership that has been left unresolved by the Courts.

It is the position of the Western Shoshone Nation that all of the activities conducted at Yucca Mountain for the purposes of developing Yucca Mountain as a high level nuclear waste repository are illegal. This position was made clear by the Western Shoshone National Council on December 5, 1987, by resolution. The resolution adamantly opposes any United States program designed to dispose of high level

radioactive waste within the Western Shoshone ancestral territory.

We respect and insist upon the rule of law. The laws that should govern our dispute are not being respected. The most significant laws that should be considered are the Indian Trade and Non-Intercourse Act of 1790. Under this law, it is not permissible for Federal, state, or private interests to acquire Indian title simply by administering Indian lands or by trespassing or encroaching on Indian lands. Only Congress can extinguish Indian title. If Congress wishes to acquire Indian land rights, it must do so expressly and it must pay fair compensation.

The Treaty of Guadalupe Hidalgo of 1848. Through this treaty with Mexico, the United States is legally obligated to respect and protect Indian land rights in much of the southwest including the Western Shoshone Nation.

The Treaty of Ruby Valley. A treaty of peace and friendship between the United States and the Western Shoshone Nation, this treaty, like all treaties, is the supreme law of the land.

The Western Shoshone Nation has never accepted the notion that our land right were ever lawfully extinguished by the United States. Western Shoshone leaders and lawyers have spent countless hours and small fortunes trying to use every possible lawful means to rectify this land rights problem, to

preserve our historic legal rights, to assert our rights and responsibilities for maintaining our culture and religious beliefs, while attempting to achieve a comprehensive and equitable resolution with the United States on this issue.

The Department of Energy argues that our fight is over now, that a final legal extinguishment was achieved by the United States. There is a very strained and technical legal argument for that point of view and the Western Shoshone people do not accept it. And, I am sure that many Americans would not either if they fully understood. I believe that employees of the Department of Energy would not accept it if they fully understood the merits of the matter, rather than plead ignorance and claim that they are Congressionally mandated for their actions.

Most seasoned political and legal observers would agree, we believe, that the underlying legal problems will remain to fester and rise again and affect the citing of Yucca Mountain, much the same way as the MX missile system development was set back in northern Nevada by Western Shoshone land rights.

Under the Nuclear Waste Policy Act of 1982, Section 2(2)(B) provides the term "affected Indian Tribe". The definition of an affected Indian Tribe means any Indian Tribe whose Federally defined possessory and usage rights to lands outside of its reservation's boundaries substantially and

adversely affected by the locating of such a facility, providing that the Secretary of Interior finds upon the petition of the appropriate Government official of the Tribe that such effects are both substantial and adverse.

The Western Shoshone National Council will not petition for such status, reasoning that the Tribes sovereignty will be compromised. The Western Shoshone National Council has made it clear to the local Tribal governments that it does not oppose any attempt by the local Tribal governments to seek such status if the local Tribal government feels that it is compelled to do so in the best interests of the Tribe. There are nine Federally recognized Western Shoshone local Tribal governments that could petition for affected Indian Tribe status. Only the Duckwater Shoshone Tribe has entered a formal petition to the Secretary of Interior. The other Western Shoshone Tribes are watching closely. It is too early to determine the full scope of off-reservation possessory and usage rights that the Western Shoshone people possess, but in light of the Federal District Court's Western Shoshone hunting injunction, these rights are substantial.

It is important to keep in mind that for the Western Shoshone people the lands to be occupied by the proposed Yucca Mountain site and the surrounding Western Shoshone lands that will or may be affected are and have

always been the permanent homelands of the Western Shoshone people. They are the locus and the subject of Tribal history and religion, and they are the very basis of Tribal existence. While other cultures may migrate to other lands, Western Shoshone culture and religion dictate the need to occupy our ancestral lands. We cannot consider gathering up our lives and effects and finding some other land to occupy if this land is impaired or uninhabitably destroyed. The Western Shoshone people must be assured, therefore, that the proposed Yucca Mountain site will not ever have adverse impacts upon us.

There are several important parts of Western Shoshone culture that were practiced at and around Yucca Mountain since time immemorial. Hunting, gathering, and religion were all practiced in the region. Although the Western Shoshone diet has changed in response to the availability of other foods and the relatively greater scarcity of naturally occurring foods, hunted game remains an important source of protein for many Western Shoshone families. A variety of plants remain important for food, medicinal, and ceremonial purposes and for firewood. There are thousands of sites of cultural and religious significance established or identified by the Western Shoshone people in several thousand years of occupancy. Many of these sites, particularly burial sites, birthing sites, and religious and

sacred sites remain important to the Western Shoshone people today.

A treaty right of access to Western Shoshone cultural and religious sites can be deemed to have survived the various Western Shoshone legal proceedings. Such rights were never ceded by the Western Shoshone and have never been litigated. No other people, group, or government can claim to have greater cultural significance or ties to the Yucca Mountain region than the Western Shoshone. The retention by the Western Shoshone of access to sacred and religious sites is a fundamental part of Western Shoshone culture. At this time, those rights are being interfered with by the Department of Energy and further steps need to be taken to insure that we are not deprived of these rights.

Nonetheless, Western Shoshone continue to visit areas restricted by the Department of Energy and the Department of Defense for hunting, religious, and other purposes. The Western Shoshone people have been dealing with problems relating to the disturbance of burial sites at an increasing rate. This is due to mining, construction, and other forms of development, as well as recreational artifact hunters. These incidents have been dealt with on an individual basis, but more and more Western Shoshone cultural and religious sites are being discovered and destroyed. We must develop a response appropriate with the social

perception of the incident and also consistent with our religious beliefs. Our burials are for the most part classified as resources rather than as human remains. They are used for unspecified scientific experiments or displayed as part of entertainment or educational programs. These remains are not resources. They are to be left where they were laid to rest.

Since the beginning of my involvement in the Nuclear Waste Program, I have had to force my point at meetings and educate the involved native Americans about which agency is conducting each study. No attempt was made by the Department of Energy to educate Tribal governments about the project as a whole. Initial contact in some cases came from subcontractors that gave a quick lesson about the activities that might destroy Native American cultural resources and burials. The possible destruction of these valuable parts of Native American culture, together with their religious significance, is certainly a compelling reason to be involved. Only through the belief of protecting Native American interests would the Tribe be involved in any nuclear issue.

One other significant problem we face is the cultural, political, and social impacts of improperly dealing with these emotional issues. These issues affect the Western Shoshone Nation as a whole. No one Tribe or arbitrary group

organized for cultural resource studies can decide the fate for Western Shoshone burials without being looked down upon by the rest of the Tribe. These impacts need to be addressed.

There are only 16 involved Tribes in the Department of Energy program. This accounts for only three of the Western Shoshone constituency. DOE subcontractors have tried to ignore our concerns just to achieve regulatory compliance. There are too many non-Indians doing studies under the American Religious Freedom Act that do not understand the Indian perspective of sacred lands.

In closing we hope to have greater participation in the future one way or another. I think we would develop a program that addresses our concerns quite well. Thank you.

DR. CARTER: Ian, I wonder if I could ask you a couple of questions? For the record, where's your home area? Where do you live in the state?

MR. ZABARTE: I live in Duckwater, Nevada.

DR. CARTER: Duckwater?

MR. ZABARTE: About 100 miles downwind of the test site.

DR. CARTER: Okay. Or upwind from the --

MR. ZABARTE: Upwind.

DR. CARTER: I have a question. Do you happen to have any legal training?

MR. ZABARTE: No.

DR. CARTER: No. I was just curious. You did a very good job of all of -- a lot of complicated legalities. Well, it sounds like to me you've had a very long and torturous relationship with the U.S. Government and I presume Yucca Mountain is just a new episode in that activity from your point of view.

MR. ZABARTE: Yes, it is.

DR. CARTER: The other thing, how many people are represented or how many Indians are represented by the Western Shoshone National Council?

MR. ZABARTE: Our representatives comes from each group and organization. Our constituency includes all of the Western Shoshone Indian Reorganization Act Tribal governments, as well as five Western Shoshone organizations, urban groups, and sacred land associations that overlap with the Indian Reorganization Act members.

DR. CANTLON: How many people would that be?

MR. ZABARTE: We're not sure about those numbers.

DR. CANTLON: What would be a ballpark estimate?

MR. ZABARTE: I would say descendants, about 7500. One of the problems we're dealing with right now and I guess it's relevant to Yucca Mountain when we talk about dealing with these burials is that no little group can deal with these things and many people are divided by some of these numbers. How do we decide who is a Western Shoshone? The United

States says for the purposes of distribution of that fund, maybe it's a quarter. So, then maybe there's only 3,000 left of Shoshone, but as far as descendants go, there's I would say about 7500.

DR. CANTLON: Do you have some kind of feeling -- well, what the frequency of Shoshone activity on the Yucca Mountain site might be in a year?

MR. ZABARTE: I really can't say. I know that there are Western Shoshone protesting what's happening out there. We have --

DR. CANTLON: I wasn't thinking so much of a protest, but of normal use of the site?

MR. ZABARTE: I really couldn't say that. You know, I've come pretty close at times myself hunting or gathering wood to the test site.

DR. CANTLON: Um-hum.

MR. ZABARTE: Not wanting to go and get arrested or have anything happen to me, you know, I don't have really the time for that, but there are people that know that they want to go down there and they would go there. They've been removed before.

DR. CARTER: Another question I wanted to ask you because it's somewhat historic, but on the other hand, some of your discussion was historic. Did the Shoshone National Council take any position, as far as you know, regarding the

land withdrawal for use by the Las Vegas bombing and gunnery range which includes thousands of square miles of territory in the state and also the Nevada Test Site which has been there, I guess, since the early 50's and uses, certainly, a number of hundreds of square miles of area? And, those, of course, are extremely large compared to Yucca Mountain.

MR. ZABARTE: The National Council hasn't had any formal resolution opposing the gunnery range, but a resolution was passed opposing nuclear testing and weapons testing.

DR. CARTER: Another thing I wanted to ask you, at a distance from Yucca Mountain -- I don't believe I heard you say, but in your personal opinion, what impacts or what effects might occur at some distance, as far as you're concerned or the Indian population, as far as Yucca Mountain is concerned? I gather you're concerned about the use of the land itself in that area for certain things and have a number of reasons for that. But, I'm thinking now at some distance. For example, I've lived in Nevada and I've hunted and fished and there's certainly a number of not only very scenic, but very beautiful places, and I've fished south of where you live at Sunnyside, those reservoirs, and I've also hunted and fished in Ruby Valley that you mentioned because that's one of the more beautiful parts of the state as far as I'm concerned. But, what do you envision as being potential impacts or effects at a distance from Yucca Mountain, if any?

MR. ZABARTE: One of our concerns would be for the wildlife. We're concerned that at this point we have our elders telling us that they've seen animals that may have been mutated and, you know, there's a lot of stories about these things. And, they scare a lot of people. Right now, access to the site is being blocked by the Department of Energy. The Department seems to somehow suggest that they have greater concern or greater interest in our burials or our artifacts or our history. We're losing that at a fast rate, and unless we are able to see it or do something about it, much significance is going to be lost. Our elders are dying. Now, these are our people that aren't being able to be involved at a level that we feel is necessary, and as everybody should know pretty well that the Yucca Mountain area and some of the Department of Energy land has some of the best artifacts and other cultural remains in the area that have been undisturbed by the general public and we'd like to be out there and have our people spend a lot of time out there. There's people that want to be out there. They just can't be out there.

DR. CARTER: Okay. Thank you. Okay, very good. We certainly appreciate very much you coming down and appearing before the panel today and we're also pleased that you and some others will be on the tour with us for the next couple of days. So, we appreciate that very much.

Yes, Carl?

MR. CARL GERTZ: Dr. Carter, this is Carl Gertz, the Yucca Mountain project manager. I just have one clarifying statement about Yucca Mountain. Yucca Mountain is, in effect, on BLM land and all citizens have the same access to that land in accordance with the rules of BLM. I don't want to confuse that with the bombing/gunnery range or the Nevada Test Site which is restricted for national defense activities. But, Yucca Mountain, itself, right now is for the most part on BLM land with access according to BLM rules by members of the public.

DR. CARTER: Okay. Thank you, sir.

All right. I think I'm going to modify the schedule a little bit. We're running a few minutes late, although we're in pretty good shape as far as schedule is concerned. So before we continue with the next DOE presentation, we will take a break and we will convene promptly at 10 minutes to 10:00.

(Whereupon, a brief recess was taken.)

DR. CARTER: Okay. In the next part of the program, we will have two people from DOE involved. Gerry Parker, who we heard from earlier, will give an overview of the environmental planning process that DOE goes through. And then, Wendy Dixon of the Yucca Mountain Project Office will talk about the implementation of the environmental program.

Gerry?

MR. PARKER: Thank you, Dr. Carter.

Over the last year or so, we've provided several, perhaps even reams of plans and documents that we have produced as part of our environmental program. What I hope to accomplish here briefly is to describe the process by which we arrived at the overall structure of our program in these plans that we've provided to the panel. Actually, this is a slightly altered version of the flow diagram that Mr. Frishman referred to which he excerpted from the panel's report of December. I spiffed it up with a little color and have tried to focus on what I think are the key aspects of the requirements in our planning process.

And, as you can see, I've highlighted four such key requirement areas. The first of which obviously is the statute that we're implementing and the fact that in several ways it modifies the environmental requirements in approach of our repository program. And, as Mr. Frishman said, environmental statutes and regulations, these are those environmental protection requirements that all major projects face; Clean Air Act, Clean Water Act, Endangered Species Act, Historic Preservation, American Indian Religious Freedom Act. Then, there's a large group of Department of Energy orders. These are essentially internal guidance documents and requirements documents that all operations within the

Department must meet. And then, we have -- and we have this separately and discretely -- the National Environmental Policy Act and the Council on Environmental Quality Regulations which drive an important environmental review function. And, I think given the issue was raised earlier, I'll spend just a few minutes on that one.

Let me then move to what we view as our key management plans driven by requirements and these flow lines are meant to be specific in this fashion. Now, let me start over to the right. I was going to indicate that our Environmental Impact Statement scoping process was to begin in the mid-90's to support the decision around the year 2000 by the Secretary to recommend a site for development as a repository and dispense with it in that manner, but I think that a really core issue has been raised in regard to Environmental Impact Statement timing, the need for comprehensive data.

Actually, if you'll bear with me just for a moment or two, a NEPA tutorial here. The National Environmental Policy Act essentially requires Federal agencies, that is Federal decision makers, to include consideration of environmental impacts when deciding on major activities. The results and their requirement essentially is an environmental review document, either an EA which is a -- level document or an Environment Impact Statement. Let me move to the

modification which was referred to earlier of the NEPA requirements within the Nuclear Waste Policy Act. The Act said that for the site characterization phase of our program, this multi-year program of studies and field tests that we're about to embark on at Yucca Mountain, that for that activity that the NEPA statute did not apply. That, as defined in Section 112 of the Nuclear Waste Policy Act, that we were to prepare an Environmental Assessment with specific content requirements specified in Section 112, and we were to use existing information, and then to proceed into the site characterization phase. So, the normal process of the Federal decision maker having to produce a NEPA environmental review document was circumvented, if you will, by Congress.

Given the nature of the site, the extensive analysis that we did in the Environmental Assessment, we feel it was warranted. The Environmental Assessment which exceeded, I think, 1200 pages in length which underwent an extensive draft review process by all the affected parties before we finalized it had, I think, over 300 or 400 pages worth of a comment/response document in regard to comments raised. The conclusions, as we indicated, were that there were no significant impacts that we could foresee as a result of our site characterization activities.

So, on the issue of timing here then, the EA or EIS that NEPA requires -- we're facing an EIS requirement for the

repository -- would indeed require a comprehensive data base, background, baseline information, and then you would project against that baseline information what the impacts of repository development, the full scale repository development, what those impacts would be on the existing environment. As required by CEQ, we deal with alternatives and things of that sort.

So that to assert at this point when the decision to proceed by the President with site characterization has been fully documented meeting all requirements that some sort of comprehensive data base is needed, really is legally not required, and for a couple of reasons, technically not justified, as well, I would assert. The first reason is that we're in an early phase where we determining suitability of Yucca Mountain as a repository, a potential repository site. That will lead eventually, if we determine suitability, to a design which we at this point do no have a design for the repository if we determine the site is suitable.

Now, to enter the EIS scoping process, you need a specific design. Unless you know what the action is, you cannot project impacts. And, it's at that point, when you know what the design of your proposed activity is in your proposed facility, and at that point when you have an existing baseline -- if we do alter the baseline during site characterization, that becomes the information and the

environmental data upon which an EIS must be based. I spent some time on it because I think it's an issue that's been raised and it really is a critical one. Other thoughts that were running around in my mind just from a technical standpoint -- I've been doing EIS's for about 15 years -- and that's the staleness of the data. The President's decision will be about the year 2000. The baseline and the environmental data that should support such a decision in EIS should not be collected and be used as the reference baseline certainly in 1990. It would be stale from a technical standpoint.

In regard to each of these requirements then in our management plans -- and these are all documents that we've provided and we have shared with the affected parties -- the environmental monitoring and mitigation plan specifically derives from Section 113 of the Nuclear Waste Policy Act. The Act says as we conduct site characterization, we're to insure that we minimize, as practicable, any adverse impacts of site characterization. This environmental monitoring and mitigation plan which we have revised twice to update does indeed indicate the monitoring that we will be conducting during the site characterization phase, as well as specific trigger conditions which would cause us to consider mitigating activities should those trigger conditions be met. And, here, I would draw our attention to the fact that

although we concluded in the Environmental Assessment in 1986 that there were no significant adverse impacts expected that we did indeed to be conservative and to protect the environment plan to monitor five key areas of potential impact and proceed with mitigation should that monitoring indicate that it was warranted.

Reclamation is a key activity. The Nuclear Waste Policy Act defines the reclamation standard that is to be met and also requires decontamination and decommissioning plans as part of our site characterization plan. And, reclamation is a critical element and it is a critical early element because unless you get started with characterizing and doing feasibility studies for reclamation and doing pre-activity work, you certainly cannot reclaim the site to meet the standard in the Act.

It was mentioned before we have a regulatory compliance plan. We have revised that to reflect more current situations. And indeed, as Mr. Frishman says, the ERCP is the sort of document that any major activity would have prepared to indicate when those activities that drive environmental statutory and regulatory requirements, what those requirements are, and our strategy. And, we have fully laid out the strategy by which the Department of Energy plans to comply with the myriad of environmental statutes that I mentioned earlier. And, similarly, the DOE orders sets out a

framework and an interaction among those parties at the Department of Energy to insure that compliance is achieved.

And, I've already mentioned that scoping and dealing with the issues and getting public input on issues of importance to the decision to build a repository, that that scoping process will yield an Environmental Impact Statement implementation plan and that, in terms of timing, is somewhere in the mid-90's when we'll embark on that.

Now, let me speed this up a bit. Moving to the guts of the program and the work that you will hear reported by our environmental scientists throughout the day, we have issued a series of environmental field activity plans dealing with the various relevant environmental disciplines. Each of these plans again indicates the activities that may affect the particular environmental media, indicates the nature and the type of the field work and the data collection and the data storage and the reporting that will take place, and as a result, there are some specific reports that we have specified in our management plans. We just issued the first annual report required by the programmatic agreement pursuant to the National Historic Preservation Act; progress reports in regard to the monitoring and mitigation program; and then finally, it's a series of topical reports, by they data reports, impact analysis reports that ultimately will feed into the Environmental Impact Statement and support the

various regulatory requirements, permitting requirements, and compliance documentation that will be required at the project.

And, with that as the overall structure, Dr. Carter, I tried to highlight a bit our view of NEPA and our view of how we will monitor and mitigate our activities during site characterization, and the work that's being performed will be described in some detail by all the scientists working in the field.

DR. CARTER: Okay. Let me ask you a couple of things, Gerry. I wonder if you would take a few moments to explain in your opinion the major differences now between an Environmental Impact Statement and an Environmental Assessment? Now, certainly, we started out in this business with Environmental Impact Statements and I happen to have been in the EPA, or shortly thereafter, when it was formed. So, I got involved early in that process. Now, these days, we do Environmental Assessments which I dare say in many cases are much or at least as comprehensive as a lot of Environmental Impact Statements. So, I wonder if you'd differentiate between these two if you can do it?

MR. PARKER: Sure, and I should probably do it at a couple of levels. Within the context of the NEPA statute itself and the CEQ regulations, the Environmental Assessment document typically is the first document that is produced to

determine whether or not an Environmental Impact Statement is warranted. And, the Environmental Assessment will be done generally on existing information. The Environmental Assessment will decide whether or not the critical requirement for an Environmental Impact Statement is being met, and if I can remember the exact language, it's whether or not we have a major Federal action significantly affecting the environment. And, if the Environmental Assessment which is a relatively short and rapidly produced document then concludes that indeed the action being proposed by the Federal Government is major, significantly affecting the environment, then a more rigorous and much more technically sophisticated document, the Environmental Impact Statement, is required.

Now, in our case -- excuse me, Dr. Carter. You were going to --

DR. CARTER: Yeah, I wanted to ask you, you're talking in sort of general terms and I presume a lot of Environmental Assessments can indeed take a fair amount of resources to produce and be extended over some length of times. So, even though they may be quicker and more inexpensive, I guess, than a full blown Environmental Impact Statement, they can be rather formidable documents or tasks. Is that true?

MR. PARKER: Yes, exactly. And, instead of dealing in the abstract, I should have dealt specifically with the May

1986, final Environmental Assessment for the Yucca Mountain site. Indeed, the extensive effort that went into it, the length of the document, the interaction with the public and affected parties was probably typical of the more rigorous Environmental Impact Statement process. The Nuclear Waste Policy Act did not require that we publish a draft. We published a draft as you must do with an EIS.

If I could proceed to the second level that I wanted in terms of our site characterization program and the environmental protection program that we're describing here today focuses on this site characterization phase of the program. And, that is that Section 112 specifically said neither the NEPA requirement for an EA or an EIS applied and that if you met the seven content requirements specifically stated in Section 112(b)(1)(e), plus or minus three, if you met those requirements, that that was sufficient for environmental review document. And, indeed, as I said, a lengthy time consuming process was followed and our conclusions of no significant impact, we feel, were solidly based.

DR. CARTER: A couple of other questions. Where's the natural and mineral resources covered in the program?

MR. PARKER: Natural and mineral resources?

DR. CARTER: Yeah, we're talking about environmental things and where is mining and potential mining and all those

sorts of things. Is this covered in your environmental program or is this a separate area?

MR. PARKER: I know in the EA in one of the important issues is recoverable resources at the site, for no other reason, because of human intrusion factors. Issue 1, Site Characterization Plan.

DR. CARTER: Okay. This is a separate program than the environmental program.

MR. PARKER: As I say, our environmental program is one dealing with the protection of various environmental media and concerns.

DR. CARTER: Another question, of course, a number of people including the State of Nevada, but I suspect others, have leveled the charge at DOE that they're only concerned with meeting regulatory requirements, nothing more and nothing less. I guess you could refer to that from their point of view as a DOE mindset. Now, how would you address those charges from the DOE standpoint?

MR. PARKER: Yeah, I would frankly approach that with some trepidation in that we certainly would not want to be seen as wasteful and, indeed, the Nuclear Waste Fund is duly funded, their utilities and their rate pays, and want DOE to appropriately protect the environment on one hand, but obviously not be gilding the lily on the other hand. I think the key aspect of our environmental protection program

countering the concern that we were just meeting minimum requirements is in the EMMP. The EA said and we believe was justified that there were no significant adverse impacts. Just to make sure, we included five specific areas in the environmental monitoring and mitigation plan which we will closely monitor and take action should that be required. So, I think maybe that conveys a sense of the commitment without saying that we're gilding the lily and going beyond require-ments.

DR. CARTER: Okay.

MR. PARKER: Because the 133 requirement for monitoring and mitigation is somewhat vague, clearly.

DR. CARTER: Well, there's certainly some things that you have to do. They're mandated in obviously meeting environmental regulations, environmental standards, or one of them. The question is if you do that, you fully understand the site from the environmental standpoint or whether there's a certain amount that you should do over and above the regulatory thing.

MR. PARKER: Yeah, and meeting all the regulatory requirements is no mean fete either and the body of all our regulations that have been established is meant to be adequate environmental protection. I shouldn't belittle the significance of meeting all the requirements.

DR. CARTER: Yeah, Warner?

DR. WARNER NORTH: I believe you used the phrase as you were making your presentation that we wouldn't want the baseline to be stale. I'd like you to expand on that a little bit. It seems to me more baseline information would be useful in gathering data over a period of the order of seven years and would probably be a lot better in terms of understanding fluctuations in the natural systems than gathering baseline date over a period of perhaps only two years.

MR. PARKER: I think the critical issue, what is the decision that the Environmental Impact Statement is meant to address? And, that decision is that of the Secretary and ultimately the President as to whether to proceed with repository development at the Yucca Mountain site. And, while we fully intend to protect the environment during the site characterization phase, it is still much more appropriate -- and we think within the scope of what an EIS is required to be -- to deal with the site as it will be left after the site characterization phase has been completed. But, the decision is not whether or not to continue through site characterization. The decision that this EIS will deal with is whether we should proceed from that point forward to actually develop the repository.

DR. NORTH: But, how about the subsidiary decisions on which design and which potential mitigating actions might be

taken along with a positive decision to go ahead? Let me give you an example. Let's consider the thermal loading question which the Board has been very interested in. It's my impression that you get significant heating at the level of the surface from the presently contemplated design. Now, what adverse impacts might that have? Is that something that you have under study and what might be learned from it in terms of the decision on what thermal loading would be appropriate in the design? Do we want to back off from the present assumptions and go to lower loading? Now, as I understand the process, it seems to me you should be gathering the data that would allow you to deal not just with the yes/no decisions, but yes under what conditions decisions.

MR. PARKER: Yeah, I think that's correct. That cross fertilization of those dealing on the design aspects of the potential repository, those with the pertinent environmental data, that is something that -- the point of what we're doing. And, I believe -- and this is just not a hedge -- but in the presentation by Ms. Dixon you'll hear more about that.

DR. NORTH: Well, I think it's very important that you consider the contingencies and which way the designs might evolve, what those subsidiary decisions might be, and gather data that might be appropriate to assist on those decisions, not just the big yes/no decision because it may very hard to

perceive where we may be in 1997 with regard to the design and the considerations that might be important. And, the further you case your net in getting information that might be useful, the less likely that we'll come to 1997 and find that we missed something.

DR. CANTLON: The other aspect of that same question, in a desert environment you have high variability in rainfall and rainfall is probably one of the big environmental driving forces. How can you talk about fresh data from a very short time sector and have any understanding of the ecosystem functions and what their response will be? What about wet years, dry years? In other words, the longer baseline, the more realistic your assessment is going to be.

MR. PARKER: Yeah, I should mention at this point that -- and, we talked about this because it was one of the issues raised by the panel in their reports -- we indeed do have an extensive amount of current ongoing environmental data gathering in this area, in the meteorological area, which you will hear about this afternoon and, indeed, in most environmental media, we will have that kind of activity ongoing. Those that must interact with the design folks are already embarked in that kind of effort. The distinction I was drawing was the kind of comprehensive requirement that an EIS environmental review requires. For instance, we know when we get to that stage of repository development that even

noise and aesthetics -- and this is NEPA precedent -- are going to be critical components to the Environmental Impact Statement. At this point, we are not doing anything in those particular environmental disciplines or media. And, so it is only, again, dealing from the structural standpoint in dealing with the need to stop everything and do two years or a year worth of data in all of these disciplines.

DR. CANTLON: But, to gather meteorological data independent of what's going on in the ecosystem is kind of useless. Because you have very site specific climatic conditions affected by the elevations in this kind of an environment. And, if you're going to understand the behavior of that mountain as you put together an EIS, you should have coupled meteorological data with the biological processes that are going on there.

MR. PARKER: I think that's where we're going, Dr. Cantlon.

DR. CANTLON: Okay.

MR. PARKER: And, perhaps so that I can sit down, we'll again defer to Grover Powell in the afternoon presentation.

DR. CANTLON: Very good.

DR. CARTER: Okay. Thank you, sir.

MR. PARKER: Thank you.

DR. CARTER: Our next speaker is Wendy Dixon and she will talk about environmental program implementation.

MS. WENDY DIXON: As you know, my name is Wendy Dixon and I'll be hopefully answering some of your questions this morning. I don't guarantee to answer all of them. I'm going to leave a number of the details to the technical presentations that will be discussed in the course of the day. But, I firmly believe that during the course of the day why our program has been developed, why it's been developed the way it has, how the pieces fit together, what we're doing right now, and where we're heading in the future, those questions are going to be lined out for you all and I think you'll have a much better picture of it by the time we're finished today.

DR. CARTER: We won't be bashful at re-asking the questions, if need be.

MS. DIXON: Good.

The main elements that I'm going to be focusing on in this morning's presentation is a little bit about the historical framework of our program, the organization, and how it works together, how it was developed, and how we interact and integrate our program between ourselves and the outside entities.

Again back to a little bit of historical framework, now there's been comments on the EA and it used existing data and it sort of sounds like there wasn't much out there. And, contrary to that, there was quite a bit of existing data out

there. There's been pre-activity surveys in the Yucca Mountain area since 1978 for the biological, archaeological area disciplines and those surveys were done prior to road construction, prior to drill pad construction. I can't say that they were all for the Yucca Mountain Project. We can't take credit for all of them because some of them were done for other activities that the test site performed, but they were done in that area. The data is available.

We've also been conducting far field radiological monitoring and that again is something that wasn't initiated for this particular program. It was initiated for the weapons testing program, but there's a lot of valuable data out there that has been collected since the mid-50's. We're piggy-backing on that far field data right now for our program. There is no use to duplicate what's already in existence out there as far as stations is concerned. And, the data that has been generated historically is something that we're pulling in for this program.

DR. CARTER: Now, when you talk about far field rad monitoring data, I believe you're going out to 50 miles or 80 kilometers?

MS. DIXON: Yes, sir.

On the biotic field surveys, those have been generated for input into this program between 1980 and 1986 and those studies dealt with small mammals, reptiles, birds,

vegetation. We also conducted desert tortoise surveys between the years 1981 and 1984 and this is an example of our pro-activity and our concern and our being on top of things. We were concerned at that point in time that the desert tortoise might at some point in time in the future be listed as an endangered species. We figured that the time frame might be in the next 10 to 20 years. We didn't anticipate it being quite as soon as it was, but irrespective of that fact, we took some measures and some steps to be prepared, to find out what was out there, you know, what the ranges were, and start doing studies so we would be prepared should the time ever come when they were being an endangered species.

We started our met monitoring program in 1985. So, we are collecting met data at this particular point in time and have been for the last several years.

Our near field rad monitoring program was started in 1987 and all these programs will be continuing on through the course of site characterization. Some of them will be amplified as we move on through time.

Terrestrial ecosystem studies, archaeological resource studies, Native American studies, all for this program have been initiated under formal planning documents which have been alluded to and I'll refer to again in a moment.

We have air quality monitoring stations up there

now for particulate monitoring. We started our soils analyses in 1989 and we have our water resources program that's been developed specifically for this project that's about to take place or get underway in 1990. But, I'd also like to say that, irrespective of the fact that our field plan for water resources be that new, there's a lot of data that has been collected out there over the past that we will utilize for this program and are utilizing, some of which will be discussed in presentations later on this afternoon.

I'm going to move through these very quickly because you've heard them already before, but we're also not sitting here without any environmental documentation. We have a fairly mature environmental document hierarchy that exists right now that lays out plans for this program. And, that does not mean that this environmental document hierarchy is static, it doesn't mean that it's not going to change, it doesn't mean that it's not going to respond to additional regulations or things we might find in the field, but it is a basis for our planning.

Again, as was stated, we had a final Environmental Assessment. We also have a program overview document which lays out the elements of this program and how it was put together. Our environmental monitoring and mitigation plan is something that is extremely important to us. In 1987, it had four key components. In 1988, we added water resources

to that. We have an environmental regulatory compliance plan that deals with our regulatory requirements and how to obtain -- you know, our methodology for obtaining permits. Again, that was revised in 1988. And, as Gerry mentioned, we have some site specific environmental field plans on how we're conducting our activities in the areas of air quality, terrestrial, cultural resources, both the archaeological and Native American components, radiological studies. Soils and the water resources EFAP will hopefully be out some time in the very near future.

Reclamation is something that we don't take lightly. We're moving toward a pretty extensive reclamation program. Headquarters has a reclamation program plan which is basically a policy document. We have an implementation plan that will hopefully be out some time in the very near term which is in response to their policy document. And, we also have issued a reclamation feasibility plan which basically says that we recognize there's things out there that we don't know and we're going to have to do some reclamation feasibility studies to really understand the best ways to reclaim the site. And, eventually, as we stated, in the mid-1990's there will be a scoping study and an Environmental Impact Statement.

DR. CARTER: Why do you use the word "reclamation" rather than "remediation", in particular? Any reason for it?

MS. DIXON: I don't know the answer to that question. Monica, can you help out?

MS. MONICA DUSSMAN: As a result of our land access --

DR. CARTER: Go to the microphone, please, ma'am?

MS. DUSSMAN: As a result of our land access agreements with the BLM, we have been asked to reclaim the land and the word "reclamation" to us implies returning the land to as reasonable a condition as we found it, as close to the original use as possible, as practicable.

DR. CARTER: Okay. I was just curious. Reclamation, of course, is a term that's been used for many, many years and I guess remediation is a somewhat newer term in general usage and obviously widely used by DOE in other activities, not necessarily connected with Yucca Mountain.

Okay.

MS. DIXON: During the course of the day, you're going to be hearing discussions on what our environmental program mission is and on this viewgraph, I've basically broken it down into four major areas; one being environmental compliance requirements, two being monitoring the effect of site characterization activities, three being collecting environmental data required for environmental compliance, and four being developing and implementing mitigation measures to minimize adverse impacts of site characterization activities. Again, these will be discussed in depth as we go through

this day.

Also, looking at the program mission, we needed to design an environmental program and certain considerations needed to be taken into consideration in putting together this program design. Considerations that we utilized in developing our environmental program included the act that what we're dealing with right now is site characterization activities. And, when you look at the type of disturbances that are tied to site characterization activities, you're looking at construction activities. You're looking at for the most part isolated locations that have less than two acres of land that's disturbed for something like a drill pad; the exception being exploratory shaft area which is approximately 45 acres. You're looking at all these isolated areas up to a total area of about 465 acres. You're looking at a type of disturbance which is, in addition to construction oriented, is operational. We'll have people going up and down the roads in cars. You'll have people at the drill rigs and at the various sites. But, those various types of disturbances were things we considered.

We also looked at the length of disturbance. We're talking about, you know, a relatively short period of time for site characterization, approximately a seven year time frame.

We looked at the findings in the Environmental

Impact Statement which indicated that there was no significant adverse impacts expected. And, yet we wanted to build a program that was pro-active. We didn't want to sit there and wait for something to change. We wanted to be on top of things to know when regulations might change or situations might change. So, we wanted to build a program that was pro-active in compliance and in protection.

In summary, we basically designed the program that we felt was comprehensive and took into consideration the areal extent of expected effects.

DR. CARTER: Let me ask you a question on the -- you said you anticipate changes in the environmental rules and regulations. Do you happen to have any astrologers on your staff?

MS. DIXON: Close to it. People that stay pretty much attune to what's going on with, you know, various elements of the ecosystem.

Okay. A little bit about our project organization. Gerry Parker who you met this morning is from headquarters. They establish the policy. But, we don't just work with Gerry Parker's folks in OCRWM. We also tie very closely into the office of Environment, Safety, and Health and to the Office of General Counsel. Those two other organizations within DOE also review our documents and our plans. They're a part of the comment resolution process. So, we're tied

very close to them. Carl Gertz who you all know is our Yucca Mountain Project Manager. My division is the Operations Control Division and the branch that environment has added is the Operations Control Branch. But, it's not just a line on down. There's also horizontal communication that goes on all the time between these groups. The site group, Max Blanchard's people who you've met, they have to talk to us and we have to talk to them. The input goes back and forth and we'll talk about that a little bit more in the future. For them to get on the site and do a site investigation, the request ends up going through my division and that request ends up getting reviewed to make sure that the pre-activity surveys are done, the appropriate regulatory compliance issues are taken care of, and so forth. So, there's constant communication back and forth this way and also on the design side of the house with party to design review meetings and so forth. So, input is going and requirements are going back and forth and again we'll talk about those in a few minutes.

DR. CARTER: Excuse me, before you move that, what's the Matrix Support Staff exactly?

MS. DIXON: Right now and we'll probably continue to use that operations office which is part of the -- you know, their primary mission is the nuclear weapons testing program. They have support functions over there like legal counsel, finance, personnel, things that we're not big enough on our

own yet to warrant having on our side of the house. So, we use them from a matrix point of view. We pay for those pieces of those FTE's that we need.

DR. CARTER: It's primarily management/administrative support?

MS. DIXON: Yes, it is. Yes.

We also, supporting my organization, have a group of contractors that we're real proud of. Science Applications International Corporation is a key integrator of our contracting team. In addition to integration for some of the primary data gathering activity, such as the met program, the near field rad program, Native American studies, the rad studies, and compliance issues, SCIC is an organization that has dealt with environmental studies across this country for some years now. They have collected data. They've analyzed data. They've performed and developed mitigation strategies. They've put together a number of Environmental Impact Statements.

EG&G Measurements performs our terrestrial ecosystem and reclamation studies for us. This is not a new group to the Nevada Test Site. They've supported the Nevada Test Site now for about 20 years. They have considerable dealing with the endangered species. They've been working down at Elk Hills at the Naval Petroleum Preserve, the same group that we have here today, and they're one of, I believe,

a half a dozen organizations that actually have a permit to deal with endangered species. We're real happy to have them as part of our team.

Desert Research Institute has performed our archaeological support work for the test site for some period of time. They're also supporting our archaeological support work. They're part of the university system and have a good basis of the basin and range area for archaeological studies.

I don't have to say a whole lot about the U.S. Geological Survey. I think most of you are aware of their credentials, as well as that of the Environmental Protection Agency who again has been helping support the Department of Energy on the radiological program since probably the mid-50's.

We're in the process right now of negotiating or getting ready to enter into an agreement with the Soils Conservation Service who is a part of the Department of Agriculture. And, really, the Soils Conservation Service has the repository of soils data for the region in question. They'll be doing our regional soils studies for us.

So, that is our team and we feel like we have a good team.

I'm going to talk a little bit about the interaction between this team and outside organizations and I thought for just a moment I might break up the differences

between the two because sometimes it gets confused. There's internal interactions that are incredibly important between the people that I've discussed and the disciplines that they're responsible for. There's also external interactions which is interactions with the rest of the project and other agencies.

With respect to internal communications, there's close communications between these team members. There's regular technical exchanges, there's regular meetings that go on, and these team members are not strangers, one to another. We have been a team right now, the folks that we've just presented to you in the last viewgraph, for the last seven years. So, we've worked out our differences. We all know who does what to who and this is a real team. EG&G, DRI, and EPA have been working together as a team on test site activities for the last 20 years. Again, this is not something new that just, you know, is in the process of being formulated. This is a group of folks that have a working relationship. And, in addition to the length of time that we've worked together and how we coordinate amongst ourselves, we also, as I mentioned earlier, have a complete set of documents that define really what the plans are that we're doing. So, we're fairly mature.

There's also external interactions which include regulatory consultations with the Advisory Council, for

example, of Historic Preservation, with the Fish & Wildlife Service for the desert tortoise, with the NDEP as it relates to permits in Nevada. There's written guidance that goes out to project participants that tell them what the requirements are. There's regular meetings that take place. There's field activity approvals and interface control working group actions which I'll discuss a little bit more in the next two viewgraphs. We're a party to design reviews. You mentioned what is our input into that. We're a part of the working group for the exploratory shaft facility, alternative design activities that are ongoing right now, and we're involved in long range planning activities which is really a responsibility of all the people on the Yucca Mountain Project and that is laying out the work plan, the schedule, the scope of this program down into license application. And, we're a party to the review of other project guidance documents.

So, as a little bit of an emphasis, I mentioned the field activity approvals who have a field activity approval process wherein the principal investigator, be that the principal investigator be from the USGS or Los Alamos or whoever that principal investigator is, comes into our organization and makes a request for approval to conduct a site activity where he has to define that site activity, the exact location of that site activity, and that site activity

location is in state and our organization performs the following review. We look at whether or not a pre-activity survey has been done for archaeological, biological, or soils resources. If it hasn't, we make sure that it is done. The reclamation requirements are passed on to the user. There's a review for conflicts with the environmental monitoring and mitigation plan. We look at land access conflicts and also regulatory compliance, do we have the appropriate permits in place to allow that activity to proceed? Based on the analysis that goes on in our organization, there's a response back to the principal investigator. It may say yes, it may say no, it may say yes, but here are the requirements, stipulations, and conditions that you can conduct your activity with. So, this is a part of our formal process for approving field work.

I also mentioned -- and I thought this needed a bit of additional explanation -- that there was an interface control working group. This is something that's just in the process of being started. But, what it really is is a clearing house of agreements or exchange of data between participants and/or participant data needs. Maybe somebody working on the design of one of the elements that you were talking to, Dr. North, might say, "I need data needs in the following areas", and we work out an agreement for, you know, we know your data needs. We'll provide those data needs. We

have data needs. And, we exchange those data needs and there is a negotiation on type and date required for those data needs.

I mentioned other project guidance documents. Most certainly, those include the project management plan, the systems engineering management plan, configuration management plan, technical data management plan, and obviously the quality assurance program description.

This program is a party to and falls underneath the QA umbrella just like other parts of this program. Applicable criteria of the OCWRM quality assurance program apply to the environmental disciplines and the environmental program continues to be updated and modified in accordance with QA requirements as applicable.

DR. CARTER: How much resources go into quality assurance and the environmental plan now or the implementation of the environmental plan in the several areas or in the total program at the working level?

MS. DIXON: Everyone is responsible for quality assurance in this program. It's hard to say what percentage of somebody's time applies to that particular area, but our whole program, you know, is covered by the QA program and no one, no participant, is removed from that process; i.e. you know, the plans have to be done in accordance with quality assurance criteria. The procedures that the participants

might write to implement those plans have to be developed in accordance with that QA criteria. For that participant to write those procedures according to that plan, that participant, this technical person, needs to have training so he knows how to do it. When he conducts that activity in the field, he is to conduct it to that procedure and he's reviewed by QA. So, the whole thing is so much of an integrated process, I'm not sure how to say, you know, 25% of each person's time or, you know -- but, a lot.

DR. CARTER: Well, I think somebody is going to have to eventually unfold that, you know, one way or the other.

MS. DIXON: Right now, a considerable amount of our time is being spent --

DR. CARTER: I understand that, you know, and you've answered sort of general and I have no problem with that. But, the Board is quite interested in the amount of resources that are going into quality assurance. There's some mandated requirements in the area, obviously, but the real question is, you know, you develop a budget and double it to cover QA or triple it or whatever it might be. And, we recently within the last several months established a panel that will deal exclusively with quality assurance and its chairman is sitting to my immediate right. So, we're very much interested in this and I guess we'd like to ask that question of you and the environmental program area now. And, I

realize it might take some time, but I think eventually we're going to have to unravel, if you will, the resources that go into quality assurance in all their minute detail versus just some generalized part of the budget.

MS. DIXON: I think that's a good point. I'm hoping that after, you know, a period of time that might go down in size to where it will always be an important part of everybody's program, but once the systems are established and the -- are all approved and the plans stay a little static, you know, that that percentage will hopefully decrease. Right now, it's very high.

DR. CARTER: Yeah, and it's going to have to be a differentiation made obviously between the sort of startup QA, the training and all these sorts of things, and some steady state when the program becomes more mature in that sense.

MS. DIXON: Um-hum.

DR. JACK PARRY: Mel, perhaps we might have an opportunity to talk with Carl. Maybe we can work out some provision by the project office of general QA commitments at some other time, not today.

MR. GERTZ: I need to respond just a touch. I'm Carl Gertz, DOE's Yucca Mountain project manager. And, Jack, yeah, we have all kinds of cost breakdowns. What we need is definitions like plans that Tom O'Farrell prepares, is that a

QA requirement or is that a technical requirement? He has to prepare the plan, but then he has to do it in accordance with procedures. Which makes it take a little bit longer than maybe he might do some other ways. And, so those distinguishing add-ons have to be defined, but we'll be glad to work with you on any basis, at all, because right now there's no doubt implementing a quality assurance program across the project is a high priority and it's taking a lot of resources. Once we get it in place, we think we can then roll in a steady state. We believe it's mandatory to have that in place. It is consuming resources, no doubt about it. So, we'll be glad to work with you and I look forward to that.

DR. PARRY: Perhaps, Dr. Cantlon for his first panel meeting will want to make that the general question to be addressed, but that will be addressed to you privately later.

MR. GERTZ: Great, thank you.

DR. CARTER: You know, a lot of this, as you say, Carl, is going to be a matter of definition and I think that's part of the process obviously, using judgment to make those definitions.

MR. GERTZ: Sure, like on the science side, our principal investigator is preparing study plans. Well, is that a quality assurance activity or is that a technical activity? A little of each, obviously.

DR. CARTER: Okay. Thank you, sir.

MS. DIXON: I have a summary viewgraph which is a flow chart I'd like to go through if you wouldn't mind and I think this viewgraph sort of ties together the rest of the presentation that I just gave.

Starting at the top, it says reviews laws, regulations, and orders and this isn't something that we did and we're finished with, this is something that goes on on a daily basis. We review the Federal Register notices. We review what's going on with DOE orders and executive orders. We review programmatic documents. Those include things like the site characterization plan, updates to the mission plan, and we have agency consultations for things such as permit requirements with the Nevada Department of Environmental Protection, with the Fish & Wildlife Service. Those requirements are all identified and then they're distributed to the appropriate parties. Some of those parties are external. On this other side of the line, the design people, the site characterization people, and some of the parties are most certainly are our folk that need to understand what the changes of requirements are and what the requirements need to be -- how the requirements need to be tied into their planning activities.

We have subdivided our environmental program into workable subparts and the pieces that we can get our hands

around and deal with. The subdivisions include monitoring and mitigation, reclamation, regulatory requirements, NEIS requirements, but each of these subparts have data names and you don't need to have a sub-tier plan for each data need for each subpart. So, we've basically looked at all the data needs of these groups and we've compiled the data needs. If each of these areas need to have, for example, air quality data, we put together one air quality environmental field activity plan that describes what kind of data is necessary in that particular discipline. The data is collected and synthesized and reported. Some of the reports of this data comes out on a yearly basis, some a quarterly basis. The data reports feed into a reference -- or basically a data base, the appropriate type of data base. There's procedures for doing so, as well as procedures for accessing that data. But, that data is there and is accessible to all the people that need to use it; to the designers, to the constructors, to the site investigators. So, they use that data base, we use that data base because they put their information in there, as well.

So, there is a lot of integration, coordination, external power organization with other people within the program and internal within the disciplines that we have.

DR. CARTER: Is this your responsibility for Yucca Mountain Project Office?

MS. DIXON: The environmental program is, yes, sir.

DR. CARTER: Okay. How much of your time is spent on the coordination or the integration process? Do you have any idea?

MS. DIXON: It's one of my main functions.

DR. CARTER: Just don't tell me 120%. I wouldn't believe that.

MS. DIXON: Half, 50%.

DR. CARTER: Okay. A fair amount, substantial amount.

MS. DIXON: Fair amount.

DR. CARTER: Jack, do you have something?

DR. PARRY: Wendy, when you talk about internal versus external, that means within your organization, they're always within YMPO?

MS. DIXON: Oh, no, when I'm talking about on this side of the house internal, that would include the EG&G folk and the SCIC people, and all the people that are a part of, you know, the environmental teams on this side. And, on this side of the house, we're talking about all the people that are not just DOE, such as Max Blanchard's division, per se, or Leo Little's division, division for design, but most certainly their participants that support them, as well. And, external also includes the regulatory agencies that we deal with and interface with and get input from.

DR. PARRY: How about the State of Nevada or the

concerned Indian Tribes?

MS. DIXON: The State of Nevada -- the NDEP is the Nevada Department of Environmental Protection and we've had quite a bit of discussion with them with respect to permit requirements. So, that falls into, you know, the agency consultation.

DR. PARRY: How about technical inputs?

MS. DIXON: Well, our documents -- the environmental documents that you have seen that were on the formal viewgraphs, those documents have gone to the State of Nevada. We have received comments on those documents from the State of Nevada. And, in some cases, comments have been -- you know, we've responded back and forth to those comments. We also, as was mentioned by the folk from the state, we view their requests with respect to their grant monies. That comes into my organization, too. I guess I would like to say that on that side of the house, I think a lot more coordination is necessary. We have been concerned that the activities of the state to conduct an environmental area could impact our environmental program because some of the species populations out there are not very abundant and we want to make sure that they don't go out there and do something that in the end, when we come to our data gathering or collection and we have study plots out there that may be interfered with, that there's no impact. So, we have

requested that there be more communication between our two parties to make sure we understand what they're doing and again that it will not impact our program.

DR. CARTER: Dr. North?

DR. NORTH: I'd like to note that there's perhaps more complexity you can add to this diagram.

MS. DIXON: There most certainly is.

DR. NORTH: You've got down in the lower right access data for, among other things, performance assessment. And then, you've got up at the top the identification requirements. It seems to me it's going to be common that as the people doing the performance assessment get on with their job they will think of more data that they would like to have. Mr. Frishman in his presentation on the fourth slide used repeatedly the phrase "sufficient information and analysis". And, you have used repeatedly here the words "requirements and data needs". Now, what is sufficient information and analysis and what really are the requirements and the needs? It seems to me this is going to be an ongoing process and you need to consider the flexibility and how you adapt to new information and new issues, not just a list as set forth in 1989 or early 1990.

MS. DIXON: We agree, um-hum.

DR. NORTH: It's got to be an ongoing evolving process. I wonder maybe if you could give us a brief summary of what

has happened on one issue of interest to the Board, namely the Exploratory Shaft Facility, as that has become a focus of attention and various alternatives are being considered. What additional requirements in data needs have come into your program? How does that process work and what kind of specific information requirements have been generated?

MS. DIXON: Why don't I just give some examples? With respect to the Exploratory Shaft Facility, when we went to locate our met program stations and our air quality stations, one of the considerations that we took into effect wasn't just topography. It also was where would be the location -- where was the plan location at that time of the Exploratory Shaft Facility? So, as an example, we would sit down and talk to the people that were involved with the Exploratory Shaft, understand their plans, and use their data, as they did our data, in some kind of a discussion to make determinations as to where appropriate locations are for our monitoring equipment. We also tie in with them for design purposes on soil reclamation; how to stockpile soil, what kind of slopes are appropriate for their design activities, what kind of curbing is necessary, reasonable, or appropriate? So, we're part of, as I mentioned earlier, design reviews and Exploratory Shaft alternative design studies because now if they're looking at other alternatives for changes from what they've done before, you know, they

need to know from us, as an example, what kind of impact might occur with the data that we've been gathering in certain locations, with the conversations that we've already had with potential impacts if they change things. So, as part of the process, you know, this is, as you're saying and reasonably so, something that's ongoing and iterative. We don't have a static program. Our documents and plans are going to change over time because of input back and forth between, you know, the site and the design people at the site and also from whatever it is we might find and also from any changes in laws and regulations or requirements that are placed on us. So, this is an evolving program. It's not a static program.

DR. NORTH: Can you summarize any major changes that have occurred as the ESF group has started to consider, for example, going out on the ramps as opposed to a shaft?

MS. DIXON: We've been a party to input on that particular area. There's been no decisions made. So, I think, you know, until --

DR. NORTH: No decisions made, but alternatives being considered?

MS. DIXON: Um-hum.

DR. NORTH: I wondered if there were any impacts of some of those alternatives that really present significant changes in terms of the requirements and data needs as seen by your

program?

MS. DIXON: We've provided input on what kind of impacts could be expected depending upon the significance of changes made.

DR. CANTLON: What are those impacts?

MS. DIXON: Well, I think I mentioned a couple of them earlier. As an example, if there was a major change in the location of Exploratory Shaft, the data that we've been gathering for the met and air quality program in that area, you know, it might not be the right area. So, we've been out there for met data since 1985, you know. There could be significant impacts if major changes in locations were made, as an example.

Monica, do you have something you want to add this?

MS. DUSSMAN: I think there a couple of us that would like to add some impacts. In the case of the met program, if the location is dramatically changed, yes, we might have to consider either relocating our monitoring stations or adding additional monitoring stations. We've also been asked to provide input in the area of location of archaeological resources. For example, if the ramp is located in a particular area rich in cultural resources, that would affect our data recovery programs for those areas. We've also been asked to review the significance to biological impact for various locations. So, the design is not that far along.

Some of the alternatives that have been proposed are not as mature in terms of descriptions for us to make definitive, to provide definitive numbers, to provide definitive impacts.

DR. CARTER: Let me make one comment. I'm not a meteorologist. Maybe we should reserve some of this discussion for that, but I don't think that I would agree if the implication of what you folks are saying is that we know major differences in the meteorology out there are sort of from one mile to the other. I think that's extremely micro-meteorology and I don't think those folks can come up with this kind of information. There may be some exceptions to that, but I don't think we're going to do that well in meteorological data.

MS. DIXON: That program will be discussed more later on during the course of the day.

DR. CARTER: Yeah, I understand.

MS. DIXON: So, I'll leave comments on that for them if that's all right.

DR. CARTER: Sure.

MS. DIXON: That concludes my presentation for this morning if you all don't have any more questions. If you would like me to -- I know the agenda has changed lately -- I can give you a run down of the presenters to follow.

DR. CARTER: Sure, that will be all right. I wanted to ask Gerry though if you answered all the questions he didn't

answer earlier. I'm being facetious.

MR. PARKER: For the record, I'll go with yes.

DR. CARTER: Okay.

Yes, Carl?

MR. JOHNSON: Carl Johnson, State of Nevada. I want to bring up a couple of -- well, one point and then ask a specific question. One is Wendy mentioned something about the need for coordination of environmental surveys between the State of Nevada and DOE. We agree with that. We have been, I think, very responsive in providing detailed plans of our survey locations and all that sort of thing. We would like to see the Department follow that same procedure and provide us with details of their surveys, so that we can then have a basis by which we can discuss the coordination of field surveys and whatever in the future.

And, secondly, and you've nicely put it up on the board is you mentioned about water resources. We do know that the EPA and the NRC in their regulations deal with human intrusion due to natural resources. Water resources is considered part of that. Wendy, I'd like to have you describe what was the decision process that the Department went through in order to put water resources into the environmental program as opposed to considering it part of the site characterization program?

MS. DIXON: USGS is doing both parts of that effort for

us. They are the folk responsible for geology and hydrology of this program. But, on the water resources side for the environmental program, we have a slightly different emphasis than what the emphasis is for the site characterization program. And, we wanted to make sure that concerns with respect to water quantity and water quality were also addressed. So, we thought that it would be reasonable and appropriate to specify that out as something specific, a specific need that we would address with the environmental program. So, I don't know if that answers your question or not.

DR. CARTER: Let me ask you a little bit more specifically, for example -- I think Carl has got an interesting question. Where, for example, will travel times for water as measured by the Chlorine36 technique -- where do those fit into the program? They're obviously part of site characterization and I think more so than water resources. Now, would they be included in this program, as well?

MS. DIXON: Site characterization program.

DR. CARTER: Okay. So, there's pieces of the water program in both of those major activities?

MS. DIXON: Yes, sir.

DR. CARTER: Okay.

MS. DIXON: Just a different focus.

DR. CARTER: Okay. Thank you. Why don't you go ahead

and set the plate for the --

MS. DIXON: Okay. The plate for the rest of the day includes the presentations in the following orders: Terrestrial Ecosystems will be conducted by Tom O'Farrell, Kent Ostler, and Ted Doerr; Water Resources will be conducted by Otto Moosburner; the Radiological Studies by Steve Woolfolk; Monica Dussman will give your presentation on Soils; Air Quality will be presented by Grover Powell; Native American Studies by Tom Greider; and Archaeological Resources by Lonnie Pippin. At the end of the day, if it's all right with you all, I'd like to have Monica come up here and give you the logistics for the field trips for the next couple of days, as well.

DR. CARTER: We will insist on that. The plant just went down behind Carl Gertz. I don't know what he's doing. Carl is killing trees again.

MS. DIXON: Either that or he wants me to sit down.

DR. CARTER: By the way, before we scare everybody in the audience, there's only part of this program that will take place before lunch.

MS. DIXON: Thank you, Mel.

DR. CARTER: Sure, thank you, Wendy.

Tom, how are you going to run the program with three speakers?

MR. TOM O'FARRELL: We're going to handle it very

expeditiously by my telling you that our purpose this morning is to provide the Board with the description of the objectives of the terrestrial ecosystems program within the context of the goals as they've been established by the Yucca Mountain Project Office and also to provide you with some idea of the design coordinates that we've used in the last couple of years and also show you how the study integration within the terrestrial ecosystems program is, in fact, integrated both within our program and also between our program and other portions of the Yucca Mountain Project, in general, and then finally to highlight for you the progress that we've made in the last seven months since our September meeting. And, the first speaker then will be Dr. Ted Doerr and he will present the first part of our program.

DR. TED DOERR: As Tom indicated, today what I'd like to do is I'll be discussing our biological resource program which Dr. Ostler will follow with discussion of the reclamation program.

Five key objectives were identified related to biological resource issues. They included monitoring the effects of site characterization activities on biological resources, to protect threatened and endangered species, to support the radiological monitoring program, to develop mitigation and reclamation strategies, and finally to provide biological expertise for special issues. One issue currently

on the plate is Ash Meadows.

To design a comprehensive biological program, it addressed all these issues and objectives. A number of design criteria were identified and evaluated. First, the objectives as identified in the previous viewgraph, we focused on four. Those are determine the effects of site characterization activities, to support the radiological monitoring program, to protect threatened and endangered species, and to mitigate and reclaim areas disturbed by site characterization activities.

The second consideration that we evaluated were what are some of the possible sources or causes of disturbance within biological resource area? Two generic causes were identified. They were radionuclides and site characterization construction activities.

To be a bit more specific, related to site characterization construction activities what we identified as primary sources effects were related to use and construction of roads, buildings, trenches, power lines, drill pads, and other facilities. Related with radionuclides and I will discuss this briefly and Dr. Woolfolk will be discussing it much more completely, I believe, in his presentation. There are three types of radionuclide sources generically of interest, those related to the Exploratory Shaft Facility and related site characterization construc-

tion, sources related to the Nevada Test Site activities, and then examining existing baseline conditions.

For possible effects based on literature review and discussions with other researchers, for site characterization we felt there were two potential types of impacts, direct impacts and indirect impacts. Direct impacts are related to site characterization activities as direct disturbance of soil or vegetation. Indirect impacts are a bit more subtle. They are related to deposition of fugitive dust, human presence and activities, and vehicular traffic.

Related to other considerations, four items to provide an overview and a context of how our designs were developed. First, the Environmental Assessment reported site characterizations would have no significant affects on biological resources. Therefore, the focus of this program has always been, as directed, to evaluate the effects of site characterization activities only. And, a third consideration related to designing these programs was to insure regulatory compliance. You'll notice this is the third item rather than a primary item. And, related to our efforts, it's primarily related to the Endangered Species Act and to provide support for radiological health and safety issues.

Finally, I'd like to point out the Yucca Mountain Project has taken a pro-active stance by going beyond the minimums on monitoring site characterization effect studies.

Based on the EA and the EEMP, the environmental monitoring and mitigation plan, we are monitoring not only desert tortoises, but a number of other what we consider significant attributes of the biological resource area.

Possible resources affected based on consideration and evaluation of existing data and knowledge included desert tortoises, soil vegetation, and invertebrate and vertebrate animal populations in communities. There's existing data related generically to biological processes and the disturbance of construction and there is data represented by the earlier studies as discussed by Wendy Dixon related specifically to Yucca Mountain and there are also process and ecosystem studies that have been done within desert systems.

DR. CARTER: Ted, are you or is someone going to bring us up to date on the desert tortoise as far as --

DR. DOERR: Yes, sir, later in the program.

DR. CARTER: Okay.

DR. DOERR: If I could have the next slide, please?

Based on those considerations, we felt that four distinct, but overlapping programs were required. These programs include the site characterization effects studies, the desert tortoise study program, the reclamation program, and the radiological monitoring support program. The reclamation program required a distinct and unique design because the primary objective is to mitigate effects of site

characterization activities. In comparison, the other three unique study programs are determining what are the effects of site characterization activities.

The radiological monitoring program was identified as a unique sub-program because of the source of what we felt the disturbances were. In this instance, it's radionuclides. Based on that, there were a number of criteria required for the radiological monitoring support studies that we evaluate. The scale based on design criteria and requirements indicated that the potential scale of study was a large scale, would be over a longer period of time perhaps, and the response on the biological system needed to be looked at and addressed on a larger scale. Finally, the resources selected for that particular program, we wanted to evaluate the biological resources related to and identify the accumulators of radionuclides and the dispersers of radionuclides.

For the desert tortoise study program and the site characterization effects studies, the design for these programs, you will note later, are going to be virtually identical. The reason for separation of the desert tortoise study program as a separate program from the site character-ization effects studies, even though they overlap significantly which will be discussed later, is because we wanted to insure compliance with the Endangered Species Act. This design was developed prior to the listing of the

tortoises threatened, but has been expanded since that time.

DR. CARTER: Ted, let me ask you a question. What's do you mean by dispersers as far as radiological?

DR. DOERR: For example, it has been suggested in some of the pathway analyses preliminarily that radionuclides could be accumulated within the vegetation or within fossorial animal species including small mammals. The dispersal side of it is evaluating carnivore populations that may, in fact, remove or consume a small mammal or herbivores, large herbivores such as mule deer, who would consume vegetation that was contaminated and then subsequently migrate or move to an extremely long distance or a longer distance away from the source of potential contamination.

Finally, in relation to the site characterization effect studies and the desert tortoise studies, we wanted to select resources with limited movements that we felt were important within the system as potential paths of energy or nutrient flow or transport or its active -- or sources downstream and also so that it was more easy to relate what are the effects of site characterization activities on the biological resources.

Again, to somewhat reiterate before I go into the design of each specific program, we wanted to select the characteristics used to select those biological attributes and included that the components were significant to the

system in relation to accumulators or dispersers of radionuclides or are important within the biological resource system, either structurally or functionally perhaps, that are most likely to be impacted by the disturbances related to site characterization activities. They could be easily and rapidly assessed. That the scale of the impact and the biota response scale were similar. Two very specific items related to our program, we identified threatened and endangered species and developed our programs to insure compliance. We also developed our programs to insure compliance and data needs for the radiological monitoring program.

Finally, a few comments related to the questions regarding ecosystem studies and what our focus is. There are two basic approaches to evaluating ecosystems. Those are from looking at it from a biotic or a structural perspective or from a processor functional perspective. Research has demonstrated the limitations of both methods. The recommended approach based on a number of studies that have looked at both sides of the coin have been to characterize and to identify, characterize and describe the structural components and attributes. Identify at that time the possible interactions and processes of interest that may be affected and then finally to describe and evaluate those processes. We are currently evaluating the first two of those and that is to describe and characterize the structural

attributes and we are initiating the identification of possible interactions and processes that may be affected by site characterization activities. If any changes in structural attributes occur that would suggest changes in interactions or processes, at that time we will be in a feedback loop of re-evaluating our program and addressing what we would then consider our important processes to examine more intensely. However, we are looking at some of the processes from a structural perspective including biomass and changes of trophic levels.

Again, I'd like to re-emphasize a few things that Wendy mentioned. That is the site characterization studies to be investigated are relatively small disturbances. They're spatially and temporally limited. The disturbances that our site characterization effect studies will be investigating are the indirect impacts, the direct impacts, the complete removal or the direct disturbance of soil or vegetation. We will be evaluating through control plots and then we will be reclaiming those areas and mitigating those effects, but for the site characterization studies we're primarily interested in what are the effects of fugitive dust deposition, traffic, and human presence, and the related changes in the communities based on that.

To focus and discuss briefly the integration of our four programs to create the biological resource program,

again we have four sub-programs; site characterization effects study, the radiological monitoring study, the desert tortoise studies, and the reclamation studies.

The first thing I'd like to point out is that there are a number of biological attributes that we will be measuring on a similar scale for three programs; the site characterization effects studies, the reclamation studies, and the desert tortoise studies. They include abiotic existing attributes, abiotic attributes that we suspect will be affected by site characterization activities, and biotic attributes that we feel will be interacting with the attributes of interest at different trophic levels. And, those are in the center. Those attributes include again fugitive dust deposition, vehicular traffic effects, weather on a microcyte basis, landscape features including slope, aspect, topography, and elevation, soils characteristic both from a structural, as well as a fertility and biotic perspective, and vegetation. Within the site characterization studies, there are a cadre of studies where we will be investigating a number of biological resources, not only vegetation and soils, but also reptiles, invertebrates, and small mammals, and at this time in non-game birds.

Similarly, with the other studies, as you can read, we have other separate unique studies within -- and as I

describe each one of these studies, I will discuss how they are integrated. Two additional items I'd like to point out is within the radiological monitoring studies and the site characterization studies, there is a number of studies that are currently being used primarily for the radiological monitoring program. They include the carnivore, lagomorph, game bird, and mule deer studies. Currently, based on data, the distribution abundance of these animals is extremely limited. However, if we determine during our sampling program in support of the radiological monitoring program that there are significant changes occurring that may be related to site characterization activities, we will reassess and evaluate those study designs and begin to incorporate them in the site characterization effect studies.

DR. CARTER: Ted, how many ovoviviparous species do you have at Yucca Mountain?

DR. DOERR: I'm unsure about the exact number. Tom?

MR. O'FARRELL: I don't know of any.

DR. CARTER: Okay.

DR. DOERR: Within the reclamation study and the desert tortoise studies, there are two -- both those study programs have two mitigation clauses in them. With the desert tortoise studies, we will be mitigating based on relocation studies, as well as pre-activity surveys. And, for the reclamation study which it's primary objective is mitigation

or reclamation of disturbances, we'll be using both the pre-activity survey process, as well as the entire program itself.

Finally, our entire program, again as Tom indicated and Kent will be discussing at length, has substantial interfaces and interactions with other groups including use and transfer of information with the GIS and we'll also be sharing data and information with the soils, cultural, meteorological, air quality, and water resources groups, and radiological monitoring group.

Finally, we participate in, by our pre-activity surveys and reclamation recommendations and endangered species, protection work. We provide information for both sighting of activities and access and approval for those sightings.

This next page of this discussion, I will be describing more specifically the design of the programs within the biological resource program. For the site characterization effect studies, we're looking at treated and controlled plots. These plots are permanently established plots. The treatment again is our sample locations are immediately adjacent to the disturbances related to site characterization activities and again we'll be evaluating the effects of indirect disturbances. There are paired plots between treated and control areas to reduce variability

within the natural environment. They're blocked by vegetation association, again to reduce variability. We will have both pre-treatment and post-treatment information based on this year's and last year's data collection efforts. And, we'll also be using trend comparisons to evaluate changes related to site characterization over time. The sample locations for all the sub-studies related to unique and specific biological resources will be sampled at the same sample location to assist in them being able to evaluate potential changes and interactions and processes.

Finally, the features that will be monitored include landscape, soils, weather, traffic, dust deposition, and from a biotic perspective, vegetation, small mammals, non-game birds, invertebrates, and reptiles.

There were four basis hypotheses that were developed for this study. The first is that species and community attributes are not different among vegetation associations to determine if, in fact, that is even a variable of interest. Secondly, that biotic community measures on treated sites, i.e. those sites adjacent to site characterization activities, are not different from measures at control sites. Our control sites are located at least 200 meters away from any type of disturbance, whether it's related to Yucca Mountain Project or any other activity related to the Nevada Test Site or public land use. The

third hypothesis is species and biotic community measures at treatment and control sites will respond in equal proportions over time to environmental factors other than site characterization activities. Again, we'll be using trend analysis. And, finally, because we are unsure if there is even effect related to indirect impacts of site characterization activities, and if there is, how far spatially does that affect travel, the fourth hypothesis relates to that and that is biotic measures at treatment sites are not different among distances from site characterization.

Schematically, what we have is we have a general area that has been identified as our control area and we have an area where the preponderance of site characterization activities will exist that has been identified as our treated area. There are four vegetation associations that have been identified within each one of those areas. Within each vegetation association, we have what is known as an ecological study plot, an ESP. On the control sites, the ESP's are at least again 200 meters away from any type of disturbance and our treatment areas are immediately adjacent to some type of disturbance, be it drill pad, road, facility. Within each ESP on the far right hand side, we have areas that we will be measuring within and using data analysis to compare among distances whether the attributes change over time related to site characterization activities.

For our desert tortoise study program, again it is very similar to our site characterization effects study. The hypotheses are very similar. With the difference currently that the third one will be looked -- the third hypothesis which is the functional attributes of tortoises are not different on disturbed versus undisturbed areas and we're approaching that with a modification to the base design just explained to you.

DR. CARTER: Let me ask you a question about the desert tortoise. Does it undergo catabolism, at all?

DR. DOERR: Would you identify catabolism for me?

DR. CARTER: Sure. It's an organism or a mammal or this particular species that might when it's threatened or food resources are very sparse, it may metabolize nutrients, for example, out of its shell for its own internal use.

DR. DOERR: I'm unsure about that as far as the physiology.

MS. DIXON: It may metabolize its urine for water. I don't know if that falls into the category --

MR. DOERR: Yeah, it does that, but as far as using the shell material, I'm unsure. It certainly would catabolize muscle tissue during --

DR. CARTER: Well, you know, shellfish do this, clams and this sort of thing. If they're threatened, they will metabolize nutrients out of their shells for their internal

use.

MR. DOERR: I'm not sure. There's been some physiological work done by Nagy over in California on tortoises.

Again, the design is virtually identical to the site characterization effects studies. We'll have randomly sighted control locations and randomly located treatment sites. However, additionally, we'll have what we're denoting here as systematically located treatment sites and what we're doing there is this is part of the mitigation process that as site characterization activities occur that are disturbing, we'll be going out, conducting the pre-activity survey. As we locate tortoises that are on the site to be directly disturbed, we will be putting radio markers on them and relocating them where necessary and monitoring them through time related to their functional success.

For the experimental design for the radiological monitoring program, again there are three radionuclides generically and sources of interest. Those are the ESF area and its associated activities, NTS activities, and then environmental background. We'll be providing annual samples from permanent sampling locations that radiate from the ESF area. We will also be providing data to determine associated species abundance and distribution to be used for two items, future potential sampling and for use in pathway analysis.

Basic hypotheses that we're interested in include

radionuclide levels will be similar for biological samples collected from all areas. And, radionuclide levels will be similar for biological samples over time.

The basic design, there are a number of biological attributes that we will be measuring. Samples will be taken, biological samples will be provided of small mammals in Deer Forge. There are a number of small mammal collection areas. They're related to specific ESF activities the will represent potential radionuclide sources and changes. There are two control locations that represent background and environmental conditions in Crater Flat and the second control location which will provide an indices of radionuclide levels related to NTS area is down on Fran Ridge. Similarly, we have three locations where we will be monitoring the abundance and distribution of carnivores, lagomorphs, and game birds that represent both the two control locations, as well as ESF activities. Finally, for the Deer Forge sampling, there are 36 sample locations permanently marked that radiate out from the ESF facility at various distances on eight compass points that will be collected once a year and the distance is up to 8 kilometers away.

The basic design for the reclamation studies, which Dr. Ostler will be giving you much more detail about later, is we will be basically using a univariate approach. However, we will be using step-wise integration studies.

We've identified four basic questions which are very typical questions related to any type of reclamation program that will need to be answered. Much of the information, as Dr. Ostler will indicate to you, is established in the literature and used. However, for site specific information, it's a part of the further studies which we are implementing this year that will be conducted.

The four questions include what are the conditions of the area prior to disturbance? We will be conducting soil analyses. We will also be evaluating undisturbed vegetation communities. And, thirdly, we will be conducting successional studies to evaluate what is the response of the community after disturbance.

Secondly, what species are best adapted for reclamation? We will both be using existing literature information. We will be depending on the successional studies to evaluate what species are being found to be located that naturally revegetate disturbed areas. And, we will be developing studies and implementing studies related to germination, survival, growth and vigor of plants used.

Thirdly, what is needed to establish a species? We'll be looking at cultural amendments. We'll be looking at suitability of a variety of plant growth media including possibly the use of mine spoil material in topsoils with and without fertilizer and other types of soil amendments.

And finally, we will be addressing the question of what is needed to ensure continued survival of reclaimed areas and again we'll be monitoring our vegetation successional studies over time.

The hypotheses used for the reclamation studies are, all species tested have similar germination, survival, and growth characteristics. All soil and cultural treatments have similar impacts on species establishment, survival and growth. Thirdly, there is no difference in environmental attributes between disturbed and undisturbed sites. And finally, there is no difference among reclaimed and unreclaimed disturb sites and undisturbed sites to determine, one, if reclamation is even needed, and two, if it is needed, how successful is it?

The final part of the presentation I'll be providing you is, is what is the current status and what have we accomplished over the last seven months and highlight those.

Again, to refresh you from our last meeting in October, the three basic technical questions that we are evaluating are, what are the effects of site characterization activities to the biological resources? What are the potential pathways of radiation to man and the environment? And, thirdly, what are the reclamation techniques needed to reclaim habitats disturbed by site characterization activities?

Related to Question 1: What are the effects of site

characterization activities to biological resources? We are using four technical approaches. They are the preactivity survey process, which we will conduct as required. There are the site characterization effects studies. During the next six months we will be revising the Environmental Field Activity Plan to reflect the current design. We will initiate microsite meteorological and disturbance monitoring. We will expand and continue both the vegetation and the small mammal studies. And we will initiate the invertebrate reptile studies and develop a study related to the spotted bat to determine presences or absences of this federally listed category II species.

Our third technical approach is the Desert Tortoise studies. During the next six months, we will complete the design of the studies, and implement those studies, including the population assessment study, the site characterization effects study, the habitat use and movement, food habit study, a study related to establishing the basin physiology and pathology disease status of the population at Yucca Mountain, and finally to determine what is the efficacy of our relocation efforts.

The fourth technical approach that we are using for Question 1 is, the radiological monitoring support studies, again to detect at a very fine level if there are any changes at all occurring within population abundance or distribution.

We will continue the lagomorph and gamebird abundance studies and initiate the carnivore abundance study.

Our accomplishments related to this Technical Question 1: What are the impacts of site characteristics on biological resources? First, we have conducted 15 preactivity surveys on over 169 separate locations which included the clearance of over 80 miles of road for use. Out of the 15 surveys, only three have been recommended to have modifications to the activity.

Related to the site characterization effects studies, we have completed and have had approved the study integration design document. Part of that approval process is it has been out to review to two separate independent statisticians. The vegetation study was initiated on 33 or 48 ecological study plots. The small mammal study was initiated on 6 or 8 study locations and those 6 study locations have been trapped twice now. The nongame bird/raven study design has been approved. And the reptile and invertebrate study documents have been prepared.

For the Desert Tortoise Program, the biological assessment was submitted in October of 1989. We received a no jeopardy biological opinion in February. Comments were submitted on the opinion by Yucca Mountain to Fish and Wildlife Service in March. An annotated outline for the training of Yucca Mountain Project Employees to ensure

protection of the Desert Tortoise, was submitted in March.

DR. CARTER: This biological opinion, this was rendered on the site characterization program?

DR. DOERR: Correct.

DR. CARTER: Okay.

DR. DOERR: We received a change on our federal handling permit to permit our continuation of studies and expansions of studies on the Desert Tortoise and we initiated or at least began to design the studies related to the Desert Tortoise Program and the expansion of it.

For the radiological monitoring support studies, the first sample period has been completed for both the lagomorph and gamebird studies.

For Technical Question 2: What are the potential pathways of radiation to man and the environment? Two technical approaches again, are being used. Those are to provide samples and then to provide data for the radiological monitoring program. Over the next six months, we will be sampling small mammal locations twice and be completing the deer forage collection which was initiated in March.

For providing data, we will continue to assess lagomorph gamebird and carnivore populations.

DR. PARRY: I'm sorry to interrupt, but I'm somewhat familiar with the study plans that were prepared or are being prepared in support of the site characterization plan. Is

there any relationship between these studies and the study plans and have these studies been perhaps reviewed by the NRC or other agencies?

DR. DOERR: At what--I'm not sure whether I understand that question fully.

DR. PARRY: There are study plans that the department is preparing for implementation of the site characterization plan. Are these studies that you are talking about here, the site characterization effect studies, are they related to those study plans?

DR. DOERR: Yes, what we did when we were evaluating originally what types of effects would occur were, we wanted to determine what were the possible sources. And in that list of sources, the construction and use of roads, drill pads, facilities, power lines, were part of and were gained from that information that you are talking about. And also the sitings of those locations, where are they going to be located down the road was considered at the time when we located our ecological study plots.

MR. GERTZ: Let me expand on that just a second, this is Carl Gertz. The study plans certainly do go to the NRC. These type of plans do not go to the NRC. They are not reviewed by NRC. They are reviewed by the project for compliance with the regulations.

DR. PARRY: Or any other agency, then?

MR. GERTZ: Yes, some do go to other agencies.

MS. DIXON: Back to the point I was making earlier on coordination of these documents, a lot of internal coordination knows what we are talking about in general is the Environmental Field Activity Plans that lay at the planning of the program and then the various participants, there's lower level tiered documents that go with that as well. The official DOE document is Environmental Field Activity Plan, which is coordinated with the EHGC within the Department of Energy. Some of the documents would go to, as appropriate for example, Environmental Protection Agency, if we are talking about the rad monitoring plan. So it depends upon the document that we are talking about, in answer to your question.

MR. GERTZ: So the National Park Service will look at some of them and Fish and Wildlife will look at some of them.

DR. PARRY: Thank you.

DR. DOERR: Our accomplishments over the past six months have been that we have trapped the small mammal locations twice. We have initiated the deer forage sampling on our 36 locations, and we have provided comments on the radiological monitoring plan. And we've provided the first sample period was completed for both the gamebird and lagomorph studies and the carnivore sample locations had been approved and marked.

With that, I'll turn it over to Dr. Ostler who will

discuss the reclamation portion of our program.

MR. OSTLER: Thanks, Ted.

What I'm going to talk about today, I'm going to address the third question that Ted showed and that question is: What reclamation techniques are needed to reclaim habitats disturbed by site characterization.

The following view graph identifies the three approaches that we are using. It shows how they integrate to provide an effective reclamation program. The first technical approach is that of conducting preactivity surveys. Now, these have been described by Ted previously, but I'd like to point out that during these initial site visits, those characteristics that may seriously impact the potential of a site to be reclaimed or evaluated, information gathered during these studies can flow in either of three directions.

First, information can flow directly into the reclamation implementation program. An example of that type of information would be vegetation baseline data that could be used as a goal for establishing your reclamation success.

Another example could be in determining whether a site was suitable, or could be reclaimed at all, in which case the site may be rejected from placement there and an alternative site proposed.

Secondly, the preactivity survey can feed into the site preparation reclamation guidelines for large surface

disturbing activities. Valuable soils and landscape information are fed into developing those site preparation reclamation guidelines.

And, finally, preactivity surveys provide valuable baseline information on species and soils that can be used in the reclamation feasibility studies, particularly the revegetation studies and the topsoil studies.

The second technical approach is the site preparation reclamation guidelines. These guidelines are site specific recommendations that can be used during initial construction activities. Again, this is kind of a proactive stance. We are looking at gathering this information prior to any disturbance occurring, instead of only considering reclamation at the time when a site is going to be decommissioned.

The objectives of this site preparation reclamation guidelines are two-fold. The first two preserve and protect the biological and soil resources. And two, to ensure that it is available at the time of final reclamation. Within the guidelines there are two important areas that are addressed. The first is the topsoil stockpile and reuse recommendations. These recommendations would cover such thing as a topsoil stripping plan for the site; topsoil storage, where that top soil would be placed, what depth that topsoil would be placed at. And to ensure that that topsoil is viable when it's going

to be reused, finally. And finally, soil reuse, whether the topsoil is best stockpiled or can be used either on that site or an adjacent site.

The second important area is that of erosion control guidelines. These guidelines are designed to protect the topsoil storage piles and also to protect those other disturbances, bare slopes that are associated with construction activities.

The site preparation guidelines are really a second phase of the preactivity survey process. Both the preactivity survey and the site preparation guidelines identify resources that are important for enhancing reclamation success. And then they provide valuable information on how to preserve and protect those resources prior to and during site characterization activities.

The third technical approach is that of reclamation feasibility studies. Feasibility studies aren't necessary in this area, because revegetation reclamation in arid environments is a very difficult process as mentioned before. Adequate reclamation can also be a very time consuming process. It may take a number of years before habitats can be successfully established. This is compounded in the Yucca Mountain area where the fact that there have been relatively few studies or projects that have successfully documented reclamation efforts and techniques that are available.

The reclamation feasibility plan or efforts fall within the following four areas: Succession studies, Revegetation studies, Topsoil studies and then Mine Spoils. Briefly, I'd like to discuss the objectives of each one of those areas.

The objectives of the succession studies are to identify the location and types of disturbance that exist at Yucca Mountain currently.

The second objective is to identify what species are successfully invading those areas through natural succession. And third, to identify the landscape and soil characteristics that enhance that succession process.

The Revegetation studies also have three objectives. The first is to determine what species are best adapted for the site. The second is to determine what is needed to establish those species in the revegetation program. And the third is to determine what is needed to ensure continued survival of those species. So, this will involve some long-term monitoring of the revegetation test plots.

The objective of the Topsoil studies, are to determine what is needed to retain the biological viability and the fertility of those topsoils. We will be looking at mycorrhizae. Mycorrhizae, we'll be looking at other soil microbes in the topsoils.

And the second component of that is to identify what

techniques are most effective at protecting and preserving that biological viability and assuring that there is adequate topsoil when the sites are ready to be reclaimed.

And finally, the Mine Spoil studies have two objectives. First, to determine the suitability of the mine spoil material as a plant growth medium. And, if it is not suitable, to identify what treatments could be applied to that either through the use of amendments or identify what topsoil depths may be required in order to adequately establish a viable habitat.

The main emphasis of the reclamation feasibility studies are the revegetation studies. In other words, in getting plants established on those disturbed sites, the topsoil and the mine spoil studies provide valuable information to the revegetation studies on the suitability of the plant growth medium and amendments that could be applied for improving that media.

While the succession studies provide an identified species that can be used in the revegetation trials and also identify landscape and soil parameters that can enhance that natural succession.

DR. CANTLON: How widely distributed will be the research sites where this will go on? Onsite or pretty much throughout the broad region area?

MR. OSTLER: The sites that we will be using for the

revegetation studies will be past disturbances in the Yucca Mountain area.

DR. CARTER: Can I ask you a question about the viability of topsoil. If you remove topsoil in that area, and basically store if for a period of time and with the anticipation of reusing it, what sort of longevity does that have in terms of how long you can go through that process?

MR. OSTLER: There are a lot of factors that enter into that. Depth of that topsoil certainly is the main one. If you store topsoil greater than one meter in depth, you lose viability rapidly. Generally within one season you have a sterile media.

DR. CARTER: I presume out there you have sort a minimum depth of topsoil in general, is that a good assumption or a bad one?

MR. OSTLER: A minimum depth of the general landscape, you mean?

DR. CARTER: The topsoil.

MR. OSTLER: It varies quite a bit. Certainly at the slopes and the top of the mountains, we have a very limited amount of topsoil, whereas the Bajadas and the lower valleys, we have more. That is why we are doing the preactivity surveys is to identify the depth of suitable material that can be stripped and either stockpiled or used elsewhere.

Okay, before I leave this slide, I'd like to point

out that the reclamation feasibility studies can feed directly into the reclamation implementation plan or they can feed into the site preparation reclamation guidelines, obviously.

The information that we gather here will build upon the reclamation experience that exists on the NTS, that exists within EG&G Energy measurements on our work at Elk Hills and throughout the arid western states.

You know, we are not trying to reinvent the wheel with this feasibility program. We are trying to build on the vast information that is out there in a general sense in the reclamation field. We are trying to supply those sites specific techniques that will be suitable for Yucca Mountain.

With that as an introduction then, I would just like to go over the current status of the program, again preactivity surveys and the site preparation reclamation guidelines are both conducted as required by DOE. The reclamation feasibility studies, we are in the process of completing the literature review. That should be done early this summer. However, in some sense, it's never going to be done. You are always going to want to keep on top of the literature and what is occurring.

We will be implementing the natural succession study this summer. We are ready to implement the revegetation study and the topsoil stockpile studies this Fall, or as DOE initiates some of the site disturbing activities.

The accomplishments to date then, the reactivity surveys, Ted discussed those. I want to point out that for three of those preactivity surveys, they involved a significant enough surface disturbance that we did soil sampling and we are in the process of preparing topsoil stockpile recommendations and erosion control guidelines for those three sites. Those are the prototype drill hole, the ESF facility, that portion on the NTS, and Trench E, which is in Midway Valley.

Accomplishments within the reclamation feasibility studies, the reclamation feasibility plan was released in March of this year. The reclamation guidelines were distributed last June. And those guidelines are an interim requirements or guidelines that are in effect until the reclamation implementation plan has been approved.

The reclamation implementation plan then has been resubmitted for concurrence with DOE headquarters and that was done in March of this year. As Ted mentioned the native vegetation characterization study has been initiated. We sampled 33 or the 48 ESP's that we have established on the site. And again the literature review is continuing.

Then as a final component of our presentation, we'd like to show the interactions that the biological resources group has with the other environmental disciplines and what the operational groups within Yucca Mountain project. This

viewgraph shows some of those interactions. Let me just go over those.

First we provide plant and animal samples, and data to the radiological monitoring department. We provide recommendations on Desert Tortoise mitigation, and also reclamation recommendations to the operations group within Yucca Mountain.

We provide baseline vegetation and animal habitat data to the reclamation. The soils information is shared among the participants, our group, SAIC and the soil conservation service, air quality and meteorological data is provided for the various studies. We relied heavily on a continuance monitoring program to supplement our spot data that we have at the ESF, at each one of our ESP's, which are ecological study plots. And finally, we received water quality and quantity information that is provided for our various biological studies.

And, that will conclude our presentation.

DR. PARRY: Wendy, I'd appreciate going back to one of your slides. I'm sorry. It's on external interactions. It has to do with the ICWG.

When I was with Batelle, there were a number of inner project group organizations and we met on a fairly regular basis. I wonder, does your group meet formally, is it just an occasional thing, or what?

MS. DIXON: This isn't just my group. This is a group whose real lead is in the engineering organization for the entity responsible for the systems engineering management plan. It's a flow down from our systems engineering management plan. It applies to all participants of the program, but it's run out of the engineering division. And, it does have, I think fairly regular meetings, but in addition to having meetings as appropriate because the interface control working group, the agreements cover agreements for data needs for all participants and obviously you don't gather 1400 participants together to have a meeting. You know, it depends upon what the type of the conversation is as to how often an individual or a group of individuals might get invited or involved in that particular group.

But outside of the meetings that occur, as necessary, depending upon the discipline, there is also what I was referring to as a management agreement, if I may use the term, that is signed between groups, i.e., between the folk that are working waste package and the folk that are providing environmental data, the folk that are working on site characterization and certain disciplines, and the folk that are providing various types of environmental data. There are agreements that are reached that are in the process of being put together that tie into data needs and time of data requirements.

DR. PARRY: So, this is a project working group as opposed to an environmental working group?

MS. DIXON: To an environmental working group, yes.

DR. PARRY: Do you have a formal mechanism for getting together within your own house, so to speak?

MS. DIXON: This overall group has a charter and there is a procedure involved that everyone follows to fulfill the requirements of that working group. It's fairly formalized.

DR. PARRY: Carl, as you may remember, the board during their first report that they put out, made a considerable point about systems engineering. And I notice this systems engineering management plan, which I don't believe the board has received. I was wondering if it might be made available.

MS. DIXON: Most certainly we'll get you a copy.

MR. GERTZ: This afternoon.

DR. PARRY: Don't--not this afternoon, nor tomorrow either.

DR. CARTER: Okay, any other questions or comments? Dr. North?

DR. NORTH: At the risk of perhaps expanding the time before lunch, I thought the slides we had on the hypotheses for the reclamation studies and technical questions were most interesting in terms of focusing some good bottom line questions. We heard a lot about the techniques that are being applied and the progress in setting it all up. I'd like to

hear a summary of what we've learned to date. And, since I'm not really an echo systems specialists, I have to ask my colleagues what lagomorphs are and things of that sort, I'd like it pretty much in lay person's language. And the questions are at the level of what's different about Yucca Mountain? And, what have learned if anything indicating that there are potential effects that are going to be difficult. And I'd like to go through the technical questions through the slides.

What are the effects of site characterization activities to biological resources, in a few minutes, what are they and which ones do you think are particularly significant in terms of motivating further study. What are the potential pathways of radiation to man in the environment? Is there anything different about Yucca Mountain compared to all that we've learned in the studies on the national test site. And three, what are the reclamation techniques needed to reclaim habitats disturbed by site characterization activities? Again, is there anything particularly different about Yucca Mountain and what is our present state of knowledge in terms of how well we can do by storing the topsoil and not getting it too deep. Does it appear that reclamation is readily feasible? Are there some serious problems? Are there some areas where we've learned we need to get data of a different kind than we were planning to get?

DR. DOERR: Do you want me to start with the biological resource issue?

DR. NORTH: Sure.

DR. DOERR: As far as what is the difference between Yucca Mountain and all other areas, right now what we are trying to do is establish that base of information so we can compare it with other areas. We know that related to trying to mitigate or reclaim areas, that there are subtle differences from a regional scale between Yucca Mountain area and for example, the Rock Valley area. Tortoise populations may be higher or lower on Yucca Mountain compared to Rock Valley. And that's why we are going out and collecting the information and using control plots to develop that basis of information to determine if in fact there really is anything significantly different, related specifically to Yucca Mountain compared to other areas in the Mohave Desert and transitions on the areas.

DR. NORTH: Do you have some hypotheses for what these subtle differences are or are we pretty much fishing around?

DR. DOERR: No. As we showed in one of the overheads earlier, some of the indirect impacts that we are interested in that may flow through the system, or impact specific biological attributes are fugitive dust deposition. If you have a lot of dust that drops down on vegetation, how is it going to change bio-mass productivity and consequently cover--

DR. NORTH: Wouldn't fugitive dust be a problem in other areas?

DR. DOERR: Would fugitive dust be? Certainly would be. However, the difference is that site characterization activities may not be occurring on those other areas. And, so we are interested in looking at fugitive dust deposition related to general environmental activities or general environment such as the dust storms of yesterday, would be a good example, compared to what is the input from site characterization activities?

DR. CARTER: But, Ted, there would be an awful lot of differences between the ecological population, if you will, species and so forth around points like Cane Springs for example who's contrast of the Yucca Mountain. So, I think there's some extremes problem and I don't know if that is a good extreme, but I think there's certainly some major differences between those two areas.

DR. DOERR: Certainly. And from that perspective, that's one reason why our control areas are very close and surround the Yucca Mountain project area. We tried to--and what we did when we selected our plots and paired those for the ecological study plots, we paired those visually and we paired those based on land form, elevation slop aspect, topography, vegetation association.

During this first sample period last year the

vegetation component, the cover of our treated plot compared to the our control plot were very similar, statistically not different. Similarly, with our small mammal trapping efforts to date the comparison of species, composition and general numbers captured on our control plots versus our treatment plots are right now, very similar, suggesting that we are at least successful to some extent in reducing the variability associated with general environment so that we have a good comparison between the areas that we suspect will be, potentially be affected by site characterization activities compared to those areas that will not have any effects other than general background and environmental perturbations.

DR. CANTLON: Following up on that with regard to site characterization and the pathways of radiation to man, what are the sources that you are dealing with and what kinds of pathways are you talking about regarding characterization, site characterization?

DR. DOERR: Again, the three basic general sources identified were, sources related to the exploratory shaft facility construction development and site characterization activities including re-suspension potentially of particulate matter out there. And consequently, we have studied sample location that are related to specific activities of site characterization activities and exploratory shaft facility development to monitor prior to those activities initiation.

What's the existing radionuclide content in those specimens and then monitor it over time. Take annual samples to see as the exploratory shaft facility and activities are initiated and are being constructed, is there a change in the radionuclide source. Similarly then we compare it against the control areas, obviously, related to NTS activities and environmental background.

Related to data acquisition and alterations for pathway analysis of radionuclides, again three basic sources of interest for radionuclides are VESF and associated activities test site in environmental background. We have the three locations, sample locations to evaluate the distribution abundance of potential accumulators or dispersers of radionuclides. That data will be supplied for pathway analysis for the radionuclides.

And then finally, we've had one sample period where the abundancy of gamebirds and lagomorphs is extremely low. And therefore, it is not feasible to begin to collect these types of animal groups for direct radionuclide analysis.

MR. O'FARRELL: One of the major thrusts of the program, John, is to establish what are the levels of radionuclides in the animals now, because we do have levels of naturally occurring radionuclides particularly in the ryolites, and we would like to establishe, was there when we have occurrences such as Chernobyl, we did have a pulse in the system. We do

want to be aware of things like that, so that if there is an attribution later that levels of radionuclides are due to activities associated with site characterization. We'll have some background to know what was there naturally.

DR. NORTH: How about the third question, the reclamation techniques and how well they seem to work and what some of the issues are determining whether they work?

MR. OSTLER: First of all, I think there is a couple of things that make Yucca Mountain unique compared to other sites on the NTS. One of those to me is the depth of the topsoils that we have to deal with. Most of the other areas on the eastern potions of the NTS have a caliche layer that is generally found within a foot or two of the surface.

Many of the areas, particularly near the Fortymile Wash area have some very deep, windblown soils in them. So we have a lot of material that we can't use for revegetation which is different.

As far as the techniques that are currently being used on the NTS for revegetation, they are using planting almost exclusively. Seeding was tried in the past a long time ago, and they have given up on that concept. I don't think that we ought to totally give up on that concept, after all there have been a lot of changes within the reclamation field, which makes seeding very viable. Obviously, we are seeing successful invasion onto the disturbances that were done in

the 70's associated on Yucca Mountain. Identifying those species I think is going to be valuable input in developing a reclamation program.

DR. NORTH: So, in summary, I am taking away is the soils are thinner and you may have to go further in terms of--

MR. OSTLER: The soils are deeper.

DR. NORTH: Are deeper.

MR. OSTLER: In some areas.

DR. NORTH: So, on Yucca Mountain you may have to do more with actually storing and moving the soil than has been.

MR. OSTLER: And the Nevada test site, to my knowledge anyway, has really not stored or dealt with topsoil in the past. So there really is a lack of information there on how best to do that in an arid environment like we are in. You know there are some very good principals that have been developed for coal mining areas, but it's pretty much--you know we can build upon that base.

MS. DIXON: I'm sorry, that is the purpose of our feasibility study too though is to go ahead and do some study plots and tests and find out the best way for reclamation really is.

DR. DOERR: And again, we are not starting from ground zero. There's been successful reclamation in the Four Corners area which I would consider an arid environment also, with the similar types of problems and issues to overcome related to

successful reclamation.

DR. CARTER: I'd just like to caution you, you probably shouldn't use the word in this particular location ground zero.

Well there's a glitch in the schedule and I wondered what it was for. We are scheduled to have lunch from 12:00 to 1:00, and then the program starts at 1:15. We've got a 15 minute glitch and we have used ten minutes of that. So, we will reconvene here at 1:15 and we'll hear discussion of water resources.

And, I would assume now that we can leave materials in this room during lunch. So, we'll see you in an hour.

(Whereupon, a lunch recess was taken off record.)

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

1:15 p.m.

DR. CARTER: Gerry would like to correct one thing. We discussed before the break sources of radionuclides and so forth and it's perhaps not obvious what those might be around the experimental shaft. So, Gerry, why don't you do that now, please?

MR. PARKER: Yes, thank you, Dr. Carter.

The issue we discussed Carl Gertz, Wendy and I before the break, is we wanted to make sure there was no confusion about the site characterization activities and the fact that there would be no radionuclides that would be introduced. There would be no radioactivity other than, and I'm not an expert on these tools or the equipment, but such equipment as well logging tools which are contained sources, if you will, and that we don't envision that our site characterization activities therefore would be involving any radioactivity during the site characterization program. And because of the discussion prior in the program that Ted Doerr had described, we wanted to make sure that was clear.

DR. CANTLON: So that the radioactivity that is being looked at is that which is natural in the geological materials, plus that which is resident from the fallout residues that will be restirred and moved again in the process of the site characterization.

MR. PARKER: I think that's exactly correct, Dr. Cantlon.

DR. CARTER: All right, very good. Then, we'll continue with the regularly scheduled program and the next speaker is Otto Moosburner from the U.S. Geological Survey. Otto.

MR. MOOSBURNER: Before I go on, I'd like to introduce three new USGS colleagues who are here and if there are some questions I cannot answer they may be available to do that; Jim Harrel, Ray Hoffman and Mr. Hugh Bevins.

DR. CARTER: Otto, I think that's better if you put that in your pocket. Thank you.

MR. MOOSBURNER: That was with my bifocals if that might be a problem.

DR. CARTER: I know the feeling well.

MR. MOOSBURNER: I'm still trying to break those in.

Okay. As a little preface to the water resources program, I'd like to say a few words about the background of water resources data collection and some interpretative studies in the general area of Yucca Mountain, a Nevada set site, Amargosa Desert, Devil's Hole area and so on, within a radius of 20 to 30 miles at least anyway.

Before the 1950's about the only data that were available was of the real reconnaissance nature of some publications--some data may be mentioned in publications. Some of it was reported and it had to do with a canvass of watering holes, et cetera, and so on.

The real impetus then began about 1960, and several thrusts have brought this about. One was the actual development and use on the Nevada test site. There was also quite a bit of development out in Amargosa Desert area, Amargosa farms in particular. And those were the two main developments. So, really sort of a systematic data collection was started at that time. And yet, many people collected data, many interpretative studies, no coordination as such. For instance, for the Nevada test site studies, many different contractors, government agents, etc., basically to meet their needs and so on. And that is pretty much brings you up into the 60's and so on and as far as this development goes.

We are using these background data and the other data that are available to sort of build or to start this monitoring program which means then that a lot of integration from the data, a lot of checking, a lot of weeding of data and also of course, using all the best data that are available to give us an idea of how to set up the monitoring program, and how to monitor and how to design the program.

Also, driving of course this water resources program is the regulatory compliance to some degree and two obvious examples would be the air/clean drinking water act and the Devil's Pup Fish at Devil's Hole, for instance.

I just want to spend one or two minutes on going over a brief summary of the hydrology. As I'm going to go

through this, we are basically going to talk about ground water hydrology, ground water flow. It basically that is the extent of the hydrologic resource. There is obviously some surface water, very sporadic. Streams may not flow for years at a time, but they are important in the sense that they can move waters into the ground as recharge, particularly. That's the long-range mechanism of course of getting surface water down to ground water. But, there is really no utility that I'm aware of as far as surface water resources at Yucca Mountain and sites nearby.

In the very brief summary here, broken down basically in water quantity and water quality, presented in a little different fashion than seven month's ago. Water quantity, the type of effects we are talking about is from well and aquifer pump testing. And that would include for instance J-13. It would include other aquifer tests which would take some water from the ground. Withdrawals for water supplies are obvious.

Water quality, sewage disposal, chemical spills and you might say other possible effects.

Objections of the water resources monitoring program characterize water resources with respect to quantity and quality, detect and document significant changes in the quantity or quality of water resources over time, identify any significant, adverse impacts on water resources which may be

due to site characterization, and develop comprehensive water resources data base, a very important aspect.

As I alluded to earlier, lots of information out there of varying degrees of quality, different time periods, different areas.

Technical questions, you might consider these as subsets of these objectives. These are the same questions that were presented seven months ago.

One, what is the potential for degradation of water quality in the Yucca Mountain area?

Two, what is the potential for reduction of water resources in the Yucca Mountain area? And, again, I remind you, this refers to water levels and wells, spring discharge, well yields and so on. It's sort of a lumping.

Three, what is the potential for lowering of water levels and decreases in springflow on Death Valley National Monument lands.

DR. CARLTON: Otto, the starting point on those questions, is that restricted to site characterization or the fully active repository?

MR. MOOSBURNER: Site characterization, with the understanding that we are trying to get at a data base of information before the site characterization as well, yes.

DR. CARLTON: Thank you.

MR. MOOSBURNER: The technical approach, which is

basically the same for those different objectives or issues. Inventory, compile and evaluate available hydrologic data. Design and integrate local and regional water resources monitoring networks, a design phase. The actual nuts and bolts is the monitoring of the quantity and the quality of water resources. And, identify changes in water resources and the potential impact of site characterization and mitigation activities on water resources.

What I'd like to do is then go through each of these four bullets on that previous overhead and talk at some length about them.

The status and accomplishments of that inventory and evaluation phase of reviewing Yucca Mountain project site characterization activities, ongoing consultations with Nation Park Service and U.S. Fish and Wildlife Service and evaluating technical literature for region and local flow systems, past and present water-quantity data, past and present water-quality data.

What I'd like to do here a little bit to give the board maybe a little better flavor--but before that we have one more overhead to finish off on future plans.

Continue inventory and evaluation of information. Remember we are still on this data inventory and evaluation phase. Compile historical water-quantity and water-quality data.

What I'd like to do is to give the board a little flavor of--we talked last time, seven month's ago about certain magnitudes and actual things that are found in the field as more or less as a historical perspective. And, I just want to indicate here, Highway 35, Well, J-13, Ash Meadows, Devil's Hole, Furnace Creek Area of Death Valley, I think mercury of course gives you some idea of some the things that I might talk about here.

DR. CANTLON: Otto, why don't you remind us of where the water from the Yucca Mountain area goes?

MR. MOOSBURNER: I think that will be the next one. Yes.

DR. NORTH: I also hope you will review for us some of the modeling activities and how this ties into your plan.

MR. MOOSBURNER: We will get onto that later on, yes. We are on this inventory phase right now.

This is a generalized flow direction. This is not part of this study as far as products of this study as such. And, point out some of the features because it's a little different scale. Here's Mercury. Here's Death Valley. Right about in here would be J-13. Here is about the Yucca Mountain site about where this star is.

Now, you can see that the postulated flow at least is generally from the northeast in this direction into the Springs, right in here, the Ash Meadows. And also, in the direction of Death Valley from a generally northern direction

and you see on interpretation that there is a lot of question marks yet.

DR. CARTER: I guess my real question was, I notice your map left off Ash Meadows and Devil's Hole and I guess the real question is whether the water underground in particular from Yucca Mountain really swings to the west or whether it goes down into that Ash Meadow's area. And, I presume some of it does.

MR. MOOSBURNER: Yes, I'll address that a little bit later. This was out of a specific publication as such. That's the reason those things weren't located on that.

Just as a reminder that if you can picture where J-13 was or the repository sort approximately about 20 miles plus to the north, northwest, this is Devil's Hole. And if you read the explanation here several things of note because in the next illustration I'll show some of the effects that have been measured from for instance, this pumping in here (indicating), within two or three miles of Devil's Hole. And you see many of these springs in here, Devil's Hole, as you know is not really a spring, it's in effect, a well.

DR. CARTER: Since you are a hydrologist these are springs rather than sperm, huh?

MR. MOOSBURNER: Yeah. I believe that would be slightly different. But, I'm not sure of that.

Okay, I think that's the locational map. Next on

please. Here's a record of the water level in Devil's Hole from about the 1960's to about 1988 here. Several things on this illustration that are rather interesting. This authenticates the monthly pumping from those what I call those production wells that are within two or three miles basically of Devil's Hole. And you can see that we are talking about five or six thousand acre feet per year if you want to integrate some of these monthly flows here in that area. And this was the response roughly about a two foot maximum response in here. This is really the minimum water level or the mandated water level from the Supreme Court decision having to do with the water level being above a breeding shelf and that would be three feet as indicated roughly--three feet below a reference point. Anyway, this--you can see also the cut-off in the pumping in here and see some of the responses in here.

This illustration--these two numbers referred to a preliminary monitoring plan that we have developed and following the illustration would be shown a hydrograph, a historical hydrograph of wells in this are to give you an idea of what some variability has been in depth of water and et cetera.

This area over here is in the area of quite heavy pumping, Amargosa Farms area. There has been some development in here (indicating), and as you can see this is northeast of

Devil's Hole and this is northwest of Devil's Hole here, and again, Well J-13.

DR. CARTER: I thought there were some very large companies involved in that agriculture area like Tenneco and so forth. Do you know?

MR. MOOSBURNER: I'd have to defer on that. I don't know the answer.

MR. FASANO: There are mining companies. American Borate mining company and things like that are in the area.

My name is Greg Fasano with Science Applications. There are a number of mining interests in the area. American Borate Company has a few large operations in the area and down toward the Death Valley area also. That's one of the--and they run a lot of wells, a lot of pumping and they have the rights to the bed of water. Plus, a lot of the mining interests up towards Beatty, and we talked about Bond Gold last time, I believe, seven month's ago. So, those are the two primary.

MR. MOOSBURNER: We will point out some of the magnitudes of some of these things that are involved here for your perspective.

This is--remember northwest of Devil's Hole and you can see that this is a pretty steady decline in that period of about 15 feet throughout those--for more than 30 years. And, that's in that area of heavy pumping. The actual, I think

maximum decline is up in over 30 feet in some parts of that area.

DR. CARTER: What size wells are these in terms of output?

MR. MOOSBURNER: Let me defer to Jim Harrel on that. Jim, could you?

DR. CARTER: Are these small or large size?

MR. MOOSBURNER: I think they are large wells, yes.

MR. HARREL: Jim Harrel. They are typical irrigation wells with maybe 16 to 18 inch diameters and drilled maybe three to five hundred feet in depth.

DR. CARTER: What's the gallon per minute or whatever output of those things? It must be sizeable.

MR. HARREL: Most of them would support a 140 acre rotary sprinkler system and that's normally on the order of 1,000 or 1,100 gallons a minute.

DR. CARTER: Okay. Thank you, sir.

MR. MOOSBURNER: Thanks, Jim.

This one you recall is located northeast of Devil's Hole. The changes are a lot less than this one here (indicating). They are some changes apparent in that, and again this is more for illustrated purposes. We are not making an in depth analysis as such. But, it certainly gives you background information on past history and so on.

DR. NORTH: Did those big changes in about 1964 or 1965,

and again in the early 1980's correspond with any known event about changes in pumping?

MR. MOOSBURNER: Are you talking about the upper one?

DR. NORTH: Yes, that's right.

MR. MOOSBURNER: This one may be a data glitch, I'm not sure. This apparently was--there was some irrigation in that area, much less than in this area over here. This apparently seems to be from either cessation or decrease of pumping in that area.

DR. NORTH: So, there is something known that corresponds to that change?

MR. MOOSBURNER: That's right. I can't tell you a specific, but we do know there was some litigation and some stress over there, right.

Oh, again, this is a little note that depth below land surface in these wells which is really in the southern part of this area, quite south of Highway 95, we are talking about relatively shallow water levels again. When we are up by J-13 or near Yucca Mountain, they are much deeper. And, again on the right would be the actual water level and feet above means sea level.

Again for illustration purposes to help us get a better understanding for designing monitoring networks, this is intended to illustrate that there may be a different water type and we talked about earlier as far as which direction our

flow is coming. Now this basically is in this direction (indicating), coming in towards Ash Meadows, and it's both in the carbonate and in valley fill. And there's another indication that we suspect that there is a lot of interaction, first all, in the carbonate aquifer to the valley fill and vice versa.

But generally these are the similar water types and the two, J-12, which is near J-13 and west of Ash Meadows over here indicate a different water type higher in nitrates and silica and it may indicate as it began, has been postulated, not in our program, that there may be some sort of a barrier separating these water types. Water coming in this direction (indicating) and then water coming down here (indicating) and actually missing Ash Meadows.

DR. CARTER: Is this water potable?

MR. MOOSBURNER: I believe so, but are you talking about clean water drinking act?

DR. CARTER: Yeah is it drinkable without adverse affects?

MR. MOOSBURNER: I believe so. Ray Hoffman, do you have any comment on that?

MR. HOFFMAN: Ray Hoffman, USGS WRD, yes it is.

DR. CARTER: Thanks.

MR. MOOSBURNER: That was easy.

MR. HOFFMAN: There are high nitrate concentrations were

around nine milligram per litre, which is one milligram below the water quality standard of ten.

DR. CARTER: Are those nitrogens perceived to be from agricultural sources or natural?

MR. HOFFMAN: It's possible, but also could be from natural sources. It's something that we just don't know because of the paucity of data in the area.

DR. NORTH: Does the water in J-12 make that standard of ten looking at the size of that arrow?

MR. MOOSBURNER: That's pretty close.

MR. HOFFMAN: It's pretty close. I think I said it was 9--I indicated 9 milligrams per litre, so it would be close to that 10 that you see out there, I think. I'm trying to recollect the data in that particular report and I believe that it did not achieve 10.

DR. NORTH: Is there any potential artificial source from the nitrate around J-12, or is that almost surely a natural source?

MR. HOFFMAN: I can't answer that. I don't know if there would be a contaminate source at the wellhead, for example, I'm just not that familiar with that wellsite, particularly, but it's a possibility.

DR. NORTH: Are there any other data points or do we just have those two, J-12 and the one down on the lower left?

MR. MOOSBURNER: My belief is that there are other data

points. This was intended merely as an illustration to show that there is possible difference in water types as to geographical location and not a strict interpretation from all the data that are available, no.

DR. NORTH: Well, that would seem like a very interesting question to pursue, whether in fact on can get relatively conclusive evidence that there is a major change in the water type and therefore support for the hypothesis that there is a separation between the two water bodies.

MR. MOOSBURNER: I believe that is being an ongoing study with the site characterization on the saturated zone studies.

DR. NORTH: We welcome an opportunity to hear more on this.

MR. MOOSBURNER: Okay, now, those overheads were more or less intended to illustrate some of the background data out there that gives the board a better feel of what's happening as far as the ground water depths and some idea of the quality and flow directions. Monitoring network design is really a second approach.

On the status and accomplishments, consulting with National Park service and U.S. Fish and Wildlife Service to address concerns about water resources in Ash Meadows and Death Valley National Monument, designed network to monitor ground-water levels and spring discharges in Ash Meadows and dEath Valley National Monument. We will show that in a later

overhead. Also, in Amargosa Desert which is what I've been alluding to of the Amargosa Desert area, (we are calling that the southern part of the regional monitoring network). Submitted draft report detailing proposed monitoring of ground-water levels and spring discharges in southern part of regional monitoring network to the National Park Service for review.

DR. CARTER: Otto, I wonder if you would describe a little bit maybe in some detail the interaction of your consulting with the National Park Service and Fish and Wildlife. Is that primarily briefing them on what is going on or is it sort of an interactive process?

MR. MOOSBURNER: It's quite an interactive process. They have quite serious concerns as I indicated in one of the first overheads about the issues about the effect of site characterization on possibly Ash Meadows which is in the Monument, and also in the springs of Furnace Creek. They are quite concerned about that. Both as a site characterization effect potentially and also accumulative other effects. They are just concerned about it because it's very important if there was any affect on those springs.

MS. DIXON: Can I add one point to that?

MR. MOOSBURNER: Sure.

DR. CARTER: Let me, while she's coming to the microphone, I didn't realize that Ash Meadows was in the

Monument.

MR. MOOSBURNER: Devil's Hole, I'm sorry.

DR. CARTER: Ash Meadows isn't to the best of my knowledge.

MR. MOOSBURNER: No, I misspoke.

MS. DIXON: I needed to add one more data point to what Otto just mentioned. Well, maybe two data points. When we applied for a water appropriations permit, the National Park Service basically protested it. They are not protesting just anything from site characterization, it's any request of water appropriation permits that could potentially impact the salt as an example. So we were not selected out for any particular reason, it's just part of the due course of the National Park Service is dealing with right now. We gave them a copy of our Environmental Field Activity Plan for water resources--this is another example when you said, are you sharing your Environmental Field Plans with any other organizations?

They took a look at it and it's sort of a generic plan and asked for additional information that was more specific to their needs and we are consulting back and forth with them to not only satisfy our own needs for information on what their concerns are and so forth, but trying to get information from them as to what they are looking for so that we can include that kind of data need into our design program and satisfy their request for information.

MR. MOOSBURNER: Okay, this second bullet is really in somewhat in response to their concerns. We were really working, have worked and are working right now on that part of the network first basically because of those concerns.

DR. CARTER: Well, their concerns are based on one would be potential future withdrawals or withdrawals during site characterization?

MR. MOOSBURNER: I think both.

DR. CARTER: And, the possible breaching of various impermeable airs which may change the flow pattern of ground water?

MR. MOOSBURNER: Yeah, I think those are all corollary to that, the basic idea is if it changes the output of those springs and also the quality, potentially, but mostly the quantity at both of those places--Devil's Hole is not flowing, but obviously it could affect water levels as such, but the springs near Furnace Creek, right at park headquarters.

DR. CARTER: But there's no evidence that the existing drilling which is substantial has made any major change in any of the ground water flows has it?

MR. MOOSBURNER: Not in the evidence I'm aware of, we have not analyzed such. But I did present those earlier graphs which give some perspective of withdrawals. Let me go back a little bit maybe. We talked about 5,000 to 6,000 acre feet per year on those production wells near Devil's Hole in

the late 60's and early 70's.

The spring discharge, the total of the springs at Ash Meadows is about 17,000 acre feet per year. My understanding is that the springs near Furnace Creek are something like 3,500 acre feet. They are smaller but very vital to that. The pumping withdrawal at Amargosa and Amargosa Desert has been as high as at least 10,000 acre feet. The acre feet per year has gone down I think in the ten year period. But, this gives you some idea of some relative magnitudes of those withdrawals in that area.

DR. CARTER: And those numbers are so large as to make the expected withdrawal during site characterization almost immeasurable won't it?

MR. MOOSBURNER: The site characterization permit application, if I understand it correctly, in J-13 would be about 400 acre feet over a seven year period which works out about 40 gallons per minute at that location. So, that's 400 acre feet over seven years.

Also, since we are on this, there's the Gold Bond Mining which is southwest of Beatty, if you recall on the--I think most of you remember where Beatty is. And, I believe that is for the projected for the seven year life is also about 22,000 acre feet per year withdrawal. From my understanding, it would be right about in here (indicating), in this area.

Here are some of the down to earth and practical considerations that have to enter into site selection considerations. Well construction and spring classification information--very important. Well construction, where it is open to the aquifers and so on. The regional and local coverage, that is proximity of site characterization activities or environmentally sensitive areas. Water use, magnitude or well or spring discharge, availability of historical data, this certainly adds a lot to it if you can have this kind of information. Technical needs of and integration with other programs in the area.

Okay, I indicated earlier that we had what I would like call a preliminary design of that southern part of that network which basically includes below U.S. 95 here. And there are on that map are shown 25 wells and five springs that are considered to be preliminary members of this monitoring network in this area.

DR. NORTH: Now, are those wells already in existence or this is a proposal for them?

MR. MOOSBURNER: Yes, these are.

DR. NORTH: Now is there historical data for these wells as well as the ones you showed us? You showed us 6 and 14 I believe.

MR. MOOSBURNER: Yes, 6 and 14. There are some--that's one of the bases as indicated earlier for picking that, but

that depth of information or that extent as we have for 6 or 14, is not available for all those wells. That's true. We are trying to get the most out of it, you might say.

As you remember there was nothing really before the 60's in any of these.

Future plans on the monitoring network design, continue refinements and modifications to southern part of regional monitoring network due to analysis of data collected, errors in reported well location or well destruction, a very important aspect, but certainly tedious and necessary. Inaccurate information. Unavailable site accessibility really refers to--it doesn't necessarily relate to the test site of such, but sometimes we may not get permission to go in even though it would be a great data point. These are the kind of things that we run into on a real level.

DR. CARTER: The site accessibility primarily related to the Yucca site area or private property?

MR. MOOSBURNER: No. Private property and so on. Remember we are still talking about the southern part of the regional network, which is off Yucca Mountain and off the test site.

Okay, future plans obviously intended to address that concern. Design the remaining part of the regional monitoring network, that means in all directions including up gradient of the general flow path that we had talked about.

They may not be of the same intensity because there are different considerations, flow direction and so on. Design localized monitoring network, now that is intended to mean the area near the drift perimeter where the data and the well holes are much more intense. And there was much--many more holes available to use, candidate sites. I think when I presented last time, within two or three miles of that there may be 20 or 30 good candidate sites within that conceptual drift boundary.

Still on the monitory status and accomplishments, well construction and site locations, water-levels and spring discharges from other agencies where we need to get them although we can get them. Collected initial water-level data at selected wells. So, we have done that.

Future plans begin as to the southern part of the regional monitoring network. Continue collection of background water-level data at wells. We are basically with some variance there, talking about quarterly basis, and as I mentioned last time, we really need to go on this for awhile to see what the necessary frequency is to adequately define changes.

Collect background spring discharge data at springs. We are talking about parts of the network quarterly, part of it annually, and I believe one or two sites would be continuous recorded. It would give us an idea of what the

variation is.

Collect background water-quality data at springs and selected wells.

DR. NORTH: And this will specifically include the nitrate silicate issue which you demonstrated on an earlier slide?

MR. MOOSBURNER: Yes. It will address that issue in the sense of trying to learn more about it with the understanding that there are some technical studies going on outside this study as well. In other words in the site characterization study.

DR. CARTER: Are you doing any radiological monitoring of the water?

MR. MOOSBURNER: No, we are not.

DR. CARTER: Is anybody?

MR. MOOSBURNER: Yes, but I can't--I think that will be coming up next.

DR. CARTER: Okay.

MR. MOOSBURNER: Collect background water-level and spring-discharge data at selected sites in the northern part of the regional monitoring network, and also water-quality. What's missing from that is also some water-quality data from those sites.

Status and accomplishments on the last objective. Evaluating various predicted analysis techniques including

modeling for use in predicting potential water resource impact which may result from site characterization activities. Specifically, estimated effect of increased water withdrawals from well J-13 on the regional water-levels utilizing Theis equation and existing estimates of aquifer transmissivity and storativity.

That computation or that estimate is considered an estimate because certainly the Theis equation is one model and there's some assumptions in there which do not follow the natural system out there exactly, but it's probably valid certainly for an order of magnitude of anticipated changes. And the computation that was done using that figure that I quoted of about 400 acre feet over that seven year period was that the effect on the water-levels were about six-tenths of a foot at one mile, two-tenths of a foot at ten miles, and one-tenth of a foot at 25 miles of that production from J-13.

As a reference, remember we said the Ash Meadows/Devil's Hole area is around 20 to 25 miles away in that general ball park. But, I would caution that this is truly an estimate at this stage. And there are ongoing studies in the saturated zone studies that are trying to understand the system better and they are also using more--you might say more comprehensive and more complex modeling. This is just a tool right now, and it also gives us a guide on how to possibly design our network so we know at least what order

of magnitude of changes we are talking about.

Types of analytical tools as I stated, a preliminary list, certainly not comprehensive, on the water-quantity, we are talking about hydrograph analysis and we have parts of that that we have really looked at. When you are looking at a hydrograph, you are looking at all sorts of things as far as trends are concerned, the hydrograph variation in space, in other words as far as water-level declines and so on. The significance of changes, statistical analyses to see whether it's a change that may have just occurred from what we are able to measure were a random change in a natural system. These kind of things.

Quantitative analysis methods certainly what I alluded to before on the Theis equation analysis would be one quantitative analysis. And then the most comprehensive digital flow models. Those are being developed as part of the program in saturated zone hydrology, both in 2-D and 3-D models, I believe. And those, I don't think there is any definitive. For instance, on this particular question I talked about, there is no definitive answer that I know of as far as the affect of J-13 on that 25 miles. They are still trying to work on those modeling techniques.

Water-quality, some type of analytical tools, presence or absence of a constituent, synthetic organics are there but really other things would be included there too.

Comparison with natural background, statistical analysis similar to above. Geochemical models, in other words, can it happen in that kind of a geochemical environment and balance of chemistry. And then again sort of an analog if you will to the digital flow models. In a lot of ways of course they are based on digital flow models as such, but you have very many complicating factors because of decay and certain chemical constituents rather than just a flow model. So, I don't know--we are not doing this part of this project and I have to say I'm not quite sure what the state-of-the-art is and where the site characterization activities interpretative studies are in that phase.

DR. NORTH: I would like to put into the record, there's a big connection between the hydrological modeling work that's being done in the area of performance assessment and the work you are describing to us. And in future meetings I'd like to hear a lot about that connection and what it is we are learning and assure that the kind of cross-fertilization that we need between these activities is going on.

MR. MOOSBURNER: You will.

DR. NORTH: Let me ask you, you've got me curious at this point, but I haven't heard very much about insights from what you are learning and I haven't heard very much about the plans for tying together the characterization needs for driving the hydrology models for performance assessment with the data

collection activities here. It would seem to be very important to make those connections. I'm particularly intrigued by this nitrate data which I hadn't recognized before.

MR. CARTER: Yeah, let me ask you a corollary question about the nitrate. Do you have any definitive ways to distinguish between nitrates from natural sources and nitrates from say, agricultural uses? Are there any tracer materials that are with one or the other, for example?

MR. MOOSBURNER: I cannot answer, but I will call on Ray and he may be able to.

MR. HOFFMAN: Yeah, there are analytical tools for doing that. A nitrogen isotopic analysis can be looked at, but on the exact details, that's kind of I think state-of-the-science, in dealing with these kinds of things in contrast to some other geochemical tools that we might be using down the road here. I mean there's other information like those two wells you are talking about. They were drilled in volcanic welded tuff. We know that from core analysis, so you have corollary information that contrasts with what's coming out of the carbonate aquifer which is made out of different materials.

There is a lot of other information in there, but as far as the source of that that needs to be looked it, there may be other data out there between those data points is my

recollection currently as we stand here is that I don't know that, but there may have been water samples but nitrate analysis may not have been done on those particular analysis. They are Amargosa farms which are in between those two data points north and south.

That's part of the marketing program evaluation is to look and answer those kinds of questions to see and add more information that we gather along down the road down here.

DR. CARTER: Yeah, I was thinking in particular an analytical technique rather than a lot of corollary information.

MR. MOOSBURNER: Into disciplinary interactions, we've alluded to some of these in certain parts of the presentation. Obtain data on local and regional saturated zone hydrology, paleohydrology and saturated zone hydrochemistry from site characterization study plans. Obtain information on facilities design from engineering. Engineering being site characterization engineering I believe. Obtain data on radiological water analyses from radiological monitoring program. Provide water samples to radiological program for analysis. Provide information on water resources to terrestrial ecosystem studies, for instance, Devil's Hole is suddenly a case in point. Share water resource data with other state and federal efforts.

DR. CANTLON: In regard to the latter, USGS had been

involved around the country in providing hydrologic data for environmental impact statements. And based on that, if you were designing an environmental impact statement for Yucca Mountain at this point, what conditional would you put into the baseline studies that you don't already have in process?

MR. MOOSBURNER: As to--I'm a little sketch on impact--environmental impact statements, since I haven't really done any, but I know about it. I think the design of the network as such looking at it from a regional perspective, as I mentioned and then from a more local perspective, I think once that's carried out and the network is designed and implemented, I think that would answer those questions as far as impact.

DR. CANTLON: So, no great, glaring holes as you can see it at this point in the characterization of the hydrology of the reason, as opposed to if you had started off laying down a baseline study for an EIS?

MR. MOOSBURNER: Now, when you say characterization you are also--I assume you are alluding to technical interpretative studies and as far as my knowledge is concerned, I think that's being done very intensely, but I am not associated directly with all those studies. But, as to trying to understand what the studies are and trying to utilize the information to design a network to monitor the consequences of site characterization plus having a background

of what has happened there, you might say baseline, I think once it's implemented I think it would give you the information that you need.

MR. FASANO: Just to clarify a little bit, the water and monitoring program that we are talking about here today alone isn't going to satisfy the needs of EIS. But coupled with the seven year's worth of site characterization data that's going to look at flow models and flow directions from many, many different angles, that together will satisfy the EIS phase. And we are integrated with that process. We do talk. USGS, as you know does both, they are physically separated, I mean location, but they are working together on this.

DR. CANTLON: And are you also working with the State of Nevada on their concerns on hydrology?

MR. FASANO: In the interactions with the State relative to study plans, back and forth and requesting comments on them, I would say yes.

DR. CANTLON: Thank you.

MR. MOOSBURNER: That concludes my presentation.

MR. JOHNSON: Carl Johnson, State of Nevada. I've got a comment and it's not directed to you Otto, as it is to Gerry Parker and Wendy Dixon and the other management folks here from DOE. Ian Zabarte in some of his remarks earlier this morning mentioned some concerns about affected party status. The work that was discussed her by Otto also takes into

account, I assume, some water-quantity and water-quality concerns of the National Park Service relative to the Death Valley area.

Death Valley National Monument is within Inyo County, California. Inyo County applied for affected status in this program of basically arguing that there could be impacts from the project on the hydrologic system in Inyo County, i.e., Death Valley.

The Department of Energy denied their affected status, basically saying that there are no hydrologic impacts to Inyo County. Now, you are proposing a monitoring program at looking at various hydrologic sites within Death Valley, in order to at least satisfy the National Park Service concerns. And I guess the point I'm trying to make is that if you are trying to satisfy the National Park Service in Death Valley which is Inyo County, why aren't you also trying to satisfy Inyo County's concerns by affording them some affected status.

I would like to point out that some representatives of Inyo County are planning to be on the field trip on Thursday and I hope that the DOE will address their concerns about water quality an quantity at that time and as to why they are not having affected status. Thank you.

DR. CARTER: Okay, does anyone from DOE wish to respond? Gerry you or Wendy?

MR. PARKER: I would defer to you Wendy, if you want to--

I'm not really intimate with your previous correspondence on the issue, if you want to deal with it.

MS. DIXON: DOE of Nevada doesn't get involved in doing analysis on who is or is not affected. So, I would like to leave that alone for the appropriate parties to deal with. But, from our point of view because we monitor something does not need that there is going to be an anticipated impact. From our point of view you monitor something so that you are able to say that there is or is not an impact. We do not believe that there will be an impact, but as we are monitoring should we be proven wrong, most certainly reconsideration of affected status, reconsideration of this entire program could in fact take place. Thank you.

DR. CARTER: Thank you, ma'am. As Carl Johnson indicated certainly the people in Inyo County will be involved in the field trip there so they will be participating in an aspect of the program.

Thank you, very much. I guess we had better proceed. Our next speaker is from SAIC, Stephen Woolfolk. And he will talk about radiological studies.

MR. WOOLFOLK: I'm Stephen Woolfolk. I work with SAIC. Before I bet started, I thought I might mention that Bill Phillips is here in the back of the room who is our new EPA program manager that also works with me in implementing this program. He just recently started working on it.

Our program is a little different than most of the programs you hear about today in that the radiological program doesn't just address the environmental issues, we also have to address certain requirements from site characterization and the radiological safety issues. So, we have a little wider scope than normal.

If you would take a look at the objectives we have, one of them is to monitor the effects of site characterization, another is to assure compliance with the applicable radiological regulations such as the clean air act, DOE's orders on what can go offsite. Collect data needed to support the design of the facility, and eventually even presentation of the SAR. Collect data needed for eventual emergency planning and post-closure monitoring activities, if a facility site were to be located here.

DR. CARTER: Let me ask you a question, Steve, before you go any further.

MR. WOOLFOLK: Sure.

DR. CARTER: You indicated that you look at the various rules and regulations, I guess including the DOE's. Now, I would assume in general that DOE's conform to NRC and EPA. They are not more rigorous, I assume.

MR. WOOLFOLK: That's no longer true. The new DOE orders coming out implement the new ICRP regulations and NCRP requirements that the NRC is still developing implementation

procedures for. And quite often now, the DOE orders are our controlling requirements, such as for public exposure offsite, NRC is still at 500. DOE says maximum individuals is 100 not in line with the ICRP. We use--in fact we will be doing things in terms of effective whole body dose equivalent.

If you look at the new DOE order, I think it's going to be 5400.5 or .6. It's still not out. It will be out momentarily is the message. It's been that way for a few months. But, it's going to be specifying relatively state-of-the-art monitoring requirements that are significantly more stringent than the NRC has asked for.

DR. CARTER: Those though are not--most of them are not referring to numerical values. A lot of that is either procedural or whatever.

MR. WOOLFOLK: Yes.

DR. CARTER: Or units in the case of the exposures.

MR. WOOLFOLK: Although, if you don't have the right monitoring equipment, they say the data is not valid, therefore it's a regulatory requirement. Just like when an NRC says there will be isokinetic samplers on the stack.

DR. CARTER: Okay, I just wanted to make clear what the distinction was.

MR. WOOLFOLK: Yeah.

DR. PARRY: Excuse me.

MR. WOOLFOLK: Sure.

DR. PARRY: How does emergency planning work?

MR. WOOLFOLK: Okay, one of the things when I talk about this site is that this is not a normal site. I don't know of any other DOE facility--any other nuclear facility that's ever been built on a site which already has a significant increase in over natural background. The existing background there is probably slightly above what you would expect in plutonium and cesium. We need to know that data and know it very well so we can tell if something were to go wrong during a repository operation, or ever before because we have another problem and I'll mention that.

If something were to happen at NTS right now, we also have to be able to tell if something has changed there in our site because of the NTS activities as well. So in both cases we need to know what is here now, so we can tell if we've been impacted or not in detail. And if a plume went across, did it go across at 20,000 feet like we think or did we get some deposition and do we have to go out and completely redo our environmental monitoring system? Or if when we are operational, you have a similar type thing.

If you had a release you would go out and immediately try and locate in the plume and you would make measurements there and you'd want to know what the concentrations on the ground are and in the air are before you get started.

And, when I talk about how much time it's going to take to get the data to do this, you'll see that we have a concern about having enough data so we can do that accurately.

DR. CARTER: Well, let me ask you one other thing, because you indicated now and I guess is it a proven factor or supposition on your part that the levels at Yucca Mountain are higher in these things. You mentioned plutonium and so forth, if they are parts of the test site, that's undoubtedly true and will verify, but I'm not sure it's true for Yucca Mountain.

MR. WOOLFOLK: Okay, it starts out as a supposition. We do know that we had shots up north of us that are tied in the Fortymile Wash thing. We do know that a number of the ground test plumes did go across the site. Not a great number, but a limited number. We know that there were various activities during the nuclear rocket process including the discorporation or a reactor for what purpose that released significant amounts of activity at various times.

The supposition is, it's there and I think when we begin to get into this area, post-closure monitoring, if we are going to try and look at something like technetium 99, where the very difficulty of that and it's values, this is probably going to show up in this area as well.

DR. CARTER: So that's at least the supposition and is yet to be verified.

MR. WOOLFOLK: Yes.

DR. NORTH: How much data have we got now that's either at Yucca Mountain or near Yucca Mountain? You are well outside the statistical fluctuation range for natural background.

MR. WOOLFOLK: Okay, we have a lot of data around the Nevada test site. Unfortunately, the one part of the Nevada test site that nobody cared about, because nobody did anything in very much is Yucca Mountain. It's the clean area. In other words they didn't go out and do anything. And back in the NRDS days the attitude was very different. The amount monitoring and the techniques were very different. We have very limited data. The data we have is from community monitoring stations operated by the EPA. There was a gap in those to some extent and we've supplemented that gap. That's part of what we did when we laid out our program is fill in the holes in the southwest corner.

So, we don't have the data to be able to tell yet. It may be that statistical fluctuations of natural background are going to override any change. We are hoping to fall out. We will probably know within about three to five years whether there is anything to detect. I don't think I'll know any sooner than that, because the natural background fluctuates too much also.

DR. CARTER: Well, some of this you are not concerned

with the fluctuation in background, you are looking for some specific thing.

MR. WOOLFOLK: Yes.

DR. CARTER: The other thing, because the prevailing winds in general were entirely different direction. They were normally inactive as we conducted either towards the north or northeast or east in general.

MR. WOOLFOLK: Typically we lost about--I don't know how many, but there were five or six above ground test plumes that went the other way. And at NRDS, I don't believe they really worried much about that except when they discorporated the reactor. I think they were very careful about what direction that plume was. But, for normal operation they weren't particularly worried because the releases were not real significant at the time.

DR. CARTER: Well I would beg to disagree with you on that one.

MR. WOOLFOLK: Okay, that was based all on hearsay.

DR. CARTER: Those were well monitored because in fact they distributes some rather large particles that contained plutonium. Some of the fuels actually got ambulated in the process, so you could find those rather readily. And they were quite interested in where those went.

MR. WOOLFOLK: Okay. Next slide.

Collect the data to characterize the impacts of the

radiological facilities surrounding Yucca Mountain. In other words collect enough data so we can do SAR's and things like that eventually. Collect the data to implement the radiological protection of the workers, the public and the environment as required by the DOE orders. As of right now we haven't ever found enough activity that significantly causes an impact, but a certain part of our work area is in a DOE controlled area and we will have to deal with it as such until we can prove otherwise. And some of the work areas we have are actually--we have some controlled areas that belong to the past DOE activities.

We want to qualify data from the past at NTS to the extent practical. We will be looking at all the back past data and eventually trying to qualify it for use as much as possible relative to the QA question which we'll have to deal with.

And we want to implement a total quality assurance program to assure the viability of the data that we generate for the licensing process.

Okay, the technical approach we use in doing our activities if first we identified the area that potentially could affect the radionuclides of importance. We evaluated the potential pathways. And then we set up a program to monitor significant pathways. We are basically doing this work with a team of people. SAIC is the person who is

responsible for the major part of the program. EPA does all of our analytical work and collection of a lot of data and they provide us with technical advice and input and it's sort of a cooperative program. And then we use EG&G for all of our work on biota and the various biological pathways.

In addition, when we put out the RMP, we made an offer to the State of Nevada for them to come and participate fully in the program and be an equal partner. As of right now they haven't been willing to do that. It's still open. I still think it's a reasonable approach.

Okay, the first question we are going to take a look at, the technical questions are: What area should be monitored and for long? What are the radionuclides of interest? What the potential pathways are? What kind of equipment we should be using and where should it be located? And what's the potential impacts of site characterization activities on the public?

DR. PARRY: Steve, excuse me, could we go back to the previous slide?

MR. WOOLFOLK: Sure. I tend to talk too fast.

DR. PARRY: On your last bullet there, what did you mean that you requested the State of Nevada?

MR. WOOLFOLK: Okay, when we put out the RMP, we indicated that we would like the state to come and participate--

DR. PARRY: What is the RMP?

MR. WOOLFOLK: The radiological monitoring plan, excuse me. Acronyms. Yeah, the radiological monitoring plan, we indicated that we would like the State to come and participate. The State in their initial response indicated that they felt that might compromise their independence and we responded that we don't mean that they can't go do things they want to do beyond what we do, or vice versa, but we can share equipment, we can do whatever they want. They can have full access to all our data and any part of the program. Like I said, we are willing to participate that way. I think it works best. It's the approach we used when I worked WIPP and it seemed to be very effective there.

MR. JOHNSON: Can I respond to that?

MR. WOOLFOLK: Yes.

MR. JOHNSON: Carl Johnson, State of Nevada. I think Steve has accurately represented the points that we made in our comments back to them on the radiological monitoring program. Their response back to us that we could have access to the data and all those sorts of things, in our view through our oversight responsibility, we have access to that data anyway. We didn't need an invitation from them to participate in just this program alone in order to get that information. We felt that we should get that data anyway as a matter of our oversight responsibilities in the program. And we felt that

was our most appropriate and best way to serve our roll in this program is to oversee what they are doing on that activity.

DR. CARTER: Let me make just one observation based on my experience in the environmental monitoring business. In the past around reactors and most other things, if we had a year's worth or two years at the most with good data, environmental data, we consider that adequate. Now, some of these programs, Yucca Mountain being an example and WIPP to some extent have been delayed and delayed. Now, I can envision us of having 25 years or so worth of background data. Basically a lot of this is measuring zeroes or close to it. Now, I don't know what you do about that, because I dare say nobody will blow the whistle and say well, you know, let's call a halt and we will get the last two or three year's worth of data before the thing goes active if indeed that happens. And WIPP has the same problem.

The environmental evaluation group is doing independent studies. They are spending a substantial amount of money and certainly WIPP itself is again spending a substantial amount of money. And you can almost predict from month-to-month what the data are going to be without ever running them through the analytical laboratory.

Anyway, a question that somebody might ought to think about.

MR. WOOLFOLK: We will address that in a minute.

DR. PARRY: You don't feel that there's the necessity for additional baseline data as far as radiological monitoring?

MR. JOHNSON: I didn't say that. I think that there is a need for additional and that's what we made in our initial comments. Because, we think there are some sites that need to be--monitoring sites that need to be activated that aren't being activated in this program.

DR. PARRY: Steve, couldn't that have been done?

MR. WOOLFOLK: Yeah, if they want to come and tell us what they want. To the extent possible in the new RMP I have answered the comments I had gotten from them and we are trying to do what they suggested. We are willing to go to any reasonable length to get the monitoring data everybody thinks is necessary.

DR. CARTER: All two decades worth?

MR. WOOLFOLK: No. Five years is my guess. That's all I need. After that we should stop for awhile.

DR. NORTH: Well is the issue some specific locations just to draw out a little more discussion on this issue?

MR. WOOLFOLK: I don't know. I'm not sure what he was referring to.

MR. JOHNSON: There's a couple of things. The main issue or one of the main issues is location. There is also some concerns over the approaches--the monitoring approaches, the

instrumentation and that sort of thing. As I remember trying to think of some of our comments, there still is the view that we would like to have some sites of our own to do an independent calibration so to speak, of their monitoring results. Because right now there is no vehicle for any independent calibration of their results.

MR. WOOLFOLK: I'm going to add additional monitoring stations if people feel they are appropriate. Eventually we also are going to ask the NRC to give us the similar type input. The RMP went to them during the site characterization phase and so far we haven't had a chance to talk to them about it.

To deal with the first question, what's are basic area of interest and what kind of time period is adequate? The first question we looked at was well what's the appropriate area? We have what turns out to be a relatively benign facility. The classic area is 80 kilometers. We certainly will not have any impact beyond 80 kilometers, but we do have one additional requirement. In 10CFR960, you are required to monitor the nearest urban area and thank goodness Las Vegas qualified because it could have been LA, which would have been rather embarrassing.

We had a difficulty with this. This is not as clear as it sounds. It's not got the right population density in a lot of the areas.

DR. CARTER: In the selection of this 80 kilometer circle, or indeed that comes from reactor work over the years.

MR. WOOLFOLK: Reactors and DOE general requirements, yeah.

DR. CARTER: Yeah, but the question is, where you've got a system that's quite different as you point out or wouldn't be relatively quiescent for the other reactors but the energy focused, if you will. How was the number selected? Is this just the path of least resistance that they used, so let's us use it kind of thing?

MR. WOOLFOLK: Yeah, the reality is probably 20 to 30 kilometers is the most I can predict is an effect. The regulatory environment is such that I doubt very seriously that anybody would accept that. So, we went to 80 kilometers. It's consistent with everybody else. And actually there is a slight glitch on that because it turns out an 80 kilometer circle just missing the city of Pahrump in a major agricultural area in Nevada and so we added four kilometers so we can say, yeah, we will monitor that as well. The monitoring stations already is in existence so it's not a major impact on our program, but it does give us data from all of these areas.

The period for which we need to get background data that actually kind of addresses your question, is that we looked at, well one to two years it typically what you

collected at a pristine site. We think that if we are getting time changing backgrounds right now that are not related to just radioactive decay because of material coming down from plow share or from NTS, or from material deposited from some other mechanism, we should be able to see it in five years. At the end of five years we should have enough data that all we would need is one to two years with a verification for start-up.

Now, when that five years worth of data has to be done to have it in time to prepare the DEIS, depending on when you assume we are going to have to do that to end up trying to figure out what data you are going to back off from. Right now we are looking at we go ahead and start in 91 and get our five years with the data and then we'll see.

This is the area that's affected just so everybody has a feel for it. As it turns out there is a low security prison right here just outside the 84 kilometer circle. You'll see that when you go in. This is Yucca Mountain. This is what we refer to as near-field, four kilometers. When we use the word near-field, we are talking four kilometers out. Much beyond four kilometers--beyond four kilometers we call that far-field. Go ahead and go to the next slide.

The next question what kind of nuclide should we be considering when we do this work? What we did was we sat down and we looked at first of all--we looked at 40CFR191 to see if

it had any special requirements. And unfortunately, some of things--they identified some rather unique isotopes in Table 2, which are not things that people normally monitor for us, it's just Tech 99. So, we looked at the isotopes specifically in Table 2. We also looked at isotopes, potentially they are from past NTS activities. We looked at potential releases from projected NTS activities such as the slow release of Krypton 85 and stuff like that.

We looked at radionuclides that are projected to be in the waste if this is chosen to be a site. And then we looked at the natural occurring radionuclides we also have available on the site and then did a scoping pathways analysis to try and narrow down our list as much as possible when it came time to do the actual analysis.

You have a series of tables in your handout. I would suggest not going through them on the board, that list all the radionuclides we identified as potential for the pathways analysis. If you have a question about it, I'm willing to go through it. It's in the RMP and which one of those criteria it met is listed. I don't know that it's useful unless somebody has a question.

DR. CARTER: Yeah, put the one up that has--

MR. WOOLFOLK: That has a typo in it?

DR. CARTER: Well, I don't know--I think it's got an error in it. I'll challenge you on whether or not you mean

zinc--not zinc but zirconium niobium 93 or whether you mean zirconium niobium 95. I'll challenge you publicly to that and you can let me know before the week is over.

MR. WOOLFOLK: Okay, let me go check and see whether that's an error on that table. That is a table right out of the RMP and it has not been revised since the first time it was issued.

DR. CARTER: Well, I'll still issue the challenge.

MR. WOOLFOLK: Okay, and I agree. I remember 95, but I was thinking 95 was short-lived and this is a long-lived thing that shows up in the HLW for some reason, but let me look. It's only in the high-level waste that we get--we are showing Savannah River, but I will check that and get back to you.

DR. PARRY: I note for instance that under spent fuel you look at a hundredth of a percent at ten years one percent at 10,000 years. Have you looked at the tenth of a percent at 1,000 years that's placed in 10CFR60?

MR. WOOLFOLK: This picks up all those isotopes, but I could look at that. The numbers come out pretty much--the identified isotopes come out the same. We have looked at that for other reasons. It doesn't change anything. The one percent is in there because it addresses the all the major long-lived isotopes that way.

DR. CARTER: By the way don't be concerned with this. I like to challenge people.

MR. WOOLFOLK: Oh, I understand. And zirconium 95 is a thing I normally associate with reactors. I believe there was some reason that zirconium 93 shows up in here for high-level waste and it's--but I will not guarantee that it is not an error. That's why I said there is probably a typo somewhere in this table, because I remember having fixed something in the new version and that's why I said that.

Based on the potential pathways to the public and worker safety impacts, what media should be monitored? And basically we did the pathways analysis. We looked at what's out there and what we ended up with is we are going to look at air and we will look at particulate noble gases, iodine and radon. Now the radon doesn't relate to environmental. It has to do with gathering data to support worker safety activities during the repository design. And the noble gas is mostly emphasis on the impacts that NTS could have on us as well as the iodine. The iodine we are talking about here is the relatively short-lived stuff that would come from a test.

DR. CARTER: Let me ask you a question about the radon. I don't have any idea what the thorium 232 and uranium 238 levels are, but I assume there's certainly some in the soil here. Just in the normal activities of construction and this sort of thing, because when you turn over the ground or bulldoze it or whatever you release a substantial amount of that radon. Have you done any measurements of that sort of

thing?

MR. WOOLFOLK: We have some preliminary measurements. I'll mention something here where we have found a problem with the system we are using. We are going to go away from Track Etch to E-PERMS, but our existing natural background runs about .3 pico curies per litre. We know from the work that was done in the tunnels up on the mesa that tuff happens to have a lot of uranium, a lot of thorium and a lot of other-- well you get a lot of radon daughter products out of it because it's relatively easy to diffuse through and it turns out to have a higher output than granite, which quite often has higher concentrations and they do have potential for some concern about working levels in unventilated areas. So, when we get underground we are going to have to worry about that.

The ambient background on the surface is .3 pico curies per litre is not particularly high, it's not real low--

DR. CARTER: It's not the national average.

MR. WOOLFOLK: It's not the Reading prong and you are not going to see things like that. But that's the kind of number we've seen so far. We will have a better number because basically they Track Etch stuff is not really able to go down. That's right at the end of the minimum detectable activity for it in spite of what Teredex told me, that they could go down a factor of three more.

Now, we will also look at soils and drift walls.

The drift walls again related back to the radon. In the biota, we will be looking at animal forage, an indicator species and then we have the EG&G people will be reviewing the data the socioeconomic people are collecting for us, so we can identify what agricultural products exist in the area and what's valid to look at. Once we have that data, then we will look and see what kind of modifications we need to make to the program.

In addition, we will look at ambient radiation using TLDs, high pressure ion chambers. We will do in-situ gamma spectroscopy. EPA currently does public dosimetry and we will use the confirmatory use of that data and before the actual-- if we could get selected as a site and probably within the next four to five years, we'll get an aerial survey done by another part of EG&G it turns out.

DR. CARTER: The public dosimetry, this is TLDs worn by members of the public various places?

MR. WOOLFOLK: And we don't see any need to increase it but there is quite a bit of it done in our area and it does provide confirmatory data.

This gives you an idea of what we are looking at. This is a one time soil sampling thing at each sampling location. Up here this is the near-field samples, far-field and these are samples that we added to the system to supplement the existing EPA system and these are samples that

already existed out there and that we are just going to use the data from. Go ahead, the next one.

What equipment should be used and where it should be located? First of all we have looked at NRC and the DOE guidance documents to see what they recommend, recognizing that it's typically media specific. In other words, what kind of sampling I'm going to do and circumstance specific about what location you want to put it at and things of that nature.

In addition we'll look at the technical guidance out there such as ICRP, is now going to be part of the new DOE order and other NCRPs guidance to try and get the best available equipment using good technical practices and laid out on a grid consistent with recommendations.

We are going to try and use reliable equipment that approach state-of-the-art. We are going to try to stay away from state-of-the-art equipment because of liability problem. Quite often you can't put this in the field and make it work consistently.

Within the limitations specified above, we are also trying to stay as consistent as possible with what's been done in the past at NTS so that we don't have monitoring data that's completely inconsistent with each other.

Finally, details on exactly how this is implemented would be real specific in nature and I thought I'd just give you an example of how we select an air sampling location and

the data we use as input.

When we go to look at an air sampling location, what we did was look at where the potential sources of radioactive material were, what the prevailing wind directions are, what kind of agriculture is in the area, what the near-field topography is, what the population distribution is in that area, what the significant present and future Yucca Mountain project activities in the area will be, the location of an existing air sampler, and also the meteorological monitoring activities and also the location of the NTS program monitoring equipment. Potential future releases that might occur such as if you looked at the exploratory shaft as a potential location for the exhaust shafts for a repository if it's selected. it's sort of a standard approach. The density goes up as more people are being protected.

When we look at what our results are, basically what is the impact site characterization? From what little data we have right now says that the doses are well less than a millirem per year from all our activities. What that really means is that they are well below detectable levels and I can tell you that they are below that number but above that number--how far below that number I haven't had data because it's below MDA, minimum detectable activity.

To day no significant increases are projected during the site characterization phase of any of these releases. We

will continue to monitor and verify it. It isn't a problem. Our current results indicate and so far all we can verify is the presence of natural occurring radionuclides. We have strontium, uranium, plutonium 239 results that approach the MDA. In other words we are bouncing right at MDA so I can't say it's not there. It may or may not be there. It wouldn't be surprising to see it. We are looking at improving our analytical capability. Right now we are using the routine analytical processes and now we are going to begin to improve them as we go along.

And the analytical capability at EPA is being expanded and improved to address all the radionuclides addressed in the radiological monitoring program and to drop the MDAs down to where we can get a little more accurate idea of where we are at.

DR. CARTER: Well, obviously to estimate a number like 1 millirem per year, you are doing that on the basis of modeling already?

MR. WOOLFOLK: Yes. That's based on air dose EPA standard.s

DR. CARTER: Let me ask you a question. You mentioned the differences in the DOE orders going into the ICRP system. Of course, you realize that 40CFR191 still deals with dose equivalents.

MR. WOOLFOLK: Yes.

DR. CARTER: Not only that but they deal with does equivalents on an organ basis either thyroid and/or other organs other than the whole body.

MR. WOOLFOLK: Yes, they didn't make things very simple.

DR. CARTER: How are you going to mach these two systems of units up?

MR. WOOLFOLK: Well hopefully, when the NRC finally decides how they want to do it, they'll tell us, but for right now we will do the calculations both ways. In fact we'll do the calculations three ways right now. I'll do them ICRP-2 based on how 40CRF191 wants it and how DOE wants it. Now, hopefully the NRC in their new regulations will clarify that to the extent to where we can all be doing one thing or at least down to two, but I don't see that we have any choice right now because everybody has their own interpretation of how they want to implement it.

DR. CARTER: And I think the emphasis should be the other place. I think the NRC has to conform their regulations to meet EPA standards.

MR. WOOLFOLK: Except that the EPA document is now under revision and so they can provide input into trying to get--

DR. CARTER: But that still doesn't remove the responsibility. It's going to be NRC has to conform to EPA standards, whatever those happen to be.

MR. WOOLFOLK: That's true.

Okay, basically one of the things we have to emphasize whenever we did the radiological program is consideration of quality assurance and we like to try and implement what we call Total Quality Program, where we don't only deal with what QA says, but we emphasize the QC of the sampling, the input directly from the people in the field to try and maximize what we get. Basically, we are trying to change your program to fit the quality assurance requirements as we go and maintain currency. The radiological data collection has to be consistent with all quality assurance requirements. The data collection program is now being revised and updated to do exactly that.

We are also going to go ahead and use imposed guidance on some things like how they write their procedures to try and make them as consistent as possible with other NRC licensees.

Some of the other things that have shown up is the TLD program currently used is based on a Panasonic system. The National Bureau of Standards has found an Alanor system being much more effective for environmental monitoring and we're going to go ahead and evaluate that and see if we shouldn't go to that system. One of the things we found was that the Track Etch materials we were using did not have the sensitivity to make the measurements down at the level that the vendors usually estimate and we were getting things where

zeroes could easily be interpreted as positives and vice versa. So we are going to E-PERMS based on the EPA and this is Office of Radiation Programs, not the Nuclear Radiation Assessment Division, which works here.

Their experience in monitoring outside is to use short-term E-PERMS which means--really means high-sensitivity E-PERMS and do your monitoring that way and we think that's going to work.

DR. CARTER: Doesn't ORP still have an office here in Las Vegas?

MR. WOOLFOLK: Yes, in fact, it's an office. It's doing a lot of the radon work on instrument verification and what we do and the way we will test our E-PERMS is we use their chambers and work with them to get our calibrations. And we have very wide access to be able to get high quality calibrations because of that. It helps our program a great deal. We get a lot of input from what they are doing.

Okay, the status of the program, we started near field monitoring back in 9/87. I terminated near field monitoring in 9/88, because we were unable to keep the procedures current and we won't be restarting until about 5/90 because of the various changes in all the programs. Hopefully when this all is in place we'll be able to run forever then.

We currently have about 37 far field stations

established and operated by EPA and there's also about 33 joint usage stations identified which are the old NTS stations that we'll use data from.

And we are attempting to implement the program completely by 1/91 and then collect our five years worth of data that we think is necessary to give us a good characteristic of what this site is like.

The rest of the status is we did issue a preliminary site characterization radiological monitoring plan back in '87 to gather some very preliminary data that's been overridden by the radiological plan which was issued in March of '88. This is just a safety plan to allow us to work in the field and make sure we have the proper controls. We also have an EFAP that was issued consistent with the rest of the program. And we also have training modules we developed and implemented for each type of monitoring we do to document the training in a manner consistent with QA.

We basically also established a support facility out in area 25 from which we operate and the radiological monitoring people operate and the EG&G people operate so that the various support activities for our program are already in place along with most of the equipment and we issued one data analysis report and we have another one in preparation. The data is very preliminary in both of those as the program is still being fully implemented.

To give you an idea of the interdisciplinary interactions, we currently require data from the meteorological monitoring program to interpret our data. We use the data from the air quality program--or we will be using the data from the air quality program, actually, to confirm our particle size data that we collect out there. They are going to be collecting P-10, I believe that's the right terminology data, which is--PM-10, which is data that tells you what the fraction is above and below 10. I'm really more interested in what's below 10 and the breaking that down into the various particle size distribution.

The terrestrial ecosystem people at EG&G do all of our collection of biota samples. They also provide us input on what the appropriate pathways to be looking at is in the biosphere. They helped us identify an indicator species that was very indigenous to the area and state and very localized area so we can characterize radionuclides that way.

In the environment, the socioeconomic people are assessing--are providing us population distribution data, agricultural data and helping us to identify potential pathways to man so we can assess the impacts of the various activities in the future and also as well as to figure out what pathways we should be using relative to agriculture.

From the hydrological monitoring program, we are going to be collecting our water samples. Most of our water

samples we won't collect, we will simply have a split made at the time it's taken by the GS people or the Livermore people or so on and so forth. Lots of people will be taking samples. We have them analyzed at EPA.

We will also try and archive some of the samples for future use recognizing we are going to lose all the volatiles, but we probably will not be able to economically analyze all the water samples. We will analyze a representative sample and hold the others.

We get data on local catch basins from the archaeological people who identify the places where the deer and the various animals will be watering, so we can actually monitor for any activity in there. The USGS will provide us with data on soil, rocks, ground water, movement, the models for that as well as the radionuclide content in some of their programs associated with site characterization.

And then the meteorological monitoring, terrestrial ecosystem people and the radiological monitoring people share equipment and facilities to the extent that's practical. And that should be everything.

DR. CANTLON: Well, I think it is gratifying to see evidence of better integration as you had indicated we were going to see. I think this is an improvement.

DR. CARTER: I'd like to comment I am pleased to see you at least considering some finite amount of time that you'll do

environmental monitoring rather than stretching it out forever. I didn't say I absolutely agreed with your five years, but at least it's more reasonable than continuous and forever.

MS. DUSSMAN: All right, my name is Monica Dussman. And I will be giving the presentation on soils program for the Yucca Mountain project.

As you've heard earlier, we have a requirement to acquire soils data for a variety of purposes. Primary amongst our requirements are the tenants of the Federal Land Policy Management Act. And as a part of our land access agreement, DOE is bound to provide for several things in the area of reclamation. First we need to make sure that all areas excavated are reclaimed through the use of topsoil, topsoil stockpiling.

Also, in addition we are bound to reclaim any mud pits that we might create. Third, we have to reclaim all areas disturbed to the extent practicable. And in order to do that, as you heard earlier this morning in Ken Ostler's presentation on reclamation, we are required to collect the appropriate soils data.

We are about to kick-off our soils programs. We have spent the last year developing that program. As Wendy Dixon told you earlier, in our area the Soil Conservation Service is the leading repository of soil data information.

And the DOE is in the process of initiating an interagency agreement with the Soil Conservation Service to come aboard and formally become one of the project participants in this area of work. The Soil Conservation Service and EG&G together will be doing the bulk of the work in the area of the soil program.

And of course, as you heard this morning, those areas, soils and reclamation are very closely tied together. We are in the process and have published a series of documents and are about to release another document which together describes soils and reclamation and those are the reclamation feasibility plan, reclamation implementation plan and the soils environmental field activity plan.

So the objectives of the soil program are to provide the data necessary to describe the soil resource in the Yucca Mountain area. This represents a requirement for general, regional information. We are also asked to delineate the extent and distribution of soil groups. This addresses primarily the laboratory analysis portion of our soils work.

Third, we are bound to support the reclamation requirements in the area of soils resulting from land access agreements, and this gets us to the need for site specific detail as Kent alluded to earlier.

This results in a three-pronged technical approach. Number one, we need to conduct a regional soil survey to

complete the soil mapping for the Yucca Mountain Region.

Number two--and the second and third technical approach objectives address very site specific concerns. First to conduct the preactivity soil investigations which will take place at the same time as the terrestrial preactivity surveys to provide site specific soil information. Third, we will be conducting pre-reclamation soil sampling and analysis just prior to reclamation. So as you recognize there is a time differential there.

This results in three technical questions that can be derived from our primary objectives. How are the soil map units distributed to Yucca Mountain? What is the composition of the soils found at Yucca Mountain? And what is the suitability of the soils for reclamation? And it puts it in these technical questions are the fact that Soil Conservation Service and EG&G will be working together. The Soil Conservation on the regional picture and EG&G on the site-specific picture and requirements. And of course all of that data will be shared internally, and also provided to the reference information base that Wendy alluded to earlier for use by other components of the program such as the design people.

We will be the first ones out there gathering soil information. And although the design effort requires soil information, they are not projected to start that for another

couple of years. So, we will be providing the first cut for them.

Under the first question, and before I get into the bullets or the details, no overall regional soil survey has been conducted for the entire Yucca Mountain area. Certain areas have been surveyed by the Soil Conservation Service, but a blanket survey does not exist. The primary effort of the SCS will be to fill in the gaps.

We have some soil survey information. They have mapped portions of Nye County. Right now that data exists in only a preliminary fashion. The EPA has conducted soil investigation in areas 15 and 18 at NTS, and Holmes and Narver have done some random soils work in area 5, but it's extremely limited. And the data while we will use it as confirmatory data, it is not enough to base reclamation work on.

So, our first order of business is to conduct the initial field studies to develop the initial soil survey legend, and to determine what further locations are required to complete the regional picture.

The soil survey itself will meed order 3 national cooperative soil survey standards. The level of detail required for a survey is dependant on the intensity of the proposed land use. Now, generally farm land is given order 1, a high intensity type of survey and then the range goes down to an order 3, which is generally applied to range land. Now

we have had a determination from the Soil Conservation Service that site characterization will not affect prime or unique farm land. That the lands that we are addressing fall in the category or range land, so we will be implementing an order 3 survey for the regional picture.

The products of that will consist of map units to address the soil associations in the area. We will cover the DOE, U.S. Air Force and BLM lands in the region. It will include the excavation of trenches to assist in field mapping of representative soils. And, as I said, we are now working out the interagency agreement with Soil Conservation Service, so the specific design of the survey and the specific locations have not been finalized. We really are just in the process of compiling that.

And lastly, the survey will be conducted according to methods used by the Soil Conservation Service in their standard practices for conducting national cooperative soil surveys. The resulted documents or products from this will include a soil map and a legend, soil descriptions and input to use and management plans, which together with this site-specific effort for reclamation will contribute to the reclamation plans.

The status of this effort, as I said, we are putting in place the interagency agreement. We expect that that will be accomplished by May 1990. The technical procedures which

are really the methods and procedures used in conducting the national cooperative soil surveys will be written in the form of technical procedures because as Wendy said earlier, we really all do fall under the quality assurance umbrella. Some programs may require more intense scrutiny by quality assurance than others, but we do have to formalize in every program, the procedures that we work to. We are held accountable to be able to reproduce what we have done. To be able to have our work stand up to scrutiny. So those procedures will be rewritten in the form of technical procedures, submitted to the project office for approval.

In addition, Soil Conservation Services require to generate an operations and safety plan for the conduct of their operations. This will be completed in June and we expect approval by July.

The intent of this is to try and get the soil survey, the regional survey done as quickly as possible. We need the information to support reclamation, but we would like to be able to accomplish that prior to the initiation of major site disturbing activities. So, we are putting a real focus on this effort to try and get that done. We expected to be done in one smooth, series of actions. We would like to begin and not end it until we are finished.

We expect that the initial field studies will take two to three weeks. This is the original scoping of the

effort. Then the Soil Conservation Service, as we all do, by the way, will submit a request for site access. As Wendy told you earlier, all of the activities proposed for the project must submit a request for site access. This applies to our programs too. Any monitoring stations that we would like to have sited, must go through the same approval process that site characterization activities do. And I think that that's an important point to make, because we ourselves are subject to the same requirements that everybody else is subject to on the project.

That means if we want to site any monitors for whatever we program, we must also go through the preactivity survey process. And we must also prove that we are not having an adverse effect through our own monitoring actions.

We expect that the field mapping and sampling effort will take approximately three to four months and three months after that we will have our final report prepared.

Technical question number 2, addresses primarily the laboratory analyses portion of the soil survey effort. It itemizes what we expect today to be analyzing. Of course though, as we work out the statement of work with Soil Conservation Service, we may find that we want to add to this list of soil and the properties that we will be examining.

DR. CARTER: Who does the lab analyses on soils?

MS. DUSSMAN: I'll get into this a little bit later, but

we have had some soil sampling done. And Colorado State University has done the analysis. As the project entertained a series of proposals from a variety of laboratory analysis capabilities and they were determined to be the ones with the most specific ability for this purpose and to fulfill the requirements for reclamation.

That's a very straight forward list of chemical properties that we expect to be examined. The interpretations that we expect to be developed based on those properties will included taxonomic classifications and horizon characteristics. These results will be describe in a use and management report which will describe the soils with respect to their potential suitability for different uses such as crops, range wildlife management, it will have an aspect of water management to it, perhaps some engineering index properties. Again, we need to work on what we will be looking for and in conjunction with Soil Conservation Service.

The status--currently some soil samples were taken during preactivity surveys. And while they are not specifically directed at the regional soil survey, they will form a data point. The analysis on those soil samples was conducted in 1989 and we expect that the samples that will be taken this year in the regional soil survey, will be completed in late 1990.

Now we reach the interface with the reclamation

program. What's the suitability of soils for use in reclamation efforts? We will be, as I stated, we will be conducting preactivity surveys and we will be--the soil samples that we take will help to determine the use suitability for each soil series within the survey area. We have two types of very site-specific soil analysis that we will be conducting. And the first conducted during the preactivity survey will determine the volume of suitable soils available for that soil reconstruction and what is the amount of soils available for salvage.

Secondly, those preactivity surveys will also provide data for soil properties to allow estimates to be made regarding reclamation potential.

Now, the second type of site specific analysis will involve pre-reclamation soil sampling and analysis. As Kent alluded to earlier there are areas there that have been disturbed. We will be looking at those disturbed areas. We will be doing sampling and analysis of the unconsolidated materials at the disturbed sites. In addition, for those areas that do have stockpiled topsoil materials, or in the future for those stockpiles that we create ourselves, we will be doing sampling and analysis.

And I should mention also that the type of preactivity sampling will depend on the location and the geography of a particular area.

The status right now, as I said, we have conducted some preliminary soil sampling analysis as a result of preactivity surveys. Those results were transmitted to EG&G for use in their reclamation suitability assessments. The environment field activity plan for soils was released last month. It details the intent of the soil surveys and the preactivity soil work. And the interagency agreement between DOE and the SCS has been initiated. We expect it to be finalized by the beginning of May.

And that's it. The interactions--we are missing our interactions slide as I think I have noted. We have interactions with the reclamation program, with other design features on the project. And of course, if there is another requirement, we will be providing all the information that we gather in soils to the reference information base, where it will be accessible by other participants.

DR. CANTLON: What would be the quality of the interaction with the people looking at the ecosystem features of the area?

MS. DUSSMAN: Well, it happens to be the same folks that are doing the work on the reclamations and ecosystems. It's EG&G. So, when we transmit the data to EG&G or when the SCS is working with EG&G, it's a very close interaction.

DR. CARTER: I have a couple of things to ask you. Let me ask you Monica, I noticed in the analyses that you do on

the soils, you indicate that you've either done or intend to do cation exchange capacity, but you don't do anion exchange capacity. Why is that?

MS. DUSSMAN: This was a preliminary listing provided by the Soil Conservation Service. And I believe we have already have some internal comments that we want to add to that list, so we will be sitting down with them as soon as that interagency agreement is in place and finalizing that list. It is a preliminary listing.

DR. CARTER: Some of the things that you are going to be concerned with as far as radionuclides are obviously anions.

MS. DUSSMAN: Yes. Right.

DR. CARTER: The other question I had was about the fact that rather than the Soil Conservation Service, I assume they may get involved in the analytical side of it, but I was sort of curious about the use of Colorado State University to do what I consider to be routine laboratory analyses of soils. Why is the University getting involved in a routine analytical job if that indeed is what it is, or is it part of a research and development or whatever? Why don't you go to an outside commercial laboratory.

MS. DUSSMAN: I will make a comment and then I will then ask Ted Doerr from EG&G to add to that. When we looked around last year for a facility to handle that type of analysis, we had a tough time finding a facility that could match the

requirements or the capabilities, I should say of Colorado State University.

In addition, they also have a working relationship already with EG&G and have done quite a few sample analyses for EG&G in the past. And Ted, if you would like to add to that.

DR. CARTER: By the way I am not calling into question their ability to do these and do them extremely well. I was just calling into question a lot of universities don't like to get involved in routine analytical things.

DR. CANTLON: But the land grant universities do it conventionally for the agricultural communities of their State.

DR. DOERR: Colorado State University is known throughout the western United States for their superlative work in soils analysis. Their soils laboratory is a feature--particularly unique feature of most universities. Because we are so concerned and interested in maintaining quality of our data sets, that was one of the principal reasons why it was recommended to at least evaluate Colorado State University's laboratory.

Secondly, as Monica indicated, we already have a working relationship with those individuals, and based on that past performance of their analyses and the consistency of their analyses, it was an overwhelming choice related to other

laboratories that can also provide those analyses.

And the final item is that it is costly to set up a complete soils analysis lab and therefore to minimize cost and to reduce duplication it was believed that this was the best way and the most efficient way of getting these analyses accomplished.

DR. CARTER: I think you still miss the point. The point I'm trying to make, great university does great work. I have no problem with any of what you said. The question is, maybe I should direct the question to Colorado State University, why they want to be involved in what I would consider a very routine analytical program. I know most of them want research and development funds to train students and so forth but not to compete with private industry.

MS. DUSSMAN: Well, they found a niche and filled it and they are getting good business.

DR. CARTER: Like I said maybe the question is directed to the wrong group, so I'll withdraw the question.

MR. PARKER: It's probably worth noting Dr. Carter, Ted Doerr did not attend Colorado State University.

DR. CARTER: I didn't even insinuate that he did. No, he uses too good of english for them. I withdraw that also.

No, they are a very good school, in fact I know a number of very delightful people there.

By the way, I'll tell you a little store a few

months ago when they had the basketball tournament in the county that UNLV eventually won, and I've got mixed emotions having kids that attended UNLV. Anyway, it turned out that Georgia Tech was in that and that's my school or one of my schools. Anyway, I wrote my colleague here to my right several days before Georgia Tech played Michigan State and I apologized for Georgia Tech having beat them. So, this was before the game, by the way. And since that time he's accused me of the fact that we don't know how to keep time at Georgia Tech.

All right, why don't we take a break and we will be back at 25 minutes until 4:00 p.m.

(Whereupon, a recess was taken off the record.)

DR. CARTER: Our next presentation on air quality will be given by Grover Powell.

Grover?

MR. POWELL: Thank you, Dr. Carter. My name is Grover Powell. I am the meteorologist on the project. Since there have been several references to meteorology, now is your chance to take potshots.

For the Air Quality/Meteorology Program we have four objectives. Like the other field programs, we are characterizing meteorology of the site. We are also monitoring the effects of site characterization throughout the site characterization process. We'll gather data concerning

the background concentrations of pollutants during the site characterization process. This will be both to get a background and also find out the changes that are occurring as a result of site characterization, and as Steve Woolfolk referred to, we do provide directly to the radiological monitoring program inputs for their dose assessment modeling.

As referred to last September, for the ongoing program we have now, there are five sites specifically we use for meteorological data gathering. Two of those sites also have co-located air particulate monitoring ongoing. We are also acquiring regional meteorological data so that we can then tie, in the third bullet, the regional meteorology with the site specific data that we are gathering.

We have essentially five technical questions that we're trying to answer. First, where does the stuff go in and around the Yucca Mountain area as driven by the winds? Second, what are the magnitudes and intensity of storms that affect the Yucca Mountain area? This is primarily for purposes of the surface facilities that will be potentially built out there. What is the effective precipitation that occurs in the Yucca Mountain area, and in this endeavor, we're working with the USGS. What effect will site characterization activities have on the existing concentrations of pollutants in the Yucca Mountain area? And lastly, this is a question that the Board readdressed, you might say, as a result of the

environmental assessment; what will be the potential changes on the visibility as a result of the site characterization?

DR. CARTER: Grover, let me ask you, what about the scenario as far as the depth of the winds you're interested in? Are you primarily interested in surface winds or-

MR. POWELL: Primarily, although we can obtain at one location some upper level data that is pretty limited and it doesn't really pertain too much for what we are worried about, which is--and this is why the program was originally set up, for radiological dose assessments. We don't have too many people living at 500 millibars, for example.

On the first technical question, which is concerned with the dispersion, we're mainly looking at continuous monitoring of the parameters, the standard parameters you have with any meteorological monitoring program; the winds, the atmospheric stability, temperature primarily for stability purposes, and using that information, we'll put that into various types of very simple gross models to get an idea--a first guess, if you will--of how well we can detect where the winds are taking the material and then, if necessary or if required, we'll perform a more detailed analysis. And this is illustrated by this slide right here; a simple first guess, and then a more refined guess, if you will, or I should say estimate. I shouldn't use the word "guess", I suppose.

This is an example of--two examples of more refined

models that can be used after that first very gross model end run. The first, Valley 5, is primarily for use on area sources and specifically it can be used in areas of significant terrain relief. Complex 1 specifically is for point sources, but it also takes into account terrain.

DR. CARTER: Are these models you've developed, or you just take them from someone else or adapt them or--

MR. POWELL: These models were not developed here specifically. Complex 1, interestingly enough, was developed by the air quality analyst who used to work on the program. Valley 5 is a program that was developed back with Bechtel in San Francisco.

The status right now of the program is that we are continuing to gather the data. The data gathering always goes on. We are in the process of siting a second 60-meter tower in the Crater Flat area. That process will begin in June of '90, this year, and I'll illustrate on a succeeding slide exactly whereabouts in Crater Flat we're talking about, and the meteorological data analysis has been delayed while we upgrade the procedures to reflect the changes that have occurred in the quality assurance area.

DR. NORTH: Is this specifically addressed to the two models you just mentioned; Valley 5 and Complex 1?

MR. POWELL: No, sir. No. That process has not yet begun. This is basically referring to the fact--how we handle

the data from the time we collect it to the time we actually analyze it. There will be another slide later on that will more specifically outline where the hang-up is, if you will.

Our accomplishments to date, in 1985 we released the first issue of the Meteorological Monitoring Plan. This plan was issued for both the Nuclear Regulatory Commission review, for the Department of Energy review, for the FAA review, and also for the Nevada Department of Environmental Protections review. Their comments were incorporated and in 1988-89 it was reissued to reflect the upgrade to include the particulate monitoring program.

We have collected over four years of data. That data gathering is continuing, once again. Three years of data have been analyzed to this point and you saw some of the results of that data back in September, and pending some upgrade, again, of the procedures, we expect to be able to analyze the remainder of the data up to the current time, and we also have implemented, as in the other programs, a total quality assurance program.

This is the area of Crater--this is the Crater Flat area, including some surrounding boundaries. At this present time, we are looking approximately in this area to site the 60-meter tower.

DR. NORTH: Would you point that out again, please?

MR. POWELL: Approximately in this area.

DR. NORTH: So you don't have a specific site determined? You're still working on that?

MR. POWELL: That's correct.

On the technical question, Issue 2, concerning the intensity and magnitudes of storms, at this point we are limited more or less to what has already been done in the past; specifically, a report put out by Dreiser and Eglington from Sandia Labs, where we have some information summarized, basically, on the intensity of storms that affect the southern Nevada area. What we hope to do in the future is, utilizing data that we're going to gather regionally, and also to some limited extent at the site, we will then try to classify more specifically the storms by type so that then that information could go to the design information people so that they can then design the facilities appropriately. We also will determine approximately what the intensity of the storms are on a recurring basis.

DR. CANTLON: And that data being used for that are all meteorological data as opposed to geological evidences of prior flooding and similar events?

MR. POWELL: Yes. That's for the climatological folks to worry about.

Current status of the program, we have received from the regional climatological stations--these are stations that sample once a day--all that information up to fall of '88. We

will issue another request to the regional climatic center in Reno, an update on that, plus we will be obtaining the continuous automatic data that's available from other networks, and also the few, in some cases far between, manned stations such as at Tonopah Test Range and also at Nellis so that we can have as complete a database as possible, primarily so that we can support the radiological folks as best we can, and we plan to begin that data analysis sometime during the next fiscal year.

On Technical Issue No. 3, what is the effective precipitation in the Yucca Mountain area? As stated before, we are assisting the U.S. Geological Survey in designing a network. I have some information that that information has been incorporated into a study plan which is just about ready to be released. We'll be providing some assistance on the analysis of that data for the extent that they need it, and we'll also be providing interpretive support as they require it.

DR. CARTER: What's effective precipitation?

MR. POWELL: Effective precipitation basically is whatever gets into the ground.

DR. CARTER: How far into the ground?

MR. POWELL: It's considered to be whatever can get into the groundwater table, and then percolate, continuing on down to the groundwater basin, I believe. Is that correct,

gentlemen?

DR. CARTER: So it's recharged data?

MR. PARRY: Is that the figure that's now used of one millimeter a year, or a tenth of a millimeter a year?

MR. POWELL: I believe it was five millimeters per year or--I know it was a very small fraction, something like .05 of an inch, a very small amount.

And I already anticipated this slide but, again, we assisted the USGS in developing that preliminary expanded network design for precipitation, and as far as we know at this point, the effort has been planned and as soon as they get funded we'll go ahead and get that going.

On Technical Issue No. 4 concerning the concentrations of background pollutants and what site characterization activities might do to change that, at the present time we're determining the background concentrations from those two sampling stations, and we will be adding criteria monitoring later. We will continue monitoring those items throughout site characterization, and then, like any other program, we'll subtract out the contribution from site characterization from the background.

Just to give you a little information on this--except I think I should go to the next slide to do it with--the way the program runs right now, there's a national schedule set up by the Environmental Protection Agency for 12-

day sampling, once every 12 days. We're doing it once every six days. The primary reason we're doing it once every six days is so we can support the radiological program with cascade impactor analysis. In other words, in between the regularly sample days, we will take one of our cascade impactors and you'll see an example tomorrow of what one of those cassettes look like. They will be put into one of the two co-located sampling stations out at the main site, and then that will be used as data for their program. That's why we have the more than necessary frequency for that particular portion of the program.

DR. CARTER: Let me ask you a question about that. How many stages does the impactor have?

MR. POWELL: Six.

DR. CARTER: Six?

MR. POWELL: Six stages.

DR. CARTER: And I presume the last one is a filter of some sort that catches--

MR. POWELL: It catches everything.

DR. CARTER: What kind of calibration data have you got on it in terms of--

MR. POWELL: We have--you mean how we actually started--

DR. CARTER: In terms of doing a good job and separating it into different particle size ranges.

MR. POWELL: We haven't actually run a cascade impactor

yet. That's been because of PMB. We're awaiting the approval of the procedures for the upgrade to the new quality assurance requirements.

DR. CARTER: But you've got one picked out you're going to use?

MR. POWELL: Yes, definitely.

DR. CARTER: Okay.

MR. POWELL: In fact, it's been sitting on my desk for over a year.

DR. CANTLON: Taking you back to the effective precipitation, are you using lysimeters to measure effective precipitation?

MR. POWELL: Okay, that's not for me to answer to, it's for the U.S. Geological people to answer to.

DR. CARTER: I think we're going to get another short answer; yes.

MR. POWELL: And as I already alluded to, this is the reason why the program basically has been somewhat delayed in the analysis portion, because we're waiting for that verification update to the software portion. When that has been completed, then we will go back and we will then determine where there is a need to revalidate the data. We don't anticipate that problem at this point.

From the data that we have gathered--this is just total suspended particulate and PM-10--some very preliminary

analysis was done last year and I will just, at this point, let you know that the rough calculations on the range were between 10 and 30 micron--milligrams per cubic meter.

DR. CARTER: Would you say that again?

MR. POWELL: 10 to 30 milligrams per cubic meter. Approximately half of that is PM-10. That's just for your information; very preliminary. And we plan to install next month the criteria monitoring equipment. I know that Dr. North likes ball park figures so I thought I'd roll that in.

We have in effect an environmental field activity plan for air quality. It was released two years ago. It will be shortly updated, basically to reflect the criteria monitoring equipment. We have collected one year of site specific data for the particulates and, again, awaiting the approval of the new procedures, the upgrade, we also have in place a total quality assurance program.

This is a list of pollutants that we're monitoring for. The top two, of course, are particulates, the bottom four are gases.

And this is the technical issue that Dr. North raised last September and we'll spend a little time with this because I think it's rather interesting. The environmental assessments show that from all contributions of site characterization activities, approximately 13 tons per year of particulates would be emitted. The limitation for a

prevention of significant deterioration review is 250 tons per year, far below, well over a magnitude. The estimate particular emissions may also be compared to other activities that are going on and about the Yucca Mountain site, such as mining.

Let's take a mine that's presently in operation just west of Beatty, Nevada, which is Bullfrog. Bullfrog approximately puts out about 11 to 15,000 tons of particulates per year. This is over three orders of magnitude greater than is anticipated to occur from site characterization activities, and--

DR. NORTH: So change the first "less" on your slide to "over"? Actually, you've changed it from the handout that I have, so--

MR. POWELL: Oh, you didn't get the update. Okay. The interesting thing, of course, yesterday, if you were noticing all the dust in the air, is even Bullfrog puts out far less than is present over Las Vegas during one of those episodes.

DR. CARTER: I'm sort of intrigued by your three significant figure estimate of particulate emissions up there. I presume you don't want to talk about that.

MR. POWELL: Which portion, Dr. Carter? I'll talk about anything.

DR. CARTER: All right, be my guest. I was sort of interested in the regulatory limits, 250 tons, obviously

rounded to two significant figures. You've got an estimate up there that's estimated to three significant figures.

MR. POWELL: That was in the EA. I didn't write the EA.

DR. CARTER: You just used it in spite of your best judgment.

MR. POWELL: In spite of my best judgment. I follow orders.

We will maintain monitoring of particulate emissions as site characterization activities commence, and then, again, going all the way back to what we are trying to establish, we're trying to get a picture of what the atmosphere is doing to all the emissions that are occurring throughout the site characterization process. In other words, what does the weather do? How does it interact with the particulate emissions, and also the gaseous pollutants when we get to it.

Again, the status is, the EA projected no significant impacts during site characterization. If it is necessary as a result of EIS scoping, we will readdress the visibility issue.

The meteorological program, as already pointed out, doesn't work in isolation. We interact with other programs; the radiological, primarily for dose assessments. We interact with the reference information base primarily to provide background data for the USGS and EG&G. As referred to, we will access all available meteorological data from all of the

networks, and we also share field facilities as practical with Terrestrial Ecosystems and radiological.

That concludes my presentation. Are there any questions?

DR. CARTER: Just an observation. I think we'll be quite interested in the data that's accumulated and the calibration, and so forth, for the cascade impactors as far as the particle sizes they may collect and how well they do that particular job. Those things have chronically had problems with them. Now, whether they've all been resolved or not, I'm not sure. That's just a comment.

DR. CANTLON: Have the Ecosystems field studies asked for any kind of modification in your meteorological data taking?

MR. POWELL: No, sir.

DR. CARTER: Do you coordinate your activities at all with the NOAA group that supports the test site?

MR. POWELL: We have requested their assistance in obtaining their data set from their meteorological data acquisition system, and I anticipate getting that data later this year. We have also coordinated with them to see if perhaps we may be able to utilize some of their resources because our program right now is somewhat limited as a result of the budget reductions, so we're anticipating--or hoping, I should say, that perhaps we can get the use of some of their equipment out there. They do have a number of stations ready

to go out in the field. It's just a question of coordination and authorization, getting the money into the right hands, and so forth.

DR. CARTER: All right. Thank you very much.

Our next presentation will be given by Thomas Greider. It'll be on the Native American studies.

Tom?

MR. GREIDER: Well, I am Tom Greider and I work for SAIC, a sociologist. For the last three and a half years I've been manager of a program to involve Native American people, American Indian tribes with traditional ties to the Yucca Mountain area in the program of cultural resource protection. We have two components of cultural resources. One is an archaeological component; the other one is a Native American component.

Well, you heard from Ian this morning, Ian Zabarte, about reference to Duckwater Shoshone tribe's petition for affected status. That is not, as you're aware, the Department of Energy's responsibility. That's the Department of Interior's responsibility. However, the Department of Energy is responsible for the American Indian Religious Freedom Act, which requires federal agencies to consult with tribes to determine what the adverse effect may be of federal programs on their traditional and spiritual practices.

They are also--the Department of Energy is also

responsible for fulfilling the programmatic agreement that was signed between DOE Yucca Mountain Project Office and the Advisory Council on Historic Preservation. In that programmatic agreement, which is designed to mitigate and protect cultural resources, it calls for consultation with the Western Shoshone people and with other tribes who may have traditional ties to the Yucca Mountain area.

Well, we began the program, like I say, three and a half years ago in advance of the programmatic agreement on the basis of the American Indian Religious Freedom Act, and we basically at that time had three objectives. One was to identify the properties and locations at Yucca Mountain or in the Yucca Mountain area that have traditional cultural and religious values to American Indian people. The second objective, on the basis of the Advisory Council's recommendations on dealing with the American Indian Religious Freedom Act of 1985, was to determine from the Indian people what they considered to be culturally appropriate actions that could be used to minimize or mitigate those adverse impacts and to protect and preserve the traditional cultural and religious practices. And then the third objective is to implement the procedures to minimize those effects on their cultural and religious values.

Well, in order to meet the objectives, I might tell an interesting story. When we first started, we wrote a plan-

-as is usual in this program--and sent it back to Washington--and I don't know if the person's here that made this comment--and the question was, "Before you do anything like this, don't you think you ought to check and see if there are any Indian people out there?" And, okay, I sort of had pictures and we went from there.

But basically, we had to identify those American Indian groups with traditional ties to the Yucca Mountain area. You heard from Ian this morning, the Western Shoshones certainly have ties. Were there others--that was the question--who should be consulted concerning their cultural and religious practices and ties to that area. And then, what are those traditional cultural and religious values that are associated with the area? And that requires in-depth consultation with spiritual leaders and elders from the tribes since they are--they have to identify that. We can't do that. And then, what are their recommended techniques that culturally make sense, that within their culture is meaningful?

I'll talk about this a little bit more later because this is actually rather problematic, because in some cases there is no answer by Shoshone spiritual leaders or Paiute spiritual leaders. They don't know what is appropriate because these are new things that they're having to deal with in a cultural manner.

And then the fourth is what are feasible mitigation techniques that the Department of Energy can adopt and institutionalize in the process to protect and preserve their cultural rights and practices? So those are the four technical questions that we set about, with the Indian people's help, to answer.

We had a broad scale technical approach, basically, for involving--for answering these questions and for involving the tribes in the process. The first would be to review the relevant literature, and that literature goes back to Indian agents' reports of the 1800's, early census reports that are now available because the time period has elapsed, a lot of literature on newspapers, local newspapers in the area that were in existence during the 1800's and 1900's.

And then, second, we went around to many of the tribes in the area and requested that they designate a person that we called an official tribal contact representative, who would keep the tribal councils informed about what was going on in the cultural resource program, help us organize site visits and that sort of thing. We maintained ongoing communication with that tribal contact and with the tribal councils and chairmen of the tribes.

And then we took a number of elders on several occasions out to the Yucca Mountain area and, in fact, all over NTS, because you can't look at just Yucca Mountain.

You've got to understand it within the entire framework of that cultural setting, and you'll hear more about that from Lonnie Pippin on the archaeology component. And then, of course, we analyzed the interviews and generated some reports that I'll talk about later.

Then we got the Indian people together and asked them--many of the elders--for their recommendations on minimizing the adverse effects, what seemed to be culturally meaningful to them. One of the things that is a bit different in our program, the Native American involvement, is that we requested--and the tribes did this--any reports that were written were reviewed by the tribal councils and by the elders who went out to the site even before the Department of Energy received an initial draft.

We do that for a number of reasons, but one of them--one of the primary reasons is that we really consider these reports to be the Indian people's reports. In a very real sense, it is their report. We act as kind of the organizer of the information, if you will, but in terms of verifying the accuracy of the interpretations, of the values, statements of values that are contained in there and cultural practices, it's up to the Indian people to verify the accuracy of that. So they review and in some cases respond in writing; in other cases, give us corrections and that sort of thing verbally.

And then, finally, we're working toward

incorporating appropriate mitigation techniques into DOE activities. Fortunately--I consider it to be fortunate--there has been very little, if any, site characterization activity, land-disturbing activity go on in that area. That's given us a little bit of breathing room to work with the tribes to develop those techniques and institutionalize those techniques in the process.

Well, who are the American Indian groups with traditional ties to the Yucca Mountain area? We did the literature review, began it in 1987. You'll notice a publication date of January, 1990. It was a long process and part of that process is the bureaucratic maze for publications in federal departments. But in any event, it's a rather thorough evaluation and yet not complete. There's a lot of literature out there that still remains to be analyzed. You've got to draw the line someplace.

We talked with tribes that we knew had traditional ties, or reservations that we knew had traditional ties to the area, got their assessment of other people who should be involved. What we have is a total of 20 reservations involved, four of them represented by the Paiute Indian Tribe of Utah, which is a fairly well-organized group over there in southern Utah, but we found that this line here is--that goes right through the cultural resources study area--was not an imaginary line, obviously. We didn't do that just for

convenience so we could include Southern Paiute people in this. The ethnographic data and the literature review certainly indicates that this was--the Yucca Mountain area was a joint use area; that it was used both by Western Shoshone people and Southern Paiute people. We usually have to be careful. We recognize that the Treaty of Ruby Valley exists, and that's Western Shoshone, and yet at the same time, Shoshone people recognize that Southern Paiute people were there. We've had people out on the site, in the area, who have firsthand knowledge because they hunted in the area before it was withdrawn and a variety of different traditional activities were conducted in the entire NTS Yucca Mountain area by living people.

You'll notice here, Owens Valley Paiute. We'll talk about them just for a second. Owens Valley Paiute, if you asked, "Are you Southern Paiute?", they would say, "Yes." But Owens Valley is a higher elevation location and people over there tend to have slightly different traditional practices and contemporary practices than what the Southern Paiute people in the Great Basin area of southern Nevada have. So we--while it obviously looks like there are three cultural groups, in one sense there is; in another sense there isn't.

One of the things I'd like to say, and Ian promised me he'd be back, but he's not, so you will notice that we have three Shoshone reservations represented; Duckwater, Yomba and

Timbisha. When we first started out the program, we asked each tribal council of all of the tribes whether they would like to represent themselves in the process, or whether they would like to have a larger group like the Western Shoshone National Council represent Shoshone interests, for example. In the case of the tribes, the reservations in Utah, they indicated they wanted the Paiute Indian Tribe of Utah to represent their interests. In terms of the Duckwater, Yomba and Timbisha reservations, they each indicated that they wanted to represent their own interests.

Recently, within the past two months, we've had a request from the Duckwater tribal chairman to have Duckwater's interests, cultural resource interests represented by the Western Shoshone National Council, and that letter asking the National Council if they would like to meet with the Department of Energy on the cultural resources program, that letter has gone out and we're awaiting a reply. So the National Council, on the basis of the tribal chairman's request, is going to be brought in to the consultation, cultural resource consultation process if they want to be.

DR. CARTER: Maybe I missed it, but I gather that the Paiutes now don't have an organization similar to the National Council; or do they?

MR. GREIDER: Yes and no. They have the Southern Paiute Chairmen's Association, which is fairly effective as a

communication group to keep tribal chairmen involved. The Western Shoshone National Council, you know, we could spend some time on that, but each reservation, in effect, has their elected tribal government so you have a tribal government affiliated with each reservation. The Western Shoshone National Council, in some cases, has certain functions that don't relate to a specific reservation. They were the ones who brought forth the issue on traditional hunting grounds that Ian referred to this morning. The National Council did that.

In terms of affected status, the individual reservations, the individual tribal governments are applying for that individually because the National Council is more of an organizing force. So the Southern Paiute people do have, in some cases, an intertribal group like that. In other cases, they don't have.

What are the traditional cultural or religious values associated with locations in the Yucca Mountain area? I'd like to take just a second here and note something that isn't on any of the slides. When we say traditional, we don't necessarily mean that those are practices or belief systems that went--that died, you know, in the past sometime. We mean that they are traditional in the sense that they're belief systems that contribute to an ongoing society, an ongoing culture. Shoshone and Paiute people, many of them are very

traditional people in terms of their spiritual beliefs, in terms of their traditional practices. It's something that, in many cases, it's almost an education process for people because the first response is, "Well, they don't really believe that any more. They don't really engage in those practices." That's not true, and when we get to--well, I can talk about it right here.

We took Indian elders who were plant specialists out to the Yucca Mountain area into Ash Meadows. They identified 77 plants that had traditional uses. Over half of those plants are still being used for their traditional purposes. Teaching children, grandchildren, teaching the uses of the plants is continuing. It's a very important part of their ongoing culture, and that's really what the Advisory Council and what the Department of Energy is trying to do, is to protect those things that are part of that ongoing culture.

So in any event, we did, in the fall of 1987 and the spring of 1988, take elders out to the Yucca Mountain area and asked them to talk about values and practices associated with the artifacts that are located there and the plants that are located there. Much of that is recorded in the two reports that came out of that, the Native American Plant Resources and Native American Interpretation of Cultural Resources in the Yucca Mountain Area.

I'm not sure where this status fits in, to tell you

the truth. That sort of comes on the next slide or two. We'll talk about that in a moment.

These are not--these reports and the work that's been done so far is not the definitive answer. There never will be a definitive answer, but what they do is educate, if you will, both the Department of Energy, their contractors, and tribal members who have forgotten what the area was like. You know, the area has been withdrawn for a long period of time. We did have elders out there who were in their eighties and who know firsthand that area, and there were amazing stories that were told while we were out there with them about Fortymile Canyon, known to them as Snake Canyon. There were religious practices, burial practices that took place in that area. We have those on record. So it educated the Department of Energy and set the stage for developing appropriate mitigation to address those cultural values.

In May of 1988, 14 of the 16 tribes, reservations that are involved in the Native American program, got together here in Las Vegas and developed a set of recommendations. Those recommendations dealt with an entire array of the environment, if you will, and to explain all of these things, Ian talked, I believe, for a moment--or made reference to the fact that everything is sacred. It remains so in the religious belief systems of the Shoshone and Paiute people today. That's why you'll see recommendations on how to deal

with animals, recommendations on how to deal with plants, sacred places such as springs. All of these places are imbued with spirits of their ancestors and other spirits within their religious belief system, so we're really talking about religious kinds of phenomenon.

As an example of some of the recommendations that they made, on artifacts, their first recommendation was to leave the artifacts in place and move the site characterization or land-disturbing activity somewhere else. That is the first priority of the Department of Energy, so we're kind of in sync there with their recommendation. They made that recommendation for spiritual reasons that I'd just as soon not talk about today. In terms of plants, they would like to--culturally important plants, they would like those plants to be left alone and to move the land-disturbing activity.

The second priority, however, on plants is to study in terms of reclamation, study the feasibility of transplanting and reseeding culturally important plants, and that's one of the areas where we're working with the reclamation people and the ecosystems people, plant people on considering the feasibility of doing that with culturally important plants.

In terms of burials, their recommendation is to leave it alone, period, and let the tribes decide on their own

what is culturally important, what should be done in a cultural manner with those burials.

Two things here--well, one, in particular, is information dissemination. There's a great deal of interest among the tribes to be informed about the environmental studies that are going on, and that's part of the problem here with, number one, the quantity of information that's being provided here. There are so many plans and so much paperwork that it would deluge these people. I mean, they would just be inundated with paper, and yet there's a very strong interest in the environmental protection work that is going on by the Department of Energy.

They were--they are actually, in many cases, surprised at the extent to which many of their recommendations jibe with what DOE and the environmental scientists are already doing in terms of trying to study the environmental consequences to plants and to animals and that sort of thing, and especially in terms of the cultural resources. They are very appreciate of the fact that DOE's top priority is to leave the artifacts in place and not disturb them.

Well, now the most difficult one and the point at which we are today in terms of involvement of the tribes. During the last several months of this year we met with all of the tribal councils, myself and a representative from the environmental branch in the Department of Energy, Yucca

Mountain Project Office, to begin talking about how to integrate feasible mitigation techniques that will address their cultural values into the environmental program. There's a strong commitment to do that. I have a personal and professional commitment to do that, and the Department of Energy has a very strong commitment at the project office level to deal with these values in a culturally meaningful way.

The status on that is that we are developing the process to incorporate mitigation techniques. Part of the problem that Ian was alluding to earlier today is a very real problem. That problem is one elder cannot speak for the entire Western Shoshone people. That elder faces a great deal of cultural pressure is he or she speaks alone. The Paiute people elders are the same way. They cannot speak outside of their own people. I mean, there's got to be interaction and communication going on.

We're working at trying to foster that communication among the spiritual leaders of the Western Shoshone people and the Southern Paiute people. We're exploring different options that would allow them to get together on their own, talk through these things so that culturally meaningful steps to them can be developed.

One of the things that we are doing is setting up the process for involving them at the observation level in

archaeological studies that go on in the future. You will hear about the pre-activity surveys that go on. There's a great deal of interest among the Indian people to observe that field work. Indian people, living Indian people frequently have different views about things than what professional archaeologists do, and they want to be able to see this for themselves.

Some of the other things that we've talked about with them, they have had requests for access to NTS to conduct spiritual practices, ceremonies and that sort of thing. The environmental branch in the Department of Energy, the project office has been checking out and exploring ways that that might be possible. It is a highly-secured area, as you will find out tomorrow if you haven't already been there, but elders--there were traditional practices that--ceremonies that were conducted in that area. They would like to be able to go back into that area and renew some of those ceremonies, and the project office feels that that's a reasonable request. So we're moving in that direction.

DR. NORTH: I wonder if I could interrupt you at this point to get a sense of context? The program that you've just described is a very elaborate, in-depth effort to understand these issues and to have communication with the Native American people. How often has something like that been done? I mean, looking at southern Nevada and then looking at the

whole U.S. west for comparisons.

MR. GREIDER: In terms of--I do a number of environmental impact statement--other environmental impact statement work on other projects. In terms of the extent to which Indian people have been involved in impact assessment on cultural resources, I think that it's fair to say that it's never been done to this level. It is something that the project office and headquarters and DOE took an early commitment to, and it's a life-long commitment, if you will. I mean, it started three years ago and every expectation is that it will continue. I mean, if the repository goes away tomorrow, the program goes away tomorrow, it obviously will come to a stop. But in the meantime, if that happens, there has been a lot of information that tribes and Indian people can use among themselves to further their education of their traditional practices and that sort of thing. So I would say, in a direct response to your question, that DOE's had a Cadillac version of consultation.

DR. NORTH: Was there any consultation carried out in the past in setting up Nellis Air Force Base and the National Test Site?

MR. GREIDER: No, there was not. The project office--and few people with the project office now were with them when we first started this, but the project office, the Yucca Mountain Project Office kicked it over--the decision. They became

convinced that this was something we had to do, and in 1986, 1987, said, "Wait a minute. The Nevada office has never done this. Nevada operations has never done this for NTS. We have to go over and get their blessing on this," and not to speak for Nevada operations but, in essence, they said, "Well, we recognize we've never done this and the American Indian Religious Freedom Act says we need to do this. Go ahead. Set the stage, because sooner or later we're going to have to come into compliance," and in fact, they are now in the process of developing the program to consult with cultural and spiritual leaders regarding the activities throughout the NTS.

MR. PARKER: Thomas, if I could just chime in and you just covered what--the main thrust of the point I was going to make, and that is, it was in the mid-eighties when the statute which governs this sort of activity came into being, so that Nellis or NTS, obviously, until the American Indian Religious Freedom Act was passed, would not have been affected by that statute, and I think we are--Tom has certainly expressed it eloquently that we've taken that statute and that requirement very seriously and that's why we're doing what we're doing.

DR. CARTER: Did that one happen to grandfather things that were already in existence, or was it mute on it?

MR. GREIDER: The Religious Freedom Act was pretty mute on that and for a long time it was interpreted by the Department of Energy, the Atomic Energy Act that basically,

you know, left out a whole lot of regulations that didn't have to be dealt with. I think the interpretation is that a lot of activities that occur on NTS don't necessarily occur under the guise of the Atomic Energy Act and so, therefore, there are a lot of things that need to be done now.

In terms of our interactions with other environmental programs and other programs of the Yucca Mountain Project, the archaeologists from DRI, we feed information to them, they feed information to us. They went out with us during the site visits to help locate, or to point out some of the artifacts that were there. The terrestrial ecosystems studies, the plants and animals, we--during what we call ethnobotany studies, the plant visits, we had botanists from EG&G accompany us so that we could have a full scientific identification of the plants. Paiute people know the plants by Paiute language and Shoshone know it by Shoshone, and sometimes Indian tobacco isn't the same thing, so we had full participation by EG&G on that one.

There is a training film that all workers with the Yucca Mountain Project view as part of their training, and in that film there is an archaeological and cultural component to it in which it explains the importance of these artifacts in that area to Shoshone and Paiute people.

Something that we're particularly excited about, and actually, many of the tribes, the reservations are

particularly excited about, also, is the fourth bullet there. The institutional group with science applications and the Yucca Mountain Project opened an informational office, about 5,000 square feet. It's a sizable information office. It's 25,000 square feet. I don't know. It's a warehouse in which they incorporated a large display from an Indian perspective. It's not an artifact display. It's basically meant to educate people on what the spiritual and cultural values are that are associated with plants in the area, that are associated with artifacts, petroglyphs, that entire area in general.

We have a monthly program going on now in which the Clark County School District Indian Education Program and teachers are bringing in Indian students and non-Indian students. We bring in Shoshone--well, we brought in Paiute elders so far. The invitation is open to Shoshone elders on a monthly basis to come in and give a presentation to Indian and non-Indian students on something traditional, if you will, something that's still being practiced that's important to them. We have one, a lecture presentation planned for the first week of May in which a world-famous Paiute basket-maker will be coming in and talking about the cultural importance of those plants that she works with and were located out in the Yucca Mountain area. That will also be given for the community at large.

The Department feels--and the--many of the tribal counsels that are involved in the program feel that this is one of the ways to protect and preserve their traditional cultural rights and practices, that by documenting these kinds of values and practices, they can use it and they can help preserve those practices for their children and grandchildren. The school system is also very enthused about it because their Indian Education Program had a large budget cut, so we're trying to fill in the gap there.

That concludes my presentation.

DR. CARTER: All right. Thank you very much.

The next presentation will be on archaeological resources and it'll be given by Lonnie Pippin from DRI.

MR. PIPPIN: I'm Lonnie Pippin from the Desert Research Institute. One person that didn't make the slide that is important to introduce is Dr. David Rhode. He will be on the tour tomorrow to help point out some of the cultural resources to you. I, unfortunately, won't be able to make that tour.

The main objective of the cultural resources program with the Yucca Mountain Project is to minimize the adverse effects on historic properties during the site characterization phase, and this is in agreement with the programmatic agreement between the Advisory Council on Historic Preservation and the Department of Energy.

In order to do this, you have to--and I'd like to

take a few brief minutes to explain the nature of the cultural resources on Yucca Mountain. I'm sort of starting at the end and coming back to the beginning again, but it's important.

I've been on the test site and been working on the test site since 1978, in the Yucca Mountain area since 1980, and the vast majority of the cultural resources in Yucca Mountain are the archaeological remains of past hunters and gatherers. Now, if you're going to make a life by hunting and gathering, you are highly mobile. You have to be in the right place at the right time to exploit those resources. That highly-mobile adaptation, of course, if you're going to look at it archaeologically, you have to look at it through a regional perspective. You cannot look at it through a site-specific perspective. The resources on Yucca Mountain didn't occur evenly over Yucca Mountain, they occurred in patches and Yucca Mountain, that environment is a dynamic environment. It has changed through time, so the way that hunters and gatherers oriented their activity around those critical resources also changed through time.

So in order to understand those, you have to have both an ecological perspective and a regional perspective. One more point I'd like to make about it--and I hope you see this tomorrow when you go out there--those resources are fragile. They are not a place where people have been living for thousands of years. They are sometimes places that people

lived for a week or so, so they're a very fragile resource and easily affected.

Now in technical questions--and these are the same ones we went through last time--in terms of procedure of how we approach for cultural resources, we first ask what are the potentially affected cultural resources? What is the significance of those? And by that we mean the legal significance of those. What are the potential effects to those cultural resources that might result from site characterization activities? And, finally, how can we mitigate those adverse effects?

Under what are the potentially affected cultural resources, how do we do that? Well, we conduct literature reviews. We do record searches, look at archives, artifact collections, and contact other agencies that are knowledgeable concerning this. We also conduct archaeological surveys in advance of all land-disturbing activities and because the effects on cultural resources--because those cultural resources are fragile and those effects on cultural resources don't only occur because of bulldozing, et cetera, we conduct sample surveys so we can identify the cultural resources throughout that region.

Where are we along that? Well, we completed the literature review quite some time ago and that's published. The environmental field activity plan for cultural resources

was released in '88. That outlines the procedure which we'll follow, and I know the Review Board has already seen that.

In terms of surveys, since 1978 when we started work in that general area, 10,000 acres have been surveyed and we have identified over 440 different archaeological sites. A large portion of that occurred in 1982 when we surveyed the core area of Yucca Mountain. Later we added sample surveys in Yucca Wash, Midway Valley, and Fortymile Canyon, and those were all completed in 1988. This year we plan to initiate two more sample surveys, that of the lower Fortymile Wash area and of the southwest Yucca Mountain area on the BLM portion of that area. And, of course, we will continue to conduct pre-activity surveys in advance of all land-disturbing activities.

Question 2: What is the significance of the cultural resource? And I said significance is a legal term, and in this case how you evaluate that significance is spelled out in the Code of Federal Regulations, 36 CFR 60.4, so we look at that. Those are four criteria in there. The main two criteria which the cultural resources in Yucca Mountain fall under are--and Tom Greider talked to you about that--their value to an existing ongoing society and the Native Americans in this case, and the one that I'm mainly interested is their value for research to tell us something about history and pre-history of that area. Now, how do we do that? Well, we develop a research design in order to codify that scientific

value.

Where are we along that? Well, the programmatic agreement that's been referred to now a whole bunch is December, 1988 that was signed. The area has been determined as potentially eligible to nomination as an archaeological district. That is very important from my perspective because that realizes the fact that those cultural resources are a part of a regional perspective rather than just site-specific perspective. The research design for the Yucca Mountain has been written. It was submitted to the DOE, submitted it to the Advisory Council on Historic Preservation in 1989. We've received comments on those and we are currently--we've responded to those comments and we're currently reviewing for resolution of those comments.

What are the potential effects to the cultural resources resulting from site characterization activities? The potential effects to those sites are evaluated at the time that we identify them, during either a pre-activity survey or during the sample surveys, and then we have established a monitoring program in which we go back to the cultural resources and determine if they are being affected, particularly those that are trying to be avoided by site characterization activities.

Where are we in terms of that? We evaluate the potential effects when we've identified them, so that's been

done. The kinds of effects are estimated from the kinds of-- and evaluated from the kinds of activities that are outlined in the site characterization plan. We are initially, or we are initiating a database on all those sites so that we know where all the artifacts are, their spatial distribution so that we can see if those move. One of our problems is people visit those sites, find a neat arrowhead and decide it's theirs and take it with them.

We revisit the cultural resources on a regular basis and should those conditions at those sites deteriorate, then we make recommendations to the Department of Energy of how we might mitigate that, and it might be through a data recovery program of that information.

How will the potential effects of site characterizations be mitigated? You've heard a number of times that we will try to avoid the cultural resources. That we try to do. That's not always possible. From all the activities, the soil sampling and the met towers and the roads and the drill pads, and et cetera, it's impossible to, of course, avoid all those, and so what we have done to be responsive to that realization is, as part of the research design, devise a long-range study plan that is designed to retrieve a scientifically representative sample of the cultural resources in the Yucca Mountain project area so we can preserve that scientific value. And finally, we've

developed--and you've heard talk about our video--a worker education program which is designed to educate the workers at the test site concerning the value of cultural resources.

Where are we here? Currently, we try to--if they're going to build a road, and you'll see this example when you go out to Yucca Mountain, the road curves in a place that you wouldn't think it ought to curve. Well, it curves there because of the cultural resources, so we try to avoid those as we go. Long-range study plan is expected to be approved and implemented later this year and, as I say, data recovery, that plan has data recovery at a scientific representation of those sites.

We are also, in order to provide us information in evaluating the value, the scientific value of those cultural resources, have initiated a number of studies. One of them--and I just got back from it yesterday--is an obsidian hydration study. Yesterday we ran out an put temperature probes next to all the met towers so that we can have baseline data on soil temperature because temperature is a--the largest driver, of course, to hydration rates and we would like to use obsidian hydration to help date the scattered artifact remains that we might not otherwise have some means to date.

We are also--as I said, the hunters and gatherers are highly mobile people. We are interested in looking at where the tools that they used came from, where did they get

their tool stone sources. We do raw material source characterization, x-ray fluorescence on obsidians so we can hopefully find source areas and find out how far they transported that rock.

Geoarchaeological mapping, we're initiating. I was also out there yesterday with the project geologist. We like to map potential depositional areas so that we know where to dig. Not always do you find the cultural resources buried on the surface. Sometimes it's buried under the surface and those are, in my opinion, the ones that I really like to find. We're developing a geographical information service or a database so that we can plot the distribution and abundance of resources and the spatial distribution of those. We integrate that sort of approach with a paleoenvironmental approach that tell us how to model those distribution of those resources. As I said, environments are dynamic at Yucca Mountain. They haven't always stayed the same. The same resources haven't always occurred there, so we're very interested in the paleoenvironmental data. And then finally, worker education program. The video is completed and we're currently planning other steps.

DR. CARTER: Lonnie, let me ask you one question. Have you decided yet what GIS you're going to use?

MR. PIPPIN: We're going with Arcinfo. It's going to probably change to Oracle, but that's the one we went with.

To be honest with you, there's a number of avenues here. We--and I mean "we" lightly here--Desert Research Institute bought a GIS package from Terra-Mar, if you're familiar with those that run on PC's and we tried to implement it on a Sun, a couple of Sun 386i's. It didn't work. There's glitches in the software, so we have purchased Arcinfo, the whole institute has purchased Arcinfo and that will be the one that we go for.

How do we articulate with the other parts of the project? Of course, we conduct the pre-activity surveys so they can get out there and do their thing. We provide the recommendations on how they might modify their things so that they won't have an effect. We provide data on paleoenvironments. Archaeological sites are good places to look for data for paleoenvironments, and also, to provide dates on the geochronology depositional models of that area. Archaeologists, of course, will date any old thing and that helps the geologists.

Expertise, we also provide expertise on prehistoric lifeways for use in consultation with Tom Greider's program, and we go out and locate the water sources or potholes and tinajas, which are important water sources for people and also for the radiological monitoring so they can look at that.

What do we need from other people? Well, we need all the environmental information we can get, both current and

paleo. We need the site characterization plans. We need to know what other people are doing so we can assess their effects on cultural resources. We need mapping assistance. We need survey assistance so that points on the landscape are flagged before we go survey them so we're all talking about the same kind of piece of real estate. We need digital elevation model data and should not have any problem getting that and, of course, aerial photography. A lot of our work is done with stereo pairs and remote sensing. We already have remote sensing tapes, a number of scenes that run across the Yucca Mountain area that we're using and excellent 1:12,000 scale aerial photos and they're doing more now. And, of course, then we need the logistic support from NITSO (phonetic) both out at Mercury and from the Waste Management Project Office in terms of coordinating our activities.

That's my presentation.

DR. CARTER: Well, thank you, sir.

Let me ask you one question. I gather from what you've said, and also Tom Greider, as far as the Native American studies, that most of what you folks do is almost a personal thing, and I was going to ask you how many staff members you have doing this, other than you and David? I gather that you've trudged over most of these 10,000 acres and done this on a personal basis. Is that almost a good observation?

MR. PIPPIN: Well, I would like to say yes to that. Unfortunately, I end up pushing more paper than I get to climb hills. I go out--usually I go out on the field project as a WOG, or a--that's a word the Oriental gentleman--it's another term for just a field bum, but I'm a crew member when I go out. I have field crew chiefs that run the crews that do the survey and survey crews are three people, about three people in size because that's the most efficient crew size when you're recording sites so you don't have people sitting around doing nothing. Then we walk back and forth in transects.

To answer your question directly, I have a--it's hard to tell. I have an archaeological lab and people in those labs are working on a number of projects, not just this project, and so Dave Rhode and myself are the two main characters, but we have a number of crew chiefs and then we hire and fire on a survey-by-survey basis.

DR. CANTLON: To what extent--you were commenting earlier about needing temperature information on soil surfaces to get the obsidian hydration studies. To what extent did the meteorological people volunteer to get that for you?

MR. PIPPIN: Well, you can only get that by putting the probes down into the ground. We just simply went to Irving Freidman of the USGS, who is the grandfather of this whole thing, and he went out there with us yesterday and we put our--put those probes down, and we'll go back and monitor those

each year. That sort of information is not necessarily important to other aspects of the project.

DR. CANTLON: Similar question on the ecology group. Have you approached any of the ecology group to give you information that would be useful in understanding the paleoecology underlying the Indian history in the area?

MR. PIPPIN: Right. I've worked with the EG&G bunch since I've started out there. A number of the EG&G people taught me quite a bit about plants myself and so we get plant identifications from them. We get formal lists from them. We have worked with them closely through the years.

DR. CANTLON: Any attempt to influence the way in which they gather the data to facilitate what you're interested in?

MR. PIPPIN: The EG&G bunch, not too much because what they're doing is just exactly what we need, so there's no need to go and yelp about it. Paleoenvironmental data for the program, of course, is not being collected under this program. It's being collected under--USGS is doing some and the State of Nevada is doing quite a bit. That information we're extremely interested in and we have articulated and interacted with both of those groups. In fact, I went to graduate school with both of those groups.

DR. CANTLON: Similar question in connection with the soil studies. Since many of the artifacts that you seem to prefer are down in the soil as opposed to on the surface, the

chemistry of the in situ situation is important. Have you discussed any of that with the soils people?

MR. PIPPIN: No, not really because the chemistry really isn't important, that important from a cultural perspective, from an archaeological perspective.

DR. CANTLON: Maybe from dating them it might be.

MR. PIPPIN: Dating the--

DR. CANTLON: Artifacts.

MR. PIPPIN: Well, the artifacts, of course the way we date those artifacts is either we use radio carbon dating or we use obsidian hydration or something like that, but the chemistry of the soil is--I've played that game before and there's a lot of work for very little information. It's not--I don't need it.

DR. CARTER: Thank you, sir.

I believe the next thing on the agenda will be a briefing about our field trips.

MS. DUSSMAN: All right. For those of you on the field trip, the bus will be leaving from this area at seven-thirty tomorrow morning, so we'd urge you to be here a few minutes before that because we do want to be on our way at seven-thirty.

The instructions to the tour bus were right by the Ramada Suite sign, but I notice that the parking lot is a little narrower than expected, so I think if you just look for

a large tour bus, it'll probably be down a little ways here to the right where the parking lot widens a little bit.

Most of you should know who you are on the tour. You've been asked to--I don't know how else to say that. You've been asked to provide personal information, Social Security numbers. If, for some reason, you are on the list but have decided not to go, please let me know. We do have folks who have expressed a desire to go should there be openings. Right now the bus is full.

We have arranged with NTS that if we do not have too many additional people going, that they could handle last-minute badge requests, but for those of you who have been at the site, you will recognize that it's a fairly complicated process. We will have to stop at the badge office, and each of us individually will have to have a badge. So after I sit down, if there is anybody who was planning to go and is now not going, please let me know, and if you would like to go, then we may have a couple of openings. I can't promise, but we may have a couple of openings.

We ask that you wear very comfortable clothing, shoes that you can walk over rough ground in. We're not going to take you out for marathon cross-country hikes; however, we are going to be doing a little bit of walking. This applies for both days, and so please dress comfortably. The layered look is in vogue today. As you can tell, the wind is still

out there. It's a little cool. It may be a little warmer today but we're going out into the open country, so please dress accordingly.

As a precaution, please do not bring a camera or binoculars. You will not be allowed to take them out on the site. That is not an arbitrary decision we have made. That is a tenet of the site of site access. You will be asked to sign a statement verifying that you are not taking such materials out on the site and the buses are randomly searched to see that those materials are there or not there, so please do not bring a camera or binoculars.

We will be providing lunch at a cost of five dollars. We plan to eat up on top of Yucca Mountain. Those of you whose eyebrows have raised, yes, the cost has gone up for the box lunches. So we would ask that you please bring exact change and could I have a show of hands for everybody that will need a receipt? One receipt; a few others. All right.

DR. CARTER: Could I ask you an edifying question? What's happened to the quality of the box lunches?

MS. DUSSMAN: I don't think I want to make a commitment in that area, but I will assure you, we went out a week ago and the box lunch is, indeed, still a good deal, but it was cheaper. And we will be eating up on top of Yucca Mountain, out in the open and, as I said, this is, indeed, a field trip

so if any of you are hesitant about that, please keep that in mind. As I said, exact change and I think that's about it.

Are there questions that I can entertain? We plan to be back here at about six-thirty.

DR. CARTER: I have a request if it's not any problem. Maybe you've already figured this in the process, but I think it would be useful to have a map or two on the buses so that we can identify at least major things that we'll be seeing, if that's no problem.

MS. DUSSMAN: Yes. We have figured that into the process. We will have with us a large map whereby you can orient yourself, and we will have a handout, a smaller version of that with some of the major items outlined on that. As a preview, we plan to be stopping at a number of places where we will give a short explanation of where we are. We urge everybody to ask plenty of questions, and if there's anything you'd like to know about we will be more than happy to talk about.

On Day 2, now the times are about the same. We will be leaving here at seven-thirty and plan to come back at six-thirty. It's been expressed that a couple of folks might have an early flight or earlier flights on Thursday. Because of the logistics of the trip, we would like everybody to be on the tour bus so that you can hear what's said. However, we will have--for access to some of the more remote areas, we

will have a couple of vans that we'll be transitioning to at one point during the day. So if there are early flight times on Thursday, we will be able to accommodate a certain number of people coming back, perhaps, a little bit earlier on the vans, and if you would let me know that as soon as you can, I can plan ahead with that.

Lunch on Day 2 will be at the Furnace Creek Inn. There are two locations to eat out there and we've picked a room with a view, so again, we would ask you to bring exact change. Greg, I believe the costs for Day 2 are $11, and I know that sounds steep. The choice was between $10 down in the valley and $11 up on the ridge with a view. We thought you'd appreciate the extra dollar's worth.

DR. CARTER: Yeah, but that's 2.2 box lunches--2.1 box lunches, whatever the arithmetic is.

MS. DUSSMAN: If you like, we can arrange for two extra box lunches.

Are there any questions? And cameras, and of course, on Day 2 cameras and binoculars are perfectly apropos.

Yes?

SPEAKER: Are you going to have thermoses of water along for out in the field?

MS. DUSSMAN: Yes. We have a couple of large coolers filled with soft drinks and a large thermos of water going with us.

Anything else? And if you--urge you to bring sun visors if you're not used to the sun, although it doesn't look like it today. The weather here is very changeable, and bring along a sun visor.

DR. CARTER: Very good. Thank you very much.

The next thing I'd like to do is ask Carl Johnson is he has any concluding remarks based on today's meeting that he'd like to do on a brief basis, and then I'd like to ask the same thing of DOE.

Carl?

MR. JOHNSON: No, I don't have any closing remarks. I've worn down.

DR. CARTER: Gerry, how about you or Wendy?

MR. PARKER: Well, actually, one of the more important action items, Dr. Carter, that I've taken from the meeting relates to Tom's presentation and it seems that the DOE Washington Headquarters elders will have to explain to Tom the spiritual importance of having headquarters approval of the plan, and again, I really appreciate the entire session and the involvement of the state and Mr. Zabarte this morning.

DR. CARTER: Thank you, sir.

Let me make a couple of remarks. First off, I would like to indicate what's transpired as far as the discussion that Steve Woolfolk and I had. He was challenged and he met the challenge. He has a copy of a RAD health handbook with

him which weighs about two pounds, and I don't know if he carries it around all the time or not. Anyway, zirconium niobium 93, indeed, is predicted to be an old material in extremely small amounts. Now, I'm not too sure he's going to be able to measure it, but that, indeed, is true. So I stand corrected, and there's a moral to that story. Just because you're challenged doesn't necessarily mean you're wrong.

Now, the other thing I'd like to do very seriously and that is, certainly I hope the record won't indicate that any aspersions were directed towards Colorado State University or any other school for that matter, but very seriously, we appreciate very much the participation by everyone in this particular Panel meeting, and I certainly want to thank Ian Zabarte for participating in the meeting and I believe that he and others will join us on the next two days of tours. We'll have some people from California and, of course, we'll have some people from Nevada, the State of Nevada, along on the tours, and certainly, DOE and its contractors.

So we appreciate very much the hard work and the effort that went into the meeting. I think we not only recognize that, but we certainly appreciate it very much. So we'll look forward to the next two days, also, as we did today, and we will see everyone then that participates in the tour tomorrow a little before seven-thirty at the big bus.

The meeting is now adjourned, sine die.

(Whereupon, the meeting was concluded.)