U.S. DEPARTMENT OF ENERGY

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MEETING OF THE ENVIRONMENTAL AND PUBLIC HEALTH PANEL

OF THE

NUCLEAR WASTE TECHNICAL REVIEW BOARD

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WASHINGTON, DC 20036

THURSDAY, SEPTEMBER 14, 1989

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ATTENDEES FROM THE DEPARTMENT OF ENERGY
ENVIRONMENTAL AND PUBLIC HEALTH PANEL
NUCLEAR WASTE TECHNICAL REVIEW BOARD

PANEL CHAIRMAN, DR. MELVIN CARTER

DR. JOHN E. CANTLON

DR. D. WARNER NORTH

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DR. DON DEERE, CHAIRMAN, NWTRB

MR. WILLIAM COONS, EXECUTIVE DIRECTOR, NWTRB

PARTICIPANTS OR PRESENTERS TO PANEL:

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CARL GERTZ, DOE
THOMAS ISAACS, DOE
GERALD PARKER, DOE
GREGORY FASANO, SAIC
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RAYMOND CLARK, EPA
ROBERT BROWNING, NRC
STEVEN GOMBERG, DOE

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(On at 8:00 A.M.)

OPENING REMARKS

BY DR. MELVIN CARTER, PANEL CHAIRMAN,

ENVIRONMENTAL AND PUBLIC HEALTH PANEL

NUCLEAR WASTE TECHNICAL REVIEW BOARD

UNITED STATES DEPARTMENT OF ENERGY

DR. CARTER: Good morning ladies and gentlemen. My name is Dr. Mel Carter and I serve as the Chairman of the Environment and Public Health Panel of the Nuclear Waste Technical Review Board. I want to welcome each of you to the initial meeting of this particular panel.

My fellow panel members are John Cantlon to my right, and Dr. Warner North, whose presence we expect momentarily. We are conducting this panel meeting as an inherent part of our fact finding regarding the proposed high-level repository as mandated by the Congress in the Nuclear Waste Policy Amendments Act of 1987.

Dr. Don Deere, Chairman of the Nuclear Waste Technical Review Board expresses his regrets at not being here at the opening. At the present time, he is over making or getting ready to make a presentation at the National Academy of Sciences and will join us later in the day.

And now, I would like to call on our executive director, Professor William Coons, who will introduce our fellow board member who is present, also consultants and staff members of the board.

Bill?

MR. COONS: Thank you, Dr. Carter.

I would like to introduce Dr. Dennis Price who is down here on this end, a board member, and we also have present this morning, Mr. Dennis Condie, who is in the back of the room. Dennis comes to us from the General Services Administration, and who has been engaged in establishing Presidential boards and commissions and so forth for the last 20 years, and has brought a great deal of experience and knowledge to the board.

I also would like at this time, to publicly thank the Federal Communications Commission, in particular, Christine White -- I don't know whether Christine is back here -- and Randy Cruger, who really have gone beyond the call of duty in trying to help us set up here, and I just want to thank them very much for all of their assistance.

DR. CARTER: Thank you, sir.

I would like to take a moment to mention the agenda and I am borrowing a DOE slide to do this.

And I would like to indicate to you that in developing the agenda, we essentially focused on environmental issues, and so certainly a number of things, some of the public health things, socio-economic and so forth, we will not concentrate on at this particular time, but these will be left for meetings in the future.

I might also mention that under air quality or in that area, we will be talking about meteorology and soils work and so forth will either be covered in the overview or under air quality.

Now, this agenda is contained in the hard copies of the viewgraphs which are available so that each of you should have a copy of that.

Now, we certainly greatly appreciate the cooperation of DOE's Office of Civilian Radioactive Waste Management and its contractors in planning this particular meeting.

I also want to thank the EPA and the NRC for having representatives that will address particular aspects of 40 CFR 191 as shown late in the agenda.

Our panel meeting is being transcribed for record purposes and before we begin, are there any other comments or informational items, before we begin a rather full agenda?

(No response.)

DR. CARTER: Okay, the way that we will conduct the meeting, I will introduce each speaker very briefly, however, concise resumes are available of each of these at the registration desk and you can have a copy of those and take a look at the backgrounds of the particular individuals who will be addressing the panel.

Now, our initial agenda item will be an overview and it will be presented by two individuals of DOE and the first I would like to introduce is Mr. Ralph Stein and he is the Associate Director for Systems Integration and Regulation.

GENERAL OVERVIEW

BY MR. RALPH STEIN, AND CARL GERTZ, DOE

MR. STEIN: Thank you, Mr. Chairman.

I would like to thank you all for the opportunity to be here today and I would like to apologize again for being unable to attend the previous meeting on Transportation. If I had been there at that transportation meeting, I think that I would have introduced to you an initiative that we were thinking about taking which is related to transportation and which hopefully would have gone a long way to solve the transportation problems with our new cask design called the hefty cask.

So as you can see it does have a lot of potential as I noted. Both Carl and I will make our presentations relatively brief because we note, that you want to get into the technical meat of this particular part of the program, so with that, let me just move quickly into the topics that will be presented.

There are, as you can see, four topics that we are going to cover today and what I am going to do, is that I am going to very quickly cover the environmental heart of the organization at headquarters. And I have asked Carl to cover the other topics that will introduce the remainder of the technical program.

As you can see, there are four items that are topics that we will cover today. Of the three, the one I would just like to talk about just for a moment, the environmental permitting summary, I think that it is important to put that particular topic into a proper context.

For us to start work at the Yucca Mountain site, there are basically three things that we need to be able to do or to have. One is that we need to have environmental permits. And two is that we need to resolve the issue relative to the endangered species, the desert tortoise and then the third is related to the access of the Air Force land.

Of these three items, the environmental permits offer the greatest deterrent to our being able to get started and acquire needed data to determine suitability of the site, and Carl will talk a little bit more about the status of those permits as he gets into his talk.

And, of course, we will cover the format of the technical presentation during that discussion.

Quickly, this is the Office of Civilian Radioactive Waste Management, the Chart and you can see that there are two of the organizational segments that are highlighted -- my office and the licensing and compliance division of that office which has the environmental compliance branch located within it.

The environmental compliance branch chief is Gerry Parker and Gerry Parker is right over against the wall and Gerry can, of course, discuss any aspect of the environmental program at headquarters.

These are some of the participants. Our Office of General Counsel, the Assistant Secretary for Environmental Safety and Health and the Assistant Secretary for Congressional Intergovernmental and Public Affairs. The General Counsel, of course, gives us guidance and direction from a law standpoint as to what the environmental laws require, and most of our environmental documents flow through General Counsel's office to be sure that they do properly comply with the regulatory and legal requirements.

Assistant Secretary for Health and Safety has a major role in all of the environmental activities that we pursue, including the issuance or at least the approval of the environmental documents such as the environmental impact statement and the Congressional Inter-Governmental and Public Affairs continue to provide support on any document that is released to the public.

And our contractors that support the headquarters organization, Westin, many of the Westin people are here today that have provided a number of support activities and SRA and CDM help out in the repository EIS planning, the environmental impact statement planning. And Argonne National Laboratory has helped us in the reformation planning relative to the site.

With that, that is my brief overview of the headquarters activities and Dr. Carter, I am not sure if you would like to introduce Carl Gertz?

DR. CARTER: Thank you, very much.

Let me ask you a couple of questions. First off, I know later on and you have not mentioned this but the license application involves a submission, of course, of a safety analysis report, as well as an environmental report. Now, is that environmental report, the environmental impact statement? Or is that a report to be based upon the environmental impact statement?

MR. STEIN: Our current plans is to prepare an environmental impact statement, and to provide that environmental impact statement to the NRC and if they adopt it, then that will serve the requirements that the NRC has for issuing an environmental impact statement.

We do not plan to prepare a separate environmental report, at least at this time.

DR. CARTER: Several of your reports mention that and they use those words and that is the reason for the question. It is not referred to as an environmental impact statement, but an environmental report.

MR. STEIN: At this point, the environmental impact statement is a document that we intend to prepare, not an environmental report. Now, it may be that there may be some requirement, because the environmental report tends to get into much more technical detail that we would have to beef up the environmental impact statement to make it suitable for the NRC, but right now, only one environmental document, to accompany the license application and that is the environmental impact statement.

DR. CARTER: Okay the other question I have, on DOE orders, are these entirely internal documents, in other words, reviewed and so forth, internally by the DOE or is there any external review?

MR. STEIN: Which documents?

DR. CARTER: I am thinking the DOE is now particularly the ones that involve environmental activities, environmental protection and so forth. You know, DOE has a whole series of orders, a number of which you have to file them.

MR. STEIN: I don't know of any formal external review that was involved in the review of those orders, but I can check. I don't know of any, but I will have to check.

MR. ISAACS: I am pretty sure that they are internal documents.

DR. CARTER: We are going to be discussing a lot of environmental regulations and of course, those enter into the picture from the DOE implementation standpoint, so that I think that it is fairly clear.

MR. PARKER: Yes, Ralph, I think that you are right, exactly, these are internal guidance provided by the Assistant Secretary of Environmental Safety and Health within the Agency, implementing the regulations that underpin those orders. But they are internal to the Agency and the NRC regulations in regard to the EIS have just been revised. I think that there was confusion early on, when that since the NIPA regulations referred to an environmental report, such as a private applicant to a reactor might have to submit to the NRC, and there is confusion as to what DOE's role would be in regards to environmental report, versus an EIS.

And but as I said, they have recently revised it to make clear that for our program we will submit an environmental impact statement which, as Ralph said, they will use it, but there will not be an environmental report.

DR. CARTER: Okay, let me mention when someone speaks for the purposes of recording this session, I wonder if each of you would identify yourselves by name, please.

Do we have any other comments or questions for Mr. Stein?

(No response.)

DR. CARTER: Thank you, sir.

The next presenter will continue with the overview of the project and that will be given by Carl Gertz, and he is project manager of the Yucca Mountain Project Office.

Carl?

MR. GERTZ: Thank you, Mr. Chairman.

And I appreciate once again the opportunity to talk to you and kind of set the stage for the hands-on workers who will tell you more about the program and there is a lot of technical detail.

Just to remind you that we have about 1,700 people working on the project at this stage and major work done by the national laboratories in so far as characterizing the site goes, and integration by SAIC and we have architects, engineers and constructors headed by a federal office of about 80 people in Las Vegas. In fact, we have about 800 people in Las Vegas right now.

And to focus just a little bit more on where we are going today, this is my office with appropriate division directors and the environmental organizations that are doing the work, and are essentially SAIC which is our technical and management support system subcontractor; Desert Research Institute, an arm of the University of Nevada system; EPA; EG & G; US Geological Survey; and that, in effect, is our team that is doing the environmental work for us.

Now, to just expand upon that, here, for today's items of interest. You notice, also that SAIC which is not delineated here, does our radiological monitoring. And some of that will flow through some of the things that we talk about today. Tom O'Farrell's people capture mammals for this activity and the people who do air quality look at some of the radiological aspects.

But specifically it was not to be addressed today so that we won't. But SAIC will talk about the air quality and radiological activities that are going on and they are also responsible for the Native American concerns.

Desert Research Institute, Lonnie Pippin here today will talk about the cultural resources. EG & G, Tom O'Farrell and his people will talk about our desert tortoise issue and other biological activities.

And the US Geological Survey will talk about water resources. And this is different than the US Geological Survey organizations that are doing site characterizations activities.

Let me set the stage again for the program. Out of our environmental program overview document, we state that our program proceeds in the classic sense through regulatory requirements that develop management plans and therefore, we implement field studies and that generates the necessary deliverables. That is what we are after, is to develop the products that are necessary for the program.

Now, let me just go through this part of it, right here.

This comes out of our environmental program overview document and it sets the stage for the hierarchy and we start here with the requirements. There is certainly the Waste Policy Act and the Amendments Act. There is the Code of Federal Regulations, 10 CFR 60, which is NRC's and 40 CFR 191. And there is NIPA and other CEQ regulations and there is environmental statutes, such as the Clean Air Act, etc., and other regulations. And then Dr. Carter, as he pointed out, we have the DOE orders. The DOE orders essentially incorporates other federal statutes.

It is from these requirements that we have developed our specific management plans; the next level of the hierarchy.

We have our environmental monitoring mitigation plan. This flows from essentially the Waste Policy Act. We have our environmental regulatory compliance plan, which takes requirements from several of the requirements documents and puts them in one document. We have our reclamation program which flows from the Waste Policy Act, and we have an environmental impact statement implementation plan, which comes, of course, from NIPA and from the modifications proscribed specifically in the Waste Policy Act as to how we do the EIS for this program.

From these management plans, come the more detailed field plans: radiological monitoring plan, environmental field activity plans, which will be discussed by those people doing the work later today, reclamation plans, and meteorological and monitoring plans.

The reason that this is kind of out here separate as opposed to not included here, we started this actually in 1985, and early on in the program. If we were to do it today, it would probably be part of the environmental field activity plan. And it very well may be in the future, folded in to one of these activities.

These plans then lead to specific reports, topical reports about areas of interest and progress reports. These reports then lead to, in effect, our products.

Our two products will be our environmental impact statement. That goes with our license application, as you pointed out, and then whatever other products that we need for the permits and regulatory compliance documentation. And this is our hierarchy and maybe you might want to address any questions on this right now, before I move on to the permit status.

DR. CANTLON: Yes, Carl, one question as you lay out the field plans, you frequently encounter in the field, information that leads to modification of the plan and I presume that there are feedback loops in there somewhere?

MR. GERTZ: Yes, we are just addressing and assessing these activities of how we assure that the changes are controlled changes and that are documented and that we just don't go willy-nilly making changes, so to speak.

So we have a procedure that will identify those feedback loops to make sure that any changes that are made, are still in compliance with the requirements documents.

DR. CARTER: I have one question, Carl, could you -- you are going to address, I presume the requirements of the State of Nevada, but this is important for two reasons, they have got inherent rules and regulations that you obviously have to comply with and but they are also delegated a number of other authorities from some of these regulations, particularly the EPA regulations, where a lot of authorities are delegated to the states. So, and you are going to address that in the --

MR. GERTZ: I am going to address that in the permit status of the presentation.

That flows very nicely and I appreciate that. Environmental permits are needed before new surface characterization activities can be done and EPA authority for permits is delegated to the State of Nevada. We have currently four permit applications filed.

We have air quality registration permit for land disturbance, which is a part of Nevada's Clean Air Act, flow-down, and modification of request for an NTS air quality permit. You may wonder why two air quality permits?

For the Nevada test site, we have an air quality registration permit and we thought that permit would allow us to do research and development activities on the Nevada test site, even though they were not test site related, they were related to Yucca Mountain.

We wanted to go out there and do some drilling, test our drilling equipment, in tough, on the test site. And we interpreted that permit to allow that to happen and in conversations between the Governor's office and the Secretary of Energy's Office, the Governor did not interpret it to include those kind of activities, and as a result, indicated that he would take us to court should we start that activity and asked us to modify our test site permit to allow the R & D activities to go on, which we have submitted that.

We have an underground injection control for the use of tracers, when we put drill holes down and do infiltration tests, or water movement tests, we are going to use tracers, and that requires an injection control permits.

And we have water appropriation. We have wells on the test site, and the land at the test site was deeded to DOE and with it, came the water rights, but we have also applied to the state for the appropriation of that water from the test site for use on this project.

And to date, and this is the bottom line, no permits have been issued. At least 15 will be required, and we have a detailed table later on that talks about all of that.

DR. CANTLON: Before you do that, what roughly are the dates of submission of --

MR. GERTZ: I am going to go through that in the next one.

DR. CANTLON: Okay.

MR. GERTZ: We will get to the dates here in a second, but let's just talk a little bit about compliance with laws, that is derived from federal laws. And those that are not derived from federal laws, DOE had made a policy position to comply with them as a matter of comity.

We think, as a good citizen, we should comply with the laws of the State of Nevada, even though we may not be federally required to. We had planned to do this as long as they are not inconsistent with the Waste Policy Act or the Atomic Energy Act and other federal statutes.

As long as they are consistent, we intend to comply with state requirements. Only three permits of the 15, are in this area of comity. One is the Water Appropriations. There may be people who will debate that; lawyers might want to debate that. Water pollution control permit and sanitary and sewage collection permits; these, of course, are required later on in the project.

As a sidelight of our activities with the state, there is a state law, just passed and effective last July that prohibits high-level nuclear waste storage in Nevada. And that is really about what the law says. It is really only a three sentences on one-quarter of a page. It doesn't particularly address permits, but, in our conversations with the state permitting agencies they wonder if they could act on permits, if that would be contrary to state law.

So, therefore, there has not been much action on the state permits as we see it, which brings us to the status of the permit applications in process.

Our air quality registration certificate was filed 20 months ago, 1-20-88. And we have had interactions with the state that is required from any new land disturbing activities, such as construction of new roads, drill pads. If we create particulate air disturbance, we need this permit. Now, the state requirement says that if it is less than 20 acres, you don't need one. However, we have done other areas in the program and we have exceeded the 20 acre limitation.

So that any new work from this point on, has to have a permit, even though it might be less than 20 acres in one isolated instance.

The state has written us and said they don't consider the application yet complete. They believe they need to see the site characterization plan and any modifications to it, and how we are addressing the comments before they believe our air quality registration certificate is complete.

That certainly is a matter of discussion. The state has chosen to tie the two closely together, meaning the two, the Waste Policy Act and the Clean Air Act. We have provided them a letter in July that states that we do deem it complete and we do request that they take immediate action.

And our status right now is that we are talking with the Department of Justice, and we will continue to talk with the state to see if we can resolve this impasse, but should that not come to pass, we will have to take whatever appropriate of action the Department of Justice and our General Counsel at the Department of Energy sees fit.

So that is our one permit on clean air and that is one, as Tom pointed out, that will be necessary for us to gather new data in the field.

DR. CARTER: Let me ask you a question, using this as an example, I guess in looking over the materials, the State of Nevada says they have some 16 or so statutes that you folks have to either follow or may have to follow. You know, some of them might be debatable, but it is a fair number.

And these require, you know, reviews and authorizations and permits and consultations and whatever. And I guess the question is, you are directed by law to do certain things to implement the Act, Nuclear Waste Policy Act. You are also directed by Congress to abide by all of local and state appropriate rules and regulations.

So it would appear to me that you know from this legal standpoint that there is somewhat of an impasse here. And I guess, for example, the permit on disturbed land, whether it involves, you know, 40 acres or 100 acres or whatever, and it would appear that you are already well into the time schedule here from when you have applied and the fact that no activity or no permit has been issued.

How long does one of those normally take -- say, if I wanted to build a used car lot and disturb 20 or 30 acres.

MR. GERTZ: We have looked at, say, one to two months. Our test site permit has been expeditiously processed by the state, not for the R & D activities that we want to do but for the normal test site activities. We do a lot of surface disturbance when we drill holes for underground testing.

And that has been expeditiously processed in a much shorter time than has occurred on this.

DR. CANTLON: Carl, have any calculations been made as to what the additional cost to the rate-payers is going to be from a two-year delay, or a three-year delay here, which seems to be sort of intentional foot dragging?

MR. GERTZ: No, not specific. We spend about a $1 million a day but there are lots of things that contribute to a possible delay of the program -- permits being one. We have to address the desert tortoise issue.

Today, we couldn't go out and do some surface disturbance until we address the desert tortoise issue, which we hope we will have resolved by the end of the year. We cannot still get on the Air Force land, which is only a part of the land that we have access, need to do studies on.

So, it is a complicated issue and we have not ascribed a particular cost to this particular delay at this time. The Secretary of Energy though, has been quoted as saying, Dr. Carter, to address your question of impasse, it may take 1,000 lawyers three or four years to solve this problem.

I have to think that was a little bit of a play on words, but certainly it is an issue for us; it is a delay for us and it is an impasse, so to speak.

DR. CARTER: Well, I would think so and I would think that you, as the project manager, have real heartburn with this. This is going to delay your entire program as far as I can tell.

MR. GERTZ: I think that the Secretary of Energy said it even better than I can. He said, federal law tells me to do one thing and state prohibits doing that and Watkins, what am I supposed to do? And I feel the same way; Gertz, what am I supposed to do?

DR. CARTER: Well, I presume that you may want them to enact Executive Order 12612, the one called, Federalism, which says that when there is a direct conflict between the federal law and the state, then something has got to give.

Is that the one that might be used in this case?

MR. GERTZ: I am not sure. I have not been privy to the detailed discussions with the Department of Justice and the Department of Energy's General Counsel. I know that they are discussing exemptions. The Clean Air Act has a Presidential exemption part of it, and I know that they are discussing that Executive Order.

DR. CARTER: You know, you can make light of it, but it is a very serious problem.

MR. GERTZ: Yes, sir, I agree.

DR. CARTER: Obviously, you cannot proceed with site characterization until you get either exemptions from these permits and so forth either from the State of Nevada, or the granting of them.

It would appear to me that they are not going to be in any hurry to grant any of them.

MR. GERTZ: That is right and the State of Nevada has attorney general decisions and they are also suing us on a potential land withdrawal and their attorney general has said, any cooperation with DOE would be viewed as undermining their court case and being the establishment of estoppel on their opposition to a repository.

They are adamantly opposed to a repository.

MR. ISAACS: I just wanted to make one point. I think that it is important to make a distinction between those that are federal flow-down authorities, those federal laws that we must comply with and, as Carl said earlier, those other ones that are state laws.

I don't believe, I will have to get the lawyers to back me up, but I don't believe that we are required by law to meet those regulations that we have said that we will meet as a matter of comity. We think that it is the right thing to do, we want to meet the intent of them, but I want to make a distinction, because a couple of times it has been put in the same bucket and I don't think that they are.

DR. CARTER: Yes, what I am talking about specifically, Tom, is where the state has a law that is in direct conflict with federal law, in this case, and you folks have been told that you have got to do both. And you obviously can't do both.

MR. ISAACS: That is correct and that is where Carl's --

DR. CARTER: You know, site characterization, the technical program and the scientific program and all that may flow from it, depends upon the resolution of this.

MR. GERTZ: We can't move on with site characterization unless we gather new data.

DR. CARTER: That is right, you are dead in the water.

MR. GERTZ: That is correct, yes, sir.

MR. ISAACS: Let me just say again, that I think that your characterization is well put. There are many valuable and necessary and needed things that this program can and will do, while we attempt to solve this problem. That is not the only thing that this program needs to do.

There are other things that are on or near critical paths as well that don't require these permits but we can't get to the finish line without it, and it is definitely the schedule of the program.

MR. GERTZ: That was the major permit that is most important immediately to us. And the other three, three of the four, are ground-water appropriation, which we believe is still a matter of comity, but we did file that on 7-21 over a year ago. It was ruled complete by the state in October, and the state has not scheduled a hearing which is required, and the state law requires an action within one year from 12-30-88. And they have been commented on that there are a number of applications ahead of us and we will have to wait our turn.

And we will just have to see what happens with that.

Our underground injection permit for the use of tracers, more recently filed in 8 April; additional information was requested in June and we are compiling that information now, and this is what I alluded to earlier about our NTS, Nevada Test Site operating permit modification.

The state made a request for more information on what we were going to do in this area of prototype drilling and the state believes that the modification was necessary for prototype testing.

So that summarizes for your request about our permit status. If you have any more questions I will deal with that and if not, I will kind of set the stage for the technical people that are coming in.

DR. CARTER: The only thing that I would say, I am sure later there are going to be additional permits and so forth, where you again, have to go back to the state of Nevada. So this essentially is the beginning of a lengthy process.

MR. GERTZ: Yes, sir, 15 of them, as a matter of fact. And I do want to emphasize what Tom points out too, we do have some data, and we can do some ongoing studies. We can do some things out there, but the bulk of our activities is going to rely on this.

DR. CARTER: The main thing though, is that you cannot characterize the site without the resolution of this particular problem.

MR. GERTZ: I can't say it any better than that, yes, sir.

MR. ISAACS: Mel, just to refresh, I think that we have provided the board or at least certain members of the board with the regulatory compliance plans, which does lay out in fairly good detail our perception of the documents we need, and what we need to go through and when we need them.

MR. GERTZ: Okay, let's talk a little bit now about technical presentations that you requested. We are going to address the four disciplines; water, air, biological and cultural resources. And the content of the presentations will be in a regulatory framework and then technical issues, and then potential mitigation measures.

Each of the individual experts are going to talk about that in their areas, but first, I would like to just kind of summarize a little bit the regulatory framework so that they don't all have to do it, because much of it is common.

There are some that are specific, but much of it is common.

And in effect, these are the common regulatory frameworks. We have the Waste Policy Act, and specific section is 113(a), which says, minimize adverse environmental impacts. That is our environmental monitoring and mitigation plan; that is what that derives from.

Certainly we have the Environmental Waste Policy Act, and the Waste Policy Act says that an EIS is not required, and the Environmental Policy Act, has requirements for an EIS but it has been modified as I said, by the Waste Policy Act.

We will be preparing an EIS and we do have the Land Policy and Management Act. That is when we are talking about our right-of-way agreement, from the BLM, not only do we have a right-of-way agreement, we have also filed for land withdrawal in the future.

Land withdrawal essentially is needed to segregate the land from mining claims, from producers' mining claims as I would like to call it.

Then we have the DOE orders and that requires us to comply with particular regulations.

DR. CARTER: Carl, I might mention here, that it would appear to me that your number two bullet there, the fact that the particular Waste Policy Act stipulates that you do not need an environmental impact statement before site characterization. It is part of the contentious issue between the state of Nevada.

MR. GERTZ: Yes, sir.

DR. CARTER: And, of course, that was a Congressionally mandated edict.

MR. GERTZ: That is correct, but certainly there are many people who believe that the Waste Policy Act went too far in compromising the EPA regulations, but right now, that is the law of the land, much like the law of the land has characterized Yucca Mountain.

As project manager, those are the two laws of the land that I am trying to carry out.

That concludes my overview, unless there are some more questions and we can get on with the technical presentations.

DR. CARTER: Let me take this time to see if there are any more questions or comments, before we move on and I would also like to introduce Dr. Warner North, our other panel member, and he is a tidy bit tardy.

Any other questions for Mr. Gertz?

(No response.)

DR. CARTER: All right, thank you, sir.

MR. GERTZ: Thank you.

DR. CARTER: All right, we will now move into the technical and scientific aspects of the program with this background and our first presenter is a geologist, Greg Fasano. He is with Science Applications International Cooperation or SAIC.

And he is a senior scientist with this project.

Mr. Fasano?

PANEL REPORT ON WATER AND WATER RESOURCES

BY GREG FASANO, SCIENCE APPLICATIONS INTERNATIONAL CORP.

MR. FASANO: Thank you and good morning.

My name is Gregory Fasano and I am an

environmental scientist, geologist with Science Applications International Corporation. And working primarily with the planning documents for the water resources program.

You are going to hear about the environmental monitoring program associated with water resources, and I would like to differentiate a little between that program and the site characterization hydrology program.

Our monitoring program deals with trying to assess potential impact of water resources, as a result of water quality and water quantity issues, or impacts, if you will.

There are two aspects to that. There is an environmental regulatory compliance aspect to the water resources program and there is a good scientific data gathering aspect relative to assessing potential impacts to such things as other water users and wildlife, for example.

Whereas the site characterization hydrology program is trying to answer large technical questions associated with siting area, the nuclear waste repository at Yucca Mountain, with the end product or the goal being to try to characterize the hydrologic conditions as it relates to potential radionuclide releases and migration through the subsurface to the accessible environment.

Again, we are separate from that effort and we are monitoring those very site characterization activities that they are trying to do to characterize Yucca Mountain and the potential effects on water resources.

And I would also like to state that we are in the planning stages of this particular effort right now, and our field data gathering efforts are going to, I believe, begin later this year, or possibly the beginning of the next calendar year. But we have some technical procedures and some QA requirements to fulfill before we actually start data gathering, and subsequent laboratory analysis of samples.

I would like to briefly go through the regulatory framework for water resources. And in addition to the four common requirements that you just heard Carl talk about, there are some more specific requirements associated with the water resources. And the federal requirements are the Safe Drinking Water Act, Clean Water Act, and the Resource Conservation and Recovery Act, the Endangered Species Act.

The top three are, federal pieces of legislation but they are what are termed federal flow-down that we talked about briefly already where enforcement authority is delegated to the state level, and in this case, obviously being the State of Nevada.

The fourth one is purely federal and I will talk about each one a little bit more now.

There is lots of internal requirements within each of those acts, and I am just going to highlight some of the things that are directly applicable to our program. The Safe Drinking Water Act requires regulation of drinking water standards, or drinking water supplies, by establishing drinking water standards.

There are currently 30 primary and 12 secondary standards that we are going to have to be in compliance with; such things as heavy metals, chlorides, and things like that. There is a whole list of them.

The Act also requires protection of aquifers, from contamination by injection of wastes and other materials into wells. This underground injection control aspect of the program requires a permit for injecting such things as tracers that we are going to use during site characterization.

The state will also have to review our drinking water system and any other systems associated with that Act -- the design of it and basically sign off on it.

And the Clean Water Act, basically establishes a policy to restore and maintain the physical, chemical and biological integrity of the nation's waters.

The National Pollution Discharge Elimination System permit, or NPDS, within this Act, requires regulation of discharges to the environment, that is the surface waters of the environment, and I would like to add that the state views surface waters -- we all know that there is not a lot of surface water at the Yucca Mountain area -- the state views surface waters as being the dry washes and dry lake beds whether there is water in them or not.

This is directly applicable to our mine waste water pond and possibly even our sewage system, depending upon final design.

It may include effluent limitations and associated monitoring of those effluents.

The Resource Conservation and Recovery Act is a very large piece of legislation. There are many subtitles associated with it, and the two that are applicable to site characterization are subtitle (c) and subtitle (i).

Subtitle (c) is management of hazardous wastes and subtitle (i) is dealing with underground storage tanks.

Subtitle (c), relative to the subtitle (c) we have been issued, the project has been issued a RCRA ID number relative to our operations in dealing with hazardous wastes and right now, currently, we are classified as a small quantity generator. And the types of wastes we are talking about are things like solvents and fuels, and things like that for site characterization.

DR. CARTER: Are you going to talk at all about the way that EPA has gone about handling the fact that subpart (b) of 40 CFR 191 has been remanded and they have amended RCRA Regulations to handle waste disposal units?

MR. FASANO: I was not going to, is it a part of the 40 CFR 191 presentation later on today?

MR. GOMBERG: We will cover that.

MR. FASANO: So as I said, we were issued an ID number and we are also preparing a waste management handling plan and I am not sure what the exact title is, but it is a waste handling management plan that is associated with our operations during site characterization.

The underground storage tank aspect, there is a possibility that we will be storing fuel in underground storage tanks and if that is the case, we will have to submit specifications, installation reporting and monitoring requirements for review.

Any released detection associated with those underground storage tanks may require ground-water quality monitoring also.

The Endangered Species Act is purely federal and it involves consultation with the U.S. Fish and Wildlife Service. And although it is not directly related to our water resources monitoring program, there are some endangered fish species in some springs in the area, and we will be collecting data -- water data, quality and quantity data associated with those springs -- and we will be using that data in hopefully assessing any potential impacts that may occur to those endangered fish species.

DR. CARTER: Well, these species, I presume, are the ones down around Ash Meadows area, a distance from Yucca Mountain site, so --

MR. FASANO: Yes, we are going to monitor those and you will hear more about the regional characteristics about the ground-water flow and things like that.

Okay, briefly I will talk about the state requirements now. You have seen these listed in Carl's presentation.

The sanitary and sewage collection system approval, the Nevada Pollution Control Law and the Water Appropriations Permit. The sewage collection system approval, its purpose is to prevent discharge of pollutants into state waters. And they have the authority to design an operation of our sewage collection systems and also grant an operating permit for that system.

The permit may require ground-water quality monitoring or just general water quality monitoring as a condition of that permit. The Nevada Water Pollution Control Law deals with discharges of pollutants to the subsurface, and it states that those must be controlled if there is a potential for contamination.

Any water impoundment designed such as our muck storage pile or mine waste-water pond again, they must be reviewed to see if there is, if seepage could contaminate the water, and degrade any water quality in the area.

If so, that may require a zero discharge permit and associated monitoring with that.

The Water Appropriations Permit is just that, it is an application for a permit to appropriate waters. In this case, for our operations during site characterization. We have applied for 402-acre feet, or approximately 131 million gallons of water over seven years of site characterization.

Obviously, that is related in our program to water quality monitoring which you will hear more about later. That is just sort of the general framework.

I believe that we are ready to move on to our technical aspects of our program, which is, you would like to introduce our next speaker, which is Otto Moosburner, unless there are any questions pending?

DR. CARTER: Any questions for Mr. Fasano?

(No response.)

DR. CARTER: All right, thank you.

The next presentation will be given by Otto Moosburner, and he is a surface water specialist with the

Nevada District of the US Geological Survey.

BY OTTO MOOSBURNER AND DICK LA CAMERA

MR. MOOSBURNER: Before I go on, I would like to introduce Dick La Camera, an associate of mine with the USGS and he is involved with the program and he may be able to answer some questions that I may not be able to.

I want to give a very brief, hydrologic overview of the Yucca Mountain area and vicinity. I know that the board may have quite a bit of knowledge; they may have had some very technical information presented to them and also in addition, we will be hearing more about precipitation in particular, in the air quality and the meteorology portion of this presentation this morning.

I just want to make a few salient points here. Precipitation on an annual basis probably in the Yucca Mountain area is probably in the order of five or six inches a year. And the point I want to make here is that the variability is very great, typical of an arid or semi-arid type of country, or region.

And probably from any one particular year, you may have one or two inches and the following year, 10 to 15 inches, a great variability. And somewhat spread out throughout the year, but very variable, possibly with a little bit of high points in the summer and in the winter.

Another characteristic that is very important here is that you may get a great portion of that annual precipitation in one day or one afternoon or something like that on occasion, typically several inches. This may not happen for many years, but you can get it.

That leads to my second aspect there, flow and floods. The flow, and I am talking about surface water flow, is very low. As a matter of fact, the information that is available right now, the last significant flow periods occurred in 1984. And I don't know if that is typical but probably not atypical.

And the way that happens, typically, usually is in response to very intense precipitation, several inches an hour for certain portions of an hour -- very short lived, several hours or less -- and then you get back to a complete ephemeral type of state.

Now, this is somewhat important as we get into it a little later, certainly this floods and flow are not really a great part of the resource, but I want to mention here, in passing, that it can affect things --for instance, floods can mobilize contaminants, spills, carry them to another part of the area, and be a basis of ground-water recharge, which is the major aquifer down there.

Just to put a little -- before I get off flow and floods -- to give you an idea, if we are talking about five inches of precipitation, let's just say a year, which is very small to start out with, compared to most of the country, the annual runoff may be an equivalent depth of possibly one or two-tenths of an inch a year, which is possibly several percent of a very small resource to start out with.

And ground-water, of course, is your major resource, underlying Yucca Mountain area, and the surrounding area. But, as I think you are aware, and if you are not, it is basically at a very deep level, typically 1,000 to 2,000 feet below the surface, or even greater below the surface.

The general location map, is the study area and vicinity, I just want to point out a few items. And Conceptual drift boundary here, your NTS boundary, larger framework and this is the Ash Meadows area, the Devil's Hole area, and we will get back to that later on.

You can see that it is down in this direction and Death Valley is more in this direction, here, and what we are calling the Parks' boundary of the water resources study area, a broken line. A lot of activity will be concentrated in that area, but there also will be a lot of activity outside of that area.

DR. CARTER: I was just curious, you may know, when was the name officially changed from Lathrop Wells to Amargosa Valley?

MR. MOOSBURNER: From what I recall, it was in the last year or two. And I don't know the actual date, because I could not find myself there after they changed the name, the next time I was there.

DR. CARTER: Thank you.

MR. MOOSBURNER: The next slide is a generalized stratigraphic relationship sketch for the hydrologic units. And what we are talking about is the three aquifers; your alluvial aquifers, usually near the surface of course, and the volcanic aquifers, by Yucca Mountain; and the tufts generally, and then an upper and lower carbonate aquifer. I will just refer to it here, really, as a carbonate aquifer and not differentiate.

A couple of things, just again as an overview that you want to keep in mind here, and that is, certainly it varies in thickness all throughout the area, greatly. You should not really view it as a pancake type of aquifer system at all.

And, in addition, what is not really portrayed probably adequately there, is that there is a great bit of faulting and displacement, more so than is even shown in here. So that there is a lot of jumbled up material in that area.

Next please. Again, as a way of background, this is a similar map here, with Yucca Mountain being right here, showing the geographic distribution and general flow directions in and near the study area. And the dark arrows are the generalized flow directions.

Now, these results, obviously not from this study, these are from previous studies that have been made. And you can see there are some question marks on this, and it means just what it says. There is a lot of uncertainty both as to the magnitude and the actual direction but this is the perceived general flow area, and what this, in a nutshell means, is that generally in this area, flows from the northeasterly to a southwest direction to the Ash Meadow Springs, generally and west of here, more northerly and southerly directions to the Death Valley as such.

DR. CARTER: I presume this information has been put together over a period of years, from a number of studies and that it is not necessarily all tied together. Is that --

MR. MOOSBURNER: That is correct.

DR. CARTER: Is that a fair characterization? Someone studies it off to the north and maybe somebody to the south and so forth and this is somewhat of a composite but you would not necessarily move a tridium atoms by those maps, if you put one in the top, or the north of the Yucca Mountain, it would not necessarily follow those arrows?

MR. MOOSBURNER: Not necessarily. There may be forces within those.

DR. CARTER: So this is very generalized?

MR. MOOSBURNER: That is right.

Next please.

This is rather, not necessarily complete, but certainly pretty comprehensive list of potential impacts to the water resources from site characterization activities. After all, that is what we are talking about really.

For instance, the first one certainly we may be talking about cross-contamination of aquifers, because of drilling involved. And certainly, for instance, septic and sewage disposal in the area could have an affect, mostly quality, certainly there is some water recharging as well.

Storage of hazardous materials, I alluded to that a little earlier. It can affect the ground-water system directly by infiltration, spills, but also it could be mobilized by floods and ruptured materials and transported to different areas, even outside the study areas, because that main drainage, what is called the 40-mile wash shown on that first locational overhead, does go through the area and does go into the Amargosa area.

DR. CANTLON: If you were to rank order of these in terms of the perceived severity of the possible impacts, what would the ranging look like?

MR. MOOSBURNER: I don't think that I am prepared to say right now. I think that we have not really, I think that we would have to wait for a data compilation and you can see that there are a lot of things out there that relate to quality, as such, and there are certain aspects that relate to quantity and that is the way that USGS -- you will see in a few minutes we sort of break it down to those two issues.

But I think that it also depends on site specific.

DR. CANTLON: Right, but for instance, the septic and sewage disposal in the site characterization phase is going to be trivial or non-existent.

MR. MOOSBURNER: Yes, it has to be seen what kind of an activity, that is right.

DR. CANTLON: The infiltration studies --

MR. MOOSBURNER: Very low.

DR. CANTLON: -- again, have to be trivial to non-significant.

MR. MOOSBURNER: Certainly water withdrawal depending on the magnitude could be one of the larger factors, yes.

DR. CANTLON: Right, so that there are certain qualifier ones that may be significant and the other ones are more or less pro forma dismissal of these as significant impacts? There is no sewage disposal system during the site characterization phase, am I correct?

MR. MOOSBURNER: I think that there is.

MR. FASANO: There is in the exploratory phase.

DR. CANTLON: Okay.

MR. FASANO: So that could be a significant local effect anyway.

MR. MOOSBURNER: So we are not excluding anything right now is what I am trying to say. And necessarily that water withdrawal, I am not trying to imply that it is least significant in this order.

I just want to give a little few words about how we are trying to approach this problem in a general sense. And as you saw in that previous overhead, there is a lot of specific site activity, site characterization activities that may have an impact.

What the general philosophy here would be to try to get to the source to monitor as near as possible to where the potential impacts are. And then as a second part of that, not the second bullet, but still within the first, is to use a part of your network further removed as sort of a backup system, in case you missed some of that initial effect.

And second, is somewhat related to the first, but if we are talking about ground-water specifically, if something is expected to affect a certain aquifer, you want to make sure that you want to monitor that one rather than the wrong one. That is the kind of a situation.

Although, you may still want to monitor the other ones because of the degree of interconnection is certainly not well established yet.

Next please.

The issues as we see them broken down into these three here, the first one relates solely to water quality. Again, this is in the study area, and adjacent areas, whatever the perceived impacts are expected to be. Now, we are talking about spring flow and well discharge and ground-water as such, in a quality context.

And okay, second, is a quantity type of issue. When we say this, water resources, we are really talking about well flows, spring flows and we are also talking about depth to water levels because it is a measure of storage -- it may not be directly a measure of storage, but it certainly is a measure rather than a quality issue.

And the third is really a subset of the second. It is not a new technical issue, as such. It is an extension of issue two to a very specific potential problem and concern by the Death Valley Monument Lands by the National Parks Service.

And we will get into details on all three of these issues.

Next please.

The technical approach for this first issue, is encompassed by these four bullets as shown. The first item here, I will just talk about it here, and is really about three aspects that are involved with this on the compilation phase. And remember that we are talking about quality, is a review of the published sources and the data bases. And a lot of work has been done; a lot of information is out there.

Second, is actually some tables and graphs will be prepared on the measured parameters for each of the water quality parameters that we will get to talk about a little later. And, again, orbit by aquifer, if possible.

The second bullet there, has network design and I will get back to that in detail in the next viewgraph.

And water quality monitoring and analysis, which is really the nuts and bolts of the program -- you are actually going out and getting the samples, analyzing them and impact evaluations, as to water resources.

DR. CARTER: Let me ask you a question. You may mean to come to it a little bit later on, but I notice in the environmental monitoring and mitigation plan for site characterization, that there is some rationale in there for initiating conditions for radiological studies. And they are based on monitoring various things and I presume water, and it calls for -- if you get certain increases over three sampling periods; whether these are quarterly or whatever, I don't recall -- but I was intrigued by the order of magnitude of what these increases might be; all the way from zero to 10 to the fifth.

Are you going to discuss --

MR. MOOSBURNER: I am going to discuss several things, one in quality and one in quantity.

DR. CARTER: Good.

MR. FASANO: Excuse me, though, the radiological aspect though, we are not going to get into. That was part of the radiological monitoring program that we are not going to be discussing today. The water quality aspects that Otto will be talking about are associated with the chemical makeup of the water, rather than the radionuclide makeup.

So, the radionuclide effort that you are talking about is a detailed effort under a radiological monitoring program and not this program.

DR. CARTER: Okay, but it is probably covered -- it gets initiated here, and he is talking about monitoring water and so forth and this is what then initiates the radiological program.

MR. FASANO: Actually taking the samples, yes.

DR. CARTER: Okay, but I am interested in the initiation activity, the rationale for what the detail spread is about.

MR. MOOSBURNER: I will discuss two aspects within the water.

DR. CARTER: Well, maybe I am interested in the interface between the two.

MR. FASANO: And if that is not it, we will get it for you.

DR. CARTER: Okay.

MR. MOOSBURNER: Wells and springs to be chosen as far as network design, are going to be based on what we have talked about on the previous overhead, on data compilation. Aquifer identification for wells and springs again, it refers to this trying to tie it down to the specific aquifers that we are talking about, if possible. Some locations will not have all the data that you would like, that is for sure.

Again, the third one relates back to that overall concept I was talking about; we certainly would like to get at the root of the potential problem, as you can. And then there will be maybe considered a modeling techniques running the whole gamut of rather simple, relatively simple analytical models to a more technical models.

Next please.

Just for some information here; the diamond shaped symbols are the existing drill holes to the water table and the small circles are the proposed drill holes. This is near the post drip boundary, and there are some additional wells, obviously, away from this overhead, shown that have been drilled or are planned for drilling.

As a point of information, because we will refer to it later, it has been referred to already as J-13 planned production well for the site characterization activities.

DR. CARTER: Okay, I wonder if you could identify on that map for me well J-12, and the reason for that is because later on I am going to have some questions about the quality of that water.

And I noted that instead of sampling, instead of the results analytical results for J-13, you have got them for J-13, plus the combination of J-12.

MR. MOOSBURNER: I am not sure --

DR. CARTER: Not given separately. So I am just wondering where J-12 is on the map?

MR. MOOSBURNER: I believe that it is south of here, and --

MR. FASANO: That is it right there. These scales, we are talking about two miles.

DR. CARTER: Okay, well, I will come back to that question, but I wanted to know where it was on the map.

Okay, thank you, sir.

MR. MOOSBURNER: Next please.

Again, as I said earlier, nuts and bolts of the monitoring program from the network, the obvious wells that are chosen, the water quality data will be collected from these wells and springs, and the analyses will identify the water chemistry parameters necessary for characterizing well and spring waters, including primary and secondary drinking water standards.

To give you some idea here, this is quite a comprehensive list. Now, let me refer to that list a little later.

Third, water quality will be monitored for the duration of site characterization and beyond. I don't know what that means. Of course, it will depend on the flow of events.

Sampling frequency will be quarterly at selected sites and annually at all sites in the network. Sampling frequency in a suite of parameters may be adjusted following review of data. That is what I am talking about here. We perceive initially, we will be sampling for all parameters the first time through and then some choices based on the analysis will be made, as to the suite of parameters.

And the point I wanted to add here, besides the suite of parameters and sampling frequency, there might be some adjustment to locations and natural sites, based on findings.

DR. CANTLON: I saw that you could eliminate again, chlorine pesticides if you find none in the first two or three?

MR. MOOSBURNER: That is the other point. We certainly are going to use some judgment here, on doing that.

DR. CARTER: Let me ask you a question here about, obviously drinking water, we would all like to think and I am sure that they do include bacteriological sampling, and you don't have that on your slide. You have got basically everything else on it.

MR. MOOSBURNER: I believe, Dick, can you respond to that?

MR. LA CAMERA: The bacteriological monitoring, at this point, will consist of total chloroform bacteria only and that is because as it stands right now, the state monitoring standards have been holding the type of biological decay.

DR. CARTER: But you do have it included in there, among your other variables?

MR. MOOSBURNER: Yes.

DR. CARTER: Okay, very good.

MR. MOOSBURNER: The list is quite comprehensive and it may not be shown here.

Next please.

To give you a little example of some equipment that is certainly going to be under consideration. The sampling of wells and especially the sampling of deep wells is a real problem. And some of the different techniques are available certainly will be evaluated.

Certainly this is an approach that has been used of trying to sample from depth, which is called squeeze pump for the collection of water quality samples from wells. Basically an enclosed unit with a teflon lined bag here and that is lowered down into the well with an attachment of an air-line with availability usually of nitrogen, and you lower it down and you see that it has some check valves, here and there.

And you lower it down to the location that you are interested in and basically by pressurizing this and shutting it off, pressurizing it and shutting it off, this will, in effect, suck in water, from the depth that you are concerned with and pump it up.

What you are trying to do is you are trying to get a good idea of what the water quality is at that location. So what you really need to do is to evacuate much of the water that is just sitting there. So a potential shortfall or a problem with something like this is that if you have a large diameter well, you have got to pump a lot of water to get aquifer water in there.

But certainly if you have the time and if the well is small enough, this is a very suitable method. An advantage is that you don't get into degassing problems and so on, because there is no real contact with the sampled water by the gas that is introduced.

This is just as an introduction to give you some idea of what can happen. It does not attempt to tell you all the problems of deep sampling of wells. It is really a complicated issue and I will get to a different aspect of it a little bit later on.

DR. CANTLON: This is a portable piece that you have dropped from well-to-well or something --

MR. MOOSBURNER: Usually a portable, right, but it usually takes quite a bit of organization to get it set up.

DR. CANTLON: Right.

DR. CARTER: Do you have an interest in any dissolved gases and would this have an effect on the concentrations of those?

MR. MOOSBURNER: On this particular one, I don't believe -- we have an interest in them, that is true -- but in this particular, the attempt is here, that it would not be gases, there is no pressure change involved here, in other words, as far as degassing it. You are not using an impeller type of pump or anything like that.

DR. CARTER: So you are not going to affect presumably things like dissolved oxygen or radon?

MR. MOOSBURNER: That is correct.

The impact evaluations will include compliance with environmental regulatory requirements, and parameters therein.

The second bullet really refers to that somewhat to the comprehensive list of potential effects that we had shown right in the beginning of the presentation. What we need to say here is that all significant effects will be evaluated, not significant effects, but significant impacts.

Now, here is a third bullet that refers to what we were talking about earlier, Doctor, on the initiation information that may in a sense ring a bell on what is happening, in other words, changes that are imposed.

Now, this is in the initial planning stages on this, whether this is a good criteria -- it certainly is not for some of them. For instance, near the threshold of detectability, technically you may be 50 to 100 percent off that you can't really tell what the value of the parameter is. So I think that this is going to have to be adjusted, depending on the parameter and so on.

But it is an attempt here to talk about changes in time and what kind of bells will be ringing. So this, obviously is in the formative stages and it will be specific, I believe to parameters involved.

DR. CARTER: Well, let me raise a couple of questions and this is probably as good a time as any, with this.

This is related to the earlier question about the initiation based on this rather lengthy thing. A number of the things that you are going to be interested in eventually, to the best of my knowledge, you essentially do not have any level or the levels or concentrations in the water are extremely low, and I mean extremely low.

MR. MOOSBURNER: Thresholds, yes.

DR. CARTER: And so you are on the threshold of detectability or even below, I suspect, in some cases. I dare say, for example, if you end up with a little bit more thorium, for example, which is one of the more critical nuclides in terms of 40 CFR 191, you are going to be quite concerned about this. And I would imagine any increase and I suspect also you have already got some thorium which is a naturally occurring material there already.

So you do have a baseline. And I am not so sure that you can see 10 percent --

DR. CARTER: -- increase in thorium, for example.

MR. MOOSBURNER: That is the point I was trying to make, that even though it is there, this is an initial tenth of where we are at in the project, but this is certainly going to be designed as we go into it.

DR. CARTER: And others, you are looking for essentially what might amount to an infinite amount, with this going from zero, for example, something like plutonium 239 or pretty close to zero, and again, any increase in that one would be appreciable, if you go from zero to something positive is a fair amount.

And, so this is an important area and it is going to be hard to deal with, because a number of these do have thresholds that are in the extremely low concentrations and distinguishing increases like 10 percent or so, are going to be analytically extremely difficult.

MR. MOOSBURNER: That is correct and that is the impression that I do want to leave you with. That is the very initial cutout just for demonstration purposes, really.

Next please.

DR. NORTH: I would like to ask about the bottom bullet there.

Modelling techniques may be used to assist an impact evaluations; what has been done using models to predict the kinds of impacts that you expect to see? In other words, getting at Dr. Carter's last question, what are you worried about?

For example, I might be worried about the effects of the withdrawals from the two wells, J-13 and J-12. And what kinds of changes might one expect to see in water quality as a result of the withdrawals that are proposed?

Have some modeling studies been done to address that question?

MR. MOOSBURNER: Not as I am aware of specifically at the site. I am talking about as far as the general technology out in the field, as far as some modeling scenarios and algorithms. That is just put there that we will possibly use that as we investigate it and as we go along in the project.

I don't know how to answer that question any differently than that. I don't know the answer really, but it is something that we don't want to just gloss over and not investigate.

The second issue now, remember we had talked about quality in the first issue and this is the quantity issue that we have talked about. And the first item again, is compilation of available water level and well and spring data.

And that is really made up of, that is quite a comprehensive list. A lot of work needs to be done here. And again, we are talking about a review of the published sources, and the data bases that are available. That means that we need to get all of that together. The compilation of the yield data, by areas and sub-areas and I will get to that in a minute; an accounting type of procedure. And tables and maps showing the sources by sources, and we are talking about categories of waters appropriated and used; water appropriated and not used and unappropriated water as such.

That is considered an accounting process. We are not really doing some of this. We are gathering the information together for this.

DR. CARTER: Excuse me, I wonder if you could just tell me or give me a feel, for example, of the expected water uses in site characterization and so forth, in terms of volume per year or whatever? What is the comparison with the quantities of water that are already used at the test site, for example, to, you know, feed and house people and take care of their domestic cares, as well as the technical programs.

Do you have any idea?

MR. MOOSBURNER: I have an idea of what the site characterization values are but I do not have -- and maybe someone here does have an idea of the -- you are talking about the whole test site, or just the site characterization?

DR. CARTER: Yes, I was just interested. Those activities have gone on since the 1950's you know, so that they must have a pretty good handle on their water use, and this is another water use that is going to be relatively nearby and I was interested in a comparison of those two.

MR. MOOSBURNER: The J-13 application is for about 90 gallons a minute, which is about two-tenths of a cubic foot per second, but I do not know -- maybe someone can help me out.

MR. MCCANN: We looked at it both for the Las Vegas Valley and from the test site area and the test site area is about .02 percent and the Las Vegas area is much, much smaller.

DR. CARTER: Yes, but I don't understand your numbers. I presume that what you are saying is that the water use here, for site characterization is very small compared to those other uses. Am I interpreting what you said, correctly?

DR. CANTLON: Somebody gave a figure earlier, of what, five million gallons per year?

MR. FASANO: The total for seven years for site characterization was approximately 131 million gallons, for a total of seven years and that is about 402-acre feet and those are the calculations that we came up with for water use during that period and it is also the numbers that we put forth for the water appropriations permit to the State of Nevada.

And it roughly breaks down, divided by seven, but you know, we are not exactly sure.

DR. CARTER: Well, I would like to make sure that those figures get in the record, so that you might want to repeat them again. I am interested now in the fact that the anticipated water use for site characterization of the repository is some rather small fraction of the water uses that are already occurring in related to the Nevada test site activities in general.

I wonder if you can state those for the record?

MR. MCCANN: It is about .02 percent of the overall test site activities.

DR. NORTH: Is the water being taken from the same places? Are wells, J-13, and J-12 being used extensively now, providing the Nevada Test site water or is that water coming from other sources?

Could you give us the percentage comparison with respect to the specific wells that are proposed to the site characterization plan?

MR. MCCANN: I don't have the percentage comparison, no, but you are right that the water for the test site comes from a number of wells all over the Nevada test site. And J-12 and J-13 are being used for other activities on the test site right now.

DR. NORTH: Could we get that information in the future, please?

MR. MOOSBURNER: Yes, we can.

To put it in a little different perspective again, the spring discharge at Ash Meadows is, we are talking about possibly 40 or 50 CFS which is possibly something like 30,000 acre-feet per year. That is really a different order of magnitude.

DR. CARTER: And some of that, but not necessarily all of it is derived from the area we are talking about, J-13, and J-12.

MR. MOOSBURNER: That is correct.

And on the last item on this compilation phase that I wanted to get to was the identification and classification and detection of springs.

Now, we think that we have a pretty good handle on certainly on the major springs in the area, and outside the area, but as a part of this program, we will certainly attempt to utilize photography, remote sensing, backed up by ground verification to detect other springs and we expect them to be small but certainly they will be identified, as a part of this program.

DR. CARTER: Let me ask you a question; are there any springs now that outcrop between Yucca Mountain and south towards Amargosa Valley?

MR. MOOSBURNER: Not that I am aware of.

DR. CARTER: Under the controlled area?

MR. MOOSBURNER: That is right, that is correct. There may be some seeps but nothing that I know of, and that is going to be a part of this project to do that.

DR. CARTER: Thank you.

MR. MOOSBURNER: Again, the second, third and fourth bullets relate to a similar type of breakdown: network design, water quantity, monitoring and analysis, and impact evaluations.

As a lead-in to this -- or at least a follow-up from the first -- is some sort of a map showing really an accounting system. The numbers refer to hydrologic areas. The numbers, like this one over here, as determined by the State Engineer of Nevada and the broken areas, for areas bounded by the broken lines and the solid line here, are the sub-areas, that what I want to differentiate here is that the numbered areas refer to basic surface water drainage as such.

And the larger areas are perceived ground-water accounting. Remember we had talked earlier about the directions of flow going in this direction as far as the sub-surface and also from north to south in this direction and the surface drainage, some of these are closed basins in here, and some of them are not.

But this may or may not have any direct connection.

Again, the factors that we would like to consider as far as the network design: data compilation, spring and seep protection classification, water use, as I have alluded to, the magnitude of the well and spring discharge -- we have just talked about this a little bit on what the relative magnitudes are -- certainly if it is a larger spring, it is just on that account, if it is a large resource, it would carry more weight than a smaller spring in the sense of trying to monitor it.

Again, aquifer identifications: again, trying to tie aquifers, certain wells and spring flows. Proximity to site characterization activities: again, trying to get as close as possible to the potential effect. And again, this particular bullet, and I think has more applicability to the quantity issue, as such.

For instance there are a lot of, as I mentioned, a lot of techniques, models going from analytical models to a very complex digital models out there and we are not saying that we are going to look at any one of them particularly but certainly some characterizations can be made, and some ideas can be determined here as to the adequacy of the data.

DR. NORTH: Has that been done? Have the models been used to make predictions what the withdrawals from J-12 and J-13 are going to imply for the spring flows in the area -- all the springs that you are considering at this time?

MR. MOOSBURNER: I believe as a part of site characterization that may be a goal. I am not aware that is --

DR. NORTH: Is there a summary of the present status of what has been done that could be provided to us?

MR. MOOSBURNER: I will certainly provide that. We will certainly provide that.

MS. DUSSMAN: The site characterization plan has a summary in there of the type of monitoring that has been done to date.

DR. NORTH: I don't want to know what kind of modeling has been done. I want to know the predictions of what the changes in the flows of the springs are going to be as best as you can estimate that at the present time and a discussion of any uncertainties that you believe are critical in making such estimates.

If the best you can do is a ballpark, then could you give us that information?

MS. DUSSMAN: We will make an effort to --

DR. NORTH: Common sense would suggest that the spring you just described, with a huge flow relative to the withdrawals, would not be affected. How about some of the smaller springs that are predicted to be down-gradient of J-12 and J-13; is there reason to believe that there would be a substantial percentage change?

That is the projection that I would like to see.

MR. MOOSBURNER: We will provide that.

I will refer to that a little bit about changes from imposed stresses that have occurred out there a little later, when we talk about the third issue.

DR. CARTER: Let me ask you another question related to this. This was related to my question about the springs, the question of whether any of them are south of the direction of the water flow in general, certainly between there and say the Ash Meadows area?

Is there any other wells, in any of the springs, and there are a number of them related to the test site in that general area, are any of these thermal? And thermal from the standpoint of thermal like the ones at Ash Meadows, and there are some 25 or so of those, as I understand in that area, but any of the waters at the test site, or any of the wells that you have sampled, or any of the springs, are they thermal to that extent?

MR. MOOSBURNER: I don't believe so, but I have not analyzed that. We have not looked at that, but not to my recollection.

Next please.

Similar breakdown as for the quality issue and again, measurement of frequency varying monthly to continuous depending on the site selection. And water use and water discharge data will be collected, that is, collected by others and will certainly be included in the data base, once it is qualified as to its usability.

Water quantity will be monitored for duration of site characterization and beyond, again, similar statement of measurement of frequency and possibly sites maybe adjusted after the initial sampling measurement.

Next please.

I am going to just go over briefly, as you recall, determining water levels is one of the aspects of this particular issue and the one on the left is a steel tape type of technique, it is old standby. Certainly it is still for calibration purposes, it is still probably the one that you want to calibrate to. You can certainly make corrections for temperature, and for stretch, because we are talking about on some of these deep holes, we are talking about 1,000 or 2,000 or more feet and we could easily talk about a foot or two difference which is a significant amount depending on the temperature and the weight imposed.

The electric tape measurement has its advantages and disadvantages. Certainly one advantage is that you do get a direct reading out of the hole when you reach the water level and also tries to get rid of the problems, or at least the problems of the steel tape as to where the water level was. You don't have to pull it all the way out of the hole and determine what mark has been wiped off and so on.

And third, is a technique used quite often. It is not as accurate, certainly as the steel tape, is to use an airline method. Basically what you are doing here is pressurizing an airline to down below the water level and the pressure of that will give you the head water above the bottom of the airline. So most gauges are certainly only read to maybe a quarter of a psi, or something like that and it is not nearly as accurate as that.

DR. CANTLON: Are most of these wells pretty vertical?

MR. MOOSBURNER: That is another, I am glad that you brought that up, that is a correction that certainly has to be made. And some of the work that has gone on in the test site, not associated with this program, corrections from surveying techniques have been utilized because that has made a difference of several feet on a deep hole.

DR. CANTLON: It seems to me that you ought to be able to hold a reflector on the surface and get a laser reading, off of it, and get a very accurate, with none of these correction problems.

MR. MOOSBURNER: Right, there are other

techniques out there, that is correct. Certainly in the technology, it has come a long way.

Okay, I wanted to give you a little idea on how discharges from wells and springs are made. This is just a sampling and starting from wells, the common procedures are taking measurements in a pressure pipe arrangement using meters, orifice plates, and nozzles, and the next overhead when we get to it, will show an orifice plate arrangement and I will describe it briefly, how that is used.

Totalizing displacement flow meters, certainly used a good example is water meter G-house, and volumetric methods are very accurate if you can use them. Other pipe methods that are more approximate maybe having to do with water trajectory, and vertical rise of open pipe flow and things like this.

Springs, the big problem with spring flow measurements is trying to gather all the water together into one place so that you can measure it, and that is probably the biggest problem that you have. Certainly the small flows, volumetric is ideal and what you are basically trying to do is get a container of known volume and stop watch you have a very accurate determination of the flow rate.

And portable weirs, and portable flumes, and as portable they can be certainly installed to make them semi-permanent, permanent and so on. Current meters would be borrowed from a measurement of a stream, and a larger stream but you can certainly use it if the well discharge is large enough.

DR. CANTLON: What do you do with regard to the use of water in the springs, are you doing any estimates of the water that comes out from that?

MR. MOOSBURNER: I think that if we get to the actual site locations, I think that the problem has to be assessed at where you can measure it. If you can get real close and have a good handle on it, and maybe that is a minor part, but I think that will be a part of the process of trying to estimate that.

DR. CANTLON: Actual flow as obtained.

MR. MOOSBURNER: That is right, and I think that it will be somewhat site specific. Certainly for instance, on the large spring flows in Ash Meadows, you can measure them right when they come out.

DR. CARTER: I wonder if you will take a few minutes and it might be well to do that for the audience and describe what you normally do when you put in a new well, say J-13, or whatever and you are going to use it and I presume that what you do is to go through and make sure that you have got the quality of water that you are interested in and you also then pump to make sure that you can get not only the rate but a sustained rate over some period of time. So that you go through pumping tests or what not.

MR. MOOSBURNER: Aquifer tests, yes.

DR. CARTER: And part of that, of course, is to look at the impact of the effect on the water table so that you are interested in draw down and this sort of thing.

But anyway, I wonder if you would just take a few minutes and run through that process?

And I presume that you are interested in draw down up to about a mile or something of this sort.

MR. MOOSBURNER: I think that it is one of the next few overheads.

DR. CARTER: Well, whenever it is convenient, I think that would be good.

MR. MOOSBURNER: Let me just address that there.

I wanted to have a little illustration showing some people who are not in the field on some of those, that instrumentation. What I referred to under the pressure pipe situation, this is an orifice plate and basically it is an insert in a pipe or you can put it at the end of a pressure pipe. It is a reduction in the area of the pipe and in this particular case, the flow is going that way and you measure the head loss or the loss in that pipe to that flow and notice that you have the pipe diameter and the losses, and you can determine what the rate of flow is in that pipe. You can do that instantaneously or you can record it in different manners.

This is a portable Weir pipe and again you can make it semi-permanent or permanent. The beauty of this is that you can fashion it out of steel as it is usually done.

This particular one is a 90-degree V-notch Weir and the advantage of a Weir in this particular case is a great sensitivity at the lower end. For instance, on this particular one, this H here, as an example given here of a larger one, is one foot, and at the upper end of that measuring capability you are talking about five or six hundred gallons per minute which is a significant, whereas with a possibly with a tenth of a foot of head down here you are talking about three or four gallons per minute.

So that it might be very useful in a situation with the variation is very great.

Again, I mentioned earlier those other techniques but this is certainly one. What you would need then just to follow that up, if you needed a continuous record of a flow, for instance, you would instrument this site with something that will record the upstream head or the water level above the notch in time and that would allow you to calculate the variation of flow in time.

J-13 has been talked about before and I believe that the application for that, the amount of water, has been about 2/10ths of a CFS or around 90 gallons a minute and the attempt here is to try to determine or evaluate the response of that.

And the effects of ground-water withdrawals on spring discharges: again, spring discharges are a lot more tricky. It was alluded to earlier -- for instance, you are affecting the water level in aquifers and it may not affect the capability of the well to discharge water very much, but certainly the spring discharges could be very sensitive. You might view it in the simplistic sense of spring discharge flowing out of a large storage basin over the rim. And you affect that water level slightly and it would certainly cease to flow, whereas the availability of water for a well would certainly not be very significant, and it would be not different than it was before.

Again, this is at the thinking level that we are at right now on this. This is certainly a situation of a initiation type of a scenario. We are talking about from, for instance, J-13, if that lowering of the water table one mile away is a foot or more that would be certainly a criteria that you could look at. I am not saying that it is the only criteria and it certainly has not been finalized.

DR. CANTLON: Has the cone of depression at any of the Nevada test sites been measured?

MR. MOOSBURNER: I believe in some of the past studies, that is correct. That is right, but not as far as this fault, I am not sure, because first of all, it is the plan site characterization.

DR. CANTLON: Do we have any ballpark of what the cones look like?

MR. MOOSBURNER: I can't tell you right now; I would be guessing.

DR. CARTER: The thing that intrigued me about this, of course, is the fact that the criterion here to trigger, you know, a review of the process or the finding, is one foot at a mile. And yet, you indicated that, you know, if you are not careful in measuring these things, you can be off by a foot or so in some of these deeper wells.

MR. MOOSBURNER: Let me address that.

What is done a lot of times, when you are looking for a difference you can set up a site. And once you are there, the differences will not have that ever involved. In other words, if you instrument a site to record that continuously, you can be pretty certain of that change, rather than trying to put down a new measuring device every time.

DR. NORTH: Before you leave that, could you give us an idea of time schedule? In other words, it sounds like you don't have an impact evaluation done right now that you can tell us about. You have already asked for that kind of information.

MR. MOOSBURNER: No we have not. As alluded to earlier, the project was started two months ago and we do not have that at the moment, as far as this project is concerned.

DR. NORTH: When are you going to have one? Have you done any of this that you have shown in Nevada as a part of permit applications?

MR. MOOSBURNER: Again, as it says here, I think that a lot of the work is being done, not in this project, but as for site characterization and that is pretty far along. I think on some of those models there are some of these impact results, you might want to call it, that are in the process of being reviewed and so on.

I don't -- we plan to use some of this. We are not really going to develop our own models on this. We are going to utilize information on models that are available, but I can't tell you right now, on what stage that is at.

DR. NORTH: I think that there are two sets of questions we would like to see addressed. And one, what are the impacts going to be from the site characterization activities? And that, I would think would be an issue of current interest with regard to these permits.

Then there is the question coming up that I presume that is addressed to the site characterization plan, given the plans for needed water supply for an operating repository, what kind of effects might that have?

And there, I suspect, we are talking about a lot more than 90 gallons a minute and I am not sure where it is going to come from.

The same kinds of models might be used to try to address that question and one of the very important things you might learn from the activities in the next few years, is what can be done to validate some of those models that are needed to give the projection of the impacts from an operating repository?

And I would like to see a summary of all of that information organized more or less as I have just described it.

MR. GERTZ: We will do that.

That is, in effect, the plan that we hope that we have laid out but we will summarize that a little more succinctly.

DR. NORTH: Yes, I was hoping that we were going to hear about it, today.

MR. GERTZ: We have not done it yet, but we will do that, that is the answer.

We are trying to give you a preview --

DR. NORTH: Okay, a preview of coming attractions.

MR. GERTZ: Yes, those 10 percents and one-quarter just do some initial thinking of the scientist, and it certainly has not approval by project management or anything.

DR. CARTER: Carl, is that some of the additional data the state wants for the permit?

MR. GERTZ: Have they asked for this type of data at this point in time?

MR. MCCANN: No, they have not asked for cone quantity depression, no.

DR. CARTER: Well, I am thinking of the general impact on water use over a period of time.

MR. GERTZ: Part of the permit that the National Park Service has asked us for those kind of projections, so that they wanted to know how it affects ash metals, and in the monitoring statement we are going to put it in there.

MR. MOOSBURNER: And we are coming to that in the next slide.

DR. CARTER: I think that Dr. North had a good thing and I would think that some of this information would most likely be required or desired in the permit application.

MR. GERTZ: That has not been required to date.

Again, in effect, our water appropriations permit has been deemed complete as of last December.

DR. NORTH: It might be useful in a court case.

MR. MOOSBURNER: The third issue, as I mentioned earlier is really not a new technical issue. It certainly centers and focuses on specific areas and let me give you just a very brief background.

The National Park Service, as a part of the -- or Death Valley National Monument as a part of the National Park Service has two pieces of land that are south of the study area, and the very small one is called Devil's Hole and which is a very small piece of land, which is basically an open hole or well, if you will, that is perceived to reflect what is happening in the deep carbonate system.

It does not discharge as such. And another larger piece of land, obviously, that is west of there, that is the National Monument proper which is mostly Death Valley.

Down at Ash Meadows, the main concern has been a endangered species type of issue, the desert pup fish lives in Devil's Hole and I believe it was around 20 years ago, some local development and by development, I mean pumping ground-water much closer than what we are talking about here -- several miles, within several miles -- appeared to be drawing down water in Devil's Hole.

And apparently the amount, what I understand about it, is that as far as what is called a breeding shelf for these desert pup fish was in danger of being, well, the water level was in danger of going below that level, which would then affect the endangered species of pup fish.

So this went all the way to the Supreme Court, I believe, and the pumpers were enjoined and distress relieved and the water levels have stopped declining in Devil's Hole. As a matter of fact, in the last 10 to 15 years, there has been a slight upward trend.

But it is way above the minimum or the minimum level needed to --

DR. NORTH: Could we go back to one of the maps and identify where Devil's Hole is?

DR. CARTER: That is what I was interested in, distinguish between that and Ash Meadows, because as I recall, isn't Devil's Hole in Death Valley?

MR. MOOSBURNER: No, Devil's Hole is in Ash Meadows.

DR. CARTER: Okay.

MR. MOOSBURNER: Let me see if I can find that.

That is about the second or third one.

Here is the Ash Meadows area and the actual flow in the springs, is by a bedrock barrier in this direction presumably affecting the flow in this direction.

Ash Meadow area includes Devil's Hole and Devil's Hole is a small part of that. As a matter of fact, most of the major springs are outside of the actual geographic boundaries of Devil's Hole.

And the main, as I understand it, the main interest of the Park Service is that water level as such. And we are talking about down in this direction, Death Valley.

Is that --

DR. NORTH: Yes, so the very crude characterization is that most of the water is coming from somewhere else, like to the northeast as opposed as down from Yucca Mountain, due north?

MR. MOOSBURNER: That is the general consensus, that is right.

DR. NORTH: How well can that be supported with models and calculations at that time?

MR. MOOSBURNER: I was going to talk about that --

DR. NORTH: Are you going to come to that?

MR. MOOSBURNER: Yes.

There seems to be quite a bit of discussion and disagreement about this. For instance, north of Death Valley -- can we have that again?

There are some mountains in here, down in this direction, the Punal Mountains as they call, they run northwest, southeast and there is a very accurate program ongoing to try to drill deep in that area to see whether the system goes in that direction, down deep, but there is some flow.

As it is brought up, there are some streams in

Furnace Creek which the headquarters of the monument proper that are about 10 percent of the total at Ash Meadows but probably four or five CFS and they are very important to the Park Service, that they are concerned about.

And the question is, is part of the water that feeds these springs a local situation or does it draw from both of these generalized flow directions? And that will not be addressed here, but that is a part of the site characterization process that we are trying to understand and that takes a lot of drilling and so on.

And that is ongoing, but there is a lot of technical uncertainty on that and you can understand the Park Service's concern because that does supply all of their operations at Furnace Creek, that is what I am talking about.

DR. NORTH: Yes, I think that we would be very interested in seeing in detail how those concerns are going to be addressed.

MR. MOOSBURNER: I am going to get into some of that. Maybe, certainly let me -- I was going to get to this a little later, but one of the -- let's go to the network design if we can find that.

That is certainly going to happen here as far as the monitoring program at Ash Meadows and Furnace Creek ought to be reviewed.

As of this summer, the springs at Furnace Creek are beginning to be monitored by the National Park Service, themselves. Apparently they have not been systematically monitored as far as continuous or anything like that. So that is going on so that there is quite a bit of uncertainty on variation in time through that.

So I don't have the information other than the totals about four CFS.

DR. CARTER: Are they monitoring these things for quality?

MR. MOOSBURNER: Mostly quantity the way that I understand it. Their chief concern seems to be quantity right now.

And Ash Meadows had an ongoing program. As a matter of fact, the USGS has monitored the major wells there since that court decree, 15 to 20 years ago, and it seems to be relatively little variation, but we certainly will look at that in detail because they will be a part of the network program, that is for sure.

And certainly the frequency which will be continued as far as continuous, quarterly, annually and so on, that is a part of the whole network design process. Which springs, smaller springs that we talked about earlier, smaller springs may really have to be measured because they may earlier in an earlier time frame, indicate some changes that are going on rather than the larger springs, percentage-wise, I mean.

DR. CARTER: Well, I think that you need to be interested, of course, in the quantity of water, because obviously any water in a fairly arid area is important to somebody. But on the other hand, I suspect that most people would be interested in the possible degradation in terms of water quality.

So I think the understanding of the closed system in and around Yucca Mountain and on a broader regional basis, are both extremely important.

MR. MOOSBURNER: Okay, I would like to add one more thing. We talked about the hydrology complication and we referred to the water withdrawal from J-13 as being about 90 gallons a minute.

In the direction of Furnace Creek, there was Death Valley Monument proper, there is a lot of present water use right now that is much larger than the 90 gallons a minute.

We are talking about thousands of gallons per minute, which obviously brings up the immediate problems of trying to separate items -- in other words, effects and causes.

This is in between generally an in alliance from J-13 to Furnace Creek springs. That has been going on for a long time, I don't know how many decades.

DR. NORTH: Given the intricacies of water law, is there the potential of reducing some of those withdrawals as a mitigating measure? In other words, the argument is made that the withdrawals for Yucca Mountain are going to make the difference that affects the pup fish.

Have you looked at mitigating strategies where you buy some water rights from somebody who is taking those much larger withdrawals and say, well, if there is a problem we can deal with it by reducing some of those withdrawals. And our modeling calculations show that this will more than compensate for the withdrawals that are planned for the Yucca Mountain area.

MR. MOOSBURNER: We will not directly address that but Greg Fasano will address that as far as mitigation. Our part of the study will be impact evaluations and technical recommendations.

But will not be directly what to do. One of them, you know, as far as water rights, I can't speak for the state either, you know, as far as what they would want to do on that. But certainly I think that, am I correct, you will talk about that?

Can we go to the next one, please?

This is similar and I think that we have covered most of the basics in this. I would think that if there are any other questions as to the Furnace Creek and Ash Meadows and their relation and discharges, I can certainly address them. But I would like to go on to the next one.

DR. CARTER: You mentioned the water quality and I was quite interested and I raised the question or mentioned it earlier. And that is, in the tabulation of data it turns out that the analytical data now are given in the report, at least the one that I read, on a combination, in other words, four wells J-13 and J-12. And I think that we are more interested at the moment in J-13, and I wondered why the analytical data for these individual wells was not included in these things, other than a combination?

There could be a lot of reasons for combining, some of which might be good and some of which might not be too good.

MR. MOOSBURNER: I plead ignorance on that. I do not, but I certainly will try to weed it out. Did Greg --

MR. FASANO: You read this in a publication about combining J-12 and J-13?

DR. CARTER: Well, I got it from pages 52 and 53 out of your environmental field activity plan for water resources.

This is analytical data on those two wells are together. And you can't separate one from the other and the question is, is there any significant difference between the two?

I think that if you are going to use J-13 water, you are going to be interested in seeing the data on that particular well.

MR. MOOSBURNER: I would like to say that if that is the case, we will certainly attempt to separate that. That may be more of a bureaucratic thing, I just don't know. But certainly on a technical basis, we will certainly need to separate that, both the quantity and the quality.

DR. CARTER: One thing you have not addressed yet and maybe you are going to get to that also, and that is flow rates of the ground-water.

MR. MOOSBURNER: Flow rates? I am not -- that is, again, something that is being addressed in the site characterization. And I think that it is going to differ in the test site, but that is something that we have not addressed yet, in this part of the study yet.

DR. CARTER: Well, that is obviously a critical element in the water program.

MR. MOOSBURNER: I understand, but I just don't want to give a number, because I really don't know.

DR. CANTLON: One of the reason that you pool chemical data from wells is that we do it on our campus, is because you are putting them altogether in a mix, and that is what the customer is getting. So that may well be that what you are looking at is some end point where the water is being delivered for use and that is what you are getting, is the mix.

DR. CARTER: No, I think that most of the reports that they are talking about indicate that they are going to use water from J-13.

DR. CANTLON: I understand that, but I am just trying to guess why --

DR. CARTER: Well, there are reasons to combine them but there are reasons not to combine them.

DR. CANTLON: Right.

DR. CARTER: And when they are combined you can't tell, if there are any differences between these two and that is what I am interested in.

MR. ISAACS: We are taking an action on this and we can separate the data.

MS. DUSSMAN: We have a table with us right now that shows them separated.

DR. CARTER: All right.

MR. ISAACS: We will make that available during the break.

MR. MOOSBURNER: We have talked about, on this overhead, both of those first two items. The last one is there really to see what may come up here. Non-Yucca Mountain project water withdrawal, I would just like -- it has been addressed and alluded to throughout this presentation and a lot of things have been going on at the test site for many years, and off the test site.

And this is certainly the more challenging aspects of first trying to study the area and also trying to monitor what is going on, trying to get a handle on separation of stresses that are different locations and some of the stresses we are not quite sure of historically. How to separate that is going to be certainly a very challenging aspect of this program.

And I don't have anything in mind here, for the third item as such, but we certainly will be receptive to addressing those as required.

That is all I have and if there are some further questions, I will try to answer them and if not, Greg will come back.

DR. CARTER: Let me ask you a couple of things. One, how do you interpret now whether or not or whether there are any problems with the quality of water from J-13? Is there anything that has been found analytically to date that looks like the water may have some problems associated with it in terms of its quality?

MR. MOOSBURNER: As far as I know, it meets all the standards.

DR. NORTH: What about the iron concentrations from 1977, page A-53 in your document?

DR. CARTER: There has been some iron variation and you might want to look at the floor iron, the leads, and the nitrates. Some of these have at least would not meet requirements at a given time.

MR. MOOSBURNER: Dick, can you address that?

We will certainly look at that and we have been looking at it.

DR. CARTER: Yes, these are in your report, and it indicates that some of these, at least, have been out of compliance. Now, this is temporary I presume, but they have not met the maximum contaminant levels of EPA and we are taking a look at the reports that you folks have been producing.

Another question related to water and it may be covered somewhere else, but it certainly involves water, has a decision been made yet as to what tracer is going to be used in the water that is going to be used for dust suppression in terms of construction activities and what not, in and around the surface facilities?

MR. MOOSBURNER: You are talking about the site characterization?

DR. CARTER: Yes.

MR. MOOSBURNER: I can't address that, and maybe someone can.

DR. CARTER: I am talking about a water issue.

MR. FASANO: Lithium bromide is one of the tracers that have been considered but there is a whole list of them.

DR. CARTER: All right.

Any other questions?

(No response.)

DR. CARTER: All right, sir, thank you.

MR. MOOSBURNER: Thank you.

MR. FASANO: I would like to reiterate a few things that came up and things that I may have talked about earlier. There is an environmental field activity plan for water resources that is in draft or concurrence review right now. And that will be, you have some advanced copies that you are quoting from.

That has the concerns in there from the general standpoint of type of impacts that may occur, and relative, Dr. North, to the National Park Service related thing on impacts to springs and Death Valley National Monument lands and I don't know if Otto mentioned it, but we are in the process of preparing a specific monitoring plan for the Park Service for their concerns at Ash

Meadows and Death Valley National Monument, Furnace Creek area specifically.

That will address just exactly what we are going to do relative to their protests on the water permit and their concerns and how we are hopefully going to mitigate those concerns, if there are problems.

We are in the process of working on that plan right now. It is a subset, if you will, of the overall monitoring program.

DR. NORTH: I guess I would state my concern as, I would like to see a plan that is more than, we are going to study it, and we are going to go and take a lot of measurements.

I would like to see a plan that says, we are going to either come up with some definitive calculations showing the impact is minimal or we are going to figure out a way to mitigate the potential impact in a way that is very powerful and persuasive to the Park Service, that the pup fish are going to be protected.

I think that if you don't have that, you have got a serious problem.

MR. FASANO: Yes, and that is our very first task, if you will, for this program to compile all the data, to assess the adequacy of models, to run models, to even begin our background data collection so that we can answer some of those questions.

DR. NORTH: Yes, but I think that time is of the essence, in having answers to this and you should worry about that. When are you going to have some answers that are persuasive?

MR. PARKER: There were some questions from the board, from the panel, Dr. Carter, that I think a couple that I see as key aspects to the question. One went to the amount of water, the volume of water as it is described by Otto is certainly small compared to other users. Other users even closer to these habitats of interest.

So both from a technical standpoint and from a regulatory standpoint, we have to admit a quandary at this point, as to how technically we are going to distinguish impacts of the larger, more proximate users from our program.

We certainly have the responsibility to try to determine what our marginal impact may be, but technically it is quite a challenge. I think that your questions really get to the essence of that challenge, in that larger users, much closer to these habitats and how to determine their impact, versus our marginal impact is something that is a problem that we have not solved yet.

DR. CARTER: Well, this is when I was talking about the quantity of water. You have got to be very careful because any quantity of water is important to someone out there. The main thing that you are projected uses are extremely small compared to current uses in that entire area.

MR. FASANO: One direct comparison of that is --

DR. CARTER: The degradation or the potential degradation of quality to me is a more serious issue, on a relative basis.

MR. FASANO: One direct comparison of water use for other uses, as Otto mentioned, there is a farming area in there, in between our site and Death Valley, for instance, that is pumping a lot of water. There is also a mining company, there is lots of mining happening in the southern Nevada area. There is a mining company called Bond Gold that has just started operations and they are pumping 2,000 gallons a minute, south of Beatty, in the general vicinity.

That is if you were to multiply that out, it comes to the water use, the water that we will use in seven years of site characterization is equal to the amount of water that just this one mining company wants to use in less than two months of operation.

So it is a comparison that we like to use and you don't use that as justification for the water that we are using, but it is a comparison for the area.z

DR. CARTER: At least it gives a perspective of the water use.

DR. CANTLON: To what extent has the water consumption requirements of the whole site characterization plan been looked at in terms of major reductions?

For instance, my earlier question about whether or not we needed sewage disposal plans, there are major construction jobs in which you don't have sewage systems in place, and they are called Porta-Johns, and there are thousands of them around. The economics of doing that, if you go to the Arctic, that is your only option that is available.

So it does seem to me that you back up and take a systems look at this question and it may well be that you are going down a trajectory in which the cost of laying the data down to convince people who don't want to be convinced may be a lot more expensive than the option of simply reducing your water consumption.

MR. FASANO: That is part of the mitigation I am going to talk about, definitely, it is one option, yes.

There is just relative to models, I just want to say something about that, where Dr. North asked about our models.

There are two models relative to the water quality that we are assessing the adequacy of. As I said, they are in the planning stages and those two, one is called the drastic classification. It has to do with identifying aquifers that are susceptible to contamination. And there is another model that is called the Help Model which is prepared by the US Army Corps of Engineers, and that is a model that assesses the likelihood of adverse impacts on ground-water.

So those are two of the things that we are assessing and possibly use if it is adequate for our purposes.

Okay, up on the screen is the technical issues again. And just to remind you, it is a quality/quantity and Death Valley National Monument Lands.

The next one.

You have heard about the program, our preliminary plans here, of course, from an issues standpoint. Our field activities plan is organized to present discrete monitoring efforts or data compilation programs, if you will.

And there are five of those. We have a ground-water quality monitoring of aquifers as monitored through wells. We have a quantity monitoring program of aquifers as monitored through wells. We have a spring and surface water evaluations program both quality and quantity and it includes seeps also.

We have a water use monitoring and data gathering which is the data compilation effort which is gathering data from the State Engineer's Office and some of the contractors that worked on the test site that collect data. And that is used so that we could estimate any impacts to those users, relative to quantity mostly.

And then there is the waste storage and disposal monitoring which is a water quality issue again, and that involves direct monitoring by the facilities in question.

The next one.

This is a list of potential mitigation measures that we have identified and first and foremost is to alter site characterization activities that may be causing impacts. This goes across the issues that we have talked about. You can suspend them, scale them back, redesign whatever, that is the number one thing that we will look at it and see if we can change site characterization somehow to stop those impacts, potential impacts that we have identified.

Develop alternate sources of water for the remainder of the site characterization phase of the project. I say the remainder of, because it will take a little time to identify if there is an impact, and so that is relative to quantity, whether that is trucking water, piping water -- there is a bunch of alternatives, purchasing water from another source, whatever, develop alternate sources.

Redesign waste and sewage disposal facilities and this gets back to what you were mentioning where rather than having a leached field for instance, a septic tank and leach field, maybe we have a totally contained system where it is pumped out, whether it is an underground tank or a Porta-Johns or whatever. The plan right now, though, as you have seen probably is a septic system with a leach field, but if that is going to cause a problem with monitoring or whatever, we are looking at alternatives to redesigning that or changing that facility.

DR. CANTLON: But the presumption here is that you are going to go ahead and install it and then measure its impact. And it would seem to me to be more of an economic approach, would be to look at the options and try an avoidance route.

MR. FASANO: Yes, as far as design goes now, relative to the number of people that are going to be out there and what they have decided they need for the exploratory shaft facility, the present plans are this septic tank and leach field and --

DR. CANTLON: The Arctic Slope operates a much bigger operation than you do and they haul it away.

MR. FASANO: That is something that we will look at, alternatives.

MR. GERTZ: The point is well taken, at the time, of course, this was designed to be --

DR. CANTLON: I am sure that you did not know your problems.

MR. FASANO: Another one is to establish site characterization setback distances, or protection zones around potentially impacted springs, and seeps or other important water resources. And buffer zones, protection zones, or whatever, Ash Meadows being one that comes to mind directly because of the endangered fish species and the size of that area would depend obviously on any modeling or data that is collected relative to, and also relative to how important the resource is. So that the size is important but until we do some modeling, or collect data, we don't know yet.

Negotiate phased water pumping programs relative to other users in the area. Phased or altered or what have you relative to the mining operations, the farming operations, logistically, of course, that is a big thing to try and accomplish but if it is something that is viable, and can reduce any impacts that we might see occur there, it is something that we would explore, whether water can be stored, pumped at different times, stored whatever.

And the last one, purchase, renegotiate

whatever water rights from other permit holders in the area, not from a buying them off their rights standpoint, but from a positive aspect if we could purchase water rights from other users in the area, we would explore that possibility also.

That concludes the formal presentation. If there are any more questions.

DR. CARTER: I would like to ask you a couple of questions.

One, to make sure that I understand it, in reading some of the documentation prior to the meeting, I noticed that the State of Nevada, apparently at this time, does not have any regulations concerning reclamation of the disturbances caused by site characterization activities, is that correct?

MR. FASANO: I believe so, reclamation, yes.

DR. CARTER: Okay, the other thing that I ran into in the report entitled, Reclamation Guidelines, the Working Paper that tickled my fancy, was something called an uncertainty allowance. And I wonder if you or someone could tell me what an uncertainty allowance is?

MR. FASANO: I believe during our biological ecosystems presentation that will be covered and they will explore those questions for you.

DR. CARTER: Well, as I understand, it is involved with construction of facilities and those may be construction and it would appear to me to be a safety factor, but it is 100 percent.

MR. FASANO: Well, we have up front procedures in place, during pre-activity surveys and things like that have input to construction and design of the facilities so that we can reclaim through the requirements that we are going to be dealing with.

THey are going to be discussing that.

DR. CARTER: Well, let me go a little further with it, because I am not too sure that you and I are on the same wavelength.

But it says, in keeping with the requirement for 100 percent uncertainty allowance, the pad -- and this is a muck pad -- has been designed with a capacity to store twice as much as expected. It is not quite a direct quote, but it is close to it.

And I guess my question is, in all of your construction activities, are you building all of them twice as big as you need them? Now, that is what this thing says. The DOE has already been accused of that in the budgetary process.

MR. GERTZ: We will check that.

DR. CARTER: Yes, it is an interesting thing because it would appear to me that this thing has got implications for a lot of construction activities and, of course, I hope that it does not say that I read it to say that everything is going to be built as twice as big as you need it.

MR. GERTZ: Yes, I don't think that we have twice the length of the tunnels that we thought that we were going to need.

DR. CARTER: Like I say, you have got to ask yourself the questions, did you apply it to the budget process or should be apply it to the building of commercial hotels and a lot of other things.

But anyway it is in there and it is an interesting thing. The implication is that it is used rather extensively for construction activities.

MR. GERTZ: We build double-sized parking lots and so forth.

DR. CARTER: That is what it says.

Now, the other thing that I have not heard and I would again, be interested in some data on it, would be the flow rates of the ground-water in the area, what is known about them at the moment. Now, there is a brief statement in one of the reports that says these are extremely variable. Now, I think that I have known that already but it indicates that the measure, and I presume that they are measured, rather than estimated, flow rates in that area have been measured from things like two meters per year up to about 20,000 meters per year.

Now, that is four orders of magnitude difference, and like I said, now, we have talked about water issues, but no one addressed the flow rate of the ground-water.

MR. FASANO: Well, that very question is one of our massive site characterization hydrology program that is going to be going on for seven years.

DR. CARTER: Again, though there is a lot of data around the test site for a thirty year period or whatever.

MR. FASANO: There are a lot of studies that have been done where you read those numbers from and certainly we are going to tailor our studies now to specifically answer those questions, especially for the hydrology program of site characterization.

Now, for our environmental monitoring program we will need to utilize some of that data, obviously as it comes out and as it relates to travel of contaminants and things like that. But that is a subject of a massive probe.

DR. CARTER: If you have any succinct reports that deal with ground-water flow rates, I would be interested, summary reports, I would be interested.

All right, thank you very much and we will take a 15 minute break.

(A brief recess was taken.)

DR. CARTER: Back on the record and this report is about air quality and meteorology.

And the first speaker who is a senior environmental scientist with SAIC is Monica Dussman.

PANEL REPORT ON AIR QUALITY/METEOROLOGY

BY MONICA DUSSMAN, SAIC; AND GROVER PROWELL, SAIC

MS. DUSSMAN: Good morning.

I and my co-presenter are with SAIC and SAIC is the technical and management support services contractor for DOE. And we also have technical responsibility in a couple of areas and one of these is the air quality/meteorology monitoring program and we will be speaking to that.

We were asked also to address the area of aesthetics and I would leave that to the end of the presentation on air quality. We will get back to that topic.

Next please.

We will begin with the regulatory framework for air quality/meteorology as it impacts the air quality technical issues. And Carl Gertz addressed the topic of permitting in his initial presentation and as we show on this viewgraph, the federal law that applies to this particular area is the Clean Air Act.

The Clean Air Act is one of the flow down pieces of legislation which is implemented through the state responsibility. With regard to the Clean Air Act and the conditions at Yucca Mountain, the area of Yucca Mountain is currently classified as a class II area, which means that it has better than national standards in the area of total suspended particulate, sulfides, sulfide dioxide, carbon monoxide, ozone, oxides of nitrogen, and is the data available indicates that, now. That is the common definition of class II.

There are no stationary sources for pollutants considered in the area of Yucca Mountain. The nearest significant stationary source is Las Vegas which is about 90 miles away. The State of Nevada considers the area unclassifiable due to the lack of data for the area.

And no extensive air quality monitoring program exists for the NTS. So that we do not have an extensive air quality monitoring data base specifically for Yucca Mountain.

We have made inferences from some data available. But, at present, an extensive data base does not exist. So to get back to the State requirements, the requirements of the Clean Air Act will be implemented through the Nevada Administrative Code, and it has a requirement for registration certificate, and this is the current application that is under consideration.

And this application is normally issued prior to construction of a facility. This would include site preparation or all site disturbing activities in support of site preparation and as Carl said earlier, the project has exceeded the 20-acre minimum and so any further activities would require the registration certificate.

The State would also issue the operating permit; once a facility has been constructed and demonstrates compliance with permitting conditions, the operating permit is issued.

Both of these are granted through the Nevada Department of Environmental Protection.

These permits, particularly the registration certificate, may require, as a part of the permit conditions may require monitoring. In other states with parallel agencies, and for similar types of developments, monitoring of up to a year may be required. However, if the applicant can prove that, that is, if monitoring is required, if the applicant can prove that they have four months worth of data that represent worst case conditions or may represent conditions extremely indicative of the site, four months worth of data may also be submitted in support or with, as a part of the permit application or as a requirement for permission to proceed with activities.

Since we have not received word from the state on the permit application and since we have not been given any form of permit requirements, the DOE, in order to implement its policy of carrying out activities in an environmentally responsible manner, has begun an air quality monitoring program.

We are beginning this program in a phased approach. And you will be hearing more about that from Grover Prowell. And the first phase is to implement the particulate monitoring portion of our program. And this began in April of this year.

Over the next several months, we will be putting in place monitoring equipment which will gather data on the other gaseous pollutants.

Are there any questions here?

(No response.)

MS. DUSSMAN: There are a number of site characterization activities that have the potential to impact air quality to varying extents. The first five address really the resuspension of particulate matter.

And the extent to which each of these contributes to particulate loading is dependent on the schedule and the extent of each of these activities. We are now working with the schedule or plan of activities as listed in the site characterization plan but, of course, this is changing rather frequently.

And we do not, as yet, have a final schedule of activities and the extent of activities in each of these areas. When we do have that we will be able to make a preliminary prediction as to the -- a very preliminary prediction -- as to the amount of particulate matter that we would expect to be resuspended as a result of each of these activities.

But, again, we are dependent upon a final schedule. And the last two bullets have to do with emissions from various pieces of machinery and vehicular traffic.

We are working with the design folks to determine the second to last bullet, emissions of machinery, determining what types of generators they will use, and any other equipment that might fall into the category of the gaseous pollutants.

Emissions from vehicles ties into travel over unpaved roads. If we are told the types of vehicles that are going to be used, we know the types of emissions. We have to combine that with the schedule of traffic, the number of vehicle trips, and the timing of those vehicle trips.

DR. CARTER: How do you intend to deal with the relatively new requirements of EPA now, as far as reporting of reportable quantities of radionuclides that may be emitted in the air?

MS. DUSSMAN: That ties into our radiological monitoring program. The radiological monitoring program -- we will be working with those folks and working with EPA to determine exactly the types of reporting materials or deliverables that they would like to see.

EPA is a working part of the project. They support the radiological monitoring program so that we have to hold some discussions with them to decide the types of information, the type of backup documentation they would like to see to accompany that. It is a relatively new requirement and we have yet to work out those details. We do plan to address it though.

DR. CARTER: Okay, but to make sure that I understand correctly, I presume then that things involving radioactivity on a generic basis now, are sort of separate, even though you look at air quality and you look at water resources, and so forth, and these are obviously major media.

But if it involves radioactivity, then the people in these media programs turn that over to the people in the radiation program. But you don't do that with chemicals or anything else, is that correct?

MS. DUSSMAN: I went a little too far. We do contribute the -- and Grover will get into that a little bit more -- but when we are talking about the particulate matter that we collect, we collect it under the purview of the air quality monitoring program and then the particulate matter, the filters, themselves, a portion of them are given over to the radiological analysis people. They go straight to EPA and EPA does the analysis along the lines of the requirements outlined in the radiological monitoring plan that has already been issued.

So there is a cross-over and I don't want to imply that there is a straight black and white line between the two. No, we support that program.

DR. CANTLON: Following up on that, there is nothing intrinsic in the site characterization plan activity, that generates radioactivity, very, very small amount is used the isotopes label.

MS. DUSSMAN: Correct.

DR. CANTLON: However, there may be residuals from the Nevada test site ventings and other activities. To what extent does the Nevada test site people take over and accommodate the cost of those, that portion of your activity, versus putting it into the rate-payer's bag?

MS. DUSSMAN: Carl?

MR. GERTZ: Let me address the fact that at the Nevada test site has an extensive off-site monitoring program for radiological activity.

DR. CANTLON: Right, and why can't they be coupled in to do this independent of the activity for the site characterization plan?

MR. GERTZ: They do that and we make use of their data, but they just don't have stations close to the Yucca Mountain like we think that we need for our radiological monitoring activities.

DR. CANTLON: Well, can't they incorporate that into their normal plan?

MR. GERTZ: Their normal plan is based on their off-site stations.

MS. DUSSMAN: That is right, they are off site and they are at a greater distance. In the radiological monitoring plan, there is -- and I don't have it with me -- but there is a diagram of a circular grid pattern of monitors that the project has put in place. And it does incorporate the test site monitoring program and it is primarily around the perimeter since our radiological monitoring program focuses -- it uses as its center, the repository area.

DR. CANTLON: I am asking a pretty narrow question; who pollutes and who pays? The Nevada test site is the source of almost all or indeed, all of the radioactivity that you have to deal with in the site characterization plan, and therefore, I think that it would be contingent on them, really to do the paying for it, as opposed to the rate payers who are paying for the site characterization plan.

MR. GERTZ: Of course, their position, and I have discussed some of that with them, is that we are doing the radiological monitoring necessary to assure a safe underground test program. If you need additional to assure whatever you need for Yucca Mountain, you are welcome to develop those.

DR. CANTLON: Irrational but understandable.

MR. ISAACS: We could also go and maybe charge the Chinese with that fallout considerations as well. We do have to take responsibility for conducting the program the way we find it. I understand his point, but I think that we have got to take charge and do what we can do and take advantage of whatever is out there in terms of monitoring.

DR. CANTLON: We would be delighted if they would pay all of our other bills.

DR. CARTER: Well, let me make a couple of comments. One, these reportable quantities, now, if you start stirring up dust and so forth, you are going to release some radon. You have to go through this as a reportable quantity.

So they have got to deal with that as a matter of legality.

The other thing, I had a number of questions and this was why I was trying to separate in my mind, how we were dealing with these media programs; water, air, and so forth, and the radiation program is separate.

And I have looked at that report and I have a few comments but it might not be appropriate to address those today. On the other hand, I would think that is one of the strengths of what I have seen in the program that you folks are putting together.

It would appear to me that you are taking full advantage of the expertise that exists in and around the test site in terms of the EPA capabilities, and RICO, EG & G and others, in terms of the monitoring and the possible applicability of that expertise to your programs.

MS. DUSSMAN: We would be happy to take your questions and provide responses to them, and I know that you have said that they relate to the radiological monitoring plan, but if you have the questions we would be happy to take an action item to provide these responses.

DR. CARTER: Well, let's go to the end, and I am not too sure that you want some of my questions, but we will see if we can put them in.

Thank you.

MS. DUSSMAN: Well, that ties right to the technical issues. Related to your comments, we are measuring the background and certainly the radon background is part of the R & T plan. In terms of just pure air quality/meteorology we have a variety of technical issues. I will quickly go through them and then ask Grover to come up and provide the issue-specific discussions.

Number one, we are looking to see what are the emissions; what are we monitoring out there; what is the extent, the background of those; where are they travelling and that is where our input from the meteorological program comes in.

Number two, what are the effects of -- and that is our background -- number two, what are the effects of our activities on that existing background?

Number three, what are the magnitudes of storms that would affect the facilities? This is an issue we have a responsibility to also support the design function and in that process, we have to address the magnitude of storms.

Number four, we are supporting the site characterization program in the area of percolation. Our job is to provide them with a measure of the amount of precipitation that falls in the Yucca Mountain area, to assist in those studies.

And I would like to now introduce Grover Prowell, also from SAIC, who will continue the issue-specific discussions.

DR. CARTER: Okay, let me ask one of those questions that may be appropriate here.

MS. DUSSMAN: Okay.

DR. CARTER: Again, it is an interface kind of a question, I think, but there is an indication if you are going to collect total suspended particulates, you are also going to collect something PM-10 --

MS. DUSSMAN: That is correct.

DR. CARTER: Which is less than 10 micron aerodynamic diameter particles. And then it says, that these size-segregated particulate data then go to the radiation monitoring program for use in calculating doses.

MS. DUSSMAN: Yes.

DR. CARTER: Now, I would be very interested in how they use those size data to calculate dose.

MS. DUSSMAN: All right, that is not -- I will take the action item to provide that to you. That is not a part of our discussion today but that write-up exists and we will get that to you.

Anything else?

(No response.)

DR. CARTER: Okay, her fellow conspirator is Grover Prowell from SAIC and you may have the floor.

MR. PROWELL: Thank you, Dr. Carter.

BY GROVER PROWELL, SAIC

MR. PROWELL: My name is Grover Prowell and we are going to address the issue of dispersion patterns at Yucca Mountain are as follows and you can see that on the slide. Prior to 1985, as Carl alluded to, there was no site specific data at Yucca Mountain addressing dispersion.

On December 1, 1985, that was formally initiated at the site. We are going to use that to hopefully answer this particular question.

And we are going to start off, if there are no further questions, by showing you what it looks like out there.

We have five monitoring stations and the reasons for picking particular locations are mainly because of the terrain. The main site is located near the surface facilities, proposed surface facilities location.

The Coyote Wash location was selected because that is expected to be near the exploratory shaft facility, the actual exploratory shaft themselves. Yucca Mountain was selected because that lies above all of the surrounding terrain and is expected to provide a synoptic view of the entire area. Alice Hill was selected because that is expected to provide lead mountain conditions. In other words, what happens to the air after it goes over the Yucca Mountain ridge. And 40-Mile Wash was selected because that is expected to be the prime exit point for emissions that may be coming out of the repository area.

Two of those locations were selected also for particulate monitoring -- the main site, and also the 40-Mile Wash site.

The parameters that we monitor are as follows and these are at the main site. The main site, the 60-meter tower primarily because we wanted to determine what would be the winds at a higher level than the normal 10-meter monitoring level and also to get another stability measurements. We have four measures of stability there; one is differential temperature, one is sigma theta, in other words, the variation of the wind and direction. Another is the variation and the solar radiation that occurs, we have a net radiometer. And also we have a measure of the vertical variation of the wind.

And we have at the remote sites a simplified monitoring system; it does not quite have the detail that is measured at the 60-meter tower but it is quite sufficient for the purposes of the program.

DR. CANTLON: What is the height of that tower?

MR. PROWELL: Ten meters, sir.

DR. CANTLON: Okay.

MR. PROWELL: And now, we are going to go about the determination of the dispersion patterns in the following manner. First, we are going to use a simplified approach, in other words, a large-scale area or estimate will be made and then second, to refine that, using a specific terrain model for the Yucca Mountain area.

As an illustration of that, this is a diagram of how the diffusion, or I should say a Gaussian model would work and it implies a point source; Yucca Mountain, of course, is going to be an area source.

And then using that model you can specify what the fall-off is in concentration a given distance from the center line of that model.

Now, using such approaches, then we will use it to identify certain wind regimes and they carry the emissions to populated areas, such as Las Vegas.

We will also use, hopefully, additional models, which are called receptor models, to identify what are the sources for the pollutants that are already there. And then we will tie the two together so as to connect sources with sinks, all of those emissions.

DR. CARTER: What sort of triggering events now are you looking for to provide the energy that is going to disperse something?

MR. PROWELL: The energy?

DR. CARTER: Yes, to get trajectories of plumes and so forth, we have got to get the material airborne and --

MR. PROWELL: You are talking about the initial lift?

DR. CARTER: Yes.

MR. PROWELL: It is expected that initially the source is not going to have any momentum to speak of, of its own, because it is not thermal.

The only way of getting any lift of its own is if the atmosphere was unstable. Unless, of course, there was a cask that was broken and open, for example.

MS. DUSSMAN: Are you talking about the materials or waste materials or are you talking about the emissions that were listed in the site characterization plan?

DR. CARTER: Yes, I presume that we are listing for modeling that we can model an accident at the site, so that we have got to have a source if we are going to have one and we have got to make it airborne so that we have to have some kind of energy that is going to do that.

Now, it is of interest to me because the question is, what kind of heights you are talking about, what kind of distances you are talking about and so forth?

I would think for sort of routine kinds of things, you are talking very much about micro-meteorology right in the area where the surface release. You are not talking about at 20,000 feet or something of this sort.

MS. DUSSMAN: We don't have anything, we don't postulate anything that would generate the type of energy that you are talking about.

DR. CARTER: Yes, I guess I am looking for some constraints on what you are telling me.

MR. PROWELL: On the source --

DR. CARTER: Well, what are you going to do? How far are you going to predict the trajectories? Is it 2,000 kilometers or what?

MR. PROWELL: We have a requirement to at least predict it out to the vicinity of Las Vegas. In other words, we have to determine what is dispersion at least out to the vicinity of Las Vegas.

DR. CARTER: That is a political constraint on your system, not a technical one.

MR. PROWELL: I will leave the political questions to someone else.

DR. NORTH: Could you deal with visibility? Describe what you are going to do in terms of visibility impacts from the dust, how you are going to make those calculations and how they relate to these modeling studies?

MR. PROWELL: At this point, we are not going to address the visibility issue.

DR. NORTH: Why not?

MR. PROWELL: Because at the time that the EA was written, it was not expected that there would be sufficient activity by site characterization to affect the visibility significantly in the vicinity of the sites.

Of course, that may change.

MS. DUSSMAN: That is an issue that we will revisit and we may come back to it.

DR. NORTH: Given how clear the air is out there, and given the PSD, the potential significant deterioration requirements within the Clean Air Act, I would think that you would want to have a story on visibility, certainly for a repository operation and I would think for site characterization as well.

MR. PROWELL: Fair enough.

DR. CARTER: Yes, because those regulations are very constrained.

DR. NORTH: Yes, it is a major issue at the Grand Canyon.

MR. PROWELL: When I get to the actual description of the sampling network, itself, I will touch back on that.

The main concern we have right now, as I said, is what may be the effect on populated areas from trajectories?

At this time, we have only one area specifically of concern. Directly to the west of Yucca Mountain, about 16 miles is Beaty, a town of approximately 1,000 people. And we have, in constrast to the other sites, when you look at the winds on an annual basis or even on a monthly basis, a pecularity that shows up at the ridge of Yucca Mountain, specifically an easterly wind component. Most of the other winds at the other sites, tend to be aligned with a north/south ballast. But at this site that does not hold true. It lies on the ridge and so is not affected by the normal diurnal cycle, which you experience in the rest of the repository area, the proposed repository area.

So, the problem we need to address possibly, if this instantaneous wind picture that we have of Yucca Mountain, is, in fact, a trajectory for the winds for the west -- we are not sure in any way, shape or form that this is the case -- but there may be an impact at Beaty.

And issue number two, addresses what is the background concentration of particulates and other pollutants at the Yucca Mountain area, and then what will be the contribution from site characterization activities to that level of concentration.

We are going to go ahead and determine, of course, what the background concentration is. It looks like we are going to have quite a bit of time to do so and then we will continue monitoring throughout site characterization.

And we will then subtract out the contribution, hopefully without too much difficulty, of the contribution of site characterization activities to that of the background level.

Monica alluded to the types of monitoring that we will do for quality and these are the specific items that we will be addressing: total suspended particulates, PM-10, and four gaseous items.

DR. PRICE: As I understood what you just said, just a moment ago, you indicated that you would get your measurements now, and then after site characterization, really begin in ernest, you would subtract out and get the difference and attribute that to site characterization, is that correct?

MR. PROWELL: Since there are no other sources in the area, that would be true.

DR. PRICE: But if you are concerned about the population down to about Las Vegas and Las Vegas is a changing scenario, would that not have an effect on things? Because of the growth and other things going on in the Las Vegas area?

MR. PROWELL: When you say changing scenario?

DR. PRICE: Because of the growth and other things that are going on in the Las Vegas area. In other words, if there are changes within the vicinity that you are monitoring other than the site characterization, then that methodology would not work would it?

MS. DUSSMAN: Las Vegas is 90 miles away and we are more concerned about Beaty.

DR. PRICE: And you don't anticipate that it is going to change very much?

MS. DUSSMAN: Right.

DR. CARTER: Let me ask you a question, before you go on. I presume again, that the radiological part of the air monitoring is going on but this is not included in your program? They are interested in carbon 14, and kryton 85, and a number of other things, but that data presumably is availble if you need it?

MR. PROWELL: Yes, it is available to all project purposes. This is an example of the type of samplers we have out there. This is specifically for PM-10 and that is essentially is how that differs from the total suspended particulate sampler that we all use out there.

Right, at the present time, we have three PM-10 samplers; two at the main site, one at 40-Mile Wash and a like number of total suspended particulate samplers.

DR. CARTER: You essentially use a double-filtration technique?

MR. PROWELL: It is a one filter. That is placed in a cassette holder.

DR. CARTER: Yes, but the diagram says that you have got a micro-quartz filter and then you have got a filter paper.

MR. PROWELL: That just refers to the cartridge cassette.

DR. NORTH: That is just the trap.

MR. PROWELL: Now, on to issue number three, what are the magnitudes of the storms that will affect the site.

Monica alluded to the fact that this is principally a concern for the surface facilities and the only data that currently exist are from past NTS studies in the area, other than for the regional meteorology, and essentially we are going to break down these storms by their intensity.

And then we are going to go from there to determine what the likelihood is for each of those events occurring specifically at Yucca Mountain.

This is taken from one of such studies, and specifically the Fujita Study and this shows the likelihood of certain high wind events at Yucca Mountain.

An interesting thing to note about that is that it shows essentially at a certain given wind velocity you are as likely to get a tornado as you are to get a certain type of high wind speed. Not very likely at all though.

DR. NORTH: Ten to the minus six?

MR. PROWELL: Or less.

DR. NORTH: That is an interesting extrapolation, heroic, I would call it.

MR. PROWELL: Issue number four addresses the concern of precipitation in the Yucca Mountain area. Otto indicated some of the work being done by the USGS in this area. And we are essentially in the mode of assisting the USGS in this effort. And we are also, of course, collecting precipitation data in our normal monitoring stations and we will also provide some interpretation analysis support for that effort.

The next slide --

DR. NORTH: Can I interrupt you for some questions?

I would like to know about dust storms in this area. I would like to know how much wind borne dust there is in that area as a function of wind speed; do you have that information?

MR. PROWELL: Not currently available, sir. We have not yet done that.

DR. NORTH: Has anybody studied that issue in connection with the test site? I would think that it would be a very important issue to how much resuspension of particulates you get as a function of wind speed, in areas that might have radioactive contamination.

MS. DUSSMAN: The test site has used monitoring to determine the direction of particulate matter in order to, for example, for any given test, they monitor the wind direction source. And the indication is that the potential release would be sent towards areas of population then the test is delayed. But the type of analysis that you are talking about has not been done for the Yucca Mountain area. We want to do that analysis and that is why we have begun our monitoring program in that area.

That is exactly the type of analysis that we propose to be doing and our particulate monitoring has begun in April of this year, so that we have not collected sufficient data to be able to do that analysis.

DR. CARTER: There are a number of studies in the past that have gone on at the test site that a release relate to this. There have been a number of studies done, for example, of various ways to resuspend material looking for the increase of radioactivity.

DR. NORTH: You can even calculate a lot of this from soil characteristics, can't you?

DR. CARTER: But there is a lot of this that has actually been measured so that there is certainly some data that might be applicable to this. And there is a lot of information that has been made of the amounts of pollutants sampled from the air under various conditions.

MS. DUSSMAN: One of the complicating conditions is terrain. And so what has been done has been done in flat areas, not in the Yucca Mountain area, so that terrain is a complicating factor. We can take some of those types of studies as isolated studies to take a look at, still we don't have some of the specific data for the Yucca Mountain and that is the difference in the analysis you are talking about.

DR. NORTH: Well, I recall on a site visit out there, I was quite conscious of the wind-borne dust.

MS. DUSSMAN: Yes.

DR. NORTH: And I don't think that I am unique in that judging from the laughter that I just heard.

Now, the question I would like to pose is the one that we were just discussing on water before the break. How much dust is going to be added by these operations, the five categories you enumerated, compared to what is there in the background?

DR. CARTER: The dust devils?

DR. NORTH: Yes, is that 200ths of a percent or something of that sort, or is it like 10 percent in the local area? It seems to me that these kinds of ballpark calculations would not be hard to do and they would be very illuminating in putting a perspective on these emissions.

Likewise the questions of the vehicles. I am used to thinking about places like Los Angeles as opposed to this kind of territory.

MS. DUSSMAN: We, could of course, if we took some of the site characterization activities, we could build a scenario where we could -- two trucks go by and we will make an assumption that they will start the ground or whip up this much dust and that we will have a wind speed of this amount and if we take a specific set of characteristics, certainly we could do that analysis and we could give you a prediction based on a very specific set of characteristics. We may not ever hit exactly that set of characteristics.

So you are right; we could do a predictive analysis. However, the questions of conditions is that they will be variable in terms of the scheduled activities.

MR. PARKER: If I could jump in, the sort of analysis that you spoke of has been done. I think that what Monica is now focusing on is what we see as our immediate need to get on with site-specific accurate modeling and data collection. We used, and if I am wrong on this, Monica, jump in here, we used regional data as far as meteorological conditions because we did not have the sort of data that the Corps is going to be providing.

We used standard, EPA, state-of-the-art emissions from this kind of fugitive dust situation based on wind information and we did, in our environmental assessment, which was a precursor to the site characterization, actually have quantitative predictions.

I think that Monica is uncomfortable saying that those are something that are going to be the final predictions once we gather the site data. But we have done the kind of back of the envelope, frankly, work that you asked for.

DR. NORTH: Yes, I would find it interesting, as I looked through your document and could not find very much of this character. It gave me a sense, of were some of these impacts going to be big or little and what should I worry about most?

I would think, for example, that some of the operations on the ridge top of Yucca Mountain, under high wind conditions, might be the most serious sources of dust that could stay suspended. And I can imagine that you could aim some of your data collection at that and simply monitor a situations where you have trucks driving on certain roads and learn a great deal.

And then maybe do some calculations indicating how that situation compares to having operations, let's say down in the Coyote Wash area, where I would expect much less in the way of high wind conditions.

DR. CANTLON: Six to 8,000 years of wind over those deserts have given you a desert pavement over most of the surfaces that have not been disturbed. Therefore, there is very little dust that comes off of them, except where you disturb them. So that area calculation of your disturbance ought to be able to give you some crude ballpark guesstimate.

MS. DUSSMAN: It is ballpark because again, you are assessing the specific areas to be disturbed.

DR. CARTER: Let me make two comments. One, this sort of information and this is the sort of questions that we were raising in the water area as well in terms of projected withdrawals compared to what is going on, through other withdrawals.

And I think that these comparisons are quite interesting. As Dr. Cantlon said, I happen to have seen dust storms in Las Vegas, where it has been disturbed where the visibility was on the order of about eight feet, and literally you could not drive a vehicle when that happened. And these did not last very long, but maybe ten or 15 minutes.

There are a number of people who have resided out there for many years, have seen those kinds of things in those areas.

The other thing I would like to interrupt for, our Chairman, Dr. Don Deere, the Chairman of the Nuclear Waste Technical Review Board has now joined us and I expressed your regrets earlier, Don, and we are certainly glad to have you with us.

CHAIRMAN DEERE: Thank you.

DR. CARTER: All right, sir, you may continue.

MR. PROWELL: Issue number four again, addresses the precipitation in the area, and we are assisting USGS on this. The next slide shows an illustration of how we are doing that.

Last January, we helped them design a preliminary network, very roughed out for two critical areas of concern for them. One is the actual area proposed for the repository or referred to as the repository block and then the upper 40-Mile Wash area, which this slide illustrates as a big oval.

The darkened circles there are actual stations there now. And there are 12 of them in that specific area. The reason why there are circles around each of those stations, is because through simple calculations, the USGS determined that this would be the effective area that each station could measure precipitation amounts for, for their purposes.

Thus, there were certain gaps and we filled them in with 10 additional stations.

DR. CANTLON: What is the projected area of that circle?

MR. PROWELL: Each one has a radial diameter of

10 kilometer radial distance.

Right now, this is being projected. It may be of interest to the panel to look just very briefly at what the possible sources of moisture are to the site area. There are two and one is from the Pacific during the winter and the second is from the Gulf of California and very occasionally from the Gulf of Mexico in the summer.

And we actually have some data to show you on that. This is for some stations in the vicinity of Yucca Mountain. In some cases, they represent up to 30 or 40 years worth of records, and in other cases, it is a very short time period.

But they all show a general trend for higher precipitation amounts in the January/February time frame and then a fall-off towards summer and then a slight pickup at the latter part of the summer and then a fall-off again towards fall.

Now, the question might be naturally asked, what does our data show? With just three years' worth of data, it confirms that trend. The additional data points that you see up there are for specific time period precipitation amounts, maximum.

Otto alluded to the fact, that although precipitation may be infrequent, as it is characteristic of the desert southwest, it often comes in quick bursts and this shows that. As you can see, at times, the monthly average amount is sometimes exceeded by the maximum 24-hour amount, very occasionally.

And if there are no further questions from the panel, I will return the discussion over to Monica.

MS. DUSSMAN: Again, we will summarize what our technical emissions were. And as seen earlier, we have identified the emissions, determined how and where they are dispersed and determined the effect of our own activities; determined the magnitude of storms and the effect of precipitation.

Next please.

In order to do that, we are summarizing the monitoring that Grover has described across the various issues. We have continuous monitoring of meteorological air quality parameters and our monitoring program has been in effect since 1985.

It is covered by the meteorological monitoring plan. And we are -- our air quality program is described in the environmental field activity plan for air quality, which was issued in August of 1988.

It covers the particulate monitoring, and it will be revised and issued when we have all of our procedures in place for the gaseous pollutant monitoring. And in it, it will describe how we will determine the dispersion patterns associated with the pollutants. And we are going to determine the background air pollutant concentrations. And in the net monitoring program, we describe how we are going to assess the magnitude of storms in the area and we are providing assistance to the USGS.

Not included here as a bullet, are supports for the radiological monitoring program which we discuss.

If we determine that our activities are impacting air quality in the area of Yucca Mountain, we have a series of potential mitigation measures that we might choose to put in place. We can reduce traffic. If we determine that our volume of traffic is causing us to tend towards an unacceptable suspended particulate level, we can reduce the traffic.

If we cannot reduce the traffic enough, then we can choose to water, oil, or pave roads, because travel on unpaved roads is a source of suspended particulates.

We can treat the muck pile prior to disposal. We can water it on a continuous basis.

We can restrict generator operation. We can also restrict the number of generators. We will be working with the engineers to determine the specifications of the type of equipment they plan to use. We can look into using equipment with lower emission rates, if that becomes a problem.

We can water other areas of disturbance, such as the drill pad or any trenches that we might be digging out there.

DR. NORTH: Have you calculated how much water is involved? I see water shown up there three times.

MS. DUSSMAN: Yes.

DR. NORTH: How does it compare with the projections for water uses that we heard about before the break?

MS. DUSSMAN: That is included in the total estimate of water required, as part of the application. So that is included in the total amount of water that the project expects to use.

DR. NORTH: So you have already included these mitigation measures, assuming you will use them?

MS. DUSSMAN: We have made an estimate and we have tried to include all of our water usage, so that we have made an estimate and included that in the total amount.

MR. ISAACS: It is a bounding calculation, Warner, even though we don't expect to have to use it. In our water appropriations we wanted to go on the high side, to make sure we only went through it once.

MS. DUSSMAN: Correct.

DR. NORTH: Okay, so that you are assuming that you are going to water the roads and you are going to water the muck pile and you are going to water the drill pad, the trenching areas and all of the disturbed ground?

MR. ISAACS: Actually we are going to assume just the opposite, but for purposes of the permit, we want to bound the case, so that we assumed it in the permit, even though we don't think that we will need to do that.

DR. NORTH: And those are the calculations for, it you do all of that watering, how much dust do you get after that?

MS. DUSSMAN: No.

DR. NORTH: I would think that would be a very interesting calculation.

MS. DUSSMAN: But that is a part of our projected analysis but we have not done that calculation yet.

We wanted to get a little bit more definitive numbers and the numbers of trucks, the number of trips, the scheduling of some of these site characterization activities. But for the purposes of the water appropriations application, we did a worst, we put in a worst case number, so that we would not have to go back and be asking for more water.

Anything else?

(No response.)

MS. DUSSMAN: We were also asked to address the question of aesthetics. For the purposes of the environmental assessment a preliminary study was done on the impacts of project-related activities on the aesthetics of the area.

For the site characterization phase, we project no impact in terms of aesthetics and we stated so in the EA. We will revisit that question with regard to repository construction operations as a portion of the EIS scoping phase and we will be initiating more formal aesthetics work post-EIS scoping.

DR. CARTER: I have a couple of questions.

One, on this one that may or may not apply if you look at it, but this would be the question of visibility as it would affect the aesthetics. Let me ask you a question, what boundary now are you going to use, or will be used to determine whether or not the air quality criteria are being met?

You know, you can measure air concentrations in a lot of places, but where is the boundary now where you are going to have to comply with EPA, the Clean Air standards or whatever?

MS. DUSSMAN: Right now, our monitors are centered in the area of the proposed exploratory shaft location which is coincident with the repository area now.

We --

DR. CARTER: That is not the question.

MS. DUSSMAN: Yes, I am getting there. We have the monitors there and if we see an impact downstream or if we see that site characterization activities are going to be more widespread, we will plan to install more monitors, more air quality monitors.

We are looking at the highest, right now, for the highest concentration of site characterization activities. If we need to expand our network, we will expand that network.

I have not answered your question?

DR. CARTER: I want to know the legal boundary. You know, you measure the air concentration any where, but where does it count?

MR. PARKER: There are a couple of pieces to that answer that relate to several of the questions that were posed by the panel, and perhaps between Ed and I having worked in the air program at EPA I have some credentials there.

I think the legal definition is binding. If you are talking about the areas where our operating personnel will be working, it is obviously an occupational safety and health concern. If you are talking about operating in wind storms and things of that sort, but from the Clean Air Act, and from a quality standpoint, it is a fence line determination legally.

DR. CARTER: Okay, what is the fence line then? Is that a vertical projection of the repository block, that is my question.

MR. PARKER: It would be land that we control.

MS. DUSSMAN: And lands that we control and disturb.

MR. MCCAN: Yes, we have looked at this and there will be some disturbances outside of the repository blocks so that we really can't use that.

DR. CARTER: I am not suggesting that you did, I am just using that as an example.

MR. MCCAN: We have got the DOE property to the east and then to the west, we have a right-of-way agreement, the property boundary will go along with our land access right-of-way agreement for air control and that will probably be the best location.

MS. DUSSMAN: Because those bound the areas that we are planning to disturb at present.

DR. CARTER: I would be interested in if you have got an answer to this question. I am not too sure that I have heard it, because I would be quite interested in hearing it. Obviously, it is an extremely important question. We can measure these things everywhere, but where do they count legally. Where do you have to make sure they are less than the requirements?

MR. PARKER: Yes, couched in several of your questions, I think that it is something that we have not answered and I think that Dr. North probably asked it as well and that is what are the impacts? And I alluded to our use of regional data and back of the envelope type of calculations of area emissions and they no where in any way approach the ambient standards established by EPA.

If I remember correctly, on a background level, we were like 10 percent of the micrograms per cubic meter for particulate matter and now for PM-10 and throwing our site characterization activity in, just brought us up marginally.

DR. CARTER: This question, by the way, you can supply not only to the air but also to the water resource, where is the accessible environment and I think that was a little bit more clear cut. But the air one, I suspect is a little fuzzy.

MR. PARKER: And as Monica and Grover went through this presentation, it struck me that this is the same sort of a presentation for the diligent program that a refinery in a major urban area would be presenting to you and it should be stressed, as I tried to when I just addressed the impact, that we are not dealing with that kind of an air quality impact or air quality situation.

With the degree of mixing, the Winrows information we have, no sources that we know of, we are in a clean area and our activities we don't project to cause that to change. That, I think, is a key bottom line conclusion at this point.

DR. CARTER: But that question has to be answered legally and technically.

MR. MCCAN: One more point, when you do these type of air quality permits, you normally select your sites in consultation with the agencies so that we are hoping that we can sit down with the State of Nevada and discuss the permit condition.

MS. DUSSMAN: Right, and as I said, if it is determined, either through our own initiative, or through consultations with agencies that we need to establish more monitors over a wider area, we can do that.

DR. CARTER: That doesn't bother me, unless you are going to use the monitors now to collect all of the contaminated air and keep it, you know, you will need a big vacuum.

DR. CANTLON: The boundary will be different in the site characterization activity than it will be from the operating.

MS. DUSSMAN: That is correct, yes.

DR. NORTH: Again, I think that there is the opportunity here to think about what the operating repository might look like in terms of its impacts using the same kinds of tools and techniques and think about it in terms of what data are you going to need to have. The problems are not completely separate and they ought to be looked at together.

And I come back to the theme that I find myself articulating at many of these meetings, and that is, the difference between meeting all of the regulations and the common sense top-down picture of what are the impacts? And I think that you have heard several of us say that we are worried about the dust situation, as manifested in visibility and as manifested in dust storms.

And I think that it will be very important to you to have a story to compare the potential impacts from this area, both site characterization and operation, compared with other things that go on in Nevada which cause dust; mining operations and various other disturbances of the land.

You need to have those calculations. Sooner or later I think that you will be asked and if you don't have them, it is going to further slow your process. So I urge you to get on with it.

MS. DUSSMAN: That is a good point and we will take that back and re-examine what we are doing in that regard.

MR. ISAACS: Warner, I think that your point is well taken. What we are trying to establish here is where we are in the program. We are just lacing on our track shoes and we are not running down the road on some of these issues yet. And you are absolutely right. The preliminary analysis that we have done, as far back as our EA's in 1986, said it is going to be hard to find these kinds of impacts on all of these resources. We did not see any significant impacts but we can't say, trust me, on that.

So what we are trying to do now -- and that was based on all of the data that was out there, not because we had collected it, but because it was collected for a variety of reasons. And we tried to analyze it and apply it where it was applicable without overstating our confidence.

We recognize that we have to have a site-specific set of programs. That is what you are hearing about, this is what we want to do when we get on the site as a part of the characterization effort. Our analysis shows that we don't think that we are going to have those kinds of concerns, but that, again, has to be demonstrated by a monitoring program and have a mitigation program in place, so that if there is impact, we don't expect for some reason, we are able to handle it.

Your point is well taken but we are trying to do it in a very methodical way so that we don't spend lots of resources worrying about problems that we have not yet defined the program that we are going to have to address it to. I think that is the consideration.

DR. NORTH: My sense is that you have done some thinking about what it might take to hold down the dust, and there are probably a lot of standard procedures that are used in this area to deal with the dust problem.

And I think that you need to weigh all of that out and I did not see it in the document. I have been involved in the Clean Air Scientific Committee at EPA and I have a lot of background on why we went to a PM-10 standard and I suspect what you are going to find when you do this monitoring is that you have got a lot of resuspended particulates that are a whole lot bigger than what counts on PM-10. You will have high TSP and low PM-10 and most of us think about that as dust.

And I think that you ought to anticipate that it is that area, where you are likely to come out with what many people may regard as impacts that we are thinking about. I would be extremely surprised if carbon monoxide came out as something that you could even measure when you get very far away from your vehicles and your generators.

DR. CARTER: Okay, any other comments on this?\

(No response.)

DR. CARTER: If not, we have got a few minutes, and let me raise a few questions related to the radiation side of it.

I don't necessarily expect responses but I would appreciate it if you would have someone check on this.

MS. DUSSMAN: Sure.

DR. CARTER: In looking over the environmental field activity plan for radiological studies, let me mention a few specific things. The program appears to me that it was a carry-over from previous RAD programs but you mention only the analysis, for example, of trediated water. Well, that is probably what they need to look for, but on the other hand, you may have a source that is going to produce tridium in the form of hydrogen or tridium in an organic form or something. And you look for these quite differently. You don't collect a sample in necessarily the same way.

MS. DUSSMAN: Yes, that is true.

DR. CARTER: The other thing in the quality control part of that document, they talk about submitting blind, blank and spiked samples. Now, I would take issue with that. I think that quality control samples have to be submitted on a random and independent basis, but normally you submit three kinds of samples.

One of these are knowns, or spikes, or standards and that is done for accuracy determination. You submit replicates so these are done for precision, and you submit blanks which are done for procedure control.

And that leaves a little to be desired in the way that that is expressed in the report. Another specific thing is in the calibration of equipment and I would essentially quote it. This is talking about counting equipment used in the radiation counting laboratory. And it says, they will defer to the manufacturer's recommendation, or at least every two years.

Now, I would submit that two years is far too infrequent for calibration of radiological equipment.

MS. DUSSMAN: We are in the process of reviewing the question of calibration right now, and that is true, not just for the RAD monitoring program but also for air quality.

And for all field activities that involve calibration of the instruments, we are -- in fact, that is in our QA plan, and that has come out with new requirements for calibration and dates of calibration and we are going through a review right now, across the board.

So, yes, I can answer to that last point, definitely that we are reviewing that.

DR. CARTER: Okay, let me raise another one that may have some significance. Admittedly the reports, most of them that we have looked at have been drafts or working papers or something, so that these are going to be honed and so forth.

But I would suggest that the Okrum program have somebody with a technical background to do that, because you have got a number of embarrassing things in some of the reports at the moment. Just quality control, for example, the calibration thing, but the report we are talking about now, the field activity plan for radiation studies, for example, lists the National Environmental Policy Act is occurring in 1983.

And obviously it was 1969. The other thing and I was going to ask the gentleman with the chart, because the field activities, the environmental field activity plan for soils now, puts 40-Mile Wash not on the east side of Yucca Mountain but on the west side of Yucca Mountain.

MS. DUSSMAN: That was an error.

DR. CARTER: I am sure that it was an error, but anyway, people, if these things get perpetuated the next thing you know you are going to lose a lot of credibility and it is a little embarrassing, you know, if they don't know where 40-Mile Wash is but they really know where Yucca Mountain is and this sort of thing.

And you folks, don't need any of that, I think you have got an abundance of credits without --

MS. DUSSMAN: That is true, the draft soils document that you were looking at -- I think that you received what was the very first draft of the soils E-FAP and all of our documents do go through Gerry Parker's shop for review and they are subjected exhaustive review, with our technical, with the peers here at the headquarters level and believe me, we go through many comment resolution meetings, to try and catch exactly that.

DR. CARTER: Well, I raise that for a help.

MS. DUSSMAN: Yes, that is how we take it.

DR. CARTER: Anything else?

MR. GERTZ: I appreciate your comments on our draft documents and we hope to provide you draft comments just for those kind of comments. We do go through an extensive review, technical, management and quality assurance review of all of those documents eventually.

One of them, we have provided a few activities for you today and I hope that it has been made clear, we are in the early stages, we are just in planning. Some data we collected and some we have not collected at all. Data we have used in the past, have been collected for other sources, pre-1985, and we have just tried to adapt it to our program to make the boundary studies.

And when the environmental assessments were done, we used bounding studies and at that time, it became clear to us, through the bounding studies based on available information that there was not going to be significant impacts in these areas, for site characterization.

However, as Tom said, we did not say trust us, we said, by the way while we go on with site characterization, we will monitor these areas to assure our bounding calculations were correct. And if monitoring shows something different then we will mitigate it and that has been our philosophy all along. I do agree with some of the things that Dr. North said, some of these projections would be helpful. Much like when we talk about the water we use, over seven years, being just as much as a mine uses in two months in the area.

The other thing that came to my mind is that same mine right now is doing surface preparation or stripping and they have something like 18 bulldozers operating, creating a lot of dust. If you drive outside Beaty you can see it in the environment and our contribution is miniscule when it comes to ongoing activities.

And of course, they are operating under the permits appropriated by the state and I am sure within the laws.

DR. NORTH: Yes, and I think that a few photographs and a few calculations showing this will be very persuasive to some of the newspaper reporters that are following these issues so closely.

MR. GERTZ: Sometimes logic does not prevail when dealing with the media in emotional issues like this, but we do try to keep those kind of things.

DR. NORTH: Well, it is an interesting comparison. I remember in my own community, in California, some years ago, the local citizens became interested in stopping a large accelerator facility put in by Stanford University. It was an issue of running a power line over a rather small area of this town and it was going to involve three towers and a few hundred yards of line but the town did not want it. So they hired a lawyer who became a Congressman as a result of his success, and he managed to stop the federal government for a period of years, on this issue.

One of the things that turned it around was a physicist who managed the accelerator, went out and took a bunch of pictures of some of the power lines that that town already had and they did a beautiful job of illustrating the comparison between the small impacts that were proposed as opposed to present practice that nobody had paid much attention to.

DR. CANTLON: Carl, do you feel that any of the regulatory language that you are operating under is a constraint on any of the research that you feel needs to be done?

You have some language that suggests that you are not allowed to make generic new studies and things like that and does that language inhibit you from making any of the studies that you feel would be pertinent to your case?

MR. GERTZ: From a project management point of view, I don't believe so. I don't believe that is inhibiting the program.

Tom, you may have some other view.

MR. ISAACS: No, that is my view as well.

MR. GERTZ: We think that we are near, you know, we are doing kind of state-of-the-art things, we are just really mining and tunneling.

DR. CANTLON: I was not thinking of that, but the studies that may be at the periphery of some of the things that you feel you really need the data to work with confidence.

MR. GERTZ: No scientist has come to me and said that I am prohibited from doing a research project because of anything like that.

DR. CARTER: All right, anything else before we break for lunch?

MR. GERTZ: One other thing that at some time it might be convenient, we have a little video that we present to everybody who works on the project about being alert for cultural resources, biological resources, and we might play that for you.

DR. CARTER: I was thinking that we will return after lunch and then we can run it for those who want to see it.

We will now break for lunch and return at 1:00 p.m. and then we will see the video for those who wish to see it and then we will start back with our agenda item, namely biological resources at 1:15 p.m.

(Whereupon, at 11:54 a.m., a lunch recess was

taken, the conference to reconvene the same day, at 1:00
p.m.)

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

(On at 1:15 p.m.)

DR. CARTER: The next subject that we will cover and there will be two speakers, both with EG & G and the first is Thomas O'Farrell and I won't introduce him except to say that he is the panel truck driver in the video.

PANEL REPORT ON BIOLOGICAL RESOURCES

BY TED DOERR, EG & G; AND, THOMAS O'FARRELL, EG & G

MR. DOERR: What I will be doing is providing the information on the regulatory framework and I will be discussing a portion of one of our first technical issues, and I will turn it over to Tom to discuss the issues related to the desert tortoise and then I will come back and finish off the majority of the technical issues, and then will turn it over to Kent Ostler to complete the presentation related to reclamation litigation.

In addition to the previously mentioned regulatory requirements, at the beginning of this meeting there are additional regulations, federal and state that DOE has interpreted that we should comply with. Those include the Endangered Species Act, the Migratory Bird

Treaty Act, Bald and Golden Eagle Act, and the Wild Horse and Burro Act.

The Endangered Species Act could impact -- there are potentially three endangered or candidate species that would be covered under the Endangered Species Act. There are 12 potential species that are either definitely located or possibly are located on the Yucca Mountain project site that are covered under the Migratory Bird Treaty Act.

Golden Eagles have been found around the Yucca Mountain area and the surrounding vicinity. Wild Horse and Burro Act covers obviously the wild horses and burros, two species which are found to the north of the area and could possibly migrate down into the Yucca Mountain project area.

In addition to the federal laws, there are two general categories of state requirements that we comply with. One are wildlife conservation laws, which impact five game species, two fur bearer species and nine non-game species, principally birds.

In addition to that, we have plant conservation laws, which we comply with where we have two species that have been identified as important or protected.

DR. CARTER: Ted, can I ask you a question, maybe you are going to cover it, but I wondered for orientation, if you might take a few minutes to indicate the general characteristics of a species being covered by the Endangered Species Act, and also the three categories where they potentially may be listed?

MR. DOERR: Tom, are you going to be covering that?

MR. O'FARRELL: Yes, I will.

DR. CARTER: Thank you.

MR. DOERR: There are a number of activities that are associated with site characterization that could have a potential impact to the biological resources. What we did was that we created a listing of those activities and then we went further, to define what types of specific disturbances would be associated with those activities and rank them according to those associated disturbances.

Primary disturbances are those disturbances that directly impact and remove vegetation or soil material. Included in those are activities such as trenching, mine spoils piles, ponding studies, surface pavement studies and seismic studies.

The second category of activities that we put together had two types of disturbances: primary, which again is direct impacts; and secondary disturbances, which are the impacts to the land adjacent to those lands which receive primary disturbances, but have a different type of disturbance. Those disturbances are fugitive dust deposition, noise, human presence, and harassment.

There are three types of activities that we are focusing on. Those are the ESF Facility and the general construction areas around the ESF facility; roads and traffic associated with roads and drill pads.

Finally there is a third type of activity and that is, radionuclide sources, which I will discuss later on during one of the technical issues.

Based on this, there are five technical issues that we have identified that relate to biological resources. The first issue is what are the impacts of site characterization activity's potential impacts to threaten an endangered species as covered by the Endangered Species Act.

The second issue is what are the impacts to what are defined by NRC requirements as sensitive or protected species? And those are species that were identified based on the other regulatory requirements that we are complying with.

The third issue is what are the impacts to either habitat or species that are endangered or protected species depend on to function and maintain their populations.

The fourth issue is what are the potential pathways of radiation to man and the environment and through the environment.

And finally, what are the reclamation techniques that are required to reclaim habitats that are used by wildlife.

There are several other things I would like to mention here. First on the five issues, if you will notice, they are all focused on site characterization impacts. That is a primary thrust and the principle objective is to identify what are the impacts of site characterization?

DR. CARTER: What about four, where is the radiation in site characterization?

MR. DOERR: Within in four, in the exploratory shaft's facility excavation, there is a potential of material being excavated and being redistributed through the environment. And therefore, we want to monitor the baseline for excavation and then track that through time to see if that, in fact, does happen.

Secondly, these issues, we are assuming two things with looking at these issues. The first is, that we are interested in not only regulatory compliance, but in protection of eco-system health and structure. And the focus of most of our studies is to look at structure rather than function, although we do look at several functional attributes of the system.

And the assumption that we make is that there is a correlation between changes in structure and changes in function within the system that we are working under.

One final mention is that because of the variety of issues that we are dealing with, there are a number of potential interfaces within an integrated program that we have developed. Those external interfaces include, interfaces with air meteorology, water resources, cultural resources, GIS and remote sensing, soils, as well as other programs.

The internal interfaces of our integrated program will be discussed later by Ken. The first issue, again, is what are the potential impacts of site characterization to threaten endangered species?

We are using three technical approaches. We have on the books, we are planning potential studies of Ash Meadow studies depending on the findings of the water resource studies. We are using what are known as pre-activity, and post-activity surveys and the third technical approach is a desert tortoise study program.

The Ash Meadow study currently we have done or are doing three things. First, we are accumulating literature in relation to Ash Meadows and the species involved.

When I mentioned the Endangered Species Act originally, I said that there were three potential species out on the Yucca Mountain project area that would be impacted by or covered under the EIS. With Ash Meadows, that is 40 miles to the south of Yucca Mountain project area and it has one of the largest endemic populations or variety of endemic species within the Continental United States and it has 24 different plant or animal species that are either threatened, endangered, or listed. So it is an extremely important biological resource.

The three items that we are currently executing, is that we are gathering the literature and going through the literature related to those biological resources.

Secondly, we have participated and supported in project office with expertise related to it, issues in regard to National Park Service and the Fish and Wildlife Service concerns have evolved.

And thirdly, based on the study results from the water resources, we will be integrating with them and developing possibly avenues of research and monitoring systems to evaluate potential impacts of site characterization on those species and their habitats.

The second technical approach of pre-activity, post-activity surveys, it is a process that has been in place for a number of years. What evolves is that when a participant in a project desires to go out and create or have an activity accomplished on the area, they submit their request to the project office and the project office contacts us and we go out to conduct a pre-activity survey.

The pre-activity survey is done within five working days of the request usually. What is involved is that from one to five scientists go out to the area that has been previously staked by the participant requesting the survey and we provide a 100 percent coverage of the area. We look for a number of items. We look in the area for desert tortoise or signs thereof, including burros, and secondly, we look to evaluate whether there are any of the three federally endangered plant species. And thirdly we look for the two plant species that are protected by Nevada law.

And finally we take soil samples, if required, because of the activity is going to encompass soil disturbance activities.

Once, the survey has been conducted, recommendations are built. Those recommendations are a part of our mitigation program which Kent will discuss towards the end of this panel. And finally, those recommendations are communicated to the project office.

Currently, during this last year, we have conducted 17 surveys and 16 of which there was either no or slight suggested modifications of the program or avoidance of certain biological resource material. One of which, which was recently conducted here was the potential for a major modification of that activity.

With that, I will turn it over to Dr. O'Farrell.

PANEL REPORT BY DR. O'FARRELL

DR. O'FARRELL: The Endangered Species Act, that is Public Law 93-205 as amended, was passed in 1973, and in 1974, the Department of Energy and Nevada Operations Office initiated a project to determine the impacts of this law on the projects associated with the weapons testing program.

The Endangered Species Act includes two categories of protection. One is for endangered species; these are species who are thought to be in imminent danger of extinction; threatened species are species that if the perceived threats to them are not resolved or relieved, that they will eventually be considered endangered species.

There are also candidate species that the Department of the Interior has put out lists of both vertebrates and invertebrates, plants, that are thought to be in need of federal protection. They are not presently listed and there are three categories of candidates.

Category one are candidates that the Fish and

Wildlife Service believes that it has sufficient information in their files to go through the listing package. Category two are the species that the Department of the Interior feels probably warrant federal protection but for which there is insufficient information to proceed with the listing package.

Category three are usually candidates that have been on the list that subsequent information indicates that the species probably does not need federal protection.

In 1980, the population of desert tortoise on the Beaver Dam slope in Utah was granted protection as a threatened species. Knowing that and knowing the impacts that were being imposed on the species throughout its range, the Department of Energy began to consider potential impacts on the desert tortoise in the Mojave Desert even though it was not listed at the time.

And as a result, since 1980, a substantial amount of information has been gathered on the status of the tortoise, on NTS. And we have the map here.

This map shows that fundamentally the range, and we are talking about the range, not the distribution and the range of the desert tortoise on NTS occupies the southern one-third of the 1,350 square miles and in gathering the information that resulted in this map two very important pieces of information came about.

In 1980 we all presumed that we would not have to look for desert tortoises at elevations above 4,000 feet and, in fact, a magic line was drawn at 4,000 feet. We have found desert tortoises up to 5,300 feet.

A second presumption in 1980 was that we would not have to worry about desert tortoises in steep, rocky habitats within the project area and we have subsequently found that some of the best sign of tortoises is in the steep, rocky areas of the project area.

On August 4th, the Fish and Wildlife, the Secretary of Interior used his discretionary power to make an emergency listing of the Mojave Desert tortoise and this is the populations of desert tortoises west and north of the Colorado River.

He took this action because in 1984, a petition was filed with the Secretary of the Interior to list the species throughout its range as threatened. And the Fish and Wildlife made a determination that there was sufficient information to go through with the listing package, but said that they did not have enough money to do it in 1984, and the threats to the species continued.

And then there was an outbreak of a virulent infectious respiratory disease which, in some areas, has resulted in almost a 50 percent loss of tortoises and was substantially the reason that the emergency listing came out.

The emergency listing that there is a 240 day period starting on the fourth of August during which the Secretary has to do basically one of two things. One, allow the listing package, just to disappear at the end of 240 days, or, during this period, come out with a final listing for the Mojave Desert tortoise.

Notice, also that the request for federal protection has been upgraded from the initial request which was for threatened status to one for endangered status.

Section seven of the Endangered Species Act provides the compliance portion of the law, and it fundamentally revolves around consultation with the Fish and Wildlife Service to develop a conservation plan.

There are two paths that can be taken. One is a formal and one is an informal consultation process. In the case of the Yucca Mountain project formal consultation is going to be required, because of the final item on the bullets.

First of all we know that desert tortoises are present on the Yucca Mountain project site. It is reasonable to presume that the characterization activities may affect the desert tortoise and its habitat. And there is a very reasonable expectation that the incidental take, the accidental killing or harassment or destruction of burrows of desert tortoises will exist and will take place during site characterization activities.

It is the latter thing, the need for an incidental take provision, to obtain permission, so to speak, to accidentally kill the animals that the formal consultation is automatically triggered.

The project office needs to have this before they can continue with any activities. As a result, formal consultation process will be initiated after biological assessment is prepared.

DR. CARTER: Can I ask you a question about the mechanics of it, or procedural things? Do a species normally move through these several steps before they are listed, or can they go from anywhere to an endangered species?

They can go immediately to endangered status. They don't have to go through any type of a process, no.

And any combination, because fundamentally the law revolves around one thing. Whatever the Secretary of the Interior says is an endangered species, that is it.

What actions have already been taken as a result of this emergency listing by the Yucca Mountain project. The first one and actually it anticipated the listing in the Federal Register on the fourth of August, and on the third of August, the Yucca Mountain project issued restrictions on vehicle traffic on main and secondary roads to avoid incidental take during this period of time. Casual access and any other activity that might possibly disturb the tortoise and its habitat was proscribed by this action.

On the ninth of August, we went to Reno to initiate informal consultation with the Fish and Wildlife Service and this was to briefly describe to them what the project was about, to tell them the type of material that would be presented to them in the biological assessment and to seek their input as to how they were going to implement the consultation process.

Each field office tends to have a different way of approaching the compliance with this law. We have already met with them and they were quite impressed with what DOE had already done. Basically, DOE has been complying with the law for eight years. The pre-activity survey process, the research activities, the reclamation that has been proposed is already taking place.

Fish and Wildlife offered that they did not anticipate any difficulty in completing a formal consultation with Yucca Mountain, based on receiving an adequate biological assessment.

Next slide.

What will be in the biological assessment will fundamentally be a description of the project and it will include some fundamental information on the life history of the desert tortoise both generic so that a person reading it could get some idea of the species and the threats to its existence; all of the known site specific information on the tortoise on the Yucca Mountain project; DOE's assessment of the impacts of site characterization on the species will be made and DOE will take the option, at that point, of including in the biological assessment their plans for mitigating any negative effects on the desert tortoise.

The biological assessment and a request for formal consultation will go to the Fish and Wildlife Service and by law, they are supposed to respond in 90 days. Typically they ask for an extension up to 180 days to make a determination, to actually make, to provide what is called a biological opinion.

It is our present schedule to have the biological assessment of the impacts of site characterization on the tortoise completed by the 30th of September, and the request for formal consultation will then go to the Fish and Wildlife and depending on their schedule, we would hope to have a biological opinion back optimistically by the end of the calendar year.

And we do not anticipate a jeopardy opinion. The opinion that the Fish and Wildlife comes out with can have one of three outcomes. One is that they determine that your actions are going to have a positive influence on the endangered species. The second one is that there will be no effect, a non-jeopardy opinion; it is not going to affect them positively or negatively and the one that you want to avoid, the opinion that you want to avoid is a jeopardy opinion, which the Fish and Wildlife

Service determines that the actions that you are going to take will jeopardize the continued existence of the species.

We, from our previous experience in DOE's petroleum reserves, don't anticipate a jeopardy opinion.

The incidental take provisions allow the Fish and Wildlife Service to impose requirements on an agency which will eliminate and mitigate the incidental take, will keep it to a minimum. Actually, DOE has a conservation program which will fulfill any requirements that we could ever anticipate that the Fish and Wildlife Service will be coming out with.

First of all, pre-construction surveys, pre-activity surveys are the fundamental way to minimize potential damage to the animals in their habitats. There is a reclamation program which is being developed and funded. We have a monitoring program of the desert tortoise and a field research project is underway and there is -- part of the, as you saw, the employee education program, the tortoise is emphasized and DOE has implemented and continues to implement a series of operating guidelines on the site: things like no off-road vehicle travel to minimize incidental take of the species.

And I would like to emphasize that this has all been going on for years prior to the actual listing of the species. And in many ways, DOE will move from an informal conservation program into a formal program, all the information and all of the compliance information is available right now.

I will mention just two items in the research program that are going to not only help DOE but they are going to help other people as well. One is the fix for impacts to desert tortoises in southern Nevada now appears to be that we are going to relocate them some place else.

No one really knows what that means or how you do it or how successful it is going to be. One of the aspects of the program that we are going to be involved in is that to determine how well that works and how effective that it is.

To date, and the other thing that I almost forgot is road kills. Tortoises being crushed along roads are probably one of the most serious causes of decimation of the local populations. We are going to be investigating ways to keep tortoises either away from roads, or if they get near roads, work with other tortoise biologists to find ways to get them under, through or across roadways without being wiped out along the way.

I hate to say that we may end up having underpasses for tortoises, that probably will prove to be very effective with drift fences and if they can get back and forth without getting crushed, it will save the local population.

People who worked on the test site, as many of you have, years ago there were more tortoises along the roads, and it has been 10 years since Phil Metica has seen a dead tortoise along the road, because basically what has happened is that all of the tortoises that are along the well-travelled along the Nevada test site have been wiped out over the years, and we want to avoid that on the Yucca Mountain project.

That is the schedule for the endangered species or at least for the desert tortoise which had the potential for slowing the project down. If there are any questions about that before we turn it back over to Ted, maybe we can handle those now?

DR. CARTER: Let me ask one question.

One of the things that was mentioned was noise as a possible impact, I presume on mammals, reptiles and so forth and what do we know about the effects or impacts of noise on those categories of biological species?

DR. O'FARRELL: There is very little. The only studies that I am aware of that were done, were done with kangaroo rats looking at the effects of generated noise on them. And with mixed results.

We did some very, very low level study. When we did seismic testing in the site descriptive phase of the project, we went along with the vibersize machine, the bumper machines to determine whether the frequencies and the level of noise that they were producing, the vibrations that they produced were having an adverse affect on the animals. And, as I said, it was quite crude and you are basically waiting to see if they come screaming out of their burrow systems.

The answer is very little is known in any useful way.

DR. CARTER: I guess in the seismic testing program they are going to be a number of seismic tests involving, as I remember, either 2,000 or 4,000 pounds of ammonium nitrate or the equivalent of that and I presume that makes quite a noise, the detonation near the surface.

DR. O'FARRELL: It can have. We have done some studies over in the railroad great project in the San Juaquin Valley associated with seismic testing and none of the shots though were of the sizes that they are talking about on the seismic for the test site. So there is no way that we can scale up from that, no.

Ted?

MR. DOERR: The technical issues that we are addressing relating to the biological resources is, what are the potential impacts of characterization activities, on the sensitive and protected species?

And again, we have three generic general technical approaches; there are pre-activity and post-activity surveys process, ranging studies, and sports studies.

Pre-activity surveys, again, it gets back to what I discussed a little bit earlier. I would like to reinforce one item, is that when we do pre-activity surveys, not only do we survey where the activity, itself is going to be, but we also survey around a buffer area, around that activity zone.

DR. CARTER: Well, I guess that one thing that we are supposed to notice in the bunny, is that was not taken at Yucca Mountain.

MR. DOERR: No, that was not.

Within the pre-activity surveys, the buffer zone, the reason that we do that is two-fold. The first, in case there are minor changes by the people that are going to be conducting the activity between the time that we survey and the time that they do conduct the activity, there will not be a need to go back out and conduct the survey a second time. So that is a time saving element.

Secondly, if there are some inadvertent disturbances adjacent to where the activity is planned, that will also be covered at the same time that the resources will be protected.

The second technical approach is ranging studies. Again, Kent will be discussing the integration of a number of our studies and specifically within this category of studies here. We have four studies that address or evaluate species, populations and community attributes related to sensitive and protected species.

And we have planned a wild horse and burro study using telemetry to evaluate movements of animals from the northern range where they are currently at to the Yucca Mountain project area, if during surveys and evaluations and conducting other studies it is determined that the animals are being found and located within the Yucca Mountain project area.

Secondly, we have work that will be conducted later using telemetry again, evaluating movements of mule deer that are also located up in the northern areas of the test site.

Both of these movements, we think, may be potential if water developments occur in relation to site characterization activities.

And the other two studies, bird studies and bat studies will be initiated this fiscal year.

DR. CANTLON: Let me go back, you are presuming that you are going to leave water sources available through some of the activities that you are engaged in?

MR. DOERR: Based on what our understanding is of the drilling operation, for example, the ESF will be a discharge of, I believe, 10 gallons per minute, is that correct, somewhere in that range? At any rate, there will be some type of a water discharge. And if that is the case, there also will be sediment ponds which will be exposed water. Those could be potentially areas where -- and we already know that mule deer tend to range through the area now. There are signs of mule deer there, although very limited.

If, in fact, we find that there was just a simple lack in the habitat of water and that overcomes that habitat limitation, and mule deer then become more predominant in the area, then we will be prepared to evaluate how the impacts are affecting those populations and those movements in the use of the area by those populations.

DR. CANTLON: But these are transient events, because the site characterization is not going to leave drill water there for very long.

MR. DOERR: Correct.

We might just want to define transient events, the large bulk of the activities that are scheduled that use water, for example, impounding studies, infiltration studies, are extremely transient, a matter of days, hours or weeks. Whereas, perhaps with the ESF drilling system, or the sewage lagoon system, we may be there for a little bit longer, but still transient in relation to numerous years.

Our third technical approach or support studies, these three studies here, studies related to fur bearers, game birds and rabbits are support studies that are related to our radiological monitoring program.

And I will discuss the technical design of those when that technical issue comes up. These three studies have been designed, as well as the bird and bat studies have been designed. They have gone through our technical review process and we are currently in the process of initiation and implementation.

DR. CANTLON: Besides those are there any other approved areas?

MR. DOERR: There are badgers, coyotes and donkeys.

And we go to the next slide.

Issue three is what are the potential impacts of site characterization on community attributes that may affect sensitive and protected or endangered and threatened species? We have two generic technical approaches and again, pre-activity and post-activity surveys, and ranging studies. Here, again, these studies are integrated with the first series of ranging studies that were listed under issue two.

We are evaluating micro-site disturbance and meteorological phenomena throughout each season at specific sampling locations and we are also conducting vegetation studies, small mammal studies and will be initiating this year, reptile and invertebrate studies.

Vegetation studies, currently this year, we have the site location selected, our procedures have been drafted and we are setting up the physical locations where our sample points will be.

On small mammal studies this week we are finishing up our fist trapping effort with small mammals. We are have eight specific plots that we are trapping on and these plots have 144 trap stations with two traps each.

And the next slide. Again, reptile and invertebrate studies we have the procedures drafted and they are under technical review and then we will go on for quality assurance review later.

Next.

The fourth technical issue which is a little different from the first three; what are the potential pathways of radiation to man and the environment? We used one generic technical approach which are six support studies. The map on the left is a general schematic of our design approach. What we are doing is that we will be supplying biological samples to other components of the radiological monitoring program to evaluate radionuclide burdens in the tissue material of the selected small mammal species and deer forage and cattle forage species.

DR. CANTLON: Your circle is centered on the waste process.

MR. DOERR: That is correct. Our circle here is related to the exploratory shaft facility and associated muck pile and in other facilities, the dots represent exploratory shaft facility, expected muck pile location, repository location, repository muck pile location, and two waste facility handling locations.

What this location down here represents, it is a trapping area, where we are conducting small mammal trapping on a quarterly basis, game bird and lagomorphs surveys, and fur bearer surveys within this small area here.

What this will provide us is with a general abundance of these animals and also we will be collecting from this location, small mammal specimens to be used for radionuclide body burdens.

This area here represents what the background radiation levels are. This middle circle here is representing with our sample location here, again, we have a small mammal trap grid and we also have game birds transects, lagomorphs transects, to estimate abundances of those species, as well as furbearer sense station, transects.

And what this represents is, that it represents both background environmental sources of radionuclides, as well as NTS activity sources, potential sources of radionuclides.

And the third circle, as pointed out by Dr. Carter, represents background radiation, potential background radiation sources, test site sources and potential exploratory shaft development sources.

With that, Kent, do you want to present issue five and discuss our monitoring program.

PANEL REPORT BY KENT OSTLER

MR. OSTLER: The final issue in the biological program is what are the reclamation techniques needed to adequately rehabilitate those lands disturbed by site characterization activities.

And these fall into principally two components. Those activities that need to be done prior to final reclamation, we needed some interim information, things that need to be done which are represented by the pre-activity surveys and the site preparation reclamation instructions.

And then finally, we have reclamation feasibility studies which are those studies that are going to provide us and fill in the information gaps so that we can adequately reclaim sites once they are abandoned and de-commissioned.

Let me just talk for a moment then on what we do on pre-activity surveys. Not only -- well at the same time that we are conducting those pre-activity surveys for the biological resources, such as the endangered species, we have a reclamation biologist or soil scientist out there who is assessing the site for its reclamation potential.

We are looking at such characteristics as slope, topography, potential for erosion and then taking a very good look at the soils, particularly if the site is going to be disturbing soils.

Our soil sampling scheme is for every acre that is disturbed, we will take and describe two soil pits within that area. Again, that is depending upon the number of soil types that may be involved in that site, as well.

But within those soil pits then, we will pull samples for analysis and we will also describe the soil horizons, the depth of material that will be suitable for stripping and stockpiling to be used later for reclamation.

And from that information, then, we develop the second item, the site preparation, reclamation instructions. That involves two principle components. The first is the top soil stockpiling specifications. And we will develop top soil stripping plans for each one of those sites that is going to be disturbed that has a suitable amount of top soil that is strippable.

Obviously when you only have a half an inch of top soil out there, one cannot feasibly save or preserve it. The second component then is erosion control specifications.

Once we have stripped the top soil from a site there is a real need to protect that for the duration of, as long as the activity lasts, until you get into final reclamation.

So we are looking at a number of components within that section and making recommendations for those soil piles. Those would include such things, as if the top soil is there for just a short amount of time, we may put a geo-textile fabric on top of it, or maybe just simulate, essentially a desert pavement by sprinkling gravel over the top of it.

If it is going to be there for a substantial amount of time, which to us, is anything over one year, we will start revegetation activities on that, whether that is a cover crop or some other kind of species. There is a need to implement that to retain the biological viability of the top soil.

So those are things that are done prior to any real decommissioning or restoration on the site. But they are very important in the final reclamation. The final component then is the reclamation feasibility studies. Reclamation in these arid areas is very difficult.

We have talked about some of the reasons here today. We have brought up about the precipitation. Not only is the precipitation very low, but it is also very quite variable, thus, you can never count on precipitation coming at any time during the year.

And this is certainly a problem and it is also there are very few particularly large-scale revegetation projects in the upper Mojave Desert transition area that have good demonstrated reclamation skills or areas where you can go to and see what has worked and what has not.

There has been a number of studies on the NTS that relate marginally to some of these aspects. There was work done by IVP, desert vinyl project in Rock Valley which is some 15 miles away, where they do provide some valuable baseline information, but there is still are significant gaps in our knowledge to adequately and consistently reclaim sites at Yucca Mountain.

This then has led to the development of the reclamation feasibility plan and we will be addressing some of those information gaps. Obviously first we start with the literature review. We have complied much of the regional information for the area that can be applicable in revegetation of our sites. And there is a lot of -- well the work that has been done more on a local level is often not available or is not in the published literature.

And so we are going to take an approach where we do a lot of personal contacts, getting into or getting with people who have been working in the area, visiting test plots and visiting demonstrations or other actual revegetation plots that may have been done in the area.

And from that, that will help build and design some of our other studies. The successional studies are very interesting. Everyone, I think, probably agrees or often heard that succession in the desert is a very, very slow process.

I visited a site in the Joshua Tree National Monument which is not very far from Yucca Mountain and was shown a road that had not been travelled for 50 years and there was really no substantial invasion of the plants onto that site in that amount of time. And the viewgraph over there shows a site in the same area, that was completely disturbed, this was a borrow area, and all the soil had been removed from that and you can see in a matter of about 25 years, the amount of succession that has occurred on that site. And but it is the intent then of our study to go in and look at such sites as this and identify those parameters that may enhance natural succession.

And hopefully by identifying those then we can use them in our active revegetation program to enhance that process.

The next important area that we feel has been overlooked is the value of topsoil particularly in these desert areas. To date, on NTS, they do not salvage topsoil. And so there is very little information available to us, on how best to not only salvage it, but to store it and keep it viable so that it can be used in later reclamation activities.

And there are two important components of that topsoil stockpiling that we are going to look at and one is certainly providing adequate erosion protection so that we do not lose the resource once we have stockpiled it. And the second is to maintain its biological viability.

And to do that we are going to look at a series of treatments that will enhance revegetation on to these test plots that we will establish on this topsoil.

Specifically what our treatments or design are for the topsoil piles at this point, are very general. We know general treatments that we will be applying and these will include species selection, fertilization, and things such as that, but the final selection has not been decided upon.

Obviously to this point, they have not removed any or stockpiled any topsoil so that those activities are not planned on beginning until probably next spring.

The fourth component study is the mine spoils study and we will be, when the ESF is initiated they will be bringing mine spoils material out and we need to take a look at this and look at the reclamation potential of that material. And we are going to be doing this in a phased approach and we will first obtain material and put it through a chemical and physical analysis. And then look at its agricultural properties to see whether it is feasible to grow plants on it directly or whether it has to be mixed with topsoil or some combination of those.

From that analysis, we will probably get into some greenhouse studies and then probably field application.

The final point that I want to address is the revegetation studies and we do have a very diverse plant community that is associated with Yucca Mountain and we need to develop site specific recommendations to address these disturbances in reclaiming those disturbances.

As I mentioned, there is very little information that is out there on reclamation and the picture diagrams one of the few organizations that is doing revegetation in the Mojave Desert and these are plots established by Caltrans, which is California Department of Transportation.

They have done quite a number of studies looking at seeding and planting of actual plants. And much of the information -- well, the specific design, again, of these revegetation trials has not been finalized. We are waiting for inputs from the literature review, from some of the successional studies in identifying those.

But some of the general things that we will be looking at, are first preservation of topsoils, and second, is conservation maximum use of the precipitation that falls and so we will be looking at water harvesting techniques there and then we will be looking at slope grading and site preparation techniques.

And also there has been studies on NTS where they felt that it is very important to protect young seedlings or transplants so that we will be looking at those kind of techniques as well.

Next slide.

I think from many of the discussions that Ted has just brought up and those in the reclamation area, you can see that we have a very diverse program under the biological resources. And we have attempted to integrate those programs so that we do have a package where we do not have redundancy or wasted effort in our data gathering areas.

Three of the needs that we felt were necessary to develop this integrated package was to measure the local and regional site characterization impacts, which Ted addressed.

The second thing was to be able to discriminate between the natural variation from the impacts. We have done this through our statistical design and our placement of our sampling plots. We have looked at, you can see over on the map diagram, where our treated areas are within this boundary here and those relate to the abundance of site characterization activities.

Our control, what we call ESP's or ecological study plots, are outside of that boundary area. So that we are looking at a control and treatment aspect, and we are also, since we are gathering information before many of the site characterization activities are occurring, we can get pre- and post-activity analysis as well.

And then look at local versus regional impacts.

The final component of that is to monitor the impacts to the ecosystem tropic levels. And we have attempted to address this item by sampling at our ESP's, so that the data that we are gathering are from these two hectare sites.

And then finally we are using a similar scale of measure, wherever practical.

To summarize then the technical approaches, that we are using to address these issues, we have developed four separate programs that address the issue and some of our programs that may take, in this case, it takes three programs to totally address that issue number two. So that these are the number of studies that we are conducting for each issue.

And not only do we have integration this way, with the studies to address the issue, but we also have integration in our program between these issues as well.

Let me give you an example of what I am talking about there. Much of the vegetation data that will be gathered during the ranging studies program, as a part of the vegetation characterization, can be used in the reclamation program. And the identification of species that are dominant in the area that would be those species that one would want to reintroduce in a reclamation program will be identified not only from that vegetation component but also from the successional studies.

The vegetation sampling will also get estimates of cover and productivity which can then serve as goals of your reclamation program to see whether you have indeed, been successful in your reclamation efforts.

Okay, all of this information has really, feeds into three basic components we feel. One is the need for scientific studies to provide information to fill those gaps that we don't have knowledge in right now.

The second component is to monitor the impacts and see what is going on with those biological systems to see whether we are having an impact and see where are mitigation measures are effective. And then the third is the operational components of our mitigation measure and that is what is described here.

Basically we are addressing two or mitigating for two important components, those of the desert tortoise and I think, Tom, has covered most of those and then the disturbed habitat. And let me just quickly go over those.

We not only have pre-activity surveys, those will identify what needs to be done, to a site, and if, indeed, if the site is viable then we can redesign or relocate that activity. There are also specifying topsoil salvage, preserving and reuse of that topsoil and also making recommendations for protection of those sites from erosion.

And finally we are claiming those disturbances with suitable plant species that can be used by the animals as habitats in the area.

That concludes our discussion on biological resources and we will entertain any questions.

DR. CANTLON: Let me raise a couple of questions. In the first place, the scale of the tortoise range, which is probably the most sensitive species being impacted by the site characterization plan, a portion of the range that you are involved with is a very tiny portion of the total range of the tortoise, isn't that correct?

MR. OSTLER: Right.

DR. CANTLON: So that the real threat to the total species population, again, is relatively modest. Maybe measurable but pretty modest.

MR. OSTLER: I would agree.

DR. CANTLON: So that one could also make the same kind of observation relative to the eco-systems that you are working with, you are in a transition zone there between the desert to the north and the Mojave Desert to the south and west.

And that is a more modest area than either the Mojave Desert or the Great Basin Desert. Nevertheless, the portion of it that is going to come under impact by the site characterization plan is a very tiny fraction of that total transition belt.

MR. OSTLER: I don't disagree with that.

DR. CANTLON: Nevertheless, you are approaching these things looking at individual species populations rather than the eco-systems. You use the word eco-system and in your summary you talked about the system, but you don't really have an eco-system study that you characterize or describe. Do you plan any looks at the eco-system, the soil, vegetation, micro-biology, animal interaction? That is the system that you are going to impact, not the individual populations which range much,

much beyond that.

Are there any eco-system studies truly that you plan?

MR. DOERR: One, I guess it depends on how do we want to define eco-system?

DR. CANTLON: You are going to look at the processes that go on in eco-systems?

MR. DOERR: That is not part of the scope of the studies per se, is to specifically look at total processes, but what we are trying to accomplish here, is by looking you are correct, we are looking at specific populations within each one of these ecological study plots that we had in preparing them for our control areas.

But we feel that by looking at it here, we are calling this essentially an eco-system of interest or a large percentage of an eco-system of interest. Although, granted it certainly is a relatively small component of the entire transition eco-system that word is used more traditionally.

DR. CANTLON: I guess what I find missing in all of the descriptions of what you intend, is to understand how the system works and knowing how it works, will the repository have any effect?

My gut feeling is probably not, but you don't have any data that I see, you are going to be able to address that question with. And as I understand part of the Nevada criticism, that is their criticism that you are looking at species populations but you are not looking at the system itself.

MR. DOERR: We feel though that by concentrating our studies at these locations, for example, if we can document by our monitoring of disturbances, such as fugitive dust deposition, that that is impacting vegetation productivity at certain levels away from the disturbance, and that that impacts perhaps species composition or reproductive efforts of small mammals, then we feel that by using multi-varied statistics that that may provide an indice of relationship.

DR. CANTLON: But you still won't know anything about the system. Let me give you an example. You have mentioned the desert tortoise and I heard what I thought was speculation not backed by data. That on the test site, the lack of observed tortoises is due to roadkills of the population -- you kill them off with cars.

And I also heard that half of them died of a respiratory disease. Then I might ask, if I were inclined to, let me say be a poser of somewhat hostile questions, in other words, I am in a bit of a Devil's Advocate mode, well supposing it is the dust from the road, or from other things that is causing these tortoises to get respiratory diseases. So that if you deal with the automobile issue, but you have not dealt with the dust, I am still worried about the tortoises. I think that you need to get down to the point of having good, credible explanations by understanding the ecological systems, and understanding to the best you can, what it was in the past that has led to adverse impacts on this population.

And just counting the tortoises very carefully really is not going to give you what you need.

MR. DOERR: Certainly I will agree with you on that and that is why we are monitoring disturbances. For example, we will be monitoring not only fugitive dust, but we will also be getting a handle on vehicular traffic through the system.

In addition to that, in relation to animal/vehicular collisions, we will also be getting a handle on that also, so for that example, certainly as well as for other combinations of those three types of disturbances, with the populations that we are investigating, we can address those issues.

DR. CANTLON: Well, let me come back to my systems question.

If you go down to Ash Meadows where you are really dealing now with some small, unique endemic eco-systems, not only endemic species, you really have got endemic eco-systems, some of which may actually have smaller range than some of the endemic species, if they are mobile species.

Yet, again, I don't see any attempt at understanding how these systems will be dealt with.

DR. CANTLON: You see that nature of what my nature of my question? I don't need an answer now, but it does seem to me that's the sort of thing that you're being criticised for is that you're gathering, I think a very substantial amount of information --- it just doesn't hang together in a way that you can address your critics. Because you 're not looking at the way the systems work, the kinds of processes that are conceivable there will influence and perturb the system. Totally different subject.

MR. DOERR: Certainly we're not --- and as I mentioned earlier in the talk --- we certainly are not addressing function.

DR. CANTLON: Right. You're going to remain vulnerable until you start looking at the function of designated systems. And I think there's just no arguing that. The second different set of questions, and this gets back to your plan of subject, the mitigation thing --- it does seem to me and you mentioned the California transportation people are doing some planting studies.

It would seem to me again, because of DOEs decision to do a very substantial mitigation plan on all of the disturbed sites, you've got a long way to go to know how to restore that back to its prior state. It's a tough job about which we know damn little, and it seems to me that from what you've described and what I've read, you're not getting the kind of data you need, because you're not doing any study of what those plans need.

How --- what --- how do those individual native species stand to respond to a mix BC you're going to have in those top soil repositories you get. In other words, does germination take place, or is there a problem with germination. What's wrong with germination, what do you need to do that?

That set of issues needs to be addressed if you really are serious about mitigating and restoring the vegetation back. And again, you're missing a piece of closing the loop. Now I'm not arguing for total mitigation. I'm just saying if that's your objective, and that's what I understand what DOEs laid out for itself, you're missing what you need to get to that input.

MR. OSTLER: I agree, those are very definite information needs and those are things that we'll be looking at in our ---

MR. CANTLON: Okay, it wasn't clear either in your presentation or in your material.

MR. CARTER: In fact, I would add that in my reading of this, that's the thing that I noticed, quite often in the reclamation area, it indicated we were going to do revegetation. You pointed out there are some problems with this, so certainly I guess you've not presented that part of the program on the same emphasis you've done on some other things.

MR. OSTLER: Again, the reclamation feasibility plan is just in the final stages of approval, and so we haven't implemented any of that at this point --- or much of it at this point ---

MR. CANTLON: But it would seem to me that you've got to spy to see what the nature of the plan is --- get plants to grow, specific kinds of plants, and specific kinds of material. And nothing in here of what you've said, discusses that point.

DR. NORTH: I will reiterate my previous speech in several other areas --- think about the operating as well as the site characterization phase. If perhaps its difficult to carry out much in the way of demonstration in the next few months on revegetation. I invite you to think about how much you might need to have a successful, completed demonstration of revegetation. Perhaps in a number of different types of locations at the time of licensing when some critic says "I don't think you can do it". You're going to need to have essentially proof demonsration that you have solved these problems, and that you can do it.

MR. OSTLER: And we certainly plan to do that. We have plans to start this fall in conducting such revegetation trials. So we are going to undertake those aspects.

DR. NORTH: Why don't we add that to the list of things we'd like to see --- the details of those plans.

MR. DOERR: Can I add three things real quick, because I'm sure Monica has something to say. What is the relation of that issue, I think that we apparently feel to highlight to you in sufficient detail to you about the studies --- the specific studies related audicologicol phenomenon that would occur. Regardless of that, with reclamation with most ecological studies, we're always going to have black boxes, and I think that that's --- with those two components, that that's probably the gray area we're talking.

Getting back to the original issue about laundering eco-systems and stressing function --- two things. One is the assumption that regarding the relationship between structure and function, that certainly is a debatable point --- as far as the relationship between change and function can be related to a change in structure and vice-versa.

And secondly , with studies that have been done in the past with monitoring functional attributes, is yes, it's extremely difficult and usually more costly to try to get a handle on function than it is structure. Not always, but very frequently. And we think that the technology is more at hand to be handling structural changes that it is trying to cope with both structural and functional. Although we would certainly enjoy entertaining those types of studies.

DR. CANTLON: But if you're going to exert biological and physical impacts on the same, truly you're going to influence the survivability of the species, but you won't know why, until you understand what it is that you did that caused the change, and then from that knowledge, you'll look at options for mitigation.

And what you're missing are the tools to get at the fundamental principals of mitigation.

MR. DOERR: But then, what are we talking about, are we talking about it on a physiological basis of the animal, or level, or are we talking a population level and just a population response? And again, I think certainly there are weakness, but I think by evaluating population responses, and correlating that, and relating that directly on site specific locations to the disturbances and to attributes of the disturbance, I think we can relate it back to site characterization activities, and extend it on to other types of activities.

DR. CARTER: I'm going to interrupt this now. We're running a little bit behind so I think we can continue this discussion at another time, and I thank you very much. Now I'd like to turn our attention to cultural resources. Again, we'll have two presentations by individuals from the desert research institute, and I presume that Lonnie Pittman will be first? --- Dave Rhode will be first! Allright. (Laughter)

PRESENTATION OF YUCCA MOUNTAIN PROJECT
CULTURAL RESOURCES STUDIES
BY LONNIE PIPPIN, DRI; AND, DAVID RHODE, DRI

MR. RHODE: Dr. Carter and North, good afternoon. I would like to begin by introducing the subject of cultural resources. As you may have gotten from the video, cultural resources comprise a number of different types of material remains which can be defined generally, as any material item made, modified either in former location, or held to be culturally significant by people. Our program has basically two components, one devoted to those cultural resources held significant by the native inhabitants of the area, the Western Shoshonians, how their tribes inhabited the area prior to European contact, in the 19th Century, and the second component deals with historical properties, the archeological component.

I'd like to begin, and give you a synopsis of the regulatory environment, treating cultural resources in the region, before Lonnie gives you a description of our technical issues.

The regulatory environment --- or framework --- begins with Presidential executive order 593, which stipulates that all federal agencies will inventory all historical or cultural resources on their controlled lands.

Presidential executive orders basically gets its teeth from the National Historical Preservation Act, of 1966, which is the legal framework for preservation and protection of important and historical properties, and establishes a national register of historic places.

There are a number of regulations guiding how this legislation is to work, among them 36 CFR 800, 36 CFR 60 and 56 CFR 4727. These provide the regulations to assess the effects of activities on historic properties, provides guidelines to nominate historic properties to the national register, or to determine whether those properties are eligible for nomination, and it provides guidelines for managing cultural resources on federal lands.

A key document for our work is the Programmatic agreement which was introduced briefly in the video. Before I give a discussion of the stipulations of that agreement, I want to bring up one other law under the American Religious Freedom Act, which stipulates that federal agencies contemplating land disturbing actions, or actions which may disturb cultural resources, consult with native groups that are concerned with those resources.

Now to get back to the Programatic Agreement --- this is an agreement --- this is an agreement between the Department of Energy and the Advisory Council on Historic Preservation --- stipulating how DOE will comply with the laws and regulations that I just mentioned. It makes several stipulations. First of all, it makes consulations with the State Historic Preservation Office. Thereon, on the state level, the arm of the advisory council of historic preservation.

The second is the identification of effects of site characterization activities on historic properties. This includes what properties there are and what effects there might be on them.

Third, is the preparation of research issues, and archeological data recovery programs, to minimize or mitigate the adverse effects of any such site characterization activities.

The fourth is implementation of measures to minimize those effects.

The fifth is an establishment of a worker education program --- part of which you saw in the video --- that is a piece of that worker education program to insure that site characterization activities, and activities associated with increased with human traffic through the area will not affect --- cultural resources.

And last but not least, to consult with native American groups on concerns with properties important to those groups.

Those are the --- that's the regulatory environment --- now I'll turn it over to Lonnie to go into the technical issues. Oh, I'm sorry, excuse me.

These are the kinds of site characterization activities, so we anticipate we'll have potential to impact cultural resources on any kind of exploratory shop construction, road and power line construction has a very strong potential to affect cultural resources, geologic trenching, operative vehicle, and foot traffic, and other aspects of increased human intrusion into the region of --- particularly within the direct boundaries of the proposed repository but also in a buffer zone around that proposed repository area.

MR. CARTER: Let me ask you one question. I got the impression while reading the environmental field of activity plan for cultural resources, the state was a party to that particular group. Namely , the Nevada division of historic preservation and archeology. Is that not true? Consultation is the word used here and it is my impression that they were sort of a tri-party agreement --- the historic group, the DOE, and the state.

MR. RHODE: The historic preservation office was invited to comment on that and it did so and it did so and we addressed those comments --- maybe you could ---

MR. PIPPIN: Yeah, I'd like to answer that. What we have done in that regard is although the state is not a program and diplomatic entity, we have acted as if they are. So we have gone through all the consultation process. We've provided all the results of our surveys, our state plan, our EFAT, our weather comment and responded to those verbally.

MR. CARTER: Okay, it may be I'm forward but maybe I misread it, but on that document on page l-4, at least I got the definite implication that they were party to it , so that's the conclusion from reading the material, and that's honestly important. You know, they either are a formal member or they aren't.

MS. DUSSMAN: If we could point out that on August l988 issue reading, problematic agreement was dated December, and we have not gone through another revision so it was our understanding that the state would be a signatory to that.

MR. CANTLON: Yeah, that date was fairly recent so what I read was correct but it's out of date.

MR. RHODE: We are still undergoing consultations with the state historic preservation office and all of our work to date, and continuing with that as though they were signers of the PA.

PANEL REPORT BY LONNIE PIPPIN, DRI

MR. PIPPIN: My name is Lonnie Pippin. I will go through the technical issues, as stated in the P.A. and all of our activities are associated with the stipulations that we've gone through in P.A.

First question --- first issue we have to address is what are the cultural resources out there. Secondly, because the National Historic Preservation Act specifies that not all cultural historical resources have to be protected and preserved, but only those cultural resources that are significant in a definition of that term in which I'll go through in a bit, need to be protected.

And so our second issue is, what are the values of our cultural resources that we know out there. What are they valuable for.

The third technical issue that we must address in terms of cultural resources are just because they're out there, and they might be valuable, if they're not going to be affected by site characterization activities, we need to know how they're going to be affected by site characterization activities. Are they or are they not --- and to what extent.

And finally we need to know what the characterization activities on Yucca Mountain, how it will affect native American and religious freedom in compliance with the AIRFA, American Indian Religious Freedom Act.

In order to identify what are the resources in the Yucca Mountain area, we have gone through a series of steps and continue to go through those steps. First of all, we did a literature review and prepared an overview document in l980, associated with the early stages of this project.

A literature review is simply what has been done in the area and we continue to update that literature review because there continues to be other studies around us. The cultural studies overview was prepared --- following the preparation of that overview, which summarized our knowledge at state. We did an intensive survey of about 2900 acres of the Yucca Mountain area proper. That survey was based on anticipated areas of activity, intense activity. In that survey, we identified nearly two hundred cultural resources. Even before we did the intensive survey, we initiated a program of pre-activity surveys on the Nevada test site, Yucca Mountain area fell within that. So we have been conducting pre-activity surveys since about 1979.

This feature here, was Alice Ridge, and it will show on all of them. And the first survey that we did shows you the sites that we found in the 25 percent sample survey of that area and 40-Mile Wash, but here is Alice again and here is that 25 percent sample of the 40-Mile Wash.

Now, the reason why we did those two areas as sample surveys is because both areas have been opened up by roads through site characterization activities and increased access and increased activities and we wanted to get an idea of what the nature of those sites were in that area.

And I may also mention in terms of methodology and how we conduct our pre-activity surveys, that are simply to get a bunch of archeologists out there, most of them with beards and long hair to walk 30 meter transects back and forth through that area of potential affect from the activity.

And we record whatever kinds of cultural resources we find at that place. We plan, in our long term site plan, to conduct additional sample surveys in the area to look at increased access and direct impacts. The Pinnacle Ridge Survey, this is Yucca Wash and the 40-Mile Wash down to about here, because of access into the potential access into the area and then the southwestern portion.

Are there any questions concerning the identification of resources so far?

(No response.)

MR. PIPPIN: Issue number two, what are the values of the cultural resources which we find? In order to measure that value, we are again tied by federal regulations, 36 CFR 800 has very specific criteria of eligibility in that. What this is tied to, are they eligible for nomination to the National Register for Historic Places, which is set up by the National Historic Preservation Act.

And it tells you in that regulation how you are going to evaluate and whether they are eligible or not. First of all, it defines in that regulation that significant cultural resources are those properties which possess integrity of location, design, setting, material workmanship, feeling, association and are associated with one or the other.

First of all, are they associated with somebody or with an event that is important. Are they associated with somebody, a person that is significant in our historical past. Do they typify a period, a method of construction, or represent the work of a master, possess high artistic value, represent significant entity whose components may lack individual distinction.

Are they a work of art or architectural significance for a building, for example. And most of this law, for the historical perspective here is written around old historic buildings, not hunter-gatherer temporary camps, which we find on Yucca Mountain for the most part.

And finally, the last criteria, do they have a potential to yield information that is important to us understanding our history, or prehistory. And most of the cultural resources in the Yucca Mountain area fall under that level of significance.

DR. NORTH: I am trying to get in the ballpark of where we are located and I think that I have some insight. I would like to read you one phrase out of this draft environmental field activity plan and you tell me if there is a lot more to it.

The phrase here is numerous cans, several isolated tin cans and one prospector's temporary camp indicate that a Euro-American historic adaptation in the Yucca Mountain area. We are not dealing with Ghost Towns or the first mine in Nevada.

MR. PIPPIN: No, in fact, I have a slide that shows you one of the historic sites, Euro-American historic sites and it is not Ben Franklin's homestead at all. It is a small rock shelter.

DR. NORTH: Yes, are we talking about any Indian sites that have specific unusual significance either religious or in terms of, you know, the type of site that one would not expect to find in other areas nearby in Nevada?

MR. PIPPIN: I would like to answer that in two parts. Number one, you brought out the Indian significance and I would like to postpone that treatment for just a second because I will get into that later.

DR. NORTH: Sure.

MR. PIPPIN: So, to break that part of the answer away. Are they significant? Well, we are looking at 12,000 years of hunter gatherer adaptations in the region. And hunters and gatherers, is that significant and have we found that elsewhere? My answer is no.

DR. NORTH: One of the study does?

MR. PIPPIN: They have not been studied well elsewhere. We have looked at hunter and gatherer behavior in the Great Basin for over 50 years, in terms of archeologists. We have not yet had any kind of good study on how hunters and gatherers make their living in the springtime. We have focused on dry caves in our research and we know a lot about big, deep, stratified caves, but we don't know very much at all about what hunters and gatherers were doing when they were not hanging out at the cave or hanging out at the marsh, which has been the focus of areas.

Yucca Mountain is a hot, arid hostile environment to be adapted to so that it is significant to archeologists to understand how prehistoric people in the past have adapted to that harsh environment.

Have we made those kinds of studies elsewhere; we are just starting to as a profession.

DR. NORTH: One of the questions if it is a hot hostile environment is did people adapt to it by largely staying away and living somewhere else?

MR. PIPPIN: That is why we have -- what are the cultural resources out there and we have, you know, have identified cultural resources out there. Don't get the impression because I say that there are 419 cultural resources found that all of them are isolated plates. They are definitely not all isolated plates. There are a number of different kinds of sites that show a number of different kinds of activities, through about a 12,000 year period.

DR. NORTH: But I am getting the impression that some of the sites along 40-Mile Wash and the Severe Tank Site are really quite interesting and my question really, is do you have those kinds of sites on Yucca Mountain where we are proposing to do work?

MR. PIPPIN: Right, let's slow back up the slides and I am getting ahead of myself a little bit here, but let me answer your question and then we can proceed.

This is the ridge of Yucca Mountain here and these sites are located on the top of the ridge of Yucca

Mountain where a number of drill hole activities have occurred. This is Textile Hill here, and this is the location of the proposed surface facilities in the repository.

We surveyed this area and we determined that that area is a source that has been used through time and so yes, that is in the direct area. A lot of these sites have been identified in the pre-activity surveys, where there is a USGS road, or a drill hole, or some of their activity that may be proposed.

In the early stages of thinking about the repository, should it be developed here, we were talking about how do you get the stuff in and is it along the terrace of the 40-Mile Wash by way of a railroad or how that decision had not been made, but there was talk about how you are going to get it in there.

Well, as you will see in a second, the terrace of 40-Mile Wash is a favorite location for prehistoric activities, so that there is quite a few cultural resources along this area.

DR. CARTER: This was my original question about sites and it seems to me that wherever you look, you find a lot of them.

MR. PIPPIN: Wherever you look, you find a lot of them.

And method of evaluation. How do we evaluate the significance of a site? First, what kind of pattern does it belong to; what kind of a settlement does it belong to and how does it fit in our understanding of what is going on in the past?

Is it one of many sites that look like that or is it relatively unique?

Second of all, does it have any depth potential? Does it have buried cultural remains with it that would have to be retrieved through excavations? We determine that by doing test excavations at it. Does it have patterning and integrity within itself, that may yield significant information concerning the past and we do that by surface mapping and doing limited collections of artifacts and take them back to the lab and look at them.

We may collect artifacts to send off for sourcing of obsidion, for example, to see that did the obsidion come from the coastal range, a long way from the test site, or did it come from a locality right next to Yucca Mountain?

And we assess the research potential of that information that we get from those, we relate that research potential to what are our important questions that we are asking of the prehistoric record in that area.

Now, briefly if I could go through in terms of what we know about the prehistory of that area already, and I will throw on some slides. And I have, and this is an interpretation that you must always remember, but I have interpreted the prehistory of Yucca Mountain of the history of Yucca Mountain to be divided into four main periods.

First, I call it early human occupation of the region and we are talking about Paleo Indians and we are also talking about a time when the environment of Yucca Mountain was quite different from what the environment of Yucca Mountain is right now.

And how different we don't know because all of the studies have not been in but it is possible that a Juniper/Yucca association, for example, grew along the edge of 40-Mile Wash rather than the kresote bush that grows there today.

And some of the early pattern of occupation that we see tends to be oriented or patterned along the ephemeral washes of the area and with isolated artifacts and here comes some of the significance of those individual plates and arrowheads. With isolated artifacts belonging to that time period along the ridge tops of Yucca Mountain.

And, of course, we have an interpretation of what that means in terms of prehistory. We, for example, the wide pattern along the empheral washes, we first thought that maybe there is water running down the wash and we have now done a lot of remote sensing studies looking at this and we find that the site patterning really goes along with the patterning of the alluvium more than it does along the wash.

And we looked at the artifacts from that and they look like they are there, remains byproducts of toolstones that they used to make their tools. So it looks like those really early people that site patterning goes along more with toolstone exploitation more than it does the water.

The middle period adaptation is a fuzzy line and this is thrown in. Here is the terraces I talked about and there are some features along those that this happens to be of the Allen Site, and by the way, this was identified in a pre-construction survey, the road was bent and where we found a number of rock features that we interpret to be hunting features and probably related to the middle period.

So the fuzzy line there is that there is not a sharp break in any of these settlement patterns, they are trends. But the trends during the middle period of occupation out there, tends to be more towards the uplands of Yucca Mountain, itself, more toward the low mountain passes.

This is two 80-gallon tenahas in that area that will probably help track the prehistoric people. A tenaha is a bedrock catchment basin that catches water. It is the most important water source on Yucca Mountain in terms of people.

Yes, that is a good example of the tenaha and we find them with lids on them and you saw in the video a little more elaborately. And that leads me to the latest adaptation that I see out there and it tends to be tethered to those lid-covered tenahas more than the middle period. The one with the lids on tend to belong to the later period and we infer that because of spatial associations between those sites.

And they tend to be small rock shelters which I interpret to be temporary camps and they have things like sandals and other perishables there. Then the final period, which is not much, there is not a lot of Euro-American historical remains, they are scattered cans.

This one site which we call Cot Cave because we found an old army cot there, tends to be another one and we infer that it is a prospector's temporary camp because there is a star drilled hole in the side of the rock shelter there. Not a lot of remains; a few cans.

The third issue, that we have to address are what are the potential effects of site characterization activities on these cultural resources. The first bullet is easy to determine. If you are going to build a road and you are going to put a bulldozer there and it is going to go through a site, you are going to affect that site, no doubt about it.

And, again, like Tom's group, we do a little buffered area around those to make sure because you can always tell, well the backhoe driver, he is not going to drive over there, but he does. So we do a little buffered area around those.

The second bullet there is much harder to define in terms of how they are going to affect and we have established and, in fact, will beef up a monitoring program in which we go back and revisit sites that we have found, recorded and look at are they being affected by illegal or unauthorized collection of artifacts; and it happens out there. It happens everywhere. Inadvertent use of artifacts for construction materials. We have a benchmark let's say, I won't say who did it, but a benchmark that needed some rocks for their little benchmark and so they used them and they happened to have come from a prehistoric site.

Increased accessibility, I have already talked about 40-Mile Canyon and the Yucca Wash survey and then you get the weekend guys going in there and looking around or anybody going in there and looking around. And because of land disturbing activities, perhaps on the top of Yucca Mountain, you change the runoff pattern, and you form an erosional trench going down the side, that may impact a cultural resource.

And those are the kinds of things that might occur that are indirect impacts.

And finally, what are the potential effects on site characterizations on the Native Americans in the area. And DOE has dealt with this issue mainly through the assistance of SAIC and they may want to jump up if I stick my foot in my mouth here.

They first did a literature review to identify what has been done in terms of Native American consultations and then they identify who were the affected Native Americans and they hired a consultant to do that and out of that they made official tribal contacts of representatives of those groups that they had identified and not all Native Americans are knowledgeable let's say about their past and/or specifically about the Yucca Mountain area. In fact, there are only about four or five of the Native Americans that are really quite knowledgeable and the others that go out there, they are interested but they are not extremely knowledgeable.

You have to remember that that area was withdrawn in 1940 as part of the Army Air Field School, anyhow, key cultural experts were identified. They conducted site visits, two site visits if I remember correctly, one during the fall and one during the spring, so that they could be there at different times to identify plant resources that may be important to them and out of that has come a series of recommendations from the Native Americans that they have been presented by the consultant through a report to DOE and DOE now has those recommendations and are looking at that and considering them.

That is the report and Dave Rhode will summarize our report unless there is any questions.

DR. CARTER: Yes, let me ask you two things. I wonder if you would make a comment on a couple of things. One is the avoidance index that was developed by DRI and how you use it and the other one is that I would be interested in several major dating techniques that you use and what periods of time they are good for?

MR. PIPPIN: The first one, the avoidance index, and I dreamt up that term, avoidance index, because I wanted to get the idea of the significance index out of it. And the way that we worked that up is that is an index that we wanted to provide DOE on whether you ought to avoid this site or not.

And we developed it not for the Yucca Mountain project, but for the Weapons Program on the Nevada Test Site. But it was designed simply as an index on do you really want to avoid that site or not and it was based on the significance and if you see, if you read in there, there are various things. Does it have things important for chronology and does it have things important for settlement patterns etc. And they are all scored and come up with a number.

There are two variables in there that are real important to recognize as site size and site depth. And those are multipliers, those are not additives. So if a great big site is multiplied by that, by a factor and if it is a deep site, it is multiplied by a factor and, therefore, that is why I call it an avoidance index. It is going to cost a lot of money and take a lot of effort if you are going to try to mitigate this through data recovery.

That is the intent of that avoidance index. Did I answer that question for you?

DR. CARTER: Yes, you did.

How about the dating techniques?

MR. PIPPIN: The dating question, the primary dating technique that is useful that we have is radiocarbon dating and that is good for about 40,000 years. We plan to and have established a sub-consultant to help us with obsidion hydration studies in the area.

There is a lot of problems with the obsidion hydration because you first have to have good temperatures studies so that you can understand, because temperature is a good driver of the hydration rates. And the hydration rates are also variable as to source, so that we have to have a good idea of where that toolstone is coming from geologically and we have a consultant that is helping us on that, with sourcing by rare earth elements that are better than the obsidion.

Those are the two main dating techniques. We use stratographic super-positioning as another one. In some of our excavations there is carbonate coatings on the underside of rocks and these are relative sort of techniques, they are not absolute sort of techniques but they give you the idea that that rock has been there for a while, and that artifact has been there for a while if it has carbonate coating on the underside of it.

MR. RHODE: I will summarize our technical approach here and go into some of the potential mitigation measures. As far as our technical approach goes, it is directly keyed to the key technical issues. First of all, we identified the historic properties that are in the region with our pre-activity surveys and our literature reviews and representative sample surveys of the entire region surrounding the proposed repository.

Secondly, we evaluate the significance of those historical properties through the use of the criteria for eligibility and the development of research problems that are important to regional prehistory and history. And then we tie the particular historic properties that we are concerned with to their potential for addressing those research questions.

And finally we assess the potential adverse affects to those historic properties from site characterization activities, whether they are the direct effects of planned land disturbing activities or whether they are the indirect effects of increased human access to them.

This is often conducted on a case-by-case basis and it is also conducted for the historic properties of the Yucca Mountain region as a whole.

We can go to the mitigation measures. As specified in the programmatic agreement, the key mitigation measure for cultural resources, if, at all possible is avoidance of those historic properties by any activities.

This can often be accomplished especially when we know if they are going to be directly affected in some way, we can move that road a little bit, we can ask that that meteorological station emplacement be placed a little bit over to the west, or something like that. For indirect effects, such as increased potential for vandalilsm and so forth, that is a harder issue to deal with, strict avoidance, so that there are a number of other measures that we are using to minimize the adverse affects of damage to cultural properties in the area.

Among these are data recovery projects at specific sites where we will go in and do excavations to collect necessary information to get the information that is available there. And we have developed a long term study program to exame a sample of archeological sites to represent the variability of cultural remains in the region and to address the research problems that we have identified that are important to understanding regional prehistory and history.

We have begun on a worker education program and finally, we monitor potential adverse impacts to particular archeological sites and we are concerned that there may be some indirect affects, and assess those potential affects through time.

And are there any questions? That concludes my discussion.

(No response.)

MR. RHODE: If not, thank you very much.

DR. CARTER: Okay, I wanted to close this session before we have a break and we talked earlier today about DOE orders and whether or not they were strictly internal documents by DOE and certainly they have a number of these to implement their own program and implement rules and regulations of other agencies.

It is quite interesting and I will be a little bit facetious, in this cultural resources area, namely the area of Native American confluence, this is one of the few areas that I know of that there is no relevant DOE order governing any aspect of response. I am being a little facetious but it is kind of interesting.

Any Ralph Stein asked for a couple of minutes to address a couple of things that came up this morning and I think that it would be appropriate to do that now. One is the DOE orders and the other one is whether we are talking about the license and the environmental impact statement or an environmental report.

MR. STEIN: Thank you, very much, I just wanted to close on the two issues; one related to DOE orders and whether or not they are internal documents and they have any external review, and the answer that I gave you this morning is that they are internal documents and basically they do not have any external review with possible exception that occasionally there is some consultation on an order during the preparation stage. But by and large my answer this morning was that they are internal documents and I --

DR. CARTER: And the approval and the responsibility are DOE's.

MR. STEIN: That is right and I did check to see if they did go outside of DOE and by and large they do not.

The second question that was asked was related to the environmental impact statement and whether or not we were going to prepare an environmental report and I answered that we did not intend to prepare an environmental report. Our plan was to prepare an environmental impact statement. NRC recently issued a rule change where they indicated that under certain conditions stated in the rule they would accept the environmental impact statement as their own, adopt it and issue it as a part of their process for dealing with our license application.

I called NRC to verify that that was indeed the case, and as I described it this morning, that is the case. The environmental impact statement that is prepared by DOE based on NRC accepting that statement they will adopt it and issue it as their own document.

DR. CARTER: Presuming they have the option of doing something else?

MR. STEIN: Yes, they do, they always have the option of doing something else.

DR. CARTER: Yes?

MR. GERTZ: I have a little clarification on some of this morning's figures that we gave out. When asked, of course, our water appropriation has been for 402-acre feet over seven years and when asked how that compared to what we do at the test site, it is about 2 percent of the use of the test site, and about 200ths of a percent of what Las Vegas uses. We gave out 200ths of a percent and I think that was wrong at the time. It is 2 percent of what the test site actually uses right now in a seven period and 200ths of what Las Vegas would use.

DR. CARTER: Two-hundredths of a percent.

MR. GERTZ: Of one percent.

DR. CARTER: All right, thank you, very much and I would like to commend all of the speakers so far. We are right on schedule so that we will now break for 15 minutes.

(A brief recess was taken.)

DR. CARTER: We will introduce our next subject which will be a discussion by respresentatives of the three agencies namely, the EPA the NRC and the DOE addressing from their point of view the environmental standards covering the storage and management of waste and also their disposal. Namely, high-level used fuel elements as well as TRU. This is 40 CFR 191 and to address the first part of this, I would like to introduce Ray Clark whose uniform is one of the US Public Health Service, and he is on detail at the Environmental Protection Agency and he is the project operations manager in the Office of Radiation Programs for 40 CFR Part 191, so Ray, we are yours.

PANEL ON 4O CFR 191

BY RAY CLARK, EPA; BOB BROWNING, NRC; AND,

STEVE GOMBERG, DOE

MR. CLARK: Thank you, Dr. Carter.

Thank you for mentioning the PHS uniform and I don't want everybody to think that the Navy is writing EPA standards, that is not true. We have nothing to do with the Navy, except the uniform looks alike.

I also want to introduce before I get started here one of our new staff engineers on 191, Priscilla Bunton who is assisting me with the overheads today.

Just wanted to basically give you a short review of the history of 191 and cover the current status of it.

The entire rule really started development back in 1976, under the authority of the Atomic Energy Act, and parts of which were delegated to EPA by reorganization plan number three, when the agency was first set up.

It went through several iterations and changes through the years and finally in 1982, the Nuclear Waste Policy Act, as probably most of you know, mandated EPA to issue standards for high-level waste.

That finally occurred in 1985. Shortly thereafter we were sued by several environmental groups and several states, and those suits were consolidated in the U.S. Circuit Court of Appeals for the First Circuit in Boston and were argued there orally. And the court seemed to take quite a bit of time in reaching its decision but finally in July 1987, they issued a decision which vacated and remanded the entirety of the rule back to the agency.

The Justice Department and the EPA issued or filed a statement to reinstate all but two parts of the rule and the court, however, only reinstated subpart (a). And what is subpart (a)?

It is one of the two major parts of the rule and it covers management and storage and we will cover these in a little more detail in just a minute and subpart (b) covers disposal and as you can see, it contains several sets of requirements, for containment, assurance and individual and ground-water protection and also to appendices to the rule.

The rule overall, is not implemented nor enforced by EPA, we don't have that authority. Therefore, for NRC licensees it is implemented either by NRC or the agreement states, and for DOE, non-NRC licensed facilities, DOE is the implementing agency. And also the rule applies to all forms of disposal except into the ocean.

And subpart (a) itself is more an operational type of standard, very similar to other regulations of this sort. It limits outside exposures to 25 millirem a year, essentially to the whole body and it applies to all NRC licensees, and DOE disposal facilities.

It is important to emphasize disposal because the way that the rule is written it does not cover research and development nor storage facilities. For instance, transuranic waste storage at the Idaho facility is not covered since Idaho is not intended to be a disposal site for those materials. And WIPP, at this moment, is not covered because it is technically still a research and development facility.

Maybe I should mention that in all fairness that the Department has agreements with, I believe, the State of New Mexico, and if there is anyone to correct me, do so and that they will follow subparts (a) and (b) until we get 191 reissued.

Subpart (b) in a little more detail, the first major section that we come to are the containment requirements and this has been a subject of some controversy of course.

And they do limit total releases for the first 10,000 years following disposal and they cover both expected and accidental releases, including human intrusion and they require a performance assessment. A performance assessment in this case, defined as an identification of processes and events which could affect repository performance, an examination of those effects to see how they do affect performance and an estimate of the cumulative releases from those events and then finally, an incorporation into an overall probability distribution.

Next realizing that there are many uncertainties involved in the performance assessment called for in Section 13, we don't believe there is enough confidence there that they could be used on their own and I don't know that anybody would disagree with that. But to help assure that the overall goals of protection of human health and the environment are reached, we added a section called, assurance requirements and these are more qualitative, what we think common sense principles and which as I say, will help assure that the standards are met.

Examples of these are requirements for

permanent markers and monitoring after the facility is closed, multiple barriers and several others. And the third group we find, is the individual ground-water protection requirements.

Both of these are applicable for 1,000 years and apply only to undisturbed performance as opposed to the containment requirements in 13, which do take into account accidental releases. Section 15, limits individual exposures through all pathways to 25 millirems per year and section 16, essentially there are some concentration limits, but essentially it is 4 millirem per year from what we call the special source of ground-water which is essentially what the agency now calls a class I ground-water, which is the most highly protected class of ground-water, which the agency recognizes.

Appendix A, lists the nuclide specific release limits for the 10,000 year period and also gives the methods for calculating those release limits for any specific facility. And that is where it is not so simply, those get a bit involved and they don't need to be covered here, I believe.

Appendix B gives guidance for implementation and this is not an official part of the CFR language and is therefore, not binding on the implementing agencies, however, it does list EPA's assumptions for the performance assessments and we think sets something of a context for their implementation and hopefully will discourage overly restrictive use of some of the assumptions that are inherent in the performance assessments.

Examples of these requirements are limits on lower limits on event probabilities which need to be evaluated and upper limits on intrusion as in number of bore holes per square kilometer.

Moving on to the court's findings, under reasons for remanding the standard, I think that there might be some confusion here for a lot of people. I will try to clear that up.

The court found through a series of interpretations of definitions that repositorys as DOE envisions and similar to Yucca Mountain or WIPP would likely constitute a form of underground injection.

Once they reached that conclusion, they said that if that is true, if that is underground injection, that makes it incumbent on EPA to be consistent with part C of the Safe Drinking Water Act, and which is the underground injection control program section of that Act.

And it allows 4 millirem per year which is as you recall, one of the limits in Section 191-16. If the dose limits are found to potentially exceed this limit, therefore, there could be endangerment of the ground-water in the vicinity of the repository. Now, EPA is not supposed to allow this endangerment to occur, even if it is potential endangerment.

If you recall, back in Section 15, the old pathways allowance is 25 millirem per year. Now most authorities agree and certainly EPA said it in its supporting documentation that the most likely release pathway out of the repository is through ground-water. Therefore, the court reasoned that if that is the most likely pathway and you are allowing 25 millirems there is a good likelihood that you are going to exceed 4 millirem and therefore, you are allowing endangerment and therefore, you are inconsistent with the Safe Drinking Water Act.

Any questions on that before I go on?

(No response.)

MR. CLARK: Therefore, the court turned it back to us and said, EPA you need to make a decision on whether this is underground injection or not and if it is, you need to be consistent with the Act and its regulations or you need to justify this 25 millirem you are allowing to a point where it satisfies us.

But I have heard a lot of people say that the Court ruled that this is underground injection and I want to emphasize that they did not, they just said that it will likely constitute.

Moving on to the second bullet there, a much more simple ruling here. The court found that between proposal and the final rule which is where we added sections 15 and 16, we had not supported the choice of the 1,000 years well enough, just in the public record. They did not say it was wrong, they did not say you need to make it something else, they just said that we had not supported it. Therefore, they gave it back to us to give them a more thorough explanation of why 1,000 years.

And finally, even though they were introduced at the same time, they ruled that Section 16 had not had enough time for notice and comment. They felt that in steps we had taken intermediate to proposal and finalization, that we had given enough background and preview to Section 15, but had not to Section 16 as it finally came out.

And as we rewrite 191 obviously several issues which we have under consideration. Obviously foremost is the relationship with the Safe Drinking Act and the underground injection control.

It is the position of the office of Radiation Programs that repository style disposal is not a form of underground injection. The agency has agreed to that language for our proposed low-level waste standard which is at OMB right now and it has not heen proposed but it has been through agency review.

We are looking at their rationale and seeing if we can use the same rationale or if we can't, we can make adjustments which still support our position on repositories. And we will also look at relationships to other standards, such as the Clean Air Act, and other sections of the Safe Drinking Water Act, parts of ground-water protection parts of the Uranium Mill Tailings Control Act and any others that we can identify.

DR. CARTER: Ray this is not so unusual. I guess part of the background of this in the radiation area we have essentially regulated on a piece-meal basis and I am not saying that is good or bad, but it has certainly been done that way. You know it has been done by media, air, water and so forth.

But in the promulgation of 40 CFR 190, the fuel cycle standards, they basically covered the fuel cycle but it was a specific definition of a fuel cycle and it excluded mining, transportation, and waste disposal, is that correct?

So now we are coming back and we are addressing the waste side of it at the moment.

MR. CLARK: That is correct.

In fact, subpart (a), well, that is correct for the entire rule. Subpart (a) for NRC licensees is intended to be a direct extension of 190 just to fill in one of those gaps you are talking about. And subpart (b) finishes it out with disposal.

Since we issued 191, the agency has come out with its ground-water classification strategy and it uses ground-water classifications one, two and three, and I alluded to class one earlier. Those are descending orders of value of ground-water resources. We will likely be incorporating such classifications into the new rule to make us more consistent with that strategy.

And also the low-level rule which I mentioned before, uses those same classifications. We obviously want to be as consistent with them as we can. We will be examining the time frame, and the overhead here says for individual standards, that that applies both to individual and ground-water protection standards, with the eye not towards going less than 1,000 years, but extending it up to and including 10,000 years.

Obviously there are a lot of difficulties in doing that and a lot of uncertainties which brings us to implementation concerns.

Before we actually propose a longer time frame, if we do, I am not saying we will, we will be looking at those implementation concerns and looking at them very carefully to make sure that we don't get into an area where it is impossible to write regulations or to implement such a standard.

There are also of course, implementation concerns in the probablistic aspect of the standards and at the moment I don't beleive that we anticipate any changes to that. We will go back and examine implementability of those Section 13, as well.

And finally we are going to update the dose assessment system. Subpart (b) was intended to reflect ICRP-26 dose system. It is not clear that that is what it is. I think that we are going to go back and just change the nomenclature to make that clear. Also in subpart (a) as I just answered Dr. Carter's question, subpart (a) for the NRC licensees was intentionally extended under the ICRP-2 system because that is how part 190 which is the uranium fuel cycle standards was done. And we now think that it is probably just better to go ahead and just update that section along with the rest of the rule.

DR. CARTER: Does this imply now that you are going to change from essentially dose equivalent which is what the 190 was based on and of course, the 191 is essentially the committed effective dose equivalents and does this make all of these internally consistent?

MR. CLARK: Yes, I mean we are going to try if we can do that. The answer is yes, that is what we are going to do unless we get some comments which are violently opposed to that occurrence.

And this again also makes us consistent with our low-level waste standard.

Finally, we have a first rewrite of 191 which we have placed in our docket. We put it there for more information purposes than comment purposes but of course, people are free to comment on it.

DR. NORTH: Is this the version of June 2, 1989?

MR. CLARK: Yes, that is correct.

And it is currently kind of in mid-stream in EPA review, since it is a first draft. We have not taken the next step above our initial step to formalize this with the agency. There are still several hurdles to cross before we get to actual proposal. We anticipate at this point, proposing standards probably in early 1990 followed soon thereafter with public hearings.

At this point, we anticipate them here in the District and one site to be determined in the western US and we will then revised standards based on those comments and issue final standards projected now for approximately two years, following proposal and possibly a little sooner than that, we will try. In other words, in late 1991, or early 1992.

That concludes my remarks for the moment.

DR. CARTER: Let me ask you a couple of questions.

One, I notice that in the proposed 191, there is a provision that calls for alternative standards if a person don't like the ones that you give them, they can apply to the administrator and this involves then, you know, of continuous exposure of less than 100 millirem, on an annual basis, or infrequent exposures of less than 500 and that is for all sources, now excluding background and medical radiation.

I guess my question is, do you anticipate or how do you anticipate people making use of that alternative provision? In other words, what is the rationale for putting that in there?

MR. CLARK: I guess the basic rationale was if a disposal system came along that looked like a good disposal system, that would otherwise be a good disposal system but could not meet the stricter standards, in subpart (a) that we would allow some room to accommodate that.

DR. CARTER: When you say, another disposal system, do you mean other than a geologic disposal system?

MR. CLARK: Possibly.

DR. CARTER: But could it be a geologic disposal system?

MR. CLARK: Yes, it could. We felt that with the requirements going in the public record having to justify such an increase would probably serve as a good deterrent and whoever came in for that, would be serious about it, and would have good reasons for applying for it.

DR. CARTER: The next question, you mentioned early on that these did not apply to ocean disposal but I gather that they also do not apply to waste that has been disposed of prior to the given date of whatever August, 1985, and the question is, I presume now that that really only excludes some TRU wastes that are probably buried in commercial low-level burial sites and/or DOE sites, is that correct?

No use fuel and no --

MR. CLARK: To my knowledge none of that has been disposed of. At least that we have been told of.

DR. CARTER: Certainly TRU has.

MR. CLARK: Certainly TRU has.

DR. CARTER: I think that was August 15, 1985.

MR. CLARK: Well, whatever the date is, that is correct.

DR. CARTER: The other thing, 191.13 the containment requirements, for subpart (b), this is the containment requirements for 10,000 years.

And that is part (a) and then part (b) basically says that the licensee does not need to provide complete assurance that the above conditions will be met and it only requires based on the record, a reasonable expectation that the compliance will be met. And I guess the question is, does that represent what it sounds like and that is some degree of flexibility in the interpretation of the standards?

MR. CLARK: Absolutely we would not nail anybody to the wall. That is correct. We wanted to be sure that there was no interpretation that this was a strictly quantitative requirement. We are not completely blind to the fact that there are large uncertainties and in some cases, just plain unknown parameter values in some of these performance assessments. Therefore, we realize that expert judgment and qualitative input will have to go into this process.

DR. CARTER: Okay the next part though, was the third part, or part (c), it says that between 10,000 and 100,000 years after disposal, projected release rates should not be much greater than those allowed in (a). That appears to me to be rather vague.

MR. CLARK: Probably a good observation. This is a first draft, but the idea here is that it is our perception that some of the international community is going towards looking at longer than 10,000 years. But our intent here is to be obviously not strictly qualitative but much more qualitative than would be acceptable in the earlier section and as it says, this would apply only to undisturbed performance. And we are not trying to estimate physical events.

DR. CARTER: One more question under the part that addresses assurance requirements.

MR. CLARK: Yes?

DR. CARTER: It would appear to me that again, it is certainly vague and maybe you will have to be vague when you are talking about such a length of time here. It says that monitoring should be contingent if there are no significant concerns to be addressed by further monitoring.

Now, that would appear to me to mean forever, or could be interpreted that way, and what does that mean in practical terms?

MR. CLARK: In practical terms.

DR. CARTER: How many years, or decades or centuriese.

MR. CLARK: This is going to sound evasive, but literally that is up to the implementing agency to determine whether there are any questions which could be addressed by further monitoring. And you are right, that could be interpreted as an awfully long time, but we don't intend it that way. We don't have a set number of years in mind either. We think that you need to at least look for expected ground-water flow patterns. And expected temperature profiles and fairly gross features that might indicate that things are not going as you had anticipated that they would in your design.

DR. CARTER: The other one, I think a lot of people would agree that they are probably rather rigorous in their nature as far as whether or not someone can meet them or some organization can meet them but anyway having read them and then you come out and says, that having done all of this you should also do everything as low as reasonably achievable and I guess the question would be, if you indeed meet these, or if indeed you can meet them, then the agency feels that you have done everything as low as reasonably achievable?

MR. CLARK: That could well be, we don't rule that out. In fact, as I recall that was one of the reasons that was not put in the final when it was originally promulgated, it was in the proposed rule. The reason that this one is in here, and again, this is all up for discussion at this point, any set decision, is that partly because the site selection guidelines are not effective at this point, since Congress said go look at Yucca Mountain and nothing else. You don't have a comparison of sites there any more to try to compare releases.

At the DOE facilities, the NRC requirements for leach limit and leach rate and cannister lifetime don't apply and finally, back in Appendix B, you will note that three has been added, and that is page 24, for those who have it, which makes a minimum multiplier on the release limits themselves. And you need not -- this is a little complicated, but if you have a disposal system with less than 10,000 metric tons of heavy metal or some equivalent level of waste which is discussed in here, say you have 6,000 metric tons, you don't need to take 6/10 of these release limits as your release limits. You can take full credit on those numbers. The reason for that is that we have been told and seen that a limiting event there would be an intruder hitting the waste, pulling waste out and it is our understanding that that could easily, one event, could easily exceed or potentially exceed those limits.

However, we would still want as good a design and engineering as could be achieved, despite that ceiling.

DR. CARTER: The other questions I have is in 191-17, the alternative provisions for disposal and it seems to me that that is an unusual wording. That what that says, is if these things don't work we are going to start over again in some time in the future.

(Continued on the next page.)

MR. CLARK: I'm not sure where you're getting the safety belts, from EPA I guess, but here again this is intended for a disposal system which may be proposed in the future, which we haven't necessarily foreseen.

DR. CARTER: Well, I presume that even if that happened you could come out with new, or amend or whatever it is you do, rather than writing in if something new happened. This way you've got a built-in device already with legislation to change the system. I think that's what this is. To me this me this just sort of seems to be rather unusual language to have there --- I mean there are other ways to accomplish when --- if the need arose in the future.

I was just curious --- it seems to me to be rather interesting.

DR. CANTLON: I guess I don't have answer for that other than that was the intent and if there are interpretations like, we'd be glad to hear those comments and consider them advisory.

DR. NORTH: The other segment that's in there is the fact that procedures for determining compliance with sub-part B, have not been formulated and tested yet, and I presume that's true, but when when do you anticipate that to happen.

I have to presume that's Dan Egan's language, and I'm not sure that I know exactly what he meant by that, but I suspect he meant that the system of going through probability distributions and assembling performance assessments, hasn't been through an actual licensing process.

Yes, it sounds to me that the reaction to that by everybody, DOE and others, is see, we told you so. You've not done it, you've not tested it, I mean where do we do it from here. Again, the language it seems to me to be very intriguing, the way it's worded.

We believe it's implementable, that's the reason it promulgated, because as I said earlier, we realize there's quite a contravercy to that and then we'll again, we'll be examining that, and we're open to changes.

MR. CARTER: Okay, thank you very much, Mr. Gerte, what you said again. I hope you'll be able to sit with us through the next presentation.

The next individual we have with us, and I'm very pleased is Mr. Bob Browning, and he's been associated with the waste management program of the NRC for a number of years, so --- twelve years or so --- and he's been the expert of the division of the waste management or high level waste management for some six years or so and he'll address the subject from the perspective of the NRC.

Bob, ---

PANEL REPORT ON 40 CFR l9l IMPLEMENTATION

BY MR. RAY CLARK, EPA; BOB BROWNING, NRC;

STEVE GOMBERG, DOE.

MR. BROWNING: Director of one of the NRC staff members that happened to be in the audience --- this gives you a preview of the scope of what I was going to talk about, but I'm on the first hit --- what NRC's role is in this particular program, and why you have a situation where NRC is in a position of regulating DOE, because it is a unique --- for both us and DOE position to be in.

The schedule that we're working with for our particular piece of this program, are some of the issues that we see with regard to the assessment piece of the program, and what we're doing currently to address our piece of this "dramatic" endeavor.

I have an extra chart --- but with regard NRC's role, the Atomic Energy Act is our basic authority for doing the kinds of things that NRC does, as Carl and most of you are aware. And then the Nuclear Waste Policy Act itself in Section 114-D, specifically says the commission shall consider an application for the repository in accordance with the laws applicable to such applications.

The more immediate authority for us to be regulating is the Nuclear Waste Policy Act itself. Within that role and really prior to promulgation of the Nuclear Waste Policy Act, NRC had been developing regulations --- and this is just intended to give you a time frame which our regulation, which applies to the licensing of the DOE repository was produced and promulated.

It's tense yet for Part 6D and a technical piece and a procedural piece were issued separately. The impetuous for our producing this rule in parallel and to some degree an advance to EPA's environmental standard was a position that DOE had taken was that they needed to know what the regulatory boundaries were for this project in order for them to really make sure that this program was focused properly.

We did issue those rules, and I might say that part of our overall strategy is to periodically look at how appropriate those rules are given the current situation. As you might imagine, back in 1981, we had one frame of reference and as we get smarter in this project, that we may find that the rules we set out and put in place might not be exactly on the mark.

So we are always in the position of taking advice and comments on our own internal look to make sure our rules are properly focused. One of the things we're particularly concerned about --- is there any aspect of our rules that is driving this program in such a way, that it isn't going to work in a technically meaningful or a way in which the public health and safety environment, of us being adequately protected.

And so in that regard, if you folks and your role as the DOE piece of this thing --- if you ever see any aspect and I'm sure that you would --- and we are going to encourage you to bring that to our attention, if we have not detected it ourselves.

And the next chart, is a schedule of events, which we've laid out and a document, which we produced for our own commission, so our own commission could see how our particular program fits in with the overall program, which DOE has responsibility for implementing and putting into place.

This particular schedule is an attachment to a commission paper which I believe you have access to. It's a strategy paper that was issued back in l988, and lays out what we refer to as our pro-active and reactive program so that everything we're doing and the rational for why we're doing it is laid out so that all the interested parties --- if they see something happening that doesn't make sense --- either on the DOE side, the industry side, the state side, the environmental side or any oversight groups --- if you sense something isn't working, you can see in totallity, what we're doing and why we're trying to do it that way.

As you can see from this chart, we're in what we call the pre-license application phase, which we don't --- we're not really licensing DOE at this stage --- and therefore, the normal things that you might see DOE see doing at the reactor plant applicant --- license for reactor plant --- we can't issue orders for DOE to do this and do that --- it's primarily at this stage giving them the best advice and comments we can with regard to --- are they, within the programatic aspects that they're working --- do they appear to be addressing the regulatory concerns that they'll have to address when they do come to us --- when they come to us with the license application to construct the repository. And it's kind of an unusual role for NRC to be in, and a lot of people look at it with a jaundiced eye --- the state of Nevada for example, is constantly warning our commission that Browning and his staff are consulting with DOE and giving him advice and leading him by the hand.

I know for a fact that DOE doesn't look at it that way, but it is kind of an unusual role for us to be in, and it is ---

DR. DEERE: I think you've got a hold of something, but they wouldn't agree that it's their hand --- I think it's a different part of the anatomy.

MR. BROWNING: No, this particular pre-license application phase has in fact started, by virtue of the fact that they have published a site-characterization plan, and we've commented on it from a regulatory perspective with our site-characterization analysis. So that particular piece is pretty much on schedule, with regard to this overall schedule.

The milestone dates are drawn from DOE's latest published mission plan or project decision schedule, and it's really --- our focus is really on the 1995 date --- for their submittal of a license application. From my very narrow, selfish perspective, I want to see that document come in perfect, so my job is very easy once it's laid on our desk, to deal with.

So that's why we're paying so much attention up front, to make sure, that as they're addressing the various aspects of their program, we're reacting to it as early as possible, if we see any problem, we're alerting it to them as early as possible.

And I believe you have copies of the site characterization analysis --- I've got a copy with me, if you'd like to --- you know --- if you'd like to introduce it into your pile of documents. I'm not sure if you need any more thick documents, but --- it does lay out our regulatory perspective of what DOE was planning to do on the site characterization program. So that's in a broad sense, not in a --- in a very narrow sense, in the pro-active part of our program, we are looking at whether the regulatory structure that we've got in place, under part 60, is in fact going to be adequate regulatory guidance, so that when we get the application, and we finally get to the point where we think it's good enough to go to a licensing hearing, a lot of the things that would normally be debated and would normally be discussed during the licensing hearing in front of the licensing board, have been put to bed.

And our lawyers tell us that the only way you can legitimately do that, in such a way that it isn't fear for subject to debate in a license hearing, is through rule making. So if you look at our strategy document, we do have various rule-making or proposed rule-making approaches lined up. Whether it will ever come to that or not, is not clear yet.

Now, I want to emphasize that point. The one rule-making that we've got to keep our eye on of course, is the EPA revised rule-making, and that's what I want to focus on in this particular presentation.

Next chart. If you go back to the historical record, that the EPA spokesman talked about, they had that published rule, and had formally promulgated it. While the law suits were going on, we had taken steps to do what we have to do as a regulatory agency, which basically is to conform our rule, Part 60, to the EPA standard.

We're all ready to do that when the court decision came out so we put that on hold. The strategy that we laid out in our strategy document, was based on an assumption that EPA would only address in the revised rule, those aspects which the court remanded. Now based on looking at working draft one, in the discussions we've had with EPA, it's not clear that assumption is valid.

They're are other things that they're reconsidering. Plus, we have thought some more, and basically, we're trying to rethink that since the rule is up for grabs now, that if during the intervening period of time --- between the time they've promulgated and now, if there anythings that need to be clarified or straightened, we're beginning to think that now is the time to do it.

Rather than let it drag on and let the issues come up in licensing hearing later on, so we will be starting a process. At least we will be proposing to our commission that we start a process, of formally commenting to EPA as early as practicable, so they can factor into their considerations, close things which we think could help immeasurably if they get fixed now as part of the EPA standard.

And that's basically what I meant by the implementability of the EPA standard. If you go back and look at the record of EPA's attempts of getting the first proposed standard out, you'll see we did raise concerns. And for the purposes of this particular session, the one concern that I think is pre-emminent was the implementability in an adjudicatory process kind of hearing of the probabilistic aspects of the EPA standards.

So, we want to take a very close look and see if there's anything more that conceivably could or should be done, to fix that before the final, final standard is promulgated.

The second bullet really deals with a problem that we have which is how can we most effectively, and meaningfully, review the DOE performance aspect. I think you'll see when you get briefings about what's going on is that the job of doing a performance assessment --- and by that I mean, the containment requirement piece of the EPA standard. How you are sure you've met the containment part of the EPA standard.

If I'm not mistaken, I've heard briefings on the part of the part of the Department of Energy, where it's on the order of ten million dollars a year effort to develop the understanding, develop the codes and models to be able to make that kind of assessment.

We don't have budgets or resources to match that, so I've got to be innovative and figure out a way to not duplicate that unnecessarily. To be able to independently assess, and comment, and come to conclusion that that is an adequate implementation --- or adequate demonstration --- that compliance with the EPA standard --- whatever that is.

We have not done that yet. We're in the process of doing it --- that will be publicly visible. You folks who are on an advisory committee on nuclear wastes, will be actively involved in reviewing out --- I'm sure the state of Nevada will have a great of interest with that particular aspect.

But it is going to take a lot of ingenuity. If I could make an analogy here, or a comparison, it's kind of what I'd like to end up with --- what I think I want to end up with --- with something similar to what we've been doing in the quality insurance area --- which is another area in DOE's program, in which they've got a massive effort to get their QA program baselined, and under control.

And we've worked out an approach where they do it --- baselined and under control. And we've worked out an approached where they do it --- we observe it and monitor it comment on it to the point where we reasonable confidence that it's okay. We do not try to fill a gap; we do not try to do their job for them. And I think that's the kind of approach we'd like to end up ultimately, where we get to the point ultimately where we end up reviewing their performance assessment work. Next chart please.

With regard to our current efforts, as I indicated, we are working currently on a strategy that makes technical sense and resource sense for independently reviewing the DOE assessment work. We have an ongoing program to make sure that our own rules aren't a source of a problem in this program that needs to be fixed. Or are there areas in today's life we can become more prescriptive and more narrowly focused so the degree of the debate about how you get from point A to B does not become an issue in the licensing hearing but did you meet the standard becomes the debate, not how you got there.

And the last of course is we have an inner department reactive portion where we're trying to look and comment on DOE's assessment work and the first manifestion of that is our comments on DOE's site characterization plan, and we have ongoing attempts to have in-depth technical meetings with the DOE people who are working that area to try to make sure that they can see any problems, we're in a position to alert them as soon as possible, so that they can get them fixed, and I can meet my goal by getting a license application that I can review within a very short period of time.

After all, we're spending all these resources up front, we ought not take a lot of time agonizing on it after --- by it, I mean the license application to deal with the construction authorization. Or the alternative, if it can't be done it would become apparent that we wouldn't get a license application.

With that --- I know this is awfully and broad but I thought from a beginning standpoint, that might suit your purposes better. We obviously can get in --- if we have the right technical people on our staff for my contractors, to deal with your more in depth technical questions.

DR. CANTLON: One question, Clarence Allen reviewed for the boards, some interplay that apparently he had with NRC people, and indicated that some of the individuals in NRC were looking at yearlines of 100,000 years instead of a 10,000 that is in the legislation because the repository is going to be around a long time. Is that line of thinking, compatible with what you are suggesting.

It does seem to me that looking at standards in a repository, you're looking at moving out to 100,000 years, you're looking at pretty cold fuel at that point.

MR. BROWNING: I'm not aware of anything we're doing that would require DOE to go beyond what the EPA standard time frame is right now, so I think that what you're referring to, is we had a technical session to deal with the concern that one of my staff has --- my staff has --- with regard to the ability to deal with the aspects of the EPA standard when you look at it from the standpoint of the impact of the tactile situation at the site and a lot of the specific discussion was in regard to the vulcanism question.

DR. CANTLON: Right, but when you're dealing with 100,000 years, we haven't found out a way to deal with that yet.

MR. BROWNING: Well that's the concern we have with the nature of the quantitative aspect of dealing with probabalistic kind of numbers that's currently embedded with EPA standard. That's not clear that the expectations that the public would have when they see that, and then they see how it's actually dealt with in a licensing kind of mode, but whether the expectations are going to match the practical reality of dealing with it and that's what we're attempting to deal with up front.

DR. CARTER: Well I guess part of that may be the amount of comparison or analogy within using some of these things, using reactors rather than much more passive repositories in terms of the material that's being stored. One is there's lots of energy in this sort of thing and the other is presuming that it's not quite dead. I don't mean that in the literal sense, but in terms of the energy factor.

I think that's one of the concerns that people have as far as the standard is concerned. You commented on the fact, of course, that the NRC per se doesn't have a regulatory role during the site characterization, but it's one --- I guess, I would describe it as cooperation or consultation between the NRC and DOE. And like you say to presumably save some resources and this sort of thing down the line.

If you do this now, and I think that everyone would agree that we're going off to some extent on a new road or a new direction. Most of us don't think in terms of a thousand years, or ten thousand, and certainly not in terms of a hundred thousand. Most of us think in terms of life and death, and seventy years or whatever, and putting kids through school, and thirty year mortgages, and this sort of thing.

How do you feel about regulating in an area now that involves such long term plans instead of ----

MR. BROWNING: Very humble. Not one degree of arrogance should show --- we're very humble. In fact, when you say consult with DOE, it's sort of --- the blind leading the blind. In fact, there's no precedent that I'm aware of, for dealing with a situation like this.

So our role is more correctly described as, we've got a regulation in place that we think is well-founded. We're trying to internally challenge whether it's well founded or not. As we look at that and as we see the separate goings on, if we see that the effort isn't addressing the regulation, we try to bring that to their attention. How DOE resolves it is up to them.

And the one balancing act that I've got to keep with my staff is to not have them try to jump in and try to give advice as to how to get from point A to B. I think that's more correctly your kind of oversite role, and even you can't probably exactly do that, but it's DOE's job to get from point A to B.

But if it looks like they're not going from point A to B, they're going from point A to C, and in order to deal with it, I've got to get them to B, I've got to tell them, hey, you're not doing it right and that's the thing that --- the State of Nevada, is a good conscience for me in that regard. They sit in on our meetings as participants, and if my staff starts stepping over that line, they are not hesitant at all about letting me know about it.

I got a letter from Bob Luchs right now, and I'm trying to figure out how to deal with it. Or if you folks see us doing that, please feel free to let me know. You know, I can't be at all these meetings and catch it happening. For example, my staff has been watching very closely on what you folks are doing on the shaft construction, and you know, they would dearly love to get into that kind of stuff, because they're technically oriented people. I think if they do, DOE tells me first that, hey, get your people back to what their role is.

If they don't, the state will and if you see it happening, please feel free to call me and tell me we're stepping on the line.

DR. CARTER: Another thing that I wanted to raise, I was curious, what sort of response do you get now when you use what you did with us which will eventually be pointed out I'm sure, a very logical thing that the NRC is funded now, and your office in particular, which it does not have the resources --- this ten million dollar a year or whatever --- you go through this process yourself.

So is this a legitimate argument, I guess, what sort of reaction do you get when you float that in various places.

MR. BROWNING: I don't have anybody giving me more resources, I'll tell you that. And that's not the purpose of my talk with you. I'm not here trying to make a subliminal pitch for more resources. The burden ought to be on DOE to do the job. They've got the best minds in the country available to them to work on it. They've got a budget --- you know, I'm sure they've got a budget problem too, but I'm sure it would be ridiculous to think to say, I've got to go off and do the thing completely independently, and compare my answers with them, as opposed to making sure that I'm going to have confidence that what they're doing is allright.

That's --- I want to make sure that everybody that's involved in this thing agrees with that, and if they don't, I want to know quickly, because I do have go quickly and revise my budget estimates, I think. Well my budgets are not small. In fact, my budgets are kind of close to some countries developmental budgets. Relative to DOEs budget it's small, let's put it that way.

DR. CARTER: Warner, do you have anything ---

DR. NORTH: Well I guess I'd like to try to draw you out a little bit more about your concerns. It is indeed a very difficult situation --- we're all trying to learn our roles in a very complicated process. You might think of it in terms of things like baseball, and DOEs job is to play the role of pitcher, and what they want to do is throw a strike.

Your role is the role of umpire, you've got to call ball or strike after they throw their pitch. And then there's EPA, and maybe their role is trying to define the rules, and what constitutes a strike. And what we're asked is look at this whole process and report on it to the public, the congress, or the Secretary, with regard to sort of evaluating the game.

And in this kind of situation, clearly it's useful to have some communication and all of us try to anticipate problems together, and see if at least we can get some common understandings as to what some of those problems are, and I heard you voice a concern about the implementation and focusing on the issue of the probabalistic criteria, and when we talked about that earlier, I suggested it might be useful to look at some other situations, like the reactor licensing, where some probablistic material have been at least proposed.

I am also concerned about some of the areas that might be considered either ambiguous or maybe left blank, in terms of how do you call a ball instead of a strike. For example there is lots said in the criteria about how one might deal with unintended human intrusion, and even some numbers given which I presume might have a foundation in some data somewhere, in terms of how many bore holes in various kinds of rock.

But an issue I don't find discussed in the working draft is about intentional human intrusion. Somebody decides they want to go mine plutonium at some point in the future --- is that an area that needs to be addressed somewhere as we try to evaluate the baseball game.

And are there other situations like that where NRC feels there may be an important ambiguity or some blank space and perhaps somebody needs to deal with it so when we get into an umpire role, we know how to make a call.

So we appreciate any thoughts you have, now or later, in terms of the difficulties facing the umpire.

MR. BROWNING: Well, you've hit the nail right on the head as far as our problem is concerned. We've laid out --- the question has to be addressed --- DOE is trying to figure out what the answer is and I've got to get the position to recognize a good answer when I see one. Basically the foundation for that is the EPA standard, but how you get there is the dilemma.

You go back and you look at the record, of our interface with EPA, when they came up with the standard they did. We're going to be revisiting that and therefore it might be useful for you to focus on that. I'm talking in very kind of general terms, not to get too technical. The first one's going to sound like a bureaucrat turf game.

One of our original problems with EPA, is when they came out with their standards, they were entreating on our regulatory turf. Namely they were coming inside the fence of our facility. Our perception of EPA's historical role was that give them environmental and then the licensee and the regulator were trying to figure out how to meet that, and come to the conclusion that had they met --- maybe even tighten up on it a little bit --- that in order to make sure you met.

When you look at what EPA has done --- they've not only given you a standard, but kind of told you how to get there --- and then, as you pointed out, said go do even better. It's kind of hard --- it puts us in a very judgmental position, as to how you add more conservatism all of a sudden. It appears to be kind of conservatism piled on conservatism. That's one message I'm getting a continual dose of that from my own advisory committee. How are you going to deal with conservatism piled on conservatism, you know if it's already there, and then everytime they 're looking at what my staff is doing, they're throwing even more conservatism on top of all the individual pieces, and you end up with something that has so many boundary conditions and constraints on it, you can't get anything done.

Or you won't be able to exercise what's kind of the heart of this, when you worry about a long term projection, is that a lot of judgment's going to be brought in to there. And how do you reach a judgment with something that's very, very conservative, that's going to last over the long term.

I don't know whether that helps or not but that's kind of the fundamental thing that's bothering us.

DR. NORTH: Let me describe something that's bothering me, sitting in my position as a risk analyst. We had a situation on Challenger, where there was a major failure and in retrospect, it appeared that information was available as a simple calculation and demonstration such as Professor Kleinman made with the   and the glass of ice water, to indicate that somebody should have reasoned through this and figured out there was a serious problem. And if they did, it didn't get to the point where it reached the people who had decision responsibility and get used.

I think there are a lot of people in the middle

American public, that are concerned that just the same kind of mistake could be made again, except that this time we're talking about ten thousand years, and they'd like to be reassured I think, that (pause) an unprecedented effort has been made, with all of this expenditure of money and all the data, to assure that that kind of mistake has been made, and that they will have to suffer the consequences.

And that test is going to be applied to the pitcher, the umpire, the writers of the rules, and I'll call it the outside auditors.

Now we won't know the outcome for ten thousand years, but I think we better recognize the kind of scrutiny we're all going to come under.

MR. BROWNING: I couldn't agree with you more, thank you.

DR. CARTER: Allright, Bob, we certainly appreciate you coming. I'm sure you'll be interested in our DOE is going to take these good standards, and enforce them, and implement those. And we're ready to hear that next. And to give us that presentation, is Mr. Steven Gomberg, who is the general engineer of the regulatory compliance branch.

MR. GOMBERG: I thought I had a slide. (Laughter) I'll be the leg of this triad of 40 CFR l9l. And what I wanted to discuss today, is very briefly our approach to implementation of 40 CFR l9l, focusing primarily on sub-part B --- some of the concerns with the original rule, and then finally some of the concerns --- I want to de-emphasize concerns --- observations, with working draft one.

The detail on the performance assessments that would be conducted as part of the demonstration of complicance with 40 CFR l9l, have been discussed a little more thoroughly in a May l989 briefing to the technical review board. Briefing on total assistant PA, presented by Dr. Felton Bingham, and also it's in pretty much detail in the SEP in Chapter 8, three five thirteen. So I wasn't planning on going into too much detail on that.

Primarily the aspects that are involved in performance assessment, involve the development and identification evaluation of scenarios, of disturbed and undisturbed, or anticipated or unanticipated processes and events. We would calculate probability of distributions of releases to the accessible environment for each scenario. And then add those all up to develop an overall CCDF.

In addition, we'll be doing as part of the sub-part A analyses, and the individual environmental protection analyses, deterministic analyses, to address pre-closure and undisturbed performance of the repository. Next slide.

Now the approach to performing the Complimentary Cumulative Distribution Formula, which is much easier to just say, CCDF, is to identify all the significant processes and events, and usually we take that to mean one chance in ten thousand of occurring over ten thousand years. We then develop a set of scenarios and specify the effects of the processes and events, on repository performance.

The scenarios are grouped into similar categories, based on the initiating event, and each involves a series of event sequences. We then calculate the probability of releases for each scenario and combine those into an overall complimentary cumulative distribution function. And basically what we hope to use, is the best available data we can get in the time duration of said characterization. Use bounty calculations to the best extent that we can, get the best expert judgment that we can, and have thorough peer review of the results of our work.

In addition, we need to evaluate the uncertainties that are explicitely considered in the CCDF, and those would include uncertainties in the models, physical conceptual models that we'll be using, uncertainties in the parameters that we'll be developing, uncertainties due to the extrapolation of short term data to ten thousand years, and uncertainties due to unanticipated processes and events that are difficult to task for.

Finally we would compare the results of the CCDF with EPA standards. (The next slide)

The purpose of this next slide is to show very quickly the concept of combining conditional scenario's specific probabilities into an overall CCDF. One of the points, is that for the undisturbed case, we combined the probability of all of the other scenarios, and then the one minus --- that probability would become the probability of the undisturbed performance.

For the performance assessment area in OCRWM, our activities that we want to focus on in FY90 are the identification and evaluation of significant processes and events, and systematic development of a a set of scenarios. We hope to do this through a sub group of our total system performance effort which will refine the existing scenario work that's been done.

We hope to develop preliminary estimates of consequences and probabilities for the selected scenarios that we identify, and to develop codes and models for key scenarios. This would include the velocity field, the engineer barrier system interactions, and the reactor transport to the accessible environment.

And we would do sensitivity studies, by varying the input parameters into the models over likely ranges that we expect to occur, to assess the inpacts of these on the results that we get. Okay.

I wanted to touch on three concerns that we had with the original rule. Starting first with the conduct of a CCDF, which involves scenario quantification and uncertainty reduction. We believe that this may limit the possibility of performing a defensible CCDF calculation, regardless of the site that's chosen.

We need to identify an exhaustive, mutually exclusive set of scenarios. We need to be able to define with some degree of confidence, the probabilities of those scenarios occurring, and we need to be able to reduce the uncertainties. We'll have short term data, and we need to be able to show with some confidence that we can predict the long term performance.

The point I'm trying to make really is that without some sort of rule of reason, or specific ground rules, when we actually quantify the process, we believe that no site could meet the strict interpretations of the current rule.

We also note that the NRC is responsible for performing the EPA standards, and to regulations that we would then implement.

DR. NORTH: So you're saying that the umpire is inclined to be very conservative, and doesn't see too well, perhaps --- there's no way you can throw a strike.

MR. GOMBERG: At the risk of getting thrown out of the ballgame --- (Laughter) --- yes, I think so.

MR. NORTH: One of the things this suggests to me is the value of some practice. That if we try to do this for the first time on national television which I think this is clearly going to get, some of the difficulties are going to be greatly magnified. On the other hand, if both the pitcher and the umpire have a fair amount of experience in practice games, it may be able to get some of the problems solved before we're on national television.

MR. GOMBERG: That exactly right. I couldn't disagree with you. The second concern that we wanted to discuss with you is the belief that for most of the

in Table l of the EPA release limits, the nucleide specific release limits, the limits are overly conservative compared to scientific and regulatory consensus. The example that I wanted to talk about is Carbon l4 which is an example of a nucleide which we feel unduly restrains repository design, primarily waste package design. I wanted to use an example case, assuming a respository and partially unsaturated conditions.

Basically from what we understand, we have approximately l00,000 curies of Carbon l4 within 25,000 packages of spent fuel. Some of this may be review for most of you. Carbon l4 has a 5700 year half-life. Currently the distribution among crud, the plating, and the fuel matrix is uncertain. Now we believe that the release mechanism for Carbon l4 in an oxidizing environment, would be through oxidation and released as Carbon l4 Dioxide. And basically the allocation that we've identified in the site characterization plan to date --- we believe that up to one percent of Carbon l4 inventory could be rapidly release after container breach.

That would basically be from crud on the outside of the . After the clatting breaching, we believe that an additional ten percent could be released at a slower rate from inside the gap between the spent fuel and the . And then finally, through oxidation as the matrix alters, there would be some additional release from the fuel matrix from the Carbon l4 traffic within the Green Mountains.

Now the regulatory scheme for this example is two-fold. The NRC has established a release on the engineer barrier system performance, which is one part in one hundred thousand per year of the one hundred thousand year inventory of the nucleid specific inventory --- and basically, through our performance allocation process in the SCP, with the understanding that for Carbon l4, there are not too many barriers which preclude the retention of Carbon l4. We predicted that we would have to demonstrate that no more than 25 packages per year, for 25,000 containers could tell.

This would be decreased as we try to show --- as we show additional released within the   and within the fuel matrix. Now, the NRC requirement if I'm not mistaken under 113, Part B, has a requirement which says that if you can't meet the ten then minus fifth per release year limit, you should be able to at least show that the total system performance will be consistent requirements.

Table number one has a limit of 100 curies for 1000 metrotons of Carbon 14, and that's the cumulative release limit. Now based on 100,000 curies that we talked about before, that would be roughly seven percent of the inventory for the seventy thousand metric tons that we expect to replace in the repository. If you account for the rapid release of one percent, for the failure of all the containers, that would meet the cumulation release. When you start adding in --- up to 10 per cent of the inventory from the fraction of the colliding failures, and the contribution within the matric ---. It requires us to either demonstrate a much tighter containment failure rate which is difficult of to start taking credit for other barriers which requires a lot of time consuming work and just more of a proof of principle that would be difficult.

Now these kind of issues are all addressed in the plan so I won't dwell on them much further, so I think I'll get right to the bottom line of this particular example.

The Carbon 14 that could be released if we take very conservative assumptions, and account for one percent of the inventory being released from the repository, the peak dose that would occur --- that's the peak of the total dose over the duration of the release would be one times ten to the minum fourth millirim per year. That's a general population dose. The ten thousand year average, which is the total release averaged over ten years would roughly be four times ten to the minus sixth.

You can see that its linear, it just goes up two orders of magnitude if we assume that all of the Carbon 14 is released into the environment. What I wanted to show, was that if you compared that release to other releases --- of other doses --- from carbon that's already in the atmosphere. The cosmogenic Carbon 14 dose is 1.25 millirims per year and I've listed the other ones here also.

What I'm trying to show by this slide is that the

Carbon l4 release from a repository would be negligible from a health standpoint, just due to the cosmogenic Carbon l4 release alone. And in fact, the releases that we're predicting may even be less that the variability in the cosmogenic release over the earth.

The other concern I wanted to discuss on the original rule, was the fact that the EPA develops the standard and the NRC implements the standard. Currently, I just wante to very briefly point out three aspects, where there is a difference and we feel that clarification would be needed.

The first is on the concept of undisturbed performance versus anticipated processes and events. The NRC term apparently includes severe events which could be anticipated --- such as earthquakes, vulcanism, ---which we don't believe was the intent of the EPA, when they were problemating their undisturbed performance. There is a concern of reasonable expectation versus reasonable assurance. The later being the NRC requirement, and I guess that we believe that reasonable assurance provides a higher level of confidence than reasonable expectation.

And the third one is the human intrusion incorporation into the overall CCDF. The NRC would require us to include human intrusions into the overall CCDF whereas the EPA requirement would allow us to consider that separately. The belief is that adding consequents of low probability, high consequent events from human intrusion did not necessarily show the adequacy of the site.

EPA recently released working draft one, of their re-promulgated rule. I do want to point out --- and hope everybody will agree --- that it is internal. It was placed in the public documental for information. Also we have not formally reviewed the rule --- the working draft rule. But I wanted to point out our approach in reviewing that rule, and some of the preliminary observations we have on that.

The Office of the Environmental Health and Safety, is part of the DOE that's coordinating the review withing DOE because the rule as it stands now involves nuclear radioactive waste management, something called greater confinment disposal at the Nevada test site, and WIIP --- Waste Isolation In Pilot Plan. We've reviewed the working draft internally and we also hope to review the performance assessment models that EPA provides, as part of the development and review of the backgroud information.

Now I apologize for putting the numerical options in the working draft rule, so I'll real briefly summarize what they are, before I go into the observations that we have. Option 2A, would do away with the ground water protection requirement, and would require 25 millirim per year dose from all pathways, including two liters per day from a high yield aquifer. That would possible require us to do some additional evaluations of all the high yield aquifers outside the control area.

Option 2B and 2C, which are very similar --- they would require no degridation of a Class One groundwater, four millirims per year from a Class Two ground water

DR. CARTER: Excuse me Steve, just for clarification, are you talking about permitted effective dose of cromotes from all pathways here? Not only water but everything.

MR. GOMBERG: For Option 2A, it's 25 millirims per year for all pathways. That's right. Option 2B and 2C then, kick back in the ground water protection requirements. And we believe that this is a little bit different than just analyzing Class One ground waters. This would require us to do additional analyses on high yield aquifers on Class 2 and Class 3 aquifers, and specifically determining the innerconnective --- it's these long words --- the innerconnectiveness of adjacent ground waters.

One of the things that is not quite clear in the rule as it stands now is the definition of the implementing agency. For our case, we believe that would be the Nuclear Regulatory Commission. And we believe the federal implementing agency is the agency that should be responsible for classifying the ground water. We point to some preamble language in the low level waste rule, part 193, which does specifically say that and would ask EPA to put some of the language into the working draft.

There is an option in the working draft for zero degradation for special sources of ground water within the control area. We believe that may be difficult to demonstrate for a hypothetical repository within or innerconnected to a special source of ground water. The option --- one of the other options in the working draft rule involves increasing the individual and working draft ground water requirement period to ten thousand years. Currently it's at one thousand years, and we believe that would require extrapolition of those predictions to ten thousand years, which would add a lot of uncertainty to the results that we would calculate. Instead we feel that EPA would need to justify the thousand year limit in order to avoid hopefully being arbitrarily capricious.

Also no language is included to clarify that a repository is not likely to constitute an injection well. We believe that would be an important addition to the rule. One of the aspects to the working draft that I guess created most of the concern was the new proposed requirement to increase regulatory time frame to one hundred thousand years. We believe that the court did not define the ten thousand year limit to be arbitrary and capricious, and that could be the limit that would apply.

The uncertainty will increase due to the extrapolation of predictions to one hundred thousand years, and so the results of any calculations that we would do to that would be subject to doubt. Now we do believe that it is appropriate to evaluate long term releases, and in fact the siting guidelines did propose to do that, but it's part of a comparative evaluation. In addition we anticipate on evaluating long term impacts for the EIS, as part of trying to predict the foreseeable impacts from the repository.

But we do believe that evaluating long term impacts for the purposes of demonstrating regulatory compliance to a specific regulatory limit is inappropriate. Also as Dr. Carter pointed out, the current wording is unclear, and I think that it --- we're not sure whether it tries to merge two different philosophies, deterministic release rates, versus probabilistic releases, and we would hope that would be cleared up in the next working draft.

There's an additional option, Option 1B, which is the definition of disposal. Option 1A, basically defines disposal as the current definition which would begin when the repository permanently closes. Option 1B would define disposal beginning at the time the waste packages are in place. And the concern that we have, is that by starting the clock if you will, prior to the permanent closure of the repository, any premature releases during what I guess I would naturally call pre-closure period, would be counted against the cumulative releases during the pre-closure period. I'm not exactly sure what the impact is going to be, but it may provide some inconsistency with the way NRC regulates it, and may unduly penalize the post-closure period due to those early releases.

Another concern, and I think this is the final concern, is the term in the assurance requirements "as small as reasonably achievable". I think this is very similar to as low as reasonably achievable. And it's not clear in the assurance requirements, whether this would apply to the repository or not. Or over what time period this would apply --- trying to predict technical, socio-economic considerations ten thousand years into the future into the design of the repository we believe would be pretty difficult.

That's basically all I have. If I can answer any questions, I'll be happy to.

MR. NORTH: What are the state of these comments, have you submitted them or are you simply giving us a preliminary version.

MR. GOMBERG: I'm giving you a preliminary version of these requirements, they haven't been formally reviewed and as I tried to stress, at this point, I characterize them as observations that we hope to be able to provide EPA.

MR. NORTH: I think they're very useful and I would encourage your non-preliminary version to us, and those ---

MR. GOMBERG: Try and stop us.

(Laughter)

MR. NORTH: And we would also be interested in any further documentation that we could get from EPA in terms of the rationale for making some of the changes they proposed. The question of how to rewrite the rules of baseball to make it more effective is one we're very interested in, to continue my analogy.

DR. CARTER: Let me ask you a couple of questions. One, you picked Carbon l4, but that really is not the limit of radio-nuclides. There's one that's more limiting in terms of the release amounts, and that happens to be Nathorium, Nathorium 232, and its lower by an order of magnitude. I just wonder if you've gone through similar calculations.

MR. GOMBERG: We have gone through similar calculations. I don't have the results here, and the only reason I picked Carbon l4, I guess is probably because of my own prejudice towards the waste package, and what that was doing of course, to the waste package. I tried to say that I wasn't trying to pick on Carbon l4, and I thought that several other new clients were also restrictive on the table limits.

DR. CARTER: Well, there's somewhat of a different data base. You've got the cosmogenic Carbon l4 which has also got a lot that was put there by weapons tests and a number of other things. In the case of Thorium, basically it's been put there by nature.

DR. DEERE: Just a comment on that in a small and reasonably achievable. This reminds me a little bit of when we were investing the damage due to the new concrete being placed in major dams, because blasting was still going on to make excavations in other areas, and this is a concern in almost every major concrete dam. And on this one they asked me please to investigate with the bureau of reclamations, the Corps of Engineers, knew exactly what they were doing about this because it's been a problem that people have been concerned with. We sort of used an old standard that came in and new applications of concrete dam, but it got used in the industry.

So upon exploring this with the Corps of Engineers, I found out they had something quite similar to this. I said well what do you really do? How do control in its specifications and in the field while this is going on.

And they said we tell them to blast more carefully. And I said well what if --- they're already being very careful? We tell them to do it even more carefully. That seems to have worked but I'm not sure how much concrete has been degraded by this process, because concreted that is only one or two days old and blasting is taking place a hundred foot away, gets really quite shaken up. So there had to be a sufficient number of tests over a period of years to finally get some changes in that. This looks like its something that would be pretty difficult to hold up in court. I'd hate to have to answer a lawyers questions.

DR. NORTH: Well, I'd certainly like to hear what some of the others have to say about their view about this proposed rewriting of the rules, and the concerns that were raised regarding implementability in an adjucatory process. Those would seem like very important considerations. Hopefully your general counsel's office and a number of other experienced lawyers have been invited to provide their comments as well.

DR. CARTER: Just try to stop them.

(Laughter)

DR. NORTH: One other point I'd like to throw out, I look at section 191.14 Insurance requirements, which I gather is new material, and we have section D, "the disposal system shall be selected and designed to keep releases to the accessible as small as reasonably achievable, taking into account technical, social and economic considerations" and then E, "disposal systems shall use different types of barriers to isolate the waste from the accessible environment, both engineered and natural barriers shall be included."

I'm not sure I know what to make of that language, especially how it can be interpreted in terms of the umpire making the call. One of the things that troubles me a little bit when I think about Carbon 14, and versus Thorium. In the case of Carbon 14, I might worry about gaseous release in the unsaturated environment, whereas with Thorium, we might have a lot more ability to have retardation by the rock materials --- make it a lot less likely that that material hopefully is going to get into the accessible environment.

And I'm not quite sure where in this system, other than this very vague language about "both engineered and natural barriers shall be included" --- that issue gets picked up and implemented.

DR. CARTER: Thank you very much. I don't presume to be able to summarize the meeting that we had here today. I think it's been a really good one. Like I say, there were a number of things we wanted to focus on at this first meeting of the environment and public health priorium*, there are certainly a number of things that we did not consider and I know they may be equally as important and in some cases, even more important.

So there will be time to visit and revisit some of these issues, and I'm sure that we will do that in the future. But certainly I would like to thank all the speakers for being rather punctual and considerate of the time --- I think we've done rather well as far as the schedule is concerned --- a few minutes beyond file which was our pre-determined quitting time, and I certainly want to thank DOE and the office of civilian radioactive waste management, for helping organize a major part of this and for providing not only speakers, but also from their contractor organization.

I certainly want to thank Ray Clark at EPA for allowing him to participate, and the same for Bob Browning at the NRC. So I'm very pleased as far as I'm concerned with the discussion we've had today. I think it's been the sort of thing that we wanted and expected and indeed, received. So I'd like to say to all concerned that I'm very grateful.

MR. ISAACS: I hope you'll allow me before you close, that we also appreciate the attention that you've given to these important subjects. We are struggling as you know, and our compatriots in the other agencies, are struggling with very difficult `first of a kind' problems here. We need the kind of supportive criticism, that I think, and suggestions that we've gotten today. And I think we take it in that spirit. And as I mentioned earlier in this and in other venues, that we have to keep in mind where we are in this program. Other kinds of restraints on us, like funding, for example, that keep the pace of the program to a certain logical --- or some might say illogical pace --- but that these comments all are constructive, they're all are important.

We need to address them all, and not only make you feel comfortable, make ourselves feel comfortable that these things are being addressed, and I think Parker and I can only say this falls into line with the other meetings that we've had which I think is a very productive long term help to the program.

MR. DEERE: I would only add what you did. We're on a virgin process. This is the fourth panel meeting that we've had. Each time the amount of information that we've been able to assimilate, interpretations that have been made, have been most helpful. There is only one panel left that hasn't had a chance to meet yet, that is a very important panel, the one hydrology and geochemistry, and we are waiting for appointment of a man in this particular field and we have high hopes that this may well be coming within the next month or the next month and a half.

However, we have not ignored that area as you know and we have been able to get two ground water consultants, give us some of their time to attend the briefings. But we now have had, when we get that one done, we will have had our first round of briefings, and now as we get farther into the second round, I'm sure it will become more specific, we will have more questions which we will be able to focus on, and hand to you in advance.

And so, we feel we are on a learning curve, and we appreciate everyone's patience and interest in the overall project, and we certainly are happy to be here and do what we can in the role that's been assigned to us.

DR. CARTER: Okay, I'd like to again thank all the speakers like I say, for the time and effort that they've put into this and certainly the people that were involved in other ways in helping to make this program to come together. So with the sufferance of any attorneys that might be present, I'd like to close this session of the Environmental Public Health Panel, ?

(Session adjourned at 5:l5 p.m.)