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OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT

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TRANSCRIPT OF PROCEEDINGS

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I N D E X

I N D E X (Continued)

2 DR. PRICE: Welcome to the last day of our meetings here.

And I'd like to just comment for the benefit of the presenters that the panel is going to maintain a kind of a similar format to the first day which we met. We will hold questions to the end of each presentation, but if there is a slide up on the screen that they wish to ask a question about before the slide is removed, they're going to feel free to interrupt to ask those kinds of questions.

MR. KOUTS: That's fine.

Any other comments that the board would like to make before we begin this morning?

DR. PRICE: Go to it.

MR. KOUTS: I'd like to welcome the board to the third day of the presentations that we've developed for you.

Right now we have identified on the agenda another institutional program. I feel, before we get into that, I'd like to reorient the board similarly to what I did on the first day associated with the overall organizational structure of the overview of the OCRWM transportation institutional program, to give you some perspective again as to how the program is broken down into its various elements and actually where the institutional program falls into our program.

This is the same slide I showed you on Monday. It identifies that the transportation program is broken down into four major components.

I would like to comment for a moment here, because I think it's been lost in the discussions we've had over the past several days on individual topics, that these are four major components of the program.

The board requested for this briefing there be individual topics within each of these program elements. I would like to draw the attention of the board that we talked somewhat of our cask systems development program. We actually didn't cover at all any of our technology development, our research associated with burnup, source terminology, cask contamination.

I believe these are all fairly major activities that we have under way. Again, they were not identified as subjects of interest for this briefing, but again, they do exist, and we spend a lot of time working on them to try to assist our cask program.

DR. PRICE: May I just comment that we would probably then, if these are important topics that you need to present, welcome a presentation at some future meeting. I think when we did structure this we mentioned to you that if there were additional topics, that these twenty plus topics that we had identified as issues were issues that were not to be the limiting factor in what DOE presented to us. And, therefore, I think we would welcome you bringing these other issues to us.

MR. KOUTS: Well, we certainly plan on doing that in the future. I would want to mention that even with the time limitations we had trying to incorporate these into the presentations, we required even a greater summary briefing on some of the issues that were identified initially.

But again, I wanted to draw the attention of the board that there are other activities under way within the program that again cover other subjects that the board wasn't briefed on during these past two days and the third day.

I'd also like to draw attention to the second component, our economical systems studies analysis. We spent a great deal of time associated with how we would operate the system and do our trade-off analyses and so forth that provides some guided principles to us. Again, this was not a subject that we briefed here.

I would like to draw attention to the

board's Dr. North. I think yesterday he wanted to see real numbers. I'd like to distribute at this time to the board ten copies of our Task F analysis. Again, this is something that we did not brief you on. It was our MRS system studies analysis which does provide a substantial amount of numbers associated with the transportation impacts with and without an MRS in the waste management system.

I think the board will find this interesting, and I think it will provide some insight as to some of our analytical tools and also some of the numbers that we're generating in the program at this time.

I'd also like to draw to the board's attention that, since we didn't go through that program element, we didn't identify that we do have a transportation systems data base, we do have a wealth of knowledge associated with the assumptions that we would operate the system under that's continually updated.

But again, given the structure of the

briefings and so forth, it was not something that we had the opportunity to go through with the board.

In our operations area we touched on a little bit about operational planning. What we're going to talk about this morning is our institutional structure, our institutional program. But before I get into that, I'd like to again reacquaint the board with the general structure of the transportation programs so you have an understanding as to generally how it's managed.

We do have a staff at DOE Headquarters associated with transportation, a transportation branch chief associated with it. I have a staff at headquarters of about three people. We manage the program through our field offices and our field structure.

If you remember this chart from the first day, our Chicago Operations Office, which is headed by Mr. Jeff Roberts over here, from a corporate management standpoint deals with our institutional activities, economic system studies and operations segment of the program. Shipping operations is tacked on implementing the connection with the programmatic direction that's directed from DOE Headquarters.

The same is true with our cask system

development program and associated research. Again, the contractors are people that you've heard over the past several days fall within this structure. Battelle Laboratories, Oak Ridge National Laboratories, Argonne National Labs and so forth again are managed through our

Chicago office through our DOE Idaho office. EG&G, Sandia and other cask contractors are again controlled through that operation.

There are essentially about five DOE people that work in those areas, and they control components of that program. And the way we're structured is that headquarters provides programmatic directions, and the field office is implemented according to the direction given from headquarters.

And I hope this helps the board and gives you some perspective again as to how generally the transportation program is managed. This differs depending on different areas within the program, and I think you did get a different story depending on again the segment of the program you're looking at, the contractor structure and the field office structure.

We do have a component, as we mentioned earlier, and you had a briefing on it Monday, associated with the Yucca Mountain Project Office activities. We do coordinate very closely with them.

But I wanted to go through this one more time so when we start talking about the institutional program you can have perspective. But again, this is implemented through our DOE Chicago Office with programmatic direction from DOE Headquarters.

Now I'd like to go into the overview -- if there are any questions from the board, I'd be happy to answer them at this time.

I'd like to go into now and give you now an overview of our institutional program.

We talked over the past several days about why we have an institutional program in the areas of risk communication and communication with the public, which was actually mandated by many of the requirements associated with the Nuclear Waste Policy Act.

We have an obligation to go out to the public to educate them as to what we're doing and to bring them into the process, and we certainly have a very vigorous and, I believe, effective institutional program within the transportation area to do this.

The objectives for the institutional program are essentially to provide timely information exchange. And this isn't just a one-way street. It's not us providing information to the public into our regional groups. It's to receive information from the public. And this is how we get feedback on our programmatic activities and can make adjustments according to how people are viewing our program.

We have a variety of program documents that we've already issued in the past, and these provide opportunities for an involvement of the planning process. We issue documents in draft for public review, we get those comments back and respond to those comments, and we adjust our documents accordingly.

Also, we have a variety of open discussions of program activities, this being one of them. We'll get into that in a minute in terms of the other forums that we use for this process.

Within each individual program element that again is broken down into sub elements we have a communications and outreach program, or element, I should say; we have national/regional issue studies; we have policy/regulatory analysis within which we develop these programmatic documents, which are issued for public review; and we also provide support to the rest of the program.

Let me talk for a minute about our communications and outreach program. We feel that they're necessary to foster understanding and confidence in the program. We spent a great deal of time and effort to make sure that we're communicating with the public at an appropriate level. We have a variety of activities to do this. We talked about some of the meetings we had, which Dr. Price attended one of them last month.

Some of the mechanisms we use are fact sheets, news articles, visual aids, technical reports, we're in the process of developing a new programmatic document in our transportation plan, which I'll talk about in a minute, and also issue discussion papers associated with many of the issues of interest to the public and I'm sure to the board.

In terms of our public meetings, we hold technical workshops with a variety of different organizations, we have meetings of our national/regional organizations, we attend professional meetings to talk about our program, and really the centerpiece of our meetings segment of our program really are Transportation Coordination Group meetings.

I'd like to talk a little bit about that a little more in detail right now.

Our Transportation Coordination Group, or TCG, is really the oldest coordinating group and external coordinating group that the Office of Civilian Radioactive Waste Management has. There were a variety several years ago. This is really the only one that has maintained its integrity over the years.

These meetings are held on a regular basis. Typically right now we hold them about every eight months. The last one we had was last month in Chicago, Illinois. We had a previous one in Kansas City.

And I'd like to talk a little bit about what we do at these meetings.

First of all, they're open to all interested parties, we try to tell whoever might be interested in our program and the activities of our program to please come to these meetings. We invite other federal agencies. We have state, Indian tribe and local government regularly attend. We also have the utilities and transportation industry who regularly attend.

These meetings are essentially structured to provide an update of the transportation activities. In addition to that, to provide seminars on subjects of interest that are identified actually by the participants in the TCG meetings.

I should draw attention to what some of these seminars are. Last month we spent about a day-and-a-half talking about emergency training and emergency response.

In terms of coverage of topics, I would mention for the board that I'm going to go over and summarize what we covered in a day-and-a-half in half an hour this morning, and just to show you the depth which you can get into some of these subjects.

We had our last seminar in Kansas City on routing. We spent about a day on routing, providing state, federal, tribal and local perspectives on routing, from both the highway and rail perspective. We talked to states who actually used Agent 164 to designate alternatives within their states, to provide input to other states as to how they might go about the analyses that are necessary under the transportation DOT rules associated with state designation of alternative routes.

We're planning on having another meeting next year, about eight months after our last meeting in July, to go over our progress in our cask development effort. There's a great deal of interest in what we're doing in developing casks and what we're doing in that program.

And our next agenda, as we stated at the Chicago meeting, is that we would cover our cask development program in depth.

What we do in those types of meetings is again to bring actually the cask contractors in to explain their designs and to go into some detail and explain to the technical community and also the public, in as much depth as they want, as to what we're doing in that area.

DR. CARTER: Chris, could I interrupt a moment?

Maybe you'll get to it. If so, just hold the question.

But I wonder if you've had any specific difficult issues to deal with, and if so, I'd be interested in the mechanism of the resolvement of those sorts of things, if you've got an example of that sort.

MR. KOUTS: Well, I think what we try to do in terms of an issue which is of great interest, for instance, emergency response, and I'll be going through some of the presentation that I went through in Chicago, what we try to provide is our perspective as to how we're going to approach each of these issues and a general time line associated with our resolution, what activities we're going to be carrying on over a certain period of time, when we're going to issue documents for public comment, and what opportunities there are for public involvement in the development of the resolution of these issues.

We took this same tack in Kansas City on routing. We identified, for instance, our policy on routing, which in terms of highway routing is something we didn't get into really.

But we stand firmly behind Agent 164. We think it's a very workable and viable regulation. We've always said from the standpoint of rail that we will comply with DOT regulations if they are in existence at the time. Right now there are no DOT rules associated with rail routing. We do have internal criteria, departmental criteria which are guidelines, but we also have plans, if there are no federal rules in effect from the Department of Transportation, that we develop our own criteria and issue that for public review so we bring people into the process associated with rail routing.

It's those types of ways we try to deal with issues, to try to explain our viewpoints on them in a public forum that I think can help inspire confidence in the program, and how we're interacting and how we're dealing with these issues, that we're not trying to do it behind closed doors, we are interested in public input.

DR. CARTER: You haven't had any real sticky ones to deal with.

MR. KOUTS: Oh, I think there are. I think certainly routing is a very sticky one, I think rail routing, since there are no criteria, are definitely interesting subjects.

I think we've gotten feedback from our

regional groups, especially the Western Interstate Energy Board, about their views on use of Agent 164, and they provided us last year with their perspective as to how to go about implementing that. It's not in compliance with the existing rules which gives us a problem, because we're duty bound to comply with federal rules.

But again, they have an opportunity to voice their opinion, and we also encourage them, if they feel they have information at their command that would help the regulatory structure be changed, to actually petition either DOT or NRC for their rules and to try and bring about changes in those rule makings.

So again, we use this as a mechanism to try to voice our views on the subject and also obtain public input as to -- public input through regional routes as to what their views are on the subjects.

DR. CARTER: Thank you.

MR. KOUTS: I'd like to identify some of the regional groups we're working with right now.

I mentioned the Western Interstate Energy Board.

I apologize for the acronyms, but again, they're easier to say than going through the long names.

We also have gotten cooperative agreements with the Western Interstate Energy Board, the Southern States Energy Board, Midwest Office of Council of State Governments.

I should stop here and give you some perspective as to what our view is in terms of our institutional program at this time.

Many, many states across the country are interested in what we're going to be doing and when we are ready to ship. And each of them individually have different needs.

Given the limited resources we have within the program, our perspective at this time is that it's best for us to deal with the regional structures, and 6 what we do is identify regional groups that can bring to us the general interests of a region, and we issue a cooperative agreement with those groups, and we work with them on the issues of interest in that region.

And on the next slide I'll be showing you what some of those issues are of special interest.

Right now we don't have total national

coverage. We have the Southern States Energy Board, Western Interstate Energy Board, we have Midwest Office of the Council of State Governments.

This covers everyone except for the northeast, and what we're doing this year is trying to identify northeastern groups, and we're hopeful that next year we'll be able to bring a northeastern group on board so we'll have total national coverage with our regional groups.

DR. PRICE: Could I ask you -- for example, take the top one, southern states, are all the states from Virginia on and below the Mason-Dixon line -- are they all members of the Southern States Energy Board and represented there or not?

MR. KOUTS: Judy, is Virginia --

MS. HOLM: Yes. Maryland on south, down across through Texas.

MR. KOUTS: There is a line of demarcation, and I forget what they are myself, but, yes, Virginia, Maryland are incorporated into it.

DR. PRICE: So when you speak western, it pretty well represents -- I was only picking on southern states just as an example.

These organizations, are they fully represented in membership by the western states, by the southern states, or are there holes in them, certain states that aren't part of the energy board?

MR. KOUTS: Judy, would you like to answer that?

This is Judy Holm from our Chicago

Operations Office.

MS. HOLM: The western states I think all states are eligible to join. At this point only Arizona of the west is not actively participating in that group. The other states are involved and meet with the board. In the southeast I believe all the southern states do participate there. We do have overlap between some of the southern states and the western group, because in their charter contiguous states, states that abut the borders of the member states, are allowed to join as associates. So there is some overlap. We're pretty well covered.

DR. CARTER: These two organizations essentially parallel the respective governors' conferences.

MR. KOUTS: That's correct.

I also want to draw your attention to the fact that, besides just working with states, we have a commitment on the part of the OCRWM and a programmatic commitment to also interact very closely with the tribal reservations that potentially can be affected by our transport, and we do have a cooperative agreement with the National Congress of American Indians, and we work closely with them.

In fact, we've got a meeting next month in

Phoenix where we're going to be going and actually learning about tribal culture from them and giving them a little bit more detailed overview of what we're doing in the program.

We also have cooperative agreements with the National Conference of State Legislatures. You'll be hearing about our work in the Commercial Vehicle Safety Alliance in a little bit. Also, that's part and parcel of some of our work with the Council of Radiation Control Program Directors.

Although we don't have a cooperative agreement with the American Association of State Highway and Transportation Officials, we are working with them very closely on a permit associated with overweight truck permitting. You're going to hear about that a little later this morning.

What this slide essentially identifies is some of the areas of interest of each of the groups. I'll just take the first one.

For example, all three of these regional groups that are interested in emergency response. AASHTO is working on the overweight truck shipments, as I said. Each of these cooperative agreements, again, lays out specific areas of interest of that group, and they work to provide their own reports, provide their own reports to us, as to their perspective. We recently received one from the Southern States Energy Board on emergency response capabilities in the southeast.

WIEB, as I mentioned earlier, provided us our routing recommendation associated with highway transport. Their recommendation is essentially we should establish a national route, one route, if you will, across the country associated with highway transport.

7

Our perspective is that that doesn't give us the flexibility to operate the system with the many different reactor sites that we're going to have to service and event sites.

Besides our outreach programs and dealing with our regional groups, we also conduct studies from an institutional perspective on shipping experience. We talked earlier about overweight truck issues from the permitting perspective. We're also very interested in watching how the WIPP, Waste Isolation Pilot Plant, routing experience turns out. We're monitoring these issues and trying to keep abreast of them.

This is also the segment of the program that produces many of our outreach documents or programmatic documents that give the public at large and decision makers throughout the country a perspective of what we're doing in the transportation area.

When I talk about the OCRWM transportation plan, what this is, this document's in preparation. We hope to issue it this fall. It's an amalgamation of some of the programmatic documents we've issued in the past. I mentioned several years ago we instituted a plan. We've also issued a business plan for our cask development program in these documents and provide the strategy of the program and how we intend to implement it.

But I would certainly offer to the board that we'd be happy to provide those documents. And certainly when the transportation plan is available for public review and it's outside the department, I would think that would be a very key document to oversee the general strategy of the program and also what the different elements of it are, what our rationale is behind each of this.

A very key part of it, transportation -- or another document that we're going to be issuing has to do with issuing discussion papers. Jeff Roberts from our Chicago Operations Office this afternoon is going to be talking a little bit about the development of our institutional program.

When we set out to develop our

institutional program, we had a variety of issues that were identified. And if I can just read very briefly from Jeff's presentation this afternoon, I'd like to read some of these issues that were identified. I'm sure that they're of interest to the board.

Emergency response, highway routing, cask design and testing, transportation infrastructure improvements, physical protection, state, tribal and local regulation of transportation, overweight truck shipments, rail and barge routing, mixture of transportation modes, prenotification, transportation operational procedures, liability, inspection and enforcement for highway, rail and barge transportation.

What we're intending to do for each of these subjects and several others is to again issue you in a separate document our perspectives of each of these issues, what our time frame is for resolving these issues, what activities are going to be under way over the development of the program to try to resolve these issues.

The area of the opportunity for public input, essentially this is something that we've learned through our institutional program. The people are interested in trying to find out what the issues are, how we're going to try to resolve them, what the opportunities for public involvement are. And again, that's what the structure of the institutional program is all about.

That issue discussion papers document will come out after the transportation plan. The transportation plan will be issued, and we'll have a ninety-day comment period. We'll then issue the final. We'll do the same thing for the issue discussion papers. And then we'll periodically review these documents and update them as we move forward in the program.

The 180(c) strategy plan, I'll be talking about that a little later this morning. That's essentially how we're going to go about implementing the emergency training requirements of the Nuclear Waste Policy Act Amendments, 1987.

The transportation plan, I talked a little bit about that we'll be issuing later this year, as I mentioned earlier, combines the transportation institutional and business plans. It gives the description of the program and management responsibilities and how we're structured. It will describe our cask design and testing efforts. It will also provide strategy associated with that program. It's going to show -- for each of those different four components that I showed you, it will show essentially the strategy and what we're going to be doing in those areas in the future and what we already have done.

System analysis, institutional interactions and, of course, something that's very much of importance within the program, application of quality assurance procedures.

Some other activities that we have within the institutional program, we review state and local grant proposals regarding transportation. We're actively involved in that area. In other words, if you're interested in obtaining funding from the department for a specific issue, we do review those, and we see whether or not it's appropriate or not for us to get involved in funding those.

We're also in the process of providing additional documents to the MRS Review Commission that gives institutional impacts and operational impacts. Some of the impacts associated with it is Task F. We see the numbers associated with the risk and the costs within the program, but we also try to provide a little perspective beyond that in the document we developed and will be giving to the MRS Review Commission.

Also, Monday we talked a little bit about -- the Yucca Mountain project office representative talked about the Section 175 Report, which was an impact evaluation within the State of Nevada. We also contributed to that report.

And that's the last slide that we have for the institutional overview.

I'd be happy to entertain any questions.

DR. PRICE: Chris, do you get involved in -- and this may be something that you'd come up with the emergency response-type thing. But, for example, working on mutual aid agreements, particularly with the Indian tribes and adjacent areas, where if an adjacent area came in, there might be -- to assist in an emergency, they might do so at the sacrifice of insurance coverage, and should have these problems, do you get into those kinds of things and provide any direction or mediation there?

MR. KOUTS: I think what we're going to have to do is when we begin to assess the training needs -- and that's one of the things I'll talk about when I get to the 180(c) implementation.

When we assess the needs of the individual states and tribes and local governments across the country, I think we'll have to get involved with those issues and identify what the most effective way for the department is to deal with that.

Again, without a routed structure, without identification of tribes involved and local governments, it's kind of difficult for us to make pronouncements at this time. I think that as we get into the process and develop a more refined strategy, I think that we'll have to deal with those types of issues.

DR. RAJ: In one of your slides you said the objective was to provide opportunities for involvement in the planning process.

Can you give us a specific example of how inputs are received and how the planning process indeed significantly changed, if at all, and what the decision process was and how it was handled?

MR. KOUTS: Okay. Well, I'll give you a kind of a macro example, if you will.

As I mentioned earlier, one of the major interests associated with our institutional structure is how we're going to deal with these many, "institutional issues," the list that I read off to you. And what they're interested in seeing is again how we're going to address the issues, what the time frame is associated with it, where the areas for public involvement are.

One of the reasons we actually segmented out the issue of discussion papers from the transportation plan is that we looked at the issue of discussion papers as something that we want to update on a more regular basis. And basically in response to comments, what we've done is segment out those issue discussion papers and have a process where we will be updating those on a more regular basis.

This is again in response to the specific needs that we've heard from people interested and how we're going to resolve those issues.

So that's kind of, in terms of the methodology, how we go about identifying whether or not we want to respond or how we're going to respond to a comment. I think we listen to all the comments, we look at the resources we have within the program, and we try to be as responsive as we can within the structures that we have.

DR. RAJ: Has there been a significant change in any plan at all due to somebody's input so far?

MR. KOUTS: I just mentioned to you one. I think the separation out of the issue discussion papers, the expansion of them, the more refined focusing we have on the issues as to the resolution of those issues -- I think that's something that we hadn't necessarily planned to do, but again, that's something we are doing. It's helping us refine our planning, and it's helping us refine our thinking associated with how we're going to resolve these issues.

And I think that's a very major example of how we responded to a very real concern identified by our institutional program.

DR. NORTH: I'd like to follow that line of questioning up with a general request.

I'm really going back to your slide on transportation program institutional objectives, where the first one you've got listed is timely information exchange.

You talk about the dissemination of information and attending public meetings subsequently.

I would like to see the document or a set of documents that summarizes the concerns of these various non-DOE groups with whom you've interacted and then the summary of what actions you have taken to deal with those instruments.

I realize that might be a large stack of documents, but as I have looked through the visual aids in this day of presentation on the institutions, I'm rather struck by the fact that we really don't have detailed coverage on those issues, which seems, from my point of view, to be extremely important. I'd like to find out what you think those concerns are and how you're dealing with them.

DR. CARTER: Chris, I have one question.

You mentioned on routing, for example, you're monitoring and tracking the WIPP experience, which is a rather far advanced concern to the transportation of spent fuel and so forth. They have had a lot of experience. They've had public meetings, they've had training sessions and this sort of thing. They've also recently issued, I guess, a Supplemental Environmental Impact Statement, and I understand there has been at least 2,000 or so comments received on that supplemental thing, and I dare say a number of those concern transportation issues.

I just wondered if it's been enough time that you've had an opportunity to glean anything in terms of lessons learned from the WIPP experience.

MR. KOUTS: The WIPP experience is a little different than ours. They basically have about ten sites that they're shipping from. We'll have about over a hundred. I think, also, the materials, and they're only going by truck transport, as I'm sure you're aware.

We're also going to go by rail.

I think that we did learn and we have learned from the WIPP experience Agent 164 is workable, is viable. It provides an effective opportunity for the states to designate alternatives they can identify within their state rather than the interstate highway system which the Department of Transportation system feels is a viable throughway for highway transport.

I think what we're learning is that certainly Agent 164 works. The Department of Transportation has also learned that in certain instances there can be disconnection within states in terms of a state designates a certain alternative and it may not hook up with a state-designated alternative in the next state. There needs to be some process associated with to bring routes together so you can have contiguous movement across the country.

And I think actually what's happened is DOT is working on those issues. Again, they're the regulatory authority in the area, and they're aware of it.

I think we are monitoring these types of activities, and from my own perspective and the department's perspective, I think the WIPP shipments and the initiation of the WIPP shipments will do nothing but help this program. I think it will provide an experience for the public that these shipments can occur, and I think the success of WIPP will have direct beneficial impacts on the transportation for this program.

DR. CARTER: Okay. Well, I certainly think there will be a lot of generic public concern issues affecting both programs, or at least have an impact on programs.

MR. KOUTS: I totally agree.

DR. CARTER: So your office does monitor these sorts of things, including the comments on the Supplemental Environmental Impact Statement as they may relate to your program.

MR. KOUTS: Yes, we do. We coordinate very closely with the Office of Defense Programs on a variety of issues. I have my counterparts in DP, and I'm working very closely with them. We try to provide as much as we can in the uniform departmental response to issues of interest to both programs.

MR. ISAACS: Let me just add a general statement that I think responds somewhat to your comment, Mel, and also Warner's.

There is a very widely accepted, I would say, group of issues that are understood to be keyed to the transportation area. They are no secret to people. They come up in the WIPP program, they come up in our program, and they reflect very much on the kinds of lists that Chris has articulated.

And there are lists that are much greater that have to do with prenotification and emergency response and routing and liability and all those kinds of issues, and there is a generic list that is of great concern at this stage in the program when we still don't have various route specific information.

We know those are the kinds of issues we're going to have to deal with. That's why we're putting together these papers, holding these kinds of meetings, to try and grapple with a set of organizations that can help us refine those things wherever the routes may be some day.

Once we get to the point where we know where our facilities are, and we know when we're going to be shipping from where to where, and we're going to have to start looking at routing and what that means in terms of working with states or regional organizations and local communities and so forth, then we're going to have to get much more specific and deal with those kinds of things in a more specific way.

So I think that's the approach it's taken in the program is to try and wrestle with that well conceived list of issues, most of which have come from outside interests. I think if an issue is raised by an outside organization, we don't say, oh, that's not interesting to us. The answer is that it gets resolved, or at least addressed.

DR. NORTH: If I could follow up a little bit on that.

The sense I have from your presentations, you're telling us a lot about the structure and various groups you're dealing with, and you're giving us some lists of what some of those issues are, but we're not getting the information on how's the process going. You know, we characterize the process all the way from we really have workable collaboration, where everybody feels that the process is an effective interchange, to the characterization that DOE decides, announces and then defends their policy and that they are relatively recalcitrant in terms of accepting other people's points of view.

I think this board would very much like to get the evidence directly as to how is the process going on these various issues, to what extent is their interchange effectively occurring, to what extent do the other parties feel satisfied that they're being heard, that their concerns are being addressed.

And we can ask the other concerned parties to present it to us, but it will help us a lot in terms of efficiency to get a summary from you as we start out.

MR. KOUTS: I'd like to mention a few

things.

We got a great deal of positive feedback from the TCG meetings. I think people who come -- I think we all recognize, and I think the people who come to our institutional meetings, that there are going to be differences of opinion as to how we're going to be doing things. I don't think anyone in the world believes, or certainly in this country, that we can satisfy everyone's concerns.

But I do think that what does help, and what we have gotten back from our regional groups and the TCG meetings, is that people are happy to hear us stand up and address an issue of interest, address how we plan to attack that issue, again, what the areas of and what the time frames are of it, what periods along

11

the process will we have documents out and we will have to formally respond.

I think, when you present that type of structure to people, it gives them confidence that issues are being dealt with in a methodical manner. I think there's recognition that you're never going to come to a total meeting of the minds, but what they are interested in again is that we are addressing them, that we do have a process for doing it and we are public about it, that we come out and identify that process and we are consistent with it, that we will hold regular meetings, that they're not haphazard, that there are mechanisms and there are people who they can call and get information from if they need it.

And that's, again, part of the institutional program process, providing information and getting feedback, and providing consistent information over a consistent period of time.

Again, whether or not this will pay off in the long run, we don't really know. Our general thoughts are that this can help. We don't know how much it will help when we get ready to ship, whether or not that will make the prevention of lawsuits coming in and so forth. We have no real idea as to whether or not we'll be affected.

But what we want to represent to you is that we are making an attempt to do this, that the department is being very up front about it, that we're coming out to the public, we're addressing the issues, we're showing what our procedures are, what the mechanisms for involvement will be, what our time frames are, and we're opening ourselves up to the world to comment on it.

And I think that's very helpful. I think it helps the department's image, it helps the program's image, and I think we do get meaningful input through this process. Whether or not it will help us resolve these issues in the long run, I can't really say. But I do think from the feedback that I've gotten since I've taken over the program that it is a useful process and we have gotten useful feedback from it.

DR. PRICE: Chris, at the TCG meetings I attended in Chicago you had presenters other than DOE, you had speakers other than DOE.

Is that the common practice in these meetings?

MR. KOUTS: Yes. And I feel that's very important. Where there are regulatory issues involved we try to have the regulatory agency there to answer the questions and provide their perspective. Where there's a state experienced in the areas, we try to get the state and local government in there so other people can hear what other experiences are throughout the country.

And we can learn also from it. It's not just for them, but it's also for us to learn.

So that's been something that we've tried to do, and we feel it's very effective. To hear, for instance, a law enforcement official from the State of Louisiana stating his experience with dealing with the transport of radioactive materials I think is very useful for someone from other states to hear about. Again, many of the states don't have the experience, and it's useful for them to identify people in other states, people they can call and learn from.

And again, it's an interactive process, not just between the department and the public and the states, but also to provide mechanisms for interaction between the states and local governments, so they can become more aware of what we're doing.

DR. PRICE: I think you had two speakers who were from the tribes, as well.

MR. KOUTS: That's correct.

We had several panel discussions where we had our institutional groups up there, and they each gave presentations, and also questions were allowed from the audience to each of those speakers.

And I think that's very key. It provides them a forum to state their concerns and also provides other people at the group meetings for information.

Any other questions that the board has?

I'd like to move on now.

I talked a little bit about motor vehicle inspection and what we're doing. Mr. John Willis, from our DOE Chicago Operations Office -- again, looking back at the structure, you'll remember where he's from. I'd like to introduce John, who will be talking about our efforts in the motor vehicle inspection area.

MR. WILLIS: Good morning. My name is John Willis from the Chicago Operations Office.

12

Efforts are under way to develop uniform vehicle inspection procedures for those vehicles that are transporting spent nuclear fuel, so I'm going to talk about what efforts are completed and what efforts are planned.

The OCRWM transportation program has entered into a cooperative agreement with the Commercial Vehicle Safety Alliance, also know as CVSA, to develop uniform vehicle inspection procedures for the highway shipments of spent nuclear fuel.

CVSA was selected for a number of reasons. First of all, CVSA is the only cognizant inspection authority for the states. CVSA has a proven capability of developing uniform vehicle inspection procedures. Also, the membership is comprised of representatives from forty-eight different states and ten Canadian provinces. So CVSA is the ideal organization for developing such procedures.

A cooperative agreement was established in 1986. And also, it's going to be renewed for a period of five years as of September of this year.

Under the first term of the cooperative agreement a task force was established. This task force was comprised of four representatives, one from the four CVSA regions. These representatives had expertise in such areas as vehicle inspection, paper inspection, motor carrier safety, and also other areas of inspection.

These representatives were ex officio representatives of the Federal Highway Administration and Research and Special Programs of DOT. These are the two organizations within DOT that promulgate motor carrier safety regulations and also hazardous materials regulations.

Now, this task force established a set of draft procedures for the highway shipment of spent fuel.

I must note that CVSA did not have inspection procedures for the transportation of spent fuel. They had inspection procedures for hazardous materials transportation and also inspection procedures for motor carrier safety inspections, but neither of these were unique for spent fuel shipments. Therefore, inspections in the past have been conducted by DOE, the utilities for the states, using a different set of procedures each time.

Obviously then there's a need for some

uniformity there. Because they don't have inspection procedures already, development of these procedures on this cooperative agreement proves to be mutually beneficial to both CVSA and to DOE.

The inspection procedures are intended to be used at the point of origin and at the point of destination of the shipments. Inspectors will look at the driver, the shipping papers, the vehicle and the package.

On the driver they'll look at such things as record of duty status, state permits, and his license, the shipping papers, they'll look at the material that they carry, the activity, the quantity.

On the vehicle they'll look at the mechanical operations of the vehicle, the brakes, the horn, the windshield wipers, the tractor, the trailer and other aspects.

And on the package they'll look at the labels, the markings, and also they'll take radiation surveys of the package itself.

There are several benefits to be derived by developing such procedures. The most obvious, the most important of which, is they intend to minimize or eliminate the need for in-route inspections. And this is how this is going to be done.

When a vehicle is inspected at the point of origin, and it passes that inspection, a decal will be affixed to that vehicle indicating that it has been sent through a CVSA inspection procedure. As that vehicle is en route to its destination, and it reaches a subsequent inspection point, it is allowed to pass through that inspection point, because it has already undergone the same procedures that they're instituting at that particular inspection point. It is then inspected again at its point of destination.

Now, reducing en route inspections will also reduce the shipment delays, reduce costs, reduce risks to inspection personnel and reduce risks to the general public.

The draft procedures, as I mentioned earlier, have been reviewed by the following organizations, Western Interstate Energy Board, Southern States Energy Board, Conference of Radiation Control
13
Program Directors, also CRCPD, and the now reorganized Nuclear Transportation Group. And also other DOE

organizations have reviewed these procedures.

Comments have been received from all these organizations, with the exception of CRCPD. Their comments are due by November of this year. Their comments also are of a different nature than the other organizations' comments. They are commenting on the health, physics inspection procedures that are contained within the entire inspection procedures. So these are due by November, this year.

When comments have been received by all of the organizations, they'll be incorporated into another version, another final version of the draft procedures, and that final version will be implemented in the five-year pilot test to actually test if they accomplish their intended purpose. This pilot test will be used on but not limited to shipments of radioactive materials going to WIPP.

There are several benefits, several purposes for instituting the pilot test, the first of which is to evaluate the soundness of the draft procedures, to see if they do what they're intended to do, to give us more feedback; secondly, to develop a training curriculum for the vehicle inspectors, and also the vehicle inspector trainers; and thirdly, to develop a data base that's large enough to answer whatever questions that might arise, particularly the question of inspections frequency.

This data base should be large enough to contain several elements or several characteristics of shipment of radioactive materials, inspection of vehicles transporting radioactive materials, so that parts of this data base can be exported for other purposes.

The pilot test will be completed in basically two phases.

Phase 1 is preparing a research design that will outline how the inspections will be conducted and what's going to be involved, who is going to be involved, how they're going to do them.

Phase 2 is the actual implementation of the pilot test and the analysis of the results.

The phase 2 is much longer in terms of duration than phase 1, because pilot tests will be conducted over a period of three-and-a-half or four years.

To give you a little more detail about the activities that are contained in the two phases, I've developed the following list of milestones.

First, we intend to complete the draft research design.

Next, submit a final research design to DOE for our approval, our review and approval.

Thirdly, a complete draft training curriculum will be developed for the vehicle inspectors and for the vehicle inspector trainers.

The inspection implementation plan will then be developed.

Next, training will be implemented.

The inspections will then be conducted for a period of, as I mentioned earlier, three-and-a-half or four years. Information will be gathered during this phase.

We'll then conduct regional workshops, where they'll review the input that's been obtained during the pilot test and revise procedures to accommodate the input or any modifications.

And lastly, when the approval of CVSA membership has been obtained, then we'll have uniform vehicle inspection procedures, because the membership of CVSA represents forty-eight different states, I think it's forty-nine by now, and ten Canadian provinces. So then everyone will have agreed on the draft procedures.

That concludes the formal part of my presentation. I'll answer any questions.

DR. CARTER: I have one question, John.

I know a number of states at the moment have gamma monitoring as part of their truck weighing procedures. In other words, they interrogate trucks at truck weighing stations.

I was just curious if you knew how many

states happen to have those. And I'm sort of interested in how frequently a truck might be monitored as it passes across the country, either by DOE or by individual states or even by local organizations.

Do you have any feel for what the future looks like?

MR. WILLIS: No. I have no information on that. But the very fact that you said that some states have it and some states don't is the reason why we want to develop uniform vehicle inspection procedures. That's the very problem, is that everyone doesn't have it, and they're not uniform from state to state.

So at the conclusion of this test we hope -- or this particular activity we hope that all states will agree on one set of procedures.

DR. VERINK: To what extent do you think you could apply dates to these milestones?

MR. WILLIS: Okay. Could you put that last chart up?

We intend to have the draft research design completed by March, the middle of March of 1990; the final research design submitted to DOE by May of '90 -- and these are estimated dates right now -- completing the research curriculum by September of '90; preparing inspection implementation plan by November of '90;

initiate the training program, March of '91; initial inspections will be conducted, they'll start in March of '91, and they'll end April -- excuse me -- the winter of '95; regional workshops will then be conducted in the winter of '95; and by June of 1996 we hope that we'll have the approval of CVSA's membership.

DR. VERINK: Thank you.

DR. PRICE: Yes. You mentioned in phase 1 prepare research design, and you said that it would be how they do the inspections. And I would assume that in the research design, which you're really going to be talking about, is what are the dependent variables, what things are we going to measure, how are we going to sample to get reliable and valid data and so forth.

Would that not be correct as to what is coming out of your research plan?

MR. WILLIS: Yes.

DR. NORTH: First I'd like to ask you to describe the significant differences between this vehicle inspection program and the one that already exists on hazardous materials other than radioactive materials.

To what extent is this proposed vehicle inspection system very similar to the one for other hazardous materials? To what extent are there significant differences?

MR. WILLIS: Okay. To my knowledge -- Jeff.

MR. ROBERTS: As John commented, these inspection procedures have been designed specifically for spent fuel. So where there are radiation measurements, those are going to be incorporated. Where there are unique aspects of spent fuel versus hazardous materials, those have been taken into consideration.

Also, the aspect of the total weight of the vehicle has to be considered when compared to other types of vehicles carrying hazardous materials.

DR. NORTH: Well, let's be specific.

For example, consider the requirements on the driver. Inspections of the driver was the first part of your second bullet on the page describing this program.

What differences are there in terms of what's asked of the driver, his record, other qualifications? Are there any tests for alcohol or other substances, anything of that nature?

MR. ROBERTS: Currently this program is designed specifically for the vehicle and the package itself. We do have plans for implementing driver training programs, as well. We haven't dealt at all with the issue of drug testing, alcohol testing at all at this time. I think that's something that's definitely going to be of interest to the general public and to us as a shipper.

DR. NORTH: How about the shipping papers, which is the second point on that bullet? Is there any significant difference there?

MR. ROBERTS: Just from the standpoint again of uniformity and understanding that the shipping papers are in order and that there are no problems dealing with those.

The idea basically behind this program is not only uniformity but reciprocity between the states, so that they each understand that these inspections have taken place in a uniform manner and that they can rely on those so we are not in the position of inspecting trucks just because they crossed an arbitrary state border.

We'd like to add some science and some real technical aspects of the inspections, such that we can try and make these shipments go as smoothly as possible and not have any trucks, for instance, getting inspected three or four times in a period of maybe three or four hours because they've gone across state borders.

MS. HOLM: Can I address this?

For drivers of radioactive shipments and a certain class of explosive hazardous materials there are more stringent training requirements, and the papers would be checked to insure that that training has been satisfied, because that would be part of the registration of the driver.

So, yeah, you'll get that.

DR. NORTH: Is this basically done the same way as for other hazardous materials, or is it significantly different? And if it is significantly different, what are the differences?

MR. KOUTS: I don't believe that we're prepared to discuss that detail at this time. We will provide that information to you.

DR. NORTH: Okay. Let me go on to another question. This is on the list of organizations that have reviewed the packages that exist at this point.

You mentioned that you have comments in from all but one of these, the Conference of Radiation Control Program Directors.

From the four groups from which you've received the comments, could you characterize what those comments are and what changes, if any, you're planning on making in the program as a result of those comments?

MR. WILLIS: I have a little more detail

over in my briefcase, if you'd like me to get it.

DR. PRICE: While he's doing that, let me ask this question, just to kind of fill the time here.

Both the next topic, which is permitting, and this topic on inspection have been really regarded in the past as being the sovereignty of the individual state, and certain states now will be sacrificing that sovereignty as they cut across lines in that they will be agreeing at least not to conduct an inspection.

And is there any difficulty in this area, both in the area -- well, that we're addressing here, I think I'll just limit it to this, on inspections, where some states may, in fact, not go along with the CVSA type stuff?

MR. ROBERTS: That's a definite possibility. We will not be able to preclude a state from using its sovereign jurisdiction.

Our idea and the idea of the CVSA is that we will give the states an option that they can rely on on an inspection from another state if they so choose.

We will still run into the situation potentially that they will not want to honor that. This effort is designed to give the states that shipments will be going through an option regarding that.

DR. PRICE: And membership in the CVSA

doesn't commit them to the conclusions that they come to providing this.

MR. ROBERTS: Basically an approval by CVSA members will mean they'll go back and try to work it through individual states. Some will be more successful than others, I would suspect.

MR. KOUTS: The goal here again for this is our desire to have as much continuous movement as we can in moving these materials across the country. And if we can alleviate with reciprocity some of the inspections that occur in state borders through the development of confidence in uniform procedures, then I think that's a benefit to everyone involved.

There are no guarantees associated with whether or not the CVSA work will allow the type of continuous movement that we would like but we're certainly trying to work toward that.

John, would you like --

DR. PRICE: Let's go back to Dr. North's --

MR. WILLIS: To answer your question, first of all, the comments have not been -- all of them have not been received yet. Therefore, the procedures have not been modified to incorporate those comments. But I can summarize some of the comments that you asked about.

Western Interstate Energy Board, their

comments were -- their key concerns were the leniency of the out-of-service criteria, especially for radiation levels.

Southern States Energy Board, their comments -- their concerns were -- some of them were on the general support for the implementation of the draft procedures. And they also commented on the basic errors in terms of wording and typographical errors. They also talked about some of the health physics standards of what's going to be used in the procedures themselves.

CRCPD, we haven't received comments from them yet, but we should shortly.

Nuclear Transportation Group -- let's see. They felt as if the procedures were too detailed.

And some of the other DOE organizations, their comments were very general in terms of what organizations they represent.

DR. PRICE: Another question on equity.

Since it starts at the point -- the inspection is done at the point of origin and the destination, the burden of inspection is going to fall differentially on states by this.

And how is equity accomplished given this? Are they reimbursed in funding? Or is there some mechanism for equity?

16 MR. KOUTS: Well, this is a subject that's been in litigation in various states for a while. There is a -- the department's viewpoint is that -- and again, since no shipments have been made, from the radioactive waste program standpoint, we're not really actively involved in any of the litigation associated with it. But there have been states that feel that fees should be paid to -- for each shipment, essentially, to defray the cost of inspection in those states of spent fuel shipments.

This is an issue that, again, certain states have implemented it, it has been in the courts, and I can't really comment, since I'm not an attorney and certainly not representative of the department in that area. But it has been subject to litigation in the past, and it's something I think we'll see more and more of potentially on states interested in charging fees to shipments through there.

There are some states that have already indicated that they will be doing that. And there are

DOT and consistency rulings that have occurred. There is a recent court decision out of Colorado associated with it.

Again, these are basically related to the defense shipments, and we have not been a party to the suits.

MR. KOUTS: Any other questions for John?

I'd like to now introduce Judith Holm, again of our Chicago Operations Office, who will be talking about some of the AASHTO work related to motor vehicle permitting and overweight motor vehicle permitting of overweight truck shipments.

MS. HOLM: I'd like to, before I get started, sort of frame this issue a little bit.

The concern about overweight trucks was expressed yesterday in some of the degradation of highways. As we've looked at this issue and received information from the group we're working with, the American Association of State Highway and Transportation Officials, they have given us some assurance that, given the certain configuration of the vehicle, that, in fact, you don't have -- given the reduced number of shipments with overweight shipments, you do not have excessive degradation. You may, in fact, reduce the amount of wear and tear on the highway.

As you're probably aware, the Federal Highway Administration and DOT have given states the authority in the overweight truck shipment area primarily because of infrastructure concerns and because DOT felt that the states had a better idea and had a better handle on infrastructure at the local level.

So with that framework, our program has to make two key decisions concerning overweight trucks.

One is whether to proceed with an overweight cask design. And that decision is due in 1990.

If yes, as a result of this study, then the decision is what proportion of the casks should be overweight. A legal weight cask, as you heard the first day, would be about 56,000 pounds, and a legal weight truck is considered a cask and vehicle up to 80,000 pounds. And that's standard through all states.

Overweight casks, which was not discussed very much, is a maximum of 80,000 pounds, according to our request for proposal.

As I said, overweight trucks require a permit to operate over the federal highway system. States argue the authority to set those limits and to issue the permits.

DR. PRICE: Could I just ask for

clarification, since you indicated that a truck at 80,000 pounds is legal weight, and then you said something about an overweight truck at 80,000 pounds, and it's a little confusing here.

MS. HOLM: An overweight cask can be 80,000 pounds itself, and the vehicle on top of that could be, you know, on up to 115,000, 120,000 pounds.

In the RFP which we issued for the cask, request for proposal, the top limit was specified at 109,000 pounds for cask and vehicle.

MR. KOUTS: I'd like to clarify this for a moment.

Perhaps it didn't come through in our cask development presentation, but each of the legal weight truck cask contracts has an option to go and develop overweight truck casks, also. And when you're talking about making a decision associated with whether or not we want to develop overweight truck casks, what we're really talking about is exercising that option within those existing contracts.

The firms identified are General Atomics and Westinghouse, who are legal weight truck cask developers at this time. There are options in those contracts to also develop overweight truck casks.

Just so you have an understanding, this is going to be a separate procurement. It's something that we have as an option in our existing procurement.

MS. HOLM: The reason we're interested in an overweight truck option is that this could potentially reduce shipments to a repository or MRS by as much as 30 percent. This is comparing a legal weight cask, which would carry between three pressurized water reactor fuel elements and seven boiling water, overweight could carry five or twelve. So there's a significant increase in payload.

This takes into account the number of reactors that have forty-ton cranes and is based on the base case which Rob Rothman mentioned yesterday of the 56/44 rail/truck split.

There are problems associated with overweight trucks. One is the lack of uniformity in state permitting practices. And as a result of that, in 1986 the study which we conducted had recommended working with the American Association of State Highway and Transportation Officials.

This group is state officers in state departments of transportation that have authority for permitting of vehicles, for setting regulations related to permits and fees, and generally regulating transportation and infrastructure concerns in the states.

AASHTO, at our request, agreed to establish a task force on truck size and weight as a subcommittee -- as part of their subcommitee on truck size and weight regulation.

That subcommittee was composed of members of each of the AASHTO regions, a chairperson from the State of California Department of Transportation. And that office basically staffed the task force. We had representatives from the Federal Highway Administration, the AASHTO staff from Washington, American Trucking Association, the Association of International Bridge, Tunnel and Turnpike Authorities, and DOE in both operations and cask contractor organizations, as well as the institutional program.

They began working with OCRWM in '86 to evaluate national uniform permitting. And a couple of issues relating to this will -- the load divisibility question was federal highway.

The Federal Highway Administration policy is that overweight shipments that can be divisible should not be permitted, and there was a threat of withholding federal aid funds for highways in the case of divisible loads. These kinds of loads usually are magazines, logs, heavy commodities that can be considered divisible.

Some states felt that overweight cask shipments would be considered a divisible load.

Upon request, The Federal Highway Administration sent a ruling back, or at least a note back, to DOE that said states don't really have to worry about the divisibility issue with an overweight cask, primarily because the cask itself is overweight without any payload. The payload is about 6,000 pounds.

So looking at that they said it doesn't seem to be a problem.

The task force, over several working sessions, developed a conceptual vehicle, which was an envelope that described maximum and minimum tolerances that could be allowed by the states. The group developed a survey and asked states and other organizations, the IBTA group, what they would consider to be the maximum load that would be allowed on their highways, if there were any administrative or policy requirements that would attach to those kinds of vehicles.

And they have since analyzed the survey results. And the good news is it looks as if every state would permit such a vehicle. A lot of states had no problem with the vehicle, and, as you'll see in a minute, some did have other restrictions, such as time of day, seasonal and other operating kinds of restrictions.

The vehicle that was fairly uniformly agreed upon by the states, and after getting comments back from the states, the AASHTO group presented this maximum envelope conceptual vehicle as a vehicle that would weigh 115,000 pounds, which is with cask and vehicle.

That was considerably more than we had anticipated, and we were pleasantly surprised that most states would readily permit this kind of vehicle.

18

There were other specifications such as axle spacing to accommodate the load. And when you have a certain dimension on axle spacings, you distribute the loads so that the wear on the pavement is not as great as if you did not take into account this loading factor.

There were other specifications such as tire size, tire widths. A lot of research has been going on lately at Texas A and M and at the University of Texas in regard to pavement/tire interactions. We've been learning about those sort of things.

So that information from the AASHTO group and the other research groups will be fed back into both our operations and cask contractor work.

DR. RAJ: What's the height? You don't have a height scale on that.

MS. HOLM: Maximum height is thirteen-six.

This is not scale. This is a conceptual drawing. The vehicle width is incorrect. That should be eight feet, six inches, which is the federal standard at this point. They would not restrict that width.

The task force report currently is under review by AASHTO's policy committee. We had a meeting of the complete subcommittee on truck size and weight, and they approved the policy recommendation, which was to adopt a uniform permit.

In the report there is a uniform permit recommended, which I can supply to you. We just received the final report, final draft report from the group last week. Forty-nine states will permit the vehicle.

As I mentioned, various operating restrictions could apply. Limits on continuous movement, such as the time of day restriction or weekend or holiday travel, would be the only serious obstacle we could see at this point to continuous movement. And we feel it is feasible to develop a uniform permit.

The next slide shows a map of the country.

The states that are all blue would indicate that they would permit the vehicle and allow continuous movement.

The crosshatched states had a time of day restriction or some other operating restrictions.

No continuous movement, which would be a ban on weekends in Tennessee, and they were not willing to reconsider. The crosshatched states, as it says in your handout, they would be willing to reconsider their position on time of day restrictions.

And Georgia is the only state that indicated it would not be willing to permit such a vehicle.

DR. CARTER: What's the basis for their lack of willingness to permit?

MS. HOLM: For continuous movement?

A lot of it, I think, is judicial, where they may not have people servicing the permit offices at certain times. Also, a lot of states feel weekend travel -- there's increased holiday traffic or weekend traffic, and they just don't want to have oversized vehicles on the road. That tends to be historical.

We are continuing to examine overweight truck uniformity. As I mentioned, the AASHTO policy committee will be reviewing this in December. There is a national meeting with the AASHTO group where they will vote on the resolution to approve a permit for this specific vehicle.

The New England Transportation Consortium is another group we're aware of that has recently formed a compact to both issue uniform and reciprocal permits in a compact-type organization, vehicles up to 109,000 pounds. For the New England states, that's a real step forward. Initially, because of the nature of their roads being fairly narrow and having other infrastructure problems, they have not permitted larger size loads.

The other work we're aware of is the Transportation Research Board, which is currently working on several studies relating to truck axle loadings. There's a movement and a feeling that if you can somehow assess weight based on axle loadings that you might be able to change some of the regulatory requirements and there might be a regulatory change in how you assess weight, not to say that you'd increase weight that much, but you would look at weight differently in terms of regulatory requirements.

And I guess we include these examples just to note that while we're looking at a specific vehicle, and we ask AASHTO to look at our vehicle in particular, we're in the mainstream of increased interest in uniformity in overweight shipments, in moving toward larger size shipments for a variety of commodities, not just this one.

The late 1989 final AASHTO recommendation will be included with additional looks at cost, systems and operational factors in the decision on whether or not to proceed with an overweight cask.

We intend to maintain our liaison with AASHTO, monitor related legislative developments and monitor other truck uniformity activities as they're continuing.

Any questions?

DR. RAJ: How unique is this overweight truck for cask transport? And the other question is what fraction of the commercial truck fleet is the overweight trucks?

MS. HOLM: The second question, I can't answer that. I'd have to go back and get more information.

DR. RAJ: The reason for that is if these shipments constitute a significant part of the overweight trucks in the west, you're going to have a lot of problems convincing the permitters to permit that. But if the addition is only a fraction, very, very minimum, you know --

MS. HOLM: I think I'm getting it's a very small fraction. My AASHTO expert is in the back. It's a very small fraction of the total number of overweight vehicles.

What was the first question again, please?

DR. RAJ: Well, how unique is it in terms of weight? I mean are we talking the top end of the spectrum? This is the heaviest truck that's going to go on the road or --

MS. HOLM: No. No. There are much heavier loads currently being permitted and moved around the country. I could give you specifics at a later time.

DR. MC FARLAND: A question, Chris, primarily to Chris.

On the infrastructure, other than the interstate, has any assessment been made with regard to routes, on state routes, where the bridges would allow this load, or what effect this loading would have cyclically on the bridges?

MR. KOUTS: The nearsighted infrastructure study, as you've heard earlier, which was initiated last month, will be looking at twenty-five miles within the reactor site. We picked twenty-five miles as to what the fee results would be to the interstate highways as generally a good distance, and we are very interested in the structure of those bridges and roads to see whether or not, again, an overweight vehicle could be used on them.

That's essentially one of the reasons why we instituted that study. We've looked inside the fence, now we're looking outside the fence, and that's a very real interest on our part. We have civil engineers looking at those bridges and other infrastructure areas to be sure we have the latest information on them.

I would also like to draw to the board's attention the Task F analysis, which gives you some real numbers, if you will, on what we expect in terms of overweight shipments related in the system. What we did within the assumptions were that we made assumptions associated with what reactor sites could handle weight permits, and did a sensitivity analysis -- or could handle overweight casks, and we did a sensitivity analysis on associated costs of risk reductions that you will get in the system with it.

And I would draw the board's attention to that.

DR. PRICE: Chris, on the bridge issue there is a national data bank, I believe, that includes a large number of the bridges twenty feet in length and over that has ratings of their substructure and different kinds of rating schemes associated in that inventory.

Are you using that? And do you intend to have rating type criteria and apply that? Maybe even in general with regard to shipments.

MR. KOUTS: In response to your question about data bases, we're going to look at every data base we can. In fact, both the national ones, and we plan to go into the county engineers' offices to try to get as much information as we can about that infrastructure.

I can't respond to your comment directly without reviewing. I'm not directly involved with the study, and I'd have to get back to you on that. But my perspective is certainly that's a certainly very logical, reasonable way to go about it.

MS. HOLM: One final comment on the question that was raised earlier about how are we identifying and what are we actually doing to resolve some of these issues in the institutional program.

We view the public not as just a mass of people out there. There are different publics, if you will, and we have divided those different publics according to interest.

I think what you see in the last two presentations are some of the groups we have identified as either having authority or special interest in these types of issues and, if they are the competent authority, are the ones to help us resolve those issues.

And that's what we've been doing in this instance as a direct -- they're doing the work, and

we're benefitting from the work and their information.
So it's a definite cooperative agreement.

DR. PRICE: I would like to also ask the equity question I asked regarding inspection about permitting.

Is each state going to be collecting a fee on the permit? How is this kind of thing working?

MS. HOLM: In the case of the New England Consortium, the origination state collects the fee for the other states. So there is a potential that equity can be achieved through that format, where you could have uniform and continuous movement, but each state still benefits and issues -- in fact, you have a collective permit issued by a group of states.

Within the AASHTO group, they are looking at similar kinds of regional consortium or compact arrangements. So they are looking at that, and we're interested in what they're going to be saying to us.

DR. PRICE: Does that imply that each state then has a uniform fee structure, that one state doesn't impose a higher fee than another?

MS. HOLM: It varies.

Is that right? Yes.

MR. KOUTS: I would want to identify the continuous movement issue. Although we can get these vehicles permitted, I think continuous movement is the real issue associated with whether or not we consider overweight trucks. And although we can get them permitted, I think if we have a problem in terms of moving the shipments whenever we want, that's an operational consideration which we have to evaluate very closely.

So I do hope the board didn't get the impression that permitting is the only issue here. Continuous movement is also very important.

DR. PRICE: Can you define continuous movement and what the issue is again, please?

MR. KOUTS: It's basically do we have time restrictions associated with moving through various jurisdictions.

DR. PRICE: Curfews and things like that?

MR. KOUTS: Curfews, things like that. Whether or not we can ship on weekends, whether or not we have to avoid rush hour, things like that.

DR. PRICE: And we already know that such curfews are in place.

MR. KOUTS: That's correct.

So this raises the additional issue for us to deal with from an operational standpoint.

The question is you have to ask yourself whether or not it's worthwhile pursuing. And I think the AASHTO work, I think, is very important. It provides perspective from the standpoint of permitting. It also provides the insight with continuous movement.

You've seen some of the data we generated in terms of what the potential is, or you haven't seen it yet, but it's at your fingertips, as to what the potential reductions in risk and costs are to the system, based on what we have now.

So I think these are the types of things we'll be looking at when we make a decision as to whether or not we want to develop an overweight truck axle.

Any other questions from the board on this subject?

Okay. Now I'd like to introduce Mr. Michael Klimas, who will be talking about shipment monitoring. Mike will be talking about a shipment monitoring tool that will be used for the WIPP shipments.

The Office of Civilian Radioactive Waste Management contributed to the development of this tool. It has application in truck shipments. We are very much interested in it. We have not made any policy decisions on whether or not we would go with such a system for our shipments, but we are very interested in the subject area.

Mike will be presenting a presentation on shipment monitoring.

MR. KLIMAS: As Chris mentioned, I'll be talking about shipment monitoring and specifically the current DOE shipment monitoring program called TRANSCOM.

To start the discussion off, first of all, I'm talk about the operation control center, what that will look like in a general sense when we start shipping, then go into details into TRANSCOM, which is DOE's transportation communication system, which is really a satellite tracking system.

In terms of the operations control center, when we start shipping in the year 2003, early shipments in 1998, we will need essentially an operations control center, and this will be the kind of operations office, administrative facility, whatever, that will be coordinating all shipments with utilities, with the various DOE facilities, MRS repository and cask

1

maintenance facility.

We'll also perform traffic management activities coordinating with carriers on these shipments and perform various records management functions. Also provide emergency response coordination and implement in-transit safeguards. And finally what I'll be talking about we'll have some sort of system for monitoring tracking our shipments.

The current DOE program is called TRANSCOM, as I mentioned. And this was a relatively recent addition. The DOE monitors its current shipments.

Its overall funding for this activity was a joint OCRWM and defense program activity. Most of the funding for developing this came from Defense Programs, but OCRWM is very interested in it and provides some funding for this activity.

In developing this TRANSCOM system DOE had overall two objectives.

The first objective was to improve the overall capability to manage shipments while they're in process. Before TRANSCOM, the only control we had was with the four-hour call-in from a truck driver to his dispatcher, and, therefore, the control was between the truck driver and dispatcher, and DOE, the shipper, was -- as the actual shipper, was out on the loop.

The other part of the reason for developing this was DOE recognized that states were interested in our shipments. They want to know when they'll be coming into the state so they can perform any inspections, things of that nature.

And this program was developed to help them improve the coordination and communication with states on our shipments.

TRANSCOM has a number of features. I can identify here what I consider kind of key TRANSCOM functions, most important of which it provides real time tracking of the vehicles.

As I'll be going through later on, there are computer screens that have latitude and longitude coordinates of the vehicles, where they're placed on the map, and we know fully precisely where each vehicle is. And right now the way the system is operating, the vehicle location is updated every fifteen minutes, and it can be done continuously. But that's sort of a cost consideration, how much money do you want to pay for it, and so we decided right now a fifteen-minute time interval is appropriate.

It also provides complete data on each shipment. This includes destination, origin, routes traveled, estimated time of arrival, material being moved, things of that nature.

It also has a module for providing emergency response information.

Another capability of this is it provides two-way communication. We not only know where the vehicle is at, but we have a way for a truck driver to send messages to TRANSCOM Central. We can also send messages from TRANSCOM Central to the driver. So this provides that we not only know where it is, but we can talk back and forth if various situations arise.

Another important feature, which gets at kind of the overall cooperation communication with state and local governments and tribal organizations, and allows other organizations to monitor shipments, as I'll be discussing later on, TRANSCOM Central has a computer screen to show where the shipment is at. Also, computer screen software is available to state agencies so they can watch the shipment as it moves through their country and through their state.

DR. CARTER: Excuse me. Could I ask you a question at this point?

Exactly how would the tribal or state or local organization, or whatever, tie into the TRANSCOM system?

MR. KLIMAS: Okay. Right now TRANSCOM is

operated out of Oak Ridge, Tennessee, through Analysis Corporation. They provide training on the TRANSCOM system, and they provide software to the state agency or tribal government. And then I think it's -- I'm not quite sure on this question, but I think once they get the computer hardware, which is really an AT computer, they can monitor the shipment as it comes through.

DR. CARTER: I'm curious about the support or lack of support or funding, if you will, for equipment training and these sorts of things.

Is there a cost involved in all the

2

services made available? Is there a cost to the tribes and so forth? If so, what are those costs?

MR. KOUTS: The basic costs they have, they incur, are, you know, the costs of a PC and a modem that would allow them to access the system. Then basically they can call TRANSCOM Central and monitor the shipment, and they can monitor the progress of the shipment. There's actually something on the screen that would indicate if there's a problem in the shipment. They would know at the same time the operations people would know.

So it provides real time feedback to designated individuals within states who are monitoring the shipments.

DR. CARTER: So the service is available, and it's up to them to fund their entry into the system, in essence?

MR. KOUTS: Again, the costs are relatively minor. It's the cost of a PC and a modem. And then all they're really paying for that is the phone line. We would provide -- or DP provides the tran to the rush shipments.

DR. CARTER: But it's up to them to provide the funding, no matter what level it is, whether it's monitored or not. I just want to make sure of that point.

MR. KOUTS: They do have to provide their own funding for their own PC's. Yes.

DR. CARTER: Thank you.

MR. KLIMAS: This is sort of a snapshot of the developmental history.

The initial feasibility study for this activity was conducted in 1986.

Prototype software was developed in '87.

And in '87 and '88 we did initial testing of the software and overall satellite tracking systems.

We did some enhancements based on that testing and really starting in October of '88 with the shipment operational.

Right now we're in a state of what's called limited operations. It's been used this last year for twenty-five roundtrip shipments. The way the project's going, you tend to use it for that program.

DR. PRICE: With your experience in the

operational twenty-five roundtrips at this point and with the mid-continent gap that exists right at this time, what has your experience been on maintaining knock-on, this ground wave type thing? And with geography, has the accuracy been deviated in certain places because of the geographic area?

MR. KLIMAS: There is a problem. There is a mid-continent gap, especially at night when the sky waves tend to interfere with the location. There tends to be blips in the program, but they usually come back to the location.

I have seen the data on the recent shipments. I know we felt that we were getting better and better tracking of that, but I think there's still potential for an issue there. And once the mid-continent gap is solved, that will provide better information, precise information.

MR. KOUTS: Strangely enough, Dr. Price, you may be interested in one of the areas that seems to be a problem has to be right here in Albuquerque.

Apparently the position moves around quite a bit, it does settle down eventually, but there are -- I guess topography in this area has an impact, and there are some deviations right here in the Albuquerque area. It's one of those that has been identified with the system.

DR. PRICE: And how about alignment between the masters and the slaves, where you get into configuration problems? Has that occurred?

MR. KLIMAS: Well, we're using, as I mentioned, the QUALCOM system, and that locks into the station that the strongest signal was from. But the system also takes its signals from all the stations around, and it does an algorithm that gives a best estimate taking all the information. So that by using that means we have the best estimate possible. But there is still some sky wave problems.

DR. PRICE: And what kind of repeatable and predictable -- I think those are two different kinds of accuracies -- have you been able to find?

MR. KLIMAS: I'm not sure what you mean.

DR. PRICE: Like people are unpredictable.

MR. KLIMAS: I'll have to get back to you in terms of specifics in terms of a range.

DR. PRICE: Those are two different kinds of accuracy measurements, I think, that are made in this kind of thing, as well as site location measurements, maybe three different kinds of measurements.

And repeatable has to do with coming back to the same location and the accuracy of the relative

3

variance with respect to that, and predictable accuracies to the extent that, if I recall correctly, you can predict the accuracy of the location that you're going to and be there.

MR. KLIMAS: We have a general band, I guess, probably, just to answer your question. We assume it's generally one to two miles for which our active vehicle would be in. But it can vary around that for certain parts of the country.

DR. PRICE: One to two miles.

MR. KLIMAS: Yeah. Two miles.

It's probably the widest band, and it's in the mountain areas right here. Sometimes you go much farther than that because of the sky waves and things that occur at night. We've done a lot of testing. In our testing of the satellite system we try to calculate those differences, and you probably have data on various studies that address that question. I can provide that to you.

DR. PRICE: And have you found cycle slip and tendencies to get off the multiples because of inaccuracies in the system?

MR. KLIMAS: One case there has been a lot of noise problems sometimes, is what you're referring to, and I think a lot of those have been solved. As we went to newer equipment for receiving TRANSCOM, we felt that we solved those noise distortion issues.

DR. PRICE: In the newer equipment, is that multi-chain equipment as such?

MR. KLIMAS: Yes. I think it was A and I we were using the equipment from.

DR. RAJ: Could I ask one more quick question?

Is there a plan to monitor the driver performance through the system, institutional and legal constraints are looked into, those things?

MR. KLIMAS: Right now Defense Programs manages this. I'm not sure of their plans in that area. We can probably get back to you of how they might in terms of speed, if he's going fifty-five miles an hour, sixty-five, that type of thing.

DR. RAJ: The fatigue or whether he was drinking, whatever the criteria.

MR. KLIMAS: Well, it depends --

MR. KOUTS: We do plan to monitor very

closely WIPP shipments. I can't really speak for Defense Programs as to what their plans are. I know they have selected a firm to do their truck transport.

DR. RAJ: I'm interested on the OCRWM.

MR. KOUTS: At this time we do have plans to monitor. I don't think until the shipments occur we really get into again looking at in detail these issues. I think we certainly have an interest in them. At this time I think we're waiting for the shipments to begin. We're monitoring and seeing what things we want to look at at that time.

Again, management of these programs and so forth concern another part of the department, but we will be monitoring them very closely. I can't really comment on all the different things.

DR. RAJ: From a purely technical perspective, are there enough gadgets and technology to do that real time? Have you looked at that just from a technical perspective?

MR. KLIMAS: It's possible. We could do a breathalyzer test before he gets in the vehicle and probably transfer that to the TRANSCOM, I guess. But there is concern, and I --

DR. RAJ: The FRA has funded a study, actually an actual demonstration study, on the monitoring and performance of the railroad engineer. You may want -- it would be beneficial for you to get in touch with them.

MR. KOUTS: I think that's a good point.

MR. KLIMAS: Restrictions on drivers'

national driver's license for the truck drivers is -- more and more there are restrictions in a general sense, and I think our program is much more sensitive, and we're very, very cautious, a very detailed program inspecting the drivers.

In the next slide I'll kind of get into some issues we just kind of discussed a little bit in terms of what I look at as a configuration of TRANSCOM.

We already have the communication system, which is, as we were talking about, the vehicle location system, satellite system and the ground station. And then computer hardware and software, what we call TRANSCOM Central.

As I mentioned, we were discussing vehicle location system, which is long-range navigation communication system. And in our test we found that the accuracy was really one-eighths to probably two miles. the one mile up there probably more accurately is two miles.

It's a general band we're fairly confident

4

with, but there are times a location can bounce around from that. It's not 100 percent within two miles.

We did extensive testing on this. We first did a prototype software. We did trips that ran from Washington, DC, through Savannah River, through Oak

Ridge, Tennessee, then up through Texas and Albuquerque, and from there up to Idaho Falls, things of that nature, where we experienced most of the problems, and we got some firsthand experience of some of the ground wave and sky wave problems that we discussed earlier.

DR. PRICE: With regard to the largest inaccuracies that you found, were these standing conditions? That is, they existed all of the time? Because I would think the accuracy that you would normally find in a predictable accuracy would be a much tighter figure like 150 to 1,500 feet or something like that, much closer than a mile to two miles.

MR. KLIMAS: Right. Generally we feel this is a fairly wide band, we feel in general it's probably within one-half to one-eighth mile, and probably closer to that in many situations.

What we did in testing, we took longitude and latitude coordinates that were published by the US Geological Service and took a reading at that point in these trips. So we think our comparison is fairly accurate in that extent.

DR. PRICE: But the large deviations, were they really local, they're in a given location.

MR. KLIMAS: Right.

DR. PRICE: And you would find that

deviation every time you return to it.

MR. KLIMAS: Well, I experienced -- in this instance particularly was an area we had some problems in, mostly at night. We do have driving at night. And various atmospheric conditions had impact on that, too. So what would most likely be in the mountainous areas, such as Albuquerque. And most likely it would occur in the evening but may not occur every day. But most likely it would occur.

MR. KOUTS: In a couple of slides, I think Mike's going to get to, is a chart of the country to give you a perspective as to what we're talking about nationwide.

MR. KLIMAS: As I mentioned, satellite tracking systems were used. Initially it was the Omninet satellite system. There's been some reorganization and buy-outs, things of that nature.

There's really two commercial satellite systems in the United States. There is, of course, Marine Satellite Systems, but the two geopositional satellite systems are Geostar and Armynet.

We tested both, and the only reason DOE decided to go with QUALCOM is that right now QUALCOM has a capability to provide two-way communication. Geostar will have this, but I don't think they're going to have it now until the fall of this year, is my understanding.

So because QUALCOM already had this capability for us not only to receive messages but send messages back to a truck driver, we went with QUALCOM. And the information is sent to a ground station which is in turn sent by phone lines to our TRANSCOM central.

This is kind of a rough configuration of Loran-C changes in the United States. There are roughly four chains in this country right now. There is, as we discussed, a mid-continent gap. And my understanding is the US Coast Guard, which manages this program, intends to install that chain in this part of the country, I guess in the 1990's. I'm not quite -- I think that's still their plan, as I understand.

This is probably not necessary, but basically the Loran-C system through each chain sends out radio waves. There's a master station, which is M, and subordinate stations, and basically location is identified through the time difference between a master station and one of the secondary stations.

To obtain one point on this, in this case we have a master station of M and a secondary station of W, the difference in time in this was 13,370 microseconds, and that's -- you develop a line of position, then you get a reading from another master station, another one of its secondaries, you get a second reading, and where these two lines of positions intersect is essentially the location of the vehicle.

So you get latitude and longitude coordinate readings, and that's essentially how our TRANSCOM system works.

As I mentioned, it takes into account the data for more than one change, where it gets good, single readings from, and you use an algorithm in there where it gets the best fit, in essence, from all the data that's available.

I kind of discussed this a little bit, too, in terms of the country and the accuracy. We found very good accuracy in the eastern part of the country, which you would expect, that's where three of the chains are, is very mountainous, and found it relatively accurate.

As we got to the west, and particularly around Albuquerque, our findings were fairly consistent with this map, but really we can now also get into some of these sky wave issues where vehicle location tends to bounce around a little bit.

DR. NORTH: You've got a misprint on that map. Shouldn't that be one-sixteenth to one-eighth?

MR. KLIMAS: Yes. That is a misprint. I'm sorry.

This is just a kind of overall schematic of how the system works. As you can see, we have the Loran-C towers from which vehicle location data is received from the truck. That data and any code messages are sent from the truck driver to the satellite system. That's sent down to the ground station that's operated by QUALCOM. And they in turn by phone line send it to us through our operation control center. We in turn will submit the information on status to the shippers within DOE and also out of state and tribal government users.

This is just kind of a general configuration of how the equipment is located on a vehicle. You have the outdoor unit on top of the cabin. The truck driver has a monitor from which he can send messages, coded messages, and also receive messages.

In terms of the computer hardware for the system, TRANSCOM Central is operated by three networked 386 IBM-PC microcomputers. They also have backing up in case for some reason the three computers break down.

Right now the system has thirty-two modems which can have thirty-two users on simultaneously. That can be expanded to a much larger number, but right now thirty-two is considered probably the maximum number of users at this time.

A state user really only has to have a modem and equivalent to an AT computer, is all that's needed.

You have a number of software modules. You have tracking module, shipping information, emergency response, two-way messaging, you have archive data from all shipments that is kept for any kind of analysis for the future, and we have a number of reports.

DR. PRICE: In the area of software, do you have plans to develop software that will serve as monitoring with respect to deviations from the -- for example, a plan like the driver files a flight plan, so to speak, as to the direction they're going to go, and then if there is a deviation from that direction that this will raise a flag at the control center?

MR. KLIMAS: Right. The shipment information module includes the route that's going to be traveled, and if there is a deviation, that's identified on the screen. So that's in the system now, it's part of the shipment information and tracking that --

DR. PRICE: How is this identified?

MR. KLIMAS: Well, to go on, in essence, the driver would have to notify TRANSCOM Central that there is a change in schedule. Otherwise, there's a blinking light that would identify a change, the blinking light changing color.

DR. PRICE: How about deviation in path?

MR. KLIMAS: Right.

DR. PRICE: Path as well as time?

MR. KLIMAS: I'm not aware of time. I can get back to you on that.

DR. PRICE: I misunderstood what you said by schedule.

MR. KLIMAS: I meant schedule meaning the route being traveled.

The tracking module, really we have three sets of maps, one for our country level map, statewide level, county level maps. The maps illustrate major highways, US highways and also major state highways, principal cities and also a separate mapping structure for rail lines. Right now the system is only operational for a highway transportation. It's not yet operational on rail.

Emphasis of the program is to get it operational as soon as possible to be ready for the WIPP

6

shipments. Now, I think they've done some studies with rail lines. We worked with Union Pacific on testing it out, but we haven't done much recently on this. But I think in the future this will get comfortable in the operation in the highway mode.

I just went through a series of maps. As you can see, this is how TRANSCOM in a general sense would indicate location of its trucks.

The green light indicates there's no problems; the yellow light is indicating that the vehicle is stopped for one reason or another; and the red lights -- there's two colors of red, one is a minor change of schedule, and red, the deep color red, is an emergency situation.

This is again a state level map, in this case Tennessee. You can see where the indication D2 is located on highway -- I think it's Highway 40.

And again, we go down to the county level map, in this case down to Henderson County, which is by Oak Ridge, Tennessee, and identify what associates run Highway 75.

So we have those level details.

Some of the other software capabilities include -- we're talking a little bit about the shipment information and bill of lading. That includes origin, destination, planned route, estimated time of arrival. When it comes to each state, each state should have an indication of when each truck should be entering into the state line.

It also identifies a shipper and ID

associated with the shipment, material, description, weight, fissile class.

We also have another module on emergency response, addresses and names of the contacts and the shipper of record, and also a summary of response actions to help provide quick response to the accidents, to know what is involved in the shipment, what that means in terms of emergency response.

Finally, TRANSCOM Central, this is located now in Oak Ridge, Tennessee. There's a staff of eight persons. The shipments are monitored when they're ongoing on a twenty-four-hour basis. TRANSCOM Central provides training to DOE users and state and local governments and tribal users. Right now I think so far they provide training to five state governments and I think to four or five Indian agencies. And they'll be doing this in the future, I think particularly for the WIPP program. I think Defense Programs wants to train all states who will be in the corridor of WIPP shipments.

Indian tribes are also involved in the shipments, and this program is undergoing recent developments.

I mentioned the development statement, updated software. Since October of last year we've also undergone two or three more integrations to make more user friendly and address issues someone brought up in using it. So we are undergoing constant data change and improvement.

DR. PRICE: Questions?

DR. CARTER: Mike, I realize you've had limited experience, but you do have at least a partially operational system.

Do you have any indication now as far as operational dependability and so on?

MR. KLIMAS: We have a satellite system would break down and --

DR. CARTER: Well, any part of the system.

MR. KLIMAS: I don't think there are any problems. I could go back and probably ask them what kind of issues or breakdowns might have occurred. I don't think there has been any to date.

DR. CARTER: Well, does anyone have an estimate of what might be the weak link in the system?

MR. KLIMAS: Weak link. I don't know if the analysis identified what the weakest part of the system is. The satellite system we're using, QUALCOM system, they have backup satellites. They're using more than one satellite. So it could break down, but there's also a backup in that situation. The computer we have, as we mentioned, a redundant computer system at TRANSCOM Central.

So I really -- off the top of my head I'm not really going to give you what point would be the weakest considering all factors.

DR. CARTER: Well, I guess a related question is whether the entire system has backup or redundancy capability.

MR. KLIMAS: There is redundancy built into it.

DR. CARTER: In the entire system?

MR. KLIMAS: In the entire system.

DR. PRICE: You indicated, Chris, that you had not decided on this but that this was something you're looking at with interest.

Are you also looking at other things, like GPS NAVSTAR? Is this really the principal thing you're looking at at this point? And is there any hesitancy or reservations or --

MR. KOUTS: Well, I think we contributed to the development of the TRANSCOM system. I think we're very interested to see how it works out in operations. And I think our judgments in terms of what system will measure these will come out of observing the WIPP experience and seeing how successful that system is.

And as improvements and new products come to the market, I think we'll evaluate them.

Right now I believe this whole system took about $1 million-and-a-half to develop. $1-and-a-half million. We contributed a small portion, probably less than 10 percent to that, basically because we did have an interest.

Again, we'll get some real time feedback from operation of the system, and we'll be able to determine whether or not it's something we want to pursue.

As Mike mentioned, this system is not yet applicable to rail shipments, and that, of course, would be one of our considerations, too. So unless TRANSCOM is also applicable to rail, you know, we would have some problems with it. We'd like to use the consistent system throughout our transportation system.

So I think those types of considerations will be taken into account, but I think we're very fortunate to have the program that will be operating the system, and we'll find out in response to Dr. Carter's comments how reliable it is and whether or not there is redundancy to feel comfortable about it.

And I'm sure DP is very interested in it, too. But in talking to the DP folks, they've had very good experience with it, it's been fairly well received by the states through which the shipments are going, because it does give them real time feedback.

I'd like to also talk a little bit about what Mike said about every four hours the driver calling in. That's essentially what will happen with the WIPP shipments. But again, given the regulatory structure associated with spent fuel shipments, NRC physical inspection requirements cause the driver to call in every two hours.

So again, I just want to draw to the board's attention that there are different requirements, you know, across DOE programs. We're bound to deal with NRC regulations, especially for spent fuel. Some of the requirements are different, and I just wanted to draw the board's attention in that regard.

And this will be in addition to whatever shipment monitoring mechanism we would have for our shipments. So the driver would be calling in at a short time interval.

DR. PRICE: Do you have any question about
the value of such a monitoring system as has just been
presented to us to OCRWM?
MR. KOUTS: I think, again, its
applicability to rail, I think, is one of the issues,

one of the things that --

DR. PRICE: But that's a relatively minor problem, is it not, applicability to rail?

MR. KOUTS: Not necessarily. The setting up the structure associated with it, of course depending on how we ship in the system, whether or not we ship by regulatory or dedicated train, whether or not we'll get the real time feedback. And greater accuracy potential is an issue we want to look at. Rail applicability from my perspective is important.

DR. PRICE: But isn't it simply -- and maybe I really don't understand something here.

Isn't it simply a matter of putting the unit on a train?

You've got a unit on a truck, and it works.

Isn't it a matter of putting a unit on a train?

MR. KOUTS: Well, it's also developing the software package, the mapping capabilities, putting on the rail routes, and putting extra effort into it. We are looking at whether or not we want to try that with some of the research shipments that we may be making in the future, and that may be a test bed to see whether or not this type of system is appropriate.

DR. PRICE: If you can map the highways,

you can map the railways.

MR. KOUTS: I agree with you.

The other consideration is, as has been touched on by the board, reliability and whether or not actually new technology is going to be developed that would cause greater accuracy to be available to us and perhaps a system of lesser cost.

As you know, technology makes leaps and bounds every year in microprocessors. There may be advances in the field in the near future, and certainly
8
we want to pick up on them. I think this again is an experiment that we funded, and we're very much interested in seeing how it operates.

DR. RAJ: Chris, are you aware that the railroads are already doing what you are saying?

MR. KOUTS: No. I understand that.

Again, as we mentioned, we need a system that's user friendly. If states are going to be using this system, associated with getting real time access to monitoring the shipments for emergency response considerations, I think we have to look at those aspects of it.

So it's a little broader base than there are just systems out there, but are those systems adaptable and useable to states. And again, this is something we have feedback for our institutional processes through the systems, and we're developing our support of their concerns, also.

Are there any other questions for Mike?

MR. KLIMAS: I might just mention, I think one of the improvements -- I think QUALCOM and both GEOSTAR, they're hoping sometime in the early '90's to provide a location through satellites, and if that's possible, they might minimize or reduce the problems we have right now with Loran-C.

MR. KOUTS: We've had a request from our court reporter if we could take our break now. If that's acceptable with the board, we'll do that, then we have three more presentations this morning.

DR. PRICE: Our court reporter may quit on us if we don't so --

THE REPORTER: I might fall over.

MR. KOUTS: So we'll take a break for ten minutes, if we could.

(Break.)

MR. KOUTS: I'd like to begin the rest of the presentations for this morning. I think we'll be able to save some time because we won't have to introduce a lot of speakers, since I'll be giving the next three presentations.

The first one will be on emergency response, and I would like to mention again that I'm going to give a brief summary of some of the material that we covered in our Transportation Coordination Group meeting last July 25th and 26th in Chicago, Illinois.

There was a great amount of material available, instruction of emergency response throughout this country where I want to focus on, specifically for this presentation for the board, and the implementation of the 180(c) requirements, which specifically direct this program to provide emergency response training to state, tribal and local governments.

First of all, I think it's important to note that the responses to all types of peacetime radiological accidents, including transportation accidents, basically are coordinated by the Federal Emergency Management Agency, FEMA, under the Federal Radiological Emergency Response Plan. And I won't try to pronounce that acronym for you.

The primary aspect of that plan is that

state and local governments have primary responsibility for protecting the public health and safety and that the federal government, the cognizant agency, will respond appropriately at the state request.

DR. CARTER: Chris, I've got somewhat of a quibble with you on a word there, and that's "assumes." I think that's a given. I think it's --

MR. KOUTS: I totally agree with you.

DR. CARTER: -- an established fact that that is the responsibility of the states, it has been, and I suspect it always will be.

MR. KOUTS: I couldn't agree with you more.

There's been a great deal of evaluation of state, tribal and local emergency response capabilities that's been done by the NRC, the Department of Transportation, FEMA, and the Office of Technology Assessment. Basic conclusions of most of those reviews are basically there are considerable resources dedicated to emergency response planning and training throughout this nation. However, the preparedness levels are not uniform.

As I mentioned earlier, FEMA is responsible for coordinating federal and state participation in developing emergency response plans. There is the Federal Radiological Preparedness Coordinating

Committee, which provides policy direction to FEMA and a variety of federal agencies who participate in that community.

There is also a Transportation Accident Subcommittee that coordinates activities related to radioactive materials transportation.

Basically there's a document called FEMA REP-5, which is guidance for the development of state,
9
local and radiological emergency response plans and preparedness for transportation accidents.

This is a document that was provided at TCG. Dr. Price, I'm sure, has a copy.

That provides planning and response guidance for state, tribal and local governments. However, the use of that guidance is strictly voluntary on the part of the state, tribal and local governments.

I'd like to address what the DOE roles are in the area of addressing emergency response for Nuclear Waste Policy Act shipments.

Under the Federal Radiological Response Plan, DOE's responsibilities include those of the shipper. We will be the shipper of materials. And we are also the cognizant federal agency for assistance in a transportation accident. If a transportation accident occurs, and if the state calls us in, then we will respond. But it is up to the state again to call us in. In most cases it may not be necessary, but if they do call us in, we will provide our assistance.

Besides our responsibilities under that plan, we also, as I mentioned earlier, have requirements -- the Office of Radioactive Waste Management has requirements under Section 180(c) of the Nuclear Waste Policy Act Amendments of 1987, where we're responsible to assist the states in emergency response training.

I'd like to also draw to the board's attention a document that was recently put together by our Office of Defense Programs. And it's a red document. Again, it was distributed at the TCG meeting. I'm sure Dr. Price has a copy. It's entitled Emergency Preparedness for Transportation Incidents Involving Radioactive Materials.

It identifies what DOE resources are available. It describes DOE assets and capabilities. It provides an overview of the federal emergency preparedness program. It also describes what the participating federal agency responsibilities are.

There is also a DOE order in relation to response to emergencies that's called DOE order 5500.1A Emergency Management System. It defines the DOE organization for emergency management. There is an Emergency Management Coordinating Committee that resolves public issues. There's also an Operational Emergency Management Team that coordinates supportive field response.

There is also a group at DOE Headquarters that is made aware of any transportation accident associated with radioactive materials. If one does happen, I am notified. Ralph Stein is also notified. I'm the first person notified within the Office of Radioactive Waste Management, and there are other offices within that are directly notified. So we are kept aware of any accident or potential emergency related to the transportation of radioactive materials.

So the department does have an internal structure where we do coordinate with the various offices that may have applicability to the accident, even those who may just be interested from an informational standpoint.

As a personal note, I've received phone calls sometimes in the middle of the night, sometimes in the middle of the business day, and many of them are very minor, just again to keep us aware of any transportation-related accident that any departmental vehicle is involved in.

I'd like to now move on and go through essentially the same presentation that I gave for the Transportation Coordination Group last July, last month.

What we're going to talk about are options for implementing Section 180 of the Nuclear Waste Policy

Act Amendment.

To review the requirements of the act, of the amendment, I should say, it essentially states that DOE shall provide technical assistance and funds to states for training public safety personnel of local governments and Indian tribes throughout the jurisdictions waste is to be transported.

Training is required to cover procedures for safe routine transportation and emergency response situations.

And funding will be provided through the use of the Nuclear Waste Fund.

Our approach for defining emergency response training needs are essentially to define the governmental roles in the process. And I think there's a lot of literature and a lot of history associated with that.

The next step would be to assess Indian tribal and local government training needs based on their response roles. We certainly don't want to leave the states out.

The next step would to be assess existing training programs to determine the adequacy for meeting tribal and local needs and evaluate funding mechanisms. Very key along this line of thinking would also be that we'll have to identify routes sometime in the future over which -- we will have to train and provide training assistance over those routes we're going to transport on.

DR. PRICE: I hate to interrupt in a way, Chris, but on that specific point I don't have a clear idea myself specifically of the steps that need to be taken in order to identify those routes and when the steps are and who actually makes the identification of the routes. Is it DOE, is it DOT, and what the steps are. I'm unclear on this.

MR. KOUTS: Okay. Let me try to amplify on that.

The department will decide what routes will be used and which routes there will be training on. We will use the existing federal regulations at the time for highway transport of the Agent 164. If there are federal rules associated with railroad routing, we will be using those.

I mentioned earlier, I think we'll get to this in a moment, we talked about what process we're going to go through the routes. We also have a time frame identified at the end of this presentation when we will identify when we will be doing this. So if you want me to address that now, I could, or I could get to it later in the presentation.

I'll address it as we come up to it.

Are there any other questions of the board at this time?

Okay. As I mentioned, we'll have to identify the routes over which we would ship, either to the repository or to a MRS.

After we identify the routes, of course, we'd have to then identify what tribal and local jurisdictions along such routes would exist.

And then we would plan on initiating training assistance three to five years before shipping.

And I think that last point is a very key one. We don't want to train too far in advance of our shippers, simply because we're concerned about the turnover at the state level and the local level, and the personnel that we would be training. So we've identified a time period of about three to five years prior to shipment as one we would begin providing this training assistance.

We've asked for input from our institutional groups in this regard, and again, this is a way of us getting feedback as to whether or not what we're doing is reasonable. So far we haven't received any real violent objections associated with this time period. We have received some concerns about whether or not it's appropriate, but again, I do want to make the point that there's a great deal of emergency response training already out there for other types of shipments, hazardous materials shipments and so forth. And our perspective is that we're going to add onto that existing capability, to adjust that training as may be necessary to deal with radioactive waste shipments.

Now I'm going to go through a little bit of each of these items individually.

In terms of definition of government roles for emergency response, I think, as I mentioned earlier, we certainly understand from the federal and state level what responsibilities are, but I think we want to get a better idea what the Indian tribes' and also local governments' perceptions are in the area of emergency response and what they view their roles are.

Sometimes it's not uniform in the state, and I think we're going out and we're going to be gathering data in this information. We're also going to be correlating closely with the other federal agencies who have responsibilities in the area, FEMA, DOT, the Environmental Protection Agency.

We also plan on using cooperative agreements with our national and regional groups and

Indian tribe groups to get their input on this issue also.

In terms of assessments of tribal and local training requirements, our options are again to use the cooperative agreements, or new cooperative agreements, with national and regional groups, to coordinate the federal agencies, and to interact with representative state, tribal and local governments, or do all three. And I think what we're trying to provide again is what options we have in front of us.

Potential evaluation criteria for those training programs are here. I won't go through all of them. I think funding mechanisms would be, of course, of interest.

The act is fairly explicit in terms of directing us to provide assistance to states through which there will be a transferance of funds to tribes and local governments. That's what the act says, and that's what we intend on doing. The types of training, the formats of the training, all these are different potential evaluation criteria.

Our options for assessing existing programs, again, use of our regional groups, and again, offshoot of our institutional program, are mechanisms for which again we're drawing people into the process to get their feedback.

Also, we can do our own assessment of these in consultation with other federal, state and tribal agencies. I think this is a good point to provide some perspective to the board. It's just the amount of emergency response training that's already out there. I alluded to this earlier.

FEMA has a great deal of training courses in a variety of different areas. They have their own national emergency training center, there are regional FEMA offices that offer courses in emergency management institute-sponsored courses that are conducted by state agencies.

There are also DOT programs. A gentleman with the Federal Rail Administration talked to me prior to the presentation and indicated that DOT has a very active program in this area, and certainly we're going to be looking into that and seeing what we can learn from it. We're also very interested in what the states and the industry and the Environmental Protection Agency have required.

DR. CARTER: Excuse me, Chris. Could I ask you one question about the slide?

Are the FEMA regional offices the same as standard federal offices, like EPA and so forth?

I know NRC and DOE don't fit that system exactly, but I guess most of the other federal agencies do.

MR. KOUTS: That's correct. We do have a variety of emergency response training programs already in existence within the program. They have been tailored to the specific shipment campaigns involved there. There are basic workshops for first responders. There's a certain training approach that they've taken in the WIPP area. There again are a variety of DOE courses already available, and again this red book outlines them.

And if the board is interested in more detail --

DR. PRICE: Chris, the WIPP training, as I understood the meeting in Chicago to indicate, had a goal -- and I may not have this understanding completely accurate -- had a goal of training people along the routes so that somebody was trained within every 200 miles. I think I heard that distance given.

Do you have any criteria for how many persons should be trained along the routes and at what intervals and so forth?

MR. KOUTS: No, we don't, not at this time. I think we're going to be looking at whether the

200-mile distance, as you've represented, is appropriate. But again, as we get into assessing local requirements in the areas, I think we'll have to make those judgments.

That's why I'm suggesting we go through this educational process for ourselves and make those judgments that the WIPP program apparently has already made.

Dr. Price was interested in how we were going to identify potential routes. When I went over there to the TCG meeting in Chicago, I think to a great extent many of the route designations probably won't be a great mystery by the time we're ready to identify them for emergency response purposes.

And the reason I say this is that we will for the NEPA process associated with our facilities have to go through transportation analysis. And we will be doing analysis of routes. We will have to for that process use our routing models.

I think people will get a perception

perhaps of the types of routes that we're looking at from each destination and origin point. So I think that will be helpful from a public standpoint to provide perspective as to what we're looking for in the routes.

And I think, again, at this point in time,

12

you know, our routing strategy, as I mentioned earlier, is to use Agent 164 for truck shipments, to use federal rules for rail shipments, if they are in effect at the time. If there are none, then we would have started a process by this time where we would have actually a public process for people to comment on the criteria which we're using for rail routing and have an opportunity for the public to comment on it.

So by the time that we're three to five years before we're shipping, I think the public will have a pretty good idea of the routes we'll be shipping over. And, of course, when we identify them for training assistance, I think the perspective there will be that we will not train over -- we will not ship over routes that certainly we haven't trained on.

And there may be adjustments associated with this. I think once we identify them we'll get perspective as to whether or not the routes are appropriate, and we'll get feedback, and there will be adjustments made in perhaps all along the campaign process.

DR. PRICE: The actual route chosen is up to the shipper that he selects to use or she selects to use.

Will you be collecting the frequency of use of routes, and will the states get feedback as to which routes are being most frequently used? And is this kind of data base and data transfer in the plans?

MR. KOUTS: Okay. Let me respond to a couple of your comments.

First of all, as the shipper we will not make the final route selection. Our perspective is that we will provide a series of routes over which the carrier --

DR. PRICE: That's what I meant. I used the wrong term. I meant the carriers.

MR. KOUTS: -- will make the final designation.

Our perspective, again, is that when we're ready to ship we want some flexibility associated with the routes we want to take to deal with weather conditions, to deal with construction that may be along the route.

So as a result, as DOE, the shipper, we'll identify through this process a series of routes over which the carrier will have options to select within those routes over which he would go.

There will be a pre-notification process prior to the time that the shipments are made. I think each of the campaigns that we'll make from each reactor site are -- the states will be aware of within those campaigns how many shipments will be involved, and they'll be aware of when those shipments are going to take place.

DR. PRICE: But the carrier files within a certain number of days after it -- and I think it's quite a few days -- after he has completed a shipment what route he actually took; isn't that correct?

MR. KOUTS: That is correct.

DR. PRICE: And will that filed information become available to the states as to the actual routes?

MR. KOUTS: Certainly.

And I would submit to you, also, that, assuming we have a shipment monitoring capability in effect at the time that you heard about on it earlier that the WIPP shipments are using, that they'll have real time feedback as to what the actual route taken was. So besides providing the formalistic responses through -- after the shipment is made, they'll be able to monitor the shipment as the shipment is going on.

DR. PRICE: This has a direct bearing on training, where and --

MR. KOUTS: Exactly. Exactly.

I've already mentioned the rail issue associated with rail routing. I've stated earlier that we're planning on beginning this training assistance three to five years before shipping. I've gone through this, again, and we've received comments from the TCG in terms of what this assistance would include.

Developing curricula in consultation with states, tribes and local governments, providing trainers for a training type of program -- again these are options -- sponsor training courses, attendance courses offered by other organizations, or sponsor training exercises as follow-up to training courses, or all of these.

DR. PRICE: Chris, regarding assistance and what it includes, isn't there somewhat of a problem in the area of equipment? You can train the people to respond, but if they aren't equipped to properly respond, then the training has a disconnect there, does it not?

MR. KOUTS: One could take that position.

The department's perspective on this, the Secretary of Energy has made a statement on this essentially in this area, is that -- not specifically for this program but for other programs, that this type of assistance does not include equipment, and we feel it's incumbent upon the states to provide the radiological monitoring equipment and so forth that they would need for this purpose.

And that was a stated position that we took at the TCG meeting, and that's departmental policy at this time.

DR. PRICE: But the states that receive the heavily traveled routes are the ones in respect to equity who need the equipment, and those that may be exempt from the traveled routes or may be exempt from routes at all do not have a need for that equipment, so is there not an equity problem if there isn't a source of equipment for these states?

MR. KOUTS: There is a potential equity problem in that area. And I can only state that our perspective at this time is that the training assistance that we've been directed to provide to the Nuclear Waste Policy Act Amendments does not include the provision of equipment to the states for emergency response purposes.

DR. PRICE: Are you concerned about that?

MR. KOUTS: We're certainly concerned and sensitive to the statements and the comments that we've received on this issue.

MR. KOUTS: Dr. North.

DR. NORTH: I'd like to follow that up with a question, maybe more of a comment, and invite you to think about the risk communications and risk perception aspects of this.

We're talking about a program where we've got these truck casks -- and let's take a legal truck, legal weight truck, as a baseline.

I can imagine a situation in which there is an accident involving one of these trucks that's rolled off the road downhill a ways. And I'm trying to imagine that situation as it might be perceived as a threat by state and local officials that have no capability for the radiological monitoring that's under their control. In other words, has that thing leaked. And, two, no capability to deal with anything that heavy in a difficult situation.

It seems to me that it is going to be almost imperative, if you are going to get people to support your program, that you have a credible response to deal with an accident. Maybe not the rupture of a cask, but something that would be perceived as a significant accident involving one of these vehicles, and that you can assure them that you will have the equipment for monitoring and the equipment for being able to deal with the vehicle on-site in a very short period of time.

And it isn't going to be a question of relying on some other federal agency, FEMA, whom they may not trust, and it is not a matter of dealing with the state, which may not have the funds in their budget to have that kind of equipment.

Rather, there is some guarantee on the part of the Department of Energy that you will solve that problem for them, because I think without that you're going to be in fairly serious trouble in terms of getting the support from a lot of state, local and tribal officials whose support you're going to need.

MR. KOUTS: I couldn't agree with you more, Dr. North. I think we have to take one step at a time.

Let's assume that there is an accident where the cask has left the trailer. Let's talk about a truck shipment that's rolled into a gully, the first responder comes up on the scene. The issue here is what kind of training do you provide to that first responder.

Well, there is a handbook that's given out hundreds and thousands -- hundreds of thousands of copies that have been distributed by the Department of Transportation. And the first thing that that responder would do, and should be trained to do, is to, first of all, look at the placarding on the trailer and see from that placarding what type of materials were on that trailer.

And there are hazardous materials that are transported every day in this country. And this book goes through, and he can flip to a page in that book, and it will tell him specifically as the first responder what he's supposed to do.

Now, in most cases in a spent fuel accident, he's essentially told to clear the area, to make sure that everyone in the area, I think within a half mile, is evacuated from around the cask.

So the other thing he could do also is go directly to the shipping papers contained in the truck, if that's available, to determine what was in the shipment.

But again, there's placarding, and there is a guide for this first responder to do.

So now, as I mentioned earlier, we have
14 responsibilites. The DOE is the cognizant federal agency since we will be the shipper. If the state calls us in -- again, when I went through this presentation, the initial responses and so forth is by the state.

If the state calls us in, we will bring all the capabilities that we have at our command to respond as quickly to that accident as possible, radiological release or not.

And there are existing capabilities within that department now. They will be beefed up, especially for our shipments, because we will be doing more. We'll make sure that we have national and regional coverage associated with this. There is a system within the Department of Energy to deal with this.

So I couldn't agree with you more in terms of the department needs this capability. We do have it in relation to the WIPP shipments. We will have it for our shipments. And there is a step-by-step approach associated with the response to these accidents.

What we're talking about here is what additional training that we will provide to state and local governments for our shipments. In many cases they have this handbook, they know that by looking at the placard or from what a cask looks like as to what initially they're supposed to do. Then there's a structure within the states to respond to that.

I also mentioned we will have shipment monitoring. If there is a problem, we notice the truck isn't moving, there will be a blip in the screen, we'll have people monitoring this on a real time basis, and we'll bring our capabilities to bear.

I don't want to leave you thinking that the department is insensitive to this issue. It's one we're trying to get out in front of, trying to do it in a public environment, providing options.

When I get to it in a minute, I'll identify the process where the public will have input into our strategy.

So in response to your comment, I think it's a well-founded comment, we totally agree with it, we're working to try to be sure the public has confidence in our capabilities.

DR. NORTH: I think that's really the gut issue, is your credibility, that not only the general public but the responsible officials at the state and local level have confidence in your ability, that we're not going to be dealing with the equivalent of a Valdez situation where they were assured that, yes, that there could never be a spill this big, and, if there were, the industry had all the equipment to deal with it.

You've got to convince a lot of very skeptical people that you have the equipment and the procedures so that they're not going to wind up holding the bag for a big mess. And it seems to me the sooner you get started on that job, then the more you recognize that you may be involved with a very significant expense to have that credibility in a demonstrated fashion the better.

I think the lesson of the importance of emergency evacuation on nuclear power plants should not be lost. It seems to me this is a very similar issue. It could be a crucial issue in terms of the evolution and the future of this whole program.

DR. PRICE: Chris, wouldn't you have a reservation in your mind -- I think I slanted my question by the way I've already started to state it.

Would you have a reservation in your mind if, let's say, on an off ramp there was a similar incident to the North American Rockwell on-site incident, where the trailer twisted and it sort of slumped over on its side and it lay there, a first responder coming up to that kind of situation, and say it occurred in a downtown area, with highrise buildings, and evacuating everybody within a half a mile?

MR. KOUTS: Well, again, each individual situation is different, and it's up to the local authorities in terms of how they're going to deal with the situation.

Yes. I think --

DR. PRICE: But here we've got a situation you just told us, well, he goes by the book, because his first responder tells him to evacuate, he has no equipment to evaluate the situation or confirm what the status is. And his first responsibility is to really stabilize the situation, and evacuating everybody within a half mile is really a destabilizing thing if it's not necessary, very, very expensive, and you talk about class action suits and so forth, and simply because maybe he didn't have one basic piece of equipment.

DR. NORTH: Just imagine the evening television coverage that day.

MR. KOUTS: I would submit to you, Dr. Price, that regardless of whether or not he evacuated a half a mile away from the cask or not, that there would be such a response in a metropolitan area that maybe a half mile wouldn't be enough. I think there would be a perspective -- you know, we talk about risk reception and so forth. Again, it's in the hands of the local people.

In terms of the training, yes, besides flipping to the page and saying, okay, well, this is -- I've look at the placard now, and I know this is a radioactive spent fuel shipment, part of this training would also involve being able to look at the cask, make a visual inspection of it, and determine whether or not something is awry.

If the cask is over on its side, it's maybe not on its shipping cradle but its impact limiters are intact, there's no evidence of any release of material to the naked eye, I think that's evidence for the first responder and also the secondary and tertiary responders within that local area as to the proper amount of precautions associated with dealing with the incident.

Again, there are a variety of training mechanisms that you can go through. The driver may be there telling people essentially what happened and providing his own assistance and giving perspective as to what's wrong with the vehicle.

Again, there are several mechanisms here which determines the level of response associated with it.

DR. PRICE: Has DOE provided a basic list of equipment that a first responder ought to have to be properly equipped to respond?

MR. KOUTS: Certainly we have our shipments. Yeah. I can't speak for the WIPP program.

Judy, do you have any information in that regard?

MS. HOLM: No.

MR. KOUTS: Jeff?

MR. ROBERTS: Part of our work with the Conference of Radiology Control Program Directors is to look at the issue of equipment, what will be necessary, and we'll be looking to them to make a recommendation to us, as they are the radiation folks in the individual states, what does an individual locale need in the way of monitoring equipment.

I think the thing that needs to be hit upon here is that this is a step-by-step process. Emergency response was identified as one of the initial transportation issues but has definitely been heightened in the last two years, specifically with regards to the change in the legislation related to the amendment which we're trying to respond to.

The first step is the department's attempt to respond to that new legislative requirement, and we're going to be spending the next X number of years putting this in place. We're looking for input from regional groups, from our TCG groups and instate individuals and exactly what is the best way to implement that.

And I think whereas there may be positions right now with the DOE, I think we need to continue to listen to those kinds of comments. And the ultimate implementatioon of an emergency response system is going to be dependent upon that interaction. So this is the first step.

We're talking to the people, we're out getting people who are under cooperative agreements with us, we're out getting their perspective and their recommendations, and I think that's the way we have to look at it. There's no question we need credibility. There is a question as to whether you can ever obtain it. But I think it's -- that is our objective.

MR. KOUTS: I think our view is we're optimistic in that regard.

DR. CARTER: Let me make a couple of comments on the instrumentation business. I think this is obviously an issue.

I don't think there's any question about it between DOE and among the states and local folks. Now, you obviously need communications in these kind of things, you need personnel, and you need equipment.

Now, obviously a first responder, as far as I know, heretofore has always been able not only to visually look and observe and make recommendations or whatever, but also they have fundamental equipment that they can make measurements and make some decisions based on that sort of response.

In a lot of states these are in highway

patrol. They've got very elaborate systems. However, most of their equipment is probably old and this sort of thing but involves essentially measurements of gamma and beta radiation. Some of them probably have some alpha capability. But I dare say there are very few states that have monitoring capability for neutrons, for example.

You know, this is one of these things that you folks are going to be concerned about. So I think this is something that certainly needs to be given some careful consideration.

I wanted to ask you a related question, though, and that is do you anticipate that the first responders are -- the people that do radiation monitoring are going to be any different in a transportation accident than they are for fixed facilities and so forth? Do you envision any differences in this pool of people on a state and local basis?

MR. KOUTS: Probably not. I think as you indicated, many of the first responders to transportation accidents will be highway patrol, state police, local police. And again, our perspective is that --

DR. CARTER: Highway maintenance people?

These are the people that are going to encounter any
accident which may occur first, I suspect.

MR. KOUTS: That's correct.

And I think our intention is to provide
additional training and training assistance to make sure

for radioactive waste shipments and fuel shipments that they'll have that additional training beyond the training that they already have. And again, it depends on the training structure they have.

DR. CARTER: Certainly as a trainer I don't want to negate the effect of training, but if you don't have the equipment in measuring radiological characteristics, you're absolutely dead in the water.

MR. KOUTS: We've received several comments on that issue.

DR. CARTER: You can't do it with a divining rod, no matter how well trained you are.

DR. NORTH: I'd like to encourage that in this program, and maybe as a report back to this board within the next year, you consider working out in detail a scenario for an accident such as was described, it's the off ramp of a freeway and in a major metropolitan area, and just go through the steps of all the things that are going to happen, how the response is going to be made, what your training is going to accomplish in terms of what the first responders know how to do, what kind of equipment they have available.

And let's look at it in detail, because I think it's that level of detail that you're going to need to have to convince people.

MR. KOUTS: Again, as I've indicated, we're going to go through a process, we're going to be assessing capabilities and needs of state, tribal and local governments across the nation. And I think that's the first step. And we've identified that as a first step, and we'll be doing that.

If I could go to the next slide here, I'd like to get a little bit more definitive, if I could.

We talked about providing perspective to our institutional groups and to the public at large as to what the major steps are in dealing with this issue. And this is the type of perspective we like to give people.

For instance, next year -- right now we're planning on June of next year to essentially have developed the draft Section 180(c) strategy for assessing training. We'll make that available for public review and comment. We're looking now at an '89 to '94 time frame.

Within that period we will also be

reviewing that strategy with the institutional network. We'll be revising that strategy as necessary depending on the comments. We'll define emergency response. We'll be consulting with other federal agencies to review focus of current training programs and audiences.

We'll be using our cooperative agreements. And, of course, as we heard earlier, through the TRANSNET system, providing access to states and tribal governments, and do evaluation within their own states.

And this is where we are right now, a general framework, if you will.

As to the types of activities we'll see over the next five years, in the '95 to '97 time frame we feel we'll have a little bit more definition perhaps in the MRS repository system. We'll be evaluating our shipping logistics in a little more detail. We'll continue to provide the same access to computer models, and these models will be updated on a yearly basis to assist states and tribes in route evaluation and designation.

We'll be defining the basic training needs of Indian tribes and local governments, surveying existing training courses to determine adequacy in terms of tribal and local training needs, if additional instruction is needed for tribes and local governments.

We can consider this supplementing existing courses or developing new courses for.

We will be defining workable mechanisms for the administration of funds associated with 180(c) limitation. And at the end of that time period we'll also issue a formal DOE policy statement for public review as to what our position would be.

In the '98 to 2000 time frame we'll have much of the information that we're developing the studies now of the infrastructure study. We'll make decisions associated with infrastructure. We'll know what our modal mix is. We'll have identified our potential routes, and we'll begin to initiate our training assistance.

In the 2000 to 2003 time frame we'll be preparing for shipping operations, we'll be continuing our training assistance, and we'll be providing a list of potential routes to our carriers to insure the shipping is conducted through the jurisdictions which we've trained over.

And then in 2003 we'll begin our operations, assuming that that's the time frame we're talking about. And, of course, all this could be adjusted as we deploy the facility earlier. And we'll be continuing -- we would be continuing our training assistance, and then we would be adjusting that training based on its effectiveness and also based on any changes that may come up in the rural routing network.

DR. RAJ: There is something that's troubling me, and maybe it's time to ask the question.

There have been a number of issues that we discussed in the last two days, and all that I have learned is that you'll be doing something in the future on many of the questions that we have raised.

How long have you had or how long has DOE had to grapple with these issues, starting from the design of the cask to, say, an emergency response, in terms of years?

MR. KOUTS: In terms of years, in terms of grappling with design issues, we issued our RFP's, I believe, in 1987. In the '88 time frame -- we didn't sign contracts until last year. In terms of emergency response, really, our first focus on it, our first strong focus, had to do with specific direction from Congress and the Nuclear Waste Policy Act Amendments. And that's about a year-and-a-half ago when we again recognized the need to begin to develop a policy and a strategy associated with implementing the requirements that have been identified by Congress.

DR. RAJ: You mean to say before the

amendments to the act there was no need for emergency response requirements at all?

MR. KOUTS: No. I'm not saying that.

I'm saying that that was a consideration, and we were looking at the mechanisms as to how we would do it, but again the act does give us specific guidance in this regard, it does give us the authority, for instance, to use the nuclear waste fund for these training assistance purposes. It is a statement on the part of Congress, and it does provide a little bit more emphasis to the program on it.

DR. RAJ: But to study the various issues involved in these things you don't need to spend any more money. It's not implementing anything at the moment. You're just in the planning stage.

And I find that there are many issues that, you know, you do have an aid for Congress to give you, the guidelines and act and to find out what kind of emergency response capabilities the people should have and emergency response instruments they should have.

And all that I'm hearing is that you're going to be doing this in the next two or three years and four or five years. The concerns of the public and mine have been there for years.

MR. ISAACS: Let me address this issue,

because I think it's rather fundamental here for the whole three-day issue here.

I think it's important for you to get some perspective on the pace and the history of the program and on the priorities that the program has had so that you can help us make good judgments about where we're supposed to go in the future, where, of course, the board is to make its comments.

This program, as I've characterized it often in the past, from the time that the Nuclear Waste Policy Act was passed in 1982 and signed into law in '83 until the amendments to the act, was largely about two things, and I've characterized that semi-humorously as siting and survival. And those are the two things that the program worried about.

We had nine sites in six states in the first repository program. We had numerous sites, 236, I think, in seventeen states in the second repository program. We had a fledgling MRS program where we were trying to decide whether or not one was needed, what we were going to do with it, and, if so, where were we going to put it.

All these things were exceedingly tight time deadlines. As a result, the program had to make a number of very different decisions about where to place its emphasis. And the emphasis was placed with no apologies in trying to carry out those specific mandates of the act.

And most of the effort in the program -- and unfortunately you weren't here for the original briefings we gave to the board, but others were. Most of those efforts in those first five years were trying to carry out those mandates of the act.

It's true that we probably could have done some of the other things in the transportation area. But I think a conscious decision was made that we need to take a look at the pacing of this program, the schedules and the milestones, and work out a program and allocate resources, both in terms of federal manpower, contractor manpower, money, and emphasis, in a way that was consistent with those provisions.

We made a conscious choice that we would pace this transportation program in a way that did not make prejudgments, that we thought we would probably have to go back and revise it at some point anyway when we knew better about certain kinds of siting decisions, for example, and when we could better apply our resources to some of those problems that weren't facing us at that point in time quite so squarely in the face.

Now, in retrospect, one might say, well, you should have done more of this, you should have done more of that.

Well, let me tell you, we were up to our eyeballs in siting problems at that point in time. It was very difficult to make those kinds of judgments.

So I heartily agree that we need to take a look, and you can help us take a look, at what are the issues -- and you're helping us now, what are the issues that we ought to be focusing our program on, how should we be organizing that program.

We still feel we have an adequate amount of time to put together a very first-class program. I think it's unfortunate that we -- and we need to schedule some other meetings for you to understand the depth of history and capability that the Department of Energy is starting from in the transportation of these wastes.

We've transported nuclear weapons for decades, and we do it safely, and we do it with the kinds of rigor that are very, very effective and have come under extreme conditions, and we've handled them all successful. We've handled all kinds of other shipments in the Department of Energy for decades, and we've done that successfully, as well.

Now, there is a set of challenges that are going to go above and beyond that, radically above and beyond that, when we finally get -- when we're going to start shipping thousands of shipments of high-level radioactive waste or spent nuclear fuel to facilities as yet identified. And we need to do that in a very disciplined fashion.

Once again, we are trying to develop some of those building blocks. You can help us by pointing out, as you're doing, some of the key features that you think are important. I think some of Dr. North's comments, for example, right on target. Some of Dr. Carter's comments, right on target.

We have to decide, though, what's the right pacing of the program. It's a zero sum game in most cases, you know. If you take a dollar and put it towards transportation, it has to come from something else in this program. And that's why those kinds of balances and priorities are important. You need to help us make those kinds of judgments.

DR. PRICE: To what extent, Tom, are you
19
able to tap what you're describing as rich history, for example, in the area of emergency response, where surely there is in DOE a considerable body of planning for emergency response and an ongoing class right now in the area of emergency management, information management,

given emergencies and so forth? To what extent do you take advantage of the very history you're talking about, and do you have mechanisms to do that?

MR. ISAACS: Yeah, I think we do. I think we have taken some advantage of them to date. Some of the experts working in these areas are the same people who have helped develop some of those other techniques.

I think that we need to develop probably a closer linkage in the development of some of these things, but they're available to us, and we've taken advantage to some extent now, and I expect we'll take more advantage as the future comes along in those areas where it makes a lot of sense.

MS. HOLM: Could I adjust another -- the defense programs group and transportation group, transportation management division, has right now a working agreement with the urban consortium to look at emergency response issues at the local level. We think it's too soon for us to start talking to local level people in this area. So we're following what they're doing.

There will be major workshops in Blacksburg in the next two weeks, and we are having people in our program attend that workshop, in fact participate in the workshop. So we do keep in close contact with the group over there.

We're aware of the background and history, and, as Tom said, we do employ the same people, basically the contractor level, that helps us with some of these problems.

In addition, as far as the emergency response issue, that is an issue that was identified as one of our sixteen original issues we had developed in an issue discussion paper on that back in 1986, '87.

In addition to the issue of discussion paper which outlined the issue, we have some internal papers that go more into depth in the issue and give us guidance as to where we need to be proceeding. This was before the amendments act.

So it's not as if we're just listening, waiting for Congress to tell us what to do.

DR. PRICE: Judith, you just passed a little test. Since I'm from Blacksburg and the Management Systems Lab, I'm aware of that conference, and I'm glad to hear that --

MR. KOUTS: We recognize you're on the agenda, also, so -- I do want to mention in response to your comments, Dr. Raj, that, again, the amendments act more formalizes the department's interest in this area. But again, this was something that had been looked at in the past.

When I read a list of issues earlier from Jeff Roberts' presentation, emergency response was one of them, and that was identified back in the mid '80's as one that we had to pay particular attention to.

What I do want to portray to you, though, is, although we recognize something is important where Congress recognizes something is important, it does give the program a little additional emphasis in that area.

DR. CARTER: Let me ask you a question, Chris, completely in a different area.

Does DOE envision at all now any materials being transported and handled in the high-level waste program, high-level waste use, fuel elements, for example, or the containers, or parts of the conveyances, involving things other than radiological radiation types of problems, any hazardous material, for example, involved at all? Any concern that there may or may not be?

MR. KOUTS: That would basically be a product of our facility design and how our facilities are operated.

From our perspective right now, there are hazardous materials moved by the department for other program purposes. In terms of the radioactive waste management program, I think the only hazardous waste potentially that I could identify is by-products of our facilities depending on what processes are associated with it.

And that will be accounted for and dealt with and identified within the facility designs.

DR. CARTER: The reason for the question, of course, obviously this is sort of a crucial question in the WIPP program, since there will be hazardous materials involved in many cases.

Some of your containers, for example, some of the casks themselves, could involve the use of lead for a shielding material. The question is whether or not in an emergency scenario this material may be released and what attitude, for example, EPA has towards that.

This is the reason for the sort of question that I'm asking. I don't know. I'm trying to elicit a little information.

MR. KOUTS: Believe me, that's a good point. I haven't really looked at that, and I'd like to be able to look into that and get back to you on that.

DR. CARTER: I think it's something that should be given consideration, because it's not necessarily DOD unilaterally in this. There are other agencies that obviously would be or could be involved in it.

MR. KOUTS: We'll look into that for you.

Are there any other questions from the board on this presentation?

Good. Now we can move on to system safety analysis within the program.

I guess we're somewhere around a half hour behind or forty-five minutes behind at this time. If necessary, we can extend some of these presentations into the afternoon at the wishes of the board.

To go back to some of the initial statements that have been made associated with the major goals of the transportation program, first and foremost in our minds is that we want to make sure we protect the public health and safety.

We've talked about providing public participation, we've talked about using private industry, we've talking about conducting activities in a cost effective manner to some extent. I'd like to focus in now as basically what we're looking at in the safety area.

As we've stated in our presentations on cask development and operational planning, that we will meet all applicable regulations in existence for public and occupational safety, to include DOT, NRC, DOE, and any local regulations which are not preempted by federal standards.

I won't go over the rather extensive regulatory structure that we've touched upon over the past couple of days, except to draw your attention that there are DOT requirements.

We talked a little bit about placarding in the emergency response area. There are certainly DOT rules in that regard. Packaging requirements, requirements for moving of hazardous materials that are applicable to radioactive materials.

Also, we've talked somewhat about 10 CFR part 71, and there are a variety of subparts. There are areas that we haven't gone into a great deal, but nonetheless are very important in assuring safety.

There are a variety of DOE orders in this regard. Environmental, safety and health orders, certainly the safety of nuclear facilities, safety analysis and review system orders, quite a large body of orders from the DOE perspective on the issue of safety.

I'd like to draw your attention to DOE order 5481.1B, which has to do with an issue, I think, that the board has a special interest in, which is safety analysis and review system within the department.

It establishes uniform requirements for the preparation and review of safety analyses for all DOE operations. It defines safety analysis as a documented process to systematically identify the hazards of a DOE operation, describe and analyze the adequacy of the measures taken to eliminate control or mitigate identified hazards, to analyze and evaluate potential accidents and their associated risks.

It applies to all DOE operations, including transportation. In addition, it states that safety analysis naturally follows an EIS. It permits a two-stage analysis and review, preliminary analysis prior to the start of substantial construction and final analysis prior to initial operations. It also references, I'm sure something that Dr. Price is intimately familiar with, Rail Standard 882B, which is a defense standard on system safety analysis.

DR. PRICE: Let me ask you a question there.

It states that safety analysis naturally follows an EIS.

How do you interpret what that means? Because systems safety, if it's going to be systematically involved, as you indicate under the bullet above, that it should systematically identify the hazards of a DOE operation, and every basic system safety textbook, I think, starts out with a statement about system safety being a cradle to grave setup -- do you interpret that to say then that you do not apply system safety until after an EIS? Because if you've done that, you've changed the natural order of things somehow by definition.

MR. KOUTS: I put that up to provide you with some perspective as to some of the DOE perspective of the order on that process.

If you look closely at the slide, you'll recognize that it's essentially four facilities. And I think the perspective of the order in that regard is that until facility designs are mature, it's difficult to identify how to go about a system safety analysis without somewhat of a mature design.

DR. PRICE: I would most wholeheartedly disagree with that.

MR. KOUTS: I'm trying to give you the perspective of the order.

DR. PRICE: Yes. I appreciate that.

MR. KOUTS: And I appreciate your comment in terms of whether or not it's an appropriate emphasis. Again, I'm trying to give you the perspective of the DOE order in this area, and the interpretation of the implementation of the order.

MR. CARLSON: Chris, can I add a little something here?

MR. KOUTS: Certainly.

MR. CARLSON: I think basically the order has to do with a systems analysis as the formal documented review of the facility design. So it's not an implication. System safety is not performed early. It's more the formalization of the review process and the specific report. Where it indicates it's a safety analysis has a formal analysis of the design.

MR. KOUTS: There's nothing that precludes earlier analysis, but there is a formalistic process associated with prior to the operations and documentation process. What the order does is reference that.

DR. PRICE: Yes. It does not preclude, but, I guess what I really think is the point, it does not also order.

MR. KOUTS: That is correct.

I'd like to draw to your attention a document that we did publish in December of 1986, it's the OCRWM Safety Plan.

It identified management policies and general requirements for the safety of the public and personnel. It essentially identifies the DOE orders, summarizes applicable NRC regulations, and it does indicate and require safety analyses should be prepared for program activities.

The guidance in that general document is not as specific, I think, as we would like.

I would like to draw to the board's attention that we have a newly prepared program management system manual that was recently approved by upper management within the program, which requires the development of a much more definitive safety and health plan that would supersede the existing safety plan.

That plan will specify policies for strategies and procedures for addressing safety and health requirements of NWPA, and it will also address applicable DOE orders.

That plan will be more comprehensive in its coverage of our safety management, safety analysis, operations safety and industrial safety.

I'm trying to give you, again, a perspective in terms of what the program is doing in this area.

I should mention that the cognizant organization responsible for the development of that plan falls within our licensing and environmental compliance area, and the director of that division would be responsible for developing that for the entire program.

I'd like to address the approach that we have within the program associated with safety, that basically, as we've talked about at great length, that the design of our casks and development of them are driven by regulations with long-standing and long-accepted design practices within the industry.

We also intend to monitor that rigorously with QA. The fabrication of those casks, as we talked about on Monday, will be driven by general industrial safety standards, which will also again be monitored by quality assurance procedures.

We've talked a little about the operations of the system. Our system will be designed and operated and maintained in compliance with many of the regulations.

I should also state that just complying with regulations perhaps may leave an impression with the board that we're doing minimal effort. I would like to -- again, in the time period that we had to present some of the implementations of these rules, there are very large margins of safety, and especially in the cask design area, that we didn't get into, when we actually began to design casks.

These are formalistic guidelines that have been issued by the NRC and developed over years. So besides just being in compliance with the regulations, you can read the regulations many ways. There's very specific items from NRC that over the years have been very conservative design approaches associated with these casks. And the amount of time that we had to present our cask designs to you, that may not have come out. But I think that may be the subject of additional interest to the board.

The same thing is true in the operational area. Although we will be complying with rules, we'll be also looking at ways within our operational procedures where we can enhance the system over and above what existing rules may be for operations.

And we've taken the position formalistically in documents and stated it publicly that, if we're aware of any improvements to regulations that should be made, we would indeed petition the appropriate regulatory authority and suggest that those changes be made, not only for our shipments, but for all shipments that would occur for any other purpose.

DR. PRICE: Chris, there's a sign on the door out there in the lobby that says "Gentlemen," and I may have need someday to use that particular door, and I want to be as careful as I can in my treatment of this so I go out feeling I'm a gentleman here.

But from what I've been able to understand in what has been presented so far, that in your cask system and the engineering of the cask, the design of the cask, in your relationship with the subcontractors, that there is no system safety engineering program. When I asked for whether or not there was preliminary hazard analysis going to be provided at the preliminary design, and I can't imagine a preliminary design review that has any kind of specifications in it, and I haven't seen the contracts which you've issued to these subcontractors, that would not call for a system safety professional to stand up and provide system safety design aspects of what this is that they are proposing that DOE buys.

And when we raise the issue of what preliminary hazard analysis is, then the response back comes what is preliminary hazard analysis, which indicates to me, whether it's right or wrong, that there simply is not a system safety program going on at this time in relationship to design and engineering.

MR. KOUTS: I would agree with your comment. We do not have dedicated system safety analysis people within the program at this time.

The purpose of this presentation was to -- again, to review what we're doing in the area of safety and indeed solicit comments from the board as to ways that we might enhance our present efforts. And we're very much interested in your comments and your thoughts associated with how we may improve the system that we have under way.

So I take your comments to heart, and I'd be interested in any additional comments that you may have associated with how we're implementing the program.

DR. PRICE: Good. I appreciate that. That makes me feel better at this point. I would like to feel better a year from now, too.

MR. KOUTS: I hope you'll be able to use that door when you leave here.

DR. PRICE: Yes. Thank you.

DR. RAJ: Dennis, may I just add something to your sentence there?

I think you should really go and look at scenarios of accidents. Dr. North mentioned, cradle to grave, as he said, when you pick up the fuel rods or spent fuel from the utility to the time it gets delivered to the repository, just think of, you know, just brainstorm, if you will, a few individuals, and identify the kinds of accidents that will happen, how you're going to handle it, what are the issues associated with that, what are the things you have done so far on that, what needs to be done, what are the parameters.

3 I don't see that thing coming out of this meeting, because I haven't heard that kind of approach.

MR. KOUTS: If I could respond to that, again, I think we're getting into an area that crosses over into the regulatory responsibility associated with the agency in that area.

I think that if you have concerns associated with 10 CFR 71, with the cask integrity, that there is a specific need for you to provide some of those concerns to the appropriate people who are driving not only our shipments but the entire industry.

I think, as I mentioned earlier, we're very concerned about safety. We're looking at a very long history of experiences associated with this and looking at the accident history.

I would refer you again to the NRC modal study, some of the analysis that has been done in that area associated with real-world accidents, ones that have actually occurred, and the potential impact on cask integrity of those accidents.

I think that you've made a good comment. I think the comment also needs to be made, if you want to pursue it further, not only with us, but also with members of the Nuclear Regulatory Commission who are responsible for not only developing those regulations but implementing them.

DR. RAJ: I'm not criticizing anybody for those regulations and not complying with them. I know you're complying with the regulations, but you should go beyond that. You are the shipper. DOE is the shipper. You have the title to the cask when you get it out of the utility's fence line, if you will. And I don't see a systematic approach, system safety analysis of the entire system. Not just cask only. I'm talking the entire system, from the cradle to the grave.

MR. KOUTS: I certainly hear your comments, and I would offer the same comment I made to Dr. Price. We're interested in comments of the board as to ways we can enhance our program.

DR. PRICE: Now, you do not need additional regulations to stimulate a system safety effort, do you?

MR. KOUTS: No, we do not.

DR. PRICE: Isn't it implied and implicit in the program and regulations and everything else that exist at this point, and there should indeed be such an effort going on?

MR. KOUTS: That's correct. We do not need a federal rule to issue a system safety analysis. What I was referring to was the question of whether or not the regulations were appropriate to design under. And the basic -- some of this information not only needs to be provided to us but also to the cognizant regulatory authority in the area.

And that was my only comment. I think it's a good comment, and I think we hear it, and I think also that another appropriate forum of that would be in front of a federal regulator associated with the implementation and development of those regulations.

DR. PRICE: I would like to add a little bit to Phani's comment, that this system safety application is shot through and through everything that you have been presenting to us. Things that we saw on our trip yesterday, software safety is a critical issue, and system safety analysis and techniques for software safety are going to be very, very important to the program.

And this cuts beyond transportation itself and affects the entire OCRWM program. It would seem to me that we can't just limit our discussion at this point to transportation and your responsibility, because it is a many faceted thing and requires a very determined effort to accomplish what should be done. It's not a casual thing that's going to be done by one person in a week or so. It's an organized thing that requires dedicated effort with professional people doing the work, people whose life is system safety.

DR. RAJ: Just one more comment in response to Tom's comment earlier that DOE has experienced the last forty years of safety transporting.

I sense there is some kind of confidence there, and you should have that, but that is not trickled down to the public. I'm afraid to say that. They are not really convinced that this can be transported safely. You take any newspaper, including yesterday's Albuquerque Journal, you'll read the concerns.

MR. ISAACS: No disagreement.

DR. NORTH: Continuing in this theme, I'd

4

like to offer a comparison and suggest that you look into it, and I'll be happy to help in this. That's with the chemical munitions program in the Army.

They also have lots of regulations that go into a lot of effort in terms of establishing them and making sure that they comply.

But if you're in a town of 10,000 people, and you're downwind about five miles from thousands of tons of a nerve agent, a very small quantity, measured in micrograms of which is deadly, you get very worried about not just have they met the regulations, but is it safe.

In one community that I was involved in visiting when I was in a national academy studying this, I had found they had gone to the following lengths.

First of all, both the local authorities and the base authorities had made sure that every medical professional in the area was trained in terms of the response, what happens if people get exposed to this stuff.

Second of all, they had thought about how they were going to evacuate the town in the event of an incident. They had actually war-gamed.

One of the things that came out of that was they found that various vehicles couldn't talk to each other, so they went to the stage of providing radio repeaters on nearby mountain tops and a radio in every single vehicle to deal with the evacuation.

According to their rules, every single public official had a gas mask in their vehicle, every single member of the fire department was trained in terms of the use of breathing apparatus.

And when we asked, could you evacuate the town in an hour, they not only said yes, they showed us the transcripts from their war games where they had simulated.

Now, that goes a long way beyond the

regulations. In terms of the basis of establishing trust, it seems to me it's a very useful parallel for you to look at.

MR. KOUTS: Thank you for your comment.

MR. ISAACS: I couldn't agree with you more.

And I suspect by the time this program is in place, where we have facilities designated and communities designated, that we're going to go that extra mile and all the others.

And I think your comment is right on target. The point is can we put together a program that is scoped properly, timed properly to make sure those things happen in the right kinds of sequence.

I don't think there's any question about that. If you look at the experience that we've had in some places, like the chemical munitions industry, for example, and some others, we can probably learn some good things that I think we should apply.

DR. NORTH: Frankly, this can be moderately expensive, take a fair amount of staff and fair amount of time. In this case it was largely accomplished by a small group of people on a very small budget. They just decided they needed to do it, and they made sure it was done.

MR. ISAACS: Sure.

DR. NORTH: I think that's the attitude you've got to have. It's a way of life that safety is really important and you do what's needed to make sure you've got it.

MR. ISAACS: Sure. No question.

DR. CARTER: You don't need to go that far afield. You've got it right in DOE. It exists in Nevada on a daily basis on the ground's nuclear weapons test.

MR. ISAACS: Exactly right.

DR. PRICE: And I'd just simply like to add, still trying to be a gentleman, that it's nice to hear that you will be doing this, but it's hard to escape -- for me to escape the strong feeling that the system safety aspect of things should have already been -- much of it should have already been done. And it's nice that, you know, you might be looking forward to doing it, but you're behind the power curve already in much of this.

MR. ISAACS: No disagreement that we may be behind the power curve.

I think you need to look at the program status to determine whether or not it's timely now to make that thing work. I think it is timely now to integrate that kind of an activity, that we can look back and see whether or not we would have benefited from some of those kinds of things. We probably would have, but we might not be sitting around in this table had we done so.

That's the difficulty I, frankly, find in trying to manage programs like this. It's very difficult that -- I appreciate your comment, take it to heart. We've got to do something about it.

MR. KOUTS: I think what you've identified is the real value of the technical review board, is that you can give us the product of your experience and insight into how we're conducting our business and provide us comments and ways to enhance our programs. That's how we view our interactions with the board. And we certainly hear your comments.

DR. PRICE: I must say I do appreciate the way you receive this. And now I hope the ball is picked up and, you know, we see some running with it.

MR. KOUTS: If I could also use that word relieve, that would be --

DR. CARTER: Chris, I had a quibble with your first slide. I've got one with your last one in this second. And that's the third bullet involving the fact that thorough evaluation and tests of the transportation system will provide a high degree of confidence. I think what that will provide is a prejudgment. I think that ought to be listed or qualified as an aspiration, that may be indeed or equally exceeded, but --

MR. KOUTS: Okay. That's a good comment.

I'll leave it up to the board. We have another presentation for this morning. I'd be happy to go through it, or if you feel comfortable with lunch at this time, we could also do it.

Checkout time is noon here in the hotel. It's --

DR. RAJ: Two minutes from now.

DR. PRICE: We think checkout is noon. Some people have to check out, so we ought to perhaps break now and then meet back at 1:00 o'clock.

MR. KOUTS: Very well.

Dr. Price, would 1:00 o'clock be acceptable or --

DR. PRICE: Yes.

MR. KOUTS: Okay. 1:00 o'clock.

(Lunch break.)

AFTERNOON SESSION - August 23, 1989

DR. PRICE: I'd like to suggest we take our seats, please.

MR. KOUTS: Now I'd like to begin the presentation that we'd scheduled before -- excuse me, are you ready to begin?

DR. PRICE: Yes, please begin.

MR. KOUTS: -- that we'd scheduled before lunch, but because of time considerations didn't get to.

I think you'll find you may have some similar discussions that we had in the systems area also in the human factors areas. We'll see if I can turn this on myself here. I'll skip this cover slide and go essentially to -- this will be duplicative to some of you at least in terms of human factors.

Generally, the objectives of human factors engineering are to optimize performance in relation to an overall system, including operators, management and maintenance functions; increase safety; increase efficiency with which machines can be operated; decrease the amount of human effort required to operate those machines; to increase human comfort in man-machine system; design workplace environments optimally to support operations personnel; and assist in defining, designing, fabricating and evaluating all types of equipment.

We'd all be interested in any objectives that the board may think are appropriate in this area.

DR. PRICE: I might suggest that there are program documents, like mil-standard 48-8-55, which talk about objectives and programs rather than go through additional ones.

MR. KOUTS: We are aware of that and we have looked at them and we tried to provide just a summary on this sheet, but we are aware of other considerations in this regard.

The next slide, please. A little perspective from a DOE Order that we have in existence, 6430.1A, on general design criteria. Division 13 of that order is that special facilities are identified as covering nonreactor nuclear facilities.

There are also some human factors engineering considerations that should be built into the development of systems and facilities within the department. This order outlines the general criteria for incorporating human factors engineering into the system design process through four basic phases: planning, requirements, analysis, system design and system test and evaluation.

It's important to note, I think, this sort of reference, mil-standard 1472C, and it provides general human factors engineering considerations.

I'd like to summarize a little bit of what we heard over the last few days. I should say up front, as in the systems safety area, we do not have dedicated human factors professionals within the transportation program at this time. We feel that we get a certain amount of human factors input from the way we've constructed the program, but it is not identified as a separate element with input.

As in the previous presentation on systems safety analyses, we're interested in the board's comments associated with the type of human factors and any supplementations or reiterations that may be appropriate.

What I'd like to do is to just summarize essentially what our perspective is. Some of the human factors elements considerations that we have been looking at within our program are the cask design program, cask tractor design and operations areas.

In a consideration of human factors in cask design, we try to look at reduced turnaround times, standardized interfaces for all the casks, ease of cask handling and maintenance considerations, allowance for multiple handling methods, and as you saw yesterday, we feel that there are influences of robotic handling to human handling.

What you saw yesterday were demonstrations of the types of robotics we could use within the waste management systems facilities, but we may apply robotics on our facilities. We also recognize where we're going to be picking up spent fuel and waste that there may not be robotics available there, so besides having it at our facilities, these robotics have to be applicable also to handle made operations and held operations with the casks.

We do feel that we do derive some benefits from looking at robotic interfaces and robotic handles, and there are some benefits associated with the human factors areas in that regard.

I mentioned on Monday that we do have a technical review group within our cask design area and a systems development program and we do have people who have had a great deal of experience in handling casks in the past providing us input as to whether or not our designs from their perspective -- these are hands-on people who have dealt with these casks in the past -- whether or not these casks are, indeed, appropriately designed.

The cask handling and transportation operations, these are, indeed, important components of our technical review group.

Again, as I mentioned earlier, and I'll be very frank with the board, we do not have dedicated human factor specialists on that review group, and we'd be interested in comments from the board associated with the addition of such individuals at the present time and in the future.

Also, in cask design from an operational standpoint, we're looking at reducing the amount of parts and components handling; the use of nonidentical connections, that's very important, as we mentioned I think previously, that to make sure you can't put a water hose where an air hose should be; marking or labeling of valves very clearly, port covers, lid bolt, torque sequence -- we talked a little bit about this in the robotics demonstrations yesterday -- torque values and alignments.

In addition to that, we're very much interested in designing to reduce the radiation exposure during maintenance on these casks and looking at mechanisms in which we can reduce the amount of human interaction or keep it at least to a minimal amount.

In the area of tractor design, I think, again, in our operational planning area we identified a variety of things that we might look at to enhance driver performance. We are looking at a variety of things we could do to the cab. Again, this all falls into the area of what we can do with the weight limitations and so forth, and we do look at these many different items.

Also in the operational area, we've looked at the need to develop comprehensive operating procedures, the types of training we need for our personnel who will be operating the casks and also the facilities training for our crews and drivers. We got a little late with this in our human factors analysis that we -- the preliminary analysis that we shared with the board and talked about yesterday. Substance abuse prevention programs are certainly important in this area and quality assurance and quality control is, of course, very important.

I won't go into very much detail, since we did talk more yesterday about the human factors study, except to just reiterate some of the general findings of that study. Human error is the leading cause of accidents involving transport of hazardous materials. It's not the only leading cause, but it is a leading cause.

Truck, rail and barge transport appear to share many common human factors considerations. Basically, one of the findings of that report is that human factors effects on transportation operations are important and should require future investigation.

As you've heard, we agree with that in the first analysis that we've done and have indicated we need to do more in that area.

So in summary, what I'd like to say is that we do feel we have some human factors input within the program in our cask system and tractor design area. In our operations area, we are looking at it and we do have DOE requirements to consider that within our system and we're very much interested in the board's comments in this area as to what presently we're doing and what your views are on it.

DR. PRICE: Chris, the feedback from people who actually do the handling and the using and have the experience is something that you wouldn't want to minimize in any sort of a way; however, that does not substitute for people who have the capabilities and who are trained in the area of human factors engineering.

At Virginia Tech, we have nine faculty in the area of human factors engineering. We have 22,000 square feet of lab space. We graduate every year several PhDs and several MSs in the College of Engineering in the area of human factors engineering. It is an area that is a technical area, it's a scientific area and is one that takes people who are interested in and dedicated to that particular area. It isn't something which is hit or miss, nor is the program something which is hit or miss.

While these overheads show certain individual things that you might say could be meritorious or something like that, the area is

largely one that -- my impression is -- that is
similar to a systems safety area and simply is not a
functional area, it is not a dedicated area, it is
not really being covered in a systematic way from

anything that I can see and it isn't, I think, something that you can simply make a few comments on both of these cases here on the record and say that this is the kind of program that you ought to have, because it is an extensive area and it covers beyond, once again, transportation.

In the area of function allocation, just as an example, is what things should be done by the human being and what things should be done by the machine and what kind of machine and under what kind of circumstances.

The displays that you're going to be having in much of your work, the control dynamics, we saw some interesting things that relieve operator workload when we were there at Sandia on the Sandia tour and saw the damping out of that pendulum.

The function allocation and the safety trade-offs and all that are involved in some of these kinds of decisions need to be made in a careful and disciplined way and not otherwise.

I think that we're talking about an

overall program with professionals who are giving of themselves in that area and know the area and receive the comments of people that are involved in the handling with a great deal of care, because it's an extremely valuable source, but that's not human factors engineering, and sometimes I think there is a great deal of misunderstanding about human factors engineering.

I'm going to just give a little war story, but I promise I'll be very, very short. I was at a banquet and someone said, "Oh, yes, we do human factors engineering," and he was involved in some controls. He said, "The other day I took a ball of clay and threw it to my partner and he caught that ball of clay and that told us what the diameter of the knob should be," and that -- to that person, an engineer, was human factors engineering.

So I think there are all kinds of ideas about it and it's really one where there needs to be careful consultation in developing the program with human factors professionals.

MR. KOUTS: I certainly appreciate your comments. I hope you didn't interpret my presentation as that we're providing or we have a comprehensive program in this area.

What I simply was attempting to do was to identify general human factors inputs that we feel we do have. In no way was I intending or representing that we do have a dedicated program, which we do not. We do not also have dedicated human factors individuals within the program at this time.

DR. PRICE: No, I did not feel you were making that kind of presentation.

MR. KOUTS: I'm interested also in -- very much interested in your perspectives, Dr. Price, and I'm also interested in the rest of the board's perspectives on the human factors issue, also.

We're almost back on schedule. I guess, we have one more presentation this morning, and it's to be given by Jeff Roberts, and he heads our DOE Chicago office and various areas for us as identified in our organizational charts.

I'd like to introduce Jeff, who will be talking about issue identification within the OCRWM Transportation Program.

MR. ROBERTS: Good afternoon. The next 30 minutes of the presentation or the panel briefing has been devoted to a subject titled issue resolution -- "Issue Identification Within the OCRWM

Transportation Program," and having sat through the last two days of the panel briefing and listening to the interaction of the board, I've had somewhat of some second thoughts as to whether this presentation was rightfully put into the overall agenda.

A lot of the issues that have come about in the form of concerns from the board is the thought process by which issues are identified, strategies for issue resolution are implemented and what are the conclusions of that and how they affect the overall program planning.

We listened to Dr. North's analogy of the house yesterday and what are the building blocks, what is the roof kind of thing. I hope to try and get to some of those things because it's key to our program, it's key to the transportation program and it's heavily related into how we implement the program, how we implement in the conduct of our activities.

So I'm going to go through some very simple models. The purpose in putting it at the end was to try to tie the common thread together, but I think it also provides the framework and maybe we'll be able to answer some of the questions that have come up.

The approach to issue resolution is based upon an understanding, first of all, of what the requirements are. There is a lot of nomenclature within program planning terms, but another name for this is the top down; in other words, what is the umbrella, what are the boundaries and the parameters by which the program operates under? Understanding those is the first step.

The second step is to understand the building blocks that need to be identified to resolve or satisfy those requirements. Dr. North, I think you've given me some new analogies. I usually call this the umbrella. I think I'll change that to the roof. The building blocks, I guess, become the two-by-fours, but it's an idea of a top-down approach, and then going to the bottom of the program and trying to integrate and satisfy those requirements through the identification of those subsystems or subcomponents of the overall system.

I'm going to run the risk of destroying the regimented format of the briefing and I'm going to ask you to take that next picture and set it aside for two charts and we'll get back to it because I think it's the fundamental premise of this whole discussion.

One thing I did want to point out and I think it's key to this is that this overall approach of identifying the requirements and understanding the issues associated with each one of those requirements has been implemented throughout the program. However, it varies in varying degrees of formality.

On the first day you heard about the cask design process and the idea of the requirements, whether they be regulatory, statutory, programmatic and the like. There are issues that are being identified within that cask design program. We've touched on some.

I think there is another discussion that needs to happen in the future, but the Sandia program is essentially developed to look at issues within those requirements, such as weeping, burnup and the effects upon the ultimate cask design.

Within the operations system development, which you heard also on the first day, it was more of a functional analysis type of approach to understanding the issues associated with implementing a transportation system, starting with the functional requirements and the performance allocations that you, Dr. Price, just talked about.

Through that analysis of the overall system and the subcomponents, there is an effort underway to try and move in a forward direction to satisfying the total requirements.

Later in this presentation, I'll focus on a historical account of how we've adapted a version of this model within the institutional programs, going back to 1984, and how an original set of issues was identified and what has happened in the last few years in an effort to resolve some of those issues.

So I'm hoping that this kind of a discussion will at least allow us an avenue for continued discussions.

Very briefly, the requirements that we operate under come from a number of sources. They may be regulatory in nature, whether they be DOT, NRC, EPA; they may be legislative in nature, such as the Nuclear Waste Policy Act, the Amendment Act and applicable state statutes; DOE Orders related to quality assurance, program management, design criteria, construction of facilities and the like.

Other commitments and requirements come to us in the form of integration with other program elements, whether it be the interface between the repository facility and the transportation system or that of the MRS and certainly the reactor facilities. Waste characteristic is another example of requirements that come to us, the particular inventory that we're going to be asked to move, its age, its spent fuel age, its burnup content, how many metric tons, where it's located, those kinds of things; and the programmatic commitments that Tom referred to where you have decisions related to priorities, constrained resources, schedules, whether they be commitments to the public or commitments to Congress or the like.

So all of these things form that roof that we begin to work under. Let me jump back to the picture, if everybody is with me. This was a very simplified and elementary pictorial account of what I'm going to talk about. I'm sure there have been many theses that have been written on this subject specifically.

What I'm trying to portray here is again this interaction of the requirements which I described, which if we can continue with the analogy is that roof by which the program is operating under. At the very bottom of the program within those requirements is the identification of issues;

again, forming the building blocks by which we're going to satisfy those requirements.

An interesting comment that came out yesterday is the comment from the board that said that the requirements may not be enough, you may have to go beyond the requirements. Hopefully, by the end of the discussion on this schematic, we'll be able to address that kind of thing because issues come to us in a variety of ways; they come both internally from within the program and they come also from external sources, such as yourselves, such as the regional groups, such as the general public, and we'll see those changing over time.

Issues also are identified for two specific reasons. The identification of issues and the resolution of those issues help us understand options that we have within the regulations or within the requirements of the program. However, there may be opportunities where we want to have some impact on changing those requirements and that kind of thinking has gone into the program planning.

Specific examples that you heard this morning related to uniform permitting and related to overweight truck and also the vehicle inspection.

It's our intention to try and have some impact on those requirements and, therefore, have a net effect or a net benefit to the program.

The marriage, if you will, of the

requirements and these issues turning into program policy or it may turn into the need for program policy. It may turn into a series of activities that are needed to establish program policy over time.

I think very specifically the issue of emergency response and of 180C is an area that fits into this. We have identified emergency response as an issue as far back as 1984. We've had some new requirements and we're now in the process of trying to implement a strategy by which we're going to comply with those requirements. We're going to get a lot of help in doing that, and we should get a lot of help in doing that, but right now we have just the inklings of a strategy that's put in place.

Program policy or the need of program policy translates directly into program activities. You can think of them as issue resolution activities.

Again, uniform permitting was an issue that was established back in 1984, and we've spent three years and a series of activities with the AASHTO group in trying to resolve that particular issue.

As Chris pointed out, it's not one issue, it can be subissues as one. Permitting is one faction of it, continuous motion is another, but as we get into these activities and we deal with the right kinds of people, our avenue gets changed and -- but the purpose, again, is to either look at what options we have within those requirements or again we've done this line where we actually have some impact on the requirements themselves.

The other thing that needs to be talked about and addressed here is that this is an integrated process, it's dynamic, it's going to change these issues. We draw a lot upon the transportation industry as a whole.

When Tom this morning said these issues that we identified were not surprises, they shouldn't be surprises because the transportation as an industry is a very mature industry. It doesn't mean that we won't have new issues.

I'm going to show you a list of issues that came up in 1984, and if I showed it again a year from now, we might add things like system safety analysis and human factors as a particular issue because of its heightened awareness within the program.

Let me just make one more comment on the picture itself. The other key element here is the feedback, which tells us how we're doing in resolving those issues; identification of issues, establishment of program policy or the need for program policy, the implementation of program activities and then how are we doing against that.

Judy talked specifically about the issue discussion papers, and I would encourage the board to try and find some time to read through the various editions of those issue discussion papers because I think you'll see there the establishment of the strategy, the identification of the issue and then on a periodic basis what's been done during the last six months to try and move towards that ultimate resolution.

So I've shown issue discussion papers as one example here of this feedback. There are others; public meetings, program reviews and the like.

DR. NORTH: Before you leave that diagram, I'd like to express my admiration, maybe because it begins to look like a house, but your last comment, especially, the idea that this becomes a notebook full of discussion -- issue discussion papers, statements of policy, statements of how you're coming on the implementation, charts showing the time schedule, that's just exactly the kind of thing I'd like to see as a board member so I can get a sense of what's the substance, how is this coming along, where are your problems, where are you putting your resources, why are you putting your resources that way.

MR. ROBERTS: And with that historical account, if there has been any change in the requirements during the interim, there is also a reflection of a new path that needs to be taken or is being taken.

DR. NORTH: Right. Then we understand where the change came from, it was a change in requirements or it was a change in the perception of issues that you might have from your interactions with the transportation industry or the public.

MR. ROBERTS: Right. Okay. Can we take an action to get those --

DR. NORTH: I encourage you to pursue that diagram and that path.

MR. ROBERTS: Okay. That's the process. That's the thought process that's been implemented throughout the program.

Now, I'd like to go through kind of a

little bit of history as to how what we call the original institutional issues were identified back in late 1984, I think, early 1985.

There are a number of ways, and I've already hinted that there are a number of ways, in which issues can be identified, whether it's through a Delphi group of experts, whether it's through more formalized methods; structural modeling is one that we've used in the past to identify system studies, all with the idea of identifying the basic components of the system, understanding their relationships and the interactions of those components and what it means to the overall system.

Then you lay on top of it objectives such as reducing risk, minimizing cost, ensuring safety and those kinds of things, the institutional issues in that whole process which lead up to the publication of the transportation institutional plan was more of a Delphi group. An expert group was put together in late 1984 to try and sit down and figure out what are the issues associated with transportation.

Again, we're looking at basically this program as being an enhancement or a refinement of issues that already exist in a very mature industry, but with the focus of the public and the national perspective, there was an awareness that we would have to go above and beyond certain cases in satisfying basic requirements; in other words, we couldn't live with just the basic requirements.

That group of expert consultants is probably a bad term here because I think we had some DOE people there, but experts, let's go with that, from industry, from the federal government, from federal contractors and the like, put together a white paper which tried to identify a minimum given at 1984, and at that time were looking at shipments in 1998; what are the issues that DOE needed to be addressing in the interim.

That white paper was used as a basis for the draft institutional plan which was then reviewed and commented on by external groups and basically became the -- basically became the basis for the transportation institutional plan.

This is that list. Again, there are no surprises. Emergency response, routing, cask

testing and design, infrastructure. Chris already
read most of these this morning, so I won't
elaborate, but I think -- or I hope through the
three days of briefings that you've at least gotten

a feeling that these are the elements that our program has been based upon.

There was an awareness at the time that there would be different people involved in different issues because interests are different within different groups. There was also a feeling from the group originally that they would have to be looked at in the grand scheme of things and the pace of the program, and that while certain issues were important right away, other issues might be more slow to come to a head, if you will, and that kind of thinking has gone into the -- this setting of priorities within the program and the areas that we feel needed to be addressed.

Along with the identification of issues was the identification of our target audiences, who are the people who are going to be involved, who are the people who are going to be affected and how do we go about trying to, first of all, resolve issues and do it in a credible manner.

That group identified six major program

participants, if you will, governments of all kinds, federal, tribal, state and local; electric utilities; the transportation industry; special interest groups; the media and the public.

This is a particularly, I think, important slide in that we try and marry those particular issues and the people that are involved in trying to understand that they are going to be involved at different levels. Also, understanding that the other factor that's here is the maturity of the program; where are we at in the program in relation-ship to actual operation, also.

People might be satisfied in being involved on an information exchange for a long period of time, but as you move closer to operations, that interest and that involvement naturally has to go up. That's the kinds of things that we tried to lay out in the issue discussion papers in trying to come up with a strategy of how you resolve these things.

Vehicle inspections was an issue back in 1984. Strategy was laid out about who should we deal with, but the experts in the field, the commercial vehicle safety alliance, these are the people that have the authority to have some impact on things like uniformity and, therefore, it was a natural for us.

What's kind of gratifying from my standpoint is that these groups had -- these are not new issues to them, they had an impetus to try and change the system, if you will. And our program, because of its national scope and because of its high public awareness, they saw this as a mutually beneficial activity.

Again, the uniform permitting with regards to overweight truck. We basically have a strategy for each one of those issues, and we've had varying degrees of success. I think the work with AASHTO was a real success story. We've gotten positions on load feasibility, we've gotten opinions from AASHTO that a uniform permit is feasible. That's a case study where you can say an issue was identified, you got the right people involved and you're moving towards resolution.

These three elements or levels of involvement move in order of increasing involvement, and I'll just briefly go through each of those and give you an idea of how we use each one of those. Chris had hinted a lot during his discussion in the institutional overview about these levels, but let me try and tie it together within the context of the model that I just showed.

Levels of involvement is the way that information exchanges at the lowest level, from our perspective, other than no involvement. We exchange information through printed materials, through videos, we provide information to the public, we also provide for a forum in which representatives of national, regional groups and the public and interest groups can come talk to us and give us insight into what areas are of interest to them.

The TCG, I think, is a prime example of how we try and focus our meeting and our forum to meet the needs of the individual group.

We attend lots of meetings. We provide speeches, we listen to speeches and we try and keep aware as to what's going on in the industry as a whole and other things that might impact our awareness.

The next level of involvement has to do with the regional and national group concept and the cooperative agreements that we've set up with these groups. These are people that basically, for now, represent the states and the public and that's the time-phased approach that Chris talked about as to

where we're at in the overall transportation program
given the fact that we're 15-plus years away from --
do you want to --

MR. KOUTS: 10 to 15.

MR. ROBERTS: 10 to 15, sorry about that. I'm not making a public announcement.

That's appropriate given the fact that we do our fighting for constraint resources and that the program as a whole has to make decisions.

It's appropriate for us now to be dealing on a regional basis. We look at these folks to actually help us on specific issues. I think that the best example I can give, which is just getting off the dime right now, is that of emergency response where we are just beginning to put together strategy as to how we will implement one ADC.

We've identified a number of subissues associated with what, which is what is the existing system, how would we implement that within the existing system both at the state and federal levels, and we've asked the Western State Energy Board and the Southern States Energy Board groups to specifically address this for us in helping identifying who are the authority points of impacts within the states for emergency training, what are the funding mechanisms that are in place right now, what is the timing of the existing schedule of training, how long does it take to get a new curriculum, for instance, plugged into a state program, what are the options associated with DOE, the federal system, do the shippers come in and just lay on a training session, or do we, in fact, integrate it into the states' program and have the state people doing that training for us.

So that's a real example of how these national and regional groups are being involved in the development of a program strategy towards issue resolution. Those tasks that I talked about are tasks that are currently funded during this fiscal year.

Let me back up. With regards to the national groups, I think it's fairly safe to say that we're in the starting blocks with how we deal with the tribal nations of this country and the effects of this campaign upon them. We've identified that we need to be aware and that's about as far as it's gone.

We've preliminarily identified potentially 80 tribal nations that will be affected by this campaign. The seminar that Chris talked about this morning, which is scheduled for next month, is again the inklings of trying to understand how a federal agency can deal with essentially 80 sovereign nations and trying to understand what their concerns are, what their issues are and how they marry against the ones that we think we've already identified. We have a lot of work to do in that area, but again I think we're seeing the beginnings of an implementation towards issue resolution.

The third level of involvement is probably what I'd categorize as where we're providing a forum where somebody else can do the work for us within the requirements of our program objectives. We have established cooperative agreements, and I've put the three examples here that we've already talked about and got briefings on this morning where we've gone to the experts within the state to help us try and change the system, whether it be vehicle inspections with Commercial Vehicle Safety Alliance; emergency response, which is basically a TBD now, but we have at least thoughts of going out to some national group similar to a CVSA that has expertise in this area and can be of help in helping us implement our training programs; then again the uniform permitting work that's been done by AASHTO.

This is just a summary slide. This is where we put it together. Requirements and issues are ways of systematically addressing and resolving issues, whether they be technical, whether they be regulatory, whether they be institutional, and we see that only through the resolution of those issues and moving towards a satisfaction of those requirements can we put together a system that's going to be effective and will, to the best extent possible, be acceptable to the public.

Just one final thought is that we need this continuous monitoring feedback that you've alluded to, Dr. North, and we at least have a vehicle for doing that. We can always be judged on how effective it is, and I think that's part of your responsibilities, but the process is there and I feel good about that.

Are there any questions?

Thank you.

MR. KOUTS: Thank you, Jeff. That concludes the presentations that we developed for the board for this meeting in the transportation area.

If there are any general questions that you have, we have some time associated with it to respond to them. You've heard a lot of material over the past two-and-a-half days, I know it's a lot to absorb, there is actually a lot more than this that we would like to provide you and we're looking forward to the opportunity to do that in the future.

We have been taking copious notes associated with some of the requests that the board has made and we are certainly going to follow through on those. I'd like to ask the board if they have any other comments or requests that we can deal with at this time.

DR. NORTH: I'll reiterate the comment that I liked the diagram with the little roof drawn in and I'd really like to see that used as a way of keeping the material organized for our involvement in the future; a notebook, as it were, showing where you are in that process with the requirement, the identification of the issues and the issue papers, the way policy is developed from that and the way policy is being implemented.

Now, tell us whether you're in the starting blocks or two miles down the racetrack, give us the chart showing your view of the milestone as you continue from there and give us a sense of what's changed as the situation evolves with differences in the requirements or changes in the way the issues have been identified. I think that will help us a lot and it will also help you.

DR. CARTER: I'd just make one comment, I liked your diagram without the roof on it as well.

MR. KOUTS: We'll need direction from the board as to how to go forth on this issue.

Any other questions or comments?

I'd certainly like to thank the board for its attentiveness over the past two-and-a-half days. We've certainly enjoyed the interactions we've had. We certainly have been appreciative of the comments the board has made. I'd like to personally thank all the presenters, certainly today and over the past two-and-a-half days, and I speak for the transportation program and that we've enjoyed this experience and we look forward to future interactions with the board on the many other transportation issues that we haven't talked about and further enhancements of those.

DR. PRICE: I thank you, Chris. My comment -- we do have one more presentation outside the transportation area, but I'll take the opportunity to respond and thank you for providing the speakers and the amount of work we appreciate that it takes a great deal of your time and involves your resources and we do appreciate it.

MR. KOUTS: Thank you. I'd like to turn

it back over to -- the meeting over to Jim Carlson here who will be introducing the rest of the presenters for the rest of this afternoon's presentations.

MR. CARLSON: I will add to that I will actually be introducing Jack Hale, who will introduce the rest of the presenters. Jack Hale is the chief of the facilities branch within the Office of Facilities Siting Development within the Office of the Civilian Radioactive Waste Management, and he'll be serving as Chris did, as host for the waste package discussions.

MR. CARLSON: Dr. Price, would this be an appropriate time to take a couple-minute break or would you like to just go on right into it?

DR. BARNARD: Let's go.

DR. PRICE: Let's just go ahead.

MR. HALE: Dr. Price, if you'd like, we'll go ahead then. I would just like to --

DR. VERINK: We can't hear you.

MR. HALE: Sorry. Dr. Price, I thank you

for this opportunity to present to you this afternoon a brief discussion of the waste package program and with some emphasis on the corrosion that we're addressing in this program.

I am Jack Hale, I'm branch chief of the Surface Facilities and Waste Package Branch. We have a number of people here with us from DOE Headquarters, from Lawrence Livermore and from the Yucca Mountain Project Office and the contractor, Weston.

Our principal speakers this afternoon will be Michael Cloninger, who is the branch chief of the field engineering branch. The waste package program comes under Mike, and he's with the Yucca Mountain Project Office, who also has SAIC, Science Applications International Corporation, as a support contractor. Dr. David Stahl is with them.

First, we will have Michael Cloninger give you an overview of the waste package program and then we will shift over into a discussion of the corrosion by David Stahl.

I have asked Mike if he would to try to push through this first portion of the discussion. It is an overview of the overall program and I think that certain members of the board here are particularly interested in the corrosion aspects and that is in the latter part. You can ask whatever questions you like, of course, but I think the things you are really after with regard to corrosion are going to come in the second half.

So at this time, I'd like to introduce Michael Cloninger, DOE Nevada, the Yucca Mountain Project Office.

MR. CLONINGER: Thank you, Jack. If it's okay with the board, I'd like to skip some of the overheads and get through my presentation in a relatively short time because I know that Dr. Verink is very interested in the corrosion aspects of the program.

Would that be acceptable? Okay.

What you have been hearing is the part of the program that delivers the waste to the repository. The focus of the waste package program is primarily for 10,000 years after closure of the repository.

I'll be briefly describing the goals of the waste package program, our strategy for attaining those goals, some of the tools available, some of the tactics, and I'd like to answer any concerns that the board may have over what's been presented.

I'll be skipping about the next four slides in your package, going right to the goals of the waste package effort, which is quite simply the development and demonstration of a conservative design that will meet the content and intent of the regulatory requirements with sufficient margin for uncertainty.

The strategy for attaining that goal is by using an iterative process of design development, testing and performance assessment that relies on, one, a multi-barrier approach; two, the unsaturated nature of the Yucca Mountain Site, although we do look at extreme scenarios for site considerations, consideration of technical and regulatory alternatives, and sufficient resolution, of course, of technical and regulatory uncertainties.

The major interfaces within the waste package program and without and outside of it, primarily the design processes, focus that this is design conceptualization, specification of materials and geometry, closure processes, fabrication processes, et cetera, and related waste package testing and modeling, not just container materials, but of waste forms and the potential waste package service environment and very closely related to repository design and site design, site characterization design and data. Of course, waste package performance assessment, closely related again to repository and site assessment.

It's through our performance assessment that we have our regulatory interpretation interface, which is very key in obtaining our strategy.

Just briefly, a little discussion of where these tools exist. The structure of the project office, under the leadership of Carl Gertz, is shown in the general slide; waste package has direct support from Science Applications International. Dr. David Stahl will be presenting some of that work a little later. The waste package effort is under the leadership of Dr. Les Jardine at Lawrence Livermore National Laboratories.

The key interfaces are with Sandia National Labs in the repository design and performance area and GS and Los Alamos in the waste package environment for our fuel transport area.

The implementation of the strategy is primarily designed to be in two stages: the design development stage and the design characterization and evaluation stage. This diagram, which is a little busy and may not be visible in the back there, so you'll have to use your booklet, shows the general layout of the strategic approach.

While there are activities going on in all of these boxes all of the time -- except, of course, the bottom one -- the flow is generally from the top. We begin with the regulatory requirements, define waste package issues, then we must interpret some of the regulatory terms as input to design bases, along with our container materials, waste form performance, site characteristics or waste package service environment definition to develop scenarios.

In other words, these scenarios describe the environment in which the waste package must perform the requirements. Once we have this design basis, we go into waste package design; closely coordinated, of course, with repository design where we'll emplace the packages.

That pretty much is the design process, although the performance allocation, where we actually assign performance requirements to individual components of the waste package, is the interface with the design characterization and evaluation phase.

From the allocated performance, we set numerical performance measures and parameter goals for each of the components and the subcomponents.

These lead to the definition of the models that must be developed for performance assessment and analysis, as well as the data to support model development and eventually performance assessments to lead to the prediction of 10,000 years or so performance.

Then we can ask the question, "Does the design meet the regulatory requirements?" If yes, great, we proceed toward license application. If not, then we must look at the results of the performance assessment for direction to see what ulterior actions would be the most advisable.

We'd like to make the shortest loop and, if possible, we would just reallocate performance or allocate performance to components that weren't depended on before. This may suggest new model development, new data and of course a new performance assessment. We would not want to, too late in the game, have to go all the way back up to redesign, but it can occur, we're in that phase now.

Failing all of that, we must go back and look at the regulations themselves and the basis for doing that is, one, it would be infeasible or too costly to meet the regulation; two, there is no health and safety reason to meet the regulation as written and then with a redefinition of the regulatory design basis, we would proceed through here again.

Now, there are two formal phases in this process called advanced conceptual design, which should start somewhere around 14 months from now, and then license application design at the end of which we will have the design to go forward into licensing with.

Briefly, I'll discuss the design development stage. As you recall, it begins with the regulations and regulatory interpretations. Some of the prime drivers for waste package are 10 CFR 60.21, which requires the evaluation of alternatives that may provide greater containment or isolation.

We must provide up to 50 years of retrievability of the waste packages after emplacement begins; that, of course, is the key interface with the repository design and operations.

Part 112 refers to the EPA's requirements, 40 CFR, Part 191, relating to the excessive environment, protection of the individuals and groundwater, and we must assess whatever contribution the waste package will make to that.

The key driver for the design basis, though, is Part 113, which requires for anticipated processes and events, our design basis, substantially complete containment for 300 to 1,000 years; following that, controlled release from the external barrier systems through 10,000 years after closure.

Part 135 sets general standards, such as there should be no significant liquid in the waste package, no pyrotechnics or explosives, things like that.

There is a flow down from our data base and the regulatory interpretations into requirements documents; a flow down from the waste management system requirements, through a few steps and down to the waste package design requirements. From our data bases, after some analysis, some of the data will go into design requirements, primarily data regarding waste form performance, which implies a certain required container performance. That would go in here.

Other data items will go into our reference information base. This is general data that describes these scenarios of waste package environment, some metal performance, metal barrier, other barrier performance, as well as the waste form performance. When these documents are completed, they form the basis for design and then we may proceed into design.

This wouldn't be complete without a picture of a couple of conceptual designs. These are the hybrid -- this is the hybrid conceptual design for the spent fuel. It will take three PWR and four PWR elements, either consolidated and boxed in storm boxes or intact assemblies. This entire package is about 15 feet tall.

This is the glass waste form. It has an inner canister, a pour canister, or three or four, and stainless steel filled with glass, high-level waste glass, and that will again be put into the emplacement container. This one is about ten feet tall; two feet in diameter on both of them.

We're currently studying six materials for this reference design. Dr. Stahl will describe that in more detail later. Once we have a design or designs, we then begin the design characterization and evaluation stage. Again, the performance is allocated out of the design phase and we develop our models, develop the data base, do our performance assessments and attempt to answer the question.

Performance allocation itself looks at the system elements that we've selected to depend on for the overall performance and top level functions are identified for each of those elements. These allocations have been expressed as failure rates of components, fractions of failed containers, failed cladding, the number of water contacted containers at any time, inventory releasable from a given waste form under certain conditions.

The total product of these fractions must yield a value that is within compliance of the requirements. For the containment period, these performance goals are divided into time segments to reflect the changing environmental conditions and rapidly decaying radioactive inventory.

As an example of the kinds of considerations that go into this, presently in lieu of a defined set of anticipated processes and events, which are a fundamental design basis, we have an expected case and a bounding case.

The expected case for the unsaturated site is that virtually no liquid water contacts the waste package. So given that at some point the container breaches, and all of it will eventually breach, then we have a potential for carbon-14 being released into the gaseous form. CO_2 exists on the exterior of the fuel components. Once the cladding is breached, we also have other radionuclides that are available for release, primarily krypton-85 and, again, there is more carbon-14 in the fuel matrix itself.

With the bounding case where we have water available, we have all of that plus once the cladding breaches, we can release the actinides and soluable species that are within the fuel matrix itself.

There is a close relationship between models and test data. Most of our models come out of some phase of testing, investigative testing, to develop conceptual models. The emphasis presently for the 10,000-year period is on a mechanistic understanding of the fundamental processes involved in waste package degradation and release. We are focusing on the most important radionuclides, the long-lived ones, the actinides, the long-lived soluable and highly mobile species.

Performance assessment models are from the fundamental models. They are combined into a process model that describes the performance of a single waste package that is expanded over the variance throughout the repository of environmental conditions and among waste packages to the performance of a set of waste packages.

This is initially compared to the NRC requirements for performance as an initial indicator of what direction we should be going. Then we do a complete sensitivity analysis over all variables and then an uncertainty analysis on top of that to get a feel for what kind of reasonable assurance finding the NRC may make regarding our application.

All of this is information for issue resolution and a licensing basis.

Our performance assessment results are our key. They basically tell us whether the design meets the requirements. If it does not meet the requirements, and as shown on the diagram earlier, we need to select alternative actions. Again, those are assign new performance goals, modify the conceptual or computational models, maybe we're just using too conservative a model. We may need to improve our data base or we may have to go all the way and redesign. If we cannot reasonably demonstrate compliance, we may have to go back and see if we can revise the regulatory basis.

As we're structured right now, our functional elements for the waste package program come basically out of the system requirements. We have an engineering function, performance assessment function, a regulatory interface, and out of the engineering and performance assessment functions, we have our waste package environment definition; closely coordinated with the other labs, waste form performance, testing and model development, predicted model development, our waste package materials testing and development and predictive modeling. David Stahl will be talking about that in greater detail later.

Now, we're going into the phase of assessment waste package manufacturing variables, feasibility, et cetera, and some larger scale waste package testing, and I would like to turn it over now to David Stahl to describe the materials program for the containment package.

MR. CARLSON: Before you turn it over, are there any questions?

MR. CLONINGER: Yes.

DR. CARTER: I'd like to introduce another gentleman from headquarters, this is Mike Frei, who is sitting to my left and who is the director of the Siting Facilities Technology Division and is responsible for all of the waste package programs.

DR. STAHL: Thank you, Michael, ladies and gentlemen.

What I'm going to do is present the waste package container materials selection, testing and modeling portion of the program, and I'll basically give an overview. There is not enough time to cover a lot of detail, but please ask questions and we'll try to answer them as we go along.

The outline, as indicated in the package, consists of the objectives of the program, the candidate materials and a little bit of history on how those were selected, the materials selection process itself, what the inputs to the material selection are, for example, the environment and particularly the degradation modes that need to be evaluated. We talk a little bit about selection strategy and our effort in alternate materials and concepts and, lastly, I'll tell you a little about the current activities both in the experimental portion and the modeling portion of the work.

Now, as Michael has mentioned, most of this effort is being performed by Lawrence Livermore

National Laboratory under Dr. Les Jardine.

Our objectives, as shown here, are threefold. Firstly, we need to select the container materials, and as Michael has mentioned, we have two phases that we are working toward: the advanced conceptual design phase and the license application design phase. So we need to select materials for each of those, and as we will show later, we hope to have a narrow focus as we go along through the program and have, hopefully, one material that we could bring into the license application design phase.

Secondly, we need to establish the basis for mechanistic performance models. We hope to, as indicated, have a mechanistic understanding of all of these processes and where we do not hopefully use a bounding approach, which will be conservative from the regulatory perspective.

Lastly, we need to perform those long-term tests to support performance assessment, models and predictions.

Now, the candidate materials, but before I go through this list, let me mention that early on in the program the Yucca Mountain Project was considering both an unsaturated and saturated site.

It wasn't until the late -- early '80's, let's say '83, '84, I think it was, when they focused in on an unsaturated site.

As a result, what we were looking for was a corrosion resistant material rather than a corrosion allowance material, because we felt that those materials would be better suited to a unsaturated repository site.

The tough rock is fairly stable and we didn't expect to see any mechanical loads on the waste packages. So as a result, we came up with a preliminary list of 31 materials. This was screened down, with expert opinion, to 17 materials which were considered further by Lawrence Livermore based on material testing programs that were underway at the time and some screening activities that were performed by Lawrence Livermore Labs or other laboratories under subcontract to Lawrence Livermore.

As a result of that screening effort, there were four austenitic alloys that were chosen, later reduced to three austenitic alloys and then three copper alloys were added, so that this gave you the six candidate alloys which we have considered and studied extensively; two stainless steels, 304L and 316L; high-nickel alloy, alloy 825; and the three coppers, high-purity copper, aluminum bronze with seven percent aluminum, and a copper-nickel with 70-30 copper-nickel content.

DR. BARNARD: I have a question.

DR. STAHL: Sure. On this?

DR. BARNARD: Yes. The six that you chose, were those chosen because they were the best of the 31 or because they might have been less expensive?

In other words, are you selecting materials that will last only a thousand years or could these materials last longer than a thousand?

DR. STAHL: Well, they certainly could. I think the objective at that time was to show that they would last a thousand years. Now, there were four criteria that we used in the selection process, given the 17 materials. One of those criteria was cost.

DR. BARNARD: Okay.

DR. STAHL: So that was one quarter of the total weighting.

DR. BARNARD: Okay.

DR. STAHL: Okay.

DR. PRICE: What are the other three?

DR. STAHL: The other three were fabrication, weldability and corrosion resistance.

Let me just show briefly the waste package strategy chart again and I'll refer to the next slide. The reason being is that waste package design relies very heavily on material selection, so that the inputs to waste package design, as shown here on this chart, are brought over into material selection, as shown in the chart that you have in the package.

For example, we need to know the expected container environment -- and we've made some assumptions on that and I'll cover some of them in a subsequent slide -- we need to know what degradation modes are important and, as I mentioned, be able to model those. We have to know what those regulatory performance requirements are and be able to set some performance goals as a result of that. An important adjunct to that is we must be able to model that performance. If we can't model that performance, even though the material appears to be excellent from corrosion or other standpoints, it would not be useful for a repository material.

Certainly, as we mentioned in the box

about repository and engineering design information, that's an important interface. Lastly, cost and fabrication data, we must be able to fabricate the container and must be a reasonable cost.

This summarizes overall the container environment for design. The maximum surface temperature we expect to see is approximately 250 degrees C. Let me show you a chart from the SCP which indicates that peak temperature here and, as you can see, it's reached very early in the emplacement period, 20 to 50 years, and then decreases rapidly, as you can see here.

In this particular analysis, which used spent full at modest burnup, about 35,000 megawatt day per ton, with 57 kilowatt per acre aerial density of heat loading, you can see that even on the curve from 300 to 1,000 years, the temperature is predicted to be over 100 degrees centigrade.

Now, there are other analyses and, of course, there is a degree of variation in this so that we have to assume that in this period, we will begin to see some containers cede water and that's part of our analysis.

Next is the groundwater composition. We anticipate that the composition will be approximately that of well J-13 water. Let me show you a cross-section of the repository. You may have seen this previously. Again, this is out of the SCP. This shows the repository horizon, above the groundwater table here, about 700 to 1,400 feet, and you will find that there is some vertical percolation of groundwater which is very slow; in fact, they talk about something like a half a millimeter per year of downward flux. In some cases, there were some analyses which indicated that the flux would actually be upward.

The water that we measured down here is the J-13 well water and it's basically a bicarbonate water, which I indicate here, of around 6.9 to 7.3 pH. So it's a near neutral pH, basically potable bicarbonate water.

The important variation, of course, is the radiation field with the thin-wall corrosion resistant material, we couldn't be a ten squared to ten to the fourth per hour. Of course, if we had a thicker container, those numbers would be reduced.

Now, as a result of that field and the moist air and air-saturated water environment, we will expect to see some radiolytic products either in the air or in the water. As I mentioned here, ammonia is not expected because the atmosphere is oxidizing.

Now, these products would have to be compared to the materials of consideration, the six materials that I mentioned, and some of them are susceptible, for example, to nitrates and nitrites; the copper materials, for example.

Now, these are the principal degradation modes which we are considering. Some are more important than others. Certainly, the first one we feel is very important, metallurgical phase instability, both in the base metal and in the weld area, including the heat-affected zone.

As you'll see later, this has led to a selection -- an easier selection of the materials because some of them chosen are not as stable as some of these others.

Mechanical stress is not a major problem. Oxidation, again, and general aqueous corrosion is not a problem. The corrosion rates in air and water for these materials are either tenths or a few micrometers per year, so we don't expect any general aqueous corrosion problems.

Localized corrosion, again, is of concern, particularly in a radiation field. Stress corrosion cracking is particularly important for some of the materials, which I'll talk about later, as well as hydrogen effects.

Microbiologically influenced corrosion is a very important area, and we're just beginning to learn a little bit more on that subject, so we don't have a lot to report on that right now.

This slide summarizes our selection strategy. The first bullet, as I indicate here, states that we need to obtain additional information on these three alloys, the alloy 825, copper alloy and copper-nickel, particularly in the pre-ACD phase. The reason being is that the two stainless steels, we feel, have metallurgical stability problems, as well as stress corrosion cracking problems. So very little additional work is done on those materials. We want to focus on these three and get as much information as we can to make the final selection.

Now, in parallel, we need to develop and screen candidates for alternate material design concepts in the pre-ACD phase, and we've had small efforts that have started up in FY 1988 and FY 1989. That's currently on hold and we hope to pick that up again when the contractor is on board. So we need to, once that screen is done, we need to develop some of those concepts further in the ACD phase.

Next, of course, will be to select the container material for license application and design based on the available site data and the container performance data. Particularly, we're interested in what that water chemistry is.

Let me show you another chart, if I can find it. Here it is. For example, on chloride content, we're looking at J-13 water, which has a very small range of chloride content and exposed to a very narrow range of oxygen content, since we do have an oxygen-saturated system.

For our analysis, as was indicated by Michael Cloninger, we have looked at some anticipated conditions which bound the expected water chemistry of J-13. Still further going out, we have some bounding conditions and then some credible but not anticipated conditions. So we need to know where we are within these environmental envelopes in order to make a material selection.

DR. PRICE: Are there probability numbers associated with an anticipated condition and so forth?

DR. STAHL: Yes, there are. As far as anticipated, that means it has a ten-percent chance of recurring and it is considered as being anticipated. If it's less than ten percent, it's not anticipated.

DR. PRICE: Over what period of time?

DR. STAHL: Over the lifetime of the repository.

Then we want to further evaluate and verify the LAD container material and design performance prior to license application using again the available site data and the performance of the materials as well as the models that we have developed during the license application and design phase.

During this period, we'll have our long-term testing program underway.

I'll talk a little bit about the alternate material design development program. The selection process parallels that for the metal barriers materials -- the six candidate alloys that we had shown you before -- in that we have a screening process, we have a peer review, we have further evaluation and then selection.

Now, in addition to the requirement that

Michael had mentioned earlier in regard to 10 CFR Part 20 -- 60.20, in regard to consideration of alternate materials and designs, we have to look at the site data, as I had mentioned, and the performance of the containers. If the site data shows that the water is larger volume than expected, that it's more aggressive, if, for example, there are higher loads than what we had considered in the thin-wall design case, then we have to look at an alternate material or design concept.

Under performance, if we can't assure that performance as far as release requirements, then we would want to look at an alternate. Lastly, if we need to allocate greater performance to the container, and I'll touch on that lightly later on, we would need to have an alternate design.

Now, this just summarizes some of the design concepts that we've looked at -- again, not in very great dettail. Ceramic materials have been examined by the program for several years. Adding to that recently, we had a workshop on graphite and graphite appears to be a very useful material in that it is an inert and fairly tough material. There are some problems that need to be resolved there in regard to sealing the graphite container or the oxide container. As far as graphite is concerned, it has to be made impermeable.

We've looked at some bimetallic designs. As indicated in the chart of the thermal history -- let me just put that up very quickly -- you can look at it in a sense that there is an early period when the temperature is high and the gamma field is also high and a later period where the gamma field and the temperature field are low. So that you can use a bimetallic design, such that the outer container is resistant to those conditions -- for example, a high-nickel-base material -- and the inner container would be resistant to the chemistry of the water over very long periods of time at low temperatures and low gamma fields. High-purity copper is an excellent candidate there.

The alternate single metals we can look at and, in fact, have looked at initially as part of the screening. We have to take another look at those materials, titanium alloys; for example, some of the high-nickel-base alloys by themselves may be adequate.

Other approaches include coatings, either metallic or ceramic coatings, or fillers which include stabilizers or monoliths. The stabilizers could be both mechanical or chemical stabilizers.

I want to summarize the container corrosion experiment work. Before I do that, I don't know if it's easier -- I'm not sure which one in your package -- is that one the next one or the table?

MR. FREI: Container corrosion experiments.

DR. STAHL: Let's talk with that one. This basically summarizes where we are right now. We've done in the last few years some corrosion experiments in gamma field and we've found basically no show stoppers.

We've confirmed, as I mentioned, that there some radiolytic effects. For example, in the creation of nitrate, nitrite and peroxide, we have to be concerned with, but they don't seem to be lifetime limiting.

We've done some slow strain rate testing and here, unfortunately, we started testing under very extreme conditions and cracking does occur to some degree with all materials. So we're currently continuing that testing under modified conditions.

The objective of these tests was to try to qualify the six candidates and to determine which of those would perform better than the others. Also underway are some crack growth rate experiments. These are basically with the three candidates that I mentioned. The slow strain rate testing includes all six materials.

Lastly, the microbiologically influenced corrosion we did go out for bid on this this past year. We've received some proposals and we hope to initiate that effort early in FY '90.

DR. CARTER: Excuse me, David, could I ask you one question?

DR. STAHL: Of course.

DR. CARTER: As far as the first part of that, what total limits now in terms of gamma exposure are you using for your materials testing?

DR. STAHL: Well, as I mentioned --

DR. CARTER: I recognize the field, but, of course, that field is going to be there for an appreciable period of time.

DR. STAHL: Well, as I showed in the curve, as far as the thermal field, the gamma field fairly well parallels that and it drops off very quickly after the first couple of hundred years and it's mainly due to strontium and cesium activity which have a 30-year half-life for radionuclides.

DR. CARTER: Are you using accumulated fields that recognize that sort of limit?

DR. STAHL: Oh, yes. That's integrated, basically.

Now, as a result of the degradation mode survey work and all of the work that was done at Lawrence Livermore Laboratories and the subcontractors, I attempted to put this curve together to try to qualitatively rate the materials.

I'm sure each of you will have some opinion on their relative rankings, but I hope that as a result of discussions I've had with the Lawrence Livermore staff that there is some consensus here on at least the qualitative relationship of each of the alloys to the degradation mode or concern.

We have the same degradation modes that I indicated earlier. We've added weldability to that list and we've combined the 304L and 316L in one column, seven-percent aluminum bronze, pure copper, 70-30 nickel and alloy 825. I don't want to go into detail on each of these, but let me just point out here the footnote of what those rankings mean. One is very good, two is acceptable, three is marginal, four -- excuse me, U is unacceptable and question mark means that we don't have sufficient data.

Now, as you can see qualitatively from this, it looks as if the alloy 825 is the best candidate, followed by the copper-nickel 70-30 alloy and then by pure copper aluminum bronze and the 304 or 316 alloys.

DR. PRICE: Excuse me, are these modes equally weighted in your mind, these degradation modes?

DR. STAHL: No. No. One has to look at what the important degradation modes are. As I mentioned early on, general corrosion is not particularly important, but stress corrosion cracking and localized corrosion are very important; these two.

Hydrogen effects, we think that they are all acceptable, basically. A big unknown is the microbiological corrosion. We've attempted to put some rankings on that based on information that was at hand.

There is some recent data which indicates that even with these other copper alloys, the seven-percent aluminum bronze and the 70-30 copper-nickel, they may be marginal rather than acceptable. We need to look very strongly at that.

Does that answer the question?

DR. PRICE: Yes.

DR. STAHL: Let me go on and talk about modeling. There are two portions on that, the container models and the system model, as mentioned by Michael Cloninger.

First off, we need to identify the degradation modes and we have to be certain that we have identified the important modes for each of those materials. Once we've identified those, we have to develop or establish the phenomenological mechanisms that are acting. Then we have to mathematically model them using parametric dependencies. There are errors, of course, in all of these stages. We then have to compare the predictions to the data and iterate -- hopefully, improve our models.

Now, for each of these, then, we have to combine them to get a single model for container performance. Once we have that, as was mentioned, we need to predict the behavior of the ensemble of containers under repository conditions, failures are going to be spread in time. Those have to be integrated and must be -- must compare that integrated performance to the 10 CFR 60 requirements and, as noted, we need to perform uncertainty and sensitivity analyses, again, to confirm that the performance requirements have been met.

This last slide indicates the status of the container behavior modeling effort. As far as metallurgical stability, we've had studies going on at various universities, including Ohio State, and have looked primarily at the emphasis -- looked primarily at the stability of the welds. We've also done some parametric testing at Babcock and Wilcox. We don't believe there are any show stoppers there, but, again, that's work that we will conclude here within the next year to aid material selection.

As far as general corrosion and oxidation, as I mentioned, we feel that we have a fairly good understanding of the processes there. We know what those rates are, we're setting those to an existing -- to existing rate expressions and, hopefully, we'll also predict corrosion potentials.

The same is true for the localized

corrosion. We've observed the pitting potentials and incubation times and those are being fit to existing models. Right now we're looking at propagation models and those are a little bit more difficult to handle.

On stress corrosion cracking, we're looking at the models that were developed that GE and by Drason and others on the slip-dissolution approach. That appears to be very applicable, but we need to adapt that to the other alloys, 825 and the copper alloys. That work was initially developed for the stainless steels.

Hydrogen effects, basically linked to gamma flux calculations. That's fairly straightforward. There are some hydrogen concerns, for example, with high-purity copper. We need to resolve those.

As I mentioned, on the microbiological side, we haven't done a heck of a lot there; basically, just studying the available information in the field and will be starting some work hopefully early in FY '90.

Lastly, on the ensemble model, we've started the effort looking at simple models for each of these modes and that will be incorporated into a system model.

That concludes my talk. Thank you. I'm happy to answer any outstanding questions.

DR. VERINK: I've got a couple that have

been raised. I was glad to hear something about the schedule of the modeling. I think some other aspects of this would be helped if we could have a little better idea where you are on the schedule.

DR. STAHL: Well, currently, the materials selection process is going along. We have taken a first cut on selection criteria through a peer review panel that was established through Dr. Robin Jones at EPRI using an independent panel that was established and we're currently gathering parametric information for the corrosion testing that I mentioned that's going on at Argonne National Laboratory and the parametric welding experiments that are going on at Lawrence Livermore Lab and at B&W.

We hope to wrap those tests up by the spring of 1990, which will enable us to make a materials selection prior to the start of the ACD phase and enable us to do a peer review of that selection.

MR. ISAACS: You might describe what ACD

is.

DR. STAHL: Advanced conceptual design.

DR. VERINK: If the studies are complete, say, sometime spring 1990, when does that next material selection milestone come? The end of that year or --

DR. STAHL: Basically at the end of that year. As was mentioned, in 14 months, we hope to start ACD, but that date is subject to the project, headquarters and congressional mandates and budget restraints, of course.

DR. VERINK: Suppose the temperature were dropped before putting materials in a repository, what would that do to the situation?

DR. STAHL: Well, it means that we're further on on this curve -- certainly we move to the right as far as the time is concerned. We would still expect that the bulk of the containers would be above the boiling point of the water and hence would remain dry. That's our design basis.

In other words, our expected condition is a dry condition. We do have analyzed, as was mentioned, a bounding case where the containers do cede some water and, as a result, you do see corrosion due to aqueous processes.

DR. VERINK: This is dry partly because
it's way above the water table or because of what --

DR. STAHL: Well, it's dry because it's
above the water table and in unsaturated, tough

rock, but also it's dry because it's warm and we've driven the moisture away from the waste packages.

DR. VERINK: From what I read in this thing here --

DR. STAHL: Yes.

DR. VERINK: -- there would be air around the container.

DR. STAHL: That's correct.

DR. VERINK: I understand that's to get better circulation and so on, et cetera, correct, or --

DR. STAHL: Well, it's basically to permit insertion. You can't have interference between the waste package and the borehole.

DR. VERINK: But that doesn't mean -- what I'm getting at is what would be the disadvantage of following the pattern, say, of the Swedes of putting bentonite around it?

DR. STAHL: Well, the disadvantage would be if indeed the rock was wet, then you would have a wicking effect of any material that you emplace between the container and the borehole wall.

DR. VERINK: And that would absorb some
moisture and swell up and close off that, wouldn't
it?

DR. STAHL: That's true, but that still means that you have moisture in direct contact with the container wall.

We've done some analyses at Lawrence Livermore looking at various packing materials between the container wall and the borehole and found that, by and large, the presence of a packing material does not lead to superior performance. It leads to marginally poor performance because of enhanced diffusion of radionuclides across that gap. There is a report that will be coming out on that shortly.

MR. ISAACS: Just a point of context. When we had three sites, for example, the other two sites we were looking at were saturated rocks and, indeed, we had buffer materials around those in our conceptual designs for the very reason that you're talking about.

I think the concept here was to take advantage of the unsaturated rock and if the temperatures were high enough, the theoretical implications which have to be demonstrated during site characterization is that we would drive that water away and take advantage of that fact in the performance of the waste package itself.

The thing I wanted to bring out here is that unless and until we get underground and actually do characterization, there will always be a degree of iteration that's going to be required once we start collecting in-situ site data that might cause us to have to deal with some of those unexpected conditions that you might find during characterization that will iterate what the characteristics of the waste package will ultimately have to have.

That's one of the reasons for having that alternate material program, for example, is to make sure that we've got flexibility and that if we get down there that everything looks good, but we still can accommodate --

DR. VERINK: Would you think there would be any advantage to the zeolites that are present in the structure with regard to --

DR. STAHL: There would be a marginal benefit from the zeolites because they do absorb cesium and to some extent perhaps iodine.

One point I did want to make before I took this chart off is the fact that the 57 kilowatt per acre aerial power density was chosen for this analysis. There is work that has gone on at Sandia and Lawrence Livermore on the basis of the transformations that occur in the rock and the thermal conductivity of the rock that this number could be increased. If this number is increased, then these temperatures would be higher earlier in life as opposed to lower.

DR. CARTER: Can I ask you one question? I was sort of curious, with any of the materials that you're taking a look at under the anticipated environments in which they will be for a considerable period of time, do any of these things experience a sort of a behavior that we observed over a period of years with graphite where a parameter -- an important parameter changes with time?

I'm thinking particularly graphite exposed to neutrons and gammas over a long period of time where it contracts for a period of time and then it switches over and decides it wants to expand.

DR. STAHL: Sure. Certainly that would be a consideration for graphite. As I mentioned, from a corrosion standpoint, graphite is a superior material. One only has to look at the Indian burial mounds and one finds graphite artifacts that have lasted a millennium. But we also looked at the other materials, as I mentioned, the metallurgical stability of both in the welding process and for long-term heat treatment.

For example, if that material is at 200 degree C for a long period of time, if you do have second phase, you have to evaluate the effect of that second phase on corrosion resistance, particularly.

DR. VERINK: I was interested to see the titanium alloy is apparently being considered again. Why were they dropped? Why are they coming back?

DR. STAHL: They were dropped primarily because of costs and fabrication difficulties, not because of their corrosion resistance, although there is uncertainty in regard to the hydrogen behavior of titanium, as you know, and there is also some crevice corrosion work that's been done by Mark Molecke here at Sandia National Laboratory, so there are some difficulties with titanium, but we need to take another look at that.

DR. BARNARD: Dr. Stahl, how confident are you that we'll be able to develop a material that will meet the regulatory criteria with 1,000 years of total containment and 10,000 years of controlled release?

DR. STAHL: I'm very confident.

DR. BARNARD: Very confident?

DR. STAHL: Yes.

DR. BARNARD: What sort of costs are we talking about for these containers? Do you have any ballpark estimate?

DR. STAHL: We've got an estimate. In fact, we have recently sponsored a detailed cost effort by B&W to look at the cost of those containers using those six materials and using different processes. It's on the order of $50,000, I believe, is what we're talking about now per container and including the quality assurance aspects.

DR. BARNARD: How much material do you assume will go into each container? How many metric tons of spent fuel, do you recall?

DR. STAHL: Well, it depends on the design. The hybrid design that was shown earlier with the three PWRs and the four BWRs has about three, three-and-a-half tons of fuel in it.

MR. ISAACS: Another number that I recall
is something like we're expecting something like a
total of 30,000 packages.

DR. STAHL: 26,000 metric tons of spent fuel planned for the repository -- excuse me, 63,000.

DR. BARNARD: That's better.

DR. STAHL: 26,000 packages, yes, 63,000 tons of spent fuel and 7,000 of high-level waste glass to make up the total of 70,000 metric tons --

DR. BARNARD: Okay.

DR. STAHL: -- which is the current design.

DR. VERINK: What are the long-term tests that you were referring to and how long is long?

DR. STAHL: Very good question. We've held up doing very much in the way of long-term testing until we've made material selection, but long-term testing will begin with the LAD phase and hopefully in advance of the LAD phase if we know the environment well enough. The long-term testing will continue into the license application period and beyond into probably the performance confirmation period, so we're talking about initially two to five years and then extending well beyond that during which time the license application and perhaps even the construction has started.

DR. VERINK: Now, these won't be electrochemical tests, or will they?

DR. STAHL: No. Those tend to be short-term tests, electrochemicals.

DR. VERINK: Yes, I know. What sort of configuration is likely to be tested? Is it going to be model size canisters or some such thing?

DR. STAHL: Certainly not full size in the long-term test program. We're hoping to look at some subsize or coupons for long-term tests. It's very difficult to, as you know, keep long-term, full-scale tests going.

DR. VERINK: When will some data be available from some of this?

DR. STAHL: Oh, yes, thank you. I had mentioned the degradation mode survey work. Those volumes are -- eight volumes have been reproduced and they are currently, unfortunately, still in the editing process. I was hoping that I would have them in advance of this meeting, but has not happened. We hope to have them soon and available to the board.

There is also a summary volume, which is a companion to that complete set, and it's a stack of about six inches high with several thousand references.

DR. VERINK: I'd like to get on the mailing list.

DR. STAHL: Absolutely. You are on the mailing list.

DR. PRICE: Any other questions? If not, we sure want to express our appreciation and thank you very much and want to express our appreciation, Tom, to you and your crew for bringing this together and making it possible for us to have this first meeting and this initial briefing.

We can see that there are a number of directions that we need to be pursuing and looking at and we will be trying to hash out where do we go from here, but thanks very much.

MR. ISAACS: If I can just say thank you and that I think we've certainly got a lot of very good and useful information.

One of the things that I want to make sure we do is we've got -- this meeting probably more

than any others demonstrates the needs for it --
we've got to come up with a mechanism to track the
things that come out of meetings like this in a way
that lets you know we've heard them and we're taking

action on it. We're going to take that tracking system and put it to the test here with this meeting to make sure that we identify those things we think we heard and let you know what we're going to do about them and put this in a schedule. Some of them are going to be responses that will take a half a day, some will take a millennium, but we'll try to put it together in a reasonable format.

DR. PRICE: I'm glad to hear that thought about tracking, because I think it's something we'd be interesting in and we're going to be very interested in receiving the transcript from this as soon as it's possible.

MR. ISAACS: As will we. Thanks once again. We really appreciate.

I think with each of these meetings, both the board and panels, we learn a lot both substantively and effectively about ways that we can interact with the panels and the board.

I think we both need to continue to work hard, because we're going to be in business together for a long time, on honing the process that we use to make this most effective and efficient. I think this is our fifth meeting and I've been very satisfied with the interactions, but that doesn't mean that we can't do better, and so I would like your suggestions also on the way we organize the meetings and the way we conduct the meetings, try and do it in kind of a predictable format so that we both get the most advantage out of it.

DR. PRICE: Yes, I think we've got some ideas to share with you.

The panel will be meeting in closed session after this. I think we'll just take the time for a short break and then we'll meet after this.

Again, thank you very much.

MR. ISAACS: Thank you.

(Proceedings adjourned at 3:00 PM.)

STATE OF NEW MEXICO)
)ss.
COUNTY OF BERNALILLO)

I, Cheryl Bruce and Kathy Townsend, the officers before whom the foregoing matter was taken, do hereby certify that we personally recorded the proceedings by machine shorthand; that said transcript is a true record of the proceedings; that we are neither attorney nor counsel for, nor related to or employed by any of the parties to the action in which this matter is taken, and that we are not a relative or employee of any attorney or counsel employed by the parties hereto or financially interested in the action.

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