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UNITED STATES NUCLEAR REGULATORY COMMISSION'S

ADVISORY COMMITTEE ON NUCLEAR WASTE

DATE: February 22, 1990

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON NUCLEAR WASTE

17TH ADVISORY COMMITTEE MEETING

7920 Norfolk Avenue

Room P-110

Bethesda, Maryland

Thursday, February 22, 1990

The above-entitled proceedings commenced at 10:00 o'clock a.m., pursuant to notice, Dade W. Moeller, committee chairman, presiding.

PRESENT FOR THE ACRS SUBCOMMITTEE:

M. J. Steindler

W. J. Hinze

Howard Larson, Cognizant ACNW Staff Member

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R. F. Fraley

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W. Dorsife

D. Cool

R. Meck

PROCEEDINGS

[10:03 a.m.]

MR. MOELLER: The meeting will resume. The next item on our agenda is a discussion of low level waste programs as seen from the perspective of the States. We have with us William Dornsife, who is Chief of the Division of Nuclear Safety for the Bureau of Radiation Protection, Department of Environmental Protection within the Commonwealth of Pennsylvania.

It was my pleasure to be in Pennsylvania several months ago and attend a meeting of their compaq group. At that meeting I had a conversation with Mr. Dornsife, and he offered to come and give us a briefing on this subject. He had formerly chaired the Low Level Waste Committee of the Conference of State Radiation Control Program Directors and he currently chairs their Environmental Nuclear Council. Mr. Dornsife, it is a pleasure to have you, and we look forward to learning what you have to share with us.

MR. DORNSIFE: Thank you, Dr. Moeller. It is a real pleasure to be here. I guess just to amplify a little bit on what my responsibilities are as Dr. Moeller mentioned, for the last eight years I was Chair person of the Conference of Radiation Control Program Directors Low Level Waste Management Committee, which basically consisted of all the regulators from the three sited states and other

host state regulators that will eventually have responsibility for regulating a low level waste disposal facility.

Just recently I was elected to the Executive Board of that Conference, and now I basically coordinate all the environmental committees of the Conference, which is basically the major effort that the conference does. We study various issues through these committees and task forces and make recommendations to various interested individuals, particularly NRC, EPA and the Center for Disease and Health.

Also, I am a voting member of the Low Level Waste Forum which, as you are probably aware, is a group of state compaq and host state representatives who meet quarterly to basically share information and ideas about progress in developing and implementing the Low Level Waste Policy Amendments Act. I am also on the Executive Committee of that Low Level Waste Forum.

In addition, I am a voting member of the host state Technical Coordinating Committee, which is basically a similar group of host state technical people who meet periodically to share information of a technical nature and try to learn lessons learned from one another and try to make sure that we don't make the same mistakes as folks learn and proceed through the process.

[Slides.]

MR. DORNSIFE: Just to tell you a little bit about my background of what my responsibilities are basically, in Pennsylvania I am Chief of the Division of Nuclear Safety and basically manage two programs. One obviously is the Low Level Waste Program and as you are probably aware, Pennsylvania is the host state for the Appalachian Compact which consists of Pennsylvania, Delaware, Maryland and West Virginia. Basically, we will eventually be responsible for disposal of the waste that is generated at some of the facilities in this neighborhood including NIH.

In addition, and I will obviously be talking for the most part about those responsibilities under that program. In addition you might be interested, I also manage a Nuclear Safety Program. Obviously after the TMI accident, Pennsylvania became very interested in nuclear safety and we put together a modest nuclear safety oversight program where we basically have a qualified engineer assigned to each nuclear power plant site in the Commonwealth, and that engineer does independent inspections. He accompanies NRC inspectors, and he basically provides general oversight of what the NRC's regulatory role is going on at those particular facilities.

Obviously, we interface very closely with the folks at Region 1 in that effort.

MR. MOELLER: Is he based or she based at the reactor; do they spend all their time at the plant?

MR. DORNSIFE: No, the engineer is not a resident engineer. I guess for the same reasons that NRC wants to rotate engineers, we decided it is probably better to have a person that is headquartered in our office. That way we can rotate assignments on a periodic basis more easily, in terms of relocating people. Also, I think it is safe to say that the engineer probably spends about a week a month actually at the facility.

In fact, he doesn't only do that nuclear safety work, there's some other programmatic things like emergency response and occasionally they help out with the Low Level Waste Program too, so there are a lot of other things besides just that oversight inspection that these engineers get involved with.

Let me just give you some perspective I think that is very important before I get started on some of the technical issues. I think when you are looking at the waste issue, I think waste is different than most other technical issues. The public views waste a lot differently. Waste touches everybody's life; everybody generates it and everybody looks to see that it is safely disposed of. In fact, everybody has a waste disposal facility of some sort probably in their neighborhood. So, it probably touches the

public a lot more than other technical issues.

In addition, I think it is safe to say that in the past there have been some real problems with waste disposal, both in landfills, hazardous waste disposal and even in radioactive waste disposal. So, the public is very skeptical about waste disposal. They are very skeptical particularly in a humid climate about putting waste in the ground. That is a very large concern. They want to know that it is being safely isolated, they want to know it is safely monitored. It's a real big concern. Again, it is not like other technical issues that the NRC deals with.

I think you will have to agree with me, I think my colleagues in the other states that have been assigned this unique responsibility under the Federal law, under the Low Level Policy Amendments Act, have done a tremendous job in implementing that responsibility. As I will talk about a little later, several states have gotten down to a final site and there's acceptance generally of some of those sites in the community. So, I think in general there has been a tremendous amount of effort done.

Obviously, there are problems in some parts of the country. That is to be expected. But I think all in all, we have done a tremendous job in implementing our responsibility. If you look at a parallel, some way to compare it to what this would be like in a high level waste

area, just assume for example if Congress were to pass a law that said okay NRC, EPA, DOE and Congress, if you don't have a high level waste facility in operation by the year 2000, we are going to make you take title to and have full liability for all the waste that is generated. I think that might make a few people move.

I think basically that's the position that state's are in. You will have to consider that nuclear power plants generate about 80 percent of the volume that are going to go to these facilities and about 95 percent of the radioactivity that are going to go to these facilities, and the states were given absolutely no authority over the regulation of those nuclear power plants. We are not allowed to regulate the source that generates it, but we are expected not only to site but also to regulate the disposal of that waste.

I think we have a unique responsibility. I think we have all generally taken that responsibility very seriously, and we have moved forward very positively in implementing that responsibility. I obviously do a lot of talking to the public. If you really want to get right down to it, there's one very important word in this issue, and it's called credibility. I think credibility is something that you really don't automatically get, it is something that you earn. Credibility is very difficult to earn.

As I tick down the kinds of things you need to gain credibility, I would like you to compare some of these things with how the Nuclear Regulatory Commission handles some of these issues, and I think you may see why there is some credibility gap as far as the public is concerned with how NRC regulates radioactive materials. I don't care how competent a technical staff you have -- I think the NRC technical staff is second to none. I am very much impressed with their technical expertise. They are again, second to none. However, there is a very large credibility gap in terms of dealing with the public.

I think first of all, credibility comes with communication. You have to have meaningful and effective two-way communication. Believe me, notices in the Federal or State Register doesn't do it. It has to be meaningful, and the public views it as meaningful two-way communications. This is a very difficult thing for technical people to do. Technical people by their nature, are very skeptical of technical concerns that the public have. They just think that these concerns are foolish, they aren't real concerns. When you talk to the public these concerns are real to the public, and they expect that their concerns will be addressed.

I think it is important that you recognize that no matter how foolish they may sound, all concerns are

legitimate concerns. I think when you get over that hurdle -- and it's an attitude problem I think more than anything - - when you get over that hurdle of being able to recognize that, you will find that solutions and compromises are very easy to come up with. I think as I go through some of the material you will see how we have done that in Pennsylvania. We basically manage to satisfy to some extent, all the interested parties.

Obviously, the interest of elected officials are different than the interest of common, ordinary citizens. The interests of environmentalists are different than the interests of the common, ordinary citizen. In fact, sometimes you have a difficult time finding a common, ordinary citizen and understanding what their concerns really are, because all you hear from are the vocal minority. It is important that you recognize there are those different constituents, they all need to be addressed, they all need to be understood, and probably all need to be addressed differently.

Very importantly, the public expects to have access to decision makers. They don't want to see the public relations staff; they want to have access to the people that are making the decisions. I think one criteria and one thing that I would think would make everybody's life a lot easier is, before anybody at any level became a

so=called decision maker that they be forced to sit in a public meeting and talk directly to the public. I can guarantee you, you perspective will change. You will come away from that meeting with a better understanding of what your decisions really mean and how they affect people. It is very important. The public expects to have access to decision makers.

In fact, not only that, they want to see some positive measure that their decisions are being understood nd addressed. They don't want lip service paid to their concerns. I think next important is the integrity of the process. You have to be honest. No matter how much it hurts, if somebody asks you a question, you have to answer it totally honestly. You have to get on a very personal level with folks. Sometimes they even impugn your own integrity, your own qualifications. You may have to put it all on the line occasionally.

Finally and very important, no matter what you do, the local public is still going to have some concern over the credibility of state or federal regulators. They want some sort of local control. They want to know that they have control over the situation if in fact things go bad, and they don't think the regulators are doing a proper job. In Pennsylvania the way we have addressed that is, our law includes a provision where there are host municipal

inspectors that basically have full access to the facility, the host municipality can too and the host county can too if they like. It is paid for by surcharges on the waste.

Those local inspectors have the authority to shut down the facility if they see a violation of health and safety. We have not -- our department will eventually be the regulator, assuming we are able to get a limited agreement with the Nuclear Regulatory Commission, which I will talk about also. We will be the regulator on that facility. We won't abrogate our ultimate responsibility for regulation, but basically that local inspector will have the same authority as our on-site inspector will have.

If he sees a health and safety violation, he can order a shut down of work. We will have to review that decision just like we would for our own inspector. Those kind of things give the locals some measure of control. If things go bad they know ultimately they can make a difference, and they have some control over their destiny.

So, I think all of those are very important. I think in order to have a credible program, you need to address those issues. If you think about them, those are some of the reasons as I discuss some of the other issues, that the state's have done some of the things they have. We have done these things -- we have had to do these things, and we have had to listen to the public and take their

concerns into consideration.

MR. STEINDLER: Let me ask you a question if you don't mind. You spoke about local inspectors. Are they accountable for their mistakes?

MR. DORNSIFE: Absolutely. We plan on entering into a memorandum of understanding with the host municipality that will contain things like the required qualifications of these people, their training, we will have some procedures on what is a legitimate health and safety reason that they can shut down a facility. I think in terms of liability, the operator is required to indemnify under our state law both the Commonwealth and the host municipality. So, in terms of liability, we are indemnified by the operator.

MR. STEINDLER: I don't mean that. I am talking about the functioning of this inspector either generated by the locality or appointed by the locality or at least responsible to, I assume the locality rather than your office; is that right?

MR. DORNSIFE: Yes.

MR. STEINDLER: How is the operator of a facility protected against what I would call frivolous activity of this inspector?

MR. DORNSIFE: If the fact that the ultimate authority still rests with the Department. It is the same

way it is protected against a frivolous activity by one of our inspectors. That is not the final action.

MR. STEINDLER: This guy really can't shut the facility down.

MR. DORNSIFE: Temporarily. A stop work order, if you will, is more like it.

MR. STEINDLER: A stop work order then is enforceable at the local level; is that what you are saying?

MR. DORNSIFE: Yes. That is probably a more accurate description of it.

MR. STEINDLER: There is a time limit between that order and the time you have to make some kind of decision on it?

MR. DORNSIFE: It is not a hard and fast one. There are some guidelines that we will probably also may make hard and fast in the memorandum of understanding of how quickly we will address those issues.

MR. STEINDLER: Thank you.

MR. DORNSIFE: Just to provide you with some -- please do interrupt. I want to keep this as informal as possible. I normally am used to giving presentations that way.

[Slides.]

MR. DORNSIFE: Just to give you a little bit of background on Pennsylvania's program, my department in our

state siting law is given very comprehensive responsibilities. In fact, we are the only state agency that is given any responsibility to implement this program under the law. We are up front, required to facilitate in site development. What I mean by that, we are required to select an operator and an operator is responsible for siting, design, construction, operation and eventual decommissioning of that facility. We are responsible for entering into a contract with that operator.

Once we do that and we are on the verge of actually executing that contract, what has been holding up our progress is a action by the State Legislature that requires a fee bill to be passed which basically places a fee on all the nuclear power plants in the compaq to help pay for the so-called Phase 1 activities. Phase 1 activities involves up to the receipt of the license application.

When we first went out for a request for proposal, we had the proposed operator paying for all preconstruction activities including the Phase 1 effort. We didn't get any proposals back. We had a meeting and asked then what their problems were in addition to some liability concerns with our law, one of the problems was they weren't willing to take the kind of risk. They weren't willing to spend $25 million up front without some guarantee of getting a right

at least to construct a facility.

So, the only way we were able to get proposals was to offer this Phase 1 funding. Obviously we need legislative action to implement that fee, and that is where the politics enter into it. We are hoping that in the next week there's a meeting scheduled of the Committee that has held hearings on that bill. We hope that Committee will vote that bill out. Therefore, we can get on with our siting process.

We have not begun siting in Pennsylvania. Basically, we have spent the past four or five years building confidence in the process by going out and meeting with an advisory committee, which I will talk about a little bit later, building confidence in the process and involving people in the process, trying to understand their concerns and build those concerns into either the law or the regulations.

MR. ORTH: If you were going to get a law passed in Pennsylvania to arrange for a fee from all of the different states in the compact, doesn't this also require action by the individual other states? For example, a power plant in another state wants to pay you a fee and their local state utility board or whatever says no, sorry about that kid, it's not allowable.

MR. DORNSIFE: Like many other things, we have

found a way out of that dilemma. What we have done -- we recognize the state law only applies to those reactors in Pennsylvania. However, we have a provision in our law that allows any major generator to be a voluntary contributor to that fund. As a voluntary contributor, he receives the full benefits of contributing to that fund and those benefits include basically getting interest on the money, and getting a credit toward disposal later on.

So really, it's more of a loan than it is anything. We have a commitment from Baltimore Gas and Electric who is the only other utility in the compact, that they are willing to be a voluntary contributor to that fund.

MR. MOELLER: At some appropriate time, I would like for you to comment on one other aspect of your program. We recently were -- one of our fellows was doing a review of all the low level waste incinerators and the status of those programs and so forth. In doing that review, we noticed that B&W had apparently attempted to license a facility at your Parks Township Waste operation.

If you could give us any information on that, we would appreciate it.

MR. DORNSIFE: Sure, I will be glad to. Basically I think the first problem that occurred at the Parks Township Facility was B&W had an arrogant attitude. They thought just because they operated a facility in that

neighborhood for the last 20 years the public would accept anything they wanted to do at the facility. So, they really didn't have a very good public involvement program in the beginning.

Consequently, they ruffled a lot of feathers of all levels, elected officials, public and you name it, and they were already operating from a hole. They never really recovered from that hole. That concern of the public, and it was a tremendous amount of concern. We had outside people come in, various environmental groups nationwide come in on that issue. A lot of misinformation obviously went back and forth. The state politicians got in the action, and they came out in opposition to the facility.

I think you need to recognize that state politics are different than federal politics. There are state agencies, particularly some regulatory agencies, some of the politicians have a lot more influence in terms of decision making at those state agencies. I think basically what happened in the case of Parks Township -- I am sure you are aware, they did get a license to operate the compactor. However, the state made a decision that they needed an air quality permit under the Clean Air Act Amendments.

The infamous Simpson amendment will end that. Of course, Pennsylvania is obviously opposed to that Simpson Amendment because of the state's right issue. We determined

that B&W needed an air quality permit, and they just weren't willing to provide the kind of information that we thought was necessary for that permit. Eventually, they just decided to cancel the effort, it wasn't worth the trouble. Ultimately, the blame lies with the licensee. The licensee didn't do their homework, and they didn't approach that project the way they should have.

One of the provisions in our Low Level Waste Disposal Act includes a requirement that commercial incineration is prohibited in Pennsylvania. People can incinerate on-site but commercial incineration is prohibited. We are also required under that law to develop specific siting requirements, state siting requirements for commercial compactors and on-site incinerators. I think you see not only does the immediate problem occur, but you typically get some adverse political fallout at the back end in addition to --

MR. SHAPIRO: What is the reasoning behind allowing on-site incineration while not allowing commercial incineration, if you can apply the same regulatory standards to each?

MR. DORNSIFE: I think technically there's no differentiation. That is the barrier you need to get over. What makes sense technically doesn't necessarily make sense politically. If we dealt with the waste issue from a

technical standpoint, we would write off places like the Nevada test site and not try to spend billions of dollars to clean it up and say these places are going to be contaminated forever. Let's dispose of all the waste we generate at those facilities. That is how we do it if we are doing things from a technical standpoint, but we obviously don't operate that way.

I think the reason commercial incineration is differentiated from on-site incineration is, you put a commercial incinerator at a location, it takes waste from all over the country. People aren't getting benefits from that waste all over the country. They kind of think that if a hospital has an incinerator, they are getting some benefit from the hospital being in the neighborhood. They get no benefit at all from waste being imported from all over the country. It would be burned at their facility and would release a small amount of radioactive material in the process.

MR. MOELLER: Let me be sure that I understand you. It was the state legislature which prohibited incinerators for any type or just low level rad waste?

MR. DORNSIFE: Just for radioactive waste.

MR. MOELLER: Just for radioactive waste.

MR. DORNSIFE: Commercial radioactive waste.

MR. MOELLER: When the legislature was considering

that law and so forth, were you invited to testify and interact with them?

MR. DORNSIFE: Yes. Obviously we testified on the Low Level Waste Disposal Act. However, you need to recognize in the background there were other even worse laws that addressed this issue. Having this provision in our law was probably a reasonable compromise to get the issue resolved on a political level. For example, there was one law that said the only place you would have commercial incineration was at the disposal site.

We recognized that it was probably a kiss of death for the disposal site, because the concern would be more of the incinerator that is going to be at that site more than the risk of disposal. I think in this case, it was something that was acceptable that we could live with and reached a political compromise.

MR. MOELLER: Your testimony before the Pennsylvania State Legislature was that you approved this particular aspect of the law?

MR. DORNSIFE: Yes. I think you recognize that if somebody were to challenge the law, there may be some problem in that meeting the challenge of Federal supremacy. Interstate Commerce, who knows. I mean, that provision could be challenged, but who is going to challenge it. I think you need to recognize the generators in Pennsylvania

in particular are very anxious to have a low level waste disposal facility. They need it and they have to have it, and they are willing to accept some of these other things because they recognize -- I think you need to recognize in Pennsylvania we are kind of unique, having the TMI accident, having had problems at Peach Bottom, Philadelphia Electric.

Our utilities probably have a better understanding than most utilities around the country of the politics and the public concerns. They have gone much further than all utilities that I have seen in trying to deal with those issues. They are very sensitive to these kinds of things. For example, as I will talk about later on the below regulatory concern issue, they are not going to rock the boat because they recognize what kind of political and public controversy that could involve.

[Slides.]

MR. DORNSIFE: Just to talk briefly about our process, the way Pennsylvania in our Low Level Waste Act which basically lays out the siting process, like I mentioned, we are required to hire a contract. We selected Chem Nuclear as that operator. We basically have a negotiated contract. We are ready to execute that contract when the Fee Bill passes. Chem Nuclear will then go out and begin screening the Commonwealth using the very stringent and proscriptive siting criteria that are in our

regulations, again, which were developed with a lot of public input from our Advisory Committee and through public meetings.

Once they have done that, they are to identify three potentially suitable sites. We expect that will occur, assuming the bill gets passed in the near future. Sometime next summer. They will come back with three potentially suitable sites. Those sites will then be submitted to our standing Environmental Quality Board. This is the Board that reviews and approves all our department regulations. It consists of various cabinet level members, cabinet level throughout the entire administration of people like the Fish Commissioner, the Game Commissioner, various other heads of various agencies and departments in the State.

That group has to find that those three sites meet the regulations and are three of the best sites in the Commonwealth before the company can then characterize those sites in more detail.

At that point, after the characterization is finished, the operator is required to select a site and submit that preferred site to the Department in a license application. We expect -- yes, sir.

MR. ORTH: One small clarification. You have rigid selection rules for the different sites, and it may be

relatively straightforward to select three sites that satisfy the selection rules. But then you threw in the word three of the best sites. There could be interminable arguments about what is best, although it may not be so arguable as to whether or not a given site meets the regulations.

So, is that word best really somewhere in the rules?

MR. DORNSIFE: Yes. Again, we very carefully considered that problem and the law is worded to address that concern. Basically to just diverge a little bit and talk about our siting regulations, we have two categories of criteria. We have disqualifying criteria, which are things like lands in the public trust, national parks, state parks, wild and scenic areas. Those kind of things are automatically excluded, flood planes, limestone areas. Those things are automatically excluded.

Then there's a category called evaluation criteria. The company is expected to go out to the public and have meetings with the public and develop weighing factors. Get input from the public on how he is to apply these evaluation criteria. That is basically how he gets down to those three sites, by weighing public opinion and coming up with three sites.

The way the law reads, they are three of the best

sites in the Commonwealth based on the administrative record. All that is on the administrative record are the details of those three sites and some backup sites. So, when you certify that those sites meet the regulations or you are determined they meet the regulations and are included on the administrative record, they are three of the best sites in the Commonwealth. I agree with you, if they are best sites in the Commonwealth, you could have interminable arguments of what makes it best. Whose opinion is it best. It is based on the administrative record.

MR. STEINDLER: Are the technical criteria for site qualification part of a law passed by the legislature or part of an administrative rule and instituted by your Department?

MR. DORNSIFE: It is administrative rule. The law required that we develop siting regulations that include general categories of things. Basically the regulations themselves were administrative procedures.

MR. STEINDLER: How are administrative procedures of this kind, how do they get into the status of actually being a procedure that has to be followed?

MR. DORNSIFE: It's very similar to the Federal process. We develop a draft regulation, but I think the biggest difference here is we had a tremendous amount of public input on the front end. We used our Advisory

Committee, our 16 member Advisory Committee which consisted of basically all the interested parties including environmental groups, to develop siting criteria.

We then took that criteria out to the public, brought the public comments back to the Advisory Committee and developed the draft regulation. That draft regulation then went to the Environmental Quality Board for initial approval to be a proposed regulation. It was then published for comment and we had public meetings again and a public hearing, and it was finally approved as final by that administrative body.

MR. STEINDLER: Thank you.

MR. DORNSIFE: It was very similar to the Federal process. We expected a license application will be -- I guess I answered the question about the best site. We expect that a license application will be submitted probably in early 1993, because there are basically some time constraints that are built right into the law. The earliest that license application will come into us would be early 1993.

Obviously, we are going to miss the 1-1-92 deadline, the next Federal milestone. In fact, assuming reasonable time for licensing and a reasonable time for construction we will just barely, if at all, be able to meet the 1-1-96 date. However, our Governor's certification did

include some provisions that would allow for storage beyond 1-1-96 if necessary. We submitted a very detailed package, and we intend to follow it very diligently to make sure licensees are doing what they say -- are committing to do what they said they did that they would do in a survey of all the licensees in the compact this past summer.

Basically, they all said they were capable of storing on-site. Some will need license amendments, some may need to expand their storage, but most everyone has committed to store the waste on-site for that period of 1993 to 1996.

MR. MOELLER: Back on your stringent criteria for siting, once those criteria were developed, did someone review them to be sure that there are sites in Pennsylvania that could meet them? I mean, they were practical as well as stringent?

MR. DORNSIFE: One of the things that we used as a basis and starting point for these regulations -- particularly disqualifying criteria -- we had already gone through a fairly extensive public process in developing hazardous waste site regulations. We, in many cases, took word for word the language that had already been approved in those hazardous waste siting regulations. The public used the two no differently.

So, we really couldn't be less stringent than the

hazardous waste criteria. Yes, we really didn't produce any maps, but we certainly looked at those disqualifying criteria to make sure, and we had some members on our Advisory Committee that had the expertise to provide input to us to make sure we weren't excluding the entire Commonwealth.

MR. MOELLER: Any of --

MR. DORNSIFE: We expect the disqualifying conditions for example, will eliminate 20 or 30 percent of the Commonwealth.

MR. MOELLER: Have sites been approved under your hazardous waste criteria?

MR. DORNSIFE: No, they have not. People have submitted -- first of all, the hazardous waste siting process is totally different. It is still expecting a permit application from an independent private company. There is no state hazardous waste siting process like we have for low level waste. Now, if we don't -- the state law has been passed. If we don't get a permit or unable to process a permit within the next two years, there will be a process similar to low level waste. There have been permits that have been issued, but those permits have been disapproved.

There have been problems with meeting the siting regulations or political problems. So, we don't --

presently Pennsylvania does not have a part B permitted commercial hazardous waste disposal facility, which is obviously another very large waste disposal problem we have.

I would like to shift gears a little bit now and talk in some detail about the design criteria that we developed as part of our regulations. I think first of all though, I would like to give you a brief status on the progress of selecting disposal technologies in the various host states. These basically are the host states that have selected a disposal technology.

Obviously, there are other states that are moving towards siting a facility, but these are the only ones that have actually determined or decided upon a technology. California, their operator is U.S. Ecology. Because their facility is in the desert and obviously Pennsylvania and some of the other Eastern states don't have a desert -- we wish we did, but we don't. They were able to convince their public that can use enhanced shallow land burial. They are looking at alternative designs, but basically they have settled on enhanced shallow land burial. I believe that is what was submitted in their license application.

California, as you probably aware, is ahead of everybody else. They actually have a license application in hand and are reviewing that license application. Again, the site is in the middle of a desert, and there is very little

public concern over those sites. Texas, although you may have visited the Texas site or have been out to Texas -- I guess I saw in your notes that you were --

MR. MOELLER: We are considering it.

MR. DORNSIFE: The Texas site is really a desert too. It's not quite as dry as California, but it really is a desert environment. However, they ran into quite a bit of public concern. They were forced to consider and actually implement an engineered design features. They basically will be putting the high activity waste in a below grade vault and the lower activity waste in concrete canisters. Basically, it will be an earth mounted bunker, is what design that they are contemplating and actually are considering. I think they have actually approved it.

That leaves the rest of the more humid climate states. Texas, by the way, has selected a final site and are in the process of characterizing that site. It is about 50 miles East of El Paso. Nebraska has also selected a final site. Their operator is U.S. Ecology, the same as California. However, they are going with an above grade covered vault. Basically, the vault is -- and I will show you some pictures of ours, but it is a very thick above grade concrete building which will then be covered by an earthen cover.

Illinois, North California and Pennsylvania have

all selected Chem Nuclear as the operator. We have all decided upon also an above grade covered vault. In addition, in these three states, not only do we have a covered vault but all the waste will be placed into concrete overpacks and placed inside that vault. I will give you some reasons for that thinking.

The reason I am presenting our design regulations to you is because we started off very early, back in 1985, developing these criteria. As a good engineer, we all know that before you build something you develop design criteria. That doesn't always occur in a political environment, but we did that. We decided to sit down with our Advisory Committee and work out a set of design criteria and involved the public in that design criteria so we could satisfy the public concerns.

I guess our first draft of the criteria hit the streets probably in late 1986. I think because at that point we had the only criteria on the street, I think you will see that basically all the above grade covered vaults, even the one that U.S. Ecology is using, generally is very similar and meets our design criteria. I think it is important to go through our design criteria, because I think it kind of set the standard for everybody's above grade vault. I think you will see that the vast majority of the people -- in fact, taking those four sites, Illinois, North

Carolina, Pennsylvania and Nebraska, that will consist of about 75 percent of the waste in the country will be going to those four facilities. I think you will see that most of the waste will be going to these types of facilities in the future.

[Slides.]

MR. DORNSIFE: First of all, coming up with design criteria we obviously had some design goals we wanted to meet. I think here probably the most important -- it is obviously difficult to separate protection of public health and safety from waste isolation, but I do it for a very good reason, because they are different issues. I think you also need to recognize that states are under a lot more constraints than NRC is. Not only do we have to satisfy and are closer to the public and are typically more responsive to the public than the Federal government is, we also have another master. We have our state legislature who also are typically more responsive to public concerns.

We had some very onerous and stringent criteria in our state law that we had to meet in our regulations. One of these required that we provide long term care for the hazardous life of the waste. That first of all required us to define what long term care was. It also was much more difficult to define what we meant by hazardous life. What we have arrived at -- again, this is with a lot of public

discussion and our Advisory Committee and input from the public -- we felt that a reasonable standard for hazardous life is the amount of time it takes for the radio nuclides to decay to the level that the dose from that waste is no more than the dose you could get from soil at that facility.

In other words, at some point you still have some long lived isotopes there but if you were to ingest that waste, you would get no more dose than you would if you were to ingest the natural radium in the soil. You can reach those levels.

MR. SHAPIRO: Are you allowing a doubling of the natural exposure; is that what you are saying?

MR. DORNSIFE: No. The public can accept the fact that if that waste is no more toxic to them -- an equal amount of waste is no more toxic than the soil that was originally there, that is an acceptable standard. To some extent you are getting different pathways, so there is some incremental increase. From the standpoint of that particular material, it is no more hazardous toxic -- its intrinsic toxicity is no greater than the soil.

MR. SHAPIRO: You are not adding, you are just replacing?

MR. DORNSIFE: Yes, exactly. This type of a standard has been pretty well accepted by the public. Again, as you will see, we have waste isolation in addition

to long term care for this hazardous life.

MR. OKRENT: Around the state there presumably is some variability with regard to the amount of dose one can get from the soil. Do you factor that into this criterion in any way?

MR. DORNSIFE: Absolutely. The thing that won't be included however, will be indoor radon exposure. As you probably are aware, Pennsylvania probably has the worst problem of any state in the country with indoor radon exposure. In fact, I bring this as an aside. I gave a lecture on risk to a local university and I tried to put the Chernobyl accident in perspective, and decided to play around with radon exposures in Pennsylvania.

Believe it or not, we have sampled about 100,000 houses in Pennsylvania. Believe it or not, the risk from radon exposure in one year in Pennsylvania is about the same risk as the entire population that Russia got in the Chernobyl accident in the first year. I was very surprised to see that, but that is basically how it worked out. Everything but indoor radon exposure would be considered in terms of that.

What it involves is that the custodial agency will have to do a calculation which, based on initial inventory shows that on restricted use of that site, it will give no more dose to anybody in the public than the soil that the

site originally did that was basically removed to dispose of the waste. We think that standard will be implemented.

Five hundred years from now, I mean, chances are that nobody is going to care about one or two millirem. Realistically, we will have bigger environmental concerns to worry about. Right now, that is what the public wants. They want that kind of assurance, long term assurance in the worst case, you are going to watch the stuff as long as it is going to create a problem for anybody.

MR. STEINDLER: When you talk about having the public in on your Advisory Committee and the various hearings, what is the public and how do you select of the many, many groups that might have views on this, participants without having to invent a ballfield or something?

MR. DORNSIFE: The best measure of that is how we selected our Advisory Committee. Instead of selecting individuals on our Advisory Committee, we looked at all the various groups in Pennsylvania, both technical and non-technical, that had an interest in this issue. We arrived at two or three environment groups, the Sierra Club, the Pennsylvania Environmental Council and University folks included. We have some utility folks, the Pennsylvania Electric Association, we have local government groups, the state supervisors organization, the County Commissioners

Organization. We have the League of Women Voters.

We have a mixture -- we have all the engineering groups, the professional engineers groups. We have the state geological society. We have a mixture of probably half and half of technical versus non-technical people.

MR. STEINDLER: How large is this group?

MR. DORNSIFE: Pardon?

MR. STEINDLER: How large is this Advisory Committee?

MR. DORNSIFE: It was basically 16 and in our law expanded to 21. Now it includes four legislative representatives.

MR. STEINDLER: Do these members act as representatives of the groups from which they came?

MR. DORNSIFE: What we do is, we don't ask the individual to serve. We ask tne organization to appoint someone to represent their interest. They decide who they are going to send to represent their interest. We feel that way that yes, they are representing the group and they provide feedback through that organization to the public, because we probably think that statewide all those groups together probably get somehow to virtually every citizen in the Commonwealth.

In terms of public hearings and meetings, anybody is allowed to come and ask questions. Our public meetings

are very informal. We make a presentation and open it up for questions, and stay there until people are exhausted.

Another important goal is adequate monitoring. We have various levels of monitoring, backup level. The public is interested certainly in not only principal monitoring but how do you make sure that you can detect anything that is going to be leaving that facility. Also, in case something goes wrong, the public is very concerned about waste recovery. Notice that we call it recovery and not retrievability. It is a very important distinction.

Finally, we have some special requirements in our regulations that address special concern waste, namely Class-C waste and mixed waste. I will address each of these separately.

MR. MOELLER: Maybe you will cover it on waste recovery. I am wondering if there is a time limit. If you put a concrete overpack on it and sealed it in, I didn't know how you would get it out.

MR. DORNSIFE: Yes, I will get to that on the next slide.

MR. MOELLER: Okay, we will wait.

MR. OKRENT: Could I ask one more question?

MR. DORNSIFE: Sure.

MR. OKRENT: Are costs of meeting the criteria factored in in any way? That's the first question. The

second question is, can you provide your own estimate of what the costs for handling these wastes are in terms of the annual taxes collected by the State of Pennsylvania to give a perspective? Is it a fraction of one percent --

MR. DORNSIFE: I was going to address that later, but since you asked I will address it now. No, there is no formal way of incorporating cost concerns or cost-benefit ratios into this design. You will recognize that if you try to apply cost-benefit, it would be impossible. We are talking about maybe saving a person a rem for millions of dollars invested. That is not the issue.

The issue is, you need to recognize the issue is if you don't do this, you are never going to get a site.

MR. OKRENT: I recognize that. I was wondering though, is it a large total amount of money or is it still a small amount?

MR. DORNSIFE: It still is a small amount. For example, we have some detailed cost estimates from Chem Nuclear to operate the facility over the 30 years that it is required to operate. The best I can break out from the chart is, for all these bells and whistles if you want to call them that, was about $20.00 a cubic foot. To give a perspective, compared to what people are paying now -- we have just recently done a call around to our utilities to find out what they are currently paying -- including the

cost of surcharge, the average cost of disposal including transportation runs anywhere from $120.00 to $150.00 a cubic foot right now.

We anticipate that the entire cost of disposal at our facility will be anywhere from $130.00 to $150.00 per cubic foot in 1988 dollars. That is a substantial smaller volume that what is going to Barnwell right now. There are some economics of scale already built into that equation. Some of the states that have very small volumes are going to be paying a lot more, because once you get below about -- we expect our volume will continue to be about 185,000 cubic feet a year on a continuing basis. That, believe it or not, makes us the second largest compact in the country in terms of waste volume.

If you go below about 150,000, you start seeing dramatic increases in the cost per unit volume disposal, and those kind of parametric studies have been done. That is where the need typically occurs. In terms of perspective to answer the political question we were asked how much does this cost the average electrical user. Incrementally, we figure that right now each electric user in Pennsylvania is paying about $3.00 a year to dispose of waste. Incrementally we are talking fifty cents. From a societal burden, it is pretty small. The societal burden of not having a facility could be potentially large.

[Slides.]

MR. DORNSIFE: The first goal was waste isolation. Again, we were restrained to some extent by our state law, because our state law bans shallow land burial. It also requires that we have an above grade engineered facility as a design. So, we had those constraints. Our regulations include the requirement for an engineered barrier above grade. We also have placed structural stability requirements for the various classes of waste on that engineered structure. Based on the hazardous life calculation based on what we are currently receiving, we typically believe that 100, 300, 500 years for the various classes of waste is a reasonable hazardous life, at least up front.

These facilities are required to meet these structural stability tests for the various class of waste. Our operator has committed to meet the 500 year stability requirement for all classes of waste. In fact, he intends to put all the waste into a concrete overpack, as I will get to it later, to some extent is required because of the recoverability requirements that we have on the facility.

MR. ORTH: You made an analogy earlier between the hazardous waste regulations and these. How long for stability on hazardous waste are the requirements?

MR. DORNSIFE: That's interesting you bring that

up. I think when you look at EPA versus NRC in terms of disposal philosophy, I think EPA in terms of isolation is more responsive to public concerns. The public views shallow land burial as leakage. They are not going to accept that. They flat out won't accept isolation of waste. They don't know what they means, but they want containment of the waste.

EPA's hazardous regulations require isolation of the waste. It may be imperfect, a double liner or double leaching collecting system. In my way of thinking it really doesn't technically provide you very much, particularly if you are only required to watch it for 30 years. I think NRC's regulations obviously are much better in the area of long term care than EPA's philosophy is. I think if you meld the two, you get to something that the public is comfortable with.

I think most of the mixed waste -- and I am going to talk about mixed waste in more detail -- most of the mixed waste we have seen are much more toxic from the hazardous standpoint. Some of the half-lives are interminable.

MR. ORTH: That is the reason, of course, I am asking.

MR. DORNSIFE: The reason that it is 500 years is, that's about all you can conceivably ask from engineers. I

mean, 500 years is pushing an engineer to certify something structurally sound. To go beyond that is impossible.

MR. ORTH: Are you answering the question then that hazardous waste rules would be 500 years in Pennsylvania?

MR. DORNSIFE: No, they are not. They are basically the same as the Federal RCRA, the double line collection system.

MR. MOELLER: Your legislature allows hazardous waste to be buried in a shallow land facility?

MR. DORNSIFE: Recognize, we don't have any hazardous waste facilities. We may not, until we adopt similar rules.

MR. MOELLER: At the moment, these requirements for the barrier, the vault and all, only apply to the rad waste?

MR. DORNSIFE: That's right.

MR. MOELLER: Okay, thank you.

MR. ORTH: I am interested in your structural stability. Does that mean after 500 years it looks something like the Greek Pantheon or something? After 500 years will that just be a relic of some kind, is that what you have in mind?

MR. DORNSIFE: As you can see further down, there is an engineer cover required over the facility to protect

the concrete primarily. As you are aware, concrete we are talking about freeze cycles, chloride and sulfates and acid rain, those are the things that are going to cause concrete problems for you. The engineer cover basically provides that protection.

MR. ORTH: Forever?

MR. DORNSIFE: Yes, forever. The 500 years are obviously the minimal. I think there is safety factors built in. Most people will expect structural stability will last longer than 500 years, but that is all the credit you are taking in terms of your performance assessment.

We are not sure how we are going to implement this one, but the regulations also require leak resistance for 100 years. Leak resistance is not defined, but again, it gives another assurance to the public that it is not only structurally stable but it inhibits water flow.

MR. STEINDLER: Leak resistance of what?

MR. DORNSIFE: The engineered structure.

MR. STEINDLER: That is the outside vault or the inside --

MR. DORNSIFE: The outside vaults. Also, the regulations -- we have always said that we are trying to find a site that, all by itself could meet the Part 61 performance objectives, forgetting about the engineered facility. If you just place the waste in this shallow land

facility, it could meet the 25 millirem per year performance objectives. However, we are putting the waste in this engineered containment to provide an extra barrier.

We have to show by performance assessment that this engineered structure can independently satisfy the performance objectives for the active institutional control period which is 100 years. There is passive institutional control period that extends for the hazardous life of the waste. The only difference between the two is, you allow some maintenance during the active period you continue to monitor throughout the hazardous life.

Finally, there is various criteria that speak to the goal of preventing contact of waste with water. This includes during waste in placement, includes after the waste is disposed of, and also for the hazardous life of the waste. Those issues are dealt with quite extensively. The goal is to prevent water from contacting the waste.

MR. OKRENT: Could I ask a question?

MR. DORNSIFE: Sure.

MR. OKRENT: Is flooding of the site therefore not to occur in the period of 500 years; is that what it means?

MR. DORNSIFE: One of the disqualifying criteria are flood plans.

MR. OKRENT: Current flood plans.

MR. DORNSIFE: Right.

MR. OKRENT: Do you propose to look 500 years into the future as to the climate changes?

MR. DORNSIFE: Obviously not. That is one of the reasons though for having the waste be recoverable. If that were to occur and you really think it is not safe to continue to dispose of the waste there, you can recover it an put it somewhere else. That is kind of the assurance that the public wants. You can't just say we haven't thought about that and we are not going to think about it. This is what we have done to ensure if that ever does occur, there is some way out of it.

[Slide.]

MR. DORNSIFE: The next very important goal is protection of health and safety. I think this is going to raise a few eyebrows. Our law requires -- this is in the law -- requires that our facility have a zero release capacity. How do you implement a zero release capacity? It took a lot of soul searching and imagination on our part obviously, but the way we finally decided to that is first of all, we say we are going to contain the waste for the requisite time periods for its hazardous life by having these stability requirements. More importantly, the public came back at us and said your performance objectives say 20 millirem and that's what you are going to be allow to be released.

Unless there is something else in the regulation to say you are not going to do that, you are going to allow 25 millirems a year to be released from that facility. That is why you have the one millirem from Illinois, because the public won't accept 25 millirem. What we have done is, in addition to the stability requirements we have a provision that says if there is any detectable radiation in our environmental monitoring program off-site, that the licensee or custodial agency has to take immediate action to identify and abate that release.

When you think about it, that's what you do anyway. That makes perfect practical sense. Under today's climate, if you saw radiation in the external environment, you would take action to do something about it. You would be forced to.

MR. ORTH: I guess the real problem though is that word detectable. We have gotten almost incredible sensitive these days.

MR. DORNSIFE: Again, if you want to have a facility, you better be sensitive of these things.

MR. SHAPIRO: I don't understand. You designed this facility so that it would essentially replace the soil that would have been there. Now, that soil is leaking. I mean, there is a balance but that soil is leaking -- that radium in the soil is very soluble. When you say zero

release, you are actually going way below your original criteria.

MR. DORNSIFE: What the hazardous life means is, after the 500 years you will have some long lived radio isotopes that will get out. That is what -- you are storing the waste until you get to the point where the release of those long lived radio nuclides will eventually -- there will be no more impact in the soil.

MR. SHAPIRO: Even the short life, your facility will certainly be less than what normally you transport back and forth. If you go into a zero release, it seems to me you are setting an impossible goal.

MR. DORNSIFE: I don't think so.

MR. SHAPIRO: I would think that you could educate the public. We have been able to educate the public for 10 millirem per year. I wouldn't give up on educating the public in terms of --

MR. DORNSIFE: We will talk about that, how successful you are in educating the public.

MR. ORTH: I think there was a small misunderstanding when I said we got incredibly insensitive. I meant sensitive in terms of detecting radioactivity. I don't think there is a sample of natural water in the U.S. that you cannot find radioactivity in it.

MR. DORNSIFE: This is above the variation of

natural background. After you have established a background and a variation of that background, if you can say this is above what the natural background is -- if you detect a byproduct isotope, that is obviously above background or probably is above background. Obviously, you investigate it. You do that anyway.

MR. STEINDLER: Does that zero release goal also apply to your hazardous waste?

MR. DORNSIFE: For 30 years, yeah. For as long as long term care is presumed -- that is the double line collection system.

MR. STEINDLER: I'm sorry, what I really meant was mixed waste.

MR. DORNSIFE: Yes.

MR. STEINDLER: You designed a package for which biological degradation is effectively going to be non-existent. How is it that you expect a licensee to demonstrate to you that after I think it was 500 years you had up there for mixed waste, that they can assure zero release of toxic material?

MR. DORNSIFE: First of all, as we will talk about later, I don't think we are going to need to dispose of mixed waste at these facilities. I think the mixed waste can be dealt with in other ways.

MR. STEINDLER: The fact is, you have mixed waste

on your slide.

MR. DORNSIFE: It is required by Federal law to have responsibility for mixed waste, and we include provisions for it. This is the best that we can do at this point with the technology in terms of isolating hazardous waste.

MR. STEINDLER: That is not the question I asked. The question I asked is, how do you expect or what kind of thing do you expect the licensee to tell you about which will give you the zero release goal after 500 years --

MR. DORNSIFE: It is not a zero release after 500 years. It is that the dose or the risk for that facility is no greater than the risk from soil. There are heavy metals in the soil.

MR. STEINDLER: I wasn't really thinking about heavy metals. There are lots of organics in soil too.

MR. DORNSIFE: Right, and that's what we are talking about. What is left in that waste presents no greater ingestion risk than the soil did before you disposed of waste there.

MR. STEINDLER: Is that what you mean by zero release?

MR. DORNSIFE: No. That's the hazardous life standards. Zero release during the 500 years is that, no release from the facility.

MR. STEINDLER: The zero release goal stops at the end of 500 years; is that what you are saying?

MR. DORNSIFE: That's right. At that point, the waste is decayed to a point where it is no more toxic than the soil.

MR. STEINDLER: Except for that it hasn't, is what I am trying to get at.

MR. DORNSIFE: Right.

MR. STEINDLER: In the case of mixed waste, you --

MR. DORNSIFE: There are toxic materials in soil. There is non-radioactive toxic materials in soil.

MR. STEINDLER: I think we have been here before. Let me stop.

MR. DORNSIFE: Again, I don't expect that we will have any mixed waste at this facility anyway. This is the best that we could do in terms of providing assurance that this material will be isolated. It goes much further than the current RCRA requirements.

[Slide.]

MR. DORNSIFE: Finally, inadvertant intruders are very important. Let's go back up to number to, I am sure that you have some interest in that. You need to understand, the public doesn't understand ALARA. I don't think the licensees understand ALARA, but imagine trying to

explain ALARA to the public. The public wants numerical ALARA goals, they understand that. I don't know why the NRC stopped with Appendix I in terms of developing numerical ALARA goals. They are reasonable.

For example, we have a numerical ALARA goal for occupational exposure; it's 10 percent of Part 20. Our licensee thinks he can meet that and that's our administrative limit that he is committed to.

MR. ORTH: Is that occupational, are you saying?

MR. DORNSIFE: Yes, that is occupational. Again, these are goals. These are basically the zero releases and ALARA goals. That is how it satisfies the compatibility issue from the NRC standpoint. It is not a requirement, it's not a regulation, it's an ALARA goal that we think is achievable.

Again, the other issue is obviously the inadvertant intruder. We have kind of one-upped the NRC again. We require intruder protection for Class-B waste in addition to Class-C waste, so both require specific engineered barrier. We think that overpack will provide that engineered barrier. Finally, we have as an ALARA goal that the intruder have no more exposure than the general public. We think that is achievable in our design.

MR. STEINDLER: When you had the intruder issue in front of your Advisory Committee, did you find that the

Advisory Committee was both cognizant as well as sympathetic with the notion that intruder protection is an important issue?

MR. DORNSIFE: I think after we explained it to them they understood it, and they were very appreciative. The way you can explain it, it's the only requirement that I am aware of where inadvertant intruders are actually protected. There is no other regulation that I am aware of in terms of anything that protects some unknowing individual that might actually intrude into this facility.

From that standpoint, they are very supportive of the concept. It is a very good selling point for this protection. It is a very important concept to the public, I think, because it is unique.

MR. STEINDLER: Over the period of life Class-A at 100, Class-B at 300 and Class-C at 500, I thought I heard you say that they are planning on -- somebody is planning on monitoring off-site movement of activity.

MR. DORNSIFE: We will get to the monitoring in a second.

MR. STEINDLER: But there is somebody doing something at the site boundaries; do I have that right?

MR. DORNSIFE: That's right. And, at the facility itself.

MR. STEINDLER: Under those conditions, what is

the concept of an inadvertant intruder look like?

MR. DORNSIFE: It is the same as NRC currently envisions. For some reason you lose institutional control of that site --

MR. STEINDLER: But there are people busy monitoring that site --

MR. DORNSIFE: NRC's rule assumes that you don't have that capability. For some reason you forget about it and the record are lost, and there is no more society. Some unknown individual digs into the waste.

MR. STEINDLER: Okay.

MR. MOELLER: You have a group of scenarios on which the 25 millirem is based?

MR. DORNSIFE: We will obviously develop those as guidance and probably use heavily the current Sandia material that is being developed.

[Slide.]

MR. DORNSIFE: The next issue is monitoring. One of the concerns the engineers had for us on our Advisory Committee is, how are you going to certify structural stability. The way we decided to do that is that you are going to make some engineering judgments up front on what the properties of these materials are going to be. We require independent monitoring of these properties. In fact, our licensee is going to build a separate test

facility that will over time, monitor how those materials are performing to make sure they are meeting the engineering objectives. So, there's a requirement of the materials monitoring structure to make sure it meets the isolation goals.

Also, there is a requirement for disposal unit monitoring. This system is internal to the disposal unit, it requires that you be able not only to identify releases before they leave the facility, but you can somehow localize. You can know where in that facility there is a leaking container, for example.

In addition, there is environmental monitoring, backup environmental monitoring both on site and off-site. Finally, our law among other things, -- if we have time we can talk about it. Our law has a very good package of so-called host municipality safety assurances and benefits. One of these is requiring for independent health and environment monitoring. In other words, within five miles of the facility anybody that wants their well water monitored can send that well water in for an independent sample, and that is paid for by a surcharge in the waste.

People are allowed so-called personnel monitoring, whole body counts. If somebody thinks they have ingested radioactive material, they can come and ask for a whole body count or a urine analysis. That is all provided for.

Again, it is a way to provide the public confidence that they have an independent way to make sure they are not being adversely affected by this facility.

[Slide.]

MR. DORNSIFE: Waste recovery. What I mean by waste recovery is that you have to design provisions into the facility that facilitates eventual recovery of the material. It is not strict retrievability. You don't have to put a door on it, for example, which is what you would have to do if it was a retrievability standard. What it means is, you have capability from an engineering standpoint to get to the waste. The waste has to be in a nice package so you can remove the offending material if you have to.

The way it is actually implemented is, the regulations basically just require that the design allow for this. There is also a requirement for a contingency plan. This contingency plan requires action limits. It requires a procedure that the licensee and the custodial agent have to develop that says when they are going to do something, at what level will they take action to recover waste and do remedial action.

Finally, this waste recovery must be coordinated with the monitoring plan, the various types of monitoring. Do you recover waste as soon as you see anything in that on-site monitoring system or can you wait until you see

something off-site.

MR. HINZE: Do you or does the public have any concern about thermal affects associated with this?

MR. DORNSIFE: From what standpoint?

MR. HINZE: The heating up of --

MR. DORNSIFE: From the waste itself?

MR. HINZE: Yes, from the waste itself.

MR. DORNSIFE: I don't think that has been identified. Chemically, not radioactively.

MR. HINZE: Both, really.

MR. DORNSIFE: I think chemically, that's a concern but radioactively I don't think it's an issue. I don't think the concentration is enough to really worry about thermal heating affects from low level waste. Now, chemically, it could be a different story. I think we need to -- I will talk about that later. We are intending to actually inspect licensees as part of our permitting program to make sure that their waste preparation meets these requirements in addition to looking at the waste when it arrives on-site.

[Slide.]

MR. DORNSIFE: Finally, our regulation addresses special concern waste. Special concern wastes, I view as Class-C, mixed and NARM. Pennsylvania, you may remember back when the low level waste policy amendment was being

debated in Congress, was the only state that had a concern about Class-C waste. Our concern was not technical. We felt we could design a facility to accommodate Class-C waste, it was a practical one.

We take the fact that Class-C waste is typically about .1 percent of the volume but it contains -- it could contain up to 95 percent of the radioactivity. Why should all these states duplicate the small special handling facility. Why shouldn't it all go to one facility with those special handling requirements. That was our concern and that was our issue. Congress and NRC didn't want to address that, so we were stuck with Class-C waste.

Now, other states are raising the Class-C issue again, they are reviving it. Our position at this point is, we don't want to see the Federal law changed for any reason because we think that messing with the Federal law at all at this point is going to create real problems for us. We have taken special measures in our regulations to address Class-C. Class-C and mixed waste have to be disposed of in separate modules, small modules that are individually monitored and individually recoverable. If you determine at some point that you need to put Class-C in another place, it can be easily recovered and sent off to that other place.

Also our regulations, and somewhat uniquely, not too many states have included NARM responsibility in their

law. Our definition of low level waste includes NARM, namely discrete NARM. Our regulations distinguish limits for NARM. We have 100 nano curie per gram limit for all alpha emitting radio nuclides except for uranium. That is for all upper limit Class-C. It is basically another isotope that is on the table. All alpha emitting isotopes with a half life greater than five years except uranium has 100 nano curie per gram upper limit. That includes all the NARM isotopes.

That is what EPA was proposing in their standards, and I will talk about that in a second. We also intend to implement a lower limit, which is two nano curies per gram to define what this discrete NARM really means. Obviously, this leaves us with probably a fairly sizeable universe of particularly radium sources that would be above this 100 nano curie per gram limit or without a home. Right now, Nevada is able to take radium seal sources but eventually that will stop. There will be an orphan waste stream out there that nobody wants any responsibility for.

This has been a concern to the Conference of Radiation Control Program Directors, this whole NARM issue over a number of years. In fact, I helped put it together. We developed a position paper a couple of years ago that recommended that NRC include NARM in the definition of radioactive material. We are talking about discrete NARM.

I think one of the problem here was when staff looked at this issue they looked at the whole universe of NARM which includes the diffuse NARM. We are talking about a lot of material when we are going into diffuse NARM. When we are talking about discreet NARM, there is a very small amount of it.

It makes no sense to me whatsoever -- first of all, the NARM currently is not being uniformly regulated around the country. Some states have very good regulatory programs. Typically, the agreements states have very good programs. Some other non-agreement states like Pennsylvania have good programs. A lot of states, it is not regulated. I can't see the reason that an NRC inspector will go to a hospital -- if this is NARM isotope he won't look at it, but if it is the same isotope as a byproduct material he will inspect it.

From a manpower standpoint, that makes absolutely no sense to us. Why shouldn't discrete NARM be regulated like other radioactive materials. In fact, in many cases, they are the same isotopes, they are just produced by other sources. I think by confusing it with the discrete NARM issue, that was not our intent. We were specifically addressing the discrete issue.

The other thing you need to recognize, and one of the things that we are really disappointed at with EPA

withdrawing their standards -- and probably was the only thing in the standards that was going to be helpful to us -- early on when NRC was developing its low level waste disposal standards, the states specifically asked them to include discrete NARM in that standard. They spent a lot of effort, in fact more effort than anything else in coming up with a way to regulate that material. We were hoping -- at least DOE had given us signals that if somehow NARM -- they had intended to put a Class-C limit on NARM.

If NARM were included in Federal regulations, they would feel responsible for taking responsibility for disposal of that discrete NARM that was above the Class-C limit. The EPA regulations being withdrawn now and NRC's position that they not be re-proposed, that leaves a very troublesome orphan waste stream. I think the states have found that radium shows up in some very unusual places and has created a lot more public health and safety problems than a lot of byproduct material has, probably more than byproduct material has.

There have been many, many examples of radium discrete sources showing up in bank vaults, all over the place that have caused significant public exposures. I still fail to understand NRC's reason for objecting, particulary to that part of EPA's rule. The states asked for that. It has nothing to do with health and safety in

terms of -- NRC keeps saying they are looking at things because it is a health and safety issue. Why would they object to NARM being included in the EPA regs. That is a health and safety issue.

MR. STEINDLER: Other than the requirement that you have laid on yourself with the 100 nano curies per gram upper limit, is there anything in any of the laws that you are currently governed by that would prohibit you from disposing radium sources in Pennsylvania?

MR. DORNSIFE: No. Our regulations now prohibit us from disposing of anything in this facility above 100 nano curies per gram.

MR. STEINDLER: That is a law or regulation?

MR. DORNSIFE: It's a regulation.

MR. STEINDLER: Okay. That is probably a conservative limit for radium. The Class-C limit should probably be lower. As you are aware, radium is probably the nastiest radio isotope out there for many reasons.

[Slide.]

MR. DORNSIFE: Just to give you an idea of the kind of design that Chem Nuclear has proposed to us, this gives kind of an overview of the various aspects. Like I said, there will be above grade bunkers. It will probably be about one foot thick reinforced concrete. This is a sketch of what the monitoring system, the internal

monitoring system might look like. Because of the requirement to keep the waste dry even during inplacement, there will be a temporary building on moveable tracks that will cover the waste and placement operations.

Other waste will be placed in concrete overpacks and grouted in place similar to the way the French do it. In fact, our company has one of the subcontractors is Numatech that will provide that technology to us. Finally, there will be an engineered cover over the facility, whose primary purpose is to impede water and primarily protect the concrete structure.

[Slide.]

MR. DORNSIFE: This just gives you a closeup of a more detailed description of the overpack and more detail of the structure. You will notice that there are interim or more than -- the facility is divided in sectors. That is the way we have of localizing problems in the module. Basically, the size of these are dictated by our RFP. Each module is sufficient to accommodate a year's worth of waste. The B&C waste will go in module and the C waste will go in a separate part of the facility, separate modules.

MR. SHAPIRO: Does each module then have a one foot concrete wall; is that what you said?

MR. DORNSIFE: Approximately.

MR. SHAPIRO: Does the whole structure outside

have another concrete wall?

MR. DORNSIFE: The overpacks will probably be about six inches thick reinforced concrete. The vault will probably be one foot thick, primarily for supporting the roof.

MR. SHAPIRO: There is a six inch overpack?

MR. DORNSIFE: Right.

MR. SHAPIRO: In a one foot module?

MR. DORNSIFE: Right.

MR. SHAPIRO: And a large building that holds it all?

MR. DORNSIFE: The large building was just a portable building, a butler building, if you will. It goes on rails to cover the inplacement operations. That goes away and a cover covers the bunker. Getting now into the more probably the things that will interest you more.

[Slide.]

MR. DORNSIFE: What are my assessment of some technical assessment needs that the states have? This is based on discussions that I have had with people from the forum and the TCC of what we feel is necessary. I think one of the things you need to recognize is that the people that really need the technical assistance from NRC are the state regulators. In several instances the state regulators to my chagrin, have not really stood up to be counted yet.

I think there is some concern on the part of the NRC staff that some of these folks are going to be tasked with regulating facilities eventually -- that they are not interested as they should be.

I would urge state programs and the staff to continue with the biannual regulatory meetings. I would also very much urge the staff to continue with the effort to have a workshop on the below grade vault review. As I am sure the Committee is aware, DOE produced a prototype license application which the staff agreed to review. In fact, some of our folks came down and actually participated in that review of the below grade vault as a training exercise.

I think both the staff and ourselves found it to be a very rewarding exercise. However, I think there needs to be --the NRC staff admits this -- they found a lot of lessons learned from performing that review. A lot of things that they would do differently, a lot of things that they would not do, and ways they would go about reviewing a real live application. Those kinds of lessons learned need to be imparted to the states. I would urge the staff to continue with the efforts to have that workshop. I think the appropriate forum would be with the state regulators. Have it as one of the biannual regulatory meetings.

I also think obviously, since 70 percent of the

waste will be disposed of in one of these above grade vaults, the states would like some guidance on regulating these above grade vaults, design guidance, similar to the kind of guidance that was issued -- that was done by the Corps of Engineers for below grade vaults, the technologies that were done. I think it is a very simple exercise to say this below grade vault study is applicable here and is not applicable there. The state really would like to have some design guidance and some idea of how to develop standard review plans for these vaults.

That brings us to the next bullet. The public is probably going to be more interested in the performance of the engineered structure than they are of the performance of the site. They are much more concerned about waste containment than they are about what is going to happen when the waste gets out and starts migrating through the environment. The issue is going to be -- in the license application is going to be on the engineered structure. Because of that, we are going to need some performance assessment codes.

There is one available right now that EPRI developed, the barrier code, that apparently NRC found some problems with in the review during the below grade vault. It is the only code out there. It is virtually not -- it has very little validation. It has had very little use, and

NRC has some problems with it. We need to get those problems on the table and need to get them resolved. Again, we are going to need these codes to make sure that we can show that this structure is going to provide stability for 500 years.

Apparently, they are fairly simple codes. They basically take the failure mechanisms that are well known in the concrete industry and combine them all in one code. It is not -- from my understanding, it is not that complex of a code. There needs to be basic research done in developing a way to assess and validate some of these codes.

[Slide.]

MR. DORNSIFE: The next point is source term problems. When I say source term, I look at the large so-called leaching source term, what is available to go into the groundwater performance model. What is the source term available to proceed through the environment. I think those of you familiar with performance assessment codes will recognize that this factor, the leaching source term is the biggest uncertainty in performance assessment code.

The two uncertainties are basically what is the initial inventory of radio isotopes which we will talk about, and what is the model you use for interacting and getting these radio nuclides mobile. If you use one model compared to another, you might have a factor of 100

difference in availability in release. There needs to be some basic -- some more research on what is the source model to use to get the radio nuclides once they contact water available for release into the environment.

One we probably can take care of very easily is the leaching source term -- the inventory, the initial inventory, the radio nuclides inventory. I think when you -- we have been playing around with the Prestell Model which EPA had used for their work on their low level waste standards and it's a pretty good model. It is very simplistic and it does the job, and is able to accommodate alternative designs. So, it is a good code to play around with to see where some of the problems lie.

One of the things that we have all noticed is that based on the current source term that we have, in particular two isotopes, iodine 129 and carbon 14 caused by the bulk of the long term exposure. Once you eliminate those two isotopes, your long term exposure is less than a millirem from all the remaining long lived isotopes. Those two are by far the biggest contributors to public -- individual public exposure on site.

Iodine 129 is greatly over estimated in the way that utilities currently characterize waste. I think you need to recognize that utilities -- their program currently consists of spending a lot of money trying to identify easy

to detect isotopes and cesium 137 and cobalt and then using scaling factors to estimate what these more meaningful isotopes are. You can't begin to even imaging cobalt 60 or cesium 137 being released in one of these facilities because of the mobility. You have iodine carbon 14 tritium, all very difficult to detect, but very rarely ever measured directly.

Those four isotopes and these two in particular that cause the bulk of the public exposure. Based on our current 129 source term -- and I assume everybody else's -- in a human environment the eventual release of 129 will exceed the NRC's performance objectives. Nobody can have a site. With what the current inventory of 129 that is currently on the test today, EPRI is in the process of developing a better system to determine 129. There are some probably easy ways to do this.

For example, there are ways you can use atomic absorption, you can use neutron absorption to detect very minute levels of I-129 to develop better scaling factors. Also, one of the very innovative ways that EPRI is working on now is the way to compare I-129 with I-131 inventory in the coolant and come up with a yearly balance of what the amount of I-129 could possibly be in the coolant that could possibly get into your waste, and use that as a maximum upper limit.

We have seen already that the I-129 is probably over estimated on the average of a factor of about 100. To give you an example, we saw one Class-C shipment from one of our utilities once that was a mechanical filter that was Class-C because of I-129. First of all, how in the hell do you get I-129 on a mechanical filter. If you believe the number, that mechanical filter had two percent of the inventory of I-129. The reason is, they used a maximum detectable limit, upper limit, and that is typically what utilities are doing. That is not acceptable.

We cannot have a site if we continue to do that. Again, from a health and safety standpoint it is conservative. From a realistic standpoint, we have to do something about it. I think the NRC staff needs to -- they are aware of it, I have talked to them on numerous occasions about it. They need to be involved in the effort to try to resolve it. The licensees need more guidance on how to deal with this issue.

Once you eliminate the I-129, you are left with carbon 14, which probably gives you a long term dose typically of about four or five millirem a year basically forever, regardless of how long your engineered structure lasts. You still get carbon 14 released obviously. There is also some concern about the inventory of it. I think utilities have over estimated that. Again it is very

difficult. It is a beta-emitter, very difficult to detect. People aren't spending the money because up to now there has been no need to spend the money to detect it at more detailed levels.

In addition, there is some questions about the pathways. For example, it has been assumed that the major pathway was uptake through roots, and there is some question that could be off by a factor of 20 based on some Canadian data that has recently come along. So, there needs to be work both in the source term, the inventory and some pathways. In addition, I think the forum -- the low level waste forum has recently voted as a position that they would like to see a uniform national manifest, similar to the manifest for hazardous waste. We think that becomes a real health and safety issue when you start implementing this compact system.

You have 12 different compacts using different manifests, and some of the waste going outside the compaq for treatment because the forum has also agreed that shipment for treatment is a necessary thing. I think the reason EPA has gone to a uniform policy for hazardous waste is, they didn't want 12 different manifests being used.

NRC has been reluctant to include, even though they have been asked to, they have been reluctant to include a uniform manifest requirement in their rulemaking on data

collection. If we are going to collect data uniformly, why don't we report it uniformly. The only way that you can get it nationally -- the easy way to get it nationally implemented is for NRC to make it a compatibility requirement. Failing that, I think you will see the host states together in implementing manifest on their own. I think that is something NRC could certainly help. It is going to happen anyway, so NRC better get on the curve in the beginning rather than on at the end.

[Slide.]

MR. DORNSIFE: Finally on the source term issue, we take great pains in the permitting inspection areas. We are required to permit each and every generator that uses our facility, and we intend to inspect those generators. Right now we have an MOU within NRC that we are currently in the process of implementing that allows us to inspect low level waste shipments at all NRC licensees. We have been implementing that program very successfully. We look at all the Part 61 classification requirements, the DOT requirements.

The only thing we can't do is enforce violations. We have to go to the NRC staff to enforce violations under that MOU. We are looking for our other party states to help us with those inspections. If they don't, we intend to go out of state and perform those inspections.

MR. STEINDLER: If those inspections are carried out by your people, are you not able to correct the I-129 over estimation?

MR. DORNSIFE: The only way -- we have no regulatory authority to correct them at this point. I think once we have a site which is too late by the way, because that problem has to be corrected now. Performance assessment is ongoing. The problem occurs in performance assessment, it's a perceived problem. It is a real problem in terms of performance assessment.

Performance assessment activities are going to occur for the next two years. Once we have a site, we can put an inventory limit on I-129 and make people only generate a limited amount.

MR. STEINDLER: I guess I don't understand what the inspection is that you are currently going through then.

MR. DORNSIFE: The inspection is basically of the final package before it goes for disposal. We look at the paperwork on how they have determined the classification, we look at how they meet the stability requirements and paperwork on it, we look at how they satisfied all the DOT requirements.

MR. STEINDLER: So, it is a paper inspection rather.

MR. DORNSIFE: No, we actually inspect the waste

shipment and actually do our own independent -- measurements of the radiation levels.

MR. STEINDLER: You can't address the --

MR. DORNSIFE: -- than what the staff currently does in terms of low level waste shipments.

MR. STEINDLER: At the moment apparently you can't address, even though you look at the radiation levels, you can't address the iodine levels; is that what you are saying?

MR. DORNSIFE: Not from a regulatory standpoint. We have talked to all of our utilities and told them the problem, and they are trying on their own to address it. For example, the carbon 14 problem is worse in boiling water reactors because of the air entrainment. It is basically a nitrogen 14 activation product is how it comes. Our boiling water reactors are currently their own independent research to try to determine whether they have over estimated their source terms.

The problem is, it is not only fixing the problem but it is going back and have a defensible way to use different numbers. The manifest is the official record. The manifest data will currently blow us out of the water. You have to have some defensible way of going back and using data other than the manifest. That is the real problem.

Another issue that the forum has addressed and we

are hoping that NRC will help us with is, the waste material issue. Currently, there are some licensees that are shipping -- I guess the best way to describe it is radioactive material NOS, RAM NOS. Some classifies waste, and Part 61 manifest systems and tracking systems are required. Some are free to categorize it as materials. There is no guidance right now to the licensees of when is a waste a waste.

For example, there are some reactors that are shipping trash to a facility in Tennessee. That facility will sort the trash, they will pick out some tools and decontaminate the tools, but 90 percent of the material there is waste. They are shipping it as material. Obviously, if you ship it as material versus waste, there is some hoops that you have to jump through in terms of manifest tracking. It creates more concern about whether the waste eventually gets back to where it belongs, the origin.

So, the forum is working on some guidance. We have talked to the processors, we have talked to the industry. We are working on guidance of when is waste a waste and when is it a material. We are hoping that the NRC staff will develop it and issue it as an information notice to all licensees, because we will eventually use that.

[Slide.]

Next, the subject near and dear to the hearts of many, mixed waste. I think first of all, Pennsylvania has had a very proactive program to try to identify how much mixed waste we actually generate in the compact. In fact, we have interviewed all the major -- about 20 of the major generators of all the various types of licensees. We interviewed all of the reactors, we have interviewed people like NIH, Westinghouse, basically all the major generators in the compact to try to determine exactly what their mixed waste generation is.

You have to recognize that although there is dual regulation here, unless a state like Pennsylvania was an authorized RCRA state, unless that state has specifically chosen to regulate mixed waste and get specific authorization for mixed waste, mixed waste is not regulated under RCRA. It is just flat out not regulated. In Pennsylvania since we haven't done that and many other states have not done that -- in fact, only about 11 or 12 have -- if somebody were to apply for a permit to store mixed waste they couldn't send it to anybody, because it is not regulated by anybody.

This has caused obviously a very large problem for these folks. First of all, understanding what mixed waste is and getting some handle on it. Basically, our program was not only to identify what they are generating but also

to find out how they are generating it and make suggestions on how they can minimize it. I think that is where the real key is. Most of the mixed waste that we found don't have to be generated. Management plans to keep hazardous materials out of contaminated areas. The plain fact is that most licensees don't recognize they have hazardous materials.

Once you do that, it is pretty easy to minimize it. I think probably 50 to 60 percent of the current mixed waste can be eliminated. So, what do you do with the rest of it? Well, there is this Federal law called Land Ban, that I am sure you are familiar with. Land Ban says that basically -- I guess the last third was just in the process of being implemented -- all hazardous waste will be Land Ban cannot be disposed of unless it is pretreated, unless it meets certain pretreatment standards. Those are specified specifically in the EPA requirements.

First of all, Land Ban also creates a problem because under the regulations you are not allowed to store waste that is Land Ban other than for treatment. Currently, as you are aware, there are no facilities or very limited facilities for treatment of commercial mixed waste. They just don't exist. In fact, under this third Land Ban, EPA granted a two year extension which is included right in the law for implementing the variance for commercial mixed waste that is in the final third. However, the waste that is in

the first two-thirds is already Land Ban and cannot be legally stored for other that treatment.

It creates a real dilemma for your licensee. They can't store it and they can't treat it, what do they do with it? What they have been doing is pretending that they don't have it. They don't report it. That is obviously not a solution. I think once you consider this Land Ban issue and the minimization issue, I think you are left with a very small amount if any mixed waste in the back end that is going to need to be disposed of. For example, or organics, the treatment is incineration. If you incinerate mixed waste, you are either going to drive off the radioactive material or destroy the hazardous material and you are left with something that you can then get a variance for to make it non-hazardous.

We suspect -- I am not convinced that is why I keep saying I am not yet convinced that we have to have a mixed waste disposal facility in Pennsylvania. I think again, a lot of folks need to recognize this. I think more and more folks are recognizing it as they look into this problem in more detail. We intend to issue a paper based on our effort. Our effort is very similar to what NUMARC has done in terms of looking at what hazardous materials are going into contaminated areas. We intend to publish that, and hopefully it will serve as a guide for people to try to

minimize their waste.

MR. STEINDLER: Has a state ever delisted a waste stream, hazardous waste stream?

MR. DORNSIFE: I don't think they have that authority. That is something EPA has to do. I think that's the case.

MR. STEINDLER: Aren't you a --

MR. DORNSIFE: I'm not sure, but I think that's the case. I don't think the states have that authority. In order to provide conformance throughout the country when something is delisted, it is done at the headquarters level.

MR. STEINDLER: Has it ever been done in the state, that you are aware of?

MR. DORNSIFE: I know there have been petitions submitted for delisting. I don't know whether they have ever been granted.

MR. OKRENT: Excuse me. Is the mining or combustion of coal ever a source of mixed waste?

MR. DORNSIFE: If you go back in the history of RCRA, coal utility waste -- so-called utility waste was originally to be regulated as a hazardous material, so was radioactive material. In fact, the proposed RCRA law had a five pico curie per gram limit on radium. Anything above five pico curies per gram was a hazardous waste.

When they looked at the volumes in looking at the

proposed rule and they got some comments in and recognized the tremendous volumes we are talking about here -- for example, almost all coal ash is above five pico curies per gram. We are talking about a tremendous burden in terms of cost of disposal for utility waste. EPA declared that a special category waste, has yet to propose regulations for its control.

MR. OKRENT: What did the public say about this? Was this raised as an issue before the Committee?

MR. DORNSIFE: I routinely compare low level waste with coal ash.

MR. OKRENT: What is the result of this comparison?

MR. DORNSIFE: I get a better perspective on low level waste. The thing you have to avoid is, when you are talking to the public to provide these perspectives, you can't -- when you provide a perspective, the bottom line can't be because this is the case it makes radioactive material okay. If you do that, you have lost them. It is just a way of them better understanding why they may not have to dislike radio active materials so much.

MR. OKRENT: I am still interested in costs. Could you give me a rough estimate of what you think the costs, both of the burial and the additional procedures that are required by meeting your original criteria per year in

Pennsylvania will be. Will it be $3 million a year or $30 million a year?

MR. DORNSIFE: Like I said, we are talking -- the overpacks and the engineered bunker is a separate cost item on Chem Nuclear's proposal. It is about $5 million a year. That doesn't mean that you wouldn't have to do anything. You would probably have to do overpacks anyway to meet the stability requirements for B&C. That is not a total cost, it is an incremental cost.

That $5 million is not the difference. There is just the shallow land burial and some of that is still going to be needed. The way that I would like to put that in perspective for you is, I think the costs for disposal is a very small -- I am sure you are aware of this -- is a very small amount that a cost of a licensee particularly a reactor pays to take care of its waste. I think the amount of money that the utilities have spent in trying to meet the various solidification requirements that NRC has proposed and rejected over time has cost them one hell of a lot more than I think this disposal is going to cost them.

MR. OKRENT: I understand what you are saying. I am trying to see where these inconsistencies in the treatment of ash from burning of coal and the RCRA requirements for just the hazardous waste -- non-radioactive and so forth -- where they fit in a societal perspective and

whether someone in Pennsylvania tries to take an overview of all of this and develop policies of result.

MR. DORNSIFE: Our department has a similar organization I guess. It is kind of tasked with looking at risks and treating risks appropriately. We have a similar kind of set up. Just like in the Federal government, many times actions are not based on risk. The public doesn't understand risk, let's face it. The public has a total misunderstanding of risk.

Before we can begin to talk about the risk of these things, we have to try to teach them what risk really means. The thing with risk is, they probably wouldn't drive a car. As you are well aware, people are much more afraid to fly than they are to drive a car, even though the risk is a lot less because of the large consequence nature of a plane crash. IT is a concept that the public just doesn't deal with very well.

I will give you a way to tie it to your question directly is that at a Sierra Club meeting once they started -- you can't imagine -- you really need to go to some of these meetings, you really do, to see what the concerns are. You can't sit in Washington and understand these concerns without hearing them first hand. Women cry. I mean, they are literally scared to death of this stuff. It is unfounded, but it is a real fear to them.

I was at a Sierra Club meeting once and said to the Sierra Club folks, I said hey, why isn't the Sierra Club asking for isolation for the long term risk from coal ash. Where are they on that issue? Where is the Sierra Club on the radon issue? Why haven't they taken a position on it. Do you know what I get? Silence. Do you know why? They don't care about risks. Waste disposal -- radioactive waste disposal is a glamorous issue. They have constituents just like anybody else. It is a political issue, even on the environmental level.

That is what you need to understand. I am being as frank as I can with you. That is where it really is. There are some inconsistencies that people have identified between EPA and NRC. The people that ought to be identifying these inconsistencies are NRC licensees. NRC has to be more proactive in finding out what these inconsistencies really are. Why can't we use the RCRA requirements and NRC requirements at the same time. Where are the inconsistencies.

The bottom line is, I think that dual regulation is workable. I shutter at the thought of some of these Congressional amendments of NRC getting the entire authority for mixed waste. Frankly, all the mixed waste that we have seen, the waste is more toxic from a hazardous standpoint. You are well that the technical standpoint of NRC is not

currently equipped to deal with hazardous material. They don't talk hazardous materials. They don't even look at them.

We have seen horrendous mixed waste problems at our utilities that NRC inspectors ignore. I think NRC shouldn't be regulating, particularly if you throw in the treatment and storage issue. Disposal is a different issue, but if you start talking about treatment and storage NRC is not the appropriate agency to regulate that.

The forum's position basically is that recognizing there are inconsistencies, there is an easy fix for this mixed waste issue. That is to declare in the upcoming referee authorization as a special category waste. As a special category waste, you can basically pick and choose what parts of RCRA are applicable. Where there are inconsistencies, you can eliminate those requirements. That is the way we see the best way to deal with this issue. Again, work at minimizing it and preventing its production. I think there's a lot of effort that needs to be expended in that part of it, and I think NRC can play a real good role in talking to their licensees about it.

[Slide.]

MR. DORNSIFE: Finally, I saved the best for last, the low regulatory concern. I guess what we are calling it now is exempt from regulatory control; is that the latest?

MR. MOELLER: Yes.

MR. DORNSIFE: Going back a long way -- and I have been in this low level waste business for almost 10 years. I guess when they change a name from diminimus to below regulatory concern it didn't make it go away. I don't think changing it from below regulatory concern to exempt from regulatory control is going to make a difference to the public either.

Anyway, I guess my perspective is that I support regulatory concern but support it in moderation. I think there are legitimate waste streams out there, like for example the simulation tool, below regulatory concern that has done very well for 10 years. It is necessary and it's the only way the waste can be disposed of. To try to stretch that to putting all the reactor trash into landfills, that is crazy from the public standpoint. Granted, from a technical standpoint, there isn't a whole lot of risk there. From a public perception standpoint, that is absolutely crazy.

I think to make it-- again, I am giving some public perception here that I have gleaned over the years on this issue. First of all, I think your 10 millirem limit -- first of all, I think you need to look at BRC or exempt from regulatory control in terms of what it is intended to do. Don't be afraid to separate the issues. For example,

10 millirem for decommissioning is probably appropriate, because that's about all you can monitor in terms of decommissioning.

Obviously, 10 millirems for consumer products isn't going to fly. I doubt very much that 10 millirems for low level waste disposal is going to fly either. In fact, I think one to four millirems -- this is basically the position the Conference has taken -- one to four millirems per year for below regulatory concern limit is probably a more acceptable from an environmental concept and from the point of the public accepting it.

The other issues that you need to understand here --

MR. STEINDLER: Before you leave that one, it is more acceptable than what?

MR. DORNSIFE: Let me give you an example of perception that we get, okay. Ten millirem, let's look at 10 millirem as a BRC limit. How do you tell the public that the reactor limit is five for reactors or that the EPA drinking water limit is four millirem. How can you have a below regulatory concern that the public perceived as being a regulatory limit?

Secondly, this 100 person rem per year, population exposure, I lived through the TMI accident and we are still living through it. A lot of the public is not convinced

there isn't a whole lot of health effects. The entire exposure from the TMI accident was 2,000 person rem. We are going to tell the public that 1,000 is a below regulatory concern limit? Just think about that.

I am not saying from a real risk standpoint that it is not something that we can live with from a technical standpoint. What I am trying to impart to you is the public's perception of that. As you will see, unless the public goes along with it, it ain't going to be implemented.

MR. STEINDLER: What you are saying is, one to four millirem per year is more acceptable than 10?

MR. DORNSIFE: I think so, yes. For whatever reason, you know, it is below regulatory limit I guess is the best reason.

MR. SHAPIRO: I just want to make the comment that the public really has no conception of one to four and has no conception of 10. I said that I never had a problem having the public accept 10. My public included mothers of children who were in a daycare center who were one year old and next to a cyclotron. Those people accepted, once you gave then the facts about background radiation and the variations in background radiation, I had no knowledge then about EPA limit or that limit, and no one that I spoke to know about five millirem or the NRC.

I am not quite sure that is the thing. I think we

are creating our own problems here. I think that 10 millirem per year is, from my experience, has turned out to be perfectly acceptable when you explain what the significance is. If we start to focus on one to four next year it will be .1 to .4. Of course, if you to --

MR. DORNSIFE: No, what I was -- I guess my real bottom line concern here is the way it is implemented, not the number. If the public recognizes this is implemented to better protect them and take care of waste streams that otherwise could not be disposed of anywhere else, they will probably accept 10 millirem. But, when you are starting to force reactor waste which they all don't want anywhere anyway and saying it is going to go to landfills, you probably have shot down any possible utility of this for legitimate waste stream because you have created such a concern to begin with.

Going on, obviously this is the reactor waste disposal and the landfills is really the public issue. I think the utilities have done themselves somewhat of a disservice by pushing this, because first of all, other than on a very limited basis you are never going to get public acceptance of reactor waste going to landfills. Secondly, the economics are questionable.

I have already talked about the curve and the fact that there is an economics of scale here. Some of these

smaller compacts, if you send 30 percent of the reactor waste to a landfill, the incremental costs of disposal is going to go up to everybody and is going to outweigh whatever cost-saving you are going to get from using this BRC.

Finally, I think the real bottom line of my concern is -- this has raised enough public clamor -- it is going to be very difficult to get legitimate waste streams that are really necessary approved in the future. I think also you need to recognize there are some real concerns on the part of the compacts here. Our law says that we have defined low level waste and I don't think legally you say it is exempt from regulatory control -- it still is byproduct material. The definition of low level waste is byproduct material.. It is still defined as low level waste in the compacts.

Every compact law says that only the compact can decide if that waste goes somewhere else. The compacts have an overwhelming I think final vote here. They can decide whether this VRC goes anywhere but that disposal facility. Finally, I think what is really going to cause you problems from the NRC standpoint is, before this can be implemented nationwide it is going to have to be proposed as compatible regulation. As I mentioned previously, the states have a lot more difficult time because their process is much more

open and responsive to the public.

We have a much more difficult time getting reguiations passed than you do. In order to have this effectively implemented, all the agreement states have to adopt the same rules. You make them compatible you are going to test that compatibility requirement. I think it's pretty frail to begin with, and I don't think you want to mess with that. After all, it is only a policy to begin with an nobody has ever challenged whether you even have the right to do that. That, I see, is a real concern.

Just in closing my discussion, and I will be glad to answer any questions you have, I appreciate this opportunity. I think you really ought to hear more from the people that are out in the trenches. Get out in the trenches yourself, because that is really where you get to see what the concerns are. Sitting in Washington here and making decisions is fine, but I think once a decision maker has to go to a public meeting and see what the real issues are and get a whole difference perspective.

You are here to serve the public. We are all here to serve the public, and that is how you effectively serve the public by understanding what the issues are and the concerns. Thank you very much.

MR. MOELLER: On behalf of the Committee, let me thank you for your presentation. We have run over time.

Are there any additional pressing questions by consultants or members of the Committee?

[No response.]

MR. MOELLER: Hearing none, let me thank you again. We will declare a one hour recess for lunch.

[Whereupon, at 12:10 p.m., the meeting recessed, to reconvene at 1:10 p.m., this same day.]

AFTERNOON SESSION

[1:10 p.m.]

MR. MOELLER: The meeting will come to order. This is a continuation of the second day of the 17th meeting of the Advisory Committee on Nuclear Waste. The topic that we have listed, and we have scheduled two hours for a discussion in it, is the implementation of a policy for criteria for residual levels of radioactive materials or radiation following decommissioning of some type of a nuclear facility.

Representing the NRC staff for this presentation is Robert Meck. Mr. Meck, the floor is yours. I believe all of you have a handout that he has provided.

MR. MECK: Thank you. We appreciate the opportunity to come before the ACNW and present this work. Dr. Donald Cool regrettably is delayed at the Atlanta Airport, and he is en route to this meeting. I think he will be here before we conclude.

My name is Robert Meck. I am the Acting Section Leader and Senior Project Manager for the work that is going to be presented this afternoon. I would like to make this presentation in two parts. At the end of each part, I would anticipate allowing some time for discussion. The first part will be a description of the technical basis report for the residual contamination criteria. The second

part will be a presentation of the interim release criteria.

I plan to allow approximately one-half the alloted time for discussion.

MR. MOELLER: Fine. Thank you.

[Slides.]

MR. MECK: NUREG/CR-5512 is entitled residual radioactive contamination from decommissioning. It was published last month, January 1990, in draft for public comment. It was prepared at the request of the Nuclear Regulatory Commission by Pacific Northwest Laboratory, and it describes the technical basis for translating contamination levels to annual dose. It includes unit concentration values for 200 nuclides approximately, and includes soils and structures.

The technical basis begins with pathways for exposure, and I should mention that ICR P-26 and ICR P-30 methodology is used in the technical basis report. The pathways are direct exposure from external sources, secondary ingestion, and this is direct ingestion of contaminated materials that may occur from the hands or direct contamination of food substances or other sources, inhalation, food and drinking water.

Using those pathways, I have applied two scenarios. The scenarios included in the report include structures, there is a renovation scenario that is assumed

that whatever structure is to be used for unrestricted use that would require renovation, that is included. In the renovation scenario there is volume contamination considerations; that is that materials that the structure is composed of is contaminated as a volume to the depth of one centimeter; and that there is also a long term occupancy scenario. This is a thin layer surface contamination consideration.

MR. MOELLER: Will you be covering the time you assume for the occupancy?

MR. MECK: I can do that. For the occupancy scenario of a structure, we assume 2,000 hours. In other words, the standard work year.

MR. MOELLER: Okay, but this is for release to the public I thought.

MR. MECK: That's right. There is also a residential or agricultural scenario, and that would include the longer term residence or occupation.

MR. MOELLER: You have one example where the facility is released to maybe an industrial organization as a place for work.

MR. MECK: That's correct.

MR. MOELLER: And then another where it is released. Where I had trouble is, you have the five micro rems per hour and that translated into 11 millirem per year.

I couldn't do that conversion on the basis of an 8,700 hour year.

MR. MECK: Okay.

MR. MOELLER: You have helped.

MR. MECK: We can go through that.

MR. MOELLER: That is a detail. Go ahead, and we will look at it later.

MR. MECK: The soils is where the residential use scenario comes in. There, it is assumed that the existing structures are raised and the houses are built a new. That includes surface soil considerations. There is also a drinking water use scenario, and that considers the total activity, total inventory on site.

MR. STEINDLER: Excuse me. On that drinking water scenario, what do you mean when you say that considers the total inventory on site? Do you have some rate at which that inventory is deposited in the drinking water?

MR. MECK: Yes. Those parameters are described in detail in the report. Briefly, the model is a two-part model. One is, if you will, a box that amounts for the decay of the radioactive material and from that box goes the material into the soil and onto the drinking water.

The conceptual problem that we ran into in this consideration was what was a scenario like this -- there's a structure that is left on site, if it is unrestricted

release, what is to prevent the new owner of this site to demolish the structure and use it as landfill on the site. So, what then become important was not only the level of soil contamination but the amount of activity that was left behind on the structure. The total activity on the site needed to be considered. So, we wanted to embrace that. That is what is implied by the total inventory.

MR. HINZE: I guess I am having trouble finding out and keeping with you in terms of your model. Is this a standard model that has been verified, and how has it been verified? What are the variables in terms of model, the parameters that you enter into this model; where do they come from in terms of the soil characteristics leading into getting into the drinking water, et cetera. What is this model all about?

MR. MECK: In general, the whole model is based on a GENII code, and that has been used by DOE in several applications. I am not sure if your question has to do with specifically the drinking water aspect of this or the overall.

MR. HINZE: Let me ask the second question. This is a well-verified model then?

MR. MECK: Yes, it is. It has been quality assured through ASCI standards. We have run several comparisons throughout the development of the report.

MR. HINZE: Then moving on to the drinking water aspect of it, what kind of range of variables do you use in the subsurface conditions to explore the results of the model?

MR. MECK: I have to tell you that the drinking water aspect of this was one of the more difficult areas in modeling, as you are probably aware. The variability from site to site throughout the country is considerable. We carefully avoided calling this a groundwater model. The part we did use is, we did use some of the standard assumptions of amounts of water usage from EPA. We also used the parameters that were used in the development of Part 61.

We were very careful to reference all of the parameters in variables in the report where those were found. I think you will find the report well referenced and you can see where the parameters came from. Can I elaborate more on that?

MR. HINZE: I think I may want to revisit that as you move along.

MR. MECK: Was it verified? What we did was, we talked to -- we asked an expert at the Pacific Northwest Labs with Bill Nelson to take a look at it. We also have our own staff hydrologist looking at this. Their concern was that there be enough flexibility in the modeling that if

site-specific parameters were available, that those could be inserted into the modeling for a site-specific case and the model would still be flexible enough to apply to a particular site.

So, we were very concerned with referencing the parameters we did use, and two, having enough flexibility that if a licensee were to come in with site-specific variables that they could insert those into the equations and derive scenarios with ample justification that the NRC staff could review and conceptually accept.

MR. HINZE: It would seem to me that you would demand the site characteristics in order that one could determine what the drinking water, if you want to avoid the word groundwater, conditions are. They have to be in there, don't they?

MR. MECK: There was a consideration of cost. We realize that this report expands a very broad spectrum of the licensees from a single laboratory at a small university conceptually to a nuclear power plant or to uranium processing. We were thinking of the smaller operations when we were looking at the generic insertion of these kinds of parameters, so that an expensive survey would not have to be conducted by those businesses that have a small operating budget.

MR. HINZE: This is a generic consideration, is it

not?

MR. MECK: It is a generic consideration. The drinking water portion of this modeling may be, because of its conservatism, may only provide a screening for when more detailed analysis is required. We do feel that there is a degree of conservatism that would likely cause specific sites to develop and ascertain what their local parameters are.

MR. HINZE: So there are flags built into this then, that would permit one to receive a signal of when more work is required?

MR. MECK: Yes. If the generic scenario for a particular site does not yield the release limits, then there is a possibility for the licensee to analyze in more detail the parameters that went into that modeling, and then to insert those and see if with a refinement of the parameters meet the limits.

MR. STEINDLER: How about the converse of that? I saw nothing in the other material other than this report that I have seen to give me confidence that in fact if a test of the generic model shows that the exercise will meet the criteria, that in fact the model won't give you in a sense, a false positive reading. Do you have any assurance that it is sufficiently precise that if it gets you to less than whatever the number is, five MR, that's a reliable

number as an upper limit?

MR. MECK: The assurance, once again, comes from a careful referencing of reputable source data that we used to develop those conversion factors per se, and in addition in comparison with criteria that have been used in the past by the Nuclear Regulatory Commission. In general, we were within about a factor of two of other standards that have been used in the past. This gives us some confidence that this is not a completely new set of criteria, that we are in familiar ranges of limits that the NRC has used in the past.

MR. STEINDLER: Okay, thank you.

MR. MOELLER: You said earlier, and I want to be sure I understood, that the models used in NUREG/CR-5512 have been carefully QA'd and everything?

MR. MECK: Yes. They have been carefully maintained to conform with ANSI standards of quality. They have also been used by DOE. As I just mentioned, we have compared them with other criteria that the NRC has used in the past. In general, they meet the limits -- tend to be within about a factor of two of what has been used in the past.

MR. MOELLER: Okay, we may come back to that later.

MR. MECK: Okay. I think I just mentioned about the flexibility. The only other point that I would make

from this viewgraph is that the report provides a description in appendices on how to use the tables and how to modify model parameters. We think that this will aid the users of the document.

[Slide.]

MR. MECK: We anticipate that the interim criteria which we will discuss in the second half of the presentation, will replace the table in Regulatory Guide 1.86 for the release of structures. In addition, the interim criteria would replace the values in Option 1 of the Fuel Cycle Branch Technical position for uranium and thorium in soil.

Option 2 of the Branch Technical Position would remain unaffected by these interim criteria.

MR. MOELLER: To refresh me, the table in REG Guide 1.86, is that for contamination limits on the surfaces of material and so forth?

MR. MECK: It is for the surfaces of structures.

MR. MOELLER: Okay. So, it is not concentrations in the soil that give a certain dose to persons.

MR. MECK: That is correct, it is not.

MR. MOELLER: Fine, thank you.

MR. MECK: There are limitations to this report. The report does not apply to burials of radioactive material on a site. When we speak of soils, we are speaking of

relatively uniform contamination of the first 15 centimeters of soil.

MR. MOELLER: I have had problems understanding that. In other words, are you saying if this nuclear facility had a low level waste burial area on site you fence that off and it's not part of what you are releasing? I didn't understand.

MR. MECK: We have to consider that on a case-specific basis. The reason that I brought this point up and am emphasizing it -- and I will come back to your point also -- is that it is conceivably possible to envision the following scenario, that some licensee had some relatively high radioactivity and site and buried it with enough soil to yield something less than the five micro R per hour that we will discuss later.

MR. MOELLER: At the surface, or a meter of --

MR. MECK: Yes, at a meter. What we are emphasizing here is all bets are off given that circumstance. We want to look in particular at that. On the other hand, which is more to your point, if a facility were to have buried material that had an activity -- a concentration in terms of pico curie per gram than was less than the limits that would be allowed on the surface, then it would be hard to imagine why this would present a difficulty. That is two sides of that same point.

The report also does not consider indoor radon. We will come to that point again also. It does not include consideration of tools and equipment which could be reused or recycled. We are talking specifically structures and soils.

[Slide.]

MR. MECK: This is in bullet format. Our sequence of actions in this area, as you are aware, the publication of NUREG report is a fact, and it is out for public comment. We have a 90 day comment period. It is my understanding that the Federal Register notice of availability was published yesterday on that. The preparation and publication of interim criteria, based upon this report and the Commission policy statement on exemptions from regulatory control, is the process that we are in at this moment.

Following that preparation of what is not on the slide is implementation of interim criteria through the use of regulatory guides for parts 10 CFR parts 30, 40, 50 and 70. We will be initiating -- we anticipate initiating, I should say, rulemaking to codify dose criteria for unrestricted use following decommissioning. Of course, we will analyze the comments on the technical basis report, the NUREG and the interim criteria.

Finally, we will develop the final NUREG and

regulatory guide, and in the rulemaking process eventually we would anticipate rule.

MR. MOELLER: You are going to go through rulemaking and you will have a rule, and will this be part of the overall exemptions from regulatory control or will it be done separately?

MR. MECK: It is not ar to me at this time what the Commission's wishes are.

MR. MOELLER: Okay. If you have a rule, then the reason you are also going to have a NUREG and Regulatory Guide is that there is just too much information to put all of it in the rule. Will the rule then cite the regulatory guide, or how does that work?

MR. MECK: That is still undecided. We feel that there is enough information or enough basis in the rules now to base regulatory guides on that would reference this NUREG report and interim guidance. However, on the other side -- there is a need for decommissioning criteria and regulatory guides now. However, we feel that the portions of the regulations are existent could be clearer and we probably need to clarify the rules.

MR. MOELLER: Dr. Orth, since he has covered the part in NUREG/CR-5512 is out for public comment, do you want to mention a couple of questions on the tables or not?

MR. ORTH: The only question I have is one

question. Are the tables that are in the comment document we have seen copied out of 5512, or are they the staff's interpretations of what the tables mean?

MR. MECK: Are you referring to the interim criteria that would be in --

MR. ORTH: Yes.

MR. MECK: Those are not copied out of the NUREG-5512. Rather, what we did was to use the 10 millirem per year total effective dose equivalent and divide the concentrations that are in the tables in Chapter 3 into 10 millirem. That gave us the resulting table. So, it's a matter of simple division.

MR. ORTH: Except that when it gets down to the business of the column. For example on building sources, we have a column listed Becquerels per hundred square centimeters. The conversion factors seem to be all wrong.

MR. MECK: That is correct. The conversion factors are wrong, and we are aware of that.

MR. ORTH: The same thing occurs on the other table with pico curies and Becquerels.

MR. MECK: That is right. We do realize that pico curies do not equal Becquerels. We recognize that, and it will be correct.

MR. ORTH: Well, are either one of the columns right? Granted, there is a mistake in conversion. Are

either of the columns in either case right?

MR. MECK: It is my belief that the ones with the older units, pico curies are correct.

MR. MOELLER: Are correct, okay.

MR. ORTH: And, the D-per M?

MR. MECK: And, the D-per M.

MR. MOELLER: So then, these tables to be sure that we are crystal clear, these tables are NRC staff conversions of data that you have taken out of the NUREG and they are not part of the NUREG.

MR. MECK: That is right. They are not part of the NUREG.

MR. MOELLER: Who did these conversions?

MR. MECK: We asked Pacific Northwest Lab to provide a letter report that would do those conversions.

MR. MOELLER: They gave you the tables with the conversions?

MR. MECK: They gave us those conversion tables. We were unaware initially of the conversion error.

MR. MOELLER: Okay.

MR. MECK: They certainly are in our -- we are aware of it now, and we will continue to review all of the data and all of the report, even though we are out for public comment. We will continue to review it for quality assurance.

MR. OKRENT: With regard to residual soil contamination in establishing what is acceptable, does the staff have in mind that this criterion would be appropriate were it in fact to be approached nationwide, or does the staff have in mind that only a limited amount of soil is involved and a limited number of people exposed to the soil are involved and so forth; could you help me?

MR. MECK: Yes. The criteria are generic, yes. However, taking cognizance of the limited number of sites and the geographical size of those sites and also, the location of the sites, both the geographical areas that the criteria are applied to and the potential populations are limited.

MR. OKRENT: You said these are generic. If I could translate then to 10 millirem per year roughly. Is it then the staff's philosophic position then that something approaching 10 millirem per year from what I will call man induced changes in radioactivity -- they are there naturally, whatever that means -- man induced changes approaching 10 millirem per year on a national basis is an acceptable -- it is below concern or not to be regulated, however you want to phrase it.

MR. MECK: The 10 millirem per year is for a hypothetical maximum leak exposed individual in a group of people who [illegible] be expected to be exposed to the

residual contamination. One wouldn't say that an exposure limit for the entire United States would not say that.

MR. OKRENT: One would not say that. Is there some average number that one can assign in some plausible way?

MR. MECK: We haven't done that. I think it would be a difficult and controversial task to attempt.

MR. OKRENT: I will come back to it, thank you.

MR. SHAPIRO: Your surface contamination limits, are those fixed contamination, removable contamination?

MR. MECK: The modeling assumed that they were primarily fixed. They were fixed at the time of release, but that some of the activity through oxidative processes or whatever processes some fraction, could then be removable.

MR. SHAPIRO: Okay. Essentially, one would have to take a measurement of total surface activity to see if it complied with these limits?

MR. MECK: Yes. To apply this modeling and the interim release criteria that we will discuss next, the licensee will have to determine what nuclides are residual and the relative concentrations of those, and there will have to be some measurements, assays and surveys made and sampling.

MR. SHAPIRO: Dave, there are some questions about comparability of other REG guides. I don't know if you want

to defer those until later and go on with the discussion.

MR. MOELLER: Let's defer and come back to it. Thank you.

MR. MECK: I am at the end of the portion that I have prepared for the report itself, the technical basis report. If there are further questions on that, I would be happy to go for that. If not, --

MR. STEINDLER: Let me ask a question, if you don't mind.

MR. MECK: Sure.

MR. STEINDLER: Your appendix A in the PNL report talks about the external dose sensitivity studies.

MR. MECK: Right.

MR. STEINDLER: There are no experimental data in that portion of the report. It appears that all of those sensitivity studies were substantially code-related.

MR. MECK: That is right.

MR. STEINDLER: Do I interpret from that, that there are no experimental data in the literature against which you could have checked any of those curves, either volume or surface contaminated issues?

MR. MECK: I don't know, but I appreciate your point because I am an experimentalist myself and I like to see those kinds of data. We have not asked PNL that specific question.

MR. STEINDLER: You did not ask them that?

MR. MECK: We did not ask them that, and I think it is a question that we should ask them. The sensitivity studies were indeed a test of the code itself, to look at what parameters affected the code and to what extent. That was the purpose of the --

MR. STEINDLER: I may be looking in the wrong part of the report. I guess what I am looking for is some correlation between calculated and experimental results to give me a little warmer feeling about the ability of the models to always be conservative so that when you come to the conclusion that the model gives you your annual 10 millirem or less that you don't have to go back and look at the system again for a site-specific calculation.

That's the question I asked earlier. I don't have that feeling at the moment. You indicated a factor of two with somewhat undefined other studies, which one assumes are experimental. If they aren't and there is another code, then I don't have much of a feeling at all as to what that factor of two means. If they are experimental studies I would expect somewhere in this report to find that correlation or comparison.

MR. MECK: The comparisons that were done were with criteria that the Nuclear Regulatory Commission has used in the past and other technical bases, in particular

for Part 61. It would require some investigation on our part to trace back whether those were indeed founded in experimental measurements or not. We did not conduct independent confirmatory measurements in producing this report.

MR. STEINDLER: I understand that, nor am I suggesting that for this particular program you should mount a large experimental program, experimental activity to try and do that. I would guess that if you go out to PNL there must be 50 buildings standing around that have been decontaminated and are currently not used, whose contamination levels ought to ascertainable fairly readily, and at least get some kind of information from existing records on where you are.

MR. MECK: Right. As I mentioned before, the code that was used in this report has been applied to decommissioning of some DOE facilities. It was a real facility at the Hanford site I believe, and we could ask the contractor to provide some information. I think there is a DOE report out on that. We simply did not reference it.

MR. SHAPIRO: The numbers you give in the criteria document are a summation of all the possible pathways, external dose, re-suspension, drinking water and groundwater or whatever, from the other.

MR. MECK: Yes.

MR. SHAPIRO: It would just be useful to have an idea for your case for occupancy of a building after it has been decommissioned to what extent these various pathways contributed to the dose. Of course, if it is tritium it is not going to be an external dose. I mean in general, if you have a gamma emitter, is the inhalation pathway important to the external dose pathway?

The extent of the approximations and the errors are very vividly between an external dose calculation and an inhalation dose calculation.

MR. MECK: You laid your finger on the complexity when you mentioned the tritium, because it depends entirely on the mix or nature of the residual contamination level. For example, if you have primarily alpha emitters and the internal dose becomes limiting ingestion and inhalation, whereas if you have a beta or a beta gamma emitter. Typically, it is he external pathway that is dominating.

We will get to that a little bit later, but in consideration of the five micro R per hour criteria that we included in the interim release criteria, I had Pacific Northwest Labs isolate out the nuclides that have greater than 90 percent of the total effective dose equivalent attributable to external dose rate. There is a quite a number of nuclides that fit that category and they are, as one would expect, beta gamma emitters. The converse, those

that have more than 10 percent of the total dose as contributed from internal mechanism, ingestion or inhalation, those are the heavier or higher number nuclides.

MR. SHAPIRO: I have one more comment. By using the effective dose equivalent, don't you essentially down play the importance and the effective internal activity, because multiplying by weighting factors which really reduce the actual dose to any organ in contrast to an external exposure which would expose all the organs essentially with a weighting factor of one.

MR. MECK: That is a reflection of the philosophy of the ICRP that we used in total dose. I don't think I am in a position to debate that philosophy. We adopted it because we felt that it was the state-of-the-art science of physics and so forth.

MR. SHAPIRO: I was talking to Charlie Minehold a very short time ago, and I told him I thought a 50 R maximum dose to an organ was an awfully high dose to allow in view of our current approach toward radiation. He said ICRP which represents the state-of-the-art is really concerned about that high dose too and is looking for a way to lower it.

MR. MECK: I will be interested to see what they develop. Are there any other questions on the report?

MR. OKRENT: Again, just to understanding

something about the residual contamination of soil. Is it possible that soil having such residual contamination might ten years from now be used for a housing development; is there anything to prevent it?

MR. MECK: When we are talking of an unrestricted release, that is exactly what we mean, that there are no restrictions on the future use.

MR. OKRENT: If I assume that the people in this housing development for the sake of discussion get the 10 MR per year and if I use my limited understanding of the most recent BAER Committee Report, the lifetime risk of cancer would be estimated larger than 10 to the minus four; am I correct?

MR. MECK: I thought the BAER Committee came out with about four times 10 to the minus four.

MR. OKRENT: This is then in some ways being allowed as a tolerable criteria, I would say, acceptable -- since the word acceptable is -- it is larger than what one would sometimes see being used for other involuntary societal risks. Although here it is not the broad population, that is true, I was just trying to see whether that had been consciously factored into the choice of a number.

I am not disagreeing or agreeing, I am only trying to understand.

MR. MECK: Yes, I think I understand what you are saying. Of course, there are more risks with everything we do. I believe the Commission position is that below this level and which translates to this level of risk, we should not be concerned with ALARA working on methods to further reduce dose. That does not say the Commission is not aware of risk at this level. What is says is, the Commission should not have to concern itself with causing licensees to further reduce contamination at this risk level.

MR. OKRENT: Do you have any idea how this compares with such standards as may exist in the Netherlands or some other places for acceptable residual contamination of hazardous chemicals in soil with regard to the lifetime risk?

MR. MECK: I don't know about other countries. I recently attended a midyear symposium in health physics society on quantitative risks. There is really quite a spectrum of quantitative risks that we are exposed to. It is my opinion that there is not a logical pattern to the risks that we accept as a society and the risks that we reject. It seems not to be the only factor that society uses to accept or reject risks.

MR. MOELLER: Why don't you go ahead.

MR. MECK: Thank you.

[Slides.]

MR. MECK: We are talking now about the interim release criteria. As I explained a little bit earlier, it is based on the Commission policy statement. I should mention that this policy statement is something under consideration by the Commission. It is not an issue at this time.

It is that portion of the statement that limits 10 millirem total effective dose equivalent per year. The interim release criteria that we are talking about here applies to soils and structures. The major features are that in general, they are somewhat less restrictive than existing criteria. I have some tables that will give a sample of that. The comparisons are a little bit difficult, because some of the ways that we go about comparing use different methodologies. For example, ICRP-II methodologies were used in some of them and different modeling are used.

If we really want to understand the differences between numbers in these criteria and other criteria, and there are a number of places that we could look for standards, it would involve unraveling the modeling scenarios and data library sources that were used in both cases and making a detailed comparison. It would be quite laborious. I have some tables in hand, and we will get to that point.

This interim release criteria does permit direct

measurement of the external dose rate portion of the total effective dose equivalent. We can spend some time on that as well as has been mentioned before in this discussion on site-specific modifications. The amount of the report not specifically addressing indoor radon, it adopts the EPA standard for radium 226 and daughters in soil.

[Slide.]

MR. MECK: Now we will discuss these points. As I mentioned earlier, the portion of the Commission policy dealing with the 10 millirem annual total effective dose equivalent to a maximally exposed individual was used. The concentrations from the technical Basis Report, NUREG-5512, were divided into this 10 millirem to provide the limits of the interim release criteria. There is also a consideration of a direct measurement, site-specific modifications and EPA radium standards, as I mentioned earlier.

MR. STEINDLER: That NUREG-5512 is different from our NUREG/CR-5512.

MR. MECK: It is not. That is just --

MR. STEINDLER: That is your shorthand version?

MR. MECK: It is a shorthand version.

MR. STEINDLER: You have it all in there.

MR. MECK: We tend to shortchange the contractors I guess when we write it that way, but it really is NUREG/CR-5512. For the discussion today, the existing

criteria that we can compare to are Regulatory Guide 1.86, which deals with surface contamination of structures. Branch Technical Position 1 which was developed for contaminated soils of uranium and thorium series. We also need to compare these criteria and the computer codes with other codes.

Recently, one of the most important codes that we need to have an early comparison with is the impact of the BRC code. This code was developed for waste streams and we plan to do that as soon as we can through the contractor. Other codes that are of interest that the Department of Energy had recently issued a RES RAD code for residual radioactivity in soil, we would like to compare this work with that. We would also like to compare the code with whatever EPA is using. There were using a REUSEIT. I am not sure if EPA is still using that code or not, but we will contact the appropriate people and find out where comparisons could be made.

Those are the highest on the list of follow up activities for this report. We hope to accomplish that during the comment period.

MR. MOELLER: The Branch Technical Position Option 1, refresh me on what that is.

MR. MECK: Could I defer that.

MR. MOELLER: Okay, I will wait.

MR. MECK: For two slides?

MR. MOELLER: Fine.

MR. MECK: In REG Guide 1.86 there are four categories of nuclides and I have sampled those categories. This is not a complete listing of that. I do have a copy of REG Guide 1.86 here, and I do have a copy of the Branch Technical Position if we need to get into the details.

[Slide.]

MR. MECK: As you can see for most of the nuclides sampled here as presented, the NUREG/CR-5512 is higher with the exception of the uranium U-235 and U-238, where it is about 20 percent lower. The numbers here are in DPM per 100 square centimeters.

MR. STEINDLER: Is that a consequence of the arbitrarial election of 10 millirem?

MR. MECK: Yes. All of the dose conversion factors in terms of concentration were divided into 10 millirem.

MR. STEINDLER: The fact that they are different simply is a reflection that you picked -- you may have picked 10 millirem arbitrarily?

MR. MECK: That's right. Ten millirem was chosen.

MR. STEINDLER: There is no other significance of that difference, is there, or am I missing something?

MR. MECK: No, that is entirely where it came

from.

MR. STEINDLER: Okay.

MR. MOELLER: Dr. Shapiro?

MR. SHAPIRO: One point is not based on dose at all, it was just a performance standard. We could talk about that later perhaps, if you would like. It is just a pure coincidence that those numbers are corresponding. They really don't correspond in many aspects and they correspond in some.

MR. MECK: That's right. When we start looking at 1.86, the consistency is spotty. The second category was actinium 227 that gave us this limit. The other limits were more like 1,000 or higher. For this grouping, thorium 232, was the lower end for discussion.

MR. MOELLER: What was the 360 for?

MR. MECK: Thorium 232.

MR. MOELLER: Okay.

MR. STEINDLER: I am still confused. Help me out here. What is the significance of this comparison?

MR. MECK: People want to know what the interim criteria that are under discussion now would look like as applied in the field. What does this mean -- how different is this from what we have been doing. This is a numerical way of looking at that.

MR. STEINDLER: The REG Guide 1.86 is an

arbitrary, non-risk related set of numbers, and you are comparing those to another set of arbitrary risk-related numbers. Is that stating it badly?

MR. MECK: I don't know how the numbers of 1.86 came into being.

MR. STEINDLER: I guess what I am saying is, you are comparing one set of --

MR. MECK: Right.

MR. STEINDLER: If Dr. Shapiro is correct, and I am sure he is, comparing one set of numbers based on risk which is your NUREG numbers to another set of numbers which appear not to be based on risk, but happen to have some importance only because they are in existence.

MR. MECK: I think that's true.

MR. STEINDLER: Is that right?

MR. MECK: That's true.

MR. MOELLER: In the last line there, you say cobalt 60 is 12,000. Is it 5,000 for cesium, or what is it for other beta gamma emitters?

MR. MECK: It would be in the thousands, and it is generally higher than the 1.86 limit. They are typically in the thousands, ten thousands.

MR. MOELLER: Cobalt is just an example.

MR. MECK: Just an example. There are so many beta gamma emitters that I didn't want to have a busy slide.

MR. MOELLER: All right.

MR. MECK: If we can move on, we can talk about the Branch Technical Position. I see that Dr. Cool has arrived from a tornado infested Florida, and I am glad to see that he is here safely. He has more knowledge on the Branch Technical position than I do, and I would invite Don to come up to the table. He doesn't want to, you think I am doing fine?

In Branch Technical Position, it has limits in pico curies per gram of soil that one can leave behind. It has two other categories that are not listed here, and I didn't list them because we didn't approach them in the NUREG/CR-5512. Those other categories are enriched uranium and depleted uranium. I will address that.

[Slides.]

MR. MECK: For natural thorium, the criteria come out to be virtually the same for natural uranium, where a factor of 15 higher are less restrictive. In the report, in the NUREG report on page C-15, there are two examples that the contractors used for enriched uranium and depleted uranium. The Branch Technical Position Option 1 allows for enriched uranium, 30 pico curies per gram of soil, whereas the NUREG report allows approximately 150 pico curies per gram. For depleted uranium, the Branch Technical Position allows 35 pico curies per gram and again, the NUREG report

allows approximately 150 pico curies per gram. So there is a comparison.

MR. STEINDLER: Can you perhaps clarify for me, the role of the Branch Technical position in the last years, I don't know how long it has been out, in terms of actual field activity? Has it been invoked, has it been employed?

MR. MECK: I am going to defer to Dr. Cool on that one. This is his area.

MR. COOL: Yes.

MR. STEINDLER: For how long?

MR. COOL: The Branch Technical Position has been used since it was published in the Federal Register in October of 1981. The only option which has ever been exercised is option one, that is the unrestricted release criteria values. We have had licensees who have talked to us and, in fact, are talking to NMSS with regard to option two, which would be burial with coverage of some sort of material.

To my knowledge at this point, unless it has happened within the last year or so, there have not been any actions taken under any option than under option one. Under option one, there have been sites released.

MR. STEINDLER: Thank you.

MR. MECK: One of the considerations that we and the staff had was that there are relatively simple

situations that one can conceive of in a licensee's activities, where it would be an unnecessary burden in the staff's view to require extensive sampling and detailed analyses of the site. It has been used in conjunction with the limits in REG Guide 1.86. We also require criteria five micro R per hour measured above background, measured at one meter from surfaces.

For example, if a radio pharmaceutical laboratory had primarily a beta gamma emitters, the staff felt that they shouldn't have to go through extensive sampling of coring of walls and dismantling of any plant equipment to, where a simple measurement in a direct measurement as opposed to modeling would provide an adequate measure for release. In that context, the interim criteria allows for a five micro R per hour above background at one meter limitation for the external dose rate component for total effective dose equivalent.

The second bullet here emphasizes that it applies only to that component. But as I mentioned earlier, if we do a computer sort of those nuclides that, with our scenarios as described in the technical basis report have greater than 90 percent of the activity contributable to the external component of the TEDE, the nuclides that come out are the beta gamma nuclides that are familiar to a lot of us and the ones that remain behind are typically the alpha

emitters. That is where the internal dose becomes relatively more important.

One can conceive of a situation where a licensee has used only beta gamma emitters and has complex areas to measure, for example, a rough terrain soil where it would be beneficial and not burdensome to simply measure five micro R per hour above background. That is why that is included in the interim release criteria.

I think that is all I am going to say on that.

MR. MOELLER: Back on the pathways that you considered which you covered when you first started your presentation, let me be sure that I understand it. If I have this facility and I am decommissioning it, and I want to release it for public use and the soil around the facility is contaminated, then you look at the nuclides in that soil and you set limits for each specific nuclides in the soil.

MR. MECK: That's right.

MR. MOELLER: It could be that in some few cases, external exposure just standing above the soil is controlling. Even though this is dirt outside a building, you still assume or you still do the calculations as if I were corn or lettuce or tomatoes or pasturing a cow on --

MR. MECK: That is correct.

MR. MOELLER: Whatever is controlling, then that

is the limit on that nuclides concentration.

MR. MECK: After all that calculation is done, then we look at it and see what is controlling, yes.

MR. MOELLER: Even though there is slim probability maybe that they will plant pasture grass there, you go ahead and do the calculations?

MR. MECK: That is correct.

MR. SHAPIRO: When an NRC inspector comes to my university and looks at whether the professors have dumped any radioactivity into the regular trash, he doesn't hold his meter one meter from the trash basket. He puts it right on the surface of the trash basket.

MR. MECK: He increases his sensitivity.

MR. SHAPIRO: He doesn't like it when it is five micro R at the trash basket. So that I can see perhaps why you chose one meter, when people check you out they are not going to survey at one meter. They are going to survey at the surface. Do you have any idea what the relationship would be between one meter dose and a surface dose?

That's a tough question I know, but has that been looked at at all?

MR. MECK: Off the top of my head, I don't. I am sure that it has been looked at. I would have to get back to you with an answer to that, if you would like.

MR. COOL: Dr. Shapiro, I believe you would find

that it will vary from site to site to site. What usually happens, and here I can speak from what is done with the confirmatory survey done by the NRC say for Oakridge associated universities, they will take some measurements at the one meter and usually have a measurement with a pressurized ion chamber to give them a very accurate reading of ambient dose rate.

From that, calibrate what they often call their swinging meters which will usually be two-by-two sodium iodide crystals which they have on ropes swinging right on the ground line. From there, they empirically derive a relationship from that particular mix of nuclides and then using these swinging meters, go across the site to do their detailed survey. It would be derived on an empirical basis for each site.

MR. SHAPIRO: Depending, of course, on where the radioactivity would be.

MR. COOL: Yes.

MR. SHAPIRO: It would be a substantial difference if it were close to the surface and you might have a substantial dose rate at the surface compared to a one meter dose rate. I am saying practically you could be in real trouble if you had a substantial dose rate at the surface.

MR. COOL: It is very difficult in many circumstances to even represent what the surface rate is,

especially as I mentioned in rough terrain, in soils that may be contaminated slightly that might may be some self-absorption as you mentioned. All of these complicating factors really do take place in the field, and makes it difficult.

One meter is a reference point that is easy to use in the field, and one can apply it conveniently. It is not something that is terribly controversial when you get that far away from a rough surface or a self-absorbing surface.

MR. SHAPIRO: Yet, you are asking me to make a surface measurement when I look at surface contamination.

MR. COOL: In terms of removable?

MR. SHAPIRO: Yes, both, fixed and removable. You have limits for me.

MR. COOL: Right, measured in a different way.

MR. STEINDLER: I think I must have missed something. How does that five micro R per hour about background translate to the 10 NMR per year? My simplistic arithmetic gets me to about 30.

MR. MECK: We did a calculation using the residential scenario in the technical basis report. If you account for the hours outdoors and add to that the effective hours outdoors, which would be the indoor hours multiplied by a shielding factor which is referenced in there at .33 and add those together, multiply those by five micro R per

hour, and then using a conversion factor that can be found in NCRP 94 at point 7 rem per roentgen, one comes out with approximately 11.

MR. STEINDLER: I guess I have a comment which is nothing but a comment. That is throwing a refinement on top o fan already somewhat shaky, in my judgment, set of models of largely computerized but not experimentally obviously verified and particularly the shielding factor which escalates the potential error in the wrong direction.

You are already going to get into a significant discussion about your baseline 10 MR. If you now want to get into an argument with people about what the number of R's behind that shield is or inside that shield, I think you are compounding a difficult situation just one step further. That is just a comment.

Let me shift --

MR. MECK: I would like to respond to the comment, in that the measurement -- the direct measurement of a direct component in our view is much preferred to a modeling measurement.

MR. STEINDLER: I certainly wouldn't disagree with that.

MR. MECK: We have more confidence with that. When we were looking for references to shielding from a house, we found several. We used what we thought was the

best of those, the most representative, and that is where we came to that number. The fact that it that versus 10 really doesn't bother me that much because, as I mentioned --

MR. STEINDLER: That wasn't my point. The point is that it looks like it is your 11 against my 30. That is where I am having a problem.

MR. MECK: I have a copy.

MR. STEINDLER: I understand. I know where you got your 11, but I am saying is that in order to get to the 11 certainly by the Roentgen to rem conversion factor, there is no problem with that. If you insist in a certain amount of time, maybe 31, you insist on a certain amount of time behind a shield. What I am saying is, that is a variable that you can now swing in any direction that you want and get you down from my 30 to your 10.

That is the one that is giving me a little trouble. Let me suggest that it is not worth further discussion. I have a different question.

MR. MECK: Okay.

MR. STEINDLER: Let me quote to you from the drafting closure one. The allowable levels applied to the structures and soils from unrestricted use after decommissioning and can be applied only to those circumstances encompassed by the assumptions underlying the modeling. I think that is a grand statement.

I have tried hard to find the underlying assumptions accompanying the modeling, and they are diffuse at best and I submit to you opaque, in that port. Are you planning to issue for the edification of people who have to review this, a more concise litany of fundamental assumptions you used in the structure of those models?

MR. MECK: I had envisioned that coming out in the form of a regulatory guide that people who had to apply it and the staff who had to review applications could apply it directly.

MR. STEINDLER: I think that is fine. It would help not only the staff that had to review it, but I would assume the potential licensees that have to comply with it.

MR. MECK: Exactly.

MR. STEINDLER: That might be a very handy thing to have.

MR. MECK: There is no doubt in my mind that the writing of the regulatory guide is going to be challenged.

MR. STEINDLER: Okay, thank you.

MR. MECK: I think we have talked a bit about the site-specific modifications that could be made in the modeling. The places that those could be made are in the assumed physical parameters, we talked a bit about drinking water and specific parameters there and also scenario parameters themselves. For example, our use of 2,000 hours

for a commercial building occupancy, there would be a circumstance where that wouldn't apply, just as an example.

There are example modifications in the NUREG report to aid the potential user on how the modeling can be manipulated to apply to a specific situation. We hope that this will be helpful to the potential users.

MR. MOELLER: Back on the five micro R per hour.

MR. MECK: Yes.

MR. MOELLER: I understand that if it is a measurement of a meter above the soil outdoors and then you say the people spend 90 percent of their time indoors and they are not out here, so you finally come up with your 11 millirem a year, I follow that. But now you are using then the same five micro R per hour as a limit inside of a building that is contaminated, and then you are saying it's okay because this is a building in which people work and they only work 2,000 hours a year.

What if it is inside of a building that I am going to convert into my home, what do you do?

MR. MECK: When we were working on this report, I passed out a cartoon that was in the American Scientist. It showed a power plant in the background and the people in the foreground said there's another power plant going condo. It was intended by the cartoonist as humorous, and I think the humor probably lies in perceived probability.

What you are suggesting is certainly probable.

MR. MOELLER: Am I to understand though that your limit for this soil outdoors for external exposure rates is five micro R per hour. Am I then to understand that for indoors for any facility that has been adequately cleaned up to be decommissioned is five micro R per hour?

MR. MECK: Yes. Implicit in that assumption is that facility would be used for commercial purposes only.

MR. MOELLER: If you know it was going to be used for a home or something, you would reduce it more?

MR. MECK: That is correct.

MR. MOELLER: Okay.

MR. SHAPIRO: You know, you are calling it unrestricted, which means you don't know. There is nothing in your plan to determine whether it will be a school room or it might just be converted into classrooms for all you know. How do you take care of that?

MR. MECK: The larger facilities -- let me answer the question directly and then elaborate on some thought processes that we had. The direct answer is that it is not explicitly addressed. The thought processes are that the larger facilities such as a nuclear power plant are typically sited in remote areas. One wouldn't think that they would be likely to be sites of a condo or a school room. School rooms are not really that bad, because they

are probably less than 2,000 hours a year anyway for any one individual.

Really what we are talking about I think are the residents. Other facilities that would have large structures that could be used right away, one would think that in general they would be converted to commercial rather than residential. I can't think off hand of a facility that would be converted to residential for residential use right off.

MR. SHAPIRO: Just go to New England Nuclear right in Boston. I visit there occasionally and their buildings would make nice residences. It's just that these things could happen.

MR. MECK: It would be on some sort of a case-by-case basis. In terms of general probability, we just wouldn't anticipate that happening.

MR. MOELLER: Okay, go ahead.

MR. MECK: Thank you.

[Slides.]

MR. MECK: In the interim release criteria, we adopted the EPA standard for radium 226 left in soil. That standard is five pico curies of radium 226 per gram of soil over the first 15 centimeters of depth. The NUREG report as I mentioned before, does not consider or account for indoor radon. The technical information that we were able to

review and the experience of the contractor was that there was no discernable correlation between the radon levels in soil outside of residences, structures and the concentration of radon inside the structures, the same structures that were measured.

Given that circumstance, we found it very difficult to model indoor radon. In the context of an existing EPA standard for radium 226, we adopted this approach.

MR. SHAPIRO: Do you have actual cases that you know of, where there was man made or man introduced radium 226 contamination where radon from that contamination would be a problem?

MR. MECK: There was an NCRP publication out on radon, and it was recent. I can't recall the exact number of the report. I guess it was a symposium on radon. In that, the nation's experts presented their data and they simply showed that for all kinds of circumstances in which residential radon was measured, whether it was from a man made augmentation to nature augmentation to ambient if you will levels, that they could measure outside of the house the radon level in the soil and they couldn't correlate that to the radon measurements inside the house.

MR. SHAPIRO: I asked, do you know of cases where there are substantial levels of radium that conceivably from

an industrial process that you could be releasing ground with substantial radium 226 in it? As far as the correlation is concerned, I would differ with you. There are lots of radon in the ground and there can be lots of radon in the house. If there is no radon in the ground there won't be radon in the house.

That does vary in that way. I just was interested in the practical situation where we know that industry introduced radiation as looked at much more severely than nature introduced radiation. If you know of cases where you would face a problem of radium 226 that you had to deal with.

MR. MECK: I don't personally know, but perhaps --

MR. COOL: Yes, there have been cases, particularly on the Department of Energy DOE side of the house with some of their FUSRAP and UMTRAP, the Uranium Mill Tailings sites. For example, the work that has been done up in Maywood, New Jersey, that was all radium contamination which was being worked over large sections of yards taken out.

I do believe that we do have some licensees for which radium would in fact be a potential concern. Some of these are dealing with refinement for tantalum and some dealing with other more rare metals which start the process from uranium or thorium bearing slags for which there is the

natural equilibrium and a fair amount of radium in that material. SO, yes, I believe that we have some cases and certainly DOE has faced it.

MR. SHAPIRO: In that case, you will apply a four pico curie 800 millirem per year limit rather than what you have in your own standards, is that so?

MR. COOL: For those particular situations, the staff has chosen at this point in the interim guidance process to recommend to the Commission that we use the existing standard which EPA has already put out.

MR. MOELLER: To comment on that, you could have added on the whole phosphate industrial emitting operations in Florida where numerous homes have radon because of industrial activities.

MR. COOL: Quite true.

MR. MOELLER: The five pico curies per gram of soil for the radium up here on the slide, that is based on what? Is that based on uptake in plants? You are saying you are going to let the EPA's four pico curies per liter govern for radon in the inside of the building, is that correct?

Then, I don't know what that means in terms of the radium here in the soil.

MR. MECK: I am not prepared to go into a detailed discussion of how EPA got what is commonly known as their

five/15 requirements. I can't give you the detailed derivation. That was already in place for dealing with this particular issue. We chose it as a convenient way for dealing with this because of the difficulties associated with the modeling.

MR. MOELLER: Sure.

MR. MECK: Five, fifteen, you will find in the regulations 40 CFR dealing with mill tailings clean up.

MR. MOELLER: Refresh me on what five and 15 are.

MR. MECK: Five and 15, there is five pico curies per gram radium in the first 15 centimeters of soil, 15 pico curies per gram in 15 centimeter increments below that.

MR. MOELLER: Oh, okay.

MR. MECK: At this point, we have recommended to the Commission only the five portion of that.

MR. MOELLER: Fine. Your five number up here is derived from the EPA standards?

MR. MECK: Yes, sir.

MR. MOELLER: Okay, fine. That's all I need.

MR. COOL: That's right. That is in 40 CFR 192.32.

MR. STEINDLER: That is equivalent to what sort of an annual dose commitment?

MR. MECK: As I mentioned before, the correlation from the outdoor soil limit to the indoor soil limit has now

been established.

MR. STEINDLER: Supposing I camp outdoors sitting on top of five pico curies of radium in my first 15 centimeters underneath me, and I do that a year. What is my dose?

MR. MECK: I don't have that figure for you, but I do have a figure for you that may be helpful. The average radon level in the United States has been taken to be something like one to 1.8 pico curies per liter.

MR. STEINDLER: Inside buildings.

MR. MECK: Inside of buildings.

MR. STEINDLER: Outdoors --

MR. MECK: That translates to about 200 millirems per year.

MR. STEINDLER: That is radon.

MR. MECK: Radon.

MR. STEINDLER: What I see up there is radium. Can I draw some distinction between the two?

MR. MECK: The radium of course, is the parent to radon. That was the concern.

MR. STEINDLER: All right.

MR. MOELLER: I gather the five pico curies per gram of radium, the EPA standard, is set on the basis of how much radon will be released into the air above that soil outdoors; is that what it is based on?

MR. COOL: Without going back and re-verifying their environmental assessment, I would hate to put those words into EPA's mouth.

MR. MOELLER: Fine.

MR. SHAPIRO: I wouldn't be surprised if that is the drinking water or something, contamination of food.

MR. MOELLER: It could be. All right, let's go ahead.

MR. MECK: This is my last prepared slide.

[Slide.]

MR. MECK: This is a reiteration of what I had said before. It is an outgrowth of limitations of the NUREG report beyond the scope of consideration are buried radioactive material on site, indoor radon and the reuse or recycling of tools and equipment. That concludes my prepared remarks. I would be happy to --

MR. SHAPIRO: Why didn't you say that indoor radon is beyond your consideration rather than saying you are talking the EPA limit?

MR. MECK: I guess that would be more accurate.

MR. MOELLER: Any comments? Bill?

MR. HINZE: I would like to back to the search for the warm fuzzy feeling that Martin was trying to get and the existing criteria comparison, particularly the use of DOE and EPA codes.

Could you tell us how you are going to use the results of testing and the comparisons of other codes, how you are going to use that during this comment period? What significance are you going to place upon the comparison, and at what point will you accept the fact that there is a good comparison, excellent comparison or poor comparison.

In a quantitative way, I would think that the use of these other computer codes could be of significant help in getting this warm fuzzy feeling about this, particularly if there are different assumptions and different parameters, different characterizations of these codes. How are you going to use these codes?

MR. MECK: Certainly, if there are different assumptions and parameters, if you started coming out with the same answers one way of interpreting that is that the codes were robust. Another way of interpreting that is maybe you were measuring the wrong thing. Of particular importance to us is the code, because the NRC has issued a policy that they would use that code.

MR. HINZE: Which code is that?

MR. MECK: The impacts BRC code. They would use that to evaluation petitions with regard to exemptions of certain waste streams. It is important to us to know that we are internally consistent within the Commission. If we are not consistent, then we should know why and where the

differences are.

MR. HINZE: How good is consistent, 10 percent, 100 percent, 500 percent? I have seen quite a variation in these numbers that you presented between your option one and your results of using the present code.

MR. MECK: Consistency ultimately, as you realize, is going to be a judgment call.

MR. HINZE: Amen. But you have to have some kind of quantification to that comparison so that people can believe in the results of the work.

MR. MECK: That is right. I believe that the limits themselves that come out with the various codes will manifest that quantification.

MR. STEINDLER: I have a couple of questions. Again, back in the back end of this appendix or whatever it is that I quoted from before, there is a statement in here that irrigation of the site with contaminated groundwater is not considered to avoid counting the inventory twice.

Does that imply that the biologically -- the agricultural pathways that are truncated in comparison to what NCRP normally uses?

MR. MECK: I am not sure about the last part of it with regard to the NCRP. Basically what the statement means is, you can't have the same radioactive nucleus up in the plant in the residential scenario where agriculture and down

in the groundwater at the same time. It can't be counted in both places at the same time. That was the rationale.

MR. STEINDLER: Since this is a long term process, I am certainly prepared to transfer it or have an uptake which is more efficient through the groundwater irrigation scheme than it is by just simply sitting in the soil.

MR. MECK: This model is simply not that sophisticated.

MR. STEINDLER: The air goes up beyond even what the code uncertainty gives me, okay.

MR. SHAPIRO: I wanted to clarify one point here. It is my impression, and I thought the meat of your presentation is in appendix B which gives the basis for your modeling. It seemed to me that the modeling itself was done very simplistically, perhaps justifiably so. It is the type of thing that could be worked out very easily with a hand calculator.

On the other hand, where the code really comes in then is, you try to calculate dose by ICRP-30 or whatever. Once this stuff is in the air, which you have assumed is a very simple process, then you go through a very complex process to see how it gets to all the organs and you multiply it by all the weighing factors, K-schemes, energies and all that; is that right?

MR. MECK: Right. As a matter of fact, it is

important to us that the codes be accessible to the technical public. It is a PC -- personal computer science code. It is publicly available, and your comments with regard to the complexability --

MR. SHAPIRO: It has two parts, a very simplistic and a very tenuous, very vulnerable part which is perhaps your major term. Then the health physicist takes over and does a great job making a very complicated dose calculation for which you need your calculator; is that so?

MR. MECK: I don't think I would put it in quite those terms.

MR. MOELLER: Go ahead.

MR. STEINDLER: I have one other question. If your 10 millirem doesn't hold up and somebody drives you to two, are most of your tabulations linearally downgraded by that factor of five?

MR. MECK: Yes. The only one that is not linear is not that complicated, and that's the drinking water. That has some exponents in it.

MR. MOELLER: I wanted to make a comment, and then we will decide what you need from us and what we can provide. There has been a lot of discussion of radon, and I was sitting here thinking. Just for the record, I would like to give some numbers, because we have thrown a lot of numbers around here. The EPA remedial action level that

they have suggested or that is currently in use is four pico curies per liter inside of buildings. If you convert that to radon decay product concentration assuming the decay products are at 50 percent equilibrium, that comes out as I recall about 0.02 working levels.

If you are exposed inside your home for one year to an average product concentration of .02 working levels, you will receive an integrated dose for exposure of one working level a month per year. Now, an exposure of one working level a month or an integrated exposure of that amount will give your lungs or calls your lungs to receive between 12 and 14 rem. That is from NCRP report 77 and 78.

A lung dose in the range of 12 to 14 rem converts over using ICRP weighting factors to an effective dose equivalent of 1,000 millirem. It happens that one working level a month gives one rem, which is wonderful that mathematically it came out that way. When the NCRP goes further in report 93 or 95 whichever one it is and gives the annual dose to the average member of the U.S. public to radon and radon decay products and says it's 200 millirem, then they are saying that the average radon concentration in the average home in the U.S. is something in the order of 20 percent of four pico curies per liter. It comes out, at least on the basis of the NCRP estimates to be a little less than one pico curie per liter.

Having said that, the next question is what do you need from us?

MR. MECK: We certainly appreciate technical comments where we need to improve or elaborate on the technical basis report. Similarly, for the interim criteria.

MR. MOELLER: You would like comments on the NUREG document and on your criteria. The criteria, I presume, include the 10 millirem number or more the subconversion numbers.

MR. MECK: I am not sure what you mean by that.

MR. COOL: The interim criteria document is based upon the technical basis document and assumes the Commission's exemption policy value of 10 millirem, which of course the Commission has not made a decision on.

MR. MOELLER: Is the 10 millirem part of what you are asking us to comment on, or is it mainly the interim criteria based on the 10 millirem?

MR. COOL: The interim criteria are based upon that 10 millirem value of the exemption policy. The staff deliberately divided the effort into two phases. One, a technical bases modeling approach which had unit concentrations as you discussed before I got here I suspect, so that it would be independent of the dose value selected.

MR. MOELLER: Sure.

MR. COOL: The second phase, which takes that basis and moves onto a dose value based upon the exemption policy, we are currently in the process of office concurrence on the interim criteria assuming the position which was sent to the Commission in the paper which you reviewed at your last meeting. We anticipate that we would go forward, and your comments as part of that would be appreciated as we go up to the Commission with this document.

MR. MOELLER: I was going to say that we may be commenting on the overall policy statement on exemptions from regulatory control. You, I gather were out of town Don, but yesterday when we met with the Commission that was one of the topics they asked us to discuss with them.

MR. COOL: Yes.

MR. MOELLER: Whether we comment separately on the decommissioning criteria and then on the total thing, to me it would be one big package. I think that if we could, we really ought to consider the entire subject. I would prefer that we consider the entire subject and comment on it in a month or two. If that timing or that schedule is not compatible with your needs, we need to know that.

MR. COOL: I cannot speak for the Commission in terms of their timing on the decision on the exemption policy itself. Before the Commission, it really is in

essence two separate actions because they already have before them the exemption policy which they discussed with you yesterday. They do not yet have before them the residual contamination criteria package.

It had been our original schedule and intention that we would have that to them within another two to three week period so that they would have that available. Whether or not that reached the Commission before their decision on the exemption policy was not particularly a driving force, recognizing that if the Commission had already made its decision on the exemption policy. The second piece would be the next step. If they have not yet made the decision, then it would be the Commission's option whether to consider them together or whether to consider them sequentially.

Comments with regard to the exemption policy of course right now are to the Commissioners. They have that particular package. Comments on the residual contamination criteria to some extent are still to the staff. We still have that package in office concurrence. The technical basis document NUREG, we have published for public comment. So, we are in that process which would extend for several months now, which is somewhat independent of what the Commission decides to do with the exemption policy itself or the residual contamination criteria deriving from it.

MR. MECK: Because the interim criteria are -- as

we have mentioned before, it is somewhat separable from what ultimate level the Commission comes out with. That is under controversy. The other point that I would like to reinforce that Don made is that the technical basis document is out for public comment. We would like to provide the licensee with a technical basis at an early date. There is nothing other than conscience that is driving that.

It is out for public comment, and I would regret seeing that -- comments on that document getting entangled with something the Commission may find thornier and delaying your comments on that document when the licensee is looking forward to getting that kind of information.

MR. STEINDLER: Let me make a couple of comments. I think we ought to separate that which we have already commented to the Commission on from this issue. A close reading of the transcript might give you some clues as to what you might think about in terms of changing, improving, or otherwise modifying the PNL document.

MR. MECK: Yes, indeed.

MR. STEINDLER: I have to admit that a moderately significant error in the document that Don uncovered which I missed completely doesn't give me a warm feeling about the rest of this technical basis document, because it is the same outfit I presume that did the work. I would suggest that needs a fairly careful review, including typographic

errors which are in that --

MR. MECK: You are referring to the conversion factor that was mentioned early on?

MR. STEINDLER: Yes, the conversion factor issue.

MR. MECK: Yes.

MR. STEINDLER: The other point is, the document which is the enclosure -- I am going to find the number on that yet -- the enclosure one I think it is, the enclosure one to this draft that you were going to lay on the Commission probably generates as many questions if I can take the liberty of guessing what the Commissioners are going to throw at you, as it gives answers. In various places I would guess again, you might be able to extract out of the transcript here some areas where you might want to review that document and see whether or not you can amplify.

Finally, because what you are going through here is the presentation for what I call an irreversible long term process, I think the soundness with which these data are laid on the world at large, this fuzzy feeling that I keep looking for, that is missing. At least it might be considered as a charge to the contractor to see whether they can't find some information in the literature to back up the quality of their modeling.

MR. MECK: Yes. Thank you for your comments.

MR. MOELLER: To try to bring this to closure, let

me offer some comments. First of all, in the draft SECY document, which I presume that would become to the Commissioners translating or transmitting this item to them, I had problems in reading some of it. But now that I have heard the presentation, it is not -- many of my questions have been answered. However, on the last page, page five of the proposed SECY document in the last full paragraph before the paragraph on coordination, the first sentence is okay. It says calculations using thus and so yielding an annual TEDE of 13.5 millirem per year.

Then the next sentence says for a reference, the average radium 226 concentration in U.S. soil is 1.4 pico curies per gram period. Then, let's look at the next sentence. While the median concentration of radon 222 in U.S. homes is approximately one pico curie per liter, comma, and the resulting average annual effective dose equivalent radon and its daughters is approximately 200 millirem per year, what is the sentence -- period.

What happened is, your while should not have been a capitol W. I think the while -- it should have been a comma in line five after 1.8 pico curies per gram comma, little W, while blah, blah for the rest of it. Am I correct?

MR. MECK: That is correct.

MR. COOL: I suspect you are correct. Obviously,

we are in the process of development. We got you a draft. At the state it was at by no means perfect, and as you have pointed out there are glitches yet. This is something which we came to brief you on. As we were in the process of preparing it, thank you for finding some of our glitches.

MR. MOELLER: I want to say, and this is a constant problem is the wrong word, because I don't want to cite it as a problem. We encourage you to come down and meet with us while you are still thinking through the process, and we encourage you to give us working papers. Above all, we would like to avoid coming back at you and condemning you for doing what we ask you to do; that is, come out in draft and share it with us.

So, we compliment you on that. I think too, the Committee have to wipe out of our mind -- it is almost like a jury trial where the judge instructs you to ignore certain statements, you never heard them. In a sense, you should ignore that these conversion factors are wrong, because they are not in the NUREG document. They are wrong, and they knew they were wrong before they even came down here.

Maybe it would have helped us if you would have put a big black X over those pages. Several of us stewed over them and said good grief, how can this be so. We should wipe that from the record. Well, if I do all of that, then I find that the things we would need to comment

upon I gather are the following; the 10 millirem per year and let me just throw out my own thinking on that. It doesn't trouble me because we have consistently said in our commentary on the old BRC what was called the BRC policy, we had commented that we could accept up to 10 millirem a year.

Particularly here where you have a source that isn't -- here Martin is saying that it is an irretrievable commitment and so forth, and he is correct. It is not a source that is open to millions of people you know, it's a few hundred and don't hold me to those numbers. It is a limited number of people that can even have access to these decommission facilities and be exposed. Indeed, it is a irretrievable commitment, but is mostly cesium and cobalt and maybe some strontium. They are going down by one-half in every generation and the cobalt much more rapidly.

I guess going on from there, we could offer some comments about the NUREG document because that is the modeling through which you are coming up with specific numbers which yield that 10 millirem. We could say how well validated, verified, et cetera are these models. My presumption is there are books of data somewhere where they have tried to verify them. What else could we do?

On the surface contamination limits, I just don't know. Don?

MR. ORTH: There is something that would have

helped for the interim guidelines in here. Let me think a minute about the best way to say it. We refer in the sections on allowable limits of contamination for building volume sources and building surface sources. We refer to the models and say okay, the models are where they are derived from. If you are just going to hand this out to somebody like me, it helps if you say why are there large differences by the order of factors of 100 in individual radio isotopes.

For example, if I am measuring at a distance of so far, obviously I am going to get the same reading for vastly different amounts if I have something like cobalt 60 with a penetrating gamma and something with a range of beta that is only so far. Some kind of an explanation of why there are these large factors, very brief just somewhere in here, rather than just saying we get it from the models. It would help a lot in interpreting why there are, as I said, cobalt 60 has 12,000 per square centimeters and something else has hundreds of thousands if not a million, et cetera.

MR. MECK: Okay, thank you.

MR. SHAPIRO: I have one comment. It is true that many of the numbers here are very close or within a factor of two of 1.86. That is helpful. If you look at tritium, you have 86 million DPM per hundred square centimeters. You look at P-32 and it is 540,000. These are numbers the

Commission is saying are okay. You go down the line and in many cases you are talking about millions and hundreds of thousands of DPM per centimeters.

When REG Guide 1.86 was developed, they went through this same process. You do on the basis of dose considerations, you can come up with some very high allowable numbers. The Committee at that time decided that it is useful to put a cap on your numbers because it is easy to -- you don't have to live with 100 million or a million DPM of tritium. It will clean up. In fact, you will probably never find it.

I would suggest very strongly that you think some upper limit on these things that is a practical limit which is on the basis of 1.86, and put a cap on it. Otherwise, I think some very good work that you have done is going to be washed out by people who are just going to look at these high numbers and say what are you guys trying to do?

MR. MOELLER: You are saying the same philosophy here, that ICRP put a cap on the dose.

MR. SHAPIRO: They should put a cap.

MR. MOELLER: To individual --

MR. SHAPIRO: The cap is very high --

MR. MOELLER: That is a thought. Are there any other comments?

MR. STEINDLER: Essentially in lieu of writing all

that stuff down, you can probably get this out of the record. It is necessary somewhere to comment on the question, how do know the generic models you are using have any validity in the real world.

MR. MECK: Yes, I remember that discussion that we had.

MR. STEINDLER: Okay.

MR. MECK: I appreciate that point.

MR. STEINDLER: We also I think we need to -- let me reemphasize that. The assumption buried in here that the models are all conservative and therefore, if you don't run up to 10 millirem on a particular calculation you don't have to do anything else. I think you need to at least address that issue in some fashion or another to be more convincing.

MR. MECK: Could you elaborate on that, because the way that --

MR. STEINDLER: Somewhere in here --

MR. MECK: No, I understand what you are saying. How to be more convincing -- what instantly pops into mind is going through all 200 nuclides and somehow measuring that --

MR. STEINDLER: Oh, heavens no. I think it is a model issue. I would guess that if you can convince me that the models are sufficiently useful in the generic sense and the translation between the generic model and the real

world, then you ought to be able to ask the question, is it valid to say --let me quote you back from your own -- we are in the draft SECY document on page three of the first paragraph.

Rather than quoting it to you, let me suggest that you read that over. The issue is really set in that first paragraph when you say if the generic models encompass a specific circumstances, then compliance for decontamination can be achieved by verifying measurements not yet identified how it is done, and sampling of residual levels of less than generic release levels. That is the issue.

If they are less than generic release levels and you go away and everything is fine, that assumes that the model in fact will only give you a conservative answer.

MR. MECK: That's right.

MR. STEINDLER: It may not. You have to I think someplace, you have to at least recognize that it is a possibility. I am troubled by the 10 millirem, and I am troubled by it not because you can argue with it in a quantitative way. Our discussion on the old BRC, however you want to call it these days, in a sense says that if I have a landfill into which I have thrown material below regulatory control, I now have two or more sources of uncontrolled formerly controlled sources that I have to worry about.

If I am already up to 10 on the basis of what you have allowed this residual contamination level to do for me in a building and I now add the landfill, then I am exceeding what I think is the normal likely practice. I guess what I am saying to you is, if the Commission is willing to accept more than 10 millirem per year for the most exposed individual in uncontrolled situations, then you can get away with it. If 10 is a cap of some fashion or another, then you folks who have just decontaminated a facility don't stand alone. There may be other sources of purposeful exposure that you have to factor into that.

That forces somebody to drive that limit down. In that sense, I think this limit doesn't stand by itself.

MR. MOELLER: There is a comment on that, and that is that the Commission asked us to use 10 millirem.

MR. STEINDLER: On that basis, my suggestion is ignore my comment but it will come up again.

MR. MECK: We are not in a position at this time to go to the Commission and use another --

MR. STEINDLER: I understand, and I wouldn't want you to do that. The other comment is that it is my understanding that the 10 millirem is a floor rather than a ceiling, and it is a floor for ALARA.

MR. STEINDLER: We could have a long discussion on the subject, and this is not the time to revisit that one.

There are some transcripts available on that discussion.

MR. COOL: If I could elaborate on that, you asked the question whether the 10 millirem was a cap. In the staff papers which we have sent up and which you have reviewed, I will point out that we have deliberately not used the word limit. We have used the word criterion. It was out expectation that was a decision point as to whether or not an exemption could be granted but not a cap above which an exemption could not be granted.

There would be circumstances where you could be above 10 millirem and be in the exemption situation.

MR. STEINDLER: Yes.

MR. COOL: It is a boundary line of decision making process, if you will, not a cap. The staff has characterized it to the Commission.

MR. STEINDLER: Let me not prolong the discussion. All I guess I am saying to you is, your activity provides a potential dose to the exposed individual which doesn't stand alone or which may not stand alone, especially if there is a significant implementation of the BRC issue. That is all I am saying.

Whether the thing is the 10 cap or 10 limit, it doesn't make any difference. I have already mentioned the fact that I think it is necessary for you users of this exercise to know what the assumptions are, so that they can

determine whether or not their particular facility falls under the models. I think that is all I would have. That is all I would add.

MR. MOELLER: To help wrap this up, and you have already said it but let me try to get out of it, do you need a letter? In other words, can you review the wrap up which we have just gone through, and will that suffice for you to move ahead? Or, does your procedure for moving forward make it essential that you have a letter from us?

MR. COOL: I do not believe that I would have to have a letter from you. As we had characterized it in the draft which you have, we were going to indicate to the Commission that we had met with you. But we will certainly go back and take into account what we have discussed here, and see if we can't improve it and come back in a little while and be able to discuss it some more after the Commission has met.

I do not feel the necessity of having a letter. If you wish to send the Commission a letter with your expressed viewpoints, certainly you are welcome to do that. We will go back and start working on this yet this afternoon.

MR. MOELLER: I would prefer that we not send a letter because we really don't have the time today. We are finishing today, and we really don't have the time to give

it the careful thought that it needs. I would hope that in the transcript and in our summary that we have just gone through that you have what you need.

MR. SHAPIRO: I did have one more comment. Nowhere in your document do you talk about WIPES, which is keeps us health physicists busy most of the time. Do you feel that WIPES are not important for looking at the release of the facilities, or is there some other place where you talk about that?

MR. COOL: The document which you got and the technical basis document do not in any sense get into how go about demonstrating compliance with those numbers. Some of those numbers are per hundreds per square centimeters which is one whole set of tables. I would fully expect and hope the physicists would still be out there with their packets of one inch and one-quarter filter paper taking WIPES just as they will also be out there with their meters.

That is a subject which is also going to have to be addressed, but was beyond as we viewed it at this point, the effort of attempting to get the numbers.

MR. MOELLER: With that, let me thank the staff, and particularly our speakers Mr. Meck and Dr. Cool for making a rather strenuous extra effort to be with us this afternoon.

With that, let's take a 15 minute break. I will

declare that the formal portion of our meeting is over. The Committee will resume and open to the public, in Executive Session to wrap this meeting up. Thank you.

[Whereupon, at 3:30 p.m., the hearing recessed.]

REPORTER'S CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission

in the matter of:

NAME OF PROCEEDING: 17th ACNW Meeting

DOCKET NUMBER:

PLACE OF PROCEEDING: Bethesda, Maryland

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

Mary C. Rosenberg

Mary Rosenberg
Official Reporter
Ann Riley & Associates, Ltd.

PRESENTATION TO
USNRC
ADVISORY COMMITTEE ON NUCLEAR WASTE

FEBRUARY 22, 1990

BY

WILLIAM P. DORNSIFE
CHIEF, DIVISION OF NUCLEAR SAFETY
PENNSYLVANIA DEPARTMENT OF
ENVIRONMENTAL RESOURCES

CREDIBILITY

STATUS OF DESIGN SELECTIONS

HOST STATE	OPERATOR	DESIGN
CALIFORNIA	US ECOLOGY	ENHANCED SHALLOW LAND BURIAL
TEXAS	LLRW AUTHORITY	CONCRETE CANISTER BELOW GRADE VAULT
NEBRASKA	US ECOLOGY	ABOVE GRADE COVERED VAULT
ILLINOIS, NORTH CAROLINA & PENNSYLAVANIA	CNSI	ABOVE GRADE COVERED VAULT

PENNSYLNANIA LLRW DESIGN CRITERIA

DESIGN GOALS

- WASTE ISOLATION FOR HAZARDOUS LIFE
- PROTECT PUBLIC, WORKERS AND INTRUDERS
- PROVIDE ADEQUATE MONITERING
- FACILITATE WASTE RECOVERY
- SPECIAL CONCERN WASTES

WASTE ISOLATION

- ENGINEERED BARRIER (ABOVE GRADE)
- STRUCTURAL STABILITY
  - CLASS A-100 YEARS
  - CLASS B-300 YEARS
  - CLASS C-500 YEARS
  - MIXED WASTE-500 YEARS
- LEAK RESISTANCE FOR 100 YEARS
- ENGINEERED COVER REQUIRED
- INDEPENDENTLY SATISFY PERFORMANCE OBJECTIVES
- GOAL OF PREVENTING CONTACT OF WATER WITH WASTE

PROTECTION OF HEALTH & SAFETY

- ZERO RELEASE GOAL
- LICENSEE-DESIGNATE HAS COMMITTED TO ADMIN LIMIT OF 10% OF PART 20 LIMITS
- INTRUDER BARRIERS REQUIRED
  - CLASS B-300 YEARS
  - CLASS C-500 YEARS
  - MIXED WASTE-500 YEARS
- INTRUDER ALARA GOAL OF 25 MREM/YR

ADEQUATE MONITERING

- MATERIALS MONITERING
- DISPOSAL UNIT MONITERING
- ENVIRONMENTAL MONITERING PROGRAM
- INDEPENDENT ENVIRONMENTAL AND HEALTH MONITERING

WASTE RECOVERY

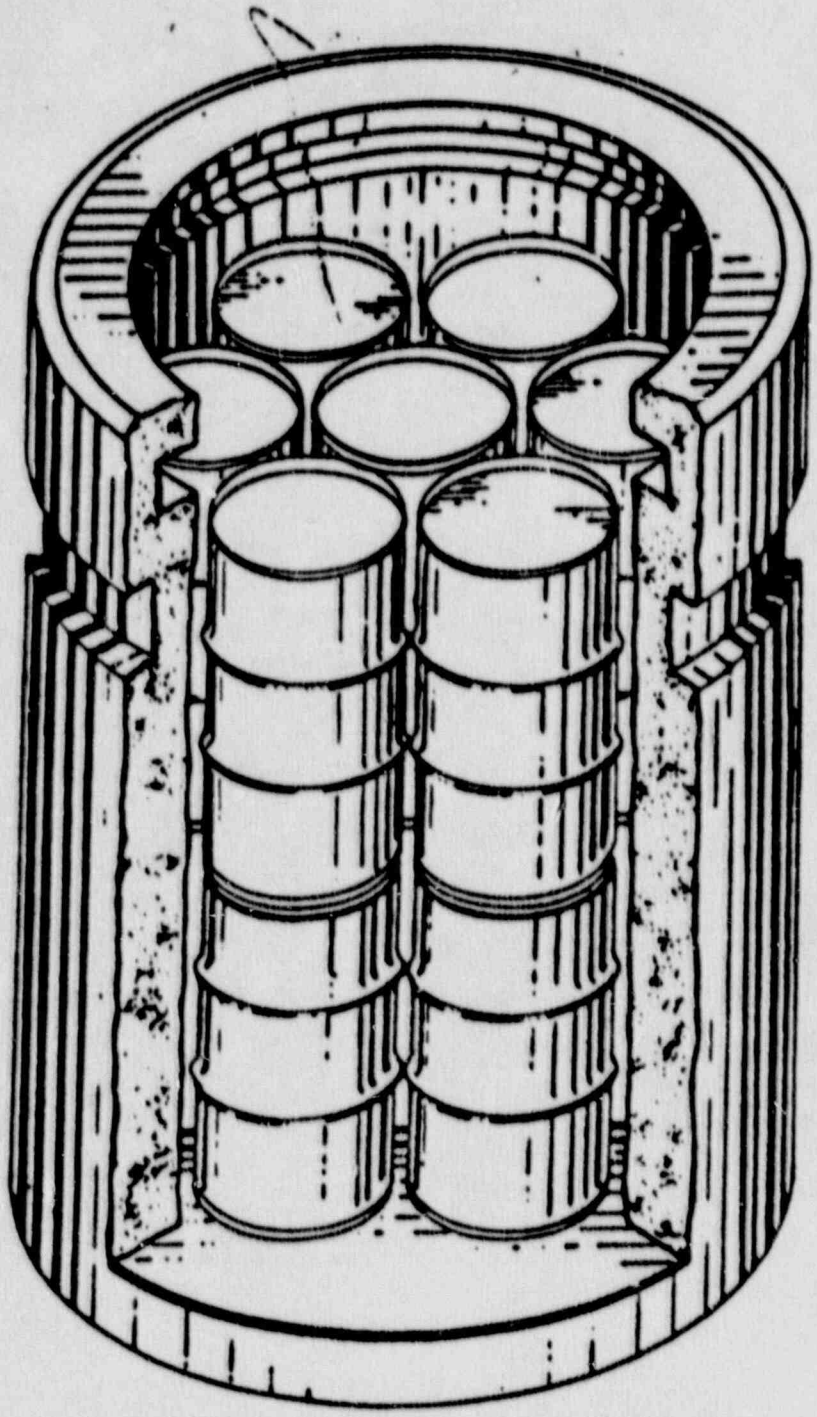
- DESIGN MUST ALLOW FOR RECOVERY
- CONTINGENCY PLAN REQUIRES REMEDIAL ACTION AND WASTE RECOVERY
- MUST BE COORDINATED WITH MONITERING PLAN

SPECIAL CONCERN WASTE

- CLASS C AND MIXED WASTE DISPOSED IN SEPARATE MODULES WHICH ARE INDIVIDUALLY MONITERED AND RECOVERABLE

- DISCRETE *NARM* WASTE ACCEPTED
  - -100 nc/gm UPPER LIMIT
  - -WILL HAVE 2 nc/gm LOWER LIMIT
  - -CONCERN WITH DISPOSAL OF GREATER THAN CLASS C *NARM*

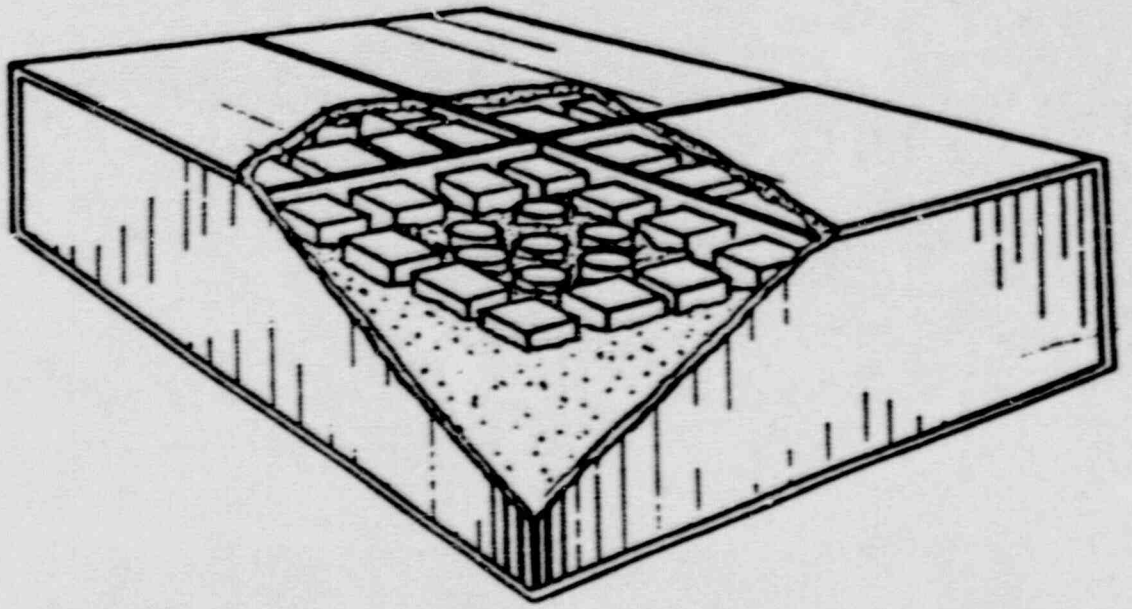
FIGURE III-7.1.3
CYLINDRICAL OVERPACK



CONCRETE OVERPACKS
(Drums or Cask Liners)

All waste will be placed inside concrete overpacks and sealed with grout.

FIGURE III-7.1.4
CLOSED DISPOSAL UNIT (WITH 4 MODULES)



CLOSED DISPOSAL UNIT (WITH 4 MODULES)
Filled units will be backfilled with sand and sealed with a concrete roof.

DESIGN TECHNICAL ASSISTANCE NEEDS

- DESIGN GUIDANCE AND SRP'S FOR ABOVE GRADE COVERED VAULTS

- DEVELOPMENT AND VALIDATION OF DESIGN PREFORMANCE ASSESMENT CODES

SOURCE TERM PROBLEMS

- LEACHING SOURCE TERM BIGGEST *PA* UNCERTANITY
- I-129 OVERESTIMATED
- C-14 PATHWAYS
- NEED FOR UNIFORM MANIFEST
- PERMITTING AND INSPECTIONS

MIXED WASTE

- COMMERCIAL MIXED WASTE GENERATION SMALL AND CAN BE FURTHER MINIMIZED
- LAND BAN CREATES STORAGE AND TREATMENT PROBLEMS
- INCONSISTENCIES DO EXIST BUT DUAL REGULATION IS WORKABLE
- SPECIAL CATEGORY WASTE

BELOW REGULATORY CONCERN

- SEPARATE WASTE FROM OTHER BRC ISSUES
- 1-4 mrem/yr MORE ACCEPTABLE TO PUBLIC
- REACTOR WASTE DISPOSAL IN LANDFILLS
  - -DIFFICULT PUBLIC ACCEPTANCE
  - -ECONOMICS ARE QUESTIONABLE
  - -WILL MAKE NECESSARY WASTE STREAM APPROVALS MORE DIFFICULT
- CREATES COMPACT CONCERNS WITH WASTE DEFINITION
- NEED COMPATABLE AGREEMENT STATE REGS FOR IMPLEMENTATION

Residual Contamination Criteria
Technical Basis Report

- NUREG/CR-5512 - Residual Radioactive Contamination From Decommissioning
- Published January, 1990
- Prepared by Pacific Northwest Laboratory
- Describes the technical basis for translating contamination levels to Annual Dose
- Includes unit concentration values for 200 nuclides
- Includes soils and structures

Residual Contamination Criteria
Pathways

- Direct Exposure
- Secondary Ingestion
- Inhalation
- Food
- Drinking Water

Residual Contamination Criteria
Scenarios

- Structures
  - renovation scenario
    -- volume contamination considerations
  - long-term occupancy scenario
    -- thin layer (surface) contamination considerations

- Soils
  - residential use scenario
    -- surface soil considerations
  - drinking water use scenario
    -- total activity considerations

Residual Contamination Criteria
Flexibility

- Licensees may propose alternative scenarios or model parameters on a site-specific basis
- NUREG/CR-5512 provides a description on how to use the tables and how to modify the model parameters

Residual Contamination Criteria
Application

- Interim criteria would replace the table in Regulatory Guide 1.86 release of structures
- Interim criteria would replace the values in Option 1 of the Fuel Cycle Branch Technical Position for Uranium and Thorium in Soil
- Option 2 of the Branch Technical Position would remain unaffected by the interim criteria

Residual Contamination Criteria
Limitations

- Does not apply to burials of radioactive material on a site
- Does not explicitly include consideration of indoor radon
- Does not include consideration of tools or equipment which could be reused or recycled

Residual Contamination Criteria
NRC Staff Plans

- Publication of NUREG/CR-5512 for public comment
- Preparation and publication of interim criteria based upon NUREG/CR-5512 and Policy Statement on Exemptions from Regulatory Control
- Initiation of rulemaking to codify dose criteria for unrestricted release following decommissioning
- Analysis of comments on NUREG/CR-5512 and interim criteria
- Development of final NUREG and Regulatory Guide

INTERIM RELEASE CRITERIA

Major Features

- Based on Commission Policy Statement and Applied to Soils and Structures
- Generally Less Restrictive than Existing Criteria
- Permits Direct Measurement of External Dose Rate
- Permits Site-Specific Modifications
- Adopts EPA Standard for Radium-226 and Daughters in Soil

INTERIM RELEASE CRITERIA

Based on Policy Statement

- Commission Policy--10 mrem annual TEDE
- Technical Basis--NUREG-5512
- Consideration of:
  - -Direct Measurements
  - -Site-Specific Modifications of Model
  - -EPA Radium Standard

INTERIM RELEASE CRITERIA

Existing Criteria Comparison

- Regulatory Guide 1.86
- Branch Technical Position, Option 1
- Need to Compare with Other Computer Codes

INTERIM RELEASE CRITERIA

Existing Criteria Comparison

NUCLIDES	REG. GUIDE 1.86	NUREG/CR
U-NAT, U-235,U-238	5,000 alpha	4,000
Ra-226, Th-230, I-129 Ac-227, trans-U	100	>190
Th-NAT, Sr-90, I-131 Th-232	1000	360--43,000
Beta-Gamma Emitters	5,000	Co-60 12,000

All numbers are dpm per 100 square cm

INTERIM RELEASE CRITERIA
Branch Technical Position, Option 1

NUCLIDE	BTP, OPTION 1	NUREG/CR-5512
Th-NAT	10	10
U-NAT	10	150

All Units Are pCi/g of Soil

INTERIM RELEASE CRITERIA

Direct External Measurements

- 5 uR/hr Above Background at 1 meter
- Applies Only to External Component of TEDE
- External Exposure Pathway Dominates for Numerous Nuclides

INTERIM RELEASE CRITERIA

Site-Specific Modifications

- Assumed Physical Parameters
- Scenario Parameters
- Example Modifications are in NUREG/CR-5512

INTERIM RELEASE CRITERIA

EPA Standard for Radium-226

- 5 pCi Radium-226 per gram of soil (averaged over the first 15 cm)
- NUREG/CR-5512 Does Not Account for Indoor Radon

INTERIM RELEASE CRITERIA
Limitations

- Beyond the scope of consideration are:
  - ✓Buried radioactive material on site
  - ✓Indoor radon
  - ✓Reuse or recycling of tools and equipment