ORIGINAL ACNWT-0082

OFFICIAL TRANSCRIPT OF PROCEEDINGS

Agency: Nuclear Regulatory Commission
Advisory Committee on Nuclear Waste

Title: 62nd ACNW Meeting

Docket No.

LOCATION: Bethesda, Maryland

DATE: Thursday, March 24, 1994 PAGES: 304 - 460

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PUBLIC NOTICE BY THE

UNITED STATE NUCLEAR REGULATORY COMMISSION'S

ADVISORY COMMITTEE ON NUCLEAR WASTE

DATE: March 24, 1994

The contents of this transcript of the proceedings of the United States Nuclear Regulatory Commission's Advisory Committee on Nuclear Waste, (date) March 24, 1994, as Reported herein, are a record of the discussions recorded at the meeting held on the above date.

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UNITED STATES NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON NUCLEAR WASTE

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62nd ACNW MEETING

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Nuclear Regulatory Commission
Conference Room P-110
7920 Norfolk Avenue
Bethesda, Maryland

Thursday, March 24, 1994
8:30 a.m.

MEMBERS PRESENT:

MARTIN STEINDLER, CHAIRMAN
PAUL POMEROY, VICE-CHAIRMAN
WILLIAM HINZE, MEMBER
JOHN B. GARRICK, MEMBER
KENNETH FOLAND, MEMBER

PROCEEDINGS

[8:30 a.m.]

MR. STEINDLER: The meeting will now come to order.

This is the second day of the 62nd Meeting of the Advisory Committee on Nuclear Waste. During today's meeting, all the sessions will be open, except for a closed meeting on new membership which will be held, I am suggesting it be held this noon and if we have lunch brought to the table, we can work through the noon hour, I think, because our schedule is fairly tight and we want to leave early.

But today the committee is going to meet with the Director of NRC's Office of Nuclear Materials Safety and Safeguards to discuss items of mutual interest. We are going to review the staff technical position, fault avoidance. We are going to hear a summary of the March 8th and 9th meeting of the Nuclear Waste Technical Review Board Panel on Structural Geology and Geoengineering, Probablistic, Seismic and Volcanic Hazard Estimates.

We are going to hear a report and hold some discussions on the meeting of the working group that we had two days ago on low-level waste performance assessment, and cover other items of additional business, anticipated and proposed committee activities, future meeting agenda,

administrative matters, and some of the letter reports that we are preparing.

Howard Larson down at the end to my right is the Designated Federal Official for the initial portion of the meeting. This meeting is being conducted in accordance with the provisions of the Federal Advisory Act, and a notice of the meeting was published in the Federal Register.

We received no written statements or requests to make oral statements from members of the public regarding today's session. It is requested that each speaker use one of the microphones, identify himself or herself, speak with sufficient clarity and volume so that he or she can be readily heard.

Let me again provide an announcement that the Advisory Committee is scheduled to move to Two White Flint North Building during the week of June 13th and 17th. The public and all of us, I guess, are reminded to pay close attention to meeting locations for these meetings from June until the logistics of this move, including support services, are fully established at the new location. The Two White Flint North Building is fairly conveniently served by the metro station, but we may be meeting somewhere else. So I would have you pay close attention to where we are meeting, perhaps at hotels or conference centers until everything is operational. Those of you who have worked

with movers and Federal governments combined should appreciate this whole thing.

Are there any additional comments that any of you have this morning?

[No response.].

MR. STEINDLER: This morning then, without further, let me introduce Bob Bernero who is standing by here and going to talk to us on a number of subjects, including a paper on the societal pledge to future generations, perhaps a discussion of some of the new organizational issues, and National Academy Committee on the Technical Basis for Yucca Mountain Standards. Bob has indicated that he is willing and certainly able to address some questions that we have.

Bob, it is a pleasure to have you here.

MR. BERNERO: Good morning, Marty, good to see you.

Let me take advantage of the opportunity to talk to you to add an additional subject. I have already had a handout there.

Marty, you and I met some weeks ago to talk about reorganization in NMSS of the components related to waste, and I would like to just explain that to the committee and give you these formal charts to help explain what we are doing. It is very important for you to understand that with

the Clinton Administration there is an Executive Order on how to deal with labor-management relationships. The buzzword of choice is "partnering." As a result, major organizational changes are made in a totally different way now than they were in the past.

[Slide.]

MR. BERNERO: As I go through and explain what we have done in this reorganization, you can understand how the system works now. Formerly, we would have for a division-level reorganization gone to the Commission and said, "Commissioners, this is what we want to do," and the Commission would say yes or no, and act on the general principles of agency function, and then the Executive Director for Operations would work with the staff in order that we have a final staffing plan, the exact details, who is in what job, and the Executive Director would approve that.

Then we would turn to the union and say, "Now let's talk about who sits where," and the space questions of office priority and so forth.

It is all different now. We go to the Commission, and I have already gone to the Commission, and we say, "This is the reorganization fundamental principle and structure." The Commission does not object to this reorganization. The Commission says, "Go thou and now partner with the union."

We have been partnering with the union for some quite a few weeks. We are essentially complete with that now, and there is a lot more on the table in this partnering with the union.

For instance, the union can question the adequacy of the organization management systems that apparently are going to be used, work prioritization, how many senior staff are in this organization versus that one, a lot of things that have previously been viewed as management prerogative only. That is fair game in this process.

I am happy to say the process is working very well. We happen to be the first major reorganization to go through the process de novo, that is, to come up fresh and go through the whole partnering process. It is not implemented yet, but I expect this week, or at the latest early next week, to sign the necessary memoranda that would go to the Executive Director and say, "Okay, we are going to go effective," and our objective has been to have the reorganization effective slightly before or coincident with our move into Two White Flint, and we are scheduled to move in two increments, the last week of April and the first week of May, end of the week that is. We will move into Two White Flint North at that time, and I expect that the reorganization will be effective before we make that move.

You may have heard that we had a target for April

3rd, but we are doing a sanity check today, even as this meeting goes on, to make sure that we don't generate three or four weeks of chaos by making the change effective too soon. I don't want people to move twice, obviously, so if we make it effective, it will be effective with everyone in their place.

[Slide.]

MR. BERNERO: Let me just briefly go through what has happened. You have the handouts so that you can have the names and the structure. This is the current division organization. Where is the wand, do you see it? There it is.

This is the current division organization. Remember, back in 1987 the then Division of Waste Management went into mitosis. It broke into the Division of Low-Level Waste Management and Decommissioning, and a Division of High-Level Waste. The present director, John Greeves, Mike Bell is the deputy, and we have three branches -- Low-Level Waste Management, Uranium Recovery and Decommissioning. Now you can recognize these are somewhat diverse functions. They are not as monolithic as the existing High-Level Waste organization.

Now, the Division of High-Level Waste Management, this is the existing, Joe Youngblood's division with John Linehan as his deputy, and this is much more a matrix

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organization, a project and QA function, Joe Holonich; hydrology and systems performance branch, Margaret Federline; and Geology and Engineering, Ron Ballard.

[Slide.]

MR. BERNERO: This function, I would just add as an aside, we have been moving people around from time-to-time on temporary assignments. Joe Holonich, for instance, is over in Low-Level Waste right now managing uranium recovery. This is very significant, as you will see when we go into the next organization.

The activities, I think you all know these but just to refresh your memory, High-Level Waste, the DOE Investigation of Yucca Mountain, basically a one-project organization; and I would add that we have a captive laboratory. Remember, we have the Center for Nuclear Waste Regulatory Analysis, and it is important to remember, I managed the Center for Nuclear Waste Regulatory Analysis out of my office, not out of the Division of High-Level Waste.

The director's office has PMDA, Project Management and whatever that stands for, but it is basically my office staff, and that is where I manage that center. It is a very large body of resources. We have now at the center over 50 professionals active, so this is a fair piece of change to pay for that, and we manage that out of the office, and will continue to manage it out of my office.

Low-Level Waste, basically Low-Level Waste is evolving to the point that NRC may not directly ever license a low-level waste disposal site. Historically, it is coming up that those that are developing are Agreement States. So we go into a technical assistance mode rather than a direct licensing mode on low-level waste.

Uranium recovery is a very active activity now because of the remedial actions. The uranium industry is not booming in the United States. It is heavily into remedial action, decommissioning and stabilization.

Last and certainly far from least, decommissioning is a growth business. We have a fair number of reactors -- excuse the typo, that is Shoreham -- in decommissioning, Fort St. Vrain and Shoreham are very well on the way toward decommissioning. These others are much farther behind. They are preparing.

We have the material sites in our SDMP, Site Decommissioning Management Plan, which is merely a way to extract material sites that are naughty problems and give them special attention.

[Slide.]

MR. BERNERO: Now here is our proposed division. What it is is just retracing the steps of 1987. It is to recombine into a single Division of Waste Management, just as we were before, using a structure of four branches. It

is much more a matrix organization similar to what we had before and, believe me, there may be some people here -- in fact, I know there are people here who are familiar with these experience of the previous matrix division, it can be a difficult thing to manage such a crew. So we are very cautious about how we are going to do this.

Basically, we have two project-like organizations, and two matrix technology or expertise center parts of the organization. Engineering and geology, similar to what we have had in High-Level Waste already; performance assessment and hydrology, again similar but now consolidating.

For instance, you are hearing during this session or this meeting this week on our low-level waste performance assessment. That is very important to us, not merely for performance assessment of low-level waste disposal sites, but for decommissioning sites, for being able to model what happens if radioactive material is disposed thus in the ground, in a concrete box, or whatever.

So performance assessment is very important, and this gives us a chance to consolidate it all where you change parameters, but modelling functions, techniques, analytical verification and validation, whatever, the principles are common.

Then the two project ones end up being a little bit -- at first glance, it may be peculiar, High-Level Waste

and Uranium Recovery. It was originally my thought to have High-Level Waste, Uranium Recovery and Low-Level waste all in a single because, basically, the principle at stake here re projects associated with long-range disposal. This other decommissioning is projects associated with short-range, a decade or so, remedial actions. The concepts, in my mind, were different.

For practical purposes, we decided to leave Low-Level Waste here, it was kind of equalization, but these are not such strange bedfellows, High-Level Waste and Uranium Recovery, because the basic function in uranium recovery is not the health physics of an operating uranium mill, it is a long-range waste disposal or waste stabilization concept, and the modeling thereof.

Basically, later on when we talk about the societal pledge, there are reasonable questions to say, "What are you doing and why are you doing it in uranium recovery, for instance, dealing with human intrusion." We kind of sweep human intrusion off the table in uranium stabilization in spite of the fact it has a very long time constant, so it does make sense, because of the principles, to have these two together.

John Austin is presently the Chief of the Decommissioning Projects Branch. Joe Holonich, I mentioned, is actually doing uranium recovery and goes back to High-

Level Waste by taking on that function. Margaret Federline already has Performance Assessment and Hydrology; and Mike Bell has long experience here for engineering and geology. I might add, some of you may remember that Mel Knapp and John Greeves both originally were in the original Division of Waste Management. They have long experience there. So I think I have a pretty good management team here.

Then one other name and function I want to mention, I mentioned it earlier, the captive lab. The Center for Nuclear Waste Regulatory Analysis is still managed out of my office. I have a Director PMDA now, Mel Knapp is that Director PMA, and he is the Manager of the Center. John Linehan, the Deputy Director of High-Level Waste changes hats with this reorganization with Mel Knapp, and John Linehan becomes the Director of PMDA, and therefore the manager of the lab. So we will continue to function that way, that the lab reports at my level, and this is the organization.

I expect that it will be effective in April, just before the move and, as a practical matter, coincident with the move. These are the benefits that we seek.

[Slide.]

MR. BERNERO: Basically, there is another Executive Order we are dealing with, too. It is called "streamlining," and there is a very strong pressure by the

Administration to have fewer supervisors per worker ratio. To have basically larger organizations with smaller or more streamlined hierarchy above them. Our agency is one that does have quite a few supervisors, you know, a lot more chiefs per indian than most people have.

I would add, I have been in the agency for more than 20 years and I have, I think, a useful historical perspective. One of the things that occurred in 1987 that I didn't particularly like was a division. In the NRC context, a division went from a major regulatory arena much more toward a small or truncated regulatory arena of responsibility.

In practical terms, prior to 1987, NRC had divisions that were as large as 200. There was one division in NRR that was over 200 people. The Division of Waste Management was over 150. I know I had two division in NRR myself that were over 150, or rather one was over 150 and one was a little under. They were major arenas, major levels or responsibility.

After 1987, we tended to have a lot more divisions and divisions had only a piece of the action, only a piece of regulatory responsibility. I think that hurt. I don't think that was a necessarily constructive thing.

It distributed the work and tended to split things up, similar principle or similar regulatory scope, and I

think this is a move back toward a larger more serious scope for a divisions.

The technical expertise to address waste management issues, believe me, for the years that I have been Director of NMSS -- for more than five years now -- it was a constant discussion.

Low-level Waste wants that hydrologist in High-level Waste, or High-level Waste wants that geologist from Low-level Waste or vice versa. There is a constant bi-play of we are all in waste disposal or waste management issues and wouldn't it be better if we had the synergism of having people consolidated.

Performance assessment is a very good area. We have a Low-level Waste Performance Assessment Plan and there is a High-level Waste Performance Assessment Team too. If you look at it you see the same names frequently. This is just a way to bring those centers of technical expertise together. I hope that we get a more uniform approach to waste management regulation as a result.

[Slide.]

MR. BERENO: With that, let me turn to the other subject. If there are any questions on this, I would be happy to respond.

The other subject is a catchy phrase: the societal pledge. That phrase -- I believe your interest

came because it was used it a speech to the National Academy of Science's committee on the waste standard.

What I am doing here today, I hope, is stimulating some thought. Marty called them questions. I would like to stimulate it more in the way of discussion. I do not have a fixed message or a fixed policy that I am here today to sell or to persuade the committee that this is what we should do.

I would like to start by asking the question, and I hope answering the question, what is the societal pledge, and use it to go into some rethinking. Not only of what are we trying to do with various standards for high-level waste disposal, or any other kind of waste disposal for that matter, but at the same time recognize and stimulate the committee's thinking on current events with respect to how waste management programs are being conducted.

We are right now in a state of flux, high flux, in the Congress, in the Administration, about what is happening in the waste management program in low-level waste and in high-level waste. I think this is a natural entree for us to talk about that, so let me see if we can walk through and stimulate and feel free to interrupt or interject.

First of all, lets go back for a moment and say what is the safety and environmental basis of contemporary activities.

[Slide.]

MR. BERENO: By contemporary activities I mean nuclear technology authorized to operate now or while I am alive or for the next three decades or something like that: the fuel fabrication plans, operating nuclear reactors, even spent fuel storage facilities.

Contemporary activities where the time scale is that we have a responsibility to our nation to say this dangerous thing can be authorized provided there is no undue risk to the health and safety of the public, and, of course, the common defense and security for those aspects that are pertinent.

We weigh those environmental impacts of: do we need it? What are the alternative for us? What is the cost benefit to us? And the "we" in "us" are contemporaries. It is this generation or this couple of generations of people. The time horizon of consideration is just that. It is a contemporary horizon.

On top of that, we have the principles of radiation protection. And you can go to the ICRP or wherever and this is the famous three principles, justification of practice, that don't do this, don't offer radiation exposure to people unless there is commensurate benefit to it. Justify doing it.

Don't make frivolous radioactive neckties that light up and glow and say kiss me or something like that.

Every once in a while we get an application for something like that and we say no. You know, it is not justified.

[Slide.]

MR. BERENO: Then the second principle is optimization or, more commonly in this country we call it, ALARA. That the radiation exposure should be a low as reasonably achievable in spite of the fact that we do have and should set safety limits. The safety limit implicitly is that level of radiation exposure to the public or to a worker that is tolerable, that is acceptable, that is an appropriate constraint.

Nevertheless, we have a focus to look below it. To be as low as reasonably achievable. There is a tenor to that that in a contemporary time scale perhaps the most dramatic example of it is air effluent of nuclear reactors. That you have a stack and you have certain gases coming out and certain particulate in the gas occasionally, and you can ask yourself: do I need a limit?

We did this with a regulation many years ago. Do I need a limit? Of course, yes, I have to meet that limit. That is in 10 CFR, Part 20. But now: are those emissions as low as reasonably achievable? And you can take the emissions and the intended dose projections and you can calculate: I can avert this much is I put in one more filter, and I know the cost of the filter, and the operating

cost and all of that. So I can say: what is the cost benefit of an incremental reduction in exposure for an incremental cost of equipment? An operating cost perhaps.

So I have a contemporary time frame. It is an exposure to the contemporary people, it is a cost of a contemporary people, and I have this concept of ALARA pretty well embedded in our regulatory system.

But I am emphasizing that this is all contemporary. It is not the time horizon of waste disposal going into many other generations.

MR. STEINDLER: Are you suggesting, Bob, that these are principles that should be followed or principles that are followed?

MR. BERENO: Both. I am saying that they are principles that are followed and should be followed for contemporary activities, and at first blush or first cut they should be followed for future activities, but we should think carefully about how they apply. How does ALARA apply to waste disposal?

MR. STEINDLER: Depending on what you do with them, I guess I would challenge you on the notion that we've justified all our practices.

The justification of the practice may well be written in the ICRP document and indeed it is. I am not sure that that is an issue that you can sustain too well,

but it depends a lot on where you are going to go with this argument.

MR. BERENO: We had a rather extensive debate with the Commission itself about five years ago. It is useful to reflect on that. The gemstones.

MR. STEINDLER: That's the one I had in mind.

MR. BERENO: Yes. Some of you remember or know that topaz is water white, aluminum silicate, as I recall. It is a nice gem but who cares? A water white, it doesn't have the luster of diamond. But if you put it in a reactor and put it in a neutron flux for a fair length of time, it turns a beautiful deep blue called London Blue, and it doesn't anneal out the color. You know, gems will anneal to neutral color with temperature. It doesn't anneal -- topaz anneals at 900 F or something like that. Not a likely temperature to reach on the human body if you wear it as jewelry or you will get it off pretty quick.

[Laughter.]

MR. BERENO: So the result is you got a nice, stable, very attractive gem. You can go down here to one of these discount jewelry houses and buy a really nice piece of jewelry for a modest amount of money.

The industry developed not a cottage industry. University of Missouri at Columbia, Missouri, is the principle manufacturer, if you would call it that, or

irradiator in the United States.

Then the Staff -- and I have to lay claim to being the Staff or one of the Staff that opposed it -- said: that's not justified, that's frivolous, that's jewelry, and we wanted to stop it. It actually grew and it became a retrospective: should we let the continue?

We had a debate with the Commission and the Commission said: no, license it; put the constraints on it to make sure it is safe, but license it. The Commission, in other words, made a decision. Now I would say: what decision did they make? Did they say you don't need to have justification? Or did they say that this benefit of human enjoyment of jewelry at reachable prices is the justification? That is not clear to me.

I, of course, followed. The Commission made a policy decision and the policy decision was authorize it and have the appropriate safety constraints. I made sure that the Staff did not do a pocket veto and say, okay, I'm going to make you count each gemstone 3,800,046 times to make sure it is not hot, and drive the price up so high that you won't make the darn things, you know. We did not do that. We did proper surveillance for a statistical counting and what have you.

So I would say I still believe in justification. The threshold of justification was moved in that case.

Let's talk now, rather than the contemporary activities, look forward to the future and waste disposal. I will just review, much of this has been discussed time and again. Just to refresh your memories, the alternatives for waste management and the focus here is essentially on high-level waste rather than all kinds of waste.

Space disposal: put it in a bucket, launch it on a rocket, and put it into solar orbit. It will go into the sun and fuse with the rest of the stuff or be completely vaporized and become part of the solar wind. It has no risk legacy to succeeding generations on this planet. You know, it is virtually off the screen and that is the great advantage of it.

However, if you have ever looked at it closely -- and I have spent a fair amount of my career in space nuclear work -- the current risk is non-trivial especially if you look at the quantities and the packaging.

We can safety launch radioactive material on the end of a hot rocket, but it is not a lot. It is kilogram quantities; not metric ton quantities. And it requires very elegant packaging for safety. Very high cost associated with that.

The deep sea bed disposal, one need only mention the London Dumping Convention. There is an international sentiment against dumping the sea that is

very, very strong. The United States used to dump at sea. Other nations still do dump at sea. The former Soviet Union still dumps at sea and there is a great uproar about it.

Nevertheless, if you look at it technically -- and some of the finest technical speeches I've ever heard have been on the subject of deep sea bed disposal, really hypnotic. You know, if you go out to the Abyssal Plain and get a long tube with a nice sharp point full of dense high-level waste and you drop it, and it goes down, it goes into the silt, and it is virtually removed from the biosphere for many, many half-lives. It has a minimal risk legacy, technically. Technically it has. It is quite defensible.

It is quite possibly irreversible. You know, this generation makes up its mind and says I am going to drop it, and you would be hard put to cruise out in the refurbished Glomar Explorer to the Abyssal Plain and grapple down there trying to get those things back if you ever try to change your mind. They are pretty hard to locate.

The geologic disposal, which virtually every nation in the world in this owner's group of people who have high-level waste, virtually every nation has a reasonably active program aimed toward geologic disposal. The risk legacy can be estimated. You can evaluate geology. You can evaluate pathways and modeling. You certainly have difficulties.

What do I do after this ice age or that ice age? There are some parts of the planet that can be reasonably excluded from ice age change, of the glacier scrubbing, like Yucca Mountain. But certainly, you go to the United Kingdom or to Sweden and you can't say the glaciers won't come back. The Canadian sites of interest are in the Canadian Shield around Hudson's Bay and all you have to do is look at the Canadian Shield. All those little shallow lakes are from millennia of glacial scrubbing back and forth.

Nevertheless, you can estimate the risk to future, even postulated, future generations. It has substantial retrievability or reversibility, but that is going to vary.

Any of you who have ever visited the WIPP site must recall the claustrophobia you feel. You are afraid that place is going to close in you before you get out. The roof sags and the walls creep in and I really feel like someone is bringing me down sample a cask of a Mont Tiago, and I won't get out.

[Laughter.]

Nevertheless, it is reversible or retrievable. You know where it is and you could mine it out in a soft deposit. In a more rigid or firm media, tuff, basalt, granite, the other rocks, the problems shift more to one of how do I plug the holes. You can certainly reverse those operations, and you have there sort of an option for

variable retrievability.

Last -- and this is a very important one because of its concept. I was debating. I originally had on the slide, "Engineered at or near surface disposal." I had the word "disposal" there because I was using the word disposal, disposal, disposal.

And I said, no, that would be making a judgment that something that is in an engineered at- or near-surface facility -- that is, a 100-ton cask with 21 fuel assemblies in it and two or three consecutive seal welds and some nice paint on it or something -- that that was disposal.

I would call it storage, and I would say that it is obvious, it is evident that this generation has to monitor and control it and so does the next generation and the next generation because its hazard, though it may be in a very passive, very, very durable container, its hazard is there within the biosphere and it is perpetual surveillance, and it is what I would call a total risk legacy that my son and my grandson and my granddaughter and so on, generation after generation, would have exactly the same risk as I have, diminished only by the gradual decay.

So these are the waste management alternatives. And what we have -- and this is important to recognize -- we have nations committed to geologic disposal, but nations, or people at least, raising the question shouldn't we rethink,

shouldn't we pause, and some saying: maybe you can never license with our state of knowledge -- I will talk about a couple of cases of this -- maybe we can't get there; maybe we should shift to this, and have a total risk legacy.

Let my granddaughter Samantha figure out what to do with this or here granddaughter Samantha figure out what to do with this material because they will be so much smarter and we will give them an endowment. I will not only pay for her college, I will put an extra how-much in a bank so that her granddaughter has at least some resources to go into it, to figure out a better way.

So this issue as we go in -- now we are going to talk about the societal pledge. Keep in mind that we are in a state of flux about where are we going, or should we continue going where we are going.

The waste disposal dilemma, the one that I would like to define, goes back to the contemporary issues.

[Slide.]

MR. BERENO: This generation or two, you know, the "we," the "us," we have the benefit of nuclear technology, but they inherit the residues. So cost benefit breaks down. It breaks down because of the inter-generational feature.

From time to time people raise the question, well, evidently, you ought to discount. It is a simple principle in economics that an averted cost is a reduced

cost because if I have to spend a million dollars today, that's a million dollars, but if I can postpone that expenditure for "N" years, I can quickly calculate, formulate, that it can go out this far and discount it.

But for ethical reasons we don't want to do that with risks that we delegate to other generations. That is part of the societal pledge.

What is it, then?

[Slide.]

MR. BERNERO: Well, one way I would put it is the societal pledge is not all that clearly spoken. But I think it is discernible that no one in the future will be exposed to a risk we would not consider tolerable today. Therefore, this is our intergenerational equity issue.

That is very simple to say, but it raises a lot of serious questions. Who is protected? Is it the maximally-exposed individual that I can hypothesize? Is it at a dry site? Someone who would tap a well in and drink whatever little rivulet of waste might come out of a site like Yucca Mountain? Or someone who might be going for potash at WIPP and put a soda straw down into that soup?

So you have a question of: Who is protected? For how long? How long is it reasonable to look out and say: I'm going to estimate the risk, and I'm going to estimate the likelihood of upset volcanos, earthquakes, climate

changes -- what have you. Let's be specific about that.

Am I going to measure with individual risk or collective risk? Collective risk -- if you go back to our principles of radiation protection, I have always felt that it focuses on individual risk first and treats collective risk as a precaution, as an additional step -- primary consideration as individual risk; secondary consideration as collective risk.

If we go out into many, many future generations, we are forced to consider collective risk even when there is no significant individual risk, ever because we have very long-lived nuclides which don't give high does to any one individual. But they persist for generation after generation and therefore, contribute a little bit here and a little bit there. We get into the micro-rem to mega-people and get big collective risk.

Do we benefit and they bear the risk? That is the point of the cost benefit. And the ALARA? How can I think of ALARA in this kind of context?

MR. GARRICK: Bob, is it fair to talk about this a minute?

MR. BERNERO: Sure.

MR. GARRICK: Just for understanding. I always get very concerned when I see single attribute questions. No one in the future will be exposed to a risk we would not

consider tolerable today. Well, what we would tolerate today depends upon the benefit.

MR. BERNERO: Yes.

MR. GARRICK: What really bothers me here is that it is ambiguous in the sense that some people might interpret this that the delta risk that we are agreeing to for the future is zero. I don't think that is what we are talking about.

MR. BERNERO: No. John, you have asked the perfect question for me to make the point as I see it, and that is it drives you to what I consider the issue of negligibility.

If I am really trying to pledge this, and there is no benefit to that future generation other than some secondary benefit about we live comfortably and left a comfortable world.

If there is no direct benefit or discernible benefit, I would argue that today a cost benefit analysis where there is no benefit would say: You can only do that if the risk is negligible -- if the risk is negligible.

Therefore, I would say the risk in future, based on the logic about who benefits and who bears the risk in ALARA, that it gets us into you must be ALARA to be point of evidently-ALARA of virtually -- you know, what term are you going to use -- de minimis, negligible -- a concept that

says: This isn't even on the screen. This is not even worthy of consideration any longer as a meaningful risk that needs a benefit to justify it.

Thus, if you just scope with radiation exposure terms -- 100 rem whole body or a 100 millirem ED. If you take 100 millirem, which is our current safety limit, if you say that is the limit, then people in the future because they have no benefit, because it should be evidently as low as reasonably achievable even down to the point of negligibility.

You shouldn't say 100 millirems okay for them. You should be saying 10 millirem or 1 millirem. Y o should be saying they are down in the grass. They are at a risk which is negligible. It is therefore a satisfaction of that societal pledge because that's the ground that you would judge today, that somebody that doesn't benefit, they should have negligible risk.

Now, that is going to be tough to define: Who is protected? How long? How likely? What is negligible? When we get to the EPA standard, there is a concept to that in a way. In their recent promulgation of the WIPP standard, they touched on this. It was rather interesting. That is: Why settle for such stringency?

[Slide.]

MR. STEINDLER: Bob, I think the comment is that

all that is based entirely on your assumption that the future generation benefit is nil.

MR. BERNERO: Yes.

MR. STEINDLER: If you make a different argument on that score, then you arrive at an entirely different answer. The argument that you then end up with is Part 191 as to whether it is or it is not excessively stringent.

MR. BERNERO: Yes, you do.

Just for historical refreshment, I found it interesting. The staff went back and got some early philosophy documents. Incidentally, I spoke to you of the organization of going back to a Division of Waste Management.

This NUREG was published just before we formed the Division of Waste Management in 1978. NUREG 0300 -- it was basically public policy considerations for waste management. This was not an issue of -- it is interesting reading to go back to that.

It was not an issue of what kind of rocks and what kind of performance assessment -- no focus on technology, but looking at: What are we trying to do? What are the public policy principles that we have to consider about. Let's say: Should the technology of the fuel cycle drive the waste disposal or vice versa?

It is interesting that three time frames of

interest were laid out in here a short time frame of active use of nuclear energy, uncertain length. Remember back in 1978 there was a great debate about whether or not there would be a closed fuel cycle.

We had not had the dearth of reactor order. It was still expected. There was uncertainty about it, but still expected that we might have a lot of nuclear reactors, a lot more than we have.

So they had the active use, the active waste management period. This is where we are guarding the stuff, where we have the fences and the plaques and whatever, but it is active human control.

Then passive isolation is the term I choose that they didn't choose. It is that period where society no longer cares, or society has forgotten about the thing. You are now relying, as many of our standards do, on this thing being sufficiently isolated that it is not likely to be disturbed inadvertently.

One principle that is imporcant with respect to program direction now -- prompt management for disposal. One of the principles that this study came up with was: Get on with the job. This generation should not leave the job for Samantha, my granddaughter, or her granddaughter. This generation should get on with the job.

[Slide.]

MR. BERNERO: Now, EPA with 40 CFR 191 -- of course, you have been deeply involved in many of the discussions of this. I would only touch on a couple of things and allude to the WIPP standard comment.

Basically, EPA has chosen a technology-based standard -- and the current National Academy of Sciences study is looking at this. But they chose a technology-based standards, typical deep geology.

They analyzed: What would you get? What are the results if you get readily or reasonably-achievable deep geologic disposal?

The health effects they got by estimate -- and this, of course, goes back in the late '70s and early '80s when all of this was being developed -- they were apparently acceptable. Back in that time period, there were assessments made. How many health effects would you get? How do they compare to other things?

They were well within the band projected for uranium deposits if they were never mined. As a result, what the EPA was saying was: Look, what is achievable is apparently acceptable. Therefore, let us make it a standard.

If they thought otherwise, if they thought there was a need -- you know, they are looking at this situation, waste disposal -- and if they thought that other situations

would be judged by this, they would rethink the standard. That is basically what they have set with the WIPP standard.

So, given that this is achievable, we conclude that it is acceptable. They went forward and the standard has a probablistic containment. The 10,000 year index of performance is what I would call it.

But if you look at the EPA standard, it is wrestling with the problem of uncertainty by saying: Analyze for 10,000 years as a basis to conclude that this is or is not acceptable. Of course, that is a controversy that has gone on for years about all the excitement comes at 42,000 years. Why did you stop at 10,000?

Now, they did have individual dose consideration. That includes in their new WIPP standard -- which is basically the 40 CFR 191 codified now for WIPP, and other repositories other than Yucca Mountain -- they now have both containment -- which is a quantitative release criterion for release and individual risk. It is 15 millirem. It is for the same 10,000 year period.

So, the WIPP standard has an individual dose consideration not added as an alternative -- it is not either meet the containment standard or meet the individual risk standard. It is meet both the containment and the individual risk.

Importantly, it contains the concept of passive

isolation. Don't rely on human intervention or human control indefinitely.

[Slide.]

MR. BERNERO: I had better speed it up. I love the microphone. I talk too much.

[Laughter.]

MR. BERNERO: NRC with Part 60 -- and many of you remember what was prevalent then and is still prevalent in some circles -- a concern about probablistic licensing. The famous phrase of then-Chairman Hendry, I think, was the one who coined it. It is not proof of the ordinary sense of the word. You are really looking for a quantitative description of expectation -- expected isolation.

The NRC standard was much more in the mold of the traditional NRC approach -- a deterministic standard. It had a host of desirable and adverse features of the geology, the hydrology, and so forth. Then it had segmentation of performance into sub-system performance criteria for defense in-depth. Don't rely on one feature.

This is the reason WIPP would have an awful problem to meet Part 60 because WIPP relies on geology. There is no waste form or waste package to rely on. If you go to the sub-system performance criteria, they were quite arbitrarily drawn, but not unreasonably.

First of all, don't let the package leak for a

long time. Then it is essentially a 1,000 package requirement.

Secondly, when it does leak, don't let it leak rapidly. That is the 10 minus 5 per year leak rate.

And lastly, have it in a place where it won't move away rapidly. There we limp because about the only thing that we know to put down there is pre-emplacement groundwater travel time. It is not a good surrogate for a good site. It doesn't treat the chemistry.

We are looking and looking and looking at that, trying to figure out what is good. But nevertheless, it is performance allocation. It is defense in-depth, the principle.

That is constantly subject to criticism because the overall performance of the EPA standard is still a part of that.

[Slide.]

MR. BERNERO: The ICRP -- I will just touch on a little bit of what the ICRP -- again, this is more focused on the societal pledge. They suggest careful consideration of discounting by the national authorities. Remember, this is an international body trying to talk to a bunch of nations.

My sense of it is: Don't discount detriment to future generations. All they say is really be careful about

it. They sort of raise the question, but I think make the judgement: You ought to assign higher weights to detriments to future generations because they didn't have a part in it. Read also they didn't benefit from it in any significant way other than the perpetuation of society.

The inverse of this -- you either assign higher weight to the detriment or you make it negligible. So, it is the same principle I'm talking about of negligibility.

ICRP-46 has no time limit ascribed. This, of course, is the thing that dogs -- so many of the European programs -- they are groping with how to deal with open-ended time. We have chosen the 10,000 year as an index of performance, but they are struggling with it.

[Slide.]

MR. BERNERO: Some of you may recall -- and in fact, most of you should -- the National Research Council Waste Management Board in 1990. The title of their report was "Rethinking High-Level Radioactive Waste Disposal."

The important thing in my mind is that the Board was saying: The way you are conducting the program is wrong. Inherent in that comment was a challenge associated with the societal pledge.

They were challenging the program because of its rigid structure of prescriptive goals and standards and schedules, for that matter -- you know, DOE with, "On this

day we will do this and on that day we will do that."

But the thing was putting the standards down rigidly and then saying, "Now go out and dig a hole and make it meet the standard," was the fundamental program direction that troubled them most. They wanted to take the gradual design-as-you-go approach.

What that brings you to is it brings you to a situation where our society would say, "Let's look at these rocks. Let's look at these strata. Let's look at these holes in the ground and learn what we can and see what we can achieve. If we see a good rock, we will know it."

I sometimes kid our Swedish colleagues. I say that the way Sweden does it is a collective because they are a very coherent society, I think. They walk around the expert peer group. They walk around and they look at various holes in the ground. Some of them nod. Some of them shake their heads. Some of them question.

When they are all nodding in unison, "We got the right hole. This is the place. It is called 'Ace Hole' or whatever." But that is how they are going to do it.

Basically I think the National Research Council was telling us that there is a fundamental program direction problem that you should back away from waiving a rigid societal pledge and saying, "By golly. I am going to have no greater than this many health effects in this many

thousand years. It is going to be this many curies coming out at the biosphere and so on," saying, "Back away from that."

[Slide.]

MR. BERNERO: Interestingly, in 1992 Roger Clark and Company with the National Radiation Protection Board in the UK, they have wrestled -- remember, they give advice, they don't regulate directly in the United Kingdom -- but they have given advice that is quite useful for how do you deal with these time frames, because basically you have the tools to predict that uncertainty is blossoming. The further out you go, the less certain you are, so they proposed, yes, go ahead with your societal pledge, but the pledge changes.

Your perspective is changing as you go on. The first 100 years post-closure you would use a rigid dose limit. That's us, as a practical matter. It is a few generations. For 100 years to 10,000 years use a risk constraint; for 10,000 years to a million years, hypothesize communities, gauge adequate protection to individuals. You see, the pledge is changing. After a million years, a qualitative check -- is there something that could upset this? That is what they are suggesting.

I might add, the UK being an island gives a unique bias to the problem. Right now they are looking at a site

for low and intermediate level waste just outside the Selafield plant. The Irish Sea is a stone's throw away. You go deep enough and the only pathway out, as a practical matter, is into the Irish Sea -- instant dilution. It's a very easy site to deal with in a sense unless the geology would change that, and it's not likely.

This idea is a useful one for thought because the idea exists there of changing the constraint or the pledge, as you go along, dealing with it differently.

The Energy Policy Act of 1992 I'll just very quickly point out, this is what the National Academy is working on. It basically said go out and look at a health-based standard instead of technology-based standard, and consider active control -- that's the phrase I would use to say that if you read the words of the Act it can even be interpreted to mean that if you discovered geologic defects you would have people there to dig it up or to grout holes or do something like that, and then they specifically ask is it valid to predict human intrusion probability for 10,000 years?

Very important point, especially since National Academies, National Academy committees go where they go. You don't set rigid bounds and they look at Question A but not Question B just because you told them to. They are quite flexible in their charters and some people I have

heard say that they are supposed to look at the validity of predicting at all geologic prediction, performance assessment prediction out to 10,000 years.

The National Academy task as defined in the law is looking at human intrusion and it is the age old question I know John for years in reactor risk assessment, it's cognitive error and things like that, setting probabilities on it. That is what they are supposed to be looking at, but I don't know. I have heard people say oh, no, they are looking at prediction over all and obviously they are at work now, as you know, and we hope to hear more at the end of this year.

The Nordic nations, basically Sweden and Finland, dominate the activity in high-level waste disposal for the Nordic nations but this is an interesting point. I singled it out for attention. It's very useful, thoughtful work that they do and future societal exposure should be well below the level which causes unacceptable detriment to the health and the environment, health of individuals, and it is this concept of "well below" I think, at least I interpret it as an affirmation of the concept or basis of negligibility. It is a way to deal with cost benefit. It's a way to deal with ALARA by leaning toward negligibility and of course the attendant problem of defining negligibility.

There is a paper available -- I have a copy of

this if anyone is, you know, if you want to reproduce it for the committee but you may already have it -- Luther Carter and what magazine did he appear in? I forget. It's very popular today and this is a quote from it: "The Nuclear Waste Policy Act reflects a mistaken belief that geologic isolation and containment of nuclear waste are within the known state-of-the-art, hence are now licensable."

That is a pretty strong statement. Luther Carter is not a licensing or regulatory authority in the United States and yet he says that we are not prepared to honor the Nuclear Waste Policy Act. I don't agree with that statement, but it is important that here is a respected voice that says that and a lot of people think that.

This is not the first time I have heard someone say, oh, we've got to shift our attention and rely on engineering -- you can never trust the geology, or you can never predict, and what I just said about human intrusion prediction for 10,000 years, you can't predict anything for 10,000 years. You know, the NRC's long-held fear of probabilistic licensing, the use of PRA in reactor safety, we run for refuge and use adequate protection. We will never use the safety goal to license a plant. Every time we get near a bottom line, we get very worried, so here is a statement it is not licensable.

Now he raises certain concepts or questions in

that paper that are quite intriguing. There is weapons plutonium. You know, in the urge to dismantle nuclear weapons both in the former Soviet Union and here the suggestion is made and in the paper he refers to one proposal, to dig an underground tunnel assembly at the Nevada test station to store weapons plutonium, not dispose but to store it. The argument is discussed at least that the right thing to do with weapons plutonium is to spike it or commingle it or coload it somehow with high-level waste to make it an unattractive target and put it with high-level waste, wherever high-level waste is going to go, so it becomes another form of high-level waste.

He is looking for a Congressional mandate, that is that the Congress would do it to Nevada again and say, Nevada, we love you so much that you are now the National Center for the Storage of Everything We Don't Want.

[Laughter.]

MR. BERNERO: And that is basically what that paper calls for, but is a storage depot, not a disposal, and as a result there is an interpretation that well, maybe, what we ought to do is have underground storage of high-level waste, the so-called underground MRS.

Now that paper doesn't really propose that but it sure gets you close to it. There are people, and if you go back and look at the report that was done at DOE, Tom Isaacs

and Max Blanchard, "Phased Licensing," from time to time you hear the concept, and it has been around for several years, that why don't you dig the galleries at Yucca Mountain and emplace in those galleries as an MRS, as a storage, emplace the waste and then continue at a more deliberate longer-range pace the evaluation of that site as a repository so that you would say, well, for today I am going to license it for a few generations as a storage depot, as an MRS, but I haven't wavered, I am still looking in the long range as a repository so there would be a coincidence of the things.

That is raised in that and this is one of the major questions about program direction.

The New York Times this year has an article -- I also have a copy of that if you wish to reproduce it if you haven't seen it. Professor Erikson from Yale, I believe, he says -- well, this is the byline on the article and it is an essential point for the article -- it is an apt byline: "Rushing to busy nuclear waste doesn't take the problem off their hands so much as it takes the solution out of their hands" -- and therefore let's turn to a policy of storage.

Go back to my slide about what are the alternatives, space disposal, deep sea bed disposal, geologic disposal, engineered at or near surface management, whatever you want to call it, you know, it's storage. He openly is calling for that, so as not to pre-empt a better

decision that future generations might be able to make.

The Dutch right now have a national policy statement that is quite interesting. In the Netherlands there are three kinds of deep geology material. They have mercury hazardous waste, mercury compounds called Class 1 or something like that. They have all the other kind of hazardous wastes that you get from chemical plant lagoons and things. That's their Class 2. Then they have high-level nuclear waste.

They have a new policy. Everything must be recycled and if you don't know how to recycle it, you ought to be careful about what you do with it so that if we ever do learn how to recycle it, we can do so, but 100 percent recycle is the societal goal. Therefore, the Dutch are openly propounding deep geologic storage as reversible, as easy to withdraw from as it was to put there, so it is what you might call "ultimate reversibility."

Well, the Netherlands, as you know, is a relatively small country and if you look under it, you have a choice of a salt dome, a salt dome, or a salt dome and if you want to have perpetual retrievability, you don't emplace in a salt dome; you build a subway with awfully good walls in a salt dome, so this idea of policy of storage, long-term, so that future generations can figure out how to recycle, that is a very significant thing that is being

bandied around.

You may have seen in your correspondence the letter from Senator Wellstone and other Senators, recent vintage -- there is a similar letter from the House of Representatives -- urging a Presidential Commission to review needs, policies and programs for nuclear waste.

[Slide.]

MR. BERNERO: Now this is broad. This is very broad: spent fuel storage, low-level waste disposal, high-level waste disposal, and DOE cleanup. Basically what this is calling for is not a change in the pledge directly, but it is calling for an agonizing reappraisal of what are we trying to and when are we trying to do it and where are we trying to go with it.

Recall that spent fuel storage is in crisis right now in Senator Wellstone's state, Minnesota. The Prairie Island Nuclear Plant needs a legislative action by the Minnesota legislature to use the license we have already granted them to store spent fuel dry. The legislature is not forthcoming with that action and if they don't get relief they are going to have to shut down Prairie Island, starting I believe in the summer of '95 because they have no more room at the inn and they are openly discussing the Mescalero Apache proposal of a private MRS.

Low-level waste disposal, as you know, the new

sites are all dogged by great controversy and just recently the Secretary of the Interior, Mr. Babbitt, called for the National Academy of Science to trot out a committee to review the technical issues raised by three USGS scientists about the adequacy or acceptability of the Ward Valley site in California, and one more example of agonizing reappraisal, so this is going on. This is one of the things the Committee should be thinking about. They are major things.

[Slide.]

MR. BERNERO: The current issues, and this is the way I would like to end, the current issues we have, these are more programmatic, directly programmatic issues and they do raise the idea of the pledge and what are our goals and standards.

The interim storage of spent fuel, the reactor situation as I just mentioned is in crisis. The MRS or equivalent, you know, the Mescalero Apache thing, it's hard to say -- the nuclear waste negotiator, the newly-appointed one, Richard Stallings, has a sunset clause. He goes out of existence in January of '95, I believe it is, and he has said -- I was in the room when he said it -- that if he doesn't have something solid to propose by August of this year, he's out of business, because it has to gear with the Congress. Anything he would propose would require

Congressional action.

So the multipurpose canister -- you have separate knowledge of that I am sure -- DOE is now talking about a proposal that requires a lot of institutional maneuvering and requests for proposal and competitions and what have you, but the concept is basically that we would have a multipurpose canister universally used for storage, for transport, and for disposal of spent fuel with appropriate overpacks and the 1998 deadline that is argued a great deal, that rather than take title to the fuel and take it away as originally expected, DOE would say to any individual reactor owner I know you want to get rid of that stuff and as you know I can't take it, but in the meanwhile here is a free can in which to put it and store it at your site. You know, it would be a government-furnished, multipurpose canisters. That appears to be the concept. It has a ways to go before you can do it and the design of that multipurpose canister is uniquely vulnerable to disposal concepts.

If it only had to be a dual-purpose canister, it could be certified quite readily, but the technical issues that become difficult are technical issues like criticality control and things like that in the disposal mode.

The goals and standards are up for debate. As you know, the WIPP standard is out now, the revised WIPP standard and the National Academy is meeting on the Yucca

Mountain standard and I don't know what they are going to say but it could have a profound effect on the program and where it goes.

And last and far from least, the DOE Civilian Radioactive Waste Management budget is before the Congress right now and it is a hot debate. Remember, this is the year of the tunnel-boring machine and in order to maintain underground exploration and at-surface exploration and design work, it takes a lot more money. The budget has to go up.

Dan Dreyfus has said if it doesn't go up, the schedule is going to fall off the table. A proposal has been made for a rather intricate funding procedure and a rather intricate way to take advantage of the receipts of the nuclear waste fund. It is not clear what the Congress is willing to do and that is before the Congress. That can have a profound effect on the civilian waste program, depending on how that budget goes because there is serious impact.

So what we have here I hope is some stimulation of thought about what are we really trying to do? The societal pledge is in fact the underlying basis of safety. What are we really trying to do in waste disposal? Unfortunately, most people, and I include the NRC Staff within that, were willing to talk about how to or what to but we don't want to

talk about that underlying philosophy very much, and as we do that we find ourselves caught up in serious questions that might change the whole program orientation and direction and thereby hinge on what we are really trying to do, what is our societal pledge, or are we going to change it?

I don't hear a clear message. Here is the answer. Let us march into the sunset. We might have an active proposal for an underground MRS, we might have a different budget. There are any number of things that can happen in the near future. And I think this committee is going to be seeing that stuff. And this is right at the heart of what your function is.

So, with that, I would be happy to answer any further questions and then you can throw me out.

MR. STEINDLER: Well, Bob, you certainly cheered me up --

[Laughter.]

MR. STEINDLEP: -- about things moving along smoothly in a well-defined direction with logic and sense behind it. However, I must say I appreciate the overview. I think you have done an outstanding job in identifying the rocks -- I'm sorry that you concluded not having a clear answer to how we hurdle over those rocks. And I do wish you would work on that a little bit more.

[Laughter.]

MR. STEINDLER: I am sure we have got questions.

Paul?

MR. POMEROY: Bob, I would just like to second that. I would like to talk about philosophy with you for days, as a matter of fact. Coming into this, however, I did have one question. It is a much narrower type of question and I would like to ask you if you had any thoughts on it.

Partially at least as a result of the interchanges between Senator Johnson and Dan Drefus, I believe the DOE is rather intensively looking at the question of at least lengthening the period of storage underground or operations and perhaps operating what you call an underground MRS for a longer period of time. That, of course, has major impact on DOE's programs and they are looking at it.

I wonder if the Staff is thinking about the potential impacts on the NRC and whether you could share any thoughts?

MR. BERNERO: Yes, we have and I would like to point out to you that it requires legislative change to do any of that.

We have looked at what aspects of the law would need to be changed in order to accommodate the so-called underground MRS or any kind of MRS for that matter in Nevada. We are looking at it in particular from the

standpoint of its impact on the program because, basically, what it would be is a very, very substantial change from a parallel program.

We have been prepared to deal with a parallel MRS if one can be found or it's alternate, a series of at-reactor lower case MRS facilities and, in parallel with that, the high level waste program focused entirely at Yucca Mountain on characterization of the site and ultimate licensing if suitable.

This would now make it a tandem program. And it has some interesting aspects. Interestingly enough, if it is going to be a tandem program, it would actually accelerate the design freeze date for the repository.

If you are going to license an MRS in the near term, one of the first things you are going to have to do is make a very tough decision that you have to live with years hence that it is going to be this big of a shaft and this big of a can and this deep a hole and so forth, because it will not be practical to rethink that part way through and say now let's take them all out and enlarge or truncate or shorten or do things. If you are not careful, you might discover that Yucca Mountain was a suitable site but you goofed it up, you know.

So we are looking at the program in that regard. It is a very fluid situation and it is very difficult for us

to see. You know, legislative action appears to be the key here. Right now, legislative action on the budget, legislative action on the agenda are the two things. It is hard to say what can come out of the Congress. But I believe in this session of Congress they have to act on the budget and that has a dramatic impact on what's going to happen in the program.

Whether they will act in some other regard, legislation on MRS or something like that, I just don't know. So we are trying to cope with it if it happens, trying to be prepared to see it.

We have done some legal analysis. OGC Reamer, in fact, is here. He has done some very good legal analysis. And it would require -- it is rather complex legislation depending on what they are trying to do, depending on what they are trying to do.

MR. POMEROY: Thank you.

MR. HINZE: Bob, this discussion may be at the very heart of what we should be doing. It is refreshing to us after being lost in pHs and types of clay and all of that sort of thing.

I would like to go to your comments about the National Academy of Science and you made a comment that there is in some places a hope that the Academy will come up with some kind of discussion regarding the reliability of

the prediction of geological parameters into the future and it was not clear to me whether you thought that was a bad idea or not.

I feel that this is a very appropriate thing to have at this point in time because of the conflict that we have regarding the extent that we should rely on the geology versus the engineered barriers. And although going back to the '50s we had the statement that we can predict for the time, time ranges that are necessary, I think that we really need a reaffirmation of this in terms of from a group that approaches it from as unbiased and scientifically reliable as possible.

I would hope that they would do that and I wonder if you had any comments.

MR. BERNERO: I share your feelings on that. The point that I was trying to make is that their charge from the law was focused on human intrusion, the cognitive error kind of thing. But I would certainly welcome if they choose to expand their charge into the predictability at all or to distinguish can you predict human versus can you predict geologic upset to a different degree of certainty and so forth.

MR. HINZE: I think the avenue is there for that. It's going to be very helpful to this Committee to the NRC, to everyone that comes --

MR. BERNERO: I am not sure what they are doing. I can say what I have heard so far and have attended and spoken at at least one of their meetings. I think that they considered that they have a fairly open charge. That committee will go where that committee goes. They may very well do the whole charge.

MR. HINZE: In fact we did sneak in a comment like that when we sent a letter to the Commission on the charge of the Academy committee. No one certainly can predict what that committee is going to do or any Academy committee.

But I am wondering, as the director of the office, what do you look forward to as the possible impact upon the Academy decisions and statements that may bear on 60 and what is happening, what will happen with 60?

MR. BERNERO: The most dramatic thing -- and I honestly do not expect the committee to come out with what I would call the perpetual SWAT team approach, that it is appropriate to rely on perpetual surveillance and corrective action. I do not think that they will come out that way and that would be profound because that would take me to my last alternative. Engineered at-surface storage is the simplest, cleanest way to do that and you satisfy everyone if you can rely on a perpetual SWAT team, because you can put it -- go down to Wachihatchie, Texas. There is a very large circular hole in the ground and the State of Texas would really like

to figure out a way to get the $400 million back. And then call that the perpetual SWAT team home, but I don't think that is going to come out.

I think the most profound thing that will come out of the committee, absent some surprise, is what are they going to say about the health risk or technology-based standard. That is very significant because what is happening is in parallel with their deliberations a standard has been promulgated for all of the other repositories, high-level waste and transuranic repositories that is sort of a template or sample and it is both; it is containment and individual risk.

So I do not know what the committee is going to come out with on that and that, I think, is the most profound. I think they will conclude on predictability, at least it is my opinion, that human intrusion predictability is pretty shaky at best. And I will call it geologic predictability is a lot better for these time periods of interest.

MR. HINZE: Speaking about geologic predictability, I have great faith in our science, the growth of the science in the future. And it seems to me that what we are going to find is that this risk that you talk about, the uncertainties in the risk that we have as we go in increasing time, I think that I have enough faith in

science and what is on the horizon that that risk we are going to be able to collect on in the future. If one has a certain modicum of retrievability that may permit us to take advantage, if you will, of the enhancements that come along. And I guess that gets to the monitoring aspect of the -- of a repository.

Do you have any feelings about an extended repository, extended repository monitoring?

MR. BERNERO: My own feeling, and I think I have expressed this before, as a practical matter a repository has an operating phase measured in quite a few decades. You do not open a high level waste repository, at least as we conceive it, and place all the waste in three years and then close it up and seal it. So you are talking a duration of a couple of generations of operational phase.

Your discoveries that are relevant to retrievability, in my mind, are basically discoveries of further data about the site and experience with the site to affirm or confirm your judgment that this is an acceptable site. It is not monitoring, monitoring in the sense of I have probes here or there and something and, whoops, I've got some cobalt 60. It's not that.

It is understanding the site and having now dug all the galleries and now I am as close as I am ever going to be to the Ghost Dance Fault or the Sundance Fault and the

Calico Hills deposit, I know as much as I am ever going to know from this site from the standpoint of its internal and surface base characterization. That's the monitoring that is important because then the final decision hinges on that and that's when you say, I don't need to retrieve this anymore. Now I can finish plugging the holes, backfilling the galleries, or closing the shaft.

MR. HINZE: Some of that is the flexibility that we saw requested by the Academy committee.

MR. GARRICK: I want to extend the discussion on the Academy's charter just a little. What happens, Bob, if the combination of the Academy's exercise and the EPA which, in the end, has to develop the standards and the Academy is simply going to make a recommendation and offer some advice perhaps of a standard, of a specific standard, and even there it may be nonspecific, what happens if this whole process takes two to three years in the meantime with respect to the licensing process?

Having worked on a number of Academy reports, I know these schedules can be extended. When we started this process with the Academy, there was quite a momentum in the performance assessment area in the licensing activity. What advice is NRC giving to Yucca Mountain in the meantime?

MR. BERNERO: Well, the key to it in my mind is that the EPA standard has been promulgated for WIPP and all

the other repositories. So EPA, in a sense, has spoken with their regulatory authority in a way that says, absent any cogent recommendation from the Committee, this is how we will regulate any repository for high level or transuranic waste.

Depending on what the academy recommends or when they recommend it or whether EPA is persuaded by those recommendations, I think that's the only game in town. That's the reference, is the WIPP standard. We have been doing performance assessment, DOE is now very well along in doing iterative performance assessment and the only obstacle I see at this time to the licensing process is, one way or another, we have to reconcile carbon 14. The carbon 14 issue is an evident or apparent exceedance of the EPA standard, at Yucca Mountain that is, and it is also an evident exceedance of Part 60, you know, the 10 minus five leak rate.

You can't burp the gas at the end of package lifetime and have it retained. So we have to have some way to deal with that. And that's the dilemma. Is there some rationale that would say, I know it's a nominal exceedance but for good and cogent reasons I am going to exempt this from it or whatever. It's a very serious question.

But overall the possible acceptability of the site, the overall satisfaction of the EPA standard and Part

60, I think the matter is in hand and the critical path is not so much the standard but the characterization of Yucca Mountain, is it adequate.

You know, one of the things that's a very healthy endeavor that I hear coming from DOE is an even sharper focus on the potential show stoppers. You know, in 1989, I have told people on Staff this, I have been in the regulatory business in the AEC/NRC for more than 20 years. And there is a certain amount of pride in the work.

July 31, 1989, I signed the letter to DOE commenting on the site characterization plan. That was not an easy signature because here was a major agency, a major program of importance to the United States and that site characterization plan got a two-by-four across the side of its head from that letter. Major objections, major comments and we took it very, very seriously. The NRC staff did a magnificent job in the short term -- you know, a short time review of the site characterization plan.

A comment we made then was, you've got to look at the major issues. Do your iterative performance assessment and focus on the things that can qualify this site. More and more I hear from DOE in their planning of streamlining or going forward with more streamlined excavation is a focus that sounds like they get to the -- you know, I have a little joke I say within Staff, the Sundance Fault -- the

Ghost Dance Fault, when the Ghost Dance Fault was identified, there was an immediate reaction: Okay, we'll have a setback. How much of a setback? How big is the fault? What does the disturbed zone look like? It was a knee-jerk response.

I envisioned guy's in the cab of the tunnel boring machine and he's got a radio telephone that communicates with DOE headquarters here, he can talk directly to Drefus. He calls up one day and says, gee whiz, Dan, I'm still 2,000 meters short of the Ghost Dance and I am in a pool of rubble. And that's it, you can fit two tons on one end of this repository and three tons on the other end and that's it. Of course, that would disqualify the site.

So this focus on let's get down there and see if there is indeed a tomb of a lost Aztec princess, something that evidently disqualifies this site, that's --

MR. HINZE: Bob, I would like to remind you that the Sundance and the Ghost Dance were mapped on the surface.

MR. BERNERO: Yes, yes.

MR. HINZE: It didn't require a tunnel boring machine to know that you have a problem.

MR. BERNERO: But how big is the problem? You cannot know until you get underground. That is a pretty exciting site. That site has a lot of features. If you look at it you say, hey, you know, if this is as bad as one

might conceive, that could disqualify the site.

MR. STEINDLER: Let me turn you to more generic items.

You have provided, I think, an interesting litany of considerations, some of which are resolved by making arbitrary decisions. My question is, what is the role of the Commission in addressing some of the issues that you have raised in your discussion of the societal pledge? Where does the Commission have a responsibility to take a position on one or the other of these points?

MR. BERNERO: The Commission cannot alone make the decision about what is the basis of our licensing and what are the criteria we must meet from our licensing. Bill Reamer can correct me if I am wrong.

Just to use an example I said a little while back about carbon 14, if carbon 14 is in evident exceedance of the EPA standard and if we have to incorporate the EPA standard in our regulation for licensing, can the NRC grant an exemption from that criterion or that limit if it is evidently in the EPA standard? I don't think we can. I don't think we can exempt somebody else's regulation. We can exempt our own, the 10 minus five. But I don't think we can exempt the EPA release thing.

We are bound by the national system and we are obligated to participate in the national system to develop,

to clarify and ultimately to implement the societal pledge properly and the criterion standards that are set by EPA and those set by ourselves. So it is not something that the Commission has the option of going off and thinking about independently, solely, in our own little world, and saying this is it, folks. Aside from public process and comment.

No, we have to participate in this national program. And especially participate in the interaction with the Congress. Because, remember, the national program framework is set by the Congress. And right now the Congress is looking at very fundamental possibilities, very fundamental change possibilities. So I don't think we have a clear role, simple, truncated, isolated role. We have to participate as a commission, as an agency which has a major responsibility int he development or comment -- that is why we give so much attention and the Commission gives so much attention, the Commission itself, to the comments on EPA standards.

You know, we comment on a lot of stuff by other agencies, we negotiate at the Staff level. But when we comment on 40 CFR 191, believe me the Staff is very familiar with this and I think you are too. We go to the Commission to ratify letters that I signed, letters of comment.

It is because of this intense policy interest and the role of the NRC being so commingled as the other

agencies.

MR. STEINDLER: The Congress is currently debating whatever the issues are that they have on their plate today and tomorrow. Does the Commission provide its views to Congress on what direction Congress ought to go?

MR. BERNERO: Yes, it does from time to time. And the Congress has had a couple of hearings lately that do not involve the Commission, you know, hearings with the DOE, Dan Drefus, et al., you know, on the MRS.

But the Commission, you know, just recently we had the oversight of DOE, the so-called Miller Bill hearing, March 8 I think it was, and there, of course, the Commission formulates very specific oversight comments, you know, for the Congress.

But, yes, there is dialogue formally and informally with the Congress.

MR. STEINDLER: One more question from Paul.

MR. POMEROY: Bob, in the societal pledge and in the Nordic Nation Statement that you gave us and other places, we talk in terms of the future health risk or detriment to society.

What -- how do we take factors -- it seems to me that you are getting to the point of trying to predict something that is not predictable in terms of what that health risk is going to be in the future. One could imagine

very seriously that in the next hundred years, for example, medical science as we know it even would get to the point where there was no risk, radiation risk anyway, to future society.

How do you factor that kind of change into the societal pledge?

MR. BERNERO: That is generally if you look into the background, the discussions, the fine print, that's generally factored in with the key assumption that future generations are equally adverse -- averse to radiation as we are, that one does not rely on the development of cures for cancer or whatever.

Similarly, one does not rely, although French law now requires consideration of it, partition and transmutation as a way to destroy waste with sufficient effectiveness that you don't have to dispose of it, you know, the really long-lived waste.

Those are among the key assumptions that underlie the societal pledge. There -- I am not troubled by making that assumption because it is a conservative assumption. I am not making the assumption that they are more averse. If anything, I don't think it conceivable that they would be more sensitive to radiation. I think they would be, if anything, less sensitive.

There is a societal assumption buried in that.

That is, society is not improving and therefore solving the problem. That that societal assumption also shows up in another way on human intrusion. You know, we have the scenario development for human intrusion that primitive cave men who don't understand radiation, technology and science have very high efficiency well drilling rigs and are digging holes and bringing up stuff and sitting around a camp fire looking at spent fuel assemblies. You know, you get into some pretty bizarre scenarios.

But I have no problem, personally, with that key assumption: Society has the same risk of cancer in the future per millirem or person rem or whatever.

MR. POMEROY: Just as a follow on to that question, you have no qualms about assuming, however, people or 150 years from now would be more knowledgeable?

MR. BERNERO: I don't want to count on it, just like I don't want to count on -- I don't think we should count on infinite surveillance even though we take -- this is a dichotomy from what we do -- you know, uranium mill tailings we have, be sure for about 200 years, project about 1,000 years and have the state or the federal government own the property and provide custody of it. But we do not assume human intrusion.

Now, it's a diffuse source. It's radon emitter, a diffuse source. But the logic is a little bit different

there. In a way, we're not counting on it, it's remote sites in the far west and things like that, there are other factors.

Human custody or active surveillance is not something I think we should count on.

MR. STEINDLER: Except by law. The Energy Policy Act. It calls on the Secretary of Energy to be there forever.

MR. BERNERO: It says that governments -- and, of course, the French do that. The French, for their low level waste sites, have active surveillance, lechate collection and monitoring for 300 years. And, you know, it's part of their thing.

But the question is, do you rely upon that to accept a less than a good site or something else? Do you rely on it? You may require it and, basically, we do. But we don't rely on it.

MR. STEINDLER: Okay. One more question and then we will close.

MR. GARRICK: I just want to make an observation, Bob.

It seems that in the nuclear industry we have a passion for shooting ourselves in the foot by the choice of words and the language that we use. And I am reminded in the '50s or '60s -- it's kind of fuzzy when it was -- of a

well-known reactor manufacturer advertizing the zero-release reactor and having a great deal of difficulty living that down.

I also think that the language surrounding the nuclear waste policy in reference to "permanent" disposal is in that same category, because nobody can prove permanency. So the only thing I sort of am a little restless about with respect to the societal pledge, are we doing it again?

You help a great deal in your explanation of what the pledge really means. But the ambiguities of it concern me that maybe here we go again, making what would appear to be a public promise that we cannot prove or demonstrate, especially if it's a promise that's interpreted as we're not going to essentially add any risk. And I just wonder -- I just wanted to make that comment because sometimes we can avoid a great deal of difficulty by just being a little smarter about how we characterized what we really intended.

MR. STEINDLER: Okay, Bob.

MR. BERNERO: I give up.

MR. STEINDLER: Thank you very much. It has always been a pleasure to listen to you and you have again demonstrated complete command of the subject.

With that, let me declare a 12-minute recess.

[Recess.]

MR. STEINDLER: Before we move into the next

topic, I have had a request for some comments from Gene Roseblum from the USGS on a topic that is very much akin to what Bob Bernero just finished talking about. And it would be useful, I think -- where did Gene go? Oh. Find yourself a microphone, if you will, and we would be pleased to hear what you have to say.

MR. ROSEBLUM: I am Gene Roseblum on the Staff of the Director of the U.S. Geological Survey and have been involved in high level radioactive waste matters, one way or another, since about 1978. So I would just like to add a couple of footnotes here to Dr. Bernero's very interesting presentation.

The article he referred to by Luther Carter is in issues of Science and Technology, about the last issue of '93. And in there also there is a letter from Kai Erikson, who also wrote the New York Times article in the following issue, the first issue of '94. Also there is a letter from me in there also commenting on underground retrieval disposal and some of the history of it. So I think you might find that interesting and very much in line with a lot of what has been said today.

I believe there is a problem in the language that seems to be causing some confusion, the words storage and disposal. When we talk about storage, we tend to -- we expect to take whatever we put in storage back again, back

out of storage at some time in the future, whereas if we dispose of something, we do not intend to retrieve it.

I think as Kai Erikson's letter in Science and Technology latches onto this and argues that something to the effect that we would simply develop and underground monitored retrievable storage if it looked like it worked alright, then maybe we could leave it there.

I would like to note that we first proposed extended retrievability back in 1983 when I wrote Circular 903. At the time, we had -- 10 CFR 60 had come out but it was only for saturated zone repositories and it needed to be amended to accommodate the unsaturated zone. And Yucca Mountain was proposed originally as a saturated zone repository and then at the suggestion of the USGS in 1982, it was proposed as an unsaturated zone repository which, at that time, would not have been covered by 10 CFR 60.

I wrote Circular 960 to try to help the NRC in making revisions to 10 CFR 60 and the circular points out how an unsaturated zone repository would be different from a saturated zone repository and I would just like to read you a couple sentences here. The heading, page 3, is Fully Retrievable Disposal.

The unsaturated zone offers the possibility of fully retrievable disposal. Fully retrievable disposal as proposed here combines both retrievable storage and

permanent disposal. The waste is at its final resting place and removing the waste is a planned option.

I then point out the problems with doing this in the saturated zone, especially as was mentioned in salt, where you have -- you are expecting flowage of the salt to seal it up. And even in the saturated zone where you have to pack in backfill and minimize any future movement of groundwater through it.

Because an unsaturated zone repository remains naturally dry, you do not have the same concerns with water flowing through it and you could keep it open for a very long period of time. If you wanted to seal it up, if the final DOE employees had to leave the site, according to the Energy Policy Act they will be there forever. But if they had to leave earlier they could simply backfill the entrances and that would certainly keep others out. Yet if, still further in the future, someone wanted to get the waste out, it would not be that difficult.

So I think that by keeping the retrievable option open, you also could accommodate future changes in technology. If someone comes up with a better solution, which we can't imagine at this time, then the waste could be brought out and that solution applied. If a better canister was developed, some advances in metallurgy or ceramics, and it was felt that it was worthwhile doing this, that option

would still be open. You have done nothing irreversible.

Just a brief note -- that was essentially what I wanted to say, point out, the background of this reversible argument.

Just a brief note on the Ward Valley low level site which was mentioned also this morning.

Although the three USGS geologists are members of the USGS, they were acting as private citizens in their criticism of that site. So what they said was their own views and not those of the organization.

MR. STEINDLER: Thank you, Gene. Let me just add one other comment.

The retrievability option built into the current high level waste standards and regulations have, I think, represented a source of significant trouble for those folks who were trying to design a system that was truly impervious because there is always the notion of can you retrieve it. But, worse than that, there was the notion that retrievability decisions have to be made on the basis of something that you measure in situ or close to in situ with due deference to surface-based testing and the question of whether or not you can produce a sufficiently decent long term monitoring device that sits close to the emplacement area and still not perturb it. It begins to sound like the Heisenberg principle.

That is a subject which has no answers, clearly, but represented some troublesome decisionmaking for the people who were trying to both design the facility as well as trying to determine if that is a sensible policy.

So I think Bob's point that there is current turmoil, both in philosophy as well as detail, I think is correct, and it would be the function of this committee to remain a steady tiller through the stormy seas, and all that sort of stuff.

Thank you for your comments, Gene, we appreciate it.

MR. HINZE: Do we have copies of Gene's letter?

MR. STEINDLER: I don't have a copy of Gene's letter. We have Luther's article.

MR. ROSENBLUM: I will be glad to provide you copies.

MR. STEINDLER: Also Erikson's.

MR. ROSENBLUM: I will get you copies. I don't happen to have them with me, but I will provide them.

MR. STEINDLER: That would be fine, if you could ship it to Howard or Rich Major.

MR. ROSENBLUM: Also, I have a paper on the same subject which is accepted for the international meeting in Las Vegas in May on the same subject of extended retrievability which also has a considerable discussion of

NRC regulations regarding backfill and problems there. So I will send you a copy of that also.

MR. STEINDLER: That would be fine. Thank you very much.

MR. HINZE: A copy of 903 as well, and we will get photocopies made. It would be much easier if we have it in hand.

MR. STEINDLER: Let's resume the agenda. Our next topic of discussion is the review of the staff technical position on fault avoidance and the lead member for this activity is Paul Pomeroy and I will turn to the meeting over to him.

MR. POMEROY: Thank you, Mr. Chairman.

Before I introduce Keith, I would like to make one or two comments just to remind us of the background. I presume all of you have read the status report in your notebooks, but if you remember in 1991, essentially, we reviewed the first staff technical position that bore on the question of seismic hazards. That is namely the identification of fault displacement and seismic hazards at a geologic repository.

In a letter to the Chairman on January 24th, 1992, we essentially approved that first part of the seismic hazard analysis. We felt at that point in time even that there were two additional parts, and the staff shared at

least one of these pleas with us, namely that there should be some discussion in the guidance with regard to setbacks, and there certainly needed to be a third STP on seismic hazard analysis, how you did it and what would be acceptable to the NRC process.

In November of 1992, we actually reviewed the draft copy of the STP that you have in front of you, namely the consideration on all fault displacement hazards on geologic repository design. This is the so-called "setback STP." We essentially agreed with the philosophy of this STP at that point in time. I certainly don't believe my opinion has changed on that subject, but we did have a strong feeling, and I especially had a strong feeling, that we wanted to have one more opportunity to look at it prior to its issuance after it had received public comment, and we wanted to review with the staff the public comments received to make sure that we had at least the full range of opinion before us prior to signing off on this second STP.

I would say the second STP is the result, direct result, of our suggestion, and perhaps it was a recommendation and perhaps it was an insistence that this be issued, so that it would be perfectly clear to the DOE and any other parties what the position of the Nuclear Regulatory Commission was with respect to fault displacement hazards and setbacks.

I would like to now introduce Keith McConnell who is Section Chief for Geology and something, which I have forgotten, and he will do the presentation on this STP.

Keith, the microphone is yours.

It is Geology and Engineering -- I always forget Engineering.

MR. McCONNELL: Well, it is actually Geophysics, but that is applied engineering, I guess.

MR. STEINDLER: As long as it isn't a Ouija Board we are okay.

MR. McCONNELL: I have to say, it is the ultimate challenge to come to the podium after Mr. Bernero makes a presentation, and I just hope that I can approximate his skill.

[Slide.]

MR. McCONNELL: As Dr. Pomeroy pointed out, I am here today to discuss with you the final draft following public comment of the staff technical position on consideration of fault displacement hazards and geologic repository design.

Before getting into the position itself, I would like to recognize Mike Lee, who is not here today. Mike Lee probably is more responsible than myself for getting the staff technical position to this point.

[Slide.]

MR. McCONNELL: With your indulgence, what I would like to do is just go back over some old ground, go back to the basis for the STP, and then provide or describe the positions that were actually taken in the STP, and then have a couple of viewgraphs at the end that will describe the comments in very general terms.

Going back, in December of 1991, I think it was in relation to the first staff technical position the investigation of fault displacement hazards, we had a viewgraph in there that discussed the staff's position with respect to fault displacement hazard and repository design at that time. There were these four bullets, basically that prudence suggests caution regarding design to accommodate displacement; that design for fault displacement must provide reasonable assurance of meeting performance objections; that 10 CFR Part 60 does not contain any specific requirement for a setback distance; and that the staff would expect that there would be early resolution of any fault related design and performance issues if DOE considers or contemplates designing for fault displacement hazard. It was these four bullets that formed the basis of the STP and basically the STP was built around these four bullets.

[Slide.]

MR. McCONNELL: I won't go through this because

Dr. Pomeroy has more or less described the chronology. There is very little to add.

[Slide.]

MR. McCONNELL: But to go to the specific objectives of this staff technical position, the objectives were to describe an acceptable approach, the consideration of fault displacement hazard in repository, to identify those regulatory requirements that relate to potential adverse conditions -- in this case, structural deformation or faulting in repository design -- and the scope, and this is important when we get to the comments, the scope of the staff technical position is very narrow and focuses only on design considerations with respect to fault displacement hazard, does not consider all the ramifications with respect to overall systems performance, and does not get into those design measures that might mitigate fault displacement hazard.

Again, it is very narrowly focused. You will see when we get to the comments that particularly the State of Nevada was concerned about the narrow focus.

[Slide.]

MR. McCONNELL: The first position taken in the staff technical position, and this was a particular concern, I think, to the committee and also to one of the outside groups, I think the Edison Electric Institute, that the

presence of Type I faults -- and I will, in the next viewgraph, describe what a Type I fault is -- inside the controlled area of the geologic repository does not by itself disqualify a site.

The basis for that is that, again, there are no specific setback or exclusionary criteria in 10 CFR Part 60, and also the Commission was quite explicit in NUREG-0804 that the presence of a potential adverse condition, in this case structural deformation or faulting, did not disqualify a site.

[Slide.]

MR. McCONNELL: Just to refresh your memory on the definition of the various types of faults, and these are out of NUREG-1451, which is the investigations STP, we list all three types here, but the most important here is a Type I fault, and those are faults or fault zones that are subject to displacement and are of sufficient length and located in such a manner that they may affect repository performance or design.

[Slide.]

MR. McCONNELL: The second position taken within the staff technical position was that when establishing specific locations for critical facilities, Type I faults should be avoided where this can be reasonably achieved. This is a good sense or common sense approach to waste

emplacement that the staff more or less codified in its position.

The reason for this, or the basis for this is that there are uncertainties i the characterization of faults, and it is going to be very difficult to demonstrate with reasonable assurance that any engineering measure that mitigates fault displacement hazard, it is going to be difficult to demonstrate that that will compensate for the condition. So the approach the staff has taken is that it is better to avoid sources of uncertainty in your calculations when you can do it.

Also another basis was that the reliability of engineered measures are subject to certain limitations, particularly when you start considering a 300 to 1,000-year waste package lifetime and a 10,000-year performance period.

[Slide.]

MR. McCONNELL: Related to that, the second or kind of a subset, if DOE does choose or is forced to choose to locate critical facilities on or in the immediate vicinity of Type I faults, they should recognize that the reliance on engineering measures is of limited value. The bases are basically similar to the last position, Position 2, that there are uncertainties in the characterization of fault displacement hazard that have to be recognized, and that engineered measures over the long-term are subject to

certain limitations.

[Slide.]

MR. McCONNELL: But the bottom line, no matter what DOE intends to do, is that they must be able to demonstrate, again with reasonable assurance, that any proposed repository facility designed to accommodate fault displacement hazard meets 10 CFR Part 60 design and performance requirements. The basis for that is the requirements in 60.21 which relate to the description and assessment of all the conditions at the site, both the engineered and natural barriers.

MR. STEINDLER: Could I go back for just a second to 2A?

MR. McCONNELL: Okay.

MR. STEINDLER: In your statement of basis, did you have a particular scenario in mind, or is this a generic statement? The "reliability of engineered measures can be subject to certain limitations" can be interpreted either as a motherhood statement, which is, you know, clearly true, or a reflection of a particular scenario that you had in mind, which drove that?

MR. McCONNELL: I think it was both. There is the motherhood statement there, but there are also discussions, particularly with respect to the Nuclear Waste Technical Review Board where some of those people in the engineering

community said, well, we can design or you can convince the engineering community that you can design for a certain magnitude of displacement, but beyond that you are going to have a hard time convincing the engineering community, even, that you can design for that level of displacement.

So I think there was both a scenario and a motherhood statement involved in that basis.

MR. STEINDLER: Okay.

[Slide.]

MR. McCONNELL: That is basically the STP in very shortened form, even though the STP itself is very short. We got very few comments. Basically, we got comments from the Association of Engineering Geologists, including the AEG's Engineering Geology Standards Committee and the Seismic Safety Committee. We got comments from the Department of Energy, and we have also gotten comments from the State of Nevada.

I am informed that there may be another group of comments that somewhere in our communication chain we broke down from EEIU Waste. We will find out what those comments were, pull that out of the file, make sure they are addressed before we issue the final STP. If this meeting with the committee has done nothing else, it has brought that to our attention.

[Slide.]

MR. McCONNELL: The comments from the Association of Engineering Geologists and the Department of Energy were generally favorable and did not require significant modifications to the STP.

The State of Nevada criticized the STP, and I will point out that there is a problem with out viewgraph. This probably should be a comma or a semicolon and a lower case. Their criticism was focused on the limited scope of the STP and factors that they thought should be considered include the consideration of faults as possible conduits for fluid or vapor flow, and also the lack of consideration of 10 CFR Part 60 design requirements, specifically relating to design factors.

We believe that these complex issues are beyond this very narrowly scoped document and will be the subject of potentially the analysis STP or even engineering design STP that is under consideration in the future.

In any event, all of these issue will be addressed in our license application review plan, and the various elements within that review plan that deal with both performance assessment and engineering design of critical facilities.

So basically, in conclusion, there were no significant changes made to the substance of the STP following public comment period because most of the comments

were either generally favorable or beyond what we considered to be the scope of the STP. Pending the ACNW's review of the STP, we will go final and publish it as a NUREG, hopefully before the end of the fiscal year.

I think that is basically all I have.

MR. POMEROY: Thank you, Keith.

Are there any questions from the committee, or Ken?

MR. GARRICK: Does the staff technical position build on their reactor experience and employ similar definitions, et cetera?

MR. McCONNELL: We tried that back with the investigations STP, and there was a groundswell of, I guess, dislike of that approach. In fact, we used parallel terms, if you are familiar with capable fault, we used the term "susceptible fault" in NUREG-1451, and there was great concern of that type of adjective being applied to any sort of fault because of what could be considered, I guess, a negative connotation to any fault. It was considered susceptible, and that is how we ended up with Type I, II and III.

So we were aware of those requirements, but we didn't parallel them. But these are not inconsistent with them.

MR. BALLARD: This is Ron Ballard. I would add

one point there, though, that we did assure ourselves that there are no inconsistencies in this approach with those that are built into Part 50 and Part 100.

MR. HINZE: Keith, outside of my fundamental concern that anything that is this universally accepted can't be really that good --

[Laughter.]

MR. HINZE: -- I do have a couple of questions, and they are certainly trivial. In the glossary, Type I faults, I would find it very convenient and very useful for you to use the parenthetical expression "e.g. quaternary faults." I think that is a very critical item in defining the Type I fault, and you have it in the document, and I think it would be useful there.

The second comment that I have is that I don't think you ever mentioned Type II faults in the document, so why do you have it in the glossary? If I am wrong, I will stand corrected.

MR. McCONNELL: No, I think you are correct.

I think you are correct. We will take it out if it is not in there. I don't remember referring to it.

MR. HINZE: It is not in there, I don't believe, other than that piece.

MR. POMEROY: Thanks, Bill.

Marty?

MR. STEINDLER: Fine. Are you looking for a communication from us concerning the technical position, formal or otherwise?

MR. McCONNELL: I don't think so unless you have some comments that you want to give us. If you have no comments then we would take what you give us today and go forward.

MR. STEINDLER: That sounds like the most expedient way to do it. I think you have probably heard all of the comments that we would transmit to you, if you exclude the first one from the geologic friend to my left here. I think we are in pretty good shape.

[Laughter.]

MR. STEINDLER: Paul?

MR. POMEROY: I think you should move forward as rapidly as possible, Keith. We are all aware of the implications of this relative to the Sundance Fault and the Ghostdance Fault. I think we all agree that it is an STP whose time has come.

Before we leave this subject through, Mr. Chairman, I would like to note that Ron Ballard, the Branch Chief of the Branch of Geology and Engineering is with us today, and this may be one of the last times that Ron is with us. I wanted to express my appreciation and, I think, the appreciation of the committee as a whole to Ron for his

help over the years. It has been a marvelous relationship, and we certainly look forward to seeing you occasionally in the future, Ron.

MR. BALLARD: Thank you.

MR. STEINDLER: I would certainly second that. I assume the reason for you not being here is retirement rather than something other.

MR. BALLARD: That is about it. 33 years is about enough time.

MR. STEINDLER: That's enough in the same job.

MR. BALLARD: Let somebody else work on it.

MR. STEINDLER: We will talk to you about that sometime.

[Laughter.]

MR. STEINDLER: Thank you very much. We are significantly ahead of schedule, a phenomenon to which I am not accustomed. I don't know how to handle it.

MR. POMEROY: It is a talent, Mr. Chairman.

[Laughter.]

MR. STEINDLER: It has been one of those weeks. Let's then move to the next item on the agenda. We have got some summaries that we need to hear about. I am wondering whether the agenda will allow us to stop the recording of our transcription -- no, perhaps not. We will keep moving.

I think, Paul, you are also up for the next

portion of the agenda.

MR. POMEROY: Yes. Thank you, Mr. Chairman. Actually, both Lynn Deering and I are going to try to provide some information on the Nuclear Waste Technical Review Board Meeting on probabilistic, seismic, and volcanic hazard estimation that was held in San Francisco earlier this month.

You have an extremely good meeting summary before you in the form of a very thick document that contains many but not all of the handouts at the meeting, and several pages of Lynn's commentary on the meeting. I am not going to repeat those. I do want to make a few general comments about what happened at the meeting.

First of all, I think it was an extremely useful meeting. We certainly appreciated the opportunity to participate in that meeting. I will tell you why I think it is perhaps important or perhaps you can surmise it as I speak somewhat.

The meeting was divided into two sections on two days, somewhat logically. The first day dealt with semiological hazard issues and the use of probability in those studies. The second day dealt with volcanic hazard estimations and the use of probability in those estimates.

Let me deal first with the seismic hazard issues. John Whitney gave a very excellent presentation on the

current status of geological activities that are directed toward, in DOE's mind, developing database for a seismic hazard analysis.

There is a handout in this mass of material from John Whitney that lists about 20 areas where data were needed, and some estimates of the percentage of the data that has been gathered. That, in a rough way if you just look at it, averages out to about 75 percent or so of all the necessary data required to do a seismic hazard assessment.

Then DOE presented a methodology for doing seismic hazard estimates. The presentation was straightforward. In my estimation, it could have been -- the hazard methodology was essentially a methodology which could have been presented several years ago.

The problem came up in that nobody has done a seismic hazard assessment in a true sense at Yucca Mountain, and the perception that I came away with was that that was going to go ahead at the same time the Department of Energy was submitting a topical report on hazard methodology to the NRC for approval.

I think it is fair to say that the presentation of methodology met with a great deal of concern, justifiable in my mind, from the various members of the Technical Review Board that were there in the sense that -- I think Dennis

Price put it in terms of the methodology: all I have to do is close my eyes and I see paradise.

[Laughter.]

MR. POMEROY: Other members of the Technical Review Board were somewhat less charitable in asking very reasonably why a seismic hazard assessment had not been done given the fact that they were 75 percent or so through the database presumably required for a full scale hazard assessment, why hadn't an assessment been done.

There was no real answer to that, so it was somewhat -- the tone of what happened during that day was unfortunate, let's say, for the DOE in terms of its seismic hazard program.

Nonetheless, there was some extremely interesting discussion that took place throughout the day which was fairly important. Both of these hazard assessments, of course, required a great deal of use of expert judgment and that is a subject near and dear to my heart. As you will see in examining Lynn's text, we did talk a lot about the possible application and the lack in some cases of the best approach to use expert judgment in the licensing process.

I found one other point I wanted to make about the probabilistic seismic hazard assessments. I think Steve Wisnowski from the University of Nevada at Reno gave one of the nicest presentations I've heard, which, in essence, was

a warning in the use of probabilistic methodologies. Not that Steve doesn't believe strongly in probabilistic methodologies and he uses them all the time in his work, but he nevertheless made a very cogent statement, well documented, about uses of probability and the possible pitfalls.

I personally believe we need more responsible discussion like that in a public arena to really point out what the strengths and weaknesses of probabilistic assessments are.

I think that is all I wanted to say about seismology. Seismology didn't do well at this meeting at all.

MR. STEINDLER: If you are going to move to volcanism, can I talk about seismology?

MR. POMEROY: Sure.

MR. STEINDLER: I've got two comments. I found Lynn's summary to be eminently reasonable and readable both because it seemed to focus on what I guess have to be pretty important point, and, two, because I think that there are some things in here which I think the committee at least needs to be cognizant of as potential issues for it.

One is a comment attributed to Sullivan at DOE that it is the general notion of DOE to try and reach closure on methodology. That may be the one and perhaps

only rationalization for not having completed a seismic analysis of Yucca Mountain.

If that was used that way, perhaps understandably, but my question is, the whole question of closure on issues such as methodology, is this a topic that we should discuss further and urge people to at lest come to grips with? We hear both sides of that so often that it isn't very clear just where the Staff, for example, would come down on it and whether or not that represents a reasonable approach.

That remains, I think, an unresolved point, not only in the case of seismic issues, but in other methodologies that are still up for grabs, expert judgment being the classic one.

Which drives me to Lynn's point that DOE apparently -- and as far as we know that's correct -- does not have a formal plan for the incorporation of the use of expert elicitation into the probabilistic seismic hazard analysis regime. And if DOE does not identify this issue through a topical report and the NRC Staff has not elected to the address the issue in a definitive sort of way, our predictions have been in the past, and continue to be, that this is going to come gradually oozing up to the licensing stage, and at that stage of the game it is going to be an enormous polemic which will be touch to resolve in any kind of reasonable time schedule.

Is that an issue, which we've discussed before if you remember in your working group meeting -- is that an issue that we should revisit to urge the Staff to begin to focus in on it, or at least to have a more hard-nosed dialogue about where they are with DOE, to use it as one of the topics of technical exchange between DOE and NRC?

I bring those two things simply to the table as issues that we could extract, that I had extracted out of this part of the summary.

MR. POMEROY: Can I briefly comment on those, sir?

MR. STEINDLER: Sure.

MR. POMEROY: The closure issue is one of some interest. In fact, I used the term in some remarks that I made to the meeting. I quickly said that I recognized that we couldn't do any issue resolution in any formal sense because of the agreements between all of the parties with regard to the issue of resolution in question.

Dave Tillson, who was giving Carl Johnson's remarks pointed out though that he felt that the state at least was in favor of trying to research some closure, if you will, on the methodological issues.

So I don't know that -- I think we are. It is a question that we should look at perhaps in a broader sense, but perhaps there is more agreement out there in terms of the closure issue than you might think.

With regard to expert judgement, perhaps we need to clarify. I think that there are things that need to be done. In fact, you give me the excellent opportunity to jump on my soapbox here. I told the group that I personally felt that we didn't have sufficient grasp of where exactly and how exactly we could use most effectively expert judgment in the licensing process, and that it certainly would be a useful research project for the Department of Energy to undertake prior to coming into a full-scale licensing hearing with expert judgment involved in their discussions.

It is not that DOE doesn't plan to use expert judgment in doing these assessments. It is more a question of who is involved in doing the expert judgment. I think that is a viewpoint that I have, and a viewpoint that is shared by some of the members of the Technical Review Board.

DOE philosophy seems to be let's let our people who have the greatest knowledge of the site participate in any expert elicitation process, and following that we will submit the whole thing for a peer review, and presumably that's where external opinion can be brought into the hazard assessment.

I told them that I thought there was another way to do that. That is to involve outside experts through the entire process and do these full scale hazard assessments

with outsiders involved at every stage of the process. Similar to the way EPRI handled its seismic hazard methodology project for the eastern United States.

I believe that some of the people that I talked to were going to consider that question very seriously, and I do think that we need to keep expert judgment firmly in our mind. I would like to think that there might be something to review in the next year's timeframe in terms of at least a first report from somebody who might be examining the use of expert judgment in more detail.

I believe there is a pilot study underway at DOE to look at the beginnings of this question.

Volcanology provided a sharp contrast to seismology on the second day that was interesting and it brought up what I consider to be another demonstration of a problem, but which some of the representatives, some of the Technical Review Board members felt was a positive aspect of what has been going on.

If any of you read in detail some of these slides, you would see that Bruce Crowe's presentation differs considerably from the LANL publication that he authored that the NRC later reviewed. Keith and the NRC provided their comments at this meeting on a submittal that indeed was the LANL submittal.

Since that time, Bruce Crowe especially has taken

the comments of the Nuclear Regulatory Commission somewhat to heart and has moved to some extent in the direction of considering the comments on the science that were made by the NRC.

So in any case the NRC presentation at this meeting was addressing the previous publication and Bruce presented a number of new, upgraded results that really indicated that DOE was responding to the NRC's input to at least moving in the direction of responding to some of the input. That was a very positive feature.

MR. HINZE: May I ask you a question about that? Does that mean that we have seen the last of the status report from Los Alamos? Are they revamping it or are they just taking to heart the oral comments and the written comments of the NRC?

MR. POMEROY: Maybe somebody else can help me with this. My impression was this essentially represented an expansion of that document and it was not clear to me what the next step was going to be.

MR. STEINDLER: I think maybe Keith might be able to help you.

MR. McCONNELL: I do not intend to speak for DOE but the original report was a draft. I've read in monthly reports coming out of DOE they have finalized it I think in February of this year and I assume we will see it some time

in the near future as a final report.

MR. HINZE: That would be a DOE report then that you will then review?

MR. McCONNELL: It is my understanding that it will stay a Los Alamos National Labs report. There is a consideration or a milestone in some of DOE's diagrams that they will make a decision that it might be a topical report or turned into a topical report in 1995.

Based on our first review or our review of the draft, we indicated that we would review the Los Alamos National Lab's final report to see how they had addressed our comments at that stage.

MR. STEINDLER: Thank you.

MR. HINZE: Is it clear then, going back to Marty's question then related to volcanism? Is it clear that NRC is relatively satisfied with the way that the methodology that is being used in volcanism now, with the revisions, of the status report?

MR. POMEROY: I certainly cannot speak for the NRC Staff. My impression was that the people at the meeting said that this indicated some progress, that it sounded at least as if DOE was listening to what they had to say. Again, we could perhaps ask Keith if he has any comment on that.

MR. McCONNELL: I think we were encouraged.

Particularly we were encouraged by the next presentation that Paul probably has not gotten to yet, which is the discussion by Kevin Coppersmith that they are going to do their own sort of expert judgment analysis of the volcanism using, I assume, the EPRI style of analysis.

We felt that that was a positive development in the consideration of volcanism and we will wait to see the results of that.

MR. HINZE: Thank you.

MR. POMEROY: That of course does take care of the next paper and does a very effective job on it. I think that that is a good nexus, that approach, and I believe that that was interpreted that way by the members of the TRB as well.

The overall impression one had coming away from the second day was there was at least some converging of the minds between the NRC and the DOE and the DOE was moving forward, if not hand-in-hand with the NRC, at least they were communicating with the NRC. I believe there are still significant problems with that. We have seen difficulties in communication before between the two groups.

I think Warner North in his presentation to the Commission recently was favorably impressed with the communication between the two groups but I think we are still struggling with the problem of effective communication

in any one of these areas between the NRC Staff and the DOE Staff on a technical level. I think we have to keep that continuously in mind as we go on with this.

In any case, coming away the second day everybody felt that volcanology was in a lot better position than seismology in that discussion. I think we came away with the feeling, everybody came away with the feeling I think that probabilistic hazard assessment, probabilistic seismic hazard assessments, volcanic hazard assessments are clearly the approach to take even with the caveats that were provided.

I think that that has some ramifications for the NRC Staff. I know Keith feels that there should be a deterministic element, a strong deterministic element in these probabilistic assessments. I suspect that there will be. In fact, I suspect that in the final analysis we will see several probabilistic seismic hazard analyses and I think we will see several deterministic hazard analyses as we have in certain instances with reactors on the West Coast and I don't think that we need to be especially concerned about the relative balance of probabilistic and deterministic analysis in this context.

It was a useful meeting. It did demonstrate clearly that DOE was listening in the volcanology case and hopefully they will move forward in the seismic hazard

instance as well. That is all I have to say. Lynn, do you have any thoughts that you would like to offer? You have done an excellent job by the way of doing this.

MS. DEERING: I would add that it was acknowledged that, yes, DOE appears to be making progress by incorporating some of the concerns over time that NRC has raised on volcanism, but it was acknowledged that this was in all likelihood or obviously due to the fact that NRC had been making these concerns known and going out on the record with those, so it wasn't a self-initiating kind of effort, that seemed obvious, but it was encouraging I think to the TRB that NRC said well, we have seen some new things here or we have heard some new things and it looks like perhaps some of our issues are really being addressed.

It was also acknowledged -- the NWTRB briefed the Commission and from what I understand, I wasn't there, but they did say that volcanism in general we feel pretty positive about the progress and communications, and I think that the word "well-ventilated" -- issues are "well-ventilated" -- there may not be agreement, but a lot of ventilation.

However, during the meeting it was acknowledged that a better method, more informal communications, a mechanism for that should be searched for. During the meeting that was raised by I think it was Alan Cornell, who

was a consultant to the TRB and Keith McConnell also raised that so that was brought up as an issue.

MR. STEINDLER: A couple of points. It is too bad that the most progress that is made in the most insignificant aspect of the risk. You know, volcanism as somebody said is a no, never mind, but boy, progress is really being made like mad there.

[Laughter.]

MR. STEINDLER: That's a little strong, perhaps.

I don't know where Warner North is coming from when we cited the saying that communications are really excellent. I am not sure that we have seen enough evidence to warrant that kind of a conclusion. That also tends to put people in a more relaxed mode about trying to improve them.

My question to the committee is, one, do we believe it, and two, if we do, fine, I'll talk to each believer privately, but if we don't is there some mechanism that we should initiate to suggest to the Commission that there are things to be done?

The other issue is how do we in fact help generate a more functional and formal communication method, other than to recommend that everybody talk on Internet, or, you know, essentially without records? I think that is an issue that is going to continue to get worse more than better.

MR. POMEROY: I think the lack of communications were clear at this meeting, in fact. The NRC commented on what they had seen, which was a document that is a couple of years old now practically. Those comments were then demonstrated or just prior to those comments it was demonstrated that indeed DOE had heard those comments but they presented a whole new set of data and one would have been much better served, I believe, if the NRC had access to that data prior to a public meeting so then they could have commented more effectively on the current state of understanding on the volcanic issues on the part of DOE, so I don't think communications are all that good.

I think the fact that DOE actually heard something that NRC said perhaps, and that is overstating it, but perhaps that alone is an indication that there is some improvement in communication and that is perhaps to be desired. I don't know what we should do in the future.

MR. HINZE: I would like to make a comment or two.

It seems to me that this is not just a matter of communication in the ordinary sense but it is a matter of sensitizing the groups to really listening to each other. There needs to be some help in that area.

I think this is a critical enough point that it is significant that we comment on it and I think that we have the opportunity to comment on it through the volcanic

research issue that we have a straw man letter developing.

I don't know how to do this. One of the things I would like to learn more about is that Keith mentioned last month at our meeting that -- I think the terminology was the Appendix 7 was being reconsidered or being revamped. Frankly, I know nothing about that and I would like to learn something about it before we write our letter on this topic, so some information here would be useful to us.

I think that if this point is ever going to be brought up, it has to be brought up very soon to try to hit it at a timely point. I guess in terms of the communication issue one of the things that I came away from the June meeting of the technical exchange and the status report was that the NRC Staff was most disappointed about the lack of the integration of the tectonics with volcanism and I don't see anything in this report that deals with that and I have not studied it in detail, but was there anything in this report to the TRB that in any way alleviated our concern and the NRC's concern in the tectonics and volcanism research?

I think that could be a kicker that would set back some of those comments that Marty stated that this may not be very important -- it may not be very important to the site itself.

MR. POMEROY: It does not necessarily come completely through here but there was a significant amount

of discussion about the integration of geological models into the volcanic assessments. Of course, Chuck Connor gave a detailed presentation and the thrust of his presentation in fact was again that the geology should be considered.

There were presentations on the structural aspects and, indeed, many of the verbal comments by Bruce Crowe. There was a lot more stress on the structural controls and the geology as it affects the hazard assessment and the volcanic ideas.

Yes, I think DOE is beginning to hear that message. I would not mind hearing anything Keith might have to say about that too.

While he is getting up to talk, I would just like to say that I could not agree more on the communication theory with you. Our bitter experience of trying to organize a small field trip of just a few of us to look at the Sundance Fault is an interesting exercise in how it is literally impossible for us and indeed in many cases for the NRC staff to quickly interact on a small basis without having 30 or 40 other people present.

So I think there are significant improvements that need to be made in the communications area.

Excuse me. Keith.

MR. McCONNELL: I do not have much to add to what Dr. Pomeroy said. I think this was one of the first

meetings where we have actually seen apparent communication between the U.S. Geological Survey, communication at a relatively calm level between the U.S. Geological Survey and the Los Alamos National Labs scientists. They appear to be -- what encouraged us was they appeared to be working together on this problem.

We still believe, and Dr. Pomeroy mentioned Chuck O'Connor's presentation that the probability models need to start incorporating more of the geologic data into them rather than making them purely statistical exercises. In our view, at least up until about a year ago, they were largely statistical exercises.

MR. GARRICK: I would really like to comment on that. I am relatively new to the waste field and that comment shocks me because I must be seeing this wrong.

I have never seen the debate as deterministic versus probablistic. I only see the problem as deterministic and probablistic.

If you agree that you are going to calculate the same parameters, then all the probablistic analysis is doing is addressing the question of how much confidence do you have in your calculation. So I see it as an added dimension in scope.

It's been my experience that as the probablistic and deterministic calculations are made in an industry and

those disciplines mature, that the deterministic people and the probablistic people do indeed converge on the same parameters and the whole issue tends to dissolve in the sunset.

If there are probablistic people out there making calculations without incorporating the phenomenonological issues, without involving the geologic data, without doing first a very comprehensive deterministic analysis, my conclusion is that they are doing it wrong. And they are not doing a competent probablistic analysis.

Now, there is one thing that will happen with time, as it happened in the reactor business. That is, the scope of the deterministic analysis will change with time as we become more intelligent as to what's important. We don't need to do the same comprehensive, large LOCA analysis today as we did in the past because we have a much better sense of its importance and where it fits in the general scheme of things. But we certainly cannot do a probablistic analysis of a large LOCA without doing a deterministic analysis.

I hope that the waste field begins to capture that important lesson to learn and this whole debate disappears.

MR. POMEROY: Let me just jump in there, John. I do not think that you and Keith are very far apart. You are saying that if they did not do their homework to get the geologic controls, at least some idea of what the geologic

controls were ahead of time, then I think that you would agree and that is somewhat where they were a year ago. I would agree with you and I think the Staff would too, without putting words in their mouth, that indeed they did not find that treatment acceptable a year ago.

We are beginning to see at least at the verbal statements -- I have not seen anything printed at this point, but at least the verbal statements that we are going to incorporate, that DOE is going to incorporate more of the geology into their probablistic program.

MR. GARRICK: I do know where some of the problems are.

MR. HINZE: More importantly, you know where the answers are.

MR. GNUGOLI: Part of the problem is, too, how they apply things in the field of waste management. I think as long as it continues that we have things that really are deterministic, called probable maximal floods and things like that, I think we are going to propagate that misunderstanding. I think that how these labels are put on these things, that's really part of the problem that we run into.

MR. POMEROY: That's all I have.

MR. STEINDLER: Well, at 15 minutes before the hour -- oh, sure. Paul would like to make some comments as

a DOE insider. Grab a microphone. Announce your name to the recorder and go.

MR. CLOKE: Yes, thank you, Mr. Chairman. I am Paul Cloke, SIAC, supporting DOE. So I see a lot of things that go on internal to DOE which my impression during the last two days has been that the people here and at NRC and I think even a good many people on the advisory committee don't get communication about.

For example, one of the things which I see is that as soon as we get a letter from the NRC or from the NWTRB or a report that is read immediately and it becomes a cause for what we call a fire drill. We have lots of fire drills.

So it does get very prompt response and what seems to me to be quite clear is that somehow that response does not get back to the NRC in a timely manner. I don't know quite what the reason for that is.

Part of that clearly is because we are under pressure to document everything fully and to make sure it goes through a review process so that we don't have internal dissensions so we provide a position and note external priorities.

Yes, I agree that we need to have a lot better communication in here. Again, I don't have any tremendously good ideas as to how to achieve that.

I would also like to make another comment to the

effect that I get a sense that a lot of people have had the impression that DOE isn't paying a lot of attention to scientific technical issues and perhaps they don't have good scientists involved in there. I am reminded of a comment that our governor in the State of Nevada made a few years ago to the effect that we have a bunch of Keystone Cop scientists in the place. Well, I suppose I am one of those.

I guess my response to that has been, well, the Keystone Cops always won in the end but if any of you want to see my resume, I would be glad to share that with you. I think other people on the program have equal expertise.

I think again it is a communication problem. There are internal priorities as Dr. Steindler has pointed out. DOE's internal priorities don't necessarily agree with those of the NRC on all occasions.

Thank you.

MR. STEINDLER: Thank you.

I would just make the observation that the lack of communication which we find is not to be construed as a commentary on the quality of the technical people, nor is a particular lack of response to be construed as a quality of a technical people. It occasionally does arise that communication barriers cause translation of views. The other issue, of course, is that not everyone agrees that the particular chunk of advice should be followed because it may

be viewed as being incorrect.

However, we have a little bit of time.

Ron, yes.

MR. BALLARD: Ron Ballard here. I just would like to add one more comment, first on communication. My own characterization would be that I do believe it is improving. To broaden the conversation a little bit, it is the ESF progress.

We are finding that DOE has been very cooperative in setting up bimonthly meetings now to informally to start tracking on the development of ESF and, of course, along with that, the surface-based study programs. So I think that is really moving in a very positive direction.

I would like to comment on -- Dr. Steindler, you had a comment earlier you were worried about these issues being delayed on and on toward licensing and we're not working on them. I would say that we have had these issues on our plate for several years. We have had resource problems. I would say that we are now in the throes of another budget exercise for the '95-'96 budget. In there we do have at least going into the budget -- I don't know how it will come out when you divvy up the resources, but going in we have Staff technical positions on the analysis methods, TP. We are also starting for '95, we hope actively, to look at the design, seismic design issues from

an engineering perspective by way of our compliance determination methodologies.

And also, another area that is not directly my concern, I believe Margaret Federline would be working on back there, we are trying to get into the budget work on expert opinion starting on '95. Again, this is off the cuff because we don't know how the budget will end up with the resource limitation. But there are, I feel, good -- there is good progress in this area.

MR. STEINDLER: Thank you. I appreciate your optimism. I must say that at times when the Administration is emphatically whittling down the agency's budget. I think it is going to be a tough fight all the way around and perhaps we should engage in some kind of conversation about your priorities and what we can do to give you folks at least whatever support we can muster on that score. The Committee has done that before.

I think whether or not it has been efficient, I will leave to somebody else, but we ought to try again.

Thanks very much.

We have the unaccustomed luxury of having a 10-minute window that we have not counted on. Howard, I guess, has agreed to move his commentary on the waste management '94 meeting up to this point in time.

Howard.

MR. LARSON: I gave you a quick synopsis of the conference in Tucson where there were 500 papers and 100 exhibitors and 2,500 attendees. And, of course, I could not attend all of those papers, but I managed to synthesize it in five pages so that should be worth something.

I also thought that it may be of equal interest if I can do everything Marty would like in 10 minutes is maybe talk a little bit about the hearings that I went to on the Hill in response to a request from Dr. Pomeroy.

In the plenary session, there were three papers. You do have a summary there that has many of the papers. It is Exhibit Number 3. I also attached to it two more papers that I got later, one from Kate Trout at Sandia on 40 CFR 191 and 194 with regard to WIPP and WIPP's attitude on the 40 CFR 191 as reissued. Steve Solomon's paper on the compilation of the cost of low level waste, so you've got those in addition.

Also it may be of interest to you in that package is a copy of the revised 40 CFR 191, because I know several of you had asked could you have an updated copy. I will quickly go through.

The French, the chairman was an interesting fellow. He had not been in the nuclear business, although he had been in waste, environmental protection for some 30 years. He thought that people should recognize that

radwaste has nothing to do with Chernobyl and from his experience he compared Chernobyl to -- as the nuclear industry's Bhopal, two nice comparisons in the conference.

He also noted that we tend to ignore the current generation here. You know, we always keep looking at the future and protecting them and we sometimes tend to forget the current generation.

He thought that waste retrievability should be studied but it should not be permitted to drive the program and that long term surface storage, in his words, were irresponsible.

He had some other comments which are in there and talks about some of the problems.

Also the next speaker was from Germany in the plenary session. He pointed out the problem that Germany is facing now where in East Germany there are no operating reactors at this particular time whereas, in West Germany, they've got 26,000 megawatts of electrical generating capacity. In West Germany, you know, they don't have the salt mine that they had thought they were going to have and they haven't had that since 1978. But in East Germany they've got Oberlin and they are storing stuff in salt.

You've got one half of the country that has no generation but has a place to store waste and the other has no place but has lots of generation.

The German law requires vitrification unless it was noneconomic, something that was of interest to me. But the volume after vitrification has to be less than the original fuel, which shouldn't be a problem.

The nuclear waste negotiator got up and said some of the things that Bob had indicated this morning, that he has got a sunset provision that ends in '95 where in January '95 he's out of business. He tried to make the point that the storage of nonnuclear fuel for 10 to 20 years at an MRS is not dangerous and we may very well have several regional MRSs rather than just one.

There was a situation with Northern States Power, and he said that was a private effort and he couldn't comment on it.

The luncheon speaker was Dick Giman who said that for the first time in his life now he use to talk about we and them and them and us, and now he is on the other side of the table after some 20 years with EPA.

He talked about the need to prioritize projects. He is in the environmental remediation effort in DOE. He also pointed out that the Secretary had just obtained 12,000 new FDE positions for site remediation as part of the effort of DOE to take control of their projects and take them away from the contractors.

MR. HINZE: 1200?

MR. LARSON: Yes. Some will be people that are absorbed, but that was the number that he used.

MR. STEINDLER: I take back what I said about the Administration's budget cut.

MR. LARSON: Well, this is going to save money because DOE and government workers are cheaper than contractors and would be more efficient.

He also wanted to institute the entrepreneurial approach in DOE. I tried to list his objectives and what direction he intended to there on page 4.

His penultimate conclusion was that DOE will no longer throw dollars at a problem in an attempt to solve it, and that people must recognize that just putting more money into a project does not necessarily mean that you are going to solve it. You may put so much money and so much resources on it that you cannot manage it and you are really in effect wasting money. So the idea was to spend the money properly.

I have got copies of the papers and the handouts on 40 CFR 101 session, which I think you will find some of those are interesting as to what considerations went into the revisions of 40 CFR 191.

It was continually stressed by everyone -- and it is a point that sometimes we tend to forget -- is that while we have always looked at 40 CFR 191 and that applies to

everything, what we are really spending most of our time on is Yucca Mountain which is yet to have its own standard formulated.

EPA rejected deep well injection, which, as you remember, was one of the questions that came up in the remand. EPA is required to write site specific standards for Yucca Mountain, which, as Ray Clark pointed out, that is something they have never done before. So it is going to be an interesting point.

Ed Raney had an interesting paper from DOE which I didn't have in here which he gave me this morning which I will copy and get out to you. I think you will find that interesting too.

I also ended up talking to some of the low-level waste people from the states. The California people and some others were concerned that -- you know, they were conducting performance assessments for their facilities, they had already done them, they did them before the branch technical position was out, they were concerned about what this meant in public.

There was also a wide disparity in some of the states as to the amount of effort they felt they put into it where some spent several million dollars on performance assessment and other did it by themselves, and relatively cheaper with their own staff.

It was a well attended conference.

I also had two sessions of the ASME Mixed Waste Committee that I am a member of to go to.

Unfortunately, there was no EPA representative.

The position of the NRC Staff is that they still owe two more guidance documents which they should have out by this summer.

There is one more that they are considering and that is what should be the consideration for a mixed waste laboratory. The request to the committee and anybody else was if you have any other guidance documents that you feel would be valuable in helping to resolve the mixed waste issue, please let the NRC Staff know what you think they should be.

I guess I will have to say that mixed waste just seems to be laying there. A lot of people talking about a lot of things, but you did not see much being done.

MR. STEINDLER: Are there any states that are still considering -- for example, Nebraska. They were discussing the mixed waste problem associated with their designs. Is there any talk of that in other repositories.

MR. LARSON: No. But you have probably seen -- or if you haven't I will give it to you before the day was out -- that California is saying help us; in order to reach a compromise with the state and everyone else associated with

this, we will just make it a Class A disposal facility, Ward Valley, and we will worry about B and C and mixed waste and everything else in the future, but in the meantime at least let us get rid of Class A waste.

But you are right, though. I just haven't seen anything. It is a topic where you know the states have requested that DOE consider, since they have the most mixed waste in the country, that they store it somewhere on some facility whether it is a DOD facility or a DOE facility or one of the facilities they are closing down, but there is no action on that either.

MR. STEINDLER: There is not action within DOE on that topic?

MR. LARSON: The action is that they are considering it, but they feel -- I can't talk about -- what I have heard is that they don't have a position on that yet because there are too many considerations.

MR. HINZE: Mr. Chairman, is there someplace here that we should be concerned about this? I still am concerned about the lack of mention of mixed waste in the low-level waste BTP, and I just wonder if we are getting ahead of a situation here without considering all of the factors. What can we do to help the mixed waste situation or at least make certain that it is properly being considered?

MR. STEINDLER: My judgment is that in the revised focus of the committee the question we would need to ask is at what point does the issue of mixed waste come before the Commission.

The Commission has in the past, I believe, at least my interpretation is that the Commission has found in the past that it was somewhat frustrated with its interactions with the EPA. Two, it has already assigned what actions it thought it could profitably take to the Staff, as Howard has just pointed out there, a few guidance that are left to be issued.

DOE is managing its mixed waste as best as they can recognizing that there are some interesting difficulties when you try and do that. The most significant of which from a laboratory scientist standpoint is just the ability to be able to do the analysis to find out what is in the pot that you now has been labeled mixed waste.

The analytical chemical laboratory that handle truly mixed waste are relatively few in number because of the enormous amount of red tape and other nonsense that you have to go through.

I think -- I don't see any window of opportunity, if that is the right term, for us to do anything significant to bring this to the attention -- formally, to the attention of folks. On the other hand, I would recommend that we

continue to at least raise the issue among ourselves and perhaps by that noise level we can make some impact.

MR. LARSON: On the other two meetings I went to, the House of Representatives --

MR. POMEROY: Before you go to that, Howard, there is a question that you wrote in your write-up that I thought was rather important. Namely, doesn't the NRC have to write a conforming Part 60 for CFR 191 as it exists as well as for the Yucca Mountain.

I think the answer is yes they do. I am not sure how they do that both for 191 and for the Yucca Mountain standard that doesn't yet exist.

MR. LARSON: I was not clear after Bob Bernero talked around that issue this morning. I don't know what the answer is.

MR. STEINDLER: On a logical system of a hierarchy of standards and regulations, Congress has inserted itself and screwed it up, frankly, by requiring site specific standards rather than commonly required environmental standards for the EPA.

But that being what it is, I guess I view the thing as the NRC having to write regulations that conform to whatever the standards are that the EPA writes up.

So there are going to be two, effectively, Part 60s eventually put together and if the NRC is smart they

will turn it into one.

MR. LARSON: I thought Bob said this morning he still thought a generic regulation was what was necessary.

MR. STEINDLER: I did not hear the necessary. I thought I heard desirable. There is a big difference. I suspect eventually that is going to get resolved, at worst, with having two separate documents.

MR. LARSON: The other day of hearings for the TRB with the Commission in the afternoon and the morning, which was really an appropriations subcommittee hearing, I summarized that and they are traveling in your mail. I summarized eight hours of hearing in three pages, so I getting better.

It was three people that went in to talk to the appropriations committee on their budgets: Dreyfus for OCR, the nuclear waste negotiator, and the TRB. Mr. Dreyfus wanted 552 million and the TRB wanted a few million, I think 2.7, and the negotiator wanted less than a million. So it was a difference in requests and also a difference in time.

Dreyfus stated that 1998 fuel acceptance by DOE was unlikely and that, as Bob said this morning, they wanted another 142 million out of the waste fund in '95 to bring the total up to 552.

There was a lot of discussion about why it had to be done that way, and what could be done, and some of the

problems among some of the members.

Congress was concerned that there wasn't any schedule yet. They made the semi-sarcastic comment that perhaps there was not any real basis for any, even the first one. They were concerned with the lack of progress, the number of audits, and the oversights of Yucca Mountain as was pointed out by one of the members that, let's see, you are 200 feet into the tunnel and you've had 18 audits, that is an audit every ten feet; and you've had 50 reviews, that's one every four feet.

[Laughter.]

MR. LARSON: Dreyfus stated that there really -- though he hadn't been associated with the project for years, as far as he was concerned there were two real problems that slowed the project over the page 12 years, and one was satisfying the State of Nevada's requirements in some areas to make sure they could get the necessary permits, and the need to collect data in an evidentiary manner. He said the samples that they took had to be collected like bullets from a crime scene.

They wanted to know how much time and dollars were spent on audits, and they said that they would get it to them. They talked about the NRC's presence on the site and NRC's questions, and it came up that in the beginning, you know, they had to answer a bunch of questions and concerns

from the NRC particularly in the area of quality assurance. And the comment was form Congressman Meyers that the NRC would questions why the sun even comes up.

MR. STEINDLER: That sounds like a reasonable question.

[Laughter.]

MR. LARSON: Unless they go the extra dollars he could not proceed ahead with everything. The main direction that DOE was going to go in was the site suitability, that the activities associated with licensing would just have to suffer. If they got the extra 142 million this year and other years that they could proceed ahead to do all of their activities consistent at the same time. Determine site suitability by 1998 and submit the application to the NRC by 2001.

The Chairman asked why not use the Corps of Engineers to build the site? He considered them the best constructors in the world and they are already on the payroll. There was some dancing around the response. Dr. Dreyfus had worked with them on the dew-line but indicated that he thought that the contractors they had at this particular time were fully qualified and knew what they were doing.

TRB -- the significant question there was the one that has come up several times this morning that Dr. North

noted, the recent discussions on volcanic issues he thought were good -- he'd just come from the same meeting that you were at -- but there were problems with the seismic.

Stallings just, as I said, talked about the fact that he was going to sunset and he was going to do his best. He thought things were going much better than he had thought they were when he got there and that more progress was being made than he thought was possible, but that this was an election year and that politicians may change their mind but there weren't any specifics as to what activities that he thought the progress was.

The TRB meeting, I gave you a copy of the transcript plus the handouts. You will see that Dr. Candlin and Dr. North made the presentation. They basically had a couple of questions for the NRC, that they thought the NRC ought to look at its ground water travel time criteria and they needed to clarify the subsystem tradeoffs.

There was a lot of discussion on this and in the end, as you will see, Dr. North indicated that after hearing the Commissioners repeat many times that they had been accused that you had to bring us a rock and we'll tell you what it is, that that really unfortunately was the position of the NRC. We couldn't provide that much additional guidance to DOE and then review whether they had performed in accordance with our guidance. Dr. North indicated that

he thought that he had learned a lot at the meeting and that perhaps the TRB should change the advice and be harder on DOE in telling that they should be much more proactive in their dealings with the NRC and make recommendations as to what DOE wanted to do and then the NRC could review it rather than propose to DOE that they ought to work with the NRC, because that just wasn't going to be a possible thing.

There was some discussion on the multipurpose canister. You'll see it in there, with the comment being that maybe DOE was pushing, trying to do something by 1998 but there was a lot of problems with the altered zones it was being called now. One of the Commissioners asked whether perhaps the MPC was not ready to be a real consideration at this time. The response was that the RFQ is probably going to be out any time now, over the next year that DOE would review it, would make an award. It had to be a flexible MPC program because the amount of heat that was generated, the size of the MPC, the spacing of the holes. There were a lot of things that impacted.

The comment that was made by some of the TRB representatives that the NRC should change its regulations prior to getting the input from the National Academy of Sciences and EPA's response to that was raised by Commissioner Rogers that he had a problem with that, and he didn't see how the NRC could do that because it took a

couple of years to revise the regulations and to start on that process now, while the National Academy and EPA had yet to respond, he thought was not too good.

Dr. Cantlin said that he felt that it was -- he just raised the question that perhaps the regulations should be changed to reflect that it is an unsaturated site evaluation vis-a-vis the original intent and philosophy behind the regulations, that it was a generic regulation for site selection, so the regulation didn't really reflect the world in which it was being done.

Dr. Selin thanked the TRB and said that they made three recommendations over the year since the beginning that he always thought was important: site suitability, requiring the systems analysis, and to shift the funding into the resolution of technical issues, and that he thought they were important.

Dr. Cantlin thought that DOE recognized the importance of that, was going in that direction but perhaps they didn't push as hard in some of these areas because they were not technical review board questions when you get into such things as systems analysis and direction of management, but they thought they were important enough that they should mention them but they weren't technical questions for a technical review board.

That's probably a good enough summary.

MR. STEINDLER: Okay. My only comment is that what I thought was the original charter of the TRB has been like the Academy committees expanded significantly, by default, I think.

There are some issues raised in that transcript that I think we might want to talk about at a later date. It would be my intent at this juncture to call this part of the meeting to a halt and go into an Executive Session that is closed and talk about people and do that while we are eating lunch and hopefully do that in an hour, and re-open the open session in an hour.

Does that seem like a rational thing to do? If so, so be it.

[Whereupon, at 12:18 p.m., the open portion of the morning session was adjourned.]

AFTERNOON SESSION

[1:42 p.m.]

MR. STEINDLER: Let's resume the meeting.

We are going to shift the agenda around a little in order to make sure that we can get some of the important input from all of the folks.

Let's pick up the Low Level Waste Performance Assessment discussion, where we want to go, and so on. Paul?

MR. POMEROY: Right. As you know, we were all at a working group meeting on Tuesday on Low Level Waste Performance Assessment program.

My perspective was that we were looking for two things -- one in evaluation of the capabilities of the NRC staff's Low Level Waste Assessment Program, and secondly, we were going to provide input regarding the staff's Branch Technical Position entitled "Performance Assessment for Low Level Waste Disposal Facilities."

We had an excellent group of presentations, as you remember. I am not planning to review those in detail. What I would rather do is after reviewing one small section of the meeting, I would rather offer you a number of bullets of ideas in each area. I would like to draw comments from all of us regarding bullets you don't like, additional bullets, additional ideas, on where we are going in the

future.

I do see this at the moment as resulting ultimately in a letter, but I don't think we should review that letter today. It is not ready even in a draft form for that. I think we should pursue the development of that letter via the same mechanism that we used for the Sundance Fault letter.

I would like to just mention that we did have two presentations from the State of Texas at the beginning of the working group. We had both the developer and the regulator speak to us.

We heard of the State of Texas' approach to doing performance assessment is vastly different, I would say, from the suggested approach in the Branch Technical Position, but apparently effective. We heard the regulators' perspective on how they were going to evaluate that performance assessment which is currently in progress.

Starting then from the viewpoint of first looking at the question of capability of the staff, we had a presentation by John Thoma, the Section Leader, giving us an overview on staff capability that you remember the hand-out for it. That really provides us a core of information for discussing capabilities of the staff in several areas.

I do think there are a few things that I want to mention, though. The staff, in my mind, has developed the

in-house capability to carry out performance assessments for low-level waste sites. I personally feel that they should be commended for this. This is a significant advance. There are other things that I think that are mostly positive that we would say with regard to other aspects of the capability question.

I think there are three bullets that I have in mind at this point in time. I would like to give you those three points. Then I would like you to ask you to jump in and give me other points that you might want to discuss or have included in any letter that we do develop.

The first is that we strongly support the use of probabalistic techniques in the performance assessment process. I think that needs to be said because the process was far different two years ago. We applaud the state-of-the-art, in essence, approach to performance assessment that the staff has come to at this point.

We feel that to the extent that we have knowledge of it, that the staff does have access to and interacts with the agreement states and non-agreement state programs. I think that that interaction should be encouraged and wherever possible expanded to ensure that the staff's programs are providing useful input in their decision-making process.

My third bullet in this area is that the staff's

capability to conduct performance assessments has been demonstrated. However, my feeling is that the credibility of those assessments would be significantly enhanced if we had a test case, if you will, that was an evaluation of a real low-level waste disposal facility.

There are a number -- it doesn't necessarily have to be an operating facility, but certainly as I think we pointed out in the working group when you get to the first hearing situation, if you do, or if you are helping other people in a hearing situation, one of the first questions regarding the credibility is going to be: Have you actually utilized these in a real case?

That doesn't minimize the value and importance that we attach to your test case results. We think they were extremely useful and important. But nevertheless, in the time frame that the staff has, if they can generate an evaluation of a real disposal facility, it would be, we think, a significant advance.

So those are really the only three bullets that I have. There are statements about the positive aspects of the staff's capabilities that we might want to make, but I would like to solicit input just on the staff's capability question.

I think you have one additional one.

MR. STEINDLER: I have a number of comments.

MR. POMEROY: Please.

MR. STEINDLER: I guess, if we were put on the witness stand to answer the question, how do you know if the staff has the kind of capability that you attribute to it, we heard fundamentally the activities in one exercise, that is the test case, and I want to be sure that if we elect to extrapolate that to a statement to the Commission that the staff has the capability, and the implication, I think, by the reader might well be that the staff has the capability to take on all comers, so to speak, to be able to do this for even very complicated sites, not necessarily that somebody might locate a low-level site on it. I just want to be sure that we understand the kind of extrapolation we are doing.

I think there is a very good chance that the staff, in fact, can cover even complicated sites, but because we don't have anything other than that test case to go on, we don't know that for sure. That gets at the crux of the question that we were asked to look at, what is the magnitude of the staff capability.

There is no question in my mind that there has been enormous progress. The issue I think I am addressing is, are they there? They never said they were there, but our implication, I think in the way you phrased it, is that they are there, and now all they need to do is pick on Maxi

Flats, or Sheffield, or some place to, in fact, demonstrate a credible performance.

I think that is perhaps the only significant issue that I would raise.

I guess I also need to continue to raise the issue on the philosophy or the policy of the Commission, that is, where does that expertise reside? Does it reside with the in-house staff or does it reside with a combination of in-house and contractor and, if the latter, should it be there, or should there -- in my mind and my suggestion is that we recommend to the Commission that there be a not too gradual transition for having competence for the basic capability in-house. If that requires additional resources, then I think we need to make the comment that with that change in policy there ought to be some additional resources.

I think those are fundamentally the issues that I would raise for you.

MR. POMEROY: John or Bill?

MR. GARRICK: I am not sure that I would put this in a letter, but I want to mention it in passing because one of the things you talked about was, in the training process, the activity connected with conferences and professional meetings, and I was pleased to see the ones that you did attend. I was also very pleased to see the interaction with other Federal agencies like EPA and DOE, and the Peer Review

Panel and so on. This is very important and an excellent step.

The one thing I did observe with respect to the list of professional societies, and I realize this was not intended to be a complete list, was the absence of some societies that are very active in this arena, and maybe, from the standpoint of the discipline of performance assessment, and certainly the subdiscipline of risk assessment, I am hoping that the NRC is recognizing them as well and I am thinking of the American Nuclear Society, and the Society for Risk Analysis, and the PSAM meeting that happens to be going on this week.

I think the perspectives that the Performance Assessment Team would get from the point of view of risk assessment modeling, particularly with respect to the handling of information, the handling of data, the structuring of scenarios, and the basic systems approach to modeling, I think those perspectives are emphasized in sessions of those societies, and I would hope that they would be on your list for future consideration.

MR. POMEROY: John, I don't want to defend the staff in any way, but I think that perhaps with this consolidation that some more interaction with some of those societies will occur. I know the first time I had the opportunity to spend a lot of time with Norm Eisenberg, who

was in High-Level Waste Performance Assessment at the moment, was at a Society for Risk Analysis meeting, and the second time was at a PSAM meeting.

I think when the Low-Level Waste Performance Assessment people and the High-Level Waste Performance Assessment people are brought together, that those areas may be better covered. I think it is a very important point, though, I agree with you.

MR. HINZE: I am approaching this from ignorance, so I want to ask a couple of questions that came to me as a result of the Low-Level Waste Workshop, and that pertained to the capabilities of the staff and the continuing capabilities of the staff.

First of all, I think you have done a great job in putting together all these good kinds of words about what they can do, and capabilities, and expertise, and all that sort of thing.

I thought that your comment here about the -- I think you have it in here someplace, about maintaining the capability of the staff, and that would involve maintaining the group. The question that I had, if I understood what was stated properly, that the idea here was that the group would be retained and kept together as an entity and exercised by involving them in some decommissioning performance assessment, and I really didn't understand how

appropriate that would be to low-level waste performance assessment, and how much of that expertise would be enhanced. Because this is a moving target, that group should enhance their capabilities in the low-level waste, and by getting off onto this -- and I don't mean to say a tangent, but getting onto decommissioning problems of performance assessment, I didn't get a warm fuzzy feeling about what that is going to do for them in low-level waste.

If one of you can help me with that, I would appreciate that.

The second problem that I had is that as I have listened to this, I heard Reuben get up and talk about his spreadsheet on hopefully what is considered a relatively simple low-level waste site, and with a casualness that I don't think was reality they did a performance assessment. Texas did a performance assessment, and then I hear there are three people on the Texas Natural Resources Commission, or whatever it is, that is going to be evaluate this.

In contrast to that, we have the extreme effort, if you will, of the NRC staff in the low-level waste performance assessment. Does that mean with the generation of all the codes and making them match together, and so forth that there was the involvement of all this work, and actually the codes are just as simple as those that were used by Reuben, or is Reuben doing it too simply and,

therefore, do we have a problem in this country?

Those are two questions that I came up with as a result of hearing this discussion.

MR. POMEROY: Let's take those one at a time. Let me ask if John Greeves, or some one of his staff, would like to comment on that because it is a question that did come up in my mind also when we talked about it, as you know, John, before. So I would appreciate any help you might give us here in terms of, on the one hand maintaining the team approach that has been developed and, at the same time, what happens when they all pay attention to SDMP sites?

MR. GREEVES: I am glad this came up because I don't think we explained exactly what we had in mind on SDMP. We had a lot to cover the other day and that really wasn't on the agenda, it was kind of an FYI. That is where we are looking to go in the future.

Not knowing what your background collectively is in the decommissioning business, let me just try and quickly describe what is confronting us in the division. We have a number of sites that have large volumes of material, millions of cubic feet of material, long-life material -- uranium, thorium, I am just giving you some examples -- at a number of these sites. It looks like that the licensee probably, in these cases, is going to come in the door and say, one of my options, in fact, my preferred option, is to

create a cell on-site, millions of cubic feet cell.

There already is contamination on-site. Some of these sites have plumes on them already. So the expectation is, one of the proposals will be to put that into a cell, put a cap on top of it, and let's have a go at it, let's talk about it.

So I already have the staff starting to look at one of these sites where we would expect that approach to be discussed. To me, there are parallels to what we did in the test case and what you do in low-level waste. It is basically a cell approach. It is going to have some sort of a cap associated with it. There are some plumes already at some of these sites. You are talking large volumes, you are talking long-life nuclides. You are talking geochemical issues, you are talking retardation issues. You put all that together and, one, I have to do the work anyhow; two, we have developed this capability and the paper that you are going to get a copy of says that we are making a mid-course adjustment in the performance assessment program, and that is the direction we are pointing in, which is what I told you the other day.

So, plus it is applying this capability on case work, which is basically the requirement that I have, which is to get the case work done. So that is where we are headed.

If I am not being clear about what these SDMP sites are, I can tell you more, but to me I need to move in that direction as opposed to going and looking at Maxi Flats or some other site where I don't have a licensing responsibility. If somebody tells me to go look at Maxi Flats, then those resources, I am going to have to put something else on hold, and what I am going to put on hold is casework.

So it just doesn't feel like good regulation and good government to me, and that is the basis for the recommendation that I have put to my management and that they have gone along with, that we take this group, these resources, and apply them to the larger sites that we have in the SDMP program. My expectation is that it will further challenge this group. They will continue to develop these resources, and they will get better at it.

MR. HINZE: John, that is helpful and it is helping me to come to an answer to my question. What I missed from what you have presented is, what is the parallel between what you are going to be doing at these sites and low-level waste performance assessment, the performance assessment for a compact low-level waste site?

MR. GREEVES: Take a look at the submodules that you saw on our charts there. If my memory is correct, and the staff will have to help me, but they start out with

infiltration. Then you evaluate a cap. Then you evaluate some structure. Then you evaluate leaching coming out of that structure. Then you evaluate transport through an unsaturated zone. Then you evaluate getting into a saturated zone. Then you evaluate it going off-site to a well, or a discharge to the surface. All of those elements will be associated with these SDMP activities.

MR. HINZE: The SDMP, is that a vaulted cell?

MR. GREEVES: Let me try and be clear. Whether it is vaulted or not is a question. I would not say that a concrete vault would be the norm. I don't have an answer to that. But you would have a cap, you would have the infiltration problem, you would have the leaching question. You would have both the unsaturated and the saturated transport issue. You would have wells being pumped. You would have eventually surface effluents. So the one element that we may not bump into right away is a vault type approach.

I asked the staff sitting around if -- you wouldn't have it either at Maxi Flats, Mike points out to me.

MR. HINZE: I really thank you for clarifying this for me, and hopefully this is clear enough for all of us. It really is important, I think, that you keep this group moving ahead and increasing their expertise. This is not

something you should remain static at.

MR. GREEVES: Just to review the bidding, like I said, I came back in August and I saw all this going on, and it just kind of grabbed a hold of me, how can the government afford to go do another test case when I have a large number of these additional sites in front of me.

MR. HINZE: But if you can do it like Reuben can, then you can afford it.

MR. POMEROY: That gets us to Texas, but before we do, John, I guess, I would anticipate that in the first SDMP site you do, you will be involved in a hearing situation.

MR. GREEVES: I would expect it, yes. We are going to get tested.

MR. POMEROY: One of the first questions that they are going to ask you is, all right, you have applied your performance assessment capability to this site, what is the credibility? Have you used it someplace where you have proved that this works, or is this de novo?

Margaret?

MS. FEDERLINE: One thing I want to emphasize is the important part of performance assessment is the systematic understanding of the processes. I think that what we are going to get is experience in scenario construction, experience in understanding the processes, experience in understanding coupled processes.

It is like Dr. Garrick explained in the paper that he shared with us. It is the systematic understanding and being able to follow through a process that is going to be our strength.

We are going to have a great deal of experience to bring to the hearing process, not that we will have used the performance assessment in a hearing, but that our people have both high-level and low-level experience, looking at long-lived radionuclides, gray interactions with other agencies and other parties on using performance assessments.

So I think it is the systematic process that we are trying to build experience in. They may be different codes. We may be applying different codes. But we are going to have the ability to evaluate and identify which codes are appropriate for which processes. That is the strength that we are going to bring to the process.

Performance assessment is a fairly new discipline. I don't know whether Dr. Garrick agrees or not, but I think NRC -- I would put the NRC staff up against some of the other good performers in the field in terms of ability to discriminate needs and understanding of processes. You know, I think that is something that we can bring to the hearing process.

MR. POMEROY: With all due to my colleague, and certainly with all due respect to the staff, I still think

you might have a credibility problem if you had never applied the system to a real case. I recognize what you have done. Perhaps I will pass it to Marty.

MR. STEINDLER: No, even if you don't think you have a credibility problem, you certainly have to be prepared to answer the question.

MS. FEDERLINE: Yes.

MR. POMEROY: You will need to do that in a hearing that will probably be less friendly than this one is.

MR. GREEVES: Just to finish, I shared with you the direction I think we should move in. I would appreciate some support on that if that is your decision. But, like I said, the work in front of is imposing. I really do need this group to focus on these cases to get some of them moving. It is, I believe, a Commission propriety.

MR. POMEROY: I would agree with you. In fact, just as a personal comment, I have one of those sites in my state. I would love to have you on my team.

I do agree with the concept that we do need to be doing things that are immediate problems. In my mind, there is no question about that.

At the same time, I think that you are going to experience a problem. I think from what I hear many of the members of the Committee share the desire to see you at some

point apply this to a real situation in low-level waste.

MR. STEINDLER: The other point that I would add on that SDMP target is that I can certainly understand the rationale. You've got at least two problems to solve. Here is a single focus on which you may be able to do that.

I am not sufficiently versed in guessing what a SDMP PA looks like, or is likely to look like. I mean, I understand the differences in source term and all that implies as far as geochemical transport, et cetera.

It remains to be seen, and I will be interesting in watching your first output, to see whether or not there is a sufficient similarity so that the exercise of skills that you are hoping for, in fact, comes true. But I think that is something you might want to keep an eye on to make sure that if it doesn't, then you've got some way to supplement exercising and continuing to improve the staff's capability in that area.

Bill, I don't know whether you ever got the question answered about complexity and machines.

MR. HINZE: No.

MR. STEINDLER: But there was a piece in the hand-out of Thoma on the hardware and software requirements and what apparently they have obtained. They are still looking at 486 PCs. They have not yet graduated to the Cray, which is a great idea if they can possibly swing it.

MR. POMEROY: Fred?

MR. ROSS: Fred Ross. I wanted to say something a little bit about our test case very briefly in relation to the real sites because that was the suggestion that we model the real site.

It was my idea to develop the test case that we did. It was based on the fact that I wanted to see if we could model a real site. There are no real sites that have the elements of performance assessment that we are interested in.

We have had contractors look at Maxi Flats and the other one in Illinois and West Valley and do some modeling with those. They don't have the concrete vaults. Their source terms are virtually unknown.

So we did was -- in fact, our test case is about as real as you can possibly get under the circumstances. We used Barnwell, essentially, with U.S.G.S. data, from some studies. We developed what we thought is a realistic concrete vault with reasonable covers and so on.

So I think we are fairly realistic. Even our source term -- our inventory is somewhat realistic because it was reconstructed from the inventory data taken in '89, '90, and '91 from the report that Gary Rolls developed.

So I think it is fairly well state-of-the-art in terms of trying to do test cases that are realistic.

MR. STEINDLER: Does your real test case also have a vault in it?

MR. ROSS: Yes, it does. That is why we are doing the concrete; yes, sir.

MR. STEINDLER: I see.

MR. POMEROY: Thank you, Fred. That helps me a lot also. That is useful.

I would like to turn just briefly to Bill's question in some extended negotiations. Before this working group, we agreed because of other questions, that we would not directly address the question of the agreement states' applications of these issues.

What we did was we followed the suggestion, naturally, of the staff to bring in the first of what we assume will be a number of people. As we see these people -- see what is happening in the various agreement states, though, I would expect that you could imagine that we would come back to talk to you some more because I think Bill raises a very important question about:

What is really happening in the world? What concern is it of the NRC? How can it be monitored and how can any problems be resolved?

There are a whole series of questions that we agreed not to talk about in this particular Working Group but they are very important questions and we don't want to,

we are not going to let them go.

Are there other comments about anything that might go into the staff capability area of any discussion that we put forward?

[No response.]

MR. POMEROY: Let me then turn briefly to questions with regard to the branch technical position. I have jotted down a few notes with regard to that and my distinguished colleague on my far left, not quite far left, John Garrick, put them into English after I wrote them, and I would like to just briefly run through them, if I can.

There are several positive comments. The BTP demonstrates significant progress since the last time we have looked at the low-level waste PA program. The general approach to PA reflects contemporary methods of analysis and that's excellent. The individual activities are -- John uses the term "well articulated" -- I would say they were "well discussed" or demonstrated, whatever, and we agree with the Staff's stated position that PA should be a successive approximation or phased or iterative approach, but we were disappointed to not see that position more clearly stated and we would recommend that you do get that iterative nature in.

Just to reinforce what I was saying earlier, these are my comments and I am then going to ask what the rest of

the members of the committee to comment on them.

The Staff is uncertain on the matter of the time frame and John specifically asked us for some input, if we had any, on that and John Garrick and I in discussions decided that as a minimum the time frame for the site specific performance assessments should be guided by the total dose versus time profile, as you have suggested on page 28 of the branch TP.

While the Staff alluded to starting PA during the early stages of facility, that approach doesn't come through clearly in the documentation and we believe that that is an important point to start at.

Expert judgment, as you all know, is one of my favorite topics and there is certainly a lot of expert judgment referenced and discussed in the branch technical position. The Staff clearly recognizes its value but it doesn't really help in a process of elicitation. There is really a need for some more guidance on the process of transforming expert judgment into a form that is suitable for inclusion in the database.

There was a feeling expressed by some members of the committee with regard to the fact that you excluded AGVs and disposal deeper than 30 meters from your branch technical position discussion. I think we would like to see at least the AGV problem addressed in some way within the

branch technical position. I believe that recent events, certain states are thinking in terms of AGVs again and it will come back, I think, to haunt us if we don't have some guidance with regard to AGVs.

We had a comment about the question of is the maximally exposed-individual the best person to use in the dose calculations versus the critical group concept that some of our international friends use. There may be a justification that I missed in the branch technical position for that choice but it might be useful to clarify why you have chosen the maximally-exposed individual if you stay with that choice rather than the critical group.

If you remember, there was discussion on the questions of means, medians, and demonstrations using those central value items versus utilization of the full state of knowledge that is some representation of the probability distribution function and I suspect that we will recommend somehow that the indicators that we use reflect the analysts' full state of knowledge.

There is an important point that I think you ought to look at personally, that is that the branch technical position is specific on many issues that are not to be included in PA -- global climate changes and so forth -- but there is not a discussion as far as I am aware of the criteria that one could use for excluding certain scenarios

and issues and a discussion of the criteria that a state regulator or yourselves might use, and we had some discussion during the Working Group of some of those criteria and discussion of those criteria in the branch technical position might be useful.

I think there is one more that we had and I think we framed it and we urge you to be sensitive to changes in regulatory policy -- I know that you both are, you all are, so in our minds though it is not clear that the BTP is anticipating the movement toward risk-based regulations and you might want to look at it from that perspective before you put it out.

Those are some of the comments that John and I have come up with. I am sure that John probably has others and I would like to solicit input from all of you. Marty?

MR. STEINDLER: Not necessarily in order.

That uncertain timeframe, I think that the recommendation of the committee using the dose/time profit is a good one, but I think it needs to be supplemented with an upper limit cut off.

Now having established both a methodology and an cut off, I think it is appropriate for the Staff to take that issue to the Commission for some kind of review and approval because that is a fairly fundamental policy decision that I am sure that the Commission would be most

interested in at least discussing with you.

I think there is a fundamental problem with the Branch Technical Position in that it is generic in many of its aspects. It is designed to be generic, but it becomes very specific in some other areas. Some of that has to do with what Paul already alluded to in terms of not having adequate criteria available for the exclusion or inclusion of particular aspects of a low-level facility.

But it seems to me that that draft ought to be reread by somebody who can put him or herself in the position of a reader needing guidance, but without any identification of what kind of facility that person is talking about or interested in, then seeing whether or not they can derive from the contents of that document facility-independent guidance.

I don't think it would be a very difficult job to do that. I think it would improve the general utility of the technical position. That would also sharpen up the identification of who the audience is, and I think that would be a useful thing to do.

I think those are the only points that haven't been mentioned that I would have offhand.

I think there are some very useful sections in that Branch Technical Position which represents a real advance over the previous versions that we have seen.

MR. POMEROY: Bill?

MR. HINZE: The bullet at the bottom of page 5 where you are talking about the criteria for excluding issues, that might take on different criteria depending upon whether you are talking about above ground vaults or not.

I think Fred Ross might have some thoughts on that. Not now, but I think that there may be a different set of criteria for above ground vaults.

Very simply, if you have global change or even regional change in the climate, this may do considerable differences in terms of floods over sheet wash. You know, the whole business. So I think there might be two sets of criteria, and I think that amplifies the fact that we really need to consider the above ground vault.

The other thing -- and maybe it is too trivial and that's why you didn't mentioned it -- but I would like to see the NRC at least acknowledge the fact that there is a problem with mixed waste. If someone can tell me that there is no problem and that this should not be taken into consideration in performance assessment, I would like to hear it. But if that cannot be provided then I think they have to acknowledge in this BTP that the problems associated with mixed waste have not been considered in developing this.

MR. STEINDLER: I guess my view is I have become a

strict instructionist about this point. This is low-level waste; this is not mixed waste.

I agree with Bill that there ought to be a statement someplace that warns the reader that if he is looking for mixed waste information or guidance, it isn't here. But I don't think there ought to be a section covering --

MR. HINZE: I think that opens up a box you don't want to open up.

MR. STEINDLER: It isn't here.

MR. HINZE: It isn't here. It has not been -- this is not being considered.

MR. POMEROY: I wouldn't go away from it completely, thought, I don't think. You remember when Nebraska was here. They were having significant problems with how to deal with mixed waste at the same time they were dealing with low-level waste. If other states take that approach --

MR. STEINDLER: But I adhere to my notion that the cover title of this things says, "Low Level Waste Performance Assessment."

MR. POMEROY: I agree with that, and I think your's and Bill's suggestion of just simply saying it is not there is a valid one, but I guess what I was saying was from Margaret and John for the future. It is a point to be

continued --

MR. HINZE: I think you could be another year on this if you try to solve that problem.

MR. POMEROY: It will probably come up at some point in the future, and it is worth thinking about.

That's it.

John?

MR. GARRICK: Yes. Since we worked these up together, I don't have any new points to add, but I would want to make an observation about -- first, I really was pleasantly surprised by the Branch Technical Position because it did have information in it that indicated a high sensitivity to a lot of the contemporary developments in the risk world. You really do need to be complimented for that.

A couple of the bullets I just want to add to a little bit. One has to do with this phased approach or iterative approach. Since there was some discussion about this yesterday and some -- I guess it was the day before yesterday -- and some differences of opinions expressed -- the first time that has ever happened when you bring up the matter of risk.

[Laughter.]

MR. GARRICK: I wanted to reemphasize the value of early applications with respect to providing guidance to the experimental program, the research program, the methods

development program, or whatever. There is a lot you can do.

You can do some parametric analysis with things like porosity and electrical conductivity and layering dimensions of geological formations pretty easily, and learn a lot in going from the location of the waste through the geosphere to the biosphere atmosphere and so on.

I really think as a close follow on perhaps to the test case, doing that sort of thing would be extremely beneficial and it does give you a good sense of some of the bounding contributors and issues.

On the bullet where we talked about the criteria for excluding phenomena such as global climate change and so forth, I somehow think that could have a very easy solution. I think that the state of mind of the performance assessor ought to be one of not excluding anything in principle. Then if there is no outliers in certain areas, then you can talk about no further consideration of some of these contributions. That is always what happens on applications. If it is clear that global climate is not going to be a factor, there is no reason for considering it.

So I guess as kind of an editorial suggestions, maybe it is in there if we look a little more carefully. The way I would handle that one is, yes, you can exclude things, but exclude them only after there has been some

minimum consideration to the extent that is necessary to make sure that it is not a competitive contributor with the things that you know are important.

I believe you have done a pretty outstanding job and I am very encouraged.

Ken, did you have any?

MR. FOLAND: No.

MR. POMEROY: I wanted to make a couple of further comments before I turn this back to the Chairman, who is looking at me with ice in his eyes.

One -- we did identify one or more places where we were concerned there was not state-of-the-art approach. John Garrick has volunteered to get together with the Staff informally and go over those to make some suggested improvements, if that meets with the approval of the Staff.

MR. GREEVES: We would encourage that.

MR. POMEROY: Mr. Chairman, as far as future plans for this, what I would like to suggest is that we handle it in the way we have handled the Sundance letter up to this point. That is, I would like to take your comments and the comments of the Committee here today and build a straw man for a first round and send it around through the four of us a few times and see if we can zero in on something that we can all agree on.

MR. STEINDLER: I think that's fine. I think we

need to make sure that everybody understands that ultimately this will rise to a full-blown open meeting at which point we read it and fine tune the thing and it will not get sent out until we have had a chance to air it at a full meeting.

MR. POMEROY: Certainly.

MR. STEINDLER: That sounds good?

MR. POMEROY: Yes.

I would like to make one last point. I did not the other day have the opportunity or the thought, and I should have, to thank Giorgio for the outstanding effort that he put into organizing this. This one was perhaps more difficult than usual because there were other issues that were impinging on our discussion and the negotiations were long and sometimes difficult to get to the point that we got to. And I have to commend him for doing an outstanding job. So thank you, Giorgio.

Mr. Chairman, thank you.

MR. STEINDLER: Okay. Well, we are moving expeditiously down our agenda, which has become truncated in time but not in scope.

I would think it would be worthwhile to close the recorded session, take a short 14-minute break and then begin to talk about committee activities, future agenda, preparation of reports and so on and arrange that set of discussions in such a way as to meet John's time schedule.

If that seems agreeable, let me thank the recorder and call the recorded part of the session closed.

The subsequent part of the session will be open to the public.

[Whereupon, at 2:36 p.m., the meeting was adjourned.]

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: 62nd ACNW Meeting

DOCKET NUMBER:

PLACE OF PROCEEDING: Bethesda, MD

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.

Barbara Whitlock
Official Reporter
Ann Riley & Associates, Ltd.

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Marilyn Estep
Official Reporter
Ann Riley & Associates, Ltd.

United States
Nuclear Regulatory Commission

NRC WASTE MANAGEMENT PROGRAM ORGANIZATION

Presented to:

ADVISORY COMMITTEE ON NUCLEAR WASTE

By:
Robert M. Bernero, Director
Office of Nuclear Material Safety and Safeguards

March 24, 1994

Current Division Organization

DIVISION OF LOW-LEVEL WASTE MANAGEMENT AND DECOMMISSIONING
Director: John Greeves
Deputy: Michael Bell

LOW-LEVEL WASTE MANAGEMENT BRANCH	URANIUM RECOVERY BRANCH	DECOMMISSIONING AND REGULATORY ISSUES BRANCH
Chief: John Surmeier	*Chief*: Joseph Holonich	*Chief*: John Austin
Division lead for regulatory program associated management and disposal of LLW.	Division lead for licensing and safety activities associated with UR disposal, including mill tailings	Division lead for regulatory development activities; and inter-agency/international policy coordination

Current Division Organization

DIVISION OF HIGH-LEVEL WASTE MANAGEMENT
Director: B. Joe Youngblood
Deputy: John J. Linehan

REPOSITORY LICENSING & QA PROJECT DIRECTORATE	HYDROLOGY AND SYSTEMS PERFORMANCE BRANCH	GEOLOGY AND ENGINEERING BRANCH
Director: Joseph Holonich	*Chief*: Margaret Federline	*Chief*: Ronald Ballard
Division lead for implementing the HLW Repository Program, DOE interface, NWPA, planning and policy analysis.	Division lead for technical expertise in hydrology, geochemistry, and overall system performance.	Division lead for technical expertise in geology, seismology, materials, and engineering disciplines.

NRC WASTE MANAGEMENT ACTIVITIES

- HIGH-LEVEL WASTE
  - *DOE Investigation of Yucca Mountain*
- LOW-LEVEL WASTE
  - *Hanford Washington, Barnwell South Carolina*
  - *State Sites under development (California, North Carolina)*
- URANIUM RECOVERY
  - *27 Active Sites, 24 Inactive Sites*
  - *Transition of Uranium Recovery Field Office (URFO)*
- DECOMMISSIONING
  - *Reactors (Fort St. Vrain, Shorham, Rancho Seco, Trojan, etc.)*
  - *Materials Sites*
  - *Site Decommissioning Management Plan*

Proposed Division Organization

WASTE MANAGEMENT DIVISION
Director: Malcolm Knapp
Deputy: John Greeves

LOW-LEVEL WASTE AND DECOMMISSIONING PROJECTS BRANCH	HIGH-LEVEL WASTE AND URANIUM RECOVERY PROJECTS BRANCH	PERFORMANCE ASSESSMENT AND HYDROLOGY BRANCH	ENGINEERING AND GEOLOGY BRANCH
Chief: John Austin	*Chief*: Joseph Holonich	*Chief*: Margaret Federline	*Chief*: Michael Bell
Division lead for LLW, decommissioning, Site Decommissioning Management Plan (SDMP) and EPA interface	Division lead for UR and HLW disposal, Waste Systems Engineering and Integration (WSE&I), quality assurance	Division lead for Performance Assessment, hydrology, geochemistry, and health physics	Division lead for geo-sciences, geotechnical engineering including Geologic Setting, Repository Design, Construction Operations (RDCO), and Engineered Barrier System (EBS)

BENEFITS OF DIVISION REORGANIZATION

- Improved efficiency and reduced agency costs,
- Key resources merged into centers of technical expertise to address waste management issues, and
- A more uniform approach to waste management regulation.

T-3.4

WHAT IS THE SOCIETAL PLEDGE?

Robert M. Bernero, Director

Office of Nuclear Material Safety and Safeguards

To The

Advisory Committee on Nuclear Waste

March 24, 1994

SAFETY AND ENVIRONMENTAL BASIS OF CONTEMPORARY ACTIVITIES

- NO UNDUE RISK TO HEALTH AND SAFETY OF THE PUBLIC
  - AND THE COMMON DEFENSE AND SECURITY
- WEIGH THE ENVIRONMENTAL IMPACTS
  - NEED
  - ALTERNATIVES
  - COST/BENEFIT

PRINCIPLES OF RADIATION PROTECTION

- JUSTIFICATION OF PRACTICE
- OPTIMIZATION (ALARA)
- SAFETY LIMITS

WASTE MANAGEMENT ALTERNATIVES

- SPACE DISPOSAL
  - NO RISK LEGACY
  - CURRENT RISK
  - HIGH COST
- DEEP SEABED DISPOSAL
  - MINIMAL RISK LEGACY
  - POSSIBLY IRREVERSIBLE
- GEOLOGIC DISPOSAL
  - RISK LEGACY CAN BE ESTIMATED
  - SUBSTANTIAL BUT VARIABLE RETRIEVABILITY
- ENGINEERED AT OR NEAR-SURFACE STORAGE
  - TOTAL RISK LEGACY

THE WASTE DISPOSAL DILEMMA

- THIS GENERATION OR TWO HAS THE BENEFIT OF NUCLEAR TECHNOLOGY

- FUTURE GENERATIONS INHERIT THE RESIDUES

THE SOCIETAL PLEDGE

- NO ONE IN FUTURE WILL BE EXPOSED TO A RISK WE WOULD NOT CONSIDER TOLERABLE TODAY
  - WHO IS PROTECTED?
  - FOR HOW LONG? HOW LIKELY?
  - INDIVIDUAL RISK AND/OR COLLECTIVE RISK?
  - DO WE BENEFIT AND THEY BEAR RISK?
  - ALARA?

NUREG - 0300: PROPOSED GOALS FOR RADIOACTIVE WASTE MANAGEMENT

- 1978 - PUBLIC POLICY CONSIDERATIONS FOR WASTE MANAGEMENT
- NOT FOCUSED ON TECHNOLOGY
- GOALS FOR THREE TIME FRAMES:
  - I - ACTIVE USE OF NUCLEAR ENERGY
  - II - ACTIVE WASTE MANAGEMENT
  - III - PASSIVE ISOLATION
- PROMPT MANAGEMENT FOR DISPOSAL

EPA - 40 CFR 191

- 0 TECHNOLOGY BASED
  - TYPICAL DEEP GEOLOGIC ISOLATION
  - LOW COLLECTIVE HEALTH EFFECTS ON GLOBAL AVERAGE POPULATION
  - APPARENTLY ACCEPTABLE
  - PROBABILISTIC CONTAINMENT
  - 10,000 YEARS
- 0 INDIVIDUAL DOSE CONSIDERATION
- 0 PASSIVE ISOLATION

NRC - 10 CFR 60

- 0 CONCERN ABOUT PROBABILISTIC LICENSING
  - NOT PROOF IN THE ORDINARY SENSE OF THE WORD
- 0 DETERMINISTIC BASIS
  - DESIRABLE AND ADVERSE FEATURES
  - SUBSYSTEM PERFORMANCE CRITERIA (DEFENSE IN DEPTH)
- 0 INCORPORATES THE EPA STANDARD

ICRP - 46 (1985)

- SUGGESTS CAREFUL CONSIDERATION OF DISCOUNTING BY NATIONAL AUTHORITIES

- FUTURE DETRIMENTS INCURRED BY PEOPLE WHO HAD NO INFLUENCE ON DECISIONS

  - ASSIGN HIGHER WEIGHTS TO THOSE DETRIMENTS?

- NO TIME LIMIT

NATIONAL RESEARCH COUNCIL - 1990

- RETHINKING HIGH-LEVEL RADIOACTIVE WASTE DISPOSAL

- BACK AWAY FROM RIGID PRESCRIPTIVE GOALS, STANDARDS, AND SCHEDULES

- TAKE A GRADUAL DESIGN-AS-YOU-GO APPROACH

NRPB - 1992

- 100 YEARS POST CLOSURE: DOSE LIMIT
- 100 YEARS - 10,000 YEARS: RISK CONSTRAINT
- 10,000 YEARS-1,000,000 YEARS: HYPOTHETICAL COMMUNITIES, GAUGE ADEQUATE PROTECTION TO INDIVIDUALS
- AFTER 1,000,000 YEARS: QUALITATIVE CHECK FOR SUDDEN, SIGNIFICANT INCREASES IN RISKS

ENERGY POLICY ACT - 1992

- THE NATIONAL ACADEMY SHOULD STUDY:
  - HEALTH BASED STANDARD
  - ACTIVE CONTROL
  - PREDICTION OF HUMAN INTRUSION PROBABILITY

NORDIC NATIONS - 1993

- FUTURE SOCIETAL EXPOSURE SHOULD BE WELL BELOW THE LEVEL WHICH CAUSES UNACCEPTABLE DETRIMENT TO HUMAN HEALTH OR TO THE ENVIRONMENT

LUTHER CARTER - 1993

- "NWPA... REFLECTS A MISTAKEN BELIEF THAT GEOLOGIC ISOLATION AND CONTAINMENT OF NUCLEAR WASTE ARE WITHIN THE KNOWN STATE OF THE ART AND, HENCE ARE NOW LICENSABLE..."
- MINGLE WEAPONS Pu WITH HLW?
- CONGRESSIONAL MANDATE FOR NEVADA STORAGE?
- UNDERGROUND STORAGE?

KAI ERIKSON - 1994

- RUSHING TO BURY NUCLEAR WASTE DOESN'T TAKE THE PROBLEM OFF FUTURE AMERICANS' HANDS SO MUCH AS IT TAKES THE SOLUTION OUT OF THEIR HANDS.

- TURN TO A POLICY OF STORAGE?

SENATOR WELLSTONE ET AL. - 1994

- URGE PRESIDENTIAL COMMISSION TO REVIEW NEEDS, POLICIES, AND PROGRAMS FOR NUCLEAR WASTE
  - SPENT FUEL STORAGE
  - LLW DISPOSAL
  - HLW DISPOSAL
  - DOE CLEANUP

CURRENT ISSUES

- INTERIM STORAGE OF SPENT FUEL
  - AT REACTOR
  - MRS OR EQUIVALENT
  - MPC FOR 1998 AND AFTER
- GOALS AND STANDARDS
  - NAS ON YUCCA MOUNTAIN STANDARD
  - WIPP
- DOE OCRWM BUDGET

T-6

PRESENTATION TO THE ADVISORY COMMITTEE ON NUCLEAR WASTE

FINAL DRAFT - STAFF TECHNICAL POSITION ON CONSIDERATION OF FAULT DISPLACEMENT HAZARDS IN GEOLOGIC REPOSITORY DESIGN

PRESENTATION TO THE ADVISORY COMMITTEE ON NUCLEAR WASTE
MARCH 24, 1994

FINAL DRAFT - STAFF TECHNICAL POSITION (STP) ON CONSIDERATION OF FAULT DISPLACEMENT HAZARDS IN GEOLOGIC REPOSITORY DESIGN

Keith I. McConnell and Michael P. Lee
Geology and Engineering Branch
Division of High-Level Waste Management, NMSS

PRESENTER INFORMATION

Staff Technical Position

Keith I. McConnell, Section Leader
Geology/Geophysics Section
Geology and Engineering Branch
HLWM (504-2532)

BASIS FOR STP

(Presented at December, 1991, ACNW Briefing)

CONSIDERATION OF FAULT DISPLACEMENT IN REPOSITORY DESIGN

- PRUDENCE SUGGESTS CAUTION REGARDING DESIGN TO ACCOMMODATE FAULT DISPLACEMENT
- DESIGN FOR FAULT DISPLACEMENT MUST PROVIDE REASONABLE ASSURANCE OF MEETING PERFORMANCE OBJECTIVE
- NO REQUIREMENT FOR SPECIFIC SETBACK DISTANCE
- EARLY RESOLUTION OF FAULT-RELATED DESIGN AND PERFORMANCE ISSUES IS NEEDED IF DOE CONTEMPLATES DESIGNING FOR FAULTING

CHRONOLOGY OF DRAFT STP DEVELOPMENT

January, 1992 -	ACNW Letter to Commission (Requests rulemaking related to faults in controlled area)
April, 1992 -	Staff response to ACNW (Indicates topic will be handled in an STP)
October, 1992 -	Staff transmits draft STP to ACNW for review
November, 1992 -	Staff briefs ACNW
March, 1993 -	Release for Public Comment
March, 1994 -	Staff briefs ACNW

STAFF TECHNICAL POSITION OBJECTIVES AND SCOPE

OBJECTIVES:

- TO DESCRIBE AN ACCEPTABLE APPROACH TO THE CONSIDERATION OF FAULT DISPLACEMENT HAZARD IN REPOSITORY DESIGN.
- TO IDENTIFY REGULATORY REQUIREMENTS THAT APPLY TO THE CONSIDERATION OF POTENTIALLY ADVERSE CONDITIONS (I.E., STRUCTURAL DEFORMATION) IN REPOSITORY DESIGN

SCOPE:

- STAFF TECHNICAL POSITION IS NARROWLY FOCUSED ON DESIGN CONSIDERATIONS AND DOES NOT SPECIFICALLY ADDRESS THE TREATMENT OF FAULT DISPLACEMENT HAZARDS IN REPOSITORY PERFORMANCE

CONSIDERATION OF FAULT DISPLACEMENT HAZARDS IN DESIGN

- Position 1:
  "The presence of 'Type I' faults...inside the controlled area of a geologic repository, does not, by itself, disqualify a candidate site for a geologic repository."

- Basis:
  1) There are no specific exclusionary technical criteria in 10 CFR Part 60
  2) The Commission has noted that a site is "...not disqualified by...the presence of a potentially adverse condition..."

CONSIDERATION OF FAULT DISPLACEMENT HAZARDS IN DESIGN

- DEFINITION OF A TYPE I FAULT:
  "Faults or fault zones that are subject to displacement and of sufficient length and located in such a manner that they may affect repository design and/or performance.
- DEFINITION OF A TYPE II FAULT:
  "Faults or fault zones that are candidates for detailed investigation."
- DEFINITION OF A TYPE III FAULT:
  "Those faults or fault zones either (1) not subject to displacement or (2) subject to displacement, but of such length, or located in such a manner, that they will not affect repository design and/or performance."

CONSIDERATION OF FAULT DISPLACEMENT HAZARDS IN DESIGN

- Position 2:
  When establishing specific locations for critical facilities, "...'Type I' faults should be avoided, where this can reasonably be achieved..."

- Basis:
  1) because of the uncertainties in the characterization of fault displacement hazards, it may be difficult for DOE to demonstrate, with 'reasonable assurance, ' that engineered solutions will compensate for the condition.
  2) The reliability of engineered measures can be subject to certain limitations, and thus can be the subject of much uncertainty during the evaluation of performance.

CONSIDERATION OF FAULT DISPLACEMENT HAZARDS IN DESIGN

- Position 2a:
  If DOE chooses to locate critical facilities on or in the immediate vicinity of Type I faults, they "... should recognize that reliance on engineering may be of limited value."

- Basis:
  1) because of the uncertainties in the characterization of fault displacement hazards, it may be difficult for DOE to demonstrate, with 'reasonable assurance,' that engineered solutions will compensate for the condition.
  2) the reliability of engineered measures can be subject to certain limitations, and thus be the subject of much uncertainty during the evaluation of performance.

CONSIDERATION OF FAULT DISPLACEMENT HAZARDS IN DESIGN

- Position 2b:
  DOE must be able to demonstrate, with reasonable assurance, that any proposed repository facility designed to accommodate the effects of faulting meets 10 CFR Part 60 design criteria and pre- and postclosure performance objectives.

- Basis:
  1) 10 CFR 60.21 notes that the description and assessment of a site must be in sufficient depth to support the assessment of the engineered and natural barriers.

CONSIDERATION OF FAULT DISPLACEMENT HAZARDS IN DESIGN

ORGANIZATIONS PROVIDING COMMENTS ON STP

- Association of Engineering Geologists (including the AEG's Engineering Geology Standards Committee and the Seismic Safety Committee)
- Department of Energy
- State of Nevada

CONSIDERATION OF FAULT DISPLACEMENT HAZARDS IN DESIGN

COMMENTS ON PUBLIC COMMENT DRAFT

- Comments from the Association of Engineering Geologists and the Department of Energy were generally favorable and did not require significant modifications to STP.

- Criticism of the STP from the State of Nevada generally was focused on the limited scope of the STP. Specifically, the lack of consideration of faults as possible conduits for fluid and vapor flow and the lack of treatment of 10 CFR 60 design requirements. The staff believes these are complex issues beyond the scope of an STP on fault displacement hazard. These issues will be addressed specifically in the staff's License Application Review Plan.

CONSIDERATION OF FAULT DISPLACEMENT HAZARDS IN DESIGN

CONCLUSIONS

- No significant changes to the STP were made following the public comment period because the comments were either favorable or considered outside of the scope of the STP.
- Pending the ACNW's review, the staff intends to publish the STP as a NUREG before the end of the fiscal year.