# Official Transcript of Proceedings

# NUCLEAR REGULATORY COMMISSION

Title: Advisory Committee on Nuclear Waste
149th Meeting

Docket Number: (not applicable)

Location: Rockville, Maryland

Date: Tuesday, April 20, 2004

Work Order No.: NRC-1434 Pages 1-176

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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON NUCLEAR WASTE

(ACNW)

149th MEETING

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TUESDAY,

APRIL 20, 2004

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ROCKVILLE, MARYLAND

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The Advisory Committee met at the Nuclear Regulatory Commission, Two White Flint North, Room T-2B3, 11545 Rockville Pike, at 1:00 p.m., B. John Garrick, Chairman, presiding.

COMMITTEE MEMBERS PRESENT:

B. JOHN GARRICK, Chairman

MICHAEL T. RYAN, Vice Chairman

GEORGE M. HORNBERGER, Member

RUTH F. WEINER, Member

ACNW STAFF PRESENT:

JOHN LARKINS, Executive Director, ACRS/ACNW

NEIL M. COLEMAN, ACNW Staff

HOWARD J. LARSON, Special Assistant, ACRS/ACNW

RICHARD K. MAJOR, ACNW Staff

ALSO PRESENT:

ANNA H. BRADFORD

DR. DAVID W. ESH

CHAD J. GLENN

DAN SULLIVAN (via video phone)

C O N T E N T S

P R O C E E D I N G S

(1:03 p.m.)

CHAIRMAN GARRICK: Good afternoon. Our meeting will come to order.

This is the first day of the 149th meeting of the Advisory Committee on Nuclear Waste. My name is John Garrick, Chairman of the ACNW.

The other members of the committee present are Mike Ryan, Vice Chair, George Hornberger, and Ruth Weiner. Also present is Consultant Jim Clarke.

During today's meeting, the committee will, one, hear a briefing on the West Valley Demonstration Project and its performance assessment plan; two, hear a briefing on risk informed regulation for NMSS activities; three, commence preparation and review of potential ACNW letter reports.

John Larkins is the designated federal official for today's initial session.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act.

We have received no requests for time to make oral statements from any member of the public. Should anyone wish to address the committee, please make your wishes known to a member of the committee

staff, and we also ask that you use one of the microphones and that you speak clearly and identify yourself.

Before starting the session, I'd like to note a few items of interest. As you all know, there have been a number of personnel organizational changes made since the 148th meeting in February. For example on March 22nd, a reorganization within NMSS affecting the future interaction with DOE's Yucca Mountain project was announced. John Reeves has been designated Director, Division of Waste Management and Environmental Protection, and Bill Reamer, Director, Division of High Level Waste Repository Safety.

On March 31, Chairman Diaz announced the multi-senior management realignment. Of particular interest to the ACNW, Luis Reyes, Region II Administrator will become the EDO. Carl Paperiello will replace Ashok Thadani as Director of the Office of Research and will be relieved as Deputy EDO for Materials, Research and State Programs.

Marty Virgilio will occupy that position. Jack Strosnider will be Director of NMSS, and as we understand it, the appointments are to be made effective as soon as possible.

One of the things the committee encourages

is that its staff members be as active as they can be in their respective professional societies, and we're pleased to announce that Neil Coleman, co-authoring with another member of the NRC staff, Lee Abransom, a paper entitled "Future Volcanism at Yucca Mountain -- Statistical Insights from the Non-detection of Basalt Intrusions in the Potential Repository."

This has been accepted for presentation at the 2004 AGU Joint Assembly in May in Montreal, Canada.

Nebraska has lost its appeal with the U.S. Court of Appeals for the Eighth Circuit which upheld a district court judgment that the state should pay $151.4 million to the Central Interstate LLW Compact Commission.

French nuclear waste agency ANDRA plans to submit a complete safety case for a geological waste repository to its nuclear regulator by the end of March. The submission will include a precise definition of waste packages to be in place in such a repository. EDF has said it is essential that a geological waste repository be in operation by the year 2008 to 2009. The dose criteria is a familiar one, 25 millirem per year for 10,000 years with evaluation out to 100,000 years with the same dose

threshold.

The U.S. Court of Appeals for the District of Columbia said it found no evidence that Congress intended the Nuclear Waste Policy Act to prohibit the NRC from issuing the license to privately owned ISFSIs, thereby allowing NRC jurisdiction over reactor spent fuel facilities.

American Ecology reported a net loss of $8 million plus for 2003, reflecting a $21 million write-off of site development costs related to the failed low level waste disposal project planned for California Ward Valley.

A bill approved recently by the Utah house would require the legislature and the governor to give explicit approval any time Envirocare seeks to dispose of radioactive waste that is more active than Class A waste. The legislation would not give Utah elected leaders any say over high level waste, such as the federally licensed facility planned for the Skull Valley Goshute Reservation.

All right. We're going to go to our first topic, and the topic is going to be West Valley, and the committee member that has the lead on this particular area is Mike Ryan.

So, Mike, it's your show.

VICE CHAIRMAN RYAN: Thanks, Mr. Chairman, and thanks to the staff for bringing this update to the ACNW regarding West Valley.

We're going to have three presentations this afternoon by Ted Glenn and Anna Bradford and David Esh regarding an update from our last information gathering about West Valley, which was in 2000. So it has been several years. It may have been late '99 or early 2000, and we'll hear what's happening with regard to the West Valley Demonstration Project, perhaps a little bit about what DOE is doing, and how they are getting their environmental impact statement together and their decommissioning plans and what NRC's roles and responsibilities and views are looking forward to those activities.

So without further ado, Chad, let me turn the meeting over to you.

MR. GLENN: Thank you.

My name is Chad Glenn. I'm the project manager in the Division of Waste Management and Environmental Protection.

I'm pleased to be here today to update the ACNW on West Valley. As you know, the West Valley is a complex decommissioning site with a number of challenging issues. These issues, we believe, must be

addressed in a manner that is both protective of public health and safety and achieve some balance between what is economically and technically feasible.

We intend to use performance assessment as an aid to help achieve this balance.

If I could have the second slide, please.

There will be three parts of our presentation. I'm going to be talking a little bit about the West Valley site history description and the status of the site. Anna Bradford will be talking about the overview of the EIS, and Dave Esh will provide a general approach for a staff review of the performance assessment of West Valley.

Slide three, please.

In this part of the presentation, I'm just going to touch on the general history and background, a little bit on the agency roles and responsibilities, talk about the site description and areas of concern and the status of activities.

Slide four, please.

In the early '60s, New York State Atomic Research and Development Authority, now the New York State Energy Research and Development Authority, NYSERDA, and Nuclear Fuel Services constructed and began operating a nuclear fuel reprocessing facility

under an AEC license.

The West Valley spent fuel reprocessing facility operated from 1966 to '72. In 1972, the facility closed for modifications, and as a result of the imposition of new safety requirements, Nuclear Fuel Services decided that compliance with new requirements was not economically feasible and informed the state that it would not continue in the fuel rock reprocessing business.

In 1980, Congress passed the West Valley Demonstration Project Act. The act authorized DOE to demonstrate a method for solidifying 600,000 gallons of liquid high level waste that remained at the site. The act also directed DOE to develop containers for holding and transporting the solidified waste, arranged transportation for the solidified waste to a federal repository, disposed of low level waste and transuranic waste from the solidifying of high level waste and decontaminating and decommissioning the facilities used at the site.

DOE and HYSERDA entered into a cooperative agreement in 1981. DOE and NRC entered into a cooperating -- well, into a similar agreement in 1981.

The act also provided that the facility and the high level waste be made available to DOE

without any transfer of title for as long as required to complete the project.

NYSERDA's license was put in abeyance in 1981, and DOE took control of the facility in 1982. In 2002, the NRC issued its decommissioning criteria for the West Valley Demonstration Project, and later in 2002, DOE complete the solidification of the high level waste at the site.

Slide five, please.

The involved agencies at West Valley are NRC, DOE, EPA, NYSERDA, the State Department of Environmental Conservation, and the State Department of Health.

Other involved stakeholders include the West Valley Citizens Task Force, the Coalition of West Valley Nuclear Waste, and the Seneca National of Indians.

In 2002, the involved federal and state regulatory agencies developed a communication plan to identify the respective roles and responsibilities at the site and their clean-up requirements and expectations. We have provided a copy of this communication plan to your staff for the committee's information.

Slide six.

In the way of regional setting, West Valley is located in Western New York about 30 miles south of Buffalo within a 3,300 acre New York State owned property called Western New York Nuclear Service Center, often referred to as simply "the center."

The center is located in the lower right-hand side of the slide. As you can see, Cattahargas Creek is the main drainage for the area that runs east to west across the north tip of the site and drains into Lake Erie.

Slide seven please.

Again, I'd like to point out the 3,300 acre center boundary and the 200 acre West Valley Demonstration Project boundary is situated in the middle of the site.

This is a 20,000 foot view of the site with residual contamination in the different areas of the site color coded. These areas include the burial areas of the South Plateau, a North Plateau groundwater plume, a cesium prong, creek sediments, and the high level waste tanks, vitrification facilities, and the process building.

The residual contamination in these areas will be evaluated in the decommissioning EIS and in the decommissioning plan, and the next several slides

will show each of these areas in more detail. In the interest of time, I will only tend to make a few comments on each slide.

If I can have slide eight, please.

The facilities on the South Plateau include the state licensed disposal area, the NRC licensed disposal area, and a drum cell. The state licensed disposal area and the NRC licensed disposal area are both inactive waste disposal areas.

The state licensed disposal area contains about 2.4 million cubic feet of waste with 130,000 curies of activity.

The low level waste was derived in this burial area from a variety of sources, including fuel cycle, industrial sources, medical sources, and research facilities. The SDA is covered with soil and synthetic cover.

The NRC licensed disposal area contains approximately 360,000 cubic feet of waste with about 300,000 curies of activity. The waste includes hardware and equipment, spent fuel hulls, sludges, filters, damaged spent fuel element. This waste was derived from a reprocessing operation, and the results are some West Valley Demonstration Project waste varied in the NDA.

And finally, there is a drug cell that contains about 20,000 cement stabilized drums from treated supernatant from the high level waste tanks. DOE plans to ship all of this drum cell waste in the next few years off site.

MR. HORNBERGER: Excuse me. Just a quick question. Was the interceptor trench and the slurry wall -- were they designed as part of the disposal or are they after the fact the control contaminant movement?

MR. GLENN: I don't think I have the answer for that question. Dave?

MR. ESH: I think they're added after the fact.

Sorry. This was Dave Esh.

MR. GLENN: In slide seven -- oh, where am I? Nine. Thank you.

The north groundwater, North Plateau groundwater plume has elevated levels of radioactivity, principally Strontium 90. This contamination is believed to have resulted from release during fuel reprocessing operations. The apparent source of the contamination was the process building.

Current groundwater mitigation steps at

the present time are pump and treat from three extraction welds to remove Strontium 90, and a pilate scaled permeable treatment wall constructed and backfilled with zeolite to absorb Strontium 90.

Dave Esh will address the plume in more detail in his presentation.

Slide ten, please.

The cesium prong resulted from an atmospheric release from the stack during the processing operation. This release resulted in low levels of Cesium 137 contamination in soils extending from the reprocessing plant northwest across the site boundary.

Slide number 11.

Some creep sediments have elevated levels of Cesium 137 resulting from previous untreated lagoon discharges.

Slide 12.

This slide just simply points out the high level waste tanks, vitrification facility, and the process building.

There are four high level waste tanks, two large tanks, two small tanks, and all I really wanted to do was simply say that all of these facilities need to be decontaminated and de commissioned, and they

will be addressed in the decommissioning EIS, and DOE's decommissioning plan.

The process building also contains the 275 high level waste canisters that are presently in storage awaiting for a geologic repository.

VICE CHAIRMAN RYAN: Glenn, just for completeness in folks that may or may not know, the gray buildings, are they nonradiological buildings or buildings that are under some other authority?

MR. GLENN: They would be areas where there is no current residual contamination to be addressed.

VICE CHAIRMAN RYAN: Okay, great. Thanks.

I neglected to mention at the outset we have some colleagues from the Department of Energy and others up at the facility via video behind us, and welcome.

MR. GLENN: Slide 13, please.

This slide shows the location of waste storage and processing facilities on site. DOE intends to ship this waste off site for disposal in the next several years.

There's also a facility. I think it's acronym is RHWF. This stands for the remote handled waste facility on the left side of the slide.

This is a recently constructed facility. It hasn't started operating yet. They expect it to start operating this summer. This facility is designed to prepare high activity waste requiring remote handling for off site disposal. The facility has a shielded work cell, the capability to track, decontaminate, and repackage waste for off-site disposal.

MS. WEINER: Question. What's the difference between your remote handled waste and high level waste?

MR. GLENN: The remote handled waste, I guess the way I would answer that is the remote handled waste in this facility would be used to handle those pieces that can actually be removed from existing buildings and need to be size reduced remotely, and this is what this facility is intended to be.

MS. WEINER: Okay. Thanks.

MR. GLENN: Slide 14 please.

This shows the low level waste treatment facilities and lagoons, and that basically ends our tour of the site. I'd like to now talk a little bit about the current status of activities.

Slide 15 please.

NRC staff is implementing the Commission's final policy statement. The final policy statement prescribes the license termination rule as the decommissioning criteria for the site. The Commission recognized that the decommissioning of the West Valley site will present some unique challenges which may require some unique solutions.

The final policy statement provides flexibility to consider other approaches for parts of the site where cleanup to the license termination rule is prohibitively expensive or technically impractical.

If it can be demonstrated that public health and safety is protected, these other approaches might include the use of robust engineered barriers, long-term license, or an exemption. Any exemption must meet the Commission's expectation that all parts of the site be decommissioned to the extent technically and economically feasible and demonstrate that the protection of the public and the environment can be maintained.

Slide 16.

DOE is presently developing a decommissioning plan. The decommissioning plan will provide the basis for NRC determination of whether or not the proposed action meets the license termination

rule. DOE intends to submit this plan to the NRC before the end of the year, this year.

The DOE staff refers to this plan as a living document that will be maintained and updated as needed to be consistent with the decommissioning EIS. NRC intends to issue a safety evaluation report documenting the results of its safety and environmental review after the issuance of the decommissioning EIS record of decision.

Slide 17.

As a result of a recent public meeting between DOE and NRC which discussed the scope of the decommissioning plan, DOE's scope will now include DOE's proposed action and a demonstration of compliance with a decommissioning criteria and evaluation of residual activity for the entire 3,300 acre site. It will include planned decommissioning activities, the radiologic status of facilities, dose modeling, a layer analysis, a final status survey, and information supporting DOE's waste incidental to reprocessing determination for the residuals in the tanks.

The scope of DOE's decommissioning plan will not include any near term waste management and facility deactivation activities.

That concludes what I wanted to address today, and I can try to answer any questions now or after the next presentation.

VICE CHAIRMAN RYAN: Just a couple of questions on that last slide, actually one. I'm a little confused with the last item not being in conflict with the previous items.

The near term waste management facility deactivation activities are not in the scope, but final status survey, ALARA, radiologic status of facilities, and so on is. I'm missing something. Why isn't waste management facility deactivation integral to the plan?

MR. GLENN: I guess I would answer it this way. I think the way that we look at it is the license termination law or decommissioning criteria is focused on the end state of the facility, the end state after decommissioning, and so with that being the focus, DOE's ongoing activities do decontaminate process cells and move waste off site. It's something that we view as within DOE's authority and its activities they have done over the last five or ten years.

So our decommissioning plan and our interest in the decommissioning plan is really focused

on the end state of the cycle, after the decommissioning.

VICE CHAIRMAN RYAN: That clarifies it for me. There's ongoing activities now to manage and deactivate facilities that are generating waste. You're viewing that to be prior to the decommissioning plan and picking up.

MR. GLENN: Correct.

VICE CHAIRMAN RYAN: Okay. I'm with you now. I just wanted to make sure I understood that.

CHAIRMAN GARRICK: Will the DOE plan be specific in terms of restricted versus nonrestricted decommissioning?

MR. GLENN: Well, I think what we've asked DOE to do was clarify on the site for the whole 3,300 acre facility. What areas would be suitable for unrestricted release? What areas would require restricted release with some kind of institutional controls? And what areas might remain under license?

We don't know what that is yet. We haven't seen that, but that's what we've asked DOE, and that's what we expect DOE to generate in the decommissioning plan

CHAIRMAN GARRICK: I assume Dave will tell us which of those plumes are atmospheric and which are

groundwater. Okay.

MS. WEINER: Which waste that you're collecting in these various facilities are you planning to transport off site and where are you planning to take it?

MS. BRADFORD: I'm going to talk about that a little bit in the next presentation.

MS. WEINER: Okay.

CHAIRMAN GARRICK: Let's proceed. Thanks.

MS. BRADFORD: Okay. My name is Anna Bradford, and I'm the NRC project manager for the West Valley environmental impact statement, which is what I'm going to talk about for a few minutes today. In just a minute I will.

(Laughter.)

MS. BRADFORD: You can go to the next slide, please.

My presentation will briefly cover the background of the EIS, the status and alternatives in the EIS, issues that we believe need to be covered in the EIS, as well as the schedule that we're currently working to.

Next slide.

The draft EIS for West Valley was published in January of 1996, and the NRC staff

provided extensive comments on this DEIS. Examples of the '96 comments were the need for an adequate long-term performance assessment; the realism of dose estimates; and the need to identify a preferred alternative.

And it's important to note at the time of the publication of that draft EIS, the LTR was not yet final, and the NRC had not published its policy statements. So DOE did not know what the decommissioning criteria for this site would be.

In 2001, DOE decided to advice their NEPA strategy and separate their analyses into two separate EISes, one which was the waste management EIS, and the other was the decommissioning and long-term stewardship EIS.

Next slide, please.

The final waste management EIS was published in December of 2003, and it addressed management of those wastes already in storage or those that would be generated over the next ten years during decontamination and decommissioning activities, and in that EIS, their preferred alternative was keep the high level waste on site until it had a destination; ship low level and mixed waste to either a DOE or a commercial facility; and ship true to WIPP.

However, the ROD has not yet been published for this, only the final EIS, and the NRC was not involved with the development of this EIS.

The decommissioning EIS addresses various decommissioning and long-term stewardship alternatives for the site, and a notice of intent was published in March 2003. In this EIS, DOE and NYSERDA are the co-leads, and NRC, EPA and NYSDEC are cooperating agencies.

And under NEPA cooperating agencies participate in the development of the EIS, and generally agencies that either have jurisdiction or have expertise in the area are being evaluated.

NRC staff is currently reviewing draft pre-decisional documents for this decommissioning EIS.

Next slide, please.

The EIS currently has five alternatives that are being analyzed. Under alternative one, all buildings, structures, and buried waste would be removed and shipped off site so that the entire 3,300 acres could be released for unrestricted use.

Alternative two would be the same as alterative one for the North Plateau with all facilities removed. However, the South Plateau burial grounds would remain under license.

Alternative three, the North Plateau would meet restricted release criteria, and the process building and high level waste tanks would be closed in place and capped. The South Plateau burial grounds, again, would remain under license.

Alternative four would consist of monitoring and maintaining the entire site, and this fulfills the NEPA requirement of analyzing the impacts of the no action alternative.

Alternative five is the same as alternative three, except that the process building is left standing and decontaminated to meet restricted release criteria, and a cap would cover only the closed in place, high level waste tanks.

DOE has identified this as their preferred alternative. NYSERDA has not yet identified their preferred alternative.

CHAIRMAN GARRICK: Have estimates been made for each of these alternatives?

MS. BRADFORD: Not at this point. I can tell you that for alternative one in the draft 1996 EIS, they had a similar green field alternative, and at the time the cost was about $8 billion with 9.3 million cubic feet of rad waste that would need to be shipped off site.

CHAIRMAN GARRICK: Thank you. That was enough.

MS. BRADFORD: The NRC staff believes that the PA underlying the EIS should be the same as the PA supporting the decommissioning plan. The EIS and the DP are closely interrelated and will be coordinated both internally within DOE and internally within the NRC.

And like Chad said, we will not make a decision on the DP until the record decision has been reached for the EIS.

The NRC's West Valley policy statement says several issues should be addressed in the EIS, and a partial listing is given on this slide. For example, the EIS should evaluate the entire 3,300 acre site, including the SDA. Impacts beyond 1,000 years should be analyzed. Impacts from incidental waste should be evaluated, and a cost-benefit analysis should be included.

Next slide, please.

The NRC and other cooperating agencies have completed several reviews of supporting EIS documentation of the last six months, and we provided comments back to DOE and NYSERDA. Some reviews that we've completed are listed here: the NDA and SDA

characterization reports, the high level waste tank farm characterization report, and four EIS appendices that were related to PA, and these are the long-term PA methodology, long-term PA models, hydrogeology analysis, and erosion studies.

Next slide, please.

This slide just provides some highlights of the EIS development schedule. DOE and NYSERDA and the cooperating agencies will be meeting in May to discuss all of the agency comments in the four PA appendices that I just described.

In October 2005, DOE plans to provide us with a PA results appendix for our review, and the environmental consequences chapter will follow in January 2006.

DOE then plans to release the draft EIS for public review in November of 2006, and this will be followed by a six-month public comment period, with plans for the final EIS public release in October of 2007.

And that's all I have today unless there are some questions.

CHAIRMAN GARRICK: Ruth?

MS. WEINER: You said that you need to do performance assessment or to look at environmental

impact past 1,000 years. Is that because there is also actinide contamination? Why are you going past 1,000 years?

MS. BRADFORD: I believe when the policy statement was delivered or -- excuse me -- developed, they believed that the peak doses may well be out past 1,000 years and so they put in that statement.

MS. WEINER: Well, what would cause the peak dose? That's my question. What would cause the peak doses to be higher? Would that be actinide in-growth or something, actinide decay?

MS. BRADFORD: Dave?

MR. ESH: Yeah, I'll talk about that a little bit.

MS. WEINER: Oh, okay.

MR. ESH: I think it's primarily a reasonably significant quantity of long-lived isotopes or actinides.

MS. WEINER: And that's in the plumes? It's in the environment somewhere?

MR. ESH: The answer to that is yes. It's both. I mean, most of it is contained in a lot of the sources that are being managed right now. When we talk about the Strontium 90 plume, I'll talk about that a little bit. There wasn't a release of just

Strontium 90, as you can imagine. It was a release of material that was undergoing processing.

MS. WEINER: Oh, okay.

MR. ESH: So it contained everything else that was in that material whenever that release occurred.

MS. WEINER: Thank you. That was exactly the answer.

Is all of your high level waste now contained in some way? Either it's pieces of large pieces or it's vitrified or it's contained in some other way; is that correct?

MS. BRADFORD: Yes, if you're considering contained to be, for example, the liquid in the tanks.

MS. WEINER: Well, are you planning to process it to get --

MS. BRADFORD: I don't believe DOE plans to process it any more than it already has been processed.

MS. WEINER: then it would stay where it is or --

MS. BRADFORD: Well, there's the alternative of digging up the tanks and shipping them off site, or there's the alternative of close in place.

MS. WEINER: Okay.

MS. BRADFORD: In which case you would stabilize it by perhaps putting grout in the tank and in between the tank and the vault and then putting a cap over top of that.

MS. WEINER: So in any case it just wouldn't be free liquid sitting in the tank.

MS. BRADFORD: No, right.

MS. WEINER: Have you been looking at what the various options they have for the Hanford tanks?

MS. BRADFORD: Yes.

MS. WEINER: I suppose this is very similar.

MS. BRADFORD: Right.

MS. WEINER: Okay. Thank you.

MR. HORNBERGER: So looking at your penultimate slide, you have recent cooperating agency reviews. So what did you learn from reviewing this material?

MS. BRADFORD: I can't go into too much detail in a public forum like this because a lot of these documents are not publicly release and our comments are not publicly released. We provided comments on things like modeling methods and adequacy, inventory estimates, uncertainty estimates.

We had a pretty broad range of comments, but I don't think we saw any show stoppers in there.

CHAIRMAN GARRICK: Okay, yes.

MR. CLARKE: I'm looking at your slide five, which has the alternatives that are being evaluated in the EIS. That's a pretty broad range of alternatives, and I wonder what is the anticipated future land use and is there going to be an attempt to target the remediation of the land use.

MS. BRADFORD: I can tell you the current land use is agricultural. It's a very rural site, and I think that's the type of land use they are assuming it will be in the future.

MR. CLARKE: Okay, and just one quick question. The unrestricted release for entire site, you have what looks like two large burial grounds. One has already been covered with an engineered cover, and you've got a slurry wall around part of it.

To get to unrestricted release, would all of that be removed?

MS. BRADFORD: Under this alternative, you would analyze it where all of the waste was being --

MR. CLARKE: And groundwater contamination, you'd have a pump --

MS. BRADFORD: Whatever we'd have to do to

meet unrestricted release criterion.

MR. CLARKE: Okay. Thanks.

CHAIRMAN GARRICK: Okay. Thanks.

Any other questions? Mike.

MR. LEE: Yeah, Anna. In slide eight, you make reference to PA results being available in October 2005. Will the staff be looking at the entire performance assessment document? Will there be a comprehensive report that synthesizes all of the information that was used and the abstractions and the methodologies and the data?

MS. BRADFORD: You mean will we be looking at more detail than just what's in the EIS?

MR. LEE: Yes, right.

MS. BRADFORD: Yes, I think we will, especially for DP. In DP space we'll need to look at that.

MR. LEE: Okay, and at some point that document would be publicly available as part of the record of decision? Would they be --

MS. BRADFORD: All of the supporting documentation? I would assume that if it's referenced in the AS (phonetic) it should be something that's publicly available.

MR. LEE: Okay.

MS. WEINER: Just another quick question. Are you including transportation of material off site in your EIS?

MS. BRADFORD: Yes. In alternative one, there's thousands of shipments that would --

MS. WEINER: And I'm interested in how you're assessing the risks of transportation.

MS. BRADFORD: I can tell you we haven't seen anything on that for this current version. In the draft '96 EIS they looked at per miles shipped, what were the fatalities from accidents, both just normal road accidents as well as accidents involving radioactive material, and then they also looked at the transportation emissions. Would that cause any fatalities from everything being emitted to the air.

MS. WEINER: You may want to answer this later because I don't want to take the time for details, but I would be interested in what programs' models were used and what models you are using in this EIS to model transportation risks and particularly the radiological risks of transportation.

MS. BRADFORD: Okay.

MR. HORNBERGER: On the waste management EIS, you said that the high level was meant to be shipped off site to a repository after being stored.

So that includes all of the spent fuel at West Valley?

MS. BRADFORD: Not anything that's in the burial grounds, but the canisters, and that's all they're addressing in that EIS.

MR. LEE: That's the vitrified waste that was generated a few years back as a result of --

MS. BRADFORD: Right.

MR. LEE: That's destined for Yucca Mountain, I think.

MS. BRADFORD: Yes, yes.

VICE CHAIRMAN RYAN: Let me add right away for all three of you we recognize that we're asking questions that might be years in advance and it's hard to know the details, and we appreciate your insights even at this early stage of getting this project up and running at this point. So thanks for looking ahead with us.

Any other questions?

MR. LARKINS: Yeah, let me just ask for clarification for myself. On page 6, viewgraph six, you say the performance assessment for EIS should be the same as the PA in the decommissioning plant. So I assume that the staff and DOE are going to use the same methodology.

MS. BRADFORD: I'm going to let Dave

address that question when he talks about PA, but my point there was really supposed to be DOE should be using the same performance model for both documents.

MR. LARKINS: Okay. But the staff is doing an independent PA, but you're not constrained to using the same. Okay.

CHAIRMAN GARRICK: Just one other point to clarify. I assume to remember that there was some damaged fuel around. Was that vitrified?

MS. BRADFORD: No.

CHAIRMAN GARRICK: And where is that?

MS. BRADFORD: At the NDA. It's buried in the NDA.

CHAIRMAN GARRICK: It's buried?

MS. BRADFORD: Yes.

CHAIRMAN GARRICK: Okay. Thank you.

VICE CHAIRMAN RYAN: That answers the 1,000-year question.

CHAIRMAN GARRICK: Yeah.

(Laughter.)

CHAIRMAN GARRICK: Yeah.

VICE CHAIRMAN RYAN: David, please.

MR. ESH: I'm going to break from the norm and stand because I have a few things to point to. I don't want to be doing this while talking.

I'm David Esh in the Environmental and Performance Assessment Directorate of the newly formed Division of Waste Management, Environmental Protection.

And I'm going to talk about the general approach for our review of the performance assessment at the West Valley site. I'd like to acknowledge my contributors to this presentation: Anna Bradford, Chris McKinney and Chad Glenn, and I hope to dispel the rumor that if it's general in the title that means it's fluffy.

So next slide, please.

For my overall outline, I'm going to give you a brief site overview. Chad Glenn did some of this in his presentation, and the other elements that I'm going to touch on are regulatory framework for the performance assessment; so to give you some idea of where we believe this fits in and what's the guidance related to a performance assessment.

And then based on what we've seen so far, I'm going to talk about expectations for DOE's PA. What do we look at as the key elements of the performance assessment for this site and problem, in particular.

And then I'll talk about our plan for

staff review and NRC's independent PA development and assessment activities we plan.

Next slide, please.

So as a brief overview, we would say that the complexity from a performance assessment perspective is high, and that's for a number of reasons, one of which is given on this slide. There are significant potential sources for contamination, a list of which is provided here, including the process building, high level waste tanks, NRC license disposal area, the Strontium 90 plume, state license disposal area, SDA, low level waste treatment facility lagoons, and cesium prong.

These are some of the potential sources for contamination. There are others. These tend to be the bigger hitters out of the potential sources for contamination.

Each of these sources --

VICE CHAIRMAN RYAN: David, just a quick question. How would you rank the geohydrologic environment in terms of its complexity?

MR. ESH: I'd say moderate to high. It's certainly not a simple site, but there are some aspects of it from a performance assessment perspective that make it a little easier to deal with,

and that's the main one being that you're not dealing with a large vadose zone, a large, unsaturated zone and what are the transport rates through the unsaturated zone.

So that makes it a little bit simpler, but there's a significant amount of heterogeneity in the geology that we see. So that makes it more complicated.

From a potential source perspective, each one of these can have different implications for the performance assessment. They have different nuclides that, therefore, have different mobilities. They have different locations. Some are surface contamination. Some are groundwater, and some are maybe at depth.

To give you an idea the process building is, of course, above grade, and so the receptor scenarios that you may be looking at for the process building and the exposure pathways will certainly be different than something like the Strontium 90 plume which is a groundwater plume that has resulted from a subsurface release.

Of course, NRC license disposal area and the state license disposal area are both disposal areas below grade. Some of the waste in the NRC license disposal area is 50 feet down. Some of it, I

believe, is more like 20 feet down. And then the state license disposal area is a little bit more shallow than the NRC license disposal area, I believe.

The cesium prong was resulting from an atmospheric release during operations, and it basically resulted in soil contamination of cesium on the ground surface.

And if you'll remember back to that one figure that Chad Glenn showed in his presentation that has that large area of color stretching off, I believe, to the upper left, that was the cesium prong, the surface contamination.

The Strontium 90 plume groundwater contamination is a smaller plume, much smaller plume than that cesium prong, but I'll show it to you in one of the slides coming.

CHAIRMAN GARRICK: Are you going to say something about the depths of the groundwater plumes?

MR. ESH: Yeah.

CHAIRMAN GARRICK: Something about the general dimensions?

MR. ESH: Sure, we can talk about that when we talk about the Strontium 90 plume.

Slide four please.

This is a picture looking south. I think

it gives you a pretty good perspective of the site.

In the upper part of the figure here, you see the state license disposal area with its geomembrane over top of it. The NRC license disposal area is located next to it.

Here's the drum cell, again, that Chad Glenn had mentioned.

Closer to you in the foreground is the process building, of course, and the high level waste tanks are highlighted. Then there's low level waste treatment facility lagoons here.

A lot of these areas are holding waste, waiting for disposal, low level waste in particular. All of that is expected to be shipped off site and those buildings, you know, taken away.

VICE CHAIRMAN RYAN: David, could you just trace with a pen the couple of creeks that are nearby, please?

MR. ESH: Sure. In between here where the trees are in the middle is Erdman Brook, and Erdman Brook generally separates the site into the South Plateau and the North Plateau. Erdman Brook flows into Frank's Creek, which is flowing along this side of the site, and Frank's Creek flows into Buttermilk Creek, which is off the picture, which flows into the

Cattahargas Creek, which is further off the picture.

So hopefully there's a slide coming up on the Strontium 90 plume, a plan view of that, where you'll get a better view of where the streams are in relation to the waste and the facilities.

MR. CLARKE: David, before you leave that slide, the geomembrane looks like it's exposed. Is that --

MR. ESH: It is exposed at the lance of this --

MR. CLARKE: It that kind of an interim design?

MR. ESH: It's designed to limit infiltration into the waste.

MR. CLARKE: But there's no soil covering it?

MR. ESH: There's no soil covering it, and there's implications, of course, for the lifetime of the geomembrane whether you cover it or you don't. Geomembranes are typically good for 50 to 100 years. If you put soil on it, then you run into questions like burrowing animals. Do they get into it?

If you leave it exposed, it's exposed to sunlight and it may not have as much of a lifetime for that. So there's implications whether you leave it

exposed or don't.

In this case, I believe it is an interim measure, and it is exposed at the surface.

MR. CLARKE: And the same thing at Maxi Flats.

MR. ESH: Yes.

MS. WEINER: I suppose in your discussion of the plumes you're going to talk about monitoring in all of these creeks and what kind of monitoring results you've gotten.

MR. ESH: Not in very much detail today, I don't think. Well, you can imagine though, okay, when we'll deal with the -- well, let's wait until we get to the Strontium 90.

MS. WEINER: Okay.

MR. ESH: It will be easier then.

Next slide, please.

So for a brief overview of the site, as I said, it's separated into two plateaus primarily based on hydrogeology, and the important thing to note here is that the receptor considerations may be different for the different waste management areas based on the availability of water.

So whereas there may be water availability on the North Plateau, there may not be or there may be

limited water availability on the South Plateau. So when you're talking agricultural scenarios and, say, a resident farmer scenario or some other scenario, that has implications for the receptor and the risks that you get for those receptors.

The other two main things that I want to note here, and they'll show up later in the presentation, are that the site experiences relatively high rates of erosion, and that can have implications for a number of things related to the performance assessment.

The other thing is that the engineer barriers are expected to be used as part of the site decommissioning and play a very significant role, or they may play a very significant role. It's too early for us to say exactly what barriers are going to be used and how important are they.

Next slide, please.

So our regulatory framework basically comes from the PA must satisfy the requirements of 10 CFR, Part 20, Subpart E, the license termination rule. And the LTR has provisions for different types of release, which we talked about some earlier.

Unrestricted release, which is basically no controls or maintenance, and you meet a 25 millirem

annual public dose limit. Also restrictive release which has two components to it, but you can use institutional controls to limit the use of the site, provide for maintenance and monitoring, which may be necessary or could be necessary in a site that has a high erosion.

And then under that scenario when the controls are working, you have to show you can meet a 25 millirem annual public dose limit.

Then you also have to do an analysis that you assume the controls fail and show that you can meet a 100 millirem annual public dose limit or in some circumstances 500 millirem annual public dose limit.

There's also alternate criteria that we don't expect they're going to apply or are going to be exercised at the West Valley site.

Next slide, please.

So that was basically our regulatory part of it, and then we have guidance documents that we believe give a lot of expectations, indications of what should be part of a performance assessment, the first one being NUREG 1757, which is the consolidated NMSS decommissioning guidance.

The second one is NUREG 1573, which is the

performance assessment methodology for low level waste disposal facilities, and the reason why I put the second one here is not only does it provide a lot of information about expectations for performance assessment or considerations when you're completing a performance assessment, but NUREG 1757 refers back to NUREG 1573 when you're dealing with complex decommissioning sites. So the two are tied together, and they provide a good guidance framework for a performance assessment.

The main point that I want to emphasize, we could go into an hour long or all day discussion about the guidance the various elements that's contained in the guidance, but one of the main elements I wanted to discuss was that the guidance stresses reasonably foreseeable scenarios and current regional practices, and basically there was a recent LTR analysis that was approved by the Commission. We would expect that that LTR analysis is implemented in whatever is done to the West Valley site.

This has implications for the risks that you generate, what type of scenarios you assign and what the receptors are doing. It has a very big implication.

The biosphere usually gets the short end

of the stick in lots of these problems, but it basically can play a big role base on how you define your starting point, how you define your scenario.

Next slide, please.

So our expectations for DOE's PA, I have included some that are kind of higher level, general at the top here, and then some that are more specific based on what we've observed so far. We expect that it should incorporate as much realism as is practicable, which is understandably difficult when you're dealing with a complex site with a lot of uncertainty. It's hard to put your finger on the realism part of it.

And so you have to balance cost, and there's always this balance between how much conservatism do you want to use, how much cost do you want to expend to reduce the conservatism. That will be ongoing as part of this process.

The other thing is to provide for a liberal consideration of uncertainty, which we believe is important for a complex site, and we always like to see for a complex site with high uncertainty probabilistic analyses, but we can't requite it. As long as somebody is dealing with uncertainty appropriately, such as a deterministic analysis with

lots of sensitivity and uncertainty analysis or a definitively conservative analysis, we can't require a probabilistic analysis, but for these types of problems in many cases it's preferable for a number of reasons that we could discuss.

CHAIRMAN GARRICK: How are they approaching the issue of uncertainty analysis?

MR. ESH: It's a mixed bag. In some cases they're trying to take conservative approaches to parameter selection or model selection or the different things that go into the development of components of the performance assessment.

In other cases, they're doing sensitivity uncertainty analysis to look at the importance of the uncertainty that they're dealing with, and then in some cases they are doing some stochastic analysis of representing various parts of the system stochastically. So it's kind of a mixed bag from part to part, component to component of the performance assessment model.

Now for the specific elements that we have expectations for. DOE's models are mostly internally developed for this project. So that makes quality assurance more important, and the main elements of quality assurance that we believe are significant for

this problem are the software and calculation verification for these independent, internally developed models, and then also the model supports for the models that are being used.

And they are usually extensive in terms of documentation that you get for these types of activities, which makes our review job harder, but so be it.

And then I want to emphasize again about the receptors should be based on the reasonably foreseeable scenarios and current regional practices.

Next slide, please.

As I mentioned, there are two key elements that can have significant influences on the performance assessment, the first being the engineer barriers. They may perform key functions at this site. There are various types of barriers being considered or may already be in place, as you noticed. There's an interceptor trench for the NDA. There's a slurry wall already in place for the SDA. There's a geomembrane in place at the SDA.

These four things that I listed here are all being considered for the high level waste tanks, the design question you asked, Dr. Weiner, about what are they doing with the liquids in the tanks. How are

they going to stabilize that? These features are all being considered for the high level waste tanks to stabilize those residual materials.

The two technical things that raised their head related to widespread use of engineered barriers are the as in place performance. You know, you can conceptualize it on paper and design a great engineered barrier and say this is one I'm going to use and, therefore, it changes my problem this way. This typically or can be a substantial difference between the as in place performance and the as conceptualized performance. That's a difficult question to answer.

And then also the long-term performance to the extent you need to rely on it in these problems is also a difficult question to answer.

MS. WEINER: Are they doing any preliminary experiments actually on the ground with cover, with grout (phonetic), and so on?

MR. ESH: Yeah, I think it's a little premature to answer, well, for them at this stage because they're still trying to decide what engineered features they are going to use, number one, but for instance, I don't know if it was Chad or Anna mentioned the slurry wall that they had put in for the

Strontium 90 plume. That was field proof of concept for how that wall might work with remediating the Strontium 90 plume.

So I don't know what their plans are going forward. If they way, "Well, our performance assessment is going to rely on these four things," how they are going to test and determine if they can get the performance they need out of those things.

Erosion rates may be high that the waste could be exposed, and what that tells us is that you need to look at the uncertainty pretty rigorously, especially for the long-term prediction of erosion. You're basically into one of these extrapolation situations. You have short-term data. You're trying to extrapolate it to a much longer time period, and you have to be careful about how you go about that process and be open minded to the uncertainties and how they may influence your estimates.

And then --

MR. HORNBERGER: Dave, by erosion, I take it you mean falluvial.

MR. ESH: Falluvial erosion, yes. Sheet and rill erosion, you know, a uniform type of erosion of the land surface, and in addition, the stream widening. As I'll show on the one slide coming up

with the surface water bodies, the stream widening can result in basically the bank of a stream just moving into the waste.

And then also gullying, formation of new channels essentially off of the streams. All three of those processes are important and considered.

CHAIRMAN GARRICK: And, Dave, have they got enough preliminary calculations to know approximately the time of peak dose or time range of peak dose?

MR. ESH: No, I can't answer that at this time, no. I'm sorry.

CHAIRMAN GARRICK: Okay.

MR. ESH: Slide ten, please.

So our plan for reviewing the performance assessment is we're going to have staff, my directorate, the Environmental Performance Assessment Directorate, as well as the Decommissioning Directorate take part in this review. It mixes different types of people.

We're also going to use technical support with a contract and the Center for Nuclear Waste Regulatory Analysis. We'll make use of their experts whenever we need them.

We also have in-house expertise, members

of research who we probably rely on for some of these more difficult challenges in this review.

We have begun, as Anna stated, reviewing the draft sections described in the performance assessment, and what I wanted to mention is that we'll try to be risk informed, and we're trying to be risk informed now, but that is difficult when you're reviewing components of a model and you don't have the results. You don't know how they all fit together. You don't know how one influences another.

It's difficult to do that at this stage, but we expect that we will do that to the extent feasible, especially when we get a more complete picture of how everything fits together and what's important and what's not.

Slide 11, please.

CHAIRMAN GARRICK: It's difficult to do when you don't do a risk assessment.

MR. ESH: Slide 11, please.

So as part of this process though we expect we're going to develop our own performance assessment model for a couple of purposes. One, to risk inform our review to the extent practical. We also plan to look at maybe some uncertainties that DOE may not look at in as much detail as what we would

like to see, and generally we do an overall kind of confirmatory analysis to see whether we get similar results to what DOE may have obtained.

On the bottom of the slide here, these were intended to be your eye test, I guess. Actually the details of them aren't important. To give you an idea, if we used the GoldSim software package or we might also use frames to the extent we're able to, maybe we'll compare both of them. I don't know. It's still preliminary, but if we used the GoldSim software package, we can build a visual model that's flexible. We can change things actively, and we can also produce a model that is pretty user friendly to other stakeholders.

So if we produce the model, we could provide it to you in a player file, and it would allow you to browse it and look at it and see parameter selections and how models were hooked together and all that sort of thing, which we really need to do as part of this public process that we're involved in. So we want it to be as accessible as possible.

Next slide, please.

One example of the complexity of the site that I'd like to touch on is the Strontium 90 plume. It originates from a corner of the process building

and basically the plume is pretty extensive in terms of aerial extent. Okay? It's basically you can see -- oh, let's go to the next slide, and then I'll talk to the things on the previous slide.

You have a plume that extends, you know, maybe 1,500 feet or so, of which you have this red area where the ground water is above 100,000 pica curies per liter Strontium 90. It's basically 1,000 feet long or so and maybe 150 feet wide. It's pretty extensive.

This lobe here near the low level waste treatment lagoons, it's unclear at this point whether that is due to contamination from the lagoons or whether it's due to transport from the original plume at the --

CHAIRMAN GARRICK: What's the depth to water table?

MR. ESH: The depth to water table is pretty shallow. There's a sand and gravel unit that's underlying the facilities here, and the plume is basically being transported in that shallow unit. Okay? So the plum is maybe in vertical extent ten to 20 feet-ish, something like that. It's not incredibly thick, and there is a rather impermeable or somewhat impermeable unit below that's preventing vertical

contamination.

The depth to water, I don't know the exact number, but it's fairly shallow as you can imagine.

MR. HORNBERGER: My recollection, in some spots it's only a couple of feet deep. It's very shallow water table.

MR. ESH: Well, actually out here towards the end of the plume there's a monitoring location where the groundwater actually outcrops at the surface. So we can imagine that --

MR. CLARKE: David, can you go down to the bottom of that slide and see if I'm oriented properly?

MR. ESH: Yeah.

MR. CLARKE: RTS drum cell, is the SDA just northeast of that right there?

MR. ESH: Yeah, this is the SDA right here.

MR. CLARKE: Okay, and that's where your slurry wall is.

MR. ESH: Yes.

MR. CLARKE: So that tells you it's pretty shallow. You've probably got water in the waste, and that's why you put the wall in.

MR. ESH: You remember this is the South Plateau, and the North Plateau is at the top, and it's

separated generally by Erdman Brook here, and so they have somewhat different geology, but you're right. It's not incredibly different in terms of if you have a relatively shallow water table here, you also have a relatively shallow water table there.

MR. CLARKE: Now, is there a plume coming from the SDA as well?

VICE CHAIRMAN RYAN: There's some dynamics there, David, if my history is right. West Valley first recognized it had a problem from a commercial disposal standpoint in that they dug trenches in what was a till and they, in essence, filled up with infiltrate.

MR. ESH: Yeah, that's right.

VICE CHAIRMAN RYAN: So it's an overflow of a, you know, glacial till bathtubbing kind of effect versus groundwater going through the waste, but in any case, you've got saturated water and disposal--

MR. CLARKE: Yeah, but the slurry wall is only covering a portion of the disposal area.

VICE CHAIRMAN RYAN: Right.

MR. ESH: The slurry wall and the geomembrane are designed to limit infiltration into the S --

MR. CLARKE: Yeah, the slurry wall is to

keep groundwater out.

MR. ESH: Yeah, yeah, yeah. It's designed to minimize the amount of water contacting waste in the SDA. The SDA had, I think, a collection and treatment system to get the leachate from the SDA.

MR. CLARKE: Is there a plume associated with that as well?

MR. ESH: I don't believe there is at this point in time, no.

The NDA -- I mean, there's some contamination, and the reason why they have some of these features like the interceptor trench around the NDA is to limit the potential transporter contamination from the NDA.

Regarding the Strontium 90 plume now, it has interesting implications for what are your receptors, what are their activities. How do you show that you're going to satisfy the restrictive release criteria when you're dealing with, you know, maybe over 100,000 pica curies per liter Strontium 90? What's reasonable and foreseeable? All of those sorts of questions are questions that we need to answer as part of this evaluation.

MS. WEINER: Did I hear you say a little earlier in the presentation, or Chad perhaps, that

you're doing pump and treat on this plume?

MR. ESH: Yeah, DOE is doing plump and treat of this plume to prevent off-site migration, and of course, that would be one remediation technology you could possibly employ. If it's a Strontium 90 plume, it has a 28 year half-life. You know, you're looking at 245 years or so for it to maybe get down to a suitable level. So that's one option that you could employ for this.

MS. WEINER: So currently they're just doing pump and treat to keep the contamination from going off site.

MR. ESH: Yeah. The interesting thing is if your receptors are all -- remember the site boundary is around the site. You have the project boundary, and then you have the site boundary at a much further distance. If your receptor is at that site boundary, the potential pathway of contamination is into the surface water bodies and then through the surface water bodies to the point at the site boundary.

Well, these streams are not huge streams, but you get a significant amount of dilution in the surface water bodies. So the dose that a person at the site boundary via the surface water pathway sees

is much, much, much less than somebody would see if they were a user of the groundwater, as you can imagine.

So the receptor location and their practices can have a big influence, especially when you're dealing with shorter lived contamination like the Strontium 90 plume.

As I had mentioned earlier, the source of this plume though was basically fuel that had been dissolved during the processing, and so all of the components of that fuel would have been in the source in addition to the strontium. It's just the strontium that has migrated. Everything else seems to be observable in the soil and the groundwater below, but it is just not migrating to any great extent, and it could be that the absorption coefficients, the distribution coefficients are large enough that the liquid phase is low, that it's not a significant concern. I don't know the answer to that yet.

MS. WEINER: So you could, in theory, draw plumes for the other radionuclides. You could draw yourself some actinide plumes.

MR. ESH: Yeah. See, ultimately you're going to have sources from the tanks, the contamination to the soil. You have these low level

waste treatment lagoons. You have the disposal areas. All of these have different amounts, quantities of nuclides, different ratios between the nuclides, and ultimately you're looking at transport of all these sources to surface water bodies.

You're looking at if you put receptors at various locations within the site, depending on the defined use, what sort of risk they would get, and then you're eroding the whole thing on top of it and potentially causing exposure of waste or things of that nature.

So it really is a difficult problem from a performance assessment perspective to analyze what are the risks from the site.

Next slide, please.

So in conclusion, we expect it's going to be very difficult. We are going to be risk informed. To the extent that we're able to, we're going to use as much support as we need from our technical experts here and at the Center for Nuclear Waste Regulatory Analysis or within other offices in the NRC.

And we are likely developing an independent performance assessment model at the site for the various reasons I have discussed earlier.

So I thank you for your time, and I'll

entertain any questions.

VICE CHAIRMAN RYAN: David, thank you.

Again, let me remind everybody to think about this in a different way from NRC and its typical role. This is a facility for which DOE is responsible and is preparing a decommissioning plan, and your role is one of a collaborating agency in a review capacity. You're not licensing the facility or those kinds of things at this point. That's the current piece on the table.

And the other, of course, is that there are other agencies as you so aptly describe that have involvement and responsibility for ongoing things and things later on. So it is probably meeting our thought that it's a very complex decommissioning activity with we would call it a rich history of operation and involvement.

So if we've asked you questions about what you're doing and we've only met what DOE is doing, I'll clarify that, in fact, you know, we recognize that DOE has the responsibility to provide the input documents, and you'll be in the review and evaluation mode, and I just want to make sure everybody nods yes, they understand that. So we just wanted to recognize that. But thanks for a forward look.

A couple of questions came to my mind, and as you all three made the presentations, and one is, and from reading the background documents, the incidental to reprocessing question certainly comes in. Maybe that's a current waste issue and not a decommissioning issue, and I'd be happy to have your thoughts on that.

And the second is maybe a little bit more of your insights into how you blend deterministic uncertainty assessment type analyses and stochastic analyses against the idea of being risk informed.

MS. BRADFORD: The weir are the waste incidentals to reprocessing question. I'm not sure exactly what you want to know there, but they would have to do an incidental waste determination, and the policy statement has what we believe are the two incidental waste criteria in there, which is that you remove the waste to the extent economically and technically feasible, and that the waste will be managed to meet the performance objectives of 10 CFR, Part 61, Subpart C.

So they're going to need to show that they could meet those two criterion. We would be reviewing that.

If they can meet those and they feel they

can determine that this is incidental waste, then that would support the alternatives of closing the tanks in place.

VICE CHAIRMAN RYAN: You know, I guess I understand what was written, but the insight that I think about is the history of that definition. Incidental to reprocessing was very much a practical definition of material that had no value for its content of special nuclear material. It really wasn't a health and safety or an environmental protection kind of criteria.

And what you've done is kind of translate it into environmental protection sort of terms. Is that a fair assessment?

MS. BRADFORD: Yes, and I'm not sure if you're aware of the lawsuit and everything surrounding incidental waste at this point.

VICE CHAIRMAN RYAN: Yes.

MS. BRADFORD: But there was a source based definition.

VICE CHAIRMAN RYAN: Yes.

MS. BRADFORD: And we were trying to show that if you could meet the protective requirements for low level waste and you're meeting health and safety, so do you need to spend, you know, 200 million per

tank to dig those up if, in fact, you're protecting public health and safety.

VICE CHAIRMAN RYAN: Right, and I'm glad you've highlighted that because to me that's kind of the important step, is you've actually translated what is an operational and source driven definition into something that is more in the environmental protection and long-term protection area, which is helpful, I think. That's one.

MR. ESH: I was hoping you'd forget.

VICE CHAIRMAN RYAN: No.

MR. ESH: Yes. So you're question was basically --

VICE CHAIRMAN RYAN: I'll admit it may be unfair because it really is down the line some, and I appreciate that.

MR. ESH: Yeah. So how do you risk inform whether you're using a deterministic risk analysis or probabilistic analysis or is one better than the other in order to do that process? Is that a --

VICE CHAIRMAN RYAN: Something like that, yeah.

MR. ESH: I think it can be more difficult if you're doing a deterministic analysis to be risk informed because you run into this issue of how are

you identifying the key parameters from a risk perspective.

If you do a traditional one off sensitivity analysis, you may get a certain result for which parameters you think are important. That may be different if you run a probabilistic model and you let all of your parameters go and they're sampled and you'll identify combinations of parameters that can have a significant impact on the result.

Now, the one element though that I think is essential, no matter what you're doing, is that you provide some baseline for what you think is your best guess, most realistic because we typically, whether it's this site or some other site, people will try to exercise conservatism. Conservatism implies you know what the true answer is, and you're going to try to set your values higher for whatever reason to make sure you're protected.

Maybe you're dealing with uncertainty and you want to be conservative because you don't want to expend the money to collect information on that parameter and whatnot.

But that's somewhat different than what we're usually dealing with. What we're usually dealing with is you have an estimate. You have an

uncertain estimate, and you're trying to generate a protective value, but you don't know whether your value is the true value or not. You have an estimate of the value. You don't have the true mean. You have an estimate of the mean, for instance.

And that problem is different, I think, and it's not acknowledged very well, but the deterministic approaches are usually operating from that that mean is not an estimate of the mean, but it's the true mean, which means you could be introducing Type 1 and Type 2 errors.

And when you're working with a problem that has lots and lots of parameters and you're doing that over the whole problem, the likelihood that you're making those types of mistakes goes up, I think. You could also cancel them out, of course, too.

I suppose that wasn't a very clear answer to your question, but I don't think there is an easy way to answer it.

CHAIRMAN GARRICK: Your last conclusion indicates that the staff will likely develop an independent performance assessment model. If you do that, will that be probabilistic?

MR. ESH: Yes.

CHAIRMAN GARRICK: And do you expect that the actinide plume will drive the peak dose calculation?

MR. ESH: My gut is that it probably won't. My gut is that the shorter lived things that are released early are going to be what's causing the peak, and the only reason I'm saying that is when I looked at the data for that source -- the Strontium 90 plume can be looked at as a very bad thing. From a performance assessment perspective, I also can look at it as a good thing. It gives you a good idea for how the geology is going to transport these materials. It gives you a good idea for how some of them are going to transport and some of them are going to be rather strongly held.

And when I look at that data, I see that the concentration of the actinides in the liquid phase isn't necessarily very high, and it isn't very mobile.

CHAIRMAN GARRICK: Buy aren't there more interdiction opportunities for the strontium plume than for the later actinide plume?

MR. ESH: The big benefit you have for something like the Strontium 90 plume is the natural decay, of course. IF you can design something to handle the problem for a few hundred years, that might

be all you need.

With the actinide you're looking at much longer time frames and in a site with high erosion, and it's a different type of problem. But I imagine that can be handled through a variety of mechanisms. Of course, we'll probably start with screening type of analyses and say these are the sources. This is the long term. Just for a real simple, conservative type analysis, what type of risks are we looking at from those long-most species, and based on that result you'll build in how much do you need to refine that calculation to evaluate your estimate basically.

And I think the issue becomes, you know, we're a regulatory agency. We're here to protect public health and safety. Once we get to a point where we're confident that public health and safety is protected, then we don't care how much you could refine it further or make a complicated model or any of those sorts of things that go on. As long as we're confident that people are safe, then we stop.

CHAIRMAN GARRICK: Yes, yes, but I guess the point is that the opportunities seem to be greater for managing the short lived material than for the long lived material.

MR. ESH: Yeah, and there's some

significant quantities of long lived material in the various sources that you're looking at, of course. You mentioned earlier there is ruptured fuel in the NDA. In the SDA, for instance, there is a lot of material referred to as SNAP, which is the nuclear auxiliary power sources, which is basically plutonium. It's a lot of plutonium.

So there's interesting materials like that in lots of these different sources that will have long-term implications, and they aren't easily managed. I think most of your confidence in those has to come from the ability of the geology to retain those because it's going to be hard to argue that an engineered solution can retain those really long lived, various types of sources.

CHAIRMAN GARRICK: Yes.

VICE CHAIRMAN RYAN: Just a follow-up question. I guess when I think about performance assessment and site performance, I always think about three different time horizons, and it's kind of short, intermediate, and long, you know, intermediate being tens to hundreds of years and long being thousands and greater and short being 30, 40, 50 years.

Do you see your confirmatory modeling activities evolving in those three different time

frames?

MR. ESH: Yeah, primarily because say if we're looking at a restrictive release problem. We have that first criteria to look at, the annual public dose limit with the controls in place.

Then we have the other element to look at. Well, what are the public doses if those controls fail?

Well, the things that drive the public doses when the controls fail are, of course, the short lived nuclides that are there because they're high activity.

So that analyses to answer that question certainly is going to have a shorter time frame than the analyses to look at the long-term public doses to an off site or on site or what is now on site but may in the future be off-site receptor.

VICE CHAIRMAN RYAN: Yeah, some of that detail actually may be helpful to try and capture as you communicate with DOE on what your expectations are because if you give them a sense of what you're looking on as a function of time as being these important drivers, that sometimes, I think, has the feature of I don't want to say simplifying because that's not quite right, but focusing modeling

activities on, you know, time horizon issues in each of those three time horizons that are different for exactly the reasons you state and others.

MR. ESH: Sure.

MS. WEINER: There must have been monitoring on the site and various leaks into the environment from the mid-'60s on. Does that data give you some good benchmarking data for some of your performance assessment, for DOE's performance assessment?

MR. ESH: Yeah, I would hope that some of that data -- there is a substantial amount of data. In particular, there's a lot of characterization of the Strontium 90 plume. There has been characterization of the stream sediments, for instance.

I would hope that that information can be used in comparison to performance assessment model results to see how reasonable or how confident could we be in the results of the performance assessment.

I mean, one of the first things I'll do when I make a performance assessment model is I'll compare the transport in the North Plateau, like 4-Strontium 90 to the actual Strontium 90 migration that has been observed. So you can get some idea for

confidence in that part of the model.

There's going to necessarily be some parts of the model that are highly uncertain, and that that uncertainty may not be very reducible. It's going to be uncertainty that you're going to have to live with, and you're going to have to make a decision in light of it anyway, but the characterization data is certainly an important element to provide confidence in the model that you do generate.

MS. WEINER: I just have a brief follow-up. You said before that you do want to look at performance after 1,000 years, but then I heard you say that from a risk informed basis, the actinides are not nearly as big a contributor to dose, any off-site dose, as the short lived radionuclides, strontium and cesium.

Could you say at this point from a risk informed basis, could you say that, well, you just concentrate on strontium and cesium, and the rest you don't need to do as thorough an analysis?

MR. ESH: No, and I may not have stated that very clearly. I didn't want to give that impression. I think that there's two components. I mean, you have a mix of shorter lived nuclides and longer lived nuclides, and the receptors and scenarios

you have to look at may be different for those different groups of nuclides. Okay?

The short lived nuclides are very important for that analysis of if you're doing restrictive release and the controls fail or if you're doing unrestrictive release and people come on the site and you have the various types of analyses that are usually done for receptors late discovery or a well driller or somebody who puts in a basement, all of those sorts of scenarios that get people close to that high activity waste. That's one element, and that can provide in many cases a peak that would be higher than that longer term off-site public dose, but it's not definitively so.

I mean it's too, I think, premature, I think, to conclude that at this point. I think I was put on a spot and that was my gut, but, hey, you know, I'm wrong and now I'll find out whether I'm wrong again.

So I think that there's enough actinides in these various sources that it's not definitively clear that they wouldn't pose a larger risk than the shorter lived, near term types of analysis

MS. WEINER: Thank you.

VICE CHAIRMAN RYAN: David, let me let you

take a break and I want to ask the folks at West Valley in the TV monitor behind you if they have any comments or input.

MR. SULLIVAN: I'm Dan Sullivan from the Department of energy. Can you hear me okay?

VICE CHAIRMAN RYAN: Sure, Dan.

MR. SULLIVAN: Okay. Well, I appreciate the opportunity to sit in on the phone call. I think the one thing everybody takes away whenever you hear about West Valley, it's nice to hear somebody else talking about how complex it is, and here at NRC I think you did a nice job of presenting I think as Chad said that 20,000 foot level. So I thought they did a nice job. And I appreciate the AC taking an interest in West Valley.

A lot of the questions that you've asked we have been working on asking ourselves, and so some of these, in fact, are premature for NRC to be able to answer. Our belief is that the performance assessments associated with the decommissioning plan and EIS are going to answer these questions. So we're fairly confident we've done some homework already. We think that some of the information that you're looking for we've got a handle on. We just haven't disclosed all of that to NRC just yet, but we intend to do that.

They're part of the process. They've looked at the appendices that make up the long-term performance assessment models. We just got their comments. I haven't even read them yet, but we've just got their comments.

So in May we'll begin some discussions and see how we did with that. SAIC will then refine the models. I think the process is good.

There is one thing I think I wanted to add in terms of a clarification. We were proud of an accomplishment that we made a year or so back and that was shipping fuel, and I believe the question was asked -- and I can't remember who asked it -- is the fuel still on site, and maybe I'm misinterpreting the question, but I want to clarify with you that that fuel has been shipped. There is no longer fuel.

We do have the canisters here. That's true, but I believe some of you had asked the question about fuel being on site, and that is now gone. That has been shipped off site.

So if it wasn't answered, I just wanted to clarify that now.

VICE CHAIRMAN RYAN: So there's no fuel left in either of the disposal cells?

MR. SULLIVAN: No, no. That was answered

correctly.

VICE CHAIRMAN RYAN: Okay.

MR. SULLIVAN: There is some ruptured fuel elements in the disposal area, but we did have 125 fuel assemblies that had been on rail cars waiting to be shipped to Idaho for quite a while, probably over a year, and that shipment has taken place.

VICE CHAIRMAN RYAN: Okay, great. Thanks. Thanks for clarifying that.

MR. SULLIVAN: I think that was it. I guess we'll just see how the rest of the call goes, but we've been grateful for your interest and the NRC's participation.

VICE CHAIRMAN RYAN: Well, we'll probably be following the activities as they develop over the months and years ahead, and we look forward to the opportunity perhaps to see you in person as your program evolves and matures and hear how it's going.

MR. SULLIVAN: We're happy to come down and talk to you any time.

VICE CHAIRMAN RYAN: Great. Thanks very much.

Mike Lee.

MR. LEE: Dave, another quick question; actually two. One, the future climate is going to

drive the erosion as well as the hydrology models. Is that being treated as a separate set of analyses or documentation or is that just being worked into the appendices that have been developed?

I just don't have a strong recollection of that.

MR. ESH: At this point, I believe it's fair to say that was one of our comments on the appendices because we didn't feel it was adequately covered in the appendices, but I can't say whether it will in the future, how it will be addressed, whether it will be part of a separate document, and whether it will be included in the appendices.

MR. LEE: Just as a curiosity, I guess NRC is going to purchase a license for GoldSim?

MR. ESH: We're in the process of attempting to purchase a number of licenses for use in decommissioning on complex sites for not only the West Valley project, but on some other sites where we have a need for that sort of tool.

MR. LEE: Thank you.

VICE CHAIRMAN RYAN: Also, back to West Valley if I may, we have representatives of NYSERDA and NYSDEC present at the West Valley site, and I wanted to offer you folks the opportunity to comment

or speak up if you so chose.

MR. PICIULO: Thanks, Mike.

I'm Paul Piciulo. I'm the Director for NYSERDA here at the site, for those who don't know me.

Like DOE, I really appreciate that you're taking the time to take a close look at West Valley. We really appreciate that look, and I think the NRC staff is delving into the details of the site and of the analyses in a very strong way, and I'm really pleased about that.

One thing that I would comment on, there was a comment earlier, and I think you made it, Mike, about NRC's role with DOE in doing this analysis, and that DOE is not a licensee. But at this point the license still exists, and so the decisions and the opinions and the consultations that NRC gives would have to follow over, flow over to the termination of the license.

So in the end when NYSERDA goes to apply, if that happens for termination of the license, it's going to depend on the work that's being done now.

VICE CHAIRMAN RYAN: Yes, that's an important aspect to why we call it a complex site, I guess and, you know, that there are ongoing roles and many participants.

And, again, John, Grady has pointed out to me that you all are present in the room, and I didn't want to slight you in any way, and I'm glad he reminded me to make sure we get your input to this meeting.

MR. PICIULO: Thank you very much, and thank you, John.

VICE CHAIRMAN RYAN: Any other comments from West Valley?

(No response.)

VICE CHAIRMAN RYAN: Well, again, thank you all for taking the time to be with us today and participating. We really appreciate hearing from you.

George.

MR. SULLIVAN: And thank you all. Thank you.

MR. HORNBERGER: I think I'll basically contain myself because I have all sorts of detailed questions that are just not appropriate now.

MR. ESH: And I'll say all of those details aren't available yet.

(Laughter.)

MR. HORNBERGER: I know. The appendix, the hydrogeology appendix, is that available?

MS. BRADFORD: Not publicly available.

MR. HORNBERGER: Not publicly. Could it be made available to ACNW staff?

MS. BRADFORD: That I don't know. We can look into it.

MR. HORNBERGER: Okay, and, Dave, you mentioned some of the scenarios that have to be analyzed. Are there set, stylized scenarios for equivalent to the human intrusion? These are specified in the regulation?

MR. ESH: Well, what's typically done is people will look at the Park 61 type of intruder scenarios, and those may be fairly reasonable for this site, in particular, because it is rural, agricultural, or it has been in the past. It's likely going to be in the future.

Where that comes into play though is sometimes we'll have sites where it's pretty close to a city or it's in a city. Is somebody really going to put a subsistence farm there and perform that type of activity?

There's more where it comes into play, but the implications for West Valley when you have a process like erosion, you start asking questions like, well, what if the waste erodes at a slower rate than the soil. So you get exposure of waste. What are the

scenarios surrounding that? What might be a reasonable scenario for that, what type of discovery scenario?

That becomes, I think, the scenario consideration.

MR. HORNBERGER: So is this something that the NRC will have to -- the staff will have to decide on what the reasonable -- whether the scenarios posed are reasonable?

MR. ESH: Yeah, I think DOE is going to define what they think are reasonable scenarios for these receptors, and we'll have to evaluate it and determine whether we think they are reasonable or not. I'll give you an example.

For instance, for the stream widening type of erosion, you can get a very, very steep stream bank. Could somebody locate a house and perform the types of activities that these typical scenarios are evaluating on that bank? That's the type of question that we'll run into.

MR. HORNBERGER: And these will be laid out in the EIS? Okay.

One detailed question I can't resist, and maybe you don't know the answer to it, but are there any organic contaminants associated with the site?

MR. ESH: Yes.

MR. HORNBERGER: Okay, and so do you know whether these lead to reducing conditions in the groundwater?

MR. ESH: I don't know the answer to that, but I know there are a number of chemical components, in particular, that were used in the processing of the fuel and also then are present in the disposal areas.

MS. WEINER: Do you know if any of these are chelating compounds?

MR. ESH: I don't know the answer to that for sure. I believe I read yes, but I can't say for sure.

MS. WEINER: I would say that that is something that is critical to look at because you can greatly increase solubility that way.

MR. ESH: Yes.

MR. HORNBERGER: And of course, there are two aspects to this. If they're chelaters, then you expect them to move in complex forms. On the other hand, if the cause reducing conditions and then you remove them, you might mobilize something that had been previously immobilized, including the actinides.

VICE CHAIRMAN RYAN: So it's an easy problem.

MR. HORNBERGER: Oh, it's trivial.

VICE CHAIRMAN RYAN: John, you had a comment?

MR. GREEVES: Yes. John Greeves, Director of Division of Waste Management and Environmental Protection.

Just the line of questioning Dr. Hornberger had, I think it's pretty clear that there's going to be multiple critical groups that are going to have to be chased here. The department is going to submit documents articulating what they think the various critical groups are, and the license termination rule calls out looking for the critical group.

Well, in this case it's multiple critical groups both in terms of time and geography. So I think over time, we'll have an inbound statement of weep CVs being the critical groups in these time frames, and we're going to have to do an evaluation as to whether we agree or see a difference, and you're going to see that in our SER ultimately from the DP.

So I think over time we're going to be back with you and other parties will be back with you describing all of that, and it's really going to chase the issues that Dr. Hornberger raised, and it's going

to be almost waste management unit by waste management unit overtime.

VICE CHAIRMAN RYAN: John, I think that's a good observation, and I would add to that that I think it's very positive that the NRC is interacting with DOE and the other participating agencies now and in a technical way and looking at these technical questions so that they get shaped early.

Because the one thing I always think about is these are always circular processes in the sense of you iterate. They're not straight lines. You're not going to do an EIS and then do an evaluation and then you're done. They're very interactive processes, and that's what I think we're getting the first look at today, and I think it's good. The interactions are up and running, and you know, you're all communicating and in a good way.

So thank you for this briefing. Any other questions or comments?

(No response.)

VICE CHAIRMAN RYAN: Hearing none, we really appreciate your presentations and interaction today. Thanks very much, and thanks to the folks in West Valley. We appreciate your participation.

CHAIRMAN GARRICK: All right. I think the

committee will take a 15 minute break.

(Whereupon, the foregoing matter went off the record at 2:42 p.m. and went back on the record at 2:57 p.m.)

CHAIRMAN GARRICK: Our meeting will come to order.

We are now going to hear from the working group on risk informed approaches and pilot studies, and I think we're going to hear from three people, and I'll ask them to each introduce themselves. Proceed, Christiana Lui first.

MS. LUI: Good afternoon. I'm Christiana Lui. I'm the section chief of the risk task group at NMSS, and with me at the table today are on my right-hand side we have Alan Rubin. He's a section chief of the Probabilistic Risk Analysis Branch, Research, who has been supporting us, the risk informed NMSS initiative.

On my right-hand side, Jim Smith. He's a risk analyst in the risk task group. His specialist is health physics.

And also at the table we have Dennis Damon, who is a senior level advisor for risk assessment at NMSS.

I just wanted to briefly remind myself and

also the committee that we last briefed you on July 31st last year. In that particular briefing, we have introduced to you a proposed risk informed decision making process, and also we discuss with you our preliminary work at that particular point.

And during today's presentation, I think we have a lot of technical insights that we can share with you regarding what we have been doing since last time we briefed you.

The next page here is just to give you a quick outline of what we are planning on presenting to you today, and our next page will explain in a lot more detail about the presentation today.

As a refresher, I would like to quickly go through the proposed risk informed decision making process and the beginning, and we have successfully tested this proposed process in two pilot studies, and Jim Smith will provide you the details after I do my introductory piece.

Lessons learned from the pilot studies and issues came up during this particular work in progress, having grouped in the key issues, and Al Rubin will present the key issues to you.

And at the end we would like to take this opportunity to answer your questions and get your

advice on our proposed approach and key issues so you can help to guide our work.

Next page.

I hope you have the hard copy in front of you even though the box did not seem to show up too clearly.

I will quickly go through the proposed risk informed decision making process, and when Jim Smith does his presentation on the pilot studies, he will step through this proposed process with actual NMSS' regulatory applications in more detail.

The first step of the process we clearly define what regulatory issues that we're trying to address and formulate any potential alternative actions at this stage, understanding that even though this particular diagram shows a linear process, we understand that it's actually an iterative process because at the very beginning you cannot possibly think of all the possible alternative actions. It's when we actually carry out the next few steps we may actually combined some of the original proposals and come up with new proposals, too.

So I just want to highlight that. Even though it's in a linear fashion, it's actually an iterative process.

And once we have clearly defined the regulatory issues and possible alternatives, the next step is we will decide whether the risk informed approach is actually the appropriate approach to use.

To help us decide whether risk informed approach will proceed, we have developed a set of screening consideration, and they focus on two big groups. First, we will decide whether risk information is relevant, and it will be beneficial to help us to meet the agency's performance goal.

And if the response to that particular question is yes, then we proceed to figure out whether the existing risk information is adequate for us to address that issue in a risk informed fashion, and if it's not, then whether it's cost beneficial to develop new risk information so we can use all the tools that we have to help decision making process.

And also, one particular issue that came out during the screening process or the decision process here is we also identified is there any other exclusive conditions that will prevent us from pursuing a risk informed approach.

And if a particular regulatory issue is screening for proceeding where the risk informed process, then we proceed to step number three. If

it's not, then we will apply other decision criteria or decision methods that will be more appropriate for addressing that particular regulatory issue.

As we proceed to step number three, we will look at whether the existing risk information is adequate for us to get our risk insights and proceed to a decision making process, and if it's not, then we will perform new risk assessments.

And the next step is the decision making process. Looking at the error that we have, we have the risk insights feeding into that decision making box, while we also have this box on your left-hand side which will have other considerations. It depends on the particular regulatory situation that we're dealing with.

Sometimes the routine risk is actually more major than the accident risk, and sometimes we have to consider both routine and accident situations, and therefore, we need to look at what are the applicable regulatory requirements out there and also what are the available guidance to a step that should be applied to this particular situation.

And also any other considerations, such as the safety margin and also the philosophy of defensing (phonetic) in that, whether those are also maintained,

and other factors that often come up is whether the communication and public confidence issues also need to be clearly factored into the decision making process.

Once we have the risk information and also these other factors that lead to the -- that a decision maker can use, then with all the options available, hopefully that the decision maker will have adequate information to proceed with the decision and also implement the action.

CHAIRMAN GARRICK: Christiana, let me understand your diagram a little bit.

MS. LUI: Yes. Okay.

CHAIRMAN GARRICK: On Step 2, you have an incoming box called "initial risk and cost information."

MS. LUI: Right.

CHAIRMAN GARRICK: And then you say decide whether to risk inform, and I guess that's on the basis of the regulatory issue it is that you're considering and the initial information you have.

MS. LUI: Right.

CHAIRMAN GARRICK: Initial risk sort of connotes that that's preliminary information. That information can vary all over the map in terms of its

scope, right?

MS. LUI: Yes. It's --

CHAIRMAN GARRICK: And I guess what I'm getting at is when you decide to risk inform and the initial risk information is inadequate, what do you do and where? Where do you do the real risk work?

MS. LUI: The real risk work is actually in step number three. In box number two, on deciding whether to risk inform, we are really talking about a scoping analysis. Look broadly whether we have the type of risk information available for us to make the type of decision we need to make, and if not, then we need to factor the costs associated with developing any new information and see whether that would be cost beneficial for us to proceed.

CHAIRMAN GARRICK: Yes, but what seems to be missing is some statement along the lines of performed necessary risk assessment.

MS. LUI: Yeah, right.

CHAIRMAN GARRICK: I mean it looks like you're dodged it by using --

MS. LUI: Well, no. Well, actually like I've stated up front, that even though it seemed to be a linear shape, but it's actually an iterative process and all of these boxes, how we describe each of these

steps have actually gone through a couple of iterations, too.

Box number three at one time has perform risk assessment.

CHAIRMAN GARRICK: Yeah.

MS. LUI: But at that particular stage we also want to give recognition that sometimes you don't have to do a new risk assessment.

CHAIRMAN GARRICK: Well, that's true. That's true, and then the only point I'm making is that somewhere along here you may not have an adequate amount of risk information available to you, and if the decision is yes, you want to risk inform, that somewhere you've got to do a risk assessment.

MS. LUI: Yeah, that's exactly the point for number three. We want to include that both the existing risk information should be looked at and if it's not adequate, then we will have to do new risk assessment.

CHAIRMAN GARRICK: Okay.

MS. LUI: Okay?

CHAIRMAN GARRICK: It's a little vague.

MS. LUI: Okay. We can try to make it as explicit as possible.

CHAIRMAN GARRICK: Well, you may have some

documentation discussing each of these boxes.

MS. LUI: Well, actually that was going to be my next point, is that we have this proposed risk informed decision making process and we actually have been developing draft guidance document to help to go into a detail on how to go through each of these particular steps, and we're in the process of integrating all of the draft guidance document into a coherent set because they were developed independently. So there is a fair amount of redundancy, and also we want to make sure that if there are gaps that we did not cover because they were developed independently, we also want to bridge those gaps.

Shall I go on?

CHAIRMAN GARRICK: Go ahead. Thank you.

MS. LUI: Thank you.

Again, I want to highlight that in terms of decision matrix, the risk informed decision making process that we have proposed, it should be applicable to all different situations that we are looking at, which will include routine and normal exposure.

And for routine and normal exposure, we have a very established framework to regulate those type of exposure under 10 CFR, Part 20. So for

accident risk with a treatment for the access situation is not as clear. So the work that Research has been helping us out has been on developing decision aids that could complement the existing regulatory framework in the routine situation by focusing on bridging the gap in the accident situation.

So we will have the framework and also the associate reference point for addressing both types of situations.

And not to lose the sight, we also want to make sure that in formulating and choosing the most optimal options, we need to look at the population impact, the collective dose because both Part 20 and then later on you will hear some issues with regard to the draft risk guidelines that would be for the accident type of situation or dealing with individual.

VICE CHAIRMAN RYAN: Can I ask you a question?

MS. LUI: Yes.

VICE CHAIRMAN RYAN: You know, the regulatory framework for public and worker in 10 CFR 20, that's kind of a compliance question. You're either in compliance or you're not, and then when you look at the accident case, you've got health effects,

and we're talking about fatalities, latent cancer, fatality and severe injury.

MS. LUI: Right.

VICE CHAIRMAN RYAN: So we've gone from being on the compliance line and we've kind of raced through the stochastic effects language as late life cancer. That's a 30-year or 40-year down the line thing with, you know, just deterministic "you're injured" kinds of effects.

Those are three very different horizons of risk or of having a problem. so how do you span such a wide range of outcomes with the same approach?

MS. LUI: Okay. When we do any kind of a consequences assessment, the first step is to estimate the exposure, and the reason why we have put forward prompt fatality, latent cancer fatality, and severe injury, because for prompt fatality we are looking at exposure exceeding a particular threshold, such as perhaps 100 rem or upwards.

VICE CHAIRMAN RYAN: Oh, no. It would be much higher than that.

MS. LUI: Right, right, but I mean --

VICE CHAIRMAN RYAN: For prompt fatality.

MS. LUI: Right. For discussion purpose here, we are actually in our calculations, we are

choosing a number between 150 rem and 200 rem as a starting point to help see --

VICE CHAIRMAN RYAN: The number is not important. What I'm trying to get across is prompt fatality and severe injury recognizable by any observer immediately at the event. Cancer fatality is not. That's a minimum of five years for leukemias and up to 30, 40, 50 years for other stuff.

So there's two different things you're talking about in the same accident risk context, and I'm just trying to sort out how that hierarchy works.

Am I making sense to you?

MS. LUI: Yes, you are.

VICE CHAIRMAN RYAN: Okay.

MS. LUI: Let me try to finish up what we're trying --

VICE CHAIRMAN RYAN: Okay, sure. We can come back to the question.

MS. LUI: -- where I was trying to go.

We are trying to cover the whole range of possible dose consequences. In other words, we have the stochastic region. We also have the deterministic region, and what we're trying to explain is that for prompt fatality, we are looking at exposure way above 100 rem range.

VICE CHAIRMAN RYAN: Sure, sure.

MS. LUI: And therefore, for stochastic assessment, we're mostly looking at low level exposure. But there is a big gap in between. That's where the severe injury comes in, trying to bridge that particular gap, and I know that this may not make a whole lot of sense right now, but for the purpose of development, we want to make sure that we are not leaving something that we are not covering.

But the utility of the severe injury will have to be tested out in --

VICE CHAIRMAN RYAN: What is a severe injury?

MS. LUI: Severe injury will be like severe burn, and, Jim, do you have any other examples?

MR. SMITH: Well, we usually think of permanent injury, like necrosis of the tissues, you know, exposure resulting amputations or permanent morbidity

CHAIRMAN GARRICK: Speak into the microphone, please.

MR. SMITH: Oh, I'm sorry.

Yes, we normally think of these as dealing with injuries that are permanent, where there's like an amputation that's required or that there's a

permanent morbidity, like a loss of function of an organ or some component of the body.

VICE CHAIRMAN RYAN: Okay. I've got you.

MR. SMITH: We do see those.

VICE CHAIRMAN RYAN: Oh, no, no. I understand that. I'm just trying to understand. I mean, you have four things up there in the first two bullets, the major bullets. You've got routine normal exposure and accident risk.

MS. LUI: Right.

VICE CHAIRMAN RYAN: There's the routine and normal. Maybe it's just the words we're using. I see you have doses that are compliant with requirements. That's an easy one. Then you've got above requirements but below some health observable threshold. That's a noncompliance. Okay? But we're not going to see anything in the blood. We're not going to see any effects, no burns, no nothing. It's a noncompliance. It's 5.01 rem instead of 5, even though that may be okay.

And then you kind of go up the dose scale, and you get to the first one, which are probably increases in latent cancer fatalities, which you'll never measure. You can only calculate it, and then you go up to the injury realm, whatever those injury

outcomes are that you can actually document with, you know, medical exam, on up to prompt fatality from very large overexposure.

So I'm just trying to keep this organized in my own mind on the dose scale, and it's four things, not three.

MR. SMITH: Well, the doses that we add up together for the first measure of the latent cancer fatality goes below the Part 20 requirements.

VICE CHAIRMAN RYAN: Right.

MR. SMITH: It's routine operations as well as accidents, and we don't normally separate them out just because one goes over 5 rem for the occupational exposure. So we're counting the total exposures as a result of normal and accident, which is below some threshold for injury. So we got three.

VICE CHAIRMAN RYAN: Okay. I see how you got there. All right.

MS. LUI: Maybe we'll come back to this point at the end.

VICE CHAIRMAN RYAN: Sure.

MS. LUI: And let me just finish up this particular slide. I just wanted to mention that in choosing the most optimal options, we also have to look at the cost benefit aspect of the various options

that we put forth on the table, looking at the possible collective exposures and the regulatory analysis guidelines also provide an emergent factor of $2,000 per rem, $2,000 per person-rem for converting everything to the same basis for comparison.

Next slide.

MR. LARKINS: It sound like you tried to provide guidance on a backfit analysis like a 5109.

MS. LUI: No, we are not trying to do that. We are not trying to overlap or possibly contradict to what's already out there, what has already been provided to the staff for guidance. The focus of this work is to try to bridge any gap where NMSS may have a need by the current guidance out there that is insufficient for NMSS' line of work.

If I may follow up a little bit more on that, in the current regulatory analysis, for example, in the reactor area, you have the safety goals there to help determine what's the significant impact, what could be considered a significant safety impact. In the material waste arena, you don't have any kind of reference level for us to gauge that.

MR. LARKINS: Sort of like a risk metric for the various regulations.

MS. LUI: Right, right.

MR. LARKINS: Okay.

MS. LUI: In fact, that would be a very good lead-in to the slide I intend to use of risk guidelines there.

(Laughter.)

MS. LUI: No, we didn't talk before.

The risk guidelines corresponds to a risk level where further regulatory action may not be warranted or the current regulatory burden can be reduced. In other words, we're following the thought that we're establishing some reference point where you will be viewed as not a significant additional risk to why the population or the individual being normally exposed to. And it provides reference level with which to measure proposed change to aid in decision making.

While we go ahead and decide to implement some kind of change to our existing regulatory options, sometimes we will end up altering the baseline risk, and you could go up and you could go down, and what we are trying to do with the risk guideline work is to help establish a reference point where we can say that whether the increase or decrease in risk will be significant or insignificant.

Without such a reference point we could be

all over the map.

And the next point is exactly to help establish a consistent reference point such that when the individual staff look at a situation, it is not going to be very case dependent. We actually have a consistent level that will apply across the board so that we are not just looking at activity in a stovepiping way. We actually have a set of uniform reference points that could apply across the board, and we won't end up being too high in one area or being too low in an area unless we have very, very good reasons.

And the last two points are the risk guideline, the draft risk guideline at this point is really to help the staff in implementing the risk informed approach. We are not proposing this as requirements for anybody to meet, but they are being used to help the staff to reason through the results coming up on the risk assessment to help gauge what can be considered to be not significant additional risk. So it could provide opportunity to pool our regulatory resources to focus on higher risk activities.

However, in the future, once the work has become more mature, if the licensee and applicant

decide that they would like to use this tool to help justify their case, they may do so, but we don't foresee that these risk guidelines will ever become requirements at this point.

The pilot studies. Once we have established the proposed risk informed decision making process and also have the draft guidance associated with guiding the staff, we really want to test this out with real NMSS applications to see whether we are totally off the line or we have some gaps that we need bridged and/or the proposed process seem to be on the right track.

So we got to a certain point of the developmental stage. We decided that we wanted to try out the proposed process to see whether the proposal on the table could be effective. And we tried this out with two real NMSS applications. One is in the spent fuel storage area, and the other one is looking a regulatory option for chemical agent detector and chemical agent monitors.

And Jim Smith will now walk you through the two pilots studies in more detail.

At this point is there any question I should answer, or we should go through Jim's presentation?

CHAIRMAN GARRICK: Any question of Christiana?

(No response.)

CHAIRMAN GARRICK: We will proceed.

MS. LUI: Thank you.

MR. SMITH: These two pilots were sort of an attempt to work out that diagram that Chris showed you earlier today just going step by step through a systematic process.

The first pilot that we'll talk about is the dry cask storage pilot study. This addressed an issue that staff has previously looked at after what they call ISG 18, interim staff guidance, and essentially it defines the types of reviews that are necessary in order to okay, certify a cask system.

The issue was whether or not to modify acceptance criteria for conducting leakage tests and dose calculations associated with a hypothetical release. In the past, in addition to the nondestructive testing that the staff would do of the cask systems, it would also require that there be a leak test performed.

The staff figured that perhaps based upon engineering judgment and past experiences that this step wasn't really necessary. So they came up with

ISG 18 that essentially said that, that past experience had shown that the leakage from these small leaks would not cause any great dose to the public. Therefore it's probably not cost beneficial.

The first step of that process that Chris showed you earlier was to define the regulatory issue and preliminary alternative actions. The proposed regulatory action, as I stated earlier was to remove requirements for leak testing, as well as the hypothetical off-site dose calculations, and to modify staff guidance so that they wouldn't have to do that as part of their review process.

There were a number of other options that were considered by the staff when they originally addressed ISG 18, and those were also looked at during this RIDM pilot test. But the staff basically had in mind the ISG approach that they have already approved so that the alternatives were not looked at in as great a detail.

Step 2. Step 2 is going through, deciding whether to risk inform. This is the screening considerations that the risk task group has developed over the years. The first four questions help us to decide whether or not it's amenable to regulation, and then the second three are more or less the feasibility

of doing such a study.

During the process at least one of the first four were answered yes for the dry cask storage system. It was clear to the staff that there would be some benefit to society making our actions more efficient and effective based upon risk assessment information, as well as previous experience with leakage.

It was also determined that it would be of little risk significance to the staff to focus on more issues, essentially allowing them to spend their regulatory dollars in a more profitable area.

There were one or two problems that came out of this process. The questions about quality of the regulatory information or risk information that was available was very subjective. The staff had some recommendations about this part that perhaps in the future we can be more explicit about what is necessary to be able to be defined as a quality risk assessment or having quality information.

But the staff decided to go ahead and screen in this process just so they could continue to test in the RIDM process.

Step 3, we evaluated the risk information. The leakage which was accounted for and the doses were

extrapolated to members of the public. They identified the populations at risk, the estimated facilities realistically affected. These were not worst case scenarios. They were based upon realistic information or at least what was guessed as a best estimate of what the doses and the effects would be.

It assumed uncertainties in the risk estimates were two orders of magnitude. So even if we weren't exactly close on the numbers, we would be conservative enough that we would be in the right ballpark.

The staff used draft information from the draft pilot PRA that's been under development by Research. Some of the information that they got from the pilot led them to believe that there were certain things that in a revision to the PRA might assist them in making future assessments.

I can go into more information about those tomorrow, I believe.

Step 4. Step 4 was taking the risk information that was available and analyzing it to see whether or not it made sense from a risk perspective. There was a very small increase in risk to the public and workers. The largest risk increase was estimated to be on the order of ten to the minus seventh per

year in latent cancer fatality. Injuries and accidents were not deemed to be credible.

Storage cask performance safety record gave a sense that the overall risk of dry cask storage is very low. From this perspective, the proposed action should proceed, i.e., the staff had made the right call in developing ISG 18.

MS. WEINER: Can I ask a question before you -- go back to that last slide.

MR. SMITH: Sure.

MS. WEINER: When you said small increase in risk to the public and workers, I assume you calculated a dose and then multiplied by five times ten to the minus four per rem.

MR. SMITH: Right, and that's how we got to the number.

MS. WEINER: So you got small potential latent cancer fatalities.

MR. SMITH: That's correct, very small doses.

MS. WEINER: And when you said individual accident risks were estimated to be insignificant, how did you estimate those?

MR. SMITH: Again, they were the dosage for the leakage associated with if the failure had

occurred and what sort of doses the individuals in the area approximately would have received.

MS. WEINER: So you had a one or more release fractions associated with leaks?

MR. SMITH: Yes, that's correct.

MS. WEINER: Did you have a series of accident scenarios and a probability associated with each or just one accident scenario?

MR. SMITH: I believe that we just assumed one release, but I see Michael --

MS. LUI: Well, actually Office of Research has been working on a probabilistic risk assessment for the storage area, and part of this work was using the preliminary information coming out from that particular risk assessment.

So they looked at all of the applicable sequences in that particular draft PRA to help estimate the risk in this type of situation.

MS. WEINER: Yes, that's exactly the question I was asking. Thank you.

MS. LUI: You're welcome.

MR. SMITH: Thank you, Chris.

MR. LARKINS: When you looked at this case, did you go back and see what the technical basis was for the leak testing? Because I see you say

maintain many layers of defense in depth. Was that an additional layer of a defense in depth?

MR. SMITH: That's on the next, yes, yes. The staff has in the past had to do these determinations. There weren't guidelines in the past as to when to stop, when safe is safe enough. So even if there was a low probability event, I imagine they just took the conservative approach that they would go ahead and do the study to see what the outcome would be.

MR. LARKINS: That wasn't exactly what I was asking. I was trying to figure when you decided it was okay to eliminate this leak testing, what was the technical basis originally for the leak testing?

VICE CHAIRMAN RYAN: How did you decide ten to the minus seventh per year in latent cancer fatality was enough?

MS. LUI: Okay. Let's address one question at a time. We actually have staff from SFPO here who will be able to better answer, Dr. Larkins, your question about the original technical basis.

MR. WATERS: Good afternoon. My name is Michael Waters. I'm a health physicist in the Spent Fuel Product office.

To answer your question, these casks are

upon closure welded with two double confinement welds, multi-passes, and they go through the full regime of radiography examination.

On top of that, we used to require them to perform a final leak test that reverified the leak, as Jim mentioned, an additional what I called layer of defense in depth.

We determined prior to this policy when we raised the device to 18 that based on operating experience and then the full rigor of welding examinations and the redundancy in two welds, that this additional leak test provided a little safety benefit.

In addition, a leakage at such a low rate that could be missed would be insignificant consequence to the public.

What we did in the pilot study was essentially, well, let's quantify that through a risk assessment and use the rhythm guidance to see where we come out as well.

VICE CHAIRMAN RYAN: I'm all set. That's a fine answer for me, too.

MR. SMITH: These are other considerations that the working group working on the pilot thought were worth pursuing where we had to maintain many

layers of defense in depth, adequate margins of safety are maintained, but that there be a net benefit dollar-wise, and that the information suggested a proposed action should proceed.

Next slide.

Again, the RIDM pilot showed that the staff's earlier decision to implement ISG 18 was consistent with current thinking in the RIDM process. The proposed risk informed decision making process was effective. They found that using a systematic approach allowed them to proceed through the process to make sure that all of their bases were covered, that adequate amount of information was available to make their decisions.

The study team identified modifications and further development to their draft risk informed guidance. They also proposed changes to the risk informed decision making process. They believe it has a potential to have a very systematic and thorough approach and would enable better prioritization, I believe defensibility and communications, meaning some people have had a problem with the word "defensibility," but essentially what it means is the staff in the past has had to make these calls, these decisions and then proceed forward based upon more or

less a gut instinct, engineering judgment.

The systematic process allows them to go through the process and say that we have accomplished it. We have done what we set out to do. We've covered all of the bases.

Okay. The next slide.

The next pilot study was based on chemical agent detectors and monitors. This, again, was a retrospective look at a staff position.

Currently there are approximately 60,000 of these units in place. These are used by the U.S. military, mainly the U.S. Army, to sit in place to alert troops in the field when there is going to be or there is an indication that there's a chemical weapons attack.

Right now, the loss rate is about three per 10,000. So that equates to about 18 a year go missing. Based upon the current enforcement policy, the NRC had previously called the Department of the Army in fairly frequently to address the losses of these devices.

It wasn't clear to anyone that there was actually a risk associated with loss of these devices. One contains approximately 150 microcuries of Americium 241 and the other two devices that I'm

familiar with carry 15 millicuries and 30 millicuries of Nickel 63.

The current requirements for having enforcement at the severity Level 3 requirement level involved the amount of activity that's lost, and it makes an assumption on the dose to member of the public who receives the entire ingestion or inhalation of that amount of activity.

Next step.

Again, what we had to do here was to look at whether the current regulatory oversight is commensurate with the level of risk due to the loss of the CADs, chemical agent detectors. Also, we considered various options as part of the RIDM process, but we focused mostly upon the preferred process of the staff, and that was to use enforcement discretion.

CHAIRMAN GARRICK: I should have asked this earlier, but as you evolve to a methodology for risk informing things, are you changing in any way your approach to how you handle defense in depth, given the fact that one of the reasons for defense in depth was to account for uncertainty in the analysis?

And as we encroach on the increasing understanding of uncertainty and in the spirit of

relieving burden, is there any consideration being given to becoming a little more sophisticated, if you wish, about the treatment of defense in depth in a risk environment?

MS. LUI: We actually anticipated that you were going to ask this question. So this is one of the --

CHAIRMAN GARRICK: You did?

MS. LUI: This is one of the key issues that we're going to address at the end.

CHAIRMAN GARRICK: Oh, okay.

MS. LUI: Yeah. We actually also have back-up slides that the meaning is all current on that particular issue.

CHAIRMAN GARRICK: All right. Thank you.

I would have asked it so early, but it appeared up here, and it just reminded me, up on Slide 12, an earlier slide,

MR. SMITH: Again, Step 2 is the screening consideration process, whether or not to proceed with the risk informed approach. The main portion of it, first are the benefits. There was at least one of these that was answered yes. As a matter of fact, I believe that all four of these were answered yes as part of the pilot.

It could help resolve a safety question whether or not we were actually -- was the regulatory effort we were spending in our enforcement area necessary to protect public health and safety?

It also could improve efficiency and effectiveness, focusing our regulatory dollars as well as those of the licensees in areas that may better improve safety.

Reduce unnecessary regulatory burden. Associated with enforcement at the NRC is not only the process of having a violation identified an the bureaucratic process of going through an enforcement conference, but also there is a great deal of time and effort at very high levels of management to sit in and discuss these cases.

So the amount of money being spent on these, it was obviously a very high burden, and we were trying to make sure that there was a commensurate reduction in risk.

Help effectively communicate a regulatory decision. Again, we thought that by defining what the risks were associated with the loss of these devices and also by outlining what the costs would have to be in order to offset that would be a good way to communicate this to the public.

Currently as far as the feasibility area, there was information available. There are two NUREG documents that deal with this type of device. One is NUREG CR-6642, byproduct material study, and the other is NUREG 1717, which is a NUREG on exempt license devices.

To be cost effective for risk informed. Again, the costs were already sunken costs from the previous risk process or the risk studies that we had done.

And the third question, other factors that limit use of risk informed approach. This is a catch-all. This is perhaps the one that's the hardest to guess up front. It's will there be someone, something that occurs. Is there a legislative requirement that you're going to have to meet regardless of the risk? Are there going to be people that are going to be unhappy and waylay you on the process of risk informing?

We didn't think at this point that that would be the case here.

MS. WEINER: Before you go on, because this is the second slide where you have listed these benefits and feasibilities, are the benefits all of equal importance and the feasibility factors all of

equal importance?

MR. SMITH: No. Actually, for the benefits it only had to decide whether or not you're going to risk inform. You only have to answer yes to one of those. If any one of these others fail, then you may need to go back and take another look at it and maybe rethink it. It's more of a management decision as to whether or not it makes sense to risk inform something or to attempt to risk inform something.

MS. WEINER: So you do make other tacit decisions. In other words, if the only benefit is that it helps effectively communicate a regulatory decision and that not very much and then costs a great deal, then you say you've made an important decision along with it, haven't you?

MR. SMITH: That's correct. At that point you would say perhaps we might be able to accomplish an initiative in the risk informing area, but the cost would more than outweigh any benefits you would get.

MS. WEINER: Okay. In communicating this process, I would suggest that it might be a good idea to make that subordinate, to be real clear about the subordinate decisions. Your two example don't lend themselves very well to that, but it would be a good

idea to say, okay, these are not equally important. These benefits are not equally important. So you do make a subordinate decision, not just this very clear cut one.

MR. SMITH: That's correct. It's very subjective going through this process. It's not a yes-no process. There's a good deal of discussion that needs to take place amongst the people who are involved in making process.

Generally, we will try to have a team of people to work on it, someone maybe who is a risk analyst, someone maybe who has a background in the legal aspects, someone who's a health physicist. So these decisions are not brought at just by running down the checklist. There's a good deal of deliberation that goes on.

Next step. I've already mentioned the two studies that previously existed that contain risk information. We also looked at the persons who might be at right.

What generally will happen with these devices is they get stolen or they get run over by a large piece of armored vehicle and get turned into scrap metal, and they will end up sent to a smelting facility. Someone along the way will have to pick it

up and carry it there. Someone along the way will have to make a determination that it's not worthy of being recycled or rebuilt, and what we found with a good number of them is since they contain a lot of metal, they end up at smelting facilities where they're melted down.

But those who are for the members and the models that were looked at, the general public, recycle worker, there were several individuals and the doses were on the order of .2 to .3 millirem. The smelter worker in a worst case situation, if they were to receive all of the 19 sources that came through the facility on an annual basis, would get about 60 millirem.

Next.

VICE CHAIRMAN RYAN: Help me out now. I'm just trying to make sure I understand it. Sixty millirem T80E, mainly from inhalation because it's americium per year of exposure or he does it once and that's the --

MR. SMITH: That's per year, per year.

VICE CHAIRMAN RYAN: So you had a lifetime of that activity.

MR. SMITH: You had a lifetime of that activity, yes. You'd multiply it by --

VICE CHAIRMAN RYAN: So he worked there for 50 years or 40 years or what did you assume?

MR. SMITH: Well, we're just looking at it on an annual basis here because we're looking at the increase in risk on an annual basis,b ut he could work there for 40 years, and in such case you'd multiply it by 30.

MR. HORNBERGER: Yeah, but he'd have to be really unlucky to get all 19 every year.

MR. SMITH: Correct.

VICE CHAIRMAN RYAN: That's what I'm getting at, is we're multiplying real unlikely events. Very quickly it becomes impossible and then wrong.

MR. SMITH: Again, we're just looking at it on an annual basis. We're looking here first to see --

VICE CHAIRMAN RYAN: You look at it one year, this activity, to calculate the risk that you used in your risk assessment.

MR. SMITH: Correct.

VICE CHAIRMAN RYAN: Okay. That's what I wanted to know.

MR. SMITH: When we started converting the numbers that we got for the unlikely event that one individual would receive all the exposure, we came out

to a -- you know, it works out with $2,000 per person-rem. We worked out to about $80 per year that we'd be saving if these events didn't occur.

The guideline I think on the regulatory analysis is $2,000 per man-rem. So we were well below that number. So we assume that the cost associated with the radiological aspects of the latent cancer fatalities was not something that you need to really be concerned about.

Next slide, please.

VICE CHAIRMAN RYAN: Just a question in modeling. It's not a matter of the numbers, but tell me about the collective notion in your view and the utility.

MR. SMITH: I'm not sure exactly if there's any alternatives here because the doses are so small that unless you use collective dosage you're not going to get any increase in your cancer risk.

VICE CHAIRMAN RYAN: My point exactly.

MR. SMITH: Yeah.

VICE CHAIRMAN RYAN: Adding them all up means they're still zero. If the individual case is zero, you can't measure it. You can't add them up and make meaning out of it.

MR. SMITH: Well, unless you use linear,

no threshold. Then every millirem counts just like every --

(Laughter.)

MR. SMITH: Well, that's true, but I'm just talking about the added effect associated with this license activity.

VICE CHAIRMAN RYAN: I would caution you very strongly to think about not using collective dose at these levels of dose that are trivial compared to background because you're running into a conundrum of logic that you can't escape.

MR. SMITH: I think that when you start talking about exposures over a larger population you're right. In this case you're probably still right, but it doesn't matter at this dose level. I think we can use this level conservatism --

VICE CHAIRMAN RYAN: If it doesn't matter don't use it. Stick with that individual case because that's stylized case of risk is much more defensible than aggregating it over some population.

MR. SMITH: Well, in this case we're pretty close to that. The other individuals involved would be getting on the order of .1, .2 millirem. The person who got the highest dose was the smelter, and he got 60 millirem. You've got probably 90 percent of

the dose.

VICE CHAIRMAN RYAN: So if the person that got the highest dose in this case is okay, then everybody else is what? Okay.

(Laughter.)

VICE CHAIRMAN RYAN: Done, period. End of point. That collective dose doesn't mean anything. It's a numerical narcosis. It doesn't mean anything.

MR. SMITH: I won't argue with you, but I don't think that's what the direction the agency is --

VICE CHAIRMAN RYAN: Well, I struggle with, you know, how do you take meaning from something that you can't logically understand.

MR. SMITH: Okay. I don't know. If you come up with an answer you'll be very, very wealthy.

VICE CHAIRMAN RYAN: My answer is put a line through it.

MR. SMITH: Okay. You asked me before why the risk informed decision method. Again, we had a very small increase in latent cancer associated with the exposure of these devices, and it's going to happen regardless of whether we change our regulations or not. The benefits to soldiers in the field of knowing whether or not there's nerve gas or some other chemical agent out there way outweighs the

72 to $80 in cost per man-rem.

Total individual accident risk, again, with the highest individual, assuming he got all of the dose, we're still insignificant compared to doses that we allow on a normal operation for licensed individuals.

Past performance, safety record gives a sense that the overall risk, the loss of these devices are low. We've had quite a few of these get lost. We went through the nuclear material events database, and we found that over the years we're averaging about 19, 20 of these a year, and if you look at the exposures associated with it, they are not as high as our worst case that we assumed, that is, 60 millirem to the one smelter.

In most cases these devices are stolen, and they're probably kept in someone's closet somewhere. Other cases where they do get destroyed and show up at recycling facilities are rare, but even then the doses are low.

Next slide.

Here we were looking at the costs associated with since the risk associated with it, the radiological risk is very low, then you have to figure out, well, do I want to change the regulation and make

things more effective and efficient, and if so, are there other parameters I need to worry about?

If you would only concern yourself with focusing on safety, that would be fine, but in this case we find that there are not only the costs of changing the enforcement policy, but the cost of implementing that change. We've found in the past that changes to regulations are fairly expensive, but we change change internal policy usually at a more cost effective rate.

Several modifications and further development to the risk informing guidance were identified, one of those being the optimization between routine accident and collective risk. The original guidance documents that we were working with under the RIDM process only deal with accident conditions.

But come to find out that there are routine conditions that also need to be added into the equation, and as Chris said earlier, Part 20 generally covers that information.

The pilot also highlighted that the proposed risk informed decision making process has a potential, again, as was found it the SFPO pilot to offer a very systematic and thorough approach to doing

a risk assessment and using the risk information, and also would enable better prioritization, defensibility, and communication.

Generally the staff in the past has had the authority to do these types of evaluations and make these calls, but there hasn't been an outlining process for them to say, yes, I have done the process that's been outlined and I have found the right answer.

I think that a great deal of efficiency can be found at the agency just by taking a systematic approach so that when the staff gets done doing their assessment, it's obvious that they've covered all bases.

There are other key issues which I think Alan Rubin is going to cover now. So with that, if you have anymore questions for me.

VICE CHAIRMAN RYAN: Any questions?

VICE CHAIRMAN RYAN: I notice you skipped over collective in that.

(Laughter.)

CHAIRMAN GARRICK: Okay.

MR. RUBIN: Okay. Good afternoon. My name is Alan Rubin. We've put off some of the questions from earlier today that we're going to get

into during the discussion of the key issues.

I just want to go back for a minute and Chris has outlined one of the purposes of the meeting today is to get feedback from the committee on the overall risk informed approach, which you've heard about, and some of the key issues. And I'll talk about a number of them, and I will give a collective view and recommendations from the staff, right now where we see some of these key issues are heads, and we would welcome and encourage some feedback from the committee.

In particular, because as I'll tell you in a couple of minutes, we plan to have a paper going forward to the Commission in September. We'll be discussing the progress, some of the results, and also some of the key issues. We will certainly benefit from the ACNW's input in this area.

So now we have some fun.

The first question, the first issue is as you are aware, the guidelines that we're proposing for waste and materials include risk guidelines for workers as well as for the public, and one of the questions is, you know, how safe is safe enough. Should there be different guidelines for workers compared to the public?

And from the existing reactor safety goals and the reactor meaning that there are safety goals for the public and not for workers. So there is no precedent really set that we can go and use in a parallel approach for the materials and waste arenas.

Some of these issues you hear about the commission of a policy decision. Some are questions on implementation of the risk approach.

So this first issue with respect to safety goals for workers, in many NMSS activities, the dominant risk is to the workers. So we felt that worker risk is very important to include in any risk informing activity.

The concept is that workers have some voluntary risks that they take in any job. There are also benefits that they gain in terms of, you know, putting food on the table, getting salary. So they bear a higher risk than in general the members of the public, and they also receive training generally to try and mitigate that risk.

For these reasons we felt that there was a good reason to differentiate between risk to members of the public and have them to allow at least from a risk guideline standpoint some higher levels of risk in the general public.

So that's the issue. That's what we're coming down on, and if you want to open it up for some discussion.

CHAIRMAN GARRICK: It seems that you have a tremendous amount of information on this from the experience of hazardous operations from flying airplanes to whatever that the workers by the nature of the things they're doing are assuming a higher risk.

MR. RUBIN: Absolutely.

CHAIRMAN GARRICK: I'm sure you consulted the experience base.

MR. RUBIN: We have looked at accident risk, both prompt fatalities, as well as latent cancer fatalities for public and for workers as a background, and as you know, the general approach for the reactor safety goals, the quantitative health objectives are to have a small risk of one tenth of one percent of the risks that the public are generally exposed to.

And we've kind of adopted or taken that similar approach for the members of the public applying to materials and waste. We feel that there's a basis to have some different guidelines for workers.

CHAIRMAN GARRICK: Yes, but this is a question that you should have tremendous amount of

data on, information on.

MR. RUBIN: In terms of accidents, yes, yes.

CHAIRMAN GARRICK: Yeah.

MR. RUBIN: Now, the question is from a philosophical standpoint is, you know, taking rather than one tenth of a percent of other risk, are there other numbers that we could use.

CHAIRMAN GARRICK: Oh.

MR. RUBIN: And we felt that there was some basis for having a higher risk level to workers in terms of risk guidelines, in terms of NRC making risk informed decisions.

VICE CHAIRMAN RYAN: Al, one interesting aspect of that, as you talked I thought about the case where if you put on an ALARA hat for a minute and think about, well, I'm looking at Alternative A and Alternative B and Alternative C, and there are both workers exposures and general public exposures, and I'm making some balance between workers and the public in that context of an ALARA decision. It might be helpful to have such guidelines I would think.

So some structure because very often I've been involved in ALARA decisions where, you know, there's no hook to hang your hat on in making that

assessment. Very often we avoid potential public dose and incur real worker dose. So we're avoiding an undetermined risk that are many years in the future and accepting a quite real risk today.

So have you thought about bringing in that balance?

MR. RUBIN: Certainly, you know, looking at --

VICE CHAIRMAN RYAN: Maybe that's a whole different question.

MR. RUBIN: Well, that certainly is a question. We would be looking at a risk to the public in terms of one of the metrics, as well as risks to the workers as another metric.

VICE CHAIRMAN RYAN: But it sort of begs the question. If you have to balance one off the other, how do you do it?

MR. RUBIN: Well, you can look in risk informed decision making. What's the incremental increase in risk that you might be imposing on workers, for example, for increased inspections or something like that?

Okay. They might be getting some dose from that in terms of reducing risk to the public, and you can do some estimates on what the benefits are,

the pluses and minuses of risk and come up with an integrated decision.

MS. WEINER: Do you look at when you increase a worker risk and there is no corresponding reduction of risk to the public?

You brought up the question of inspectors, and we actually did look at that with transport vehicles crossing state boundaries. There is no corresponding increase in public benefit in having an inspection at every border, but there is a considerable increase in risk to the worker.

MR. RUBIN: And how these risk guidelines would help in those kinds of decisions would be what do you mean by considerable increase in risk in terms of the staff decision making where there is no, you know, metric for the staff to put their hat on. That's how these risk guidelines would help decision making uniformly whether it's transportation or whether it's radiological workers.

MS. WEINER: So you're actually expressing the risk guidelines in terms of numbers.

MR. RUBIN: Yes.

MS. WEINER: Quantitative risk.

MR. RUBIN: Yes. Similar in the reactor area where there are three tiers. There is the high

level, qualitative safety goals. There should be no insignificant risk, and then below that there's the quantitative health objectives which determine that no significant -- determine significance is one tenth of one percent, the general risk to the public.

We have a similar approach that we're proposing in the materials and waste guidelines. In the reactor area they go one level further in terms of subsidiary objectives, which is we look at core damage frequency and lower daily (phonetic) release frequency and try to use those as closer units that you can measure and do some risk analysis, PRA analysis work.

We haven't gone that far yet. It may be in some cases in NMSS there may be some subsidiary objectives that would be useful, easier to measure against, and also you know, if you met those, you met the higher level objectives.

But we have not proceeded that far. We're still trying to work on the bigger picture items, but we're aware of that. That may be a benefit down the road.

Are there any other comments on this particular item? I haven't gotten feedback from the committee whether or not --

VICE CHAIRMAN RYAN: Well, it's

interesting. I guess it's very thought provoking.

MR. RUBIN: Yeah, these will all be. That's why I say this is where the fun begins.

MS. WEINER: I would like to submit that I think the voluntary/involuntary dichotomy is a little bit false. If you have a worker in a job and suddenly his job involves an increased risk, no matter what it is, I mean, it could be from chemical exposure, whatever. You're saying that he or she has the choice of quitting that job.

I don't think so, or of not doing that particular job. Generally not. So my point is I don't think that voluntary/involuntary is a particularly metric to use.

CHAIRMAN GARRICK: I don't know about that.

MS. WEINER: Well, then we don't agree.

CHAIRMAN GARRICK: Well, I find it difficult to see how you would take the position that you could limit the risk to some minimum under the circumstances where it is just inherently risky to do. I don't understand that.

MS. WEINER: No, and that's not -- this is one of the things that is applied. I mean, clearly there are going to be occupational risks, especially

radiological risks, are going to be considerably more than -- you know, as Mike just said, you're going to incur a real occupational risk sometimes.

VICE CHAIRMAN RYAN: No, I said a real dose, not risk.

MS. WEINER: Okay. You're going to incur a real dose as against a calculated, not real dose to the general public. That's certainly true.

VICE CHAIRMAN RYAN: This really is to me fascinating in the sense that I'm thinking about it in, you know, the terms of at this level of exposure where I think there's no value to collective dose, which is incremental background or medical exposure of the stuff we accept as routine, 300 millirem a year.

You know, at that level I don't know that it makes any difference. I think worker and the public, if it's an increment over whatever they're getting that's trivial, then the same risk tool makes sense to me, but as you kind of go up your scale on up to fatal accidents and so forth, I think you quickly get away from that.

So I'm not too sure some kind of a tiered approach doesn't make some sense. I'm thinking out loud with you, but it is a very thought provoking question.

MR. RUBIN: Well, I mean, your question comes up quite often. Is there a threshold?

VICE CHAIRMAN RYAN: No, no. I'm not asking that.

MR. RUBIN: But in terms of decision making now, what staff does in the reactor arena is from the cost-benefit analysis they do integrate the risk. They look at the consequences and they integrate it over the population and come up with a person-rem.

You know, there hasn't been a change in the policy that the staff should not use a linear, no threshold in making that cost-benefit decision.

VICE CHAIRMAN RYAN: I have no problem with people, you know, using the LNT, linear no threshold, theory for radiation injury, but it's a very artificial number to say I'm going to multiply it by ten to the six people times a number, and it looks huge, and it miscommunicates what the real risk is.

That's my own disagreement with it.

MR. RUBIN: Absolutely, and we'll --

VICE CHAIRMAN RYAN: As a metric, we could then multiply it by pi for all I care. You know, it doesn't matter. It's a metric, and it's a metric against some standard. So you measure it. I

understand that.

But the real focus of the kind of analyst's view in my mind is more along the lines of what you did for the two cases you gave, which is what can happen; who can it happen to; is that by itself a risk, and then you integrate it to measure it against some metric. That's the secondary thing to me.

So the real focus is that kind of case analysis, and the structure of that case analysis that you have now hopefully, you know, kind of across the NMSS activities, and then the theory I guess is you have enough cases evaluated across a board enough range of activities. Everybody has got a hook to hang their hat on at the end of the day.

I mean, so it's not a debate of LNT and some other theory of radiation injury. The practical fact is it is the one we use. Done; I'm fine with it. It's just that the metric doesn't mean anything when you multiply it out, but it looks terrible.

MR. RUBIN: And one of the issues that we'll talk about is the last one on this page, and we'll get to the next one. You know, what population are we considering is the one at significant risk?

And that certainly relates to the issue we're talking about how, which is how many people do

you include in your risk estimates and where do you cut it off?

Maybe we should move on to the next issue on this slide.

MS. WEINER: Well, what are your thought about that last point? What does the staff think about it?

MR. RUBIN: The first one or the last one?

MS. WEINER: Last one, the population that should be considered. Because I have a lot of problem with collective dose also, and I have an equal problem with coming up with some completely arbitrary critical population, and I'd like to know what your thinking is about that.

MR. RUBIN: I'll get into that. I will talk about some of the considerations.

MS. WEINER: Okay.

MR. RUBIN: Before I skip to that, before I skip this second bullet, I think maybe the second one will be a little shorter than the last one.

CHAIRMAN GARRICK: I'm not sure. I think the answer is yes on both parts of the second one.

MR. RUBIN: Okay.

CHAIRMAN GARRICK: Yes, the guidelines should be consistent, and yes, it should be activity

specific.

MS. WEINER: Yes.

CHAIRMAN GARRICK: I don't understand how you can have a completely consistent -- you know, I think you have to partition the problem to the situation.

MR. RUBIN: And we agree with that. Our recommendation would be that there ought to be uniform guidelines across determined activities.

CHAIRMAN GARRICK: Yes.

MS. WEINER: Yes.

MR. RUBIN: We would, you know, find no basis or rationale to really have, you know, one activity having some higher level of risk guidelines than another.

CHAIRMAN GARRICK: Right.

MR. RUBIN: So we're in violent agreement with you on that.

MS. WEINER: Right.

MR. RUBIN: I thought that would be safe.

MS. WEINER: Knock that one out.

MR. RUBIN: And now the issue, what population at risk. And this you'll hear later on what we're proposing, will be proposing to do is continue on this work on a case-by-case basis with

some pilot applications to try and enhance the confidence and determine what kinds of populations you do consider for the various activities.

VICE CHAIRMAN RYAN: Can you use a cutoff principle, like NCRP recommends, and say if it's somebody that gets a millirem or less, forget it?

MR. RUBIN: We could. We haven't made that decision yet.

VICE CHAIRMAN RYAN: If you calculate doses below one millirem per year, they're not counted.

MR. RUBIN: Just to go back to the reactor area again where we have experience, the guidelines are to use distance from the site, from the plant. For early fatalities they use a distance of one mile and for latent cancers a distance of ten miles. You know, those numbers weren't just picked arbitrarily. It was looking at where the risks were for those accident scenarios and how far out you should go in terms of doing your risk estimate.

VICE CHAIRMAN RYAN: That's fine, but then I think it's if they're in the ten mile radius and they still get a number below one millirem, you don't count it.

MR. RUBIN: Oh, okay, but that's -- I

guess there's different levels of information. You could look at the overall integrated risk to the total population. You could also look at the distribution, which both pieces of information would be helpful.

MR. HORNBERGER: So completely aside from this artificial $2,000 per person-rem, you actually see some value in calculating a collective risk?

CHAIRMAN GARRICK: Dose.

MR. HORNBERGER: Collective dose? I mean, one millirem to the population of Los Angeles and you're going to calculate how many fatalities from cancer?

MR. RUBIN: No, I don't think we would go that --

MR. HORNBERGER: I mean, that's nuts, right?

MR. RUBIN: We're not proposing that.

MR. HORNBERGER: Oh, okay.

CHAIRMAN GARRICK: Yeah, the context, I think, that it makes sense in is you consider the population to the extent that it affects individual dose.

MR. RUBIN: This is clearly a challenge. The diversity of NMSS activities, you know, they range from fuel cycle facilities to storage of spent fuel,

to transportation of spent fuel and radioactive materials, to medical, industrial applications, and each of these may have some -- is going to have a different population that you need to consider, and just some of the factors to help in determining what that population would be is where are the boundaries of the facility.

Is there an exclusionary or not, that the public has limited access or no access?

CHAIRMAN GARRICK: I think one message you've gotten so far is that this committee thinks that collective dose is a bad idea.

MR. RUBIN: Okay.

CHAIRMAN GARRICK: It doesn't make any sense.

MR. RUBIN: Okay.

CHAIRMAN GARRICK: It has nothing to do with reality.

MR. RUBIN: A really bad idea.

(Laughter.)

PARTICIPANT: It's not a bad idea. It's a really bad idea.

MS. WEINER: An awful idea.

VICE CHAIRMAN RYAN: And I guess, you know, just to be fair, I agree with the fact that in

most applications it doesn't matter. I mean, it doesn't help you explain or evaluate risk.

If there was a case where you had some very large accident potential and deterministic effects that affected a large number of people, like a detonation or something that spread a lot of stuff around, you could think of very specialized cases where, you know, if it's in a densely populated area in town versus out in, you know, the rural area, how many people could be affected might have an impact.

But if you're calculating anything that's a fraction of background as the individual dose, and maybe this will help you think through it, there's got to be a place where it doesn't add any value. There has got to be a place where it does.

When you get up into prompt deterministic effect potentials, t hen I think it might help you a little bit in assessing overall risk, if there's one person or 1,000 people or 10,000 people at that deterministic skin burns, ulcerations, and death kind of risks. That's where it might help you.

But if you get below where you're in the fatal cancer risk space and on down into regulatory space, I don't think it helps you at all because there's absolutely no way in these small populations

to ever demonstrate the risk you're calculating. So it's magic with numbers. It can never be validated, and that's why it loses its value irrespective of the radiation biology questions. It has no meaning.

So that's the best way I can say it. And, again, I don't want to discount it completely from that deterministic end. I think it has value there, but beyond that, conflict.

MR. RUBIN: But on the collective dose, I mentioned is one use in value and cost-benefit analysis, but in terms of how we would consider the population at risk compared to risk guidelines, we're looking at an average population.

VICE CHAIRMAN RYAN: And we're saying don't use it at all.

MR. RUBIN: Okay. All right. We got that message.

CHAIRMAN GARRICK: I think this is one where you could win because people are interested in their risk, their individual risk.

VICE CHAIRMAN RYAN: You know, in the metrics you described in the two cases, it worked just find. You maximized it. You looked at that worker and you've talked about what happens if he sees 19 and is that risk. I think you're done, boom, period.

MR. DAMON: Could I help out a little bit? I'm Dennis Damon.

You know, I think Alan has brought out the distinction. When it refers to population, he's really talking about individual risk. So we're really looking to apply these guidelines to a most exposed person or to every person equally, but you look for the most exposed. If you've done it for him, you've covered everybody.

But in practice, in practice, that doesn't work. Okay? It's very impractical to go and try to find, okay, where is the most susceptible, peculiar, strange individual who gets the maximum dose?

So what's done in practice is a concept they call reasonably maximally exposed individual or critical group, and what we're doing is adopting that here in a risk informing sense, okay, as opposed to a regulatory sense. We're using different terminology because in the critical group, RMEI space, some of this stuff that's done is very nonrealistic, regulatory, artifact.

We're talking about realistic risk informing, identifying an analog to critical group, just as is done in the reactor's QHO for acute fatalities. They take the one mile nearest population

to the facility. Okay?

It's just to get something you can reasonably calculate that captures this idea of the most exposed individual. So it's not collective at all. It's individual, and what Al is going to get into is how difficult that can be in some of the things in NMSS because we don't have all fixed sites with fixed populations.

We have things moving around.

VICE CHAIRMAN RYAN: I mean, ICRP and others have all sorts of formulations for critical groups and REMIs (phonetic) and all of the rest, and I think I certainly agree with you, but the step that I think I don't agree with and the others don't agree with is they'll multiply it by some number of people and come up with a man-rem or some --

MR. DAMON: Right. That's what I'm trying to say. I'm trying to confirm that we're not doing that. This population is like a critical group, you know. You're going to do the population, but it's the most exposed individual you're looking for.

VICE CHAIRMAN RYAN: I would suggest then you change when you talk about the critical group instead of population exposure.

MR. DAMON: We have adopted a term sort of

internally. It's a population at significant risk, but it's the concept. You just have to understand what we're reaching for. It's like a critical group, only it's realistic.

CHAIRMAN GARRICK: It would also help to get rid of the collective language.

MS. WEINER: Yes. That would go a long way.

CHAIRMAN GARRICK: Carry on.

MR. RUBIN: Go on to the next slide, please.

One of the questions or issues that we talked about is are injury risk guidelines needed in risk informing NMSS. We have acute fatalities, latent fatalities and injury as a proposed risk guideline also.

VICE CHAIRMAN RYAN: You mean radiation injury.

MR. RUBIN: Radiation injury, yeah, these are radiation, and it could be chemical also.

VICE CHAIRMAN RYAN: How about occupational?

MR. RUBIN: Yes, these are for public and for workers.

VICE CHAIRMAN RYAN: No, no, no. On the

risk of OSHA injuries.

MR. RUBIN: No, these are radiation.

VICE CHAIRMAN RYAN: Because they're going to happen a whole lot more than any other --

MR. RUBIN: No, that's not part of the scope of this, not OSHA. These are radiation or chemical risks associated with the fuel cycle facilities, for example, but it's not --

VICE CHAIRMAN RYAN: Well, chemical is an OSHA risk.

MR. RUBIN: Yeah, there's a little overlap with NRC looking at risk from HF-6 and fuel cycle facilities.

VICE CHAIRMAN RYAN: But they're regulated under the OSHA umbrella. so how do you pick out chemicals instead of back injuries and all of the rest that are orders of magnitude more important in terms of risk?

MR. RUBIN: The dominant areas we're looking at is radiation risk, radiation exposure.

MR. DAMON: I'll take on that. There's a memorandum of understanding between OSHA and NRC that defines which chemicals are going to be regulated by NRC and which ones by OSHA.

VICE CHAIRMAN RYAN: Okay.

MR. DAMON: So it's along the lines of chemicals that are an intimate part of the -- for example, uranium toxicity, we've got that one. Chemicals that are part of the process which we license is part of it.

But if it's just in storage on site and an accident happens, that's OSHA.

VICE CHAIRMAN RYAN: That line has been drawn for you then.

MR. RUBIN: Yes.

VICE CHAIRMAN RYAN: Okay.

MR. RUBIN: So our proposed response to this issue is that we think that there is a value to having an injury risk guideline because, you know, workers do get injured, radiation exposures, as Jim mentioned, and we thought that would be one of the risk matrices that would be part of the decision making process.

VICE CHAIRMAN RYAN: How many deterministic injuries have there been in the last ten years or so?

I assume that's what you mean, is a deterministic risk because you can't measure fatal cancer risk.

MR. SMITH: No, that's true.

VICE CHAIRMAN RYAN: Or see it expressed.

MR. SMITH: What we do, we have anecdotal information from incidents involving radiographers. There are one or two instances where a source became dislodged and someone accidentally picked it up and stuck it in their back pocket, walked around for a few hours.

I don't think that we have enough of them to be able to come up with a statistically valid number, but they do occur every so often.

If you're talking about the medical area, which we really didn't address as part of at least 6642 or 1717, there are conceivably injuries that occur on an annual basis as part of medical events.

VICE CHAIRMAN RYAN: Setting patients aside, as they're the ones that received the misadministrations, I guess I agree with you that database for workers is very small, particularly in the last ten years versus the previous 20.

MR. SMITH: Correct. What we also see is not in this country, but there's a nice control model in other countries where we don't have regulatory authority. There have been incidents of death and dealing with panoramic irradiator facilities; also have been other types of injuries involving

radiography sources generally.

But there have been sources that have caused erythema resulting from problems with weld logging sources, but for the most part the deaths that have occurred have occurred overseas and other areas that aren't regulated in a similar fashion to the NRC.

VICE CHAIRMAN RYAN: Okay, but you can't use that as a guideline or a basis.

MR. SMITH: No, but what you can do is say if we took away our radiation protection program, or regulatory program, what boundaries/barriers would not be in place.

It helps us to do a modeling of the effectiveness of a regulation.

VICE CHAIRMAN RYAN: You know, I don't disagree with the answer you gave to the question, which was yes, but, boy, trying to figure that out was tough.

CHAIRMAN GARRICK: Let me compliment you for your strategy here, throwing these questions.

(Laughter.)

CHAIRMAN GARRICK: This is sort of turning it around and putting the committee a little bit on the side of the table that we're not often on.

When you talk about injury risk and I'll

consult my experts here on the panel, should we really not be talking about injury but rather be talking about dose? It's the risk of a dose because we --

MS. WEINER: Yeah.

CHAIRMAN GARRICK: -- don't know what the injury is for --

PARTICIPANT: Except if they're deterministic.

CHAIRMAN GARRICK: Yeah.

MR. SMITH: When we started looking at the threshold for fatal doses, we figured about 175 rem, I think, is where you start seeing fatalities from exposure to at least camera radiation.

VICE CHAIRMAN RYAN: That's without medical intervention though.

MR. SMITH: Right. That's correct, and there are situations where people have been exposed and not known it. So that you do have to take that into account.

And then we have, well, the latent cancer fatality. You pretty much are going to have latent cancer risk using linear no threshold from zero millirem up to whatever is sublethal. But we wanted to look at a range that was --

VICE CHAIRMAN RYAN: Careful.

MR. SMITH: Yes.

VICE CHAIRMAN RYAN: I mean it's not linear on up there. We know t hat part.

MR. SMITH: We know that, but we know there's a range where there are exposures that are sublethal on a whole body basis, but there is a possibility of having extremity exposures or exposures in localized points that would cause injuries.

So, yes, you're right. It's a dose that we're measuring mostly in terms of a whole body dose, but we're assuming that if you're getting 175 rem whole body, there's a very high dose to your hand if you've had the source in your hand.

VICE CHAIRMAN RYAN: I think if you cast these thresholds and staging things on a dose line irrespective of whether that's exactly the meaning of a fatal dose curve under the circumstances X versus Y versus Z, you'll get a lot less argument than if you try and ascribe it to an outcome.

MR. SMITH: Correct.

VICE CHAIRMAN RYAN: So I would have a tendency to decide the dose lines and just live with the fact that they're going to be brighter in your modeling, which is really what you want. You want a bright modeling, transparent modeling exercise than

how you could envision outcomes from let's pick 300 millirem.

Some people with 300 millirem won't survive no matter what you do. Some people will do just mine with minor medical intervention. Some people will need lots of intervention.

I'm sorry. Three hundred rem. Sorry.

CHAIRMAN GARRICK: I was getting worried.

VICE CHAIRMAN RYAN: Excuse me. Three hundred rem.

But you know, if you just say a threshold for this kind of a risk area is 300 rem, well, you know, that's the number you use and so if you turn it into a bright line from the numerics point of view, you'll have a whole lot less, I think, problem conveying the risk structure for the calculations and the assessments and kind of let judgment come in at the end of it than trying to build judgment into it up front.

CHAIRMAN GARRICK: This is why the Yucca Mountain radiation standard was a dose standard and not an injury standard.

MR. SMITH: I know that we tried to make the -- the original reason was that we had had risk assessments in the past where you had doses on the

millirem range over large populations, and then they would use one risk number. They would multiply the number of people exposed.

VICE CHAIRMAN RYAN: We've already solved that problem.

MR. SMITH: Yeah. You'd come back, and they would say, "Well, 1,000 rem to one person is the same risk as one rem to 1,000 people."

You're going, "Wait a minute. You're going to have a dead body on one situation, and you're going to have a bunch of people with an elevated cancer risk in the other situation."

VICE CHAIRMAN RYAN: That's like a 200 mile an hour wind for an hour or a one mile an hour wind for 200 hours. The same amount of air goes by, but it's a whole different feel.

MR. DAMON: I'd like to remind one thing that occurred to me on this injury risk is that we are also talking about applying this to chemical exposures, and there is also a permanent injury, you know, deterministic chemical injury range. So you know, people can get burned from chemical.

In fact, one of our inspectors at one of our fuel cycle facilities got exposed to an HF release and, you know, I don't know that it led to a chronic

health problem, but that would count as an injury if that led to chronic breathing difficulties or because she got exposed to that chemical, that would be what we're calling an injury here.

CHAIRMAN GARRICK: Well, common sense would say where we understand the injury thresholds we use them, but when we don't understand them, we use something else.

VICE CHAIRMAN RYAN: Or when they're invisible and you have to use dose.

CHAIRMAN GARRICK: Yeah.

VICE CHAIRMAN RYAN: I think dose is a good surrogate for radiation injury. I fully understand the chemical problem because there is no such thing as dosimetry for chemicals in the regulatory arena of, you know, it's TLVs and, you know, they're all based on some deterministic endpoint for the most part. You know, some cancer studies have been determined for some chemicals, but you know, a lot of it is deterministic. It's apples and oranges.

Again, the NCRP has tried to attempt that one.

CHAIRMAN GARRICK: I think you've got our position and our thoughts on this. Let's move on. Can we?

MR. RUBIN: Another question is in applying risk guidelines should they be applied across the spectrum of facilities or applications in NMSS or an individual facility.

CHAIRMAN GARRICK: Well, when we did the reactor risk studies, one of the most important lessons we learned from the whole exercise in the late '70s and '80s was how important specificity is. Nuclear power plant risk is very much plant specific, and so I don't know how you can escape the issue of specificity as being critical to being quantitative in any way about the risk of something.

MR. RUBIN: Certainly the risk are going to vary from facility to facility.

CHAIRMAN GARRICK: Absolutely.

MR. RUBIN: No question about it.

CHAIRMAN GARRICK: It varies on the basis of -- even on like facilities.

MR. RUBIN: Right.

CHAIRMAN GARRICK: When we did the Indian Point study, side by side units, the risk was an order of magnitude difference between Unit 2 and Unit 3. There were two different operators. they had different maintenance practices, and they have other things that enter into it.

But the reactors for the most part were identical.

MR. RUBIN: Right, and I'm not suggesting that those differences be ignored. The question here -- and I'll tell you what our recommendation is; I'll turn the tables back on myself -- is that in making risk decisions do you look at the average risk or do you look at an individual facility and each individual facility should try to achieve that guideline or not?

And in the reactor area, for example, for generic activities like rulemaking or resolving generic issues or eliminating unnecessary regulatory burden, look at an average across the industry. And at the recommendation that we would apply for materials and waste is similar. For any generic kind of regulatory decision that the agency would make, look at an average across the industry.

But you're still looking at differences, what might be the high and low ranges of facilities. You don't just take one facility and say that's typical of everybody. So making a decision, not each individual facility would try to achieve that guideline.

CHAIRMAN GARRICK: But where you can lump

it and average it, yeah, but in the final analysis you want to know whether a specific source, a specific facility, a specific plant is high or low or whatever risk.

MR. RUBIN: Well, I think if there is, again, not a generic decision but a more specific decision tha the agency is trying to make using risk information, then you could look at the individual facility itself.

So I see both approaches being we're recommending. If there's a regulatory decision on an individual facility, look at the individual risk to that facility. If it's more generic in nature, use sort of an average.

CHAIRMAN GARRICK: As a regulator, the generic and average may make some sense. A plant or facility owner, I want to know what the risk is very specifically of my plant, my facility. And I think that's what I ought to be accountable for.

MR. RUBIN: Okay. Any other comments on that one before I move to the question on what kind of standards? I think this came out in some of the pilot studies, is what's the quality, level of quality of the risk assessments that are being used in decision making. It relates to questions of uncertainty and

defense in depth, and we'll get to that also. I haven't forgotten about the defense in depth question, by the way. It's up here.

I think in terms of where we go, in terms of the extent that NMSS will be using risk informed decision making, eventually there may be a need to develop some kind of a standards for quality of risk analysis. That's being done in the reactor arena right now, and we're not suggesting that it be done now, but it's kind of wait and see.

So there is no overall standard for doing risk analysis, but that may be something to look at in the future.

CHAIRMAN GARRICK: Yeah.

MR. RUBIN: We're trying to look at it on a case-by-case basis right now.

CHAIRMAN GARRICK: Right. I think that you've got to get an information base. You've got to get a database.

MR. RUBIN: We want to get experience.

CHAIRMAN GARRICK: Right. You've got to get some experience, and then I think the issue of standards will manifest itself. You'll probably end up developing categories of things and have different standards or a standard for a particular category.

But I think this is something where experience is going to have to be the basis. In a way West Valley is a wonderful opportunity in that regard because just about every waste and decommissioning high level/low level problem that you have is there, and it seems that one ought to be able to use that as kind of a test facility for getting some of the experience that's needed to assess the sensibility of standards.

MR. RUBIN: And we're learning a lot in doing the pilot dry cask PRA.

CHAIRMAN GARRICK: Right.

MR. RUBIN: That Research has done, and also industry is developing a dry cask storage PRA for a different kind of cask system. So we're learning as we go.

Let me get now to the defense in depth question, and how do you consider that in risk informed decision making. One defense in depth critical philosophy that the agency has, you have to take into account the uncertainties in the design and the construction and the operations of facilities and make sure that there's a high confidence in meeting the overall safety objectives.

So that's there. That's a given.

Let me put up a back-up slide. It's the last slide. It's number 33, if you could go to that.

CHAIRMAN GARRICK: Thirty-three?

MR. RUBIN: You don't have that.

That's the last page in your handout? Okay, okay. It should be there, yes.

CHAIRMAN GARRICK: That's it. thank you.

MR. RUBIN: So going back to where we see defense in depth, we want to make sure the uncertainties are understood as best we can. If there are large uncertainties, you would tend to have a greater reliance on defense in depth, but you don't want to eliminate defense in depth entirely. It has always got to be there.

So when Chris' original flow diagram for how you make risk informed decisions, there were other factors that went into the decision. Defense in depth is one. Uncertainty is another.

So going down to the bullet third up from the bottom, considering uncertainties in decision making, you need to look at the level of confidence you're looking for. I'm sure you have redundancy and diversity and independence to meet your safety objectives. You need to look at the safety margins that you've got in order to try to see how you're

meeting risk guidelines and overall safety objectives, and make sure you've got activities in each of your facilities that provide defense in depth and safety.

It's hard to quantify, you know, to come up with an algorithm, but certainly it is a very important factor that goes into our decision making.

CHAIRMAN GARRICK: Yeah, and as I was saying earlier, I think that the concept of defense in depth was a very valid one and very much needed at a time when we were far less sophisticated in dealing with the world of uncertainty than we are now.

In the limit, you would think it would be an antiquated concept because you would think that if you really were knowledgeable about the uncertainties and their sources that you would be in a position to effectively quantify the different levels of defense.

And if you do that with great confidence, then the concept becomes less meaningful, but --

VICE CHAIRMAN RYAN: I would guess that the more that you go across the NMSS licensees and activities, the smaller the facility, the less they know about defense in depth. So there's a huge number of licensees that don't have that reactor experience of understanding that to the level of detail in the reactor facility.

MR. RUBIN: Right, right. But, yeah, it's a basic tenet of regulatory practice.

CHAIRMAN GARRICK: It is, and we're keeping that.

MR. RUBIN: Right.

CHAIRMAN GARRICK: In the practice, in terms of, you know, comparing reactors.

VICE CHAIRMAN RYAN: My point is I think it's more important to keep it for the NMSS activities than the reactors that are mature, but I'm not saying you --

MR. RUBIN: I'm not sure I buy that, but it's --

CHAIRMAN GARRICK: Well, I think it's a matter of degree. I think that we should certainly if we had made any progress in the world of quantifying risk, we should be evolving to a position where there should be much less dependence on the mystery of defense in depth. The mystery should be disappearing.

MR. RUBIN: Whether you can actually remove a physical barrier to release like a containment, if you can assure that you really know what your core damage frequency is and the reactor analogy, you probably wouldn't go that route for decision making.

CHAIRMAN GARRICK: But the key point here is not so much being for sure that you understand. It's being for sure that you understand the uncertainty, and that's what has to become the defensible basis for depending less on a mystery of safety safeguards, such as arbitrary defenses.

MS. WEINER: Actually you have a very good recent example of the interaction between risk information and defense in depth, and that was the repeal, if you will, of 10 CFR 71.63, the double containment provision.

We have a tremendous amount of information now about releases and Type B containment and so on, and the recent decision that we did not need the double -- the double containment was an early defense in depth concept, and double containment for transportation packages of plutonium, and it has gradually gotten limited to the point where it only applied to transuranic waste, and now it's gone, and it was -- this is a very good application, it seems to me.

It may be inadvertent, but it's a good application of risk information.

MR. RUBIN: And there may be applications that we can use now even with our current

understanding of risks. If we look at, you know, risk guidelines and if we had estimates of risk that were, you know, orders of magnitude below what are some of the proposed risk guidelines, even with large uncertainty, you're still going to be assure of maintaining safety.

So you make decisions in uncertainty and then maybe really, you know, get some relief on the --

CHAIRMAN GARRICK: We're getting into a time crunch here.

MR. RUBIN: Okay. I'm sorry. Let's continue on then.

CHAIRMAN GARRICK: Even though we're the reason for it.

MR. RUBIN: The last question has to do with, you know, if we go and implement some risk guidelines in materials and waste arenas, how consistent they should be with the reactor safety gold arena, and you're aware the reactor safety goals cover public and acute latent cancers, and we are proposing guidelines, additional guidelines for materials in ways that cover workers and injury guidelines.

And there are some reasons. There are some really good reasons why there are differences, and I think we talked about some of them. So we don't

think that because, for example, that we're looking at having guidelines for workers and materials and waste activities that that would necessitate doing something similar in the reactor arena.

So there are legitimate reasons for, you know, differences in facilities and operations and risks that we understand or we think we understand.

CHAIRMAN GARRICK: Yeah, you would think that there would be a set of principles at which there was complete consistency, and then beyond that it becomes a matter of implementation and how you do it, and there's going to be differences at that level.

MR. RUBIN: So our approach right now is to have, you know, a similar kind of guidelines for public risk in terms of acute and latent cancer fatalities, a tenth of a percent as an approach, to have risk guidelines and you look at --

VICE CHAIRMAN RYAN: Do any logical groupings fall out of across all NMSS activities?

MR. RUBIN: In terms of?

VICE CHAIRMAN RYAN: Grouping different standards for reactors or are there different standards within the whole span of NMSS?

MR. RUBIN: When you say "different standards"?

VICE CHAIRMAN RYAN: Well, your last question, how consistent should they be.

MR. RUBIN: Oh, oh, oh.

VICE CHAIRMAN RYAN: When you just say how consistent should they be across all of NMSS activities, I'm thinking of somebody that has a tiny source that does a little bit of something with it versus somebody that has a 10,000 curie broad scope license. That's a real difference.

MR. RUBIN: Yeah, I thought that was what we talked about, one of the earlier issues. Should you have some uniform risk guideline across the spectrum of NMSS' activities?

VICE CHAIRMAN RYAN: Well, I'm picking up on John's point. In principle, yes, but in implementation, all detail and requirements I would think would be a little bit more rigorous for the 10,000 curie broad scope licensee rather than a tenth of a millicurie-something licensee.

Am I making sense?

MR. RUBIN: I guess I'm not sure I understand exactly what the question is.

MS. LUI: Well, let me try to help. One of the work that we're currently pursuing is looking at all available risk studies out there where we can

get the available risk information for the broad spectrum of NMSS activities. At some point I think we will be ready to show you where the different activities stand.

We have some preliminary information at this point. However, we're not ready to really present that information yet because there's still work yet to be done.

VICE CHAIRMAN RYAN: Okay.

MR. SMITH: Well, I can say that at least within the industrial, medical, and nuclear safety area, when they did 6642, they divided their area up into 40 rough bins of types of licensees, and even at a very broad definition of these different types of licensees, there were 40 different types.

So then you have the other three divisions to worry about. So even if you stated that high a level and start breaking that down into facilities that involve maybe half a dozen employees up to the ones that involve 1,000 or so employees, if you kept it at the high level that IMNS did, they still came up with 40 different systems.

VICE CHAIRMAN RYAN: It still becomes a continuum.

MR. SMITH: Yes, correct.

VICE CHAIRMAN RYAN: All right.

CHAIRMAN GARRICK: I think you'd better jump to the conclusions.

MR. RUBIN: Let me move on. Just very briefly for these last two slides we'll go very quickly.

Path four, what we intend on doing, we've developed some draft documents for specific steps in the risk informing process. We're going to consolidate those into one document and then prepare a Commission paper in September of this year.

We would appreciate again any input we get from this committee on anything we discussed today, and we will incorporate that in our guidance as we go forward to the Commission.

And over the next two years what we will be proposing is to have some limited work on a case-by-case basis to gain experience with some of the informed activities and the use of proposed risk guidelines.

Summary and conclusions. They have had a lot of accomplishments so far that have gone on in the last couple of years. We've developed the post framework with working with Research and NMSS and risk guidance for risk informed decision making at NMSS.

That's a large step forward, I think.

We developed draft accident risk guidelines for both public and the workers in materials and waste activities. We completed two pilot studies that you've heard about and gave some insights from those.

And we identified as a recommendation a number of key issues that we talked about just a little earlier.

CHAIRMAN GARRICK: One of the things that I'd like to certainly see is more examples and more pilot studies of things that are more in the mainstream of the issues of decommissioning and waste associated with NMSS activities.

For example, I don't know that we learned very much from the case of the dry storage probabilistic risk assessment about the real problems facing NMSS, but I think we would learn a lot if you used as a pilot something like Sequoia fuels or some aspect of West Valley, where it really crosses all of the issues just about that NMSS is involved in.

The spent fuel storage is too much like a spent fuel risk assessment or partial reactor risk assessment. It doesn't really have the characteristics of a Sequoia fuels cleanup or a West

Valley cleanup. Some components of those would really be, I would think, very attractive opportunities for implementing what you're trying to do here.

I don't know how the rest of the committee feels.

MS. WEINER: I think that's a very good point, especially if you take something like West Valley, which covers a wide range of risks and of applications really.

VICE CHAIRMAN RYAN: If you picked something, too, on the lower end of things and look at the area where you do have a lot of input, which is the industrial radiography, I mean, that would be an interesting example to kind of track through your process and see how that shakes out.

CHAIRMAN GARRICK: All right. Well, any other parting questions or comments from any members? Go ahead, Jim.

MR. LARKINS: Just to follow up on what John said about other examples, in the remediation area there's a term that's being kicked around that's probably not a good term, but it's called risk balancing, and it strikes me that one of the things where we can really be risk informed is not only in deciding what we should do at these sites, but how we

should do it.

And for example, it strikes me that we often put people in protective equipment to mitigate one risk, thereby possibly increasing another risk, and I think that's ripe for some analysis as well. I have found very little data on that.

CHAIRMAN GARRICK: Yeah.

MR. LARKINS: But if you put someone in Level A protection, let's say, to mitigate a probably very low risk of radiation, you probably increase their risk of falling into a trench or even hit by a backhoe, some of these things as well.

So it may not be an area you're that interested in right now, but this whole topic of how do you balance certain kinds of risks against other kinds of risks to make the best decision, ecological risk, worker risk, remediation risk, community human health risks. All of these different kinds of risk I think is a n area that's very ripe.

CHAIRMAN GARRICK: Any other questions from staff?

VICE CHAIRMAN RYAN: Thanks for a thought provoking presentation.

CHAIRMAN GARRICK: Yeah, thank you. And you really did turn the tables on us.

MR. McKINNEY: This is Chris McKinney. I wanted to do one clarification, which was on critical groups in that there had been a statement earlier that critical groups are automatically unrealistic, and to say that there is no guidance that says we have to use unrealistic. Waste management and probabilistic is trying to get as realistic as possible with our scenarios, and in fact, the international community is much, much more realistic for operational settings than NRC does, and just to clarify that than that previous statement.

CHAIRMAN GARRICK: Well, the concept of conservatism has no meaning unless you know something about realism, and that's kind of been our point. You need to somehow establish a reference against which to decide how much conservatism makes sense, and if you keep the whole issue in a fuzzy state because of conservatism, you're not in a position to do that. You're not in a position to calibrate conservatisms.

This committee has spoken to that for several years.

Okay. Thank you very much. That was excellent and keep it up. We look forward to hearing from you again and some more good examples and experiences, and we will be talking to you soon.

We'll take a 15 minute break. We will not need the recorder after this break.

Thank you.

(Whereupon, at 4:50 p.m., the meeting was concluded.)