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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON NUCLEAR WASTER

WORKING GROUP SESSION

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DECOMMISSIONING CRITERIA OF THE

WEST VALLEY DEMONSTRATION PROJECT

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FRIDAY

OCTOBER 19, 2005

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THE INN AT HOLIDAY VALLEY,

ELLICOTTVILLE, NEW YORK

PRESENT:

Michael Ryan, Chairman

Allen Croff, Vice Chair

Ruth Weiner, Member

James Clarke, Member

William Hinze, Member

David Kocher, Invited Expert

Frank Parker, Invited Expert

Thomas Nauman, Invited Expert

Rich Major, Designated Federal Official

I-N-D-E-X

P-R-O-C-E-E-D-I-N-G-S

(8:30 a.m.)

CHAIRMAN RYAN: I'd like to ask you to take your seats, please. The meeting will come to order. My name is Michael Ryan, chairman of ACNW. The other members of the committee present are Allen Croff, vice chair; Ruth Weiner, James Clarke and William Hinze, and invited experts David Kocher, Frank Parker and Thomas Nauman.

Today the committee will conduct a working group to discuss the application of the Commission's final policy statement on the decommissioning criteria of the West Valley Demonstration Project. Rich Major is the recognized government official for today's session.

The meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. We have received no written comments or requests for time to make oral comments from the public regarding today's session. Should anyone wish to address the committee, please make your wishes known to one of the committee staff.

It is requested that speakers use

one of the microphones, identify yourself and your organization, and speak with sufficient clarity and volume so that they can be clearly heard. It's also requested that if you have cell phones or pagers, that you kindly turn them off. Thank you very much.

I'd like to now turn the working group part of the meeting, working group session over to Dr. Clarke who will discuss further the specific goals for today's session. Dr. Clarke?

DR. CLARKE: Thank you, Dr. Ryan. The ACNW is a technical advisory committee. We have been following staff activities on the decommissioning and License Termination Rule, and then had a working group meeting this past June on proposed guidance revisions for decommissioning under the LTR. We're pleased to be here and learn about the status of performance assessment approaches that are being taken for this complex decommissioning site.

Today we will hear presentations from the NRC and from the DOE. We have also scheduled time for round table discussions and time for comments from attendees. And I suspect, as always, we have an ambitious schedule. I will try to keep us on schedule. I would ask those of you at the table that have questions, if you have several questions, please prioritize them and maybe leave some for the round table discussions so we can do everything that we'd like to do today.

And now it's my pleasure to introduce to you our invited experts. And let me begin at the far end of the table with Frank Parker. Dr. Parker is a distinguished professor of environmental and water resources engineering at Vanderbilt University. He is a former member of the advisory committee for West Valley before decommissioning activities began, and he has also served as a consultant to the NRC advisory committee on reactor safeguards. Frank is a member of the National Academy of Engineering, a former chair of the board on radioactive waste management, and currently chairs the National Academy committee on waste determinations, waste incidental to reprocessing, a topic of great interest here and at a few other sites as well. Frank has degrees from MIT and Harvard. We're delighted that he could be with us today. Welcome, Frank.

DR. PARKER: Thank you.

DR. CLARKE: Our next expert is Tom Nauman. Tom is vice president of Shaw, Stone & Webster Nuclear Services and northeast regional director. He has over thirty years of experience in radioactive waste management, decommissioning and development of spent fuel storage systems. He served as a member of the Nuclear Safety Oversight Board for Three Mile Island unit two and Saxton plant decommissioning projects. He has a degree in environmental engineering from Southern Illinois University, and is a graduate of the Northwestern University Kellogg School of Business. Tom also served as an invited expert for a working group meeting on decommissioning guidance unit last June. Welcome back, Tom.

And David Kocher was also a consultant to the ACNW. Dave has a PhD in physics from the University of Wisconsin. He worked at Oakridge National Laboratory for twenty-nine years and now is a senior research scientist assigned to Oakridge Lab for the past five years. Over thirty years experience in environmental health physics, fellow of the Health Physics Society. David is the principal author of NCRG report 1146, for his risk management and remediation of radioactive manmade substance. Welcome, Dave.

And at this point we should go to our first presentation, and I think Chad Glenn from the NRC will get us started.

MR. GLENN: Good morning. My name is Chad Glenn, and I work for the Nuclear Regulatory Commission in the division of waste management and environmental protection. I've been asked to talk --

CHAIRMAN RYAN: Can you just hold up a minute, we'll get you a microphone.

MR. GLENN: Can you hear me now.

CHAIRMAN RYAN: Much better.

MR. GLENN: Thank you. I've been asked to talk on two topics. The first topic is NRC's responsibilities at West Valley. And the second topic, the Commission's final policy statement on decommissioning criteria for the West Valley Demonstration Project.

NRC's responsibilities at West Valley are really driven by three statutes; the Atomic Energy Act, the West Valley Demonstration Project Act, and the Environmental -- the National Environmental Policy Act.

Next slide, please. Under the Atomic Energy Act, NRC has the responsibility for the Part 50 license that authorizes the spent fuel reprocessing at West Valley. NRC's Atomic Energy Act responsibilities include the assurance of public health and safety, of licensed facilities and activities, inspection, and ultimately license termination.

In 1981 the license was suspended, or as we put it sometimes, put in abeyance, to execute the West Valley Demonstration Project Act. The license continues in effect but the technical specifications of the license related to the operation and maintenance of the reprocessing facility were put in abeyance pending the completion of DOE's responsibility under the West Valley Demonstration Project Act. After DOE completes its responsibilities, NYSERDA's license will be reinstated to allow decommissioning and license termination under the Atomic Energy Act.

Next slide, please. Under the West Valley Demonstration Project Act, NRC's responsibilities include prescribing decommissioning for the West Valley Demonstration Project; informal review and consultation with DOE on DOE's plans and activities; monitoring project activities for the purpose of public, assuring public health and safety. The West Valley Demonstration Project Act has not given licensing or regulatory responsibilities to the DOE, so we do not regulate DOE under this act.

Next slide, please. Under the National Environmental Policy Act, NRC's responsibilites include participating as cooperating agency in the decommissioning EIS. Adopting or supplementing the decommissioning EIS. And ultimately we conduct an environmental review for license termination under the Atomic Energy Act.

Next slide, please. As previously noted, the West Valley Demonstration Project Act directed NRC to prescribe decommissioning criteria for the West Valley Demonstration Project. In February 2002 the Commission issued a final policy statement prescribing NRC's License Termination Rule as the decommissioning criteria for the West Valley Demonstration Project reflecting the fact that the applicant's decommissioning goal for the entire site is in compliance with the License Termination Rule. The License Termination Rule criteria applies to the decommissioning of the high-level waste tank and other facilities which high-level waste solidified under the project was stored. The facilities used in solidification of waste and any material and hardware used in the project. The Commission also provided criteria for incidental waste to clarify the classification of any residual waste remaining after the tanks are clean.

Next slide, please. The LTR, as you know, is the standard decommissioning criteria for all NRC licensed sites. It will apply to the termination of NYSERDA's license after the license is reinstated. In terms of the timing of decommissioning, the Commission policy statement contemplates a sequential decommissioning process at West Valley. First DOE completes its decommissioning responsibilities under the West Valley Demonstration Project Act. Then NYSERDA's license is reinstated, and NYSERDA completes its decommissioning and license termination responsibilities under the Atomic Energy Act. The LTR provides a range of public dose criteria; dose criteria for unrestricted use and restricted use, and I think Dave Esh is going to talk more about that. What I wanted to say here also was that the Commission's policy statement indicates that the LTR was sufficiently flexible to allow part of the site to be released for unrestricted use, part of the site would be released for restricted use, and portions of the site may need to remain under license.

Next slide, please. As you know from looking at the information regarding West Valley, it's a unique site, complex, and has many challenges. It's for this reason that the Commission policy statement emphasized the need for flexibility while ensuring safe decommissioning. The Commission recognized that public health and safety considerations and cost benefit considerations may justify the evaluation of alternatives that do not fully comply with the License Termination Rule criteria. After cleanup to the maximum extent technically and economically feasible, the Commission will consider alternatives to release under the License Termination Rule, including exemptions from the LTR if it can be demonstrated that public health and safety and environment are protected. The Commission may also conclude that the only way to ensure adequate protection to public health and safety might be to maintain a long-term or perpetual license for some part of the facility.

That's all I was going to say about the Commission's policy statement, and that concludes what I was going to present to the ACNW. I'd be happy to take any questions.

DR. CLARKE: Thank you, Chad. At this point what I think I'd like to do is recognize that we've invited members of several other agencies, both state and federal, to attend this meeting. We give you an opportunity now if you like to step to the microphone and identify yourself and say a few words, and then we'll entertain questions for Chad.

MS. YOUNGBIRD: Good morning. My name is Barbara Youngbird. I'm with the New York State Department of Environmental Conservation. New York State is an agreement state with the NRC, and the Department of Environmental Conservation is one of four state agencies that have implemented the agreement state program. In that capacity we regulate the state licensed disposal area at West Valley. We also have a continuing interest as the state's environmental agency in the entire West Valley Demonstration Project. With me today is Patrick Kinkanan (phonetic) and from our Region 9 office in Buffalo, and he represents the other piece of our regulatory authority which is the Resource Conservation and Recovery Act. That applies to both the Department of Energy's activities at the West Valley Demonstration Project Act and NYSERDA's activities at the site. So we're available to answer any questions you have on those two programs.

DR. CLARKE: Thank you, Barbara. Would anyone else like to come to the microphone?

MR. BAKER: Hi, I'm Gary Baker. I'm with the New York State Health Department. We are the lead agency for protection of the public health in New York State, and that includes ionizing radiation, and we also are the agency that has regulatory responsibility for public water supplies. We are participating in reviewing the Environmental Impact Statement and decommissioning of West Valley primarily through the Department of Environmental Conservation which has, which is the lead agency. It is anticipated that any concerns that we have will be shared with the Department of Environmental Conservation and worked out with them, and so we would have one, essentially one voice. And that is not a unique role because we generally participate in other inactive hazardous waste site cleanups with the department in a similar fashion. And the department is, of course, interested in ensuring the public health and will continue to monitor and review the decommissioning project. Thank you.

DR. CLARKE: Thank you, Gary. Do we have anyone else who would want to come to the microphone? Please.

MR. PACHULO: Good morning. My name is Paul Pachulo (phonetic). I'm the director of the West Valley Site Management Program under the New York State Energy Research and Development Authority. Before I make any comments I'd like to introduce a few staff that I have that are here today; Paul Bembia, Ted, Colleen Gerwitz, and Pat Brody with NYSERDA's counsel office. I just want to take a few minutes to talk about NYSERDA's role. You should have received -- I'm sorry, I didn't have a view graph, but I have a one-page handout, it's a color handout that shows an outline of this site. If you don't have that, that's really okay.

As you heard NYSERDA holds title to the Western New York Nuclear Service Center on behalf of the state of New York, so as such we're the owner of the entire 3,300 acre property which is shown on that figure in blue. Under the West Valley Demonstration Project Act, at a cooperative agreement that we signed with Department of Energy, DOE has exclusive use and possession of the central portion of this site. It's about 160 to 200 acres and it's shown on the view graph in green. And they have possession and control of that piece of property for executing the demonstration project.

NYSERDA has two roles down at this site. One is as the landlord of the 3,300 acres, and as such, we're responsible for the day-to-day management of the state-licensed disposal area and in large part the balance of the site which is the area that we call the retained premises, and it's labeled on there.

The second responsibility that we have, which is pursuant to the terms of the cooperative agreement that we signed with the department, is to review activities of the demonstration project and to arrange for New York

State's 10 percent share of the project cost.

As Chad Glenn mentioned earlier, NYSERDA is now the sole licensee for the Part 50 license that the Commission issued for the reprocessing facility of this site. The technical specifications for that license are held in abeyance for the term of the demonstration project. At some point in the future possession of the demonstration project premises, or some portion of that premises, may return to NYSERDA, and after -- after DOE has completed their decontamination and decommissioning. And then, as you heard Chad say, we would have to do some license termination.

In the final policy statement the Commission said that the same decommissioning criteria that applied to the Department of Energy will also be applied as part of NYSERDA's license and any exemptions or alternative criteria granted to DOE will also apply to NYSERDA.

Many of you may have heard that there's areas of disagreement between NYSERDA and DOE about the scope of DOE's obligations under the demonstration project for decontamination and decommissioning, and while those disagreements have some important implications for the project and for the Environmental Impact Statement, they do not affect the performance assessment or some of the technical calculations and analysis that are going on. For those of you who may have an interest, if you have any interest in understanding any details about those issues or responsibility differences, I'd be happy to provide you with a letter that we've provided to DOE that delineates those issues.

Several years ago the government accountability office did a report regarding West Valley and regarding the progress of the project and issues that are affecting the completion. And among their conclusions was the statement that it would probably, it would likely require some legislation to resolve some of the problems that are there. As such, NYSERDA with input from the Citizens Task Force that we have at West Valley, drafted legislation over a, probably a one-year very public process that would basically address a number of the issues affecting cleanup of the site. This legislation has been introduced by Representative Randy Kuhl who represents the local district and most recently by Senators Schummer and Clinton, and I'd be happy to share that legislation with anybody that would be interested in seeing that.

I want to say thank you for everybody coming. There was a tour people attended yesterday and got a good look at the site that was really terrific. And I appreciate you holding this meeting right here in Western New York. Thank you very much. If you have any questions I'd be glad to answer them.

DR. CLARKE: Thank you, Paul. Any others?

At this point let's open it up to questions. Dr. Ryan?

CHAIRMAN RYAN: None at this time, go ahead.

DR. CLARKE: Allen?

MR. CROFF: Yes, I'm a little bit uncertain about how the decommissioning criteria fit into the EIS; and that is, you've said that NRC will prescribe decommissioning criteria, amongst other things, and has done so, but is DOE obligated to use those entirely? I mean do they have the authority to say, well, we'll modify this, maybe we won't or to interpret them differently or to have an alternate set? What obligates them to use them as a decision basis?

MR. GLENN: Well, the West Valley Demonstration Project, whatever obligation that I'm aware of comes directly from the West Valley Demonstration Project Act which requires, I think it's -- which requires DOE to decommission D and E facilities that they've used in accordance with any criteria NRC may prescribe. And so the Commission Policy Statement represents those criteria that are called out for in the West Valley Demonstration Project Act.

MR. CROFF: Okay.

MR. GLENN: That's the best I can do on that question.

MR. CROFF: Second question: You mentioned LTR criteria applied to high-level waste or facilities where high-level waste is being used. Do those criteria not apply to the, say, low-level waste burial ground or some places that don't have high levels?

MR. GLENN: The LTR criteria applies to all the usual waste of the site. As Paul Pachulo mentioned, there's a state-licensed disposal facility on the West Valley site that is not part of the West Valley licensed site. But apart from the SDA, state-licensed disposal area, the LTR is the criteria that applies for all residual contamination at the site.

MR. CROFF: Thanks.

DR. WEINER: Thank you, I just have one question for Chad and one for Mr. Pachulo. Doesn't NRC have some responsibility for transportation packaging since a great deal of this material is being moved off site to other places, don't you have responsibility under Part 71?

MR. GLENN: I think DOE may have a better response to that than I do, but I do know that our responsibilities, in part have, we have reviewed transportation packages that, our spent fuel office has reviewed and issued compliance demonstrations for the transportation packages of spent fuel containers when they have hauled spent fuel from the site to some other location. So we have been involved in the review of those transportation packages, but I think the Department of Transportation is the primary need for those transport high-level waste, as far as I know, but I could be -- I'll defer to DOE and others on that.

DR. WEINER: How about for packaging the low-level waste that goes off site?

MR. GLENN: Likewise, I think DOE is primarily responsible for packaging the low-level waste for whatever destination that waste is going to; whether it's a DOE disposal facility or Envira Care or wherever the waste is destined to.

DR. WEINER: You don't certify Type A packages, you just certify Type B packages; is that correct?

MR. GLENN: I'm not an authority on the certification process so I'm going to have to get back to you on that, if that's okay.

DR. WEINER: Okay. Thank you. I do have a question for Mr. Pachulo. Are there any purely technical disagreements that you have with DOE, not responsibility agreement, not questions of responsibility but purely technical questions how something is being done or what is going to be done; are there disagreements in that area?

MR. PACHULO: There are a number of technical issues that we're following very closely through the Environmental Impact Statement in making our comments to be sure that, you know, they're addressed in a very scientific manner. We've done that over the years, we've provided comments to DOE on various technical activities. But under the Demonstration Project Act, they have the sole responsibility to implement the project the way they do so that's, again, one reason why we're very happy the body of ACNW is taking a close look at what's going on because it's very important the closure of the site is done in a very technically sound manner.

MR. HINZE: Chad, can I ask you, referring to your Slide 5 of the statutory responsibilities of the NRC, your first bullet talks about NRC participating as a cooperating agency in the decommissioning EIS. Could you expand a bit on what your view of what the cooperating means in terms of the role of the NRC in the EIS?

MR. GLENN: Okay. I think what the policy says is that we're a cooperating agency because of our involvement in providing the decommissioning criteria. So the EIS has to evaluate the impact of applying the License Termination Rule to the decommissioning alternatives at this site. So we're reviewing, as part of our cooperating agency responsibilities with other cooperating agencies, how the criteria are being applied across all the alternatives.

MR. HINZE: What is the depth of your investigation or involvement in the EIS; is it simply looking at it from the LTR criteria?

MR. GLENN: No, it's not just the LTR criteria. We're looking across all the disciplines, across the full range of the EIS because ultimately we have to adopt this EIS or supplement it so if -- so we're looking at it from A to Z. Everything that's supposed to be in an EIS, we're making sure that we believe it's there.

MR. HINZE: That's what I wanted to hear. Thank you very much.

DR. CLARKE: Okay. Let's turn to our experts. Dr. Parker?

DR. PARKER: I'd like to follow up a little bit on that previous question. Could you tell us in practical terms what the difference is between consultation, cooperation and regulatory authorities.

MR. GLENN: In terms of the Environmental Policy Act or all the statutory responsibilities?

DR. PARKER: Here in West Valley all three are mentioned at different times in your papers.

MR. GLENN: Okay. Well, in terms of the informal review and consultation, when the -- that comes out of the West Valley Demonstration Project Act. Congress apparently did not want us to regulate DOE so we interpret that word informal review and consultation can mean something other than a regulatory relationship with DOE here. So we review and have reviewed EISs, other documents, we provide advice to DOE, but we're not reuglating DOE. So DOE, this advice spans EIS, it -- we also review WEIR, we will be reviewing WEIRs terminations. So there's a whole range of plans or activities that DOE is involved in and could consult with us and we provide advice. That advice is usually in the form of comments, letters. Under the West Valley Demonstration Project Act we monitor, we meet with DOE on different topics. NRC Region 1 conducts monitoring visits, we call them monitoring visits because they're not a licensee. They visit the site on several occasions throughout the year, and it's kind of like an inspection but it's not an inspection. It's to monitor DOE project activities from the standpoint of public health and safety. Does that help answer your question?

DR. PARKER: If I understand you correctly, that means if they chose to, DOE could ignore what you have to say?

MR. GLENN: I believe that's correct. But I don't think that -- there's no indication that we've gotten that reception in the past and I don't think that's what we expect to see in the future.

DR. PARKER: One more question?

DR. CLARKE: Sure.

DR. PARKER: In the LTR you allow exemptions. In 3116 there are no exemptions mentioned. Can you clarify how you would handle them differently then.

MR. GLENN: The exemption -- I'm not sure what the number refers to.

DR. PARKER: That's the act that looks at the remainder of waste in tanks at the three major sites Hanford Flats, Savanah River and Idaho.

MR. GLENN: I'm going to let Neal Jensen answer that. Neal's from our office of general counsel.

MR. JENSEN: As you just indicated, Section 3116 applies to the waste determinations that might be made by the Department of Energy, but it only applies in South Carolina and Idaho, and it would not apply in New York.

DR. PARKER: So they would actually be regulated to different standards.

MR. JENSEN: The West Valley project would be regulated -- well, it wouldn't be regulated. The waste incidental to the processing criteria was placed in the Commission's policy statement so that those criteria which appear in the policy statement are the criteria that the NRC would expect DOE to use.

DR. PARKER: Since I'm not a lawyer, if I understand you correctly, there are differences.

MR. JENSEN: Yes.

DR. PARKER: Thank you.

DR. NAUMAN: Just a few questions. My issue is with the SDA. Is it covered under the LTR for the site as a whole or not?

MR. GLENN: It's, the Commission's policy statement says that we will cooperate with the state of New York in applying the LTR in a manner that's consistent. But the LTR -- I mean the LTR does not apply specifically to the state-licensed disposal area simply because the state-licensed disposal area is not part of the NRC-licensed site. So the LTR is not, whatever the criteria that are the decommissioning criteria for the state-licensed disposal area may or may not be -- the LTR may or may not apply. But the Commission said to consult and coordinate in the application, consult with the state and coordinate with the state in the application of the LTR to the state-licensed disposal area. And at this point in time I don't think there has been, that consultation hasn't been completed so we don't know what is going to happen with respect to the state-licensed disposal area and the LTR.

I think maybe one thing that I could add to that is that whatever the dose impact relative to the state-licensed disposal area, they would not be controlling in terms of the termination relative to the rest of the site to meeting the LTR.

DR. NAUMAN: Okay. I'm sure we'll find out more about that as we go through today.

The NDA would be covered under the License Termination Rule then?

MR. GLENN: Correct.

DR. KOCHER: It was just hypothesized when DOE reaches decision on how they want to decontaminate a Commission site, they put out an EIS, what they see as the final end state of the 200 acres they are responsible for. Let's suppose the NRC or the state or the public, you know, has some points of disagreement about wehther they comply with the License Termination Rule or not. It's conceivable it could happen. So my question is what mechanisms do people have to register their disagreements, if any, in some kind of formal way? Is this through the EIS process? Would the commissioners write letters to the secretary of energy? How might this play out over time? What recourse do other people have if they don't agree with DOE's decisions.

MR. GLENN: The EIS, DOE's, Department of Energy and NYSERDA's EIS, it's a joint EIS. And as any EIS, it will be issued in draft form for public comment, and I think they have a fairly long comment period planned for this EIS. And I think there'll be, it looks to me like there will be ample opportunity for the public or stakeholders to provide comments on the draft EIS when it's published. I think DOE and NYSERDA also may have additional information they'll want to offer on this, but that's my understanding of this document.

There is also a decommissioning plan that will follow the EIS and the decommissioning plan that will also, DOE would submit a decommissioning plan to NRC for review and we would also put that decommissioning plan out for, you know, federal register for public comments so folks would have an opportunity to comment on that as well.

DR. CLARKE: Okay. Any questions? Chad, thank you.

David Esh from the NRC will now give us a presentation on the models and methodology that they will use, are using in their performance assessment.

MR. JACKSON: My name's T. J. Jackson, I'm with the Department of Energy here at West Valley. I'm the deputy director, just wanted to cover very quickly the role and responsibilities for DOE as well. I apologize, I thought we were going to do it similarly --

DR. CLARKE: I'm sorry.

MR. JACKSON: Basically the roles and responsibilities for the Department of Energy are primarily defined by the West Valley Project Demonstration Act, so you've heard a little bit about that from both Chad and Dr. Pachulo today, but just to kind of hit those things very quickly the Act has very specific things that the department is supposed to do at the West Valley Demonstration Project. Just very quickly, those five things were to develop the containers we were going to use to put the high-level waste in. The demonstration project itself was to demonstrate that we could safely solidify that high-level waste such that we could transport and dispose in a federal depository. Disposal of the low-level waste and transuranic waste that was generated during the conduct of the project. The decontamination and decommissioning of the project facility that DOE used during the project. And then ultimately the last thing was going to be to transport the waste to a repository.

So there are a couple other documents out there that define roles and responsibilities, the cooperative agreement as Dr. Pachula discussed basically did a lot of things, but ultimately defined the exclusive use of the 200 acres approximately that is used for the demonstration project. And ultimately at the end of the completion of the Act, DOE is to facilitate the licensing activities between New York State and NRC as we turn back over.

I think a couple of questions that I heard you ask maybe I can help out a little bit with. Because when DOE came in and took over the project when the license and the tech specs were put in abeyance, DOE's systems were, DOE orders, our management systems were basically used and have been used in the twenty-some years that the project has been executed and so very formal processes. We have safety analysis reports that NRC has reviewed. We have safety evaluation reports written by the NRC for our safety analysis reports. Their focus, as Chad was saying, on public safety and health. DOE supplements those safety analysis reports basically looking at worker safety and the environment on the project. So, again, there are very formal processes that we conduct the project under. The monitoring visits that NRC does from region one, they come up I want to say approximately quarterly. Do we have the ability to disagree with the NRC monitor? I guess we do. We never have. We get monitoring reports, we take that advice and consultation very seriously. If the monitor sees things that are not going to according to his views, we take that very seriously and we go correct those.

So, trying to think what else we -- we also have an NRC memorandum of understanding that defines our roles and so, again, I think over the years -- and I will say NRC has stepped up its participation and oversight when we have gotten into very critical stages of the project, such as when we were starting up the vitrification facility, we had NRC monitors almost on a monthly basis and very involved in the review of the design, the process, the way we were going to solidify the high-level waste. And, again, that's continued as we have also, just a couple of years ago we shipped spent fuel from the project and that was an NRC-licensed container that, the two casts that we shipped the spent fuel in and NRC does on the Type B cast they provide certification for that. Class A, that is our responsibility and we also work under the Department of Transportation requirements for those. And we also have other various permits. And basically we are responsible for the safe operation of that site, so we work with the Department of Environmental Conservation with RICRA issues and how we're going to close a facility under RICRA as well as things we're going to close under the West Valley Demonstration Project Act. You're going to hear a lot of information today and tomorrow, I believe, about where we believe we're going. We're into the environmental impact process and evaluation of a range of alternatives, and so decisions have not been made in the interim. And I think I talk about this this afternoon, I'll give you some status of where we are with various activities that we're doing as far as shipping low-level waste off site reducing the rest of the project in the interim while final decisions are being made. Hopefully I'll answer some of those questions this afternoon, but I'll take any questions that you have now.

DR. WEINER: I just had one question T. J., since you mentioned SARs. Can you give us some idea of how, the history of your safety analysis reports; were they always on target? Did you violate some of the subs? Have they gotten better over the years, same over the years? Just some general idea.

MR. JACKSON: The process has evolved. I believe when I first arrived here back in '93 we had, I want to say seven or eight different modules to our safety analysis, very system oriented so when we brought a new system on line, we evaluated all of the impacts, all of the operations and the end results that were going to go into operating that process. As we progressed, and again I think I might talk about this a little later on today, but as we processed say the supernatant off the high-level waste tank there was an analysis done for that facility. As we brought the vitrification facility on line, there was a specific module for evaluating that facility, that operation, that process. Where we are now is we have more of a site-wide safety analysis, and I again I think some of that has improved and gotten streamlined because we're not as complicated as we used to be because of a lot of the most critical operations are complete. The major activities are now going in and disassembling whatever systems we put in to process the waste over the years. And so I would say again we probably have a more general safety analysis now than the more system specific activities that we analyzed back through the years. Have we gotten outside of our safety analysis, no, not to my knowledge. They've done a very good job, we have a very rigorous unreviewed safety question process that we go through whenever things are, designs change, whenever there are discoveries of issues where, again, we have trained safety analysts that look at each of those identified activities and run those through up against our safety analysis to know whether or not we've gone outside the line and to my knowledge we have not had a positive USD on those.

DR. CLARKE: We really need to keep moving, Bill. Can you save that for the round table?

MR. HINZE: Sure.

DR. CLARKE: T. J., thank you for coming up. I'm sorry we missed you the first time.

MR. ESH: I'm pleased to be here. I hope I can meet your goal of volume, but you're going to be on your own in terms of clarity, I'm afraid. I'm here to talk about our methods and models for NRC's performance assessment at the West Valley Demonstration Project. And some of you may not have been aware of what we're doing, so we look at this as kind of a first initiation into our work, and I'll try to make it clear what our objectives are for our work because I think it influences how we go about it. I'd like to acknowledge the contributors to this work. Christian Ridge, Cynthia Barr, Karen Pinkston, Shaniqua Walker, Anita Turner, John Peckenpaugh, Chris McKenney and Mark Thaggard. They're a very talented group, and I'm pleased to have them helping with this effort.

Next slide, please. As a presentation outline, I'm going to talk about the regulatory framework for performance assessment. I think that's important to put it into the proper context, but I do realize we're going from roles and responsibilities at the West Valley Demonstration Project to performance assessments. That's a pretty abrupt change, so I'll try to transition us a little bit. The performance assessment is going to be used to develop the risks of the material left on site, and those risks then will be factored into the decommissioning process in terms of how much cleanup is needed and also into the EIS decisions related to the environmental impact. So performance assessment plays a key role at this site, and as I'll indicate a little bit down the road here there's a few aspects of West Valley that make performance assessments play even a larger reason than what it might at some similar sites. I'm going to cover the objective for our PA. The overview for our PA going through some of the methods and models. That's a very daunting task in a half an hour and I'm only going to be able to skim the surface, but if you have further questions, I know we're kind of set up here with my back turned to the audience, but we're an open agency, if you have questions, my contact information is on the first slide feel free to e-mail or call with questions that you have. And we do have future plans, right now we're at what I would call a beta version, it's undergoing verification and sensitivity testing. And based on the results of that process, we'll modify the model as needed. And then I hope to give you a brief visual demonstration of the model, I think that will help you understand what we're doing and that will put things in the proper perspective.

Next slide, please. The regulatory framework for the PA as Chad Glen mentioned basically the PA dose estimates must satisfy the requirements of 10 CFR Part 20, Subpart E, of the LTR. The LTR has really two main provisions. For unrestricted release, which basically no controls or maintenance, and you have to meet a 25 millirem anual public dose limit. And then for restricted release you can get credit for the institutional controls that may limit use of the site and provide for the maintenance and monitoring, especially for engineered barriers. You have to meet a 25 millirem annual limit with those controls in place and with that monitoring and maintenance occurring, but then you also have to perform an analysis assuming that the controls fail that you can meet 100 millirem annual public dose limit. Whenever you perform the analysis when the controls fail, you also have to assume that you can no longer have the monitoring and maintenance done. But the performance of your engineered barriers are dependent on the monitoring and maintenance, and then they evolve as you would naturally expect them to without monitoring and maintenance analysis.

Next slide, please. The objectives for our performance assessment is, the primary objective is this is an internal review tool, and we'll use it to identify risk significant issues, explore parameter and model uncertainties and hopefully perform a risk-informed review of DOE's performance assessment.

Review of one of these performance assessments can be a challenge, it's a lot of information, there's a lot of complicated things going on and one of the best ways to review something like that is to do some of the work yourself. It helps you learn what questions you need to ask. So that's our main objective for this model. We intend to base our decisions in the EIS and decommissioning on DOE's PA model results. But I believe, as Chad mentioned, or a question from the committee, there may be a circumstance where we reach agreement on something. And if we don't reach agreement on something and we have an area where we aren't able to reach a consensus on, we may have to rely on our own calculations or our own analysis. That raises the bar substantially for us in terms of documentation and verification and all the activities you would need to do to make it a public process. So if it's an internal review tool, that gives us one standard. If it's an external product that we're basing a decision on then that gives us another standard in terms of what we need to do for the performance assessment.

For our internal review tool this model must be flexible and easily modified because we learn as we go along, I think on a couple slides coming up I'll talk a little bit about the history of where we started and where we are. And we learn new things as the EIS alternatives for the site change and information about the site changes, so we can't have a tool and a construct that we aren't able to react to those changes easily.

Next slide, please. This is just a photograph of the site looking south. The south plateau in the background and the north plateau's in the foreground. It shows all the main facilities. Those of you that were on the tour yesterday, the only reason I put this here is to provide you a perspective of the site and understand what it looks like, all the new facilities. It is separated into these two geologic plateaus and two acquifers systems really that have different implications for dose assessments. There's the north plateau in the foreground. There's a higher likelihood that the water may be able to be used for domestic purposes than the south plateau.

Next slide, please. As an overview, as I just mentioned, it's separated into two plateaus. The receptor considerations may be different for the different waste management areas based on the availability of water. The two last points are the real important points here. The site experiences relatively high rates of erosion. Paul Bemia of NYSERDA and Dan Sullivan of DOE were kind enough to allow us to come up a couple weeks ago and have what's called the extended erosion tour where we hiked in the stream channels and through the gullies, and at one point almost scaled a fence to get across a ditch and we had the western New York weather of a cold storm come through that knocked out power and it hailed, but it was a good tour. And we took some of our experts, particularly in the erosion area, along and they were pretty impressed by the tour, and it also gave them a new perspective for the site. One of our erosion experts said the site is going to be very challenging to mitigate the effects of erosion and the cost may be very significant for a design. The last element here, engineered barriers, are expected to be used as part of the site decommissioning. That's also a challenge to predict the long-term performance of engineered barriers. It does look like they will play a key role in certain parts of the site.

Next slide, please. So as an overview for our model, I'm going to go through some of the highest level points here first and then talk about some of your specifics and sub-models. I hope to do that fairly quickly. I know we're already behind schedule. I don't think I'll be able to catch us up, but I do want to be able to show you a little bit of the model to give you some understanding of what we work with. The methodology that we employed in the PA is the level of detail that is appropriate for a review tool and consistent with the information available to support the model. The second point is a very important point. NRC's philosophy to perform its assessment is you're not really gaining anything besides creating additional efforts if you're going beyond the support you have available for your model. You can make a very complicated model but if you don't have anything constrain it and say it appropriately represents the site or reality, then you're not really helping yourself. So we like to keep things as simple as possible and consistent with the support for the model.

We use the software product GoldSim for this work, it's a visual probabilistic simulation environment and therefore our performance assessment is fully probabilistic. We can make anything in it as uncertain, stochastic as we want. The methodology and approach allow for a high degree of flexibility to modify the model.

Next slide. We began or, I should say I began development of this in August 2004. This was on a very part-time basis. Maybe between August 2004 and early 2005 there was a two or three month period where I devoted more than half my time to it, but other than it's an effort that we were trying to plan for the West Valley EIS coming in, and it was really a part-time effort. The current model has over 1,950 GoldSim elements, and eight levels of subcontainment. Hopefully that will make some sense to you when I show it to you in a little while here. It has over 700 stochastic elements to represent uncertainty. And our overall approach is to use a highly-abstracted, top-down type of approach with highly-uncertain representation of the system. We think this gives us what we need for a review tool. We keep it as simple as possible and we try to overestimate the uncertainty in things, so that when we do uncertainty analysis and sensitivity analysis, we can identify those areas that might need more refinement that would benefit from making a more complicated model. As I said before, we're currently undergoing verification and sensitivity studies for this internal version of the model.

Next slide, please. Because the model is visual, at this point we intend to use the model as documentation. I'll show you that also coming up here. We think that's sufficient for an internal review tool and eventually when we get to a version that we're comfortable with, it can be made publically available. It would have to be saved as what's called a player file which allows somebody in the public without a license to download the free player which is basically a viewer for the file, and they would be able to open the file and look at it. They wouldn't be able to run it or change it, but they would be able to look at it to see what was done. The goal is that this model would be fully transparent to a technically qualified independent reviewer. I'm sure my section leader chuckles at that because I think that's probably an overstatement and a difficult task. But performance assessments are complicated and there's no way around it and this site is complex which makes it worse. So our goal is to have it fully transparent, but it's not going to be easy, even if it is.

Integration between subject matter experts and PA analysts of course has been easy for us because up to this point in terms of building the model I was the team of subject matter experts and the team of PA analysts, so I hope that I've integrated with myself appropriately, but we have a team now that's doing this verification and sensitivity studies, and they do have expertise in a variety of subject areas, so it will take a little more effort to ensure that we get some consistency there.

Two features of GoldSim that I'd like to note that we think prevents common errors is it has an internal unit conversions that basically tells you when you're trying to do something that's not consistent from the dimensional standpoint of the unit. And that's a common mistake when you're making a complicated model. And also it allows for visual linking of information as you're building it so you won't inadvertently type in the wrong parameter name to link into an equation. You can visually hook things in as you're building it, and it helps to ensure that you don't make those types of mistakes.

The model currently contains 30 radionuclides including decay chains. That's based on DOE's previous analysis, and generally we've developed this model independently of DOE. We understand what they've done, but we go about it our own way, analyze the information in our own way, make our own models. But this is one area where we did rely on their previous analysis and our own professional judgment as to what radionuclides were likely to dominate the risk when applied to various scenarios. It is an area we think we might go back and reevaluate, if needed. But the whole performance assessment process is iterative, so if we see that under certain scenarios there's short liberated radionuclides that are causing a big risk, then we may go back and look at the whole list of short liberated radionuclides and see which ones might have behavior in the environment that would also maybe cause risks that we didn't include on the list. We don't expect to be surprised by that, but you never know.

Next slide. NRC model overview of our sources. We have six primary waste management areas. I know there are more waste managment areas than that, but we've selected the ones for representation in the model that we believe are likely to drive the risks at the site, and those are the high-level waste tanks, the process building, the lagoons, the strontium-90 plume, and the NDA and the SDA. The NDA and SDA are broken out into different disposal types because they have different depths for disposal and also geometries and they may have different implications for release rates and risks, so we represented all those disposal types explicitly.

As you're probably aware, these disposal areas received all sorts of different materials and different types of disposals. It's a very complicated system to try to represent in a model so we've, as I indicated, we use an abstractive approach and it may be fairly crude but we think it's appropriate for the type of analysis that we're doing in a review role.

Next slide, please. For our receptors in the model, we basically have a selector that the user can pick what type of receptor he wants to analyze. A resident, a farmer, an intruder well-driller that you can evaluate acute or chronic effects, and also a recreational intruder or receptor that can on site or off site. The receptor can be located any distance from the sources, the waste management areas, within physical constraints so you can't put them on the other side of the stream 1,000 meters away if the distance between the waste management area and the stream is only 500 meters. So there are some constraints where you can locate them, but you can look at the impact of where the receptors are located. And the user can set the institutional control and intruder periods so that gets to the restricted release component, you can evaluate different alternatives under restricted release.

Next slide, please. In terms of our submodels, we develop different submodels for waste release, transport through the vadose or unsaturated zone, transport through the saturated zone, and calculation of the concentrations in environmental media to which the receptors would be exposed.

The exposure pathways depend on both the source and the receptor location. I've listed some of the pathways we have included here, of course, it varies, as I said, by source and receptor. But we put things in like typical pathways of water ingestion, soil ingestion, and plant ingestion. And then also for some of the recreational scenarios fish ingestion, also deer ingestion.

Next slide, please. Our release submodel includes the ability to represent temporal effects on infiltration as a result of maybe the presence of engineered barriers or an infiltration diverting cap. The radionuclides are partitioned between the waste, soil, water and air and can be transported by diffusion or advection. And then we also allow different distribution coefficients and solubilities to be defined for each waste management area. And that can be important because some of the radionuclides could be sensitive to the geochemistry of the system and also the geologic material type that may be there. The failure of engineered barriers as well as maybe binding of the waste in some sort of matrix are also included in the release submodel where needed.

Next slide, please. Transport through the vadose zone, we represent that as a series of one-dimensional cells. I'll talk about that in a little bit. You know, you might be thinking, well, these are in some cases big three-dimensional or at least two-dimensional waste management areas or systems so how are you representing that with a one-dimensional series of cells. We did some GIS modeling to develop what we thought the uncertainty distribution in both where the waste is located, so what it's saturation may be, and then also the transport distance through, say, the vadose zone may be from a given waste management area. So the approach we're really taking is to convert real variability in the system into uncertainty and represent that as a probability distribution. Then when we go through our analysis if we find, well, that's a key parameter that's influencing the releases from that waste management area, maybe we'll go back and try to make a two-dimensional representation, like a two-dimensional plan view of the waste management area. Similar to the waste release submodel, the vadose zone submodel we have partitioning between the different environmental media. You can use different Kd's and solubilities. And as I said, the uncertainty in the degree of saturation is included and we use this variable vadose zone thickness.

Next slide, please. The transport through the saturated zone is represented by one-dimensional pipe elements, and we did the same thing here with the GIS model that we devolped and 3-D geologic model is to develop a probability distribution for transport length from the source to the surface water body. It also includes some of those waste management areas. Part of it will flow in one direction and part of it will flow in another direction, so we have a partitioning or fractioning between the different areas of the source to the different streams. I'll show you that in a minute here, it'll make more sense to you. We have the main processes; dispersion, advection, decay and sorption are all included in these transport models.

Next slide, please. For dose modeling, we basically take these environmental concentrations in water, air and soil that are generated in a garden and a field environment that are potentially irrigated with contaminated water, and pathway dose conversion factors are developed on a receptor and radionuclide basis that are then used to calculate the TEDE, total effective dose equivelant, as the product of the pathway dose conversion factors and concentration source estimate.

The dose modeling can be challenging. We have all the main pathways we believe. You can add a lot more pathways and get a lot more complicated, but we feel what we have is probably sufficient for a review tool, it gives us an indication of what dominates. It looks to us like the groundwater consumption that's occurring is one of the dominant pathways for most of the protection of the public type of analysis.

Let's switch over, I'll sit here and give you a visual demonstration of the model for a few minutes. When you pop it up this is what you get, this is basically the platform for GoldSim. In this case, we've taken a picture of the site and put it in the background here to provide some context. And I should say for people that are reading this transcript in the future, this might not make too much sense.

We have the packages here that are ways to organize material in the model, and it's been separated into pop-up areas that I'll show you here. When I talked about documenting things in the model, we've used this feature where you can put basically links to other files in the model so I can double click on this, and hopefully it comes up. There's a picture of the NDA there from one of DOE's reports. So if one of my staff members is working on this model and they don't understand a lot about the NDA, hopefully we could put a link in there that'll pop up the report or a section of the report that they can look at and understand what's going on with that.

And I mentioned the GIS modeling, that's the work I did with Allen Gross at the NRC. This work was basically we took information from DOE that had a lot of data and GIS data, and then basically reanalyzed that and developed a 3-D geologic model for the site, and we used that to develop tables of information, the various thicknesses of the hydrologic units at different areas, and also we used it to develop this figure here, figure one, which was an estimate of the flow paths of the various waste management areas through the surface water bodies. So as I had mentioned when we were trying to figure out how to represent this, say, two-dimensional or three-dimensional NDA waste management area in the model, there's a lot of effort involved with trying to make a, say a 3-D model or even a 2-D model of this waste management area and representing it in a performance assessment. As it is, this model runs, if we're performing a stochastic analysis, it might run 250 realizations in about fifteen minutes or so. If we went and we made this within an area into two- or three-dimensions with say 100 or 500 elements, we'd be looking at a significant computational burden to run that analysis. So we have to try to balance that needing complexity in the model with being able to use it as a review tool. What this shows is, say, that in the 3-D geologic model and GIS analysis that a certain fraction of this waste management area may flow to this section of the surface water body, and the other fraction may flow to this surface water body. So when we abstracted it in a performance assessment, that's what we did, we basically made an uncertainty sampler that would send part of the waste management area with this flow path in the analysis a fraction of the time and part of the waste management area to other surface water bodies a fraction of the time. So we've put in these various descriptors and things to hopefully have it make sense to somebody that's using it.

Then the model itself is all contained within the packages -- oh, one other thing first; reviewer comments. After I made what I would consider maybe a pre-beta version of the model, we had some of our staff on my first slide review it, and they submitted comments to me. And I basically gave a response and modified the model. The text here is small intentionally so you can't read whatever they said, Dave, what are you doing here, you're an idiot. This is a comment from Christian Ridge and it had to do with solubility limits and the changes I made. This was a way to document where we were and where we're going, the comments that we got and the changes we made to the model.

If we go back here, you can browse the model through the visual pane here on the left and then there's also this tree -- or on the right, and there's a tree structure on the left. When I'm talking about subcontainment, each time I branch one of these out, that's a different level of subcontainment. So in this case to get from the root of the model down to the final ending branch, there's a lot of linkage that's going on here or a lot of levels to the model. That's just ways of organizing your models to hopefully make sense to somebody that's looking at it.

The highest level are these main packages. I'll show you maybe the simulation settings here. One thing I talked about is that you can specify the receptors. So in this case you have a data element so you can choose what type of receptor you want to run; farmer, resident. So these are in there and then they change from 2 to 1 if they want to run farmer instead of resident. And that changes the receptor you're going to run. And then we also have the ability to look at different waste management areas so if you want to run the high-level waste tanks, the lagoons, etc. Or you can run all of them for one plateau and all of them for the other plateau. But it's a way of being able to perform different analyses.

In this simulation package we also have some technical triggers so there's question about like, well, are the solubilities what you think they are or are the Kd's what you think they. In these things we've built in the ability to turn them on and off. So you can have sorption in the waste area, you can turn them off and see how does that change your results without sorption. It's a good way to analyze what's going on with your model and see what things are really driving the limitation of the risks or driving the risks themselves. So we put in a lot of, I call this, like, conceptual model uncertainty in this manner. We didn't ignore conceptual model uncertainty. We realized that our strategy in some cases was fairly simple, so wanted to be able to look at the implications of some of these other higher order complexities. As you see, though, as I'm over here browsing the model that if you have the file you could go through and generally get an understanding of what's being done, it's expanding the tree over here on the side and it can get pretty complicated. It's not easy to understand if you don't have some training in GoldSim.

The materials container here, as I talked about, we can specify different solubilities per waste management area, and for all these different material types you can specify different Kd's for the different material types. For the high-level waste tanks there was a question about whether reducing ground would be used to help limit the magnesium and maybe even neptunium releases or not. We weren't sure what was going to be found, so we have both in here and the user can just set whether you're reducing Kd's or oxidizing Kd's. So hopefully there's a lot of flexibility in here we can analyze a lot of different situations in the model.

Maybe I'll just show you a little bit more. Waste management areas might be of some interest to you. When I talked about documenting things in the model, you can put notes in here and explain what's being done in this part. You're only limited by your time and effort to how well you want to document things within the file. We put notes in here to explain what's being done in different areas. And then say within one of these areas, file of waste tanks, there's three subpackages; infiltration which we just right now have a simple cap representation that limits infiltration. If the cap is there, it's limiting infiltration. Then it can fail at a certain time and increase by whatever rate you want. We don't, in general, have not put process models in here for that sort of thing just because we didn't have the information for it nor did we have the effort to do that sort of activity. If we have to in the future, we can but we keep it as simple as we need at this point.

The source term, we do some basic GoldSim elements like a source element which provides for different inventories you can put different types of inventories, and you can put whether it's bound in a matrix or not as it's released from the waste area or whether it's freely available and mixed with the soil. And then you can specify different barriers, too. So in this case we have assumption about maybe this is a high-level waste tank, you're gonna have grout in there, and say the grout hydraulically is going to prevent releases for a period of time, then it's going to fail and you can get a higher infiltration rate. So conceptually that's what we're doing.

A lot of these waste management areas are somewhat the same once you get in them, besides the NDA and SDA which, in this case, we've broken them out into different disposal types. And there's, it's a little bit different in the representation of release, too, especially for the NDA there was some question about whether the disposal areas, you would have diffusion from them up to the WLT, whether you would have maybe a bathtubing type of process that goes on, as the precipitation cycles, it fills the waste area and you can potentially get it up to the weathered lavery till, WLT, and transport it laterally off the disposal area. Or whether you can get vertical transport from the waste management area through the clay. So we've tried to account for that by allowing the user to say, okay, what pathway do you want to analyze for this waste management area. And I'd be happy to spend some time at the end of the day if anybody wants to look at this in a little more detail. I think it gives you a little idea of the tool we use and how we go about using it. I can't really spend much more time going through it.

But those assessments, I'll show you that real briefly, it's fairly complicated. It gets complicated in a hurry. Here's a description of the different scenarios you can analyze. And you can provide most of the documents in here, too. I don't have this document on this computer, but when you get it all set up, you can provide links to the reference documents in here too. But in this case there's general calculations where we estimate environmental concentrations. You have to estimate them in the soil, the air, and the water for each area. And in this case for say the resident we have this representation of what's the concentration in a garden getting contaminated irrigated water. And the, let's see, we have the plant concentration ratios for food. This is done, it's a little bit tricky but it's basically a way of using the geometric means for different -- different based on the plant, the isotope and the plant type. Here we have all the different isotopes, then we have the different plant components, but you can specify different geometric mean for the soil-to-plant transfer factor. But then we wanted to use in this case the same geometric standard deviation for all those, we didn't want to just use constants for those. We had to do this little tricky thing here, this is something that if you didn't have GoldSim training, it would take you a while to figure out what it was doing. And then we used those conversion factors from FGR 11 and 12, and those are basically a factor of information.

So our verification process was to go through, check all the data. Then they're also going through essentially hand calculations where they can do them of these various model component and seeing that they can produce the values that the model produces, and we're performing sensitivity analysis. I use, it's a software product called NorWare (phonetic) that has genetic variable selection algorithms in it, and we use that to take the output of this model and run that on it, and basically we can identify the top sensitive parameters very clearly with that technique. So we intend to use that in the future, running it for each of these scenarios within probably the next month time frame. So we wanted to get through this verification type activity first to make sure we don't have any major errors in here, we're comfortable with the output. So let's go back to the presentation now.

As I said, this is still a beta version, it's still under development but we have some preliminary insights from it, and these might not be substantially different than what you would be able to say based on professional judgment looking at the sites, the sources, etc.

The Strontium-90 plume poses maybe the largest immediate risk impact for a North Plateau water user primarily because it's already in the water and it's fairly mobile and that clearly is, on a concentration basis, is fairly high. It's pretty clear to us that the high-level waste tanks will require a large amount of engineering or source removal in order to meet the performance objectives, and I think DOE as done calculations that would basically confirm that statement. And the groundwater, if not used on the South Plateau, it looks like the surface water systems that are surrounding the site dilute those releases quite a bit. There's a big difference at some sites between using groundwater and using surface water, even for a small stream, like you saw Frank's Creek you could step over it that provides for a lot of dilution if it's receiving a lot of its water -- not all of its water from the aquifer that's feeding it. And direct contact with the waste or residual contamination in the intruder scenario such as the well-driller scenario which is the only one we've put in here to date, that posed a significant challenge for any waste management areas, especially the disposal areas it seems like.

Our future plans are to complete this verification and sensitivity evaluations and modify the model as needed. And we are working on a separate assessment of erosion impact at the site. The model is already complicated as it is, and to overlay erosion on top of that with then variable thicknesses above the waste and when the waste might be exposed, and then turning on our assessment scenarios and changing how it may be released and transferred, it just seemed like it would be much too complex, it would be too complex for us to do and to review and be comfortable in the output and it would be too complex for somebody else to understand what was being done either. So we're going to do it separately as an off-line analysis. And that's partly why we had the tour of a few weeks ago to get more information on the erosion impact for our experts in that area who will be helping us in that effort. And we hope to develop risk insights to share with the reviewers of the PA to help risk-inform their review.

As a conclusion here, we expect this review, and it has been in the past, to be very difficult. The site is challenging and has a lot of complexity. We'll develop these insights from our modeling to help risk-inform, and we believe our model is highly flexible and reasonably represents uncertainty in both the parameters and the model. So therefore we're pretty comfortable with it as a review tool. As I had indicated, if we needed to move forward and say we got to a point where we didn't agree with something that DOE was producing and had to do our own analysis, then that's a whole 'nother level of effort in terms of documentation and clarification and all those other things. So I'll entertain any questions you may have.

DR. CLARKE: David, thank you very much for the presentation, it was very interesting. Dave?

DR. KOCHER: I'm collecting my thoughts.

DR. CLARKE: Tom.

DR. NAUMAN: David, I agree, very interesting presentation. Have you ever considered direct participation by the DOE and NYSERDA and DPC individuals to participate as subject matter experts in the development of your program?

MR. ESH: That's a very good question, and I think it's directly in line with what we did two weeks ago when we came up here. We've developed the model basically with the information sources that we had; i.e., documents, those sorts of things and DOE's results. But we felt that there's a lot of knowledge out there that's not represented on paper and even there's a lot of paper out there that is difficult to locate and access. So we thought, well, let's talk to the source on some of this information. We in particular had questions about the disposal technology of the NDA and the SDA; how the waste was disposed, depths, geometry, what it was contained in, those sorts of things. And so when we came up for the erosion tour a couple weeks ago, we spent the afternoon talking about those areas. They had spent some time to pull out relevant documents and sections of documents, both DOE or SAIC, the contractor for DOE, and NYSERDA, both groups have pulled out a lot of information for us to help revise or at least improve those areas of the model.

So, yeah, I think there's a great value to it. There's always -- up to this point this was a one-man internal effort. We're moving ahead, and I think there's a value to trying to do that going forward. We certainly are open to people reviewing it and giving us comments or at least I am. I don't know if my management would agree with that. We don't want to get caught up in the burden of responding to comments on our review tool, but that's all it is, it's just a review tool. If there's something that we can do to improve it or that might influence our review, we would want to know that. But we wouldn't want to spend an inordinate amount of time because it is a fairly complicated model and it is, I think it's a pretty easy thing to pick up, but that might just be me. Somebody without the training might ask a lot of questions that they wouldn't ask if they had the training. Similar to -- the way I look at this effort is we want to try to avoid asking questions in our review that we wouldn't ask if we hadn't done this activity. So we did this activity to try to ask better questions and less questions, not ask every questions we could think of. So we don't think we're doing a good job in our review if we just asked everything we could think of.

DR. NAUMAN: Well, that answers part of my question. My issue is any time you have a GoldSim type product, there's different opinions of the quality of that product or how it works and until you are trained on it, you really don't thoroughly understand it. And if the other individuals, the other parties that are involved like the DOE, NYSERDA and DPC, if they don't have that thorough understanding, then it leads to conflict later, my model's better than your model. And I think that's going to not serve the overall good if you can get -- I don't want to get into a group think scenario where everybody does the same thing, but I would recommend that you push for active participation and not just to get more information but participation and understanding by those other groups.

MR. ESH: Yeah, I understand, I think there's probably more benefit than there is detriment to that, but there is some of each.

DR. PARKER: I have a few questions. Let's start with how much material has actually been left in the tanks. What's the volume and what are the Becker L. quantities?

MR. ESH: I have curie quantities. It might be easier to even show you what's -- the amount of inventory that we have in there is based on DOE's waste characterization reports. The amount of material that's going to be left in the high-level waste tanks is a small volume on the bottom, a small layer. I don't know if it's -- maybe someone from DOE can comment.

UNIDENTIFIED SPEAKER: There's two main tanks, 8D-1 and 8D-2. 8D-1 is about an inch about 4,500 gallons. And 8D-2 has somewhere around 13, about 4,500 -- no, about five inches about 13,000 gallons. T. J. has that in his presentation is this afternoon. He's got better numbers and he can tell you the detail.

MR. ESH: I was going to tell you that the curie numbers are such that, curies can be misleading. There can be a lot of curies of, say, cesium 137 in there that provide very small risk because of the mobility of it and the short half-life, and generally it looks like ambresium 241, and therefore the neptunium 237, new lead (PH) 210, maybe a few of the uranium species, and also Technesium-99, those look like the more challenging ones for that element. So that there might only be 10 curies of Technesium-99, but it still causes a problem, just like the Strontium-90 plume was estimate that maybe the source of the Strontium-90 plume was only on the order of 500 curies that's in the groundwater and causing that plume now that's has caused a problem. The amount of Strontium-90 that might be in the tank residuals might be 20, 30,000, something like that, on the order of thousands. I don't remember the exact number.

The tanks have this bottom layer of fluid, but then they also have this ring around the annular region of the tank from heating of the tank and precipitation of the contents of the tank. And that ring of material has quite a bit of activity. I can show you the exact numbers if you want, they're in the vectors in the model there.

DR. PARKER: Second question then is: How well did your model predict the Strontium plume?

MR. ESH: Yeah, it's reasonably close. We looked at the groundwater concentrations and the arrival times that are being estimated from the model for the Strontium-90, and they're in reasonable agreement with the evolution of the Strontium-90 that you see in that acquifer right there. It's not exact and we didn't do a calibration exercise. We basically put in parameters -- a lot of our parameter distributions are, unless we have site specific information, they're generic distributions from a literature source, say, for Kd's we might use Shepard and Theebo (phonetic) that has a compilation for sand units, loam units, clay units, you know, and organic influence units. So when you're using the generic distributions, they tend to overestimate the uncertainty that may be experienced at the site if you had site specific information. Site specific information is always preferred, but if it's not available, we feel you have to use some fairly uncertain generic distribution to fully characterize the risk. In something like Strontium-90, the results are strongly dependent on the Kd as you can imagine. When the Kd is low you get a very high, fast transport and high Strontium-90 concentration. When the Kd is high, you get retention of it and much lower risk. The mean output agrees fairly well, but on either end of the calculation it might not agree very well because of that uncertain distribution.

DR. PARKER: That was going to be my last question, but I'll take that up now then. Since you have 750 units that are stochastic, meaning you're going to have a very wide range of variability or uncertainty, when you tell us that you're meeting the dose criteria, what percentile are you using?

MR. ESH: We in general will use -- remember, this is a review tool, so we'll use the peak of the mean output. The mean of the realizations usually ends up being, for a problem like this, maybe about the 90th percentile, maybe the 95th percentile. The dose response can be highly nonlinear, as you are probably well aware. So we use our regulatory output as the peak of the mean of the realization for the stochastic output. It ends up being a high percentile in most cases. I can't say exactly what it is.

DR. PARKER: My last question is: With very complicated geology, as you have here, and your choice of a one-dimensional model, as I can understand, can you tell us how well that represents the three-dimension flow?

MR. ESH: I think taken at first glance the one-dimensional representation does not represent the three-dimensional problem well at all. But when you think about it from a PA standpoint, we probably err on the side of overestimating the risk if we have to. So like, I'll try to step back and give you an example. If you have variable geology under a waste management area, you have a sand unit but then part of it sees a loam unit or something like that, that might have higher sorption, if we simplify it and represent it only as a sand unit, we're going to overestimating the risk from the part that sees the loam unit, of course. That's what I tried to convey with the GIS. In using the one-dimensional representation, we're not ignoring the variability in the site, we're representing it as uncertainty. We representing it in a different way. What we've done is we've taken the real variability and converting it into an uncertain distribution to allow us to use a one-dimensional representation. We're going to try going forward to do some analysis to show that that approach works fairly well for this project. And if we find that it doesn't, then we'll go back and we'll expand it and make it more complicated.

DR. KOCHER: Fairly minor question here. I wanted to be a little clearer about some of the definitions of your receptors. Are you assuming in some of these situations that a person is actually residing at the physical location, say, of the NDA, is living on top of that site and is drilling through the waste in that kind of situation, or are you putting someone at a boundary somewhere?

MR. ESH: That's a good question, and it's probably not simple to answer. For the North Plateau basically in the current version of the model, we assume that the North Plateau receptor, if controls fail or under the analysis of unrestricted release, they could reside on the North Plateau and they could use water. The user of the model determines the down gradient distance from the source that the receptor is residing. Typically we'll apply about a hundred meters buffer zone in that Part 61 type analysis. In a decommissioning analysis, they'll put the receptor anywhere in relation to the source depending on the site specific characteristics, etc. So we have the possibility of putting them anywhere, but they can reside on the plateau where the waste is.

For the South Plateau, we don't have the resident or the farmer using groundwater on the South Plateau currently in the model. We can change that if we need to, but it looked like the water availability was somewhat limited from our perspective. So they can live on the South Plateau, but they don't get exposed through drinking water. They can -- there was a concern by one of the agencies that somebody can build a dam on the streams and provide a water source to irrigate crops. So there's a trigger in the model somebody can dam up the stream and take water from the stream and use it to irrigate the crops, somebody could get exposed through a, say the vegetable consumption pathway in that scenario.

In all the waste management areas we evaluate the well-driller as somebody that can drill a well unknowingly through the waste management area as an intruder receptor. That's an intruder receptor though, not under the public scenario. So I don't know if I answered your question.

DR. KOCHER: That's getting close. The basic idea here is you're doing sort of a balancing act between allowable releases to some environmental medium and what's your exposure to radioactive material that has not moved, and it's kind of the latter scenarios I was interested in. Obviously it's different for the building where vitrification took place or reprocessing took place. But it's very conceivable they have this nice graded area out where the waste units are and it's high ground, I put my house on high ground whenever I can, and I'm going to be digging into the waste, that kind of thing, that has not moved.

MR. ESH: I believe in most cases, besides the alternative of no action, they are looking at some sort of capping or cover on a lot of the areas, especially the waste disposal areas. But we do look at depth to waste, and generally if the depth to waste is more than three meters, then we won't have a resident scenario for that area, unless there's residual soil contamination they can get some direct exposure to or pathways like that. But if the depth is less than three meters, then we would evaluate a resident scenario where they could build a house, exhume material and spread it on the land surface around the house. So it's dependent on the depth to waste, and that's one of the complexities with the erosion scenario is the erosion is changing that depth to waste. So it could change when a receptor is a valid type of analysis to perform at a given location at some time in the future. It gets very complicated when you throw in the erosion process.

DR. KOCHER: That's the answer I was looking for.

DR. CLARKE: Bill?

MR. HINZE: Dave, let me ask you, how long are you performing these assessment out to? And do you have the information to perform the assessments out to that period of time, are there any holes? And how are the uncertainties changing with time?

MR. ESH: Yeah, it's currently set up right now that we'll run it for 10,000 years usually. In decommissioning phase, the analyses are usually performed for 1,000 years remember, but I believe Chad had made a comment on one in the West Valley policy statement, it says something about considering longer impact to the EIS. I don't know if it says going out to peak impact or not. For the types of analyses that we've performed so far it looks like those peaks generally occur within 10,000 years depending on what you're assuming about the engineering, of course. That's the big uncertainty. The two biggest uncertainties for the longer-term impact that may increase or you would expect would increase, would be your ability to estimate the long-term performance of the engineered barriers over long periods of time, and your ability to assess the erosion impacts at the site over long periods of time.

MR. HINZE: Does that include climate then?

MR. ESH: We would consider climate. Usually in our performance assessment methodologies, we consider changes to climate from naturally induced, naturally-induced climate changes. We don't speculate about human-induced climate changes, but we consider the impact of natural climate cycles. For climate change, though, generally the approach is if you would expect an extreme occurrence, say, a glacier formation or something like that for climate change, we consider that if people are worried about a glacier and living where a glacier is, their exposure to radioactive material is probably the least of their concerns. So we generally will look at climate change as it may influence like erosion rates, infiltration, waste mobilization, that's how we consider climate change in our methodology.

MR. HINZE: You're looking at the effect of various engineered barriers, do you go beyond that to look at possible mitigating engineered barriers that might be put in, additional drains, more pumping, et cetera?

MR. ESH: We don't. Our approach is generally to evaluate the alternatives that DOE proposed, to understand them, to understand the uncertainty associated with them and the impact of that uncertainty, but we haven't gone as far as considering other alternative barriers that may mitigate impact, especially in the future. It is something that you could do, but it's probably more of a, instead of representing it in the model explicitly, using the model output to consider okay, well, here's the long-term impact, and what type of system maybe could I put in place to mitigate that impact. We generally don't do that, though.

DR. WEINER: I want to thank Dr. Parker and Dr. Kocher for asking some of my questions. Are you going to require that DOE use distributed inputs and use a probabilistic model.

MR. ESH: No, we can't require it. We can strongly recommend it. We can talk in detail about the implications of when you don't do that for a complicated site like this. But we can't require them to use a probabilistic approach. And generally we look at two approaches for a site like this. If you're going to use a deterministic approach, it has to be at least reasonably conservative, and maybe even decidedly conservative, to account for the uncertainties associated with it, or you can use a probabilistic approach. There's advantages and disadvantages of each. In terms of explaining the output to stakeholders and especially the public, it can be much easier to talk about a deterministic model, the number is the test. Then as you get into the probabilistic standpoint, and I answered Dr. Parker's question about what metric we use for probabilistic output and I said peak of the mean. A lot of people don't know what I'm talking about, but I'm pretty sure he did.

A long answer, we can't require them to do a certain approach, but we could recommend it and we can talk about the implications if you don't.

DR. WEINER: And I would assume those implications include the fact that you are using a probabilistic model and using the peak of the mean, if they are using a deterministic model and there are going to be some gaps in there.

MR. ESH: Yes.

DR. WEINER: In other words, it creates a problem for your review, does it not?

MR. ESH: Well, not a problem for our review. I think it helps us identify what parts of the deterministic model things, we may need to look more strongly at the parameter selections. And then also it can help us when looking at sensitivity analysis because the typical approach for sensitivity analysis for the deterministic model is to look at one parameter at a time and see, okay how much did it change the output. But you aren't fully capturing the impact of the uncertainty when you do that type of analysis for a model that has lots of uncertainties that can influence one another or can cause a combined effect of those uncertainties. So you may see limited dose impact for varying some Kd and then you see a limited dose impact for varying the groundwater flow rate, so if you have both probabilistic and the model behaves nonlinearly, well, lo and behold when both of them are sampled, one sampled low, one sampled high. All the sudden you get a big result in the risk sample. So that's the type of problem using the deterministic approach. We're well aware of it and we use our model to learn and then do a better review of DOE.

DR. WEINER: Does your model include some coupled parameters?

MR. ESH: Yeah, we use correlation between sampled parameters where we think we need them from a physical standpoint.

DR. WEINER: One final question. Is the backyard farmer scenario for the North Plateau realistic considering the erosion rates we saw yesterday?

MR. ESH: I don't know how realistic it is. There's a big impact on the dose results with what receptor you use and where he's located. We generally try to make reasonably conservative selections when it comes to receptors. If you have a gully and you have very steep slopes, we would generally believe that it's unlikely somebody is going to reside on those slopes. But if you have a gully forming on site and you have a big flat area that the gully is slicing into, remember there's this issue of the the temporal scales that we're dealing with. Somebody can farm and live on the order of thirty to fifty years where it may be 3,000 years that we're talking for this gully to form and encroach. So it can be challenging to put it into context in our minds when you're analyzing it what's reasonable and what's not reasonable. We would expect the receptors that are selected should be consistent with the regional practices and consider the topography of the site as it evolves and the rate of the evolution of the topography.

MR. CROFF: Do you consider the radionuclide inventory input to be stochastic or deterministic in nature?

MR. ESH: Right now it's just represented as deterministic vectors based on the reports that DOE has generated, but we intend to make them stochastic in the future because we reviewed the inventory reports and it looks like in some cases there's a fair degree of uncertainty in the inventory. Especially for the disposal areas, but maybe even for, say, the high-level waste tanks.

CHAIRMAN RYAN: David. You know, as you talk first of all, thanks for a fascinating insight and meeting the obligation to cover a world of stuff in a short period of time. As we break, I'll offer it as something maybe to think about; have you thought about the ultimate documentation goal of justifying things like there are six waste management areas. Why weren't there nine? You've decided at least for now on a deterministic source term you're heading towards maybe a probabilistic or at least a sampling view of a source term. You picked federal guidance, I'm going to guess you're treating those at the moment as fixed values. Are you going to sample those because of the geographic update infractions and so forth. And I know that's a big world where the entire project team of one person part time doing this, but it would be interesting as you go forward, I think, if you make a choice, to document the basis for that choice. Is that all going to be part of your documentation for your GoldSim modeling?

You don't have to answer that now,

but that might be a topic we could talk about at the round table a little later on this morning. I just wanted to plant that question in your mind because I think if you can get there and the decision making is transparent, then the model becomes powerful, you know, beyond just the calculation problem.

MR. ESH: I'll answer it briefly. I'm sure as we were looking at the model you probably felt like a hamster in a very cruel maze, but I think as I showed earlier, we had some area for documentation. There was one file called model description when the very first version even pre-beta was put together, I wrote up maybe five pages describing what was being done in the model. I think what we could do, depending on what we need to use it for, if it's an internal review tool, we'll document it a lot less as long as we understand it that's our main goal. But if we have to share it externally and it's being used for any sort of decision making, then all of that would have to be documented and we would have to decide whether we try to do it within the model providing links to documents that would explain why we have these six waste management areas or why are we doing the dose modeling this way. You could do that pretty easily in two or three pages here or there, four or five maybe, I don't know but you would provide all the linkage there. Or you could make one big report that describes it all, but I think if you try to make a report of a model like this, it makes it more difficult. I think if somebody can look at the model and link to the documentation, it's a lot more understandable.

CHAIRMAN RYAN: Again, I think after we hear from DOE and others in the afternoon, I think the closer you can get to having that need to have that documentation independent might be to everyone's advantage in the long run because it really gives the foundation for the conversation about why is my value different than your value and so forth. Just a thought.

DR. CLARKE: David, thank you. I have a few questions I'm going to reserve for the round table. I would ask the rest of you to do the same. We're scheduled for a fifteen minute break. Let's take it, and we'll resume at 10 to 11.

(RECESS TAKEN)

DR. CLARKE: Okay. Folks, let's resume. Thank you. We have been asked when using a microphone, please hold it closer.

Our next presentation is Joe Price from SAIC and will talk about the DOE's approach to modeling and methodology for their PA. Joe?

MR. PRICE: While we're waiting, I'll take just a minute to introduce people who helped me out. Our project manager's name is Jim Hammilman, he's a nuclear engineer, Ahmad Bahadir (phonetic) and Sandy Dodge (phonetic). Sandy's out in the Denver area and the rest of us are here from the Washington DC area. Excuse me, I'm a little bit hoarse, I apologize for that.

We have a couple of slides here that are introductory material before we get to the main body of the presentation. This first one tries to set the scene for what we want to talk about. We're going to give a little summary of our approach to long-term PA. We're going to introduce the techniques that we use, sometimes give examples of the type of results that are available from the calculations.

The next slide we give a summary of the order of the presentation. There are about seven topics. First we'll discuss the approach that we use for long-term PA. We'll give first level results from the types of scenarios analyzed. And we'll say something about the receptors. And the balance of the presentation will give some detail on analysis and results for groundwater release and integrated code for direct intruder.

On the next slide we state what our objectives are for the long-term PA. We want to have basis for estimating long-term health impact for all of the EIS alternatives. We want to be able to check our compliance with dose and risk standards. And we'd like to understand how the process works, how inventories, design features and the environment interact. Hopefully identify scenarios of the barriers and maybe also find out what can get you into trouble at West Valley.

On the next slide we start to edge through our seven steps. Upper-level statement of the approach is to develop and analyze the statement of scenarios, a set of scenarios that stands for the range of conditions you're going to see at the site. To do that we use mathematical models, and we can talk a little bit about selecting and developing models. In developing these models we have analytic requirements, the configuration of the environment, environmental pathways, et cetera. We want to have our codes be flexible enough that they can handle minor changes in the closure designs.

On the next slide we have a diagram of the seven steps that we apply to long-term PA. The first step is a developing a site conceptual model. A couple of examples of the type of information that goes into that, but those are just representative. Clearly geomorphology and other topic areas go into there. A site model, this sort of simplifies the site topography and environmental conditions that we use to help analyze the scenarios. The information that's used in developing this conceptual model is documented in what are called environmental information documents. They're said to be, approximately twenty.

Step two identify inventories of constituents of concern and engineered barriers. Estimates of inventory have been developed for both radionuclides and chemical constituents, and they're documented in what's called waste characterization reports. They form basis for analysis. The engineering designs are described and documented in what are called closure engineering reports. One of these is developed for each of the alternatives that we analyze.

Next box in step three, we look at our site conceptual model and we try to identify how groundwater and other media interact in such a way as to possibly move constituents to individuals.

Step four, we have layer demography over the site. Use regulatory guidance to help select receptors. Putting all those pieces together gets our exposure scenarios and we analyze those scenarios and characterize uncertainty.

On the next slide a quick summary of the guidance that we try to use when we do this analysis. Under NRC looking at guidance has come up with the NU Part 20 where we also look back at the Part 61 analysis. For EPA we look at their risk assessment guidance exposure factor handbooks they have OSWER directives on land use and how to go about doing the analysis on radionuclides. And of course we're cognizant of all DOE's guidance.

On the next slide we summarized results for the types of scenarios that we looked at. There are basically four different types. First is the residual contamination of surface soil. This is a scenario that would occur under alternative one and possibly in some areas under other alternatives in which the main source of contamination had been removed. That would be for pre-release areas.

Next scenario that we have is groundwater release to on-site and off-site receptors. This applies for stabilized facilities under alternative two, three, four. And we also do the same analysis for abandoned facilities under alternative five.

Next type of scenario we have is the erosion release scenario, they're ongoing processes at the site, so we look at this and see how waste from the area might affect intruders, this is off-site receptors and a single on-site receptor. And last is direct intrusion, and we try to do this consistent with past regulatory guidance and past practice.

Next slide is the upper-level description of the type of models we use. For residual contamination of surface soil we use a computerized program called RESRAD. We can use this code to calculate cleanup levels that we call CDLs, and we also use it to calculate unit dose risk factors that we use in analysis of the groundwater release scenarios.

For groundwater release scenarios we have developed project specific codes that we try to incorporate on a mechanistic basis the way the site environmental conditions and closure designs interact.

For erosion release, we do that in a two-step process. First we use what's called a landscape evolusion model to calculate how the site will change, site topography will change over time. That would be the first step. Second step, we have a site specific model to calculate the health impact of that change in topography, how that could affect release of waste.

For direct intrusion we basically are using Part 61 home construction and well-drilling intruders. Each of these involves a worker who contacts waste either in the process of digging the foundation for the home or in drilling a well, and they also initiate residential agricultural scenarios when the intruder removes some portion of the waste from the ground surface and spreads it on the land surface.

That's the introduction to the four types of scenarios. I should say a little bit about the receptors. We have four off-site receptors, let's start from the distant and come in. On Lake Erie we have receptors that reflect use of water from water intake systems from Niagara River and the eastern edge of Lake Erie. On the Cattaraugus Creek near the reservation of the Seneca Nation we have the American Indian receptor using surface water. And along Cattaraugus Creek near the site is where Buttermilk Creek intersects Cattaraugus Creek we have a receptor who is our nearest member of the public. For on-site receptors we have creek water user on Buttermilk Creek, and for each WMA we have intruder type receptors that are consistent with the barriers and the conditions of that site.

The next slide is a cartoon that introduces the concept used to analyze groundwater release scenarios. The three arrows to the left represent near-field flow through engineered in the vicinity of the waste. Little box waste form represents the, a release module from the waste. The larger box represents movement through the acquifer. And the well is an example of possible exposure route for receptors. The groundwater models have these four main modules that I'll talk about in a little more detail on the next slide.

Near-field flow module; we construct a node branch network based on the CER designs and configuration of the acquifers and we use these in sort of equivalent electrical network to calculate the flow rates around and through the waste form. So this portion of the model, which we'll see a little bit more in the next couple of slides, includes the tumulous, slurry wall, and the wasteform itself.

Wasteform release module. We have several designs for the different ways to do it, one of which I described as spacially distribute the values that we use to model impact to the North Plateau plume. Others are represented here as localized. We have a specific release model for the high-level waste tanks, for reflected geometry, and the distribution waste in that tank. And we have other basically partitioning limited models that we use to represent trenches and holes, stuff like that.

The groundwater transport module is a one-dimensional flow tube, include longitudinal dispersion, retardation and decay. The output of that calculation is concentration at a well or discharge to surface water. We felt that because of the nature of the West Valley site, we are closely reviewing receptors, we'll be integrating release from wasteform at the creeks, and we would have issues about how much of the plume does the well capture. And we decided the conservative approach of using a one-dimensional flow tube would be acceptable for this site.

In the human health impact module, we calculate the dose and the risk for radionuclides using FGR 11, 12 and 13, and chemicals using IRIS reference. In the health impact model for the groundwater scenarios, we have four types of sources; one is a drinking water well, one is surface water user, third is a combined drinking water and irrigation water well. Each of these, the surface water and drinking water irrigation wells have multiple exposure routes through the regular agriculture, fish consumption, deer consumption, et cetera.

The next slide gives some idea of the level of complexity that we try to capture. This is a picture of the closure design on the North Plateau, it shows a tumulous. One of the upper layers of the tumulous is a drainage layer that serves to divert water away from the waste. Below that is the central core of the tumulous or I call it conductivity clay layer that also serves to diminish infiltration. In the vicinity of the tanks, there's a unit called the sand and gravel unit that's transmissive. The excavation itself has a couple layers in it. Near the tank there's some compacted till. The rest of the excavation is filled with what's called unselected backfill. So we have in our near-field flow model nested parallel series of flow paths to take into account this level of complexity on the North Plateau.

Next slide shows how things work on the South Plateau. On the South plateau we again for the closure alternatives have a tumulus with the same type of drainage layer and upper clay layer. For the NDA we represent the two flow paths. The upper ten feet or so of the South Plateau is what is called weathered till and it's fairly transmissive, and water can move through that layer in a horizontal direction. So we run the model to calculate the horizontal release to the nearby creek. Also some water can move, only a portion of the waste would be exposed in that upper transport layer, so we also analyze a second vertical transport layer where water moving downward can move through the entire length of the wasteform and into a unit called Lacustrine and Kent recessional and flows over toward Buttermilk Creek. When we do that analysis we take account of the different depths of the waste; for example, the holes in which the hulls are buried are 55 feet deep, and the holes in which, in the process area, NFS process area, averages about 20 feet deep, and the WVDP areas down about 28 feet. The vertical downflow model has three segments; one of which represents weathered till, one of which represents this clear portion of what we call unweathered till, and the third piece represents movement through the unweathered lavery till below the waste.

The next slide shows another cartoon, if you will, representation of the things that take place when we model the tumulus. We take credit for the drainage layer and for a single clay layer from the central core of the tumulus. When we modeled horizontal flow through either the sand and gravel or the weathered till on the South Plateau, we take account of the French drain and slurry wall, and of the aquifer drains around that.

On the next slide tells a little bit about the type of results we get. And when we run the groundwater releases three types of cases; we do deterministic base cases, we do deterministic sensitivity analysis, and we do Monte-Carlo uncertainty analysis. For the deterministic base cases, the type of results we can get out of the model are the flow rates around and through the wasteforms, time series of mean dose risk, time series of hazardous risks, and we also report the impact by pathway nuclide for the year of peak impact. So all of that same information is available in the deterministic sensitivity analysis runs and we use those to try to figure out what are the most sensitivity parts of the closure systems.

Let's see, the next slide would give an example of a time series of dose because the dose here is rather low, this would be typically a off-site individual. The plot shows an early peak which is very common in the analysis we do, we see that typically carbon, iodine, generally technesiums produce this early peak. That peak is frequently followed by neptunium plateau, neptunium and uranium, and finally in the very long term we may see a plateau or a pulse coming through from plutonium. We can of course add all of these time series to calculate cumulative impacts for off-site individuals.

The next slide is an example of the type of time series we see when we compare risk from radionuclides to risk from chemicals. Typically risk from the radionuclides comes from a rate of eighty or a hundred higher than for the chemicals.

The next slide shows those time series of mean dose that Dave was talking about for the uncertainty analysis, and I'll quickly run through the steps of an uncertainty analysis so that you may see how it's different or similar to what David discussed. First step is review the site model and mathematical models and pick of all the variables that appear in those models those that you want to represent as random variables.

For our analysis we have picked the hydraulic conductivity and distribution coefficients for the aquifers. The hydraulic conductivity for the drainage layer, for the clay layer, for the tumulus, the hydraulic conductivity of the slurry walls in the tumulus closure designs, and the distribution coefficients for the different contituents in the wasteform. So we come up with in our current analysis about 67 random variables.

Once you've got that, you pick distribution probability for those, frequency of occurrence for those different variables. You draw samples from those distributions. You run the codes multiple times, and you plot for each of the facilities the time series of mean dose. You identify, you add them all up, identify the year of peak mean dose for the combined facilities and you take a look at that particular year and plot.

On the next page the doses from each of the realizations that contributed to that peak mean dose. One of the things we do with this is we compare our deterministic dose with this time series probabilistic dose, and generally we're above the 90th percentile with our deterministic results. The last thing that we do here is we want to try to get some sort of idea what are the sensitivity parameters using the correlation analysis that didn't come out real well. So in our uncertainty code, we input a dose threshhold for every year in which the dose threshold is exceeded, the dose by pathway, and the vector of random variables that gave that dose, so that we then can look at that and see which combinations of those random variables are coming up to give you that peak dose -- or those larger doses.

And I think this particular slide shows a result that is very standard will have the median, many, many small doses, the mean will probably show the 90th percentile, and basically the shape of the distribution is controlled by the whoppers that are happening up there in realization that don't occur very often. So that is the end of the discussion with the groundwater models.

The next slide talks about the SIBERIA landscape evolution model. As I said earlier, we do this erosion analysis in two steps. First step is calculate what the topography is going to look like in the future.

First two bullets in this slide tell us something about starting these calculations. The model represents the topography as a grid of nodes and elements. Associated with each of those nodes is a position and an elevation, that's input information. Also input information is average precipitation that will drive erosion through the model.

The next three bullets talk a bit about how the model works. First thing it does, it routes precipitation through the watershed using a rule that it's going to go in the direction of greater slope. Next feature of the model is sediment balance formed at each node. Transport to and from each of the nodes is represented as a function of each run-off and the slope at each point. The transport correlations are parallel functions of discharge and slope, so you have to calculate what those exponents are. In order to do that, we use short-term predictions that are generated using a model called WEPP, water erosion prediction product. There are many many variables that go into WEPP model, and we run this model for multiple -- storms of different magnitude. And we use a probabilistic approach to incorporate storms of all magnitude when we carry that infromation forward into use in SIBERIA.

For the erosion cases representing uncertainty using three cases which we call best estimate, favorable and unfavorable. And the specification of WEPP input parameters that drives the identity of these three cases was based on a sensitivity analysis that determined that vegetation cover is real variability, unreal variability, critical pure particle removal, or sensitivity variable. And so we then picked unfavorable, best estimate and favorable values for each of those, run WEPP and use that to generate the calibrations as used in SIBERIA.

When we run SIBERIA, we get two types of results. The first is the elevation of each of the nodes in the system. Each place in our study area has a function in time. Second output that we get out of this is we can draw transects through different areas, and we use the shape of those transects to select the receptor location. And what we have found is that when you get into the waste areas, the slope is great and, therefore, we have analyzed for creek water receptors and an on-site recreational receptor but not for an intruder. We're making the claim that because the slope of the area is high, somebody's not going to try to build their house in this developing creek bed waters.

The next two slides speak to the second element of the analysis that is calculated how much human health impact would get out of this. Actually if you would jump to the cartoon, we could probably do that first. This is how we represent the effects of erosion. The specification and problem is we have this rectangular prism that contains the waste, specify the inventory of the waste, the elevation of the top and the bottom of the waste, but also the elevation to the ground surface. So what happens is the erosion moves the ground surface downward towards these cells containing a waste inventory. When ground surface infiltrates the top of the cells containing the waste, waste is removed and deposited in the creek. That is summerized actually on the preceding page. As I said, that last human health impact module is the same as the groundwater module in terms of the pathways that it analyzed, it was for a surface water user.

All right. What we get out of the

human health impact analysis for erosion, we look at the best estimate in deterministic cases, and there's three sensitivity cases that we try to use to balance uncertainties. The type of results that we get are shown in the next slide. This likely represents a source on the South Plateau where ground surface reaches the waste early, travels through a tank right through the hole that's at 55 feet. That would be the first bar would be identified as area two. And area one would represent a source on, maybe at the high-level waste tanks where the waste layers are much thicker, come out much later, see less erosion on the North Plateau than on the South Plateau.

Final slide talks about our intruder analysis. As I said before, it's patterned after the Part 61 guided scenarios. We took parameter values from the Part 61 analysis. We left out a discovery scenario. If you note, Part 61 analysis there was a discovery scenario that was really just a variation in home construction, so we left that out. In the home construction scenario, a worker comes and excavates the foundation of a house. As David said earlier, in the course of doing that he gets an exposure dose for inhalation and direct. If he goes down ten feet, in the course of doing that he contacts waste, he takes that waste out of his foundation and distributes it over the area near the home and initiates a residential agriculture scenario where he's getting a dose from the usual pathways; dust inhalation, soil ingestion, crop and animal product ingestion.

Similarly we analyzed a situation where someone comes along and drills a well, intersects waste on the material he brings up on the drill bit and also adjacent to the cuttings pond, he also inhales some waste. Initiation of this scenario also initiates the residential agriculture scenario where he comes and takes the cuttings out of the pond and spreads it around the ground surface and then grows his garden in that soil. There's no height cutoff on this, like I said, Part 61 analysis the well only went 200 feet deep. So we look at this scenario at each WMA for each alternative.

And the last of the direct intruder doses we have is for recreational hiking. This is for the person that walks through the area each day and in the course of doing that, from radionuclides he would get exposure, inhalation and inadvertent. And, as I said, we analyze these scenarios for each alternative's waste management area, and we are saying we look at that for the NDA and SDA also. And that was the last slide. Go backwards and go to questions.

DR. CLARKE: Okay. Thank you, very interesting presentation as well. Dr. Hinze, would you like to start?

DR. HINZE: Thank you. Let me ask you a question or two about SIBERIA, the modeling program for erosion. We have heard from you and David that this is a very critical concern at this site. Can you tell me what was the basis upon which you selected SIBERIA as a landscape modeling program for this area? And have you checked it against any other landscape modeling programs?

MR. PRICE: The basis was our geomorphologists reviewed the available models out in the literature, and I think basically there were two available at the time; SIBERIA and CHILD. At that time CHILD was at an early stage of development. So they selected SIBERIA on the basis of it being the best available model at the time. And, no, we have not checked it against other landscape evolution models. It's a pretty labor-intensive job just to run this model as it is.

DR. HINZE: Does SIBERIA take into account sapping from erosion in the gulches?

MR. PRICE: I would represent SIBERIA, from an engineering scale, a nominological model in that it's 7,000 forms for each node, in minus out equals accumulation. Accumulation, of course, is a change in elevation. The in minus out, there's two terms in there. One is called a fluvial transport term and the other is a diffusional term, and those two terms are designed to subsume the effects of the smaller erosional processes such as sapping. In other words, it's a scale up from that level, if you will.

MR. HINZE: Is it a nonlinear model?

MR. PRICE: Yes.

MR. HINZE: Are you taking into account the possibility of the range of changes, for example, precipitation or types of precipitation or base level changes?

MR. PRICE: Well, we are taking into account storms of all magnitude, so in that sense we're looking at the range of different precipitation in such frequencies which they occur.

MR. HINZE: Well, change in the sea level, for example?

MR. PRICE: No, not in the general sea level.

MR. HINZE: Because that will have an impact on depth of erosion.

MR. PRICE: One of the features of the model that I didn't mention was that one mode in which one can run the model is to specify the elevation of the nodes in the channels and you can determine the rate at which those nodes are moving downward, at least we have, using the WEPP predictions, and so that's a boundary addition to the model at the creeks. The nodes that represent the creek are moving downward at a certain rate, and that rate is relatively high per our three cases based upon our WEPP parameterization, WEPP calculations basis. In the past we have used lower rates of down cutting, and when we do that we see a different general shape to the topography.

MR. HINZE: Does your calculation with WEPP take into account landslide phenomenon?

MR. PRICE: One of the two terms that's considered is the longitudinal plane and is represented by landsliding and the magnitude of that parameter, then look at that to decide whether or not you believe that you're capturing the effect. And to actually calibrate that we would use a literature report on a survey of all the different landsliding events, and the researcher recommended a value that he felt would capture all the different types of those sorts of processes.

MR. HINZE: Speaking about calibrating or validating, how have you validated your model to this specific site? Have validated it?

MR. PRICE: We have not done that, no, it's not possible because of the time scales over which we're looking. One might think of, well, if you knew the initial topography 10,000 years ago, you might run SIBERIA and see how that evolves in that time. But we don't know the starting point so we don't know where to start to do that.

MR. HINZE: Have you looked at the age of any of the surfaces?

MR. PRICE: There's not a lot of information available on age of the creeks. There is one age dated wood sample located near Buttermilk Creek and that's generally thought to establish age for during which down-cutting of Buttermilk creek occurred, and that's on the order of 10,000 years.

MR. HINZE: The rate of evolution of techniques for dating services is very high at this time. Thanks very much.

DR. WEINER: Can you give me some idea of what the conservatisms are in your whole model? Where have you deliberately taken a conservative estimate of something, and what was it.

MR. PRICE: Well, with respect to erosion, we believe that we're conservative with respect to the down-cutting rates in the creeks. We're planning to do some sensitivity analysis to document in the EIS just how important that is. With respect to the groundwater scenarios I think we're conservative with respect to the scenarios that we analyze.

DR. WEINER: Can you be a little more specific? What did you overestimate and what did you underestimate?

MR. PRICE: In terms of overestimating, I'm saying that we analyzed residential farmer scenarios in each of the WMAs, say, within fifty to one hundred feet of the barriers. When we run each of the deterministic scenarios, we raise the points of the barriers, we decrease the hydraulic activity by order of magnitude, increase the hydraulic activity of the slurry wall by order of magnitude. That's the sort of conservatism we used to analyze.

DR. WEINER: Don't your conservatisms pile up on top of each other? I mean, don't you have -- as you accumulate conservative estimates of your various parameters, you're getting further and further from reality, are you not?

MR. PRICE: Well, that would be true, yes, but part of the reason why we do the uncertainty analysis is to help us look at exactly where we stand with respect to that. And in NRC guidance they have said they would like for your determination to be somewhere around or above the 90th percentile. And so you could say you keep piling things up, you're gonna end up with 99.9999. Generally, we're not finding that, we're finding ourself in the 95 range.

DR. WEINER: What were the chemical forms in your slide 17 and 18, what were the chemical forms of the radionuclides and what chemicals did you use when you have these numbers for lifetime risk?

MR. PRICE: For our release models we're using partition limited release models where the amount of the radionuclides that is on the soil of a similar wasteform is determined by this coefficient, and those are not chemical forms specifically. The constituents that we have in this particular example is probably the South Plateau where the chemical, controlling chemical would be arsenic.

DR. WEINER: So that, it's basically the arsenic risk that you're calculating?

MR. PRICE: For the chemicals, yes.

DR. WEINER: What were the dominant radionuclides in your calculation?

MR. PRICE: On the South Plateau the

NDA is typically uranium. Now this is for the groundwater release model. Across the board for the erosion scenarios the controlling nuclides are plutonium 239 and 240. So the high-level waste tank is petrolium nuclides, technesium and plutonium. For the processing building is those two plus --

DR. WEINER: So you're confident that the radionuclides you are looking at come from the processes and the waste, not naturally occurring?

MR. PRICE: Certainly.

DR. WEINER: You're looking at isotopes of uranium that do not occur normally, in much greater concentration?

MR. PRICE: Yes. And these are predictions based upon estimates of inventory that are documented in those waste characterization reports. It's not based upon an actual measurement out in the environment.

DR. WEINER: Finally, I'm just curious, you coded your own models and every time you use a different model you will clearly get a different result. Did you do this before you knew what kind of model NRC was going to use to review your model, or did you make any attempt to use models that had been used for other projects?

MR. PRICE: At the time -- we've been developing these models for quite a while. The draft EIS came in '96, and that was well before NRC had any inquiry in developing a model. We did review available models, most of which didn't reflect, we didn't think we could reflect the site specific engineered barriers. Another example would be with a high-level waste tank which, as previously mentioned, it was discovered there was a ring of concentration on the outside of the tank. Also there's a great deal of hardware, columns, support barriers, more than you could possibly imagine, inside the tank and they found that the radionuclides accumulated on those surfaces. So we developed a model for the tanks to be consistent with its symmetry and be able to represent this radial distribution of concentration instead of using some off-the-shelf model to represent uniform distribution. When the question is asked what about peak, we're estimating the peak in concentration to be about factor twenty higher on the outside wall in the so-called ring section of Tank 2 than the concentration in the center of the tank.

DR. WEINER: So you used it to address your specific release problem.

MR. PRICE: Yes.

DR. WEINER: Thank you.

MR. CROFF: No questions.

CHAIRMAN RYAN: I guess I'll ask you the same couple of questions I asked Dave. I take a look at some of the results on the pages that you've shown. Looking at the time frames and hearing about kind of a mix of deterministic and some analytical work in arranging the values. How do I know those values are even different, for example, groundwater release curve, there's a factor of two.

MR. PRICE: Could you point to it.

CHAIRMAN RYAN: 16. Those curves track fairly well, and I guess without a lot more insight into uncertainty, sensitivity and maybe even probabilistic approach with some promulgated error, how do you know that they're different versus reality?

I'm struggling with the question of, in the same question I posed to David, if you're not extremely careful in documenting where and how you've made a deterministic decision and how they'll string together along the lines of Dr. Weiner asked about how, you know, how you could lose track of your results pretty quickly. The second risk is you can lose track of risks, you can actually mask things if you're not careful. So are you addressing those kind of things, is that in your upcoming plans? How do you address the question of uncertainty and various approaches to it?

MR. PRICE: Well, I think for the deterministic -- for each of the runs we do we have calculation packages, and in one element of that calculation package is a folder that's titled data and description for each of the waste management areas analyzed. And in that folder we accumulate all of the input information that went into that run, the CDR information, Kd information that we possibly took from the literature, etc. And so we have documentation of each of the deterministic runs. The intent of the uncertainty analysis is to try to get a handle on how far off or where the deterministic analysis deals --

CHAIRMAN RYAN: I recognize, for example, on these graphs we're dealing with different facilities, but when I see a factor of two, I ask myself are they different? What's different about it? Typically I'd want to see an uncertainty bar on that line. So again, maybe that's coming along but I think that documenting deterministic values in a calc package is one thing, but justifying the selection of a value based on a range of values that could be selected, that's a different matter. That's more of what I'm asking about. For example, we all know Kd's vary all over the place. If you do a deterministic value and you picked one Kd, why did you pick that one? And are you going to get into that kind of detailed documentation, how you do these calculations and how you do sensitivity studies around them?

MR. PRICE: Yes, that sort of base information that's documented in EIS. So, for example, for the Kd's we have reviewed site specific information and we feel as if there are enough measurements only for two radionuclides to support a site specific analysis, that's the strontium and uranium. The balance of our peak evaluation depends on that Shepard and Theebo reference that David referred. That's a national sample of each distribution coefficient and that, photocopies of that information is in the data files.

CHAIRMAN RYAN: What I'm kind of getting the impression of is the short presentation is you're kind of leaning more a deterministic rather than probabilistic sorts of analysis and you're making professional judgments. Shepherd and Theebo I know quite well, but how do you know it applies here?

MR. PRICE: You don't, that's true.

CHAIRMAN RYAN: And I'm not necessarily criticising that decision, I'm simply saying without exploring what that means in terms of potential results, you really don't know where you stand in a risk bank?

MR. PRICE: But aren't we doing that in an uncertainty analysis? The Shepard Theebo came up with those numbers, we didn't produce those. As I said, we're using those Kd's for the aquifers and for the wasteforms in the uncertainty analysis.

CHAIRMAN RYAN: And, again, if you lay out a probabilistic approach to that and do that kind of analysis, I didn't glean that you had done that as well?

MR. PRICE: Oh, yeah, that's the whole discussion on slides eighteen and nineteen. I spoke to it. Maybe I should have put all those -- I spoke possibly too quickly when I was discussing this slide on Page 18. I discussed the steps in this uncertainty analysis, and that's described in one of the appendices of the EIS which includes identifying these random variables, identifying distributions for the random variables, selecting the vectors and realizations, running the code.

CHAIRMAN RYAN: But this is just one run, if I read this correctly. It's a single line, there's no error bars, no multiple runs. Is that the mean?

MR. PRICE: This is the time series of mean dose from each of these facilities.

CHAIRMAN RYAN: If it's a mean, then there's some disruption around that. How big is that error margin? Is it really the same number? I guess I probably used up too much time.

MR. PRICE: The next curve gives you some of that information for the year of peak mean dose, it tells you what the distribution coefficients. I guess I did not write down what the peak mean dose was, but we could add some of that information.

CHAIRMAN RYAN: The details would be helpful.

MR. PRICE: Okay.

Again, I think the point I'm trying to make is if you clearly and readily transparent of what's deterministic and why and how your uncertainty analysis flows out of that it would be a good thing to think about how to get that done.

MR. KOCHER: I'm not quite able to interpret what I see here. Is the vertical axis labeled correctly? This must be a cumulative distribution of function.

MR. PRICE: Right so --

DR. KOCHER: So frequency --

MR. PRICE: That's the wrong term.

DR. KOCHER: I wanted to make sure I understand.

MR. PRICE: Yeah, that's a cumulative distribution for year of peak mean dose.

DR. KOCHER: I have no other questions.

DR. NAUMAN: How many WMAs did you consider?

MR. PRICE: Under alternatives two, three, and four, which are the engineered closure alternatives, we analyzed the high-level waste tanks, the process building, the NDA and the SDA. Under alternative five, which has features of a walk-away, we analyzed those, plus the lagoons. So in the closure engineering reports described the structural, the alternative, which facilities are going to remain and which are not under, for example, alternative two, three or four the lagoons are slated to be removed and so we don't analyze that is there. We analyze only the facilities that remain with inventory.

DR. NAUMAN: How does that align with what you did?

MR. GLENN: I think it generally aligns. We also have the Strontium-90 plume in there. Because we weren't analyzing a particular scenario or a particular alternative in the EIS, we have the waste management areas in there that can be analyzed, but if you're looking at a particular alternative in the EIS then you choose which ones you simulate. I think in terms of a risk perspective, we have the same ones that Joe had mentioned in addition to the Strontium-90 plume.

DR. NAUMAN: There seems to be a lack in what's been extrapolated so far. I'll save the rest of my questions for this afternoon.

DR. PARKER: Found it very interesting, but I'm confused, not unusual, but perhaps you can help me. Slide 20 you look at only the first thousand and 10,000 years. Then on slide 24 you show the results of that which seem to be in line with what you've stated as the probability over 10,000 years. But if you go over to figure 18 -- 16, 17 and 18, now we go up to 100,000 years. It's not clear to me whether or not -- obviously, you're not taking into account erosion after 10,000 years. What is the impact of erosion assuming it continues, what is the impact of that erosion on these results?

MR. PRICE: We don't take into account the effects of erosion in evaluating the groundwater scenarios. We felt that its very difficult to determine what sort of -- Page 16, for example, is a groundwater release result. And it's difficult to analyze what's going to be the future flow distribution for the aquifer based upon change in the topography due to erosion so we have groundwater modeling that gives a better understanding of how the groundwater system works now. But if we tried to couple that with an erosion model, I think we would lose confidence in it relatively quickly.

DR. PARKER: The data is changing pretty rapidly. It should be shown in the horizontal groundwater release model, and that would be my assumption?

MR. PRICE: Sure, and the position of the creeks relative to the waste facilities, if you were trying to integrate both the groundwater and erosion analysis, are changing and so your flow directions are then open to question.

DR. PARKER: Perhaps I don't understand figure 24. What are these doses; are they surface water only that don't include groundwater?

MR. PRICE: Yeah, this is a dose to an off-site individual.

DR. PARKER: Certainly not labeled that way so that we understand the distinction between groundwater and surface water dosages.

MR. PRICE: Right. I did mention verbally that when we do the erosion analysis, we look at off-site individuals, surface water users.

DR. PARKER: I guess I'm still confused. Don't you also have to include the groundwater dosages as well at the same time, the off-site users, you're subject to both?

MR. PRICE: That's true, yes. But we haven't integrated the erosion and groundwater modeling is basically the short answer to your question.

DR. PARKER: Basically you'll have a higher dose if you add the two together?

MR. PRICE: It's possible, but it's difficult to predict how they're going to interact, to do the groundwater modeling based on the average conditions established by the erosion model, that would be difficult.

DR. PARKER: I had a similar question that Dr. Weiner asked you on the radiological and the chemical. And the question is: Are those differences real? And how much overlap is there because of the uncertainty in figure 17?

MR. PRICE: Well, I think what we're

seeing here in this picture, the relatively low-level of risk from the chemicals is driven by low-level of inventory and by the relatively greater hazard of the radionuclides. So the deterministic results, as I said, we don't have surface waters that we can put around it, but we do have confidence that the effects of the radiological constituents are going to dominate over geological constituents.

DR. PARKER: Is that the present case? What are the dosages now radionuclides versus the doses of chemical?

MR. PRICE: I'm not sure that we reported dosage from chemicals in the environmental reports. I don't know the answer to your question.

DR. PARKER: Final question; you didn't say anything at all about the vadose zone. Do you do a, do you do a separate analysis for the vadose zone?

MR. PRICE: No, we don't, especially for the South Plateau we analyze the system as saturated all the time. And on the North Plateau, we make a similar approach with the vadose zone being relatively thin and narrow there, and most of the facilities, for example, the tanks being below the level of the groundwater.

DR. FLACK: Just a couple of questions from the reactor side of the house, which is primarily my background. We do importance analyses to understand what's driving things. Do you also do these importance analyses as to what is driving the dosage?

MR. PRICE: We do, yes, for the deterministic cases we do sensitivity analysis to look at that and then for the uncertainty analysis we use that output information that are referred to from the uncertainty analysis for those upper-end cases that tend to dominate that distribution dose.

DR. FLACK: You can print them out in some order as being the most significant down?

MR. PRICE: Yes, generally. For example, for groundwater we're seeing the partition coefficient for the wasteform is the single most important variables. In hydraulic conductivity of the wasteform and its immediately surrounding layers that determine what portion of water goes through the wasteform and what goes around it.

DR. FLACK: Okay. So then you can focus on those uncertainties and modify them as best you can understanding certain parameters and that sort of thing. Okay. My second question has to do with the Strontium-90 plume. You mentioned that was not part of your analysis?

MR. PRICE: No, I didn't say that. I was not part of the uncertainty analysis. And the rationalization there is that we don't have much uncertainty about where the impacts of the Strontium plume lie in relation to the standards. They're going to be way, way above dose standards in the foreseeable future.

DR. FLACK: So you have done that analysis and you can show what kind of doses, but that was not presented here; is that not to be presented here?

MR. PRICE: Right, we did not, but when we do the EIS -- I did describe we have what we called a distributed source curve. We use that to describe concentrations out at the aquifer now to predict out into the future, and we report on two points. One at 100 meters, and one at 300 meters, and the EIS have the traces of those at these two locations as a function of time. And it's about 150 years or so for the dose at Powder Point goes below, say, 500 millirem a year.

DR. FLACK: So you can use the data as it's being generated today actually to validate your model; is that how you're using it?

MR. PRICE: We have checked it against that, yes.

DR. FLACK: And how did it come out?

MR. PRICE: It seems to be in general agreement with it, yes, but we're using a one-dimensional flow tube and the measurements are two-dimensional and sort of indicate sort of a separation of the plume near the discharge point, so it's not a perfect comparison.

DR. FLACK: But you use that input to update your model?

MR. PRICE: We have not done that yet to the model.

DR. FLACK: Sound like a good idea to do.

MR. PRICE: Yes, I agree.

DR. KOCHER: I did have one additional question. You were the first person to mention the issue of residual contamination on surface soil, and I'm wondering where it falls, as you see it, where it falls in importance as a potential source of exposure? It might be, for example, important for this recreational hiker. Obviously it would be a concern only to the people who are physically on the site, but where does this fall in the spectrum of potential sources of risk as you see it?

MR. PRICE: It falls at the lower end, and I guess a primary use of that particular scenario is to determine cleanup levels for the three different scenarios.

MR. SCOTT: We have understood that the SIBERIA model predicts a gradual diminution of the gullies getting smaller and perhaps not as deep as they are now. Is that a correct understanding? And if so, can you explain why you think the model is showing that? And perhaps the NRC staff could give us their perspective on that as well.

MR. PRICE: Sure. The results that the model would predict in relation to the size and the extension of the gullies depends in part on the parameterization of the model. In 1999 we gave a presentation to the NRC where we had a parameterization of the model that used relatively low down-cutting rates from the creeks. The results that were shown at that time showed extensive movement of the gullies, that would be in particular NP-1 and NP-3, but on the average lower down-cutting rates in others areas.

The current parameterization where we tried to stay consistent with WEPP is giving us a very high down-cutting rate in the three channels, and when we use that in the model, the high rate of erosion generated by this down-cutting overwhelms the effects of the gully and overtakes, if you will, the growth of the gullies.

MR. SCOTT: Okay. So is that reflected in the current draft of the EIS?

MR. PRICE: The current draft of the EIS is using this more conservative what I call WEPP calibration.

MR. SCOTT: Thank you. Can we get the NRC staff?

MR. ESH: Sure. This is Dave Esh. I do have to say that the erosion modeling that is being done or has been done is a considerable effort, and we've been critical of it and -- well, it's easy to cast stones, but if you've understood what's involved in doing it, we tend to be a little more understanding. Regardless of that, the issue of the gully formation and landform evolution, it does seem to be potentially driven by some of the selections for parameters for initial conditions in the model. One of the questions or concerns that we had with the erosion modeling is, of course, how well does it represent reality. And we thought maybe there are some analogue sites that you can look at in the region that might give you an indication, if you could get some sort of estimate of when those systems were formed and where they potentially are located, whatever, they may be an older system, how they evolved, how they compare.

From the standpoint of -- the best you're going to be able to do is probably look at the topography and see the general characteristics of it. Do you see the dendritic pattern of gullies that are forming or do you see a more smooth surface for the older types of areas compared to the more recent areas. You might be able to do that. We thought that that would probably be a good idea.

When we reviewed the work back in

April of 2004, that's when we had the series of meetings, we reviewed the erosion modeling that had been done to that point and one of the concerns we have is that the SIBERIA model doesn't really appear to allow new gully formation, and that process seems to be driven by maybe pretty fine scale features of the site, some that might even be generated by processes like tree fall or very, you know, localized types of surface processes that cause that. So one thing that we suggested is to run the model not just with the initial conditions that you have now in terms of topography, but to introduce some uncertainty in the initial topography and see on you how it evolves. Does it produce gullies in new spots? Will they impact the waste management areas? What are the rates of formation? That sort of thing.

So I think there are some things that you can do to investigate it, but it's a big effort just to run that model, to do that work for one case for one analysis. So we're understanding of the effort involved to do it, but we also think there are some things that you could do to see; does it make sense, basically. Does it make sense based on what you have now and what you have in some other locations.

MR. SCOTT: So the jury's still out?

MR. ESH: Yeah. I mean, we're currently in the process of reviewing the new calculations for the EIS, but if our previous comments weren't sufficiently addressed, we'll end up asking the same ones over again.

DR. CLARKE: Dave, if you want to stay there. I guess we're into the round table. I believe you said the NRC doesn't have the erosion model as well. Have you decided how you're going to do that?

MR. ESH: Yeah, our contractor, the Center For Nuclear Waste Regulatory Analysis, they have used the CHILD model in the past that Joe mentioned, and they have some experience with it. Our intentions at first pass are to develop an assessment of the erosional impact but not to do process modeling of the erosion process itself. So we'll try to do a pretty open-minded, highly uncertain analysis of the erosion impact and see, okay, if the gully formation rate is 500 years and it gets to this waste management area, what are the impacts. That sort of analysis. If we find there's a big influence on the timing and expense in a particular type of erosional process and its impact in the facilities, then we may need to go back and do our own process modeling. It's a challenge, especially with the level of resources that we have.

DR. CLARKE: Thank you. One other question for both of you. Since there is some chemical contamination, I didn't hear either of you mention ecological issues. Is that something that would be addressed?

MR. PRICE: It will be addressed in the EIS, but we don't have results now.

DR. CLARKE: Okay. Let me just open it up to the round table.

CHAIRMAN RYAN: Do we have a request for somebody to speak now or later in the day?

MR. BEMBIA: I was going to speak during the public comment section.

DR. CLARKE: Let me just see if there's anything else under the heading of round table, and then we'll do that. Latiff?

MR. HAMDAN: I have a question for Dave, and one for Joe. Dave, I was surprised that you're doing the source system as deterministic in your modeling. The power of GoldSim is the stochastic to handle uncertainty. And the source team for this slide and this slide seems to be uncertain. You have surface contamination, you have groundwater contamination, so the first thing that I would think about is that you would want to take advantage of the GoldSim capability and make a source team stochastic.

MR. ESH: The only reason why we did that was because we wanted to separate the effects of uncertainty in the inventory from uncertainty in the other processes. So by the time lunch would be over I could convert it to represent the stochastic. It would take even less than that, maybe ten minutes I could convert it to be being stochastic. The vectors of the inventory are there, all I would have to do is to insert distributions for each of the isotopes and just change the length of the vector, so it would be very easy to do.

The only reason it's done that way is as we were building it we wanted to understand the impact. We recognized, we believe there's a lot of uncertainty in certain aspects of the inventory and we plan to include that in our assessment.

CHAIRMAN RYAN: Just a quick follow-up on that point, Latiff, if you don't mind. It's interesting to see the way waste was shipped from the site is probably inherent bias of high values because the error you don't want to make is underestimate what you ship, but it's okay to overestimate. People would use, for example, minimal detectable activity found in radionuclides is less than this, but they reported this on the shipping manifest. So it's interesting to think in a little more detail how you would handle the uncertainty.

MR. ESH: Yeah, I think to develop, say, a table of inventories called for in the waste characterization report for the NDA and the SDA, there's a huge amount of effort went into to generate even those table of numbers because there were all these shipments of all this material, and as you indicated, many times you had information like the contact dose rate of the container. Maybe you had a volume or a mass number, maybe you didn't. Maybe you didn't even have a contact dose information. You certainly didn't have, in most cases, information on the isotopic distribution for those disposals. So there's a really difficult effort in trying to estimate the inventory for the disposal areas. I think in that respect the uncertainty for those is probably going to be much higher than, say, the high-level waste tanks. There's still uncertainty in that process, too, so I think the best you can do is try to understand what that certainty may do and then consider it whenever you're assessing the impact, because it is in many cases a direct influence on the risk, the uncertainties in the inventory.

MR. HAMDAN: One other questions. Thanks, Dave. Joe, can you give us some specific examples of how the results of the analyses that you did, how they were used to improve your analysis, which I'm sure you used it for that purpose, but also to maybe improve the characterization of the soil contamination and perhaps even go as far back as maybe improving the radiation of the site?

MR. PRICE: The integration on performance of the models has been sort of in cooperation with the CERs, so over the years we've analyzed different closure designs or different combinations of, say, distribution coefficients parameters, sort of integrated to where we are now. With respect to using predictions of the models to -- I'm not sure. Can you restate the last part of the question?

MR. HAMDAN: The use of the results of the sensitivity analysis, you have reviewed that, but Dave would be doing the same thing or has done the same thing. Give us an idea of how you use these results specifically to go back and think where you spent your time recognizing the site of the contamination, whether your reclaiming of the tanks or something else is where you ought to put your money or maybe you ought to put it somewhere else. How much did you use the sensitivity analysis results to give back your operation and then use the information, which would be very useful?

MR. PRICE: A primary example of how we use the results of the sensitivity analysis is to design a wasteform for the high-level waste tank, what kind of retention capability you should have, and over time we've increased the retention capability for Neptunium. That's the sort of thing we've used the models for in terms of improving the design. I don't think that we can say that we have gone back and used those results because they're predictive in nature to help us understand something about, say, the inventory. The estimates of the inventory are difficult to develop. Some of the inventory we had to input the best estimate how much we had in each case. In the analysis we used a conservative deterministic pound, but we haven't gone back and, because it's predictive in the future, compared it with existing site contamination, if that's where you want me to go.

MR. HINZE: I'd like to ask a very brief question. Nuclear Fuel Services terminated their activity on the site in 1972, partly to retrofit for some seismic problems the site involved. I'm wondering if there's been any consideration given to the buried waste? Are the seismic problems any concern to the buried waste, have you considered at all seismic activity at all in this?

MR. PRICE: Not explicitly. We reviewed it and felt that for the buried waste, that it wasn't, the magnitude of the earthquakes that are predicted to affect the site are on a calibration of zero to ten per the seismic analysis. But with respect to the landsliding as you see it in the erosion analysis, that was partly why we went to this conservative basis, try to subsume in a conservative way things that will varify and therefore cause us to modify the model, such as an earthquack induced landslide. That's partly why we went to this conservative basis to try to bound the analysis, have more of a feeling of confidence that we had bounded the analysis.

DR. CLARKE: I really think I need to keep this moving.

MR. COLEMAN: I held this comment for the round table as you asked.

DR. CLARKE: Okay. Go ahead.

MR. COLEMAN: A comment on communicating results to the public. Dave, you've mentioned several times that people might need GoldSim training to fully understand the results. I've had some GoldSim training, and I would definitely believe that. One thing that could help is to show a few simple models representing key parts of the GoldSim representation. For example, you described the Strontium-90 plume as posing the largest immediate risk. The groundwater plume could be represented by a relatively simple stand-alone mathematical model that captures most of the GoldSim results and most of the observed plume behavior. Just one way to help the public understand and sort of avoid the appearance of results coming out of a black box. Have you considered this sort of approach?

MR. ESH: I think there's some value in doing that. There's always the challenge of communicating these technical topics that we deal with. And I may have mislead you a little bit. What I was trying to say in that slide that you may need GoldSim training in order to understand the model, but it would be my job to explain the results from a physical standpoint why you're getting the results you are and why you see the results that you got. For that I would hope I could do it and someone could understand it without having the software training. What I was trying to say was if somebody actually wanted to look at the model, they might need the training to understand what's being done in the model. Just like if you were trying to reveiw a model created in FORTRAN, you'd need to know FORTRAN in order to understand what's being done in the calculations.

It's the same deal. But I would hope the results could be explained without someone needing to have the software experience to understand the result.

DR. CLARKE: Okay. Thank you both. At this time I will invite any comments from attendees. Please come forward to the microphone.

MR. BEMBIA: Thank you. My name is Paul Bembia. I'm a program manager with the New York State Energy Research and Development Authority. I've been with NYSERDA at the West Valley site for fifteen years. I have a bachelors degree and a masters degree in geology. Prior to joining NYSERDA in 1990 I was with an environmental consulting firm, and prior to that I was with the Nuclear Regulatory Commission in the geotechnical branch in the Division of Waste Management in the office of Nuclear Material Safety and Safeguards. I am a primary reviewer of the decommissioning EIS, and I have been working on the decommissioning EIS for about as long as I've been with NYSERDA. My purpose here today is to identify several issues that NYSERDA believes may be critically important to the outcome of the long-term performance assessment. From the discussion that's gone on here today and also the discussions yesterday, I believe the ACNW also recognizes those issues and I don't think I'm going to bring up any new issues here, but I do want to make these concerns clear.

The first issue is in regard to erosion modeling. We believe that there are important questions that need to be addressed about erosion predications. For example: How should the results of a 10,000 year erosion prediction for this site be assessed? How do we determine whether the modeled results have any correspondence with the real world. How do we determine the uncertainty in the results? Considering the potential uncertainty, how should we use the results from erosion modeling to define the rate of radionuclide release from facilities? Should we use the results of the erosion modeling to limit receptor locations? The manner in which the erosion model results are used in the performance assessment is likely to be critical to its outcome, and we ask the ACNW and NRC staff to look closely at this issue.

The second issue is groundwater modeling. Due to the geologic complexity of this site, the ACNW and NRC staff should look closely at the approach for groundwater modeling used in the long-term performance assessment. We believe it's important to assess how the methods and results from the updated performance assessment compare with any independent NRC analysis of previous groundwater modeling work; for example, the work that was done for our 1996 DEIS or the extensive work sponsored by the NRC in the 1980s and 1970s. If the methods and the results differ significantly, the reason for those differences should be understood. We also believe the model results should be compared to the real site data wherever possible as a way to test the predictions. For example, will the model adequately duplicate the distribution of contaminants actually in the groundwater plume today.

And the third issue is receptor locations. We ask you to look carefully at the basis for receptor locations and the exposure scenarios identified for each of these receptor locations. We ask the ACNW and the NRC staff to consider whether additional receptor locations and exposure scenarios may be required to assess whether the entire licensed facility can meet the decommissioning criteria set by the NRC.

The fourth issue is engineered barriers. I think we've heard that engineered barriers may be critical components for certain facilities that are closed in place under certain closure alternatives. And we ask the ACNW and the NRC staff to look closely at the assumptions for the performance of any needed engineered barriers, and the technical basis for those assumptions. And also the assumptions for failure modes of those engineering barriers, particularly assumptions for the physical and chemical degradation of the barriers with time, the partial failure of engineered barrier systems, and the assumptions used for the breaching of the engineered barriers by erosion processes.

And finally, the last issue is the technical basis for the performance assessment. And there have been many analyses of site and facility performance conducted at the Western New York Nuclear Service Center over the last 30 years using different conceptual models, different computer codes, different assumptions and different input data sets. At times the different modeling approaches have resulted in significantly different performance outcomes for the same facility. This begins to raise a question for us as to how we should view any one set of these modeling results. How certain were we in the first set of PA results before the second set came along? The second before the third? Or the work done by the NRC here in the 1980s.

If the analysis approach has changed signficantly over the last several years because the results have changed significantly as well, we believe it's critical for there to be a clear and defensible technical basis for the performance assessment, particularly if the analysis is to be used for site closure decisions and compliance demonstrations. As such, we welcome, and frankly we request, the ACNW'S view on the strength of the scientific basis for the current West Valley long-term performance assessment. And we're particularly interested in your view on the use of complex models and complex codes to assess facility performance over very long periods of time, 10,000 plus years, and how the results of those calculations should be used in decisions on the future of the site.

In closing I just want to say we're very pleased with the interest of the ACNW in the work here, and we hope to have additional exhcanges with the ACNW and the NRC staff on these and other issues as the EIS process continues.

DR. CLARKE: Thank you. Are there any others that wish to make comments?

MR. VAUGHAN: Good afternoon. I'm Ray Vaughan, V-A-U-G-H-A-N. I'm a member of the West Valley Citizen's Task Force and of the Coalition on West Valley Nuclear Waste. I'd like to thank NRC, especially David Esh, and Chad Glenn for a very informative presentation and all the committee members and experts.

A few comments. NRC's use of probabilistic methods will be very useful as a benchmark against which other agencies' deterministic assumptions can be judged, assuming that these other agencies continue to use deterministic methods. We also look forward to NRC's separate erosion analysis and erosion modeling. That's a very crucial part of this effort to close the site safely. There seems to be general agreement that erosion is a severe problem at the site. The problem is not just local site erosion, but geomorphic evolution of the whole valley within which the site sits. It's a natural geologic process that may be difficult to stop or slow down at the rate needed as long as the facilities remains in place. As you probably know from your site tour yesterday, the facilities at the site are built on glacial fill, not on bedrock. If you have a chance either before or after lunch, you might want to take a look at the map or physical model I brought in, it's on the table at the back of the room. It's one that I and a friend of mine put together a couple years ago to represent the material as glacial fill as opposed to the hills such as the one you see here and the one right across the road from the site. The site itself, the facility, it's built on several hundred feet of glacial fill, and that's a big part of the erosion problem.

The issue of global warming is potentially important. The greater peak stream flows that may be associated with global warming need to be taken into account as part of the calibration and/or operation of any erosion model. In my judgment WEPP appears to be inappropriate for erosion model calibration unless it can somehow be ground truth against actual data for this particular site. It's not clear, for example, that WEPP and/or SIBERIA properly take into account processes such as piping and landsliding or for that matter landsliding that may be aggravated by seismic activity. One of the previous pieces of evidence that's rendered important for model calibration is the surveying that was done by Survey Methods, people who are professional surveyors I believe, surveyed along the access of Frank's Creek and Urban Brook, which is a little creek that immediately bounds the burial ground. In two consecutive survey sessions, one in the year 1980, another in the year 1990, those two surveys showed readily measurable down-cutting along both those creeks during that ten-year period. And if you're familiar with the 1996 draft EIS for this site, the down-cutting during that ten-year period was largely used as a calibration for the erosion modeling or erosion predictions that were presented in that draft EIS. But in the last nine years or so the Department of Energy and the consultant SAIC tended to ignore that evidence. That is a piece of evidence without calibration any erosion model that may be questionable given the short duration, ten years, but it is at least some amount of real data during a period of time during which rainfall and parameters that affect erosion rates are fairly well known. That needs to be taken into consideration.

Looking at the slide number 24 that Joe Price presented, it's worth noting that the doses that he showed for erosion release scenario, which range up to about 10 millirems per year, are orders of magnitude below similar projections that SAIC submitted to the West Valley Citizen's Task Force a few years ago. I do not have copies of those presentations with me. It was pages from a presentation that he did with Power Point, more likely transparencies at that point in time. But those show, as I said, much higher consequences from erosion release, same type of thing he's showing today in slide 24. The doses are well, well above the twenty-five millirem per year limit that would be needed for safe closure under the License Termination Rule. So it's important obviously to look beyond result at the assumptions.

In closing let me just say in

general when results and models are released to the public for review such as will occur soon for the environmental impact statement process, it's very important that the results and models that are released whether you're talking about GoldSim or SIBERIA, whatever, be released in a way that's traceable and the assumptions are fully available. We need to be careful that we can actually look beyond results, we in the public who have some technical ability, we can look beyond the results and see what those depend on. To use the same words that Paul Bembia used we need to make sure there's a clear and defensible technical basis for this site closure. Thank you.

DR. CLARKE: Thank you. Are there any others that wish to provide comments at this time?

(NO RESPONSE)

DR. CLARKE: Okay. That being the case, I have heard that there is food available somewhere in the building. We are scheduled to resume at 2. I think we're very close to schedule, so let's do that.

(RECESS TAKEN)

DR. CLARKE: Okay. Could you take

your seats, please. We'd like to resume. Okay. A couple of announcements. If you haven't signed in, please do so, there are sign-in sheets in the back. We would like to remind you to please turn off your cell phones. And if you do want to speak and use the microphone, please hold it up close and speak loudly so our reporter can hear.

Our next presentation will be given by T. J. Jackson of the Department of Energy. He will give us an update on the site status and ongoing activities.

MR. JACKSON: Thank you. Before I get started I'd like to thank a couple of folks who have done a lot of work to set this up with Mr. Major. Hominy (phonetic) Moore is on my staff with DOE. Dan Sullivan has also helped out here. And I brought couple of other folks, Ken Snyder from West Valley Nuclear Center, Karen Malone from West Valley, and Don Stiener. Again, if we need to call on them I want to make sure I acknowledge that you're here in support of the project.

My name is T. J. Jackson, I am deputy director with DOE here at the project. Next slide, please. I just want to start out with a little bit of history for the project. West

Valley was the site of the only commercial nuclear power -- I'm sorry, fuel reprocessing facility to operate in the United States.

On the slide number 3, there's kind of a chronology of how West Valley came to be. In 1961 New York State acquired the parcel on which the West Valley New York Nuclear Service Center is located. And in '62 Nuclear Fuel Services had reached an agreement with the AEC and with the state of New York to construct the plant. 1963 the state of New York opened the disposal area, the SDA begins operations. From '66 to '72 is when Nuclear Fuel Services operated the plant, processed about 600 metric tons I believe of fuel. About 60 percent of that was supplied under contract by the federal government from en reactor, and then the other 40 percent coming from commercial entities. What remained at the end of 1972 was about 600,000 gallons of liquid high-level waste in one of the, one of the high-level waste tanks.

'72, reprocessing operations halted. There was going to be modifications to the facility, it was going to get bigger, they were going to process a little more. And as regulations increased and the job just seemed to get bigger and Nuclear Fuel Services basically opted out of operations for the center.

So basically '76 they notified New York State of their intent to withdraw from reprocessing, and in between there and 1980 is when New York State came to the federal government looking for some assistance in how to clean up the facility. What that resulted in was legislation, Public Law 96-368 which is the West Valley Demonstration Project Act, I talked to you about it a little bit this morning, which defines the role and responsibility for the department. And basically the main thing it did is it wanted us to come in and demonstrate that we could safely solidify that 600,000 gallons of high-level waste. Now there were a few other things that we talked about already where we needed to clean up the low-level waste, the transuranic waste that was generated during the process, to decon and decommission the facilities used and ultimately transport the waste off site.

Next slide, please. As I just kind of ran through, the act authorized the department to conduct this demonstration project. The five things that I just mentioned are there with the next bullet. And ultimately one of the things I think I want to bring up is that at the time of the transition, New York State transitioned the licensed facility there was a lot of work done to put that license in abeyance and to turn the facility over to DOE for exclusive use to conduct the project. So again, where you took the tour yesterday, those approximate 200 acres is where we conduct the project, and that is basically again our key focus for the project.

As we said earlier today, the tech specs were put in place, the bullet towards the bottom there. One of the things we haven't really talked about too much is the Act specifies 90 percent to be paid by the federal government and 10 percent to be paid by New York State as a cost share for this project. And NRC is required by the Act to establish decommissioning criteria which in 2002 they did when they put the policy statement out which prescribed the License Termination Rule.

In 1981 we reached agreement with NYSERDA, a cooperative agreement. Again, it provided the working relationship, the arrangements for DOE to manage the project. There was a supplemental agreement in February of '91 which talked a lot about the EIS and how we were going to proceed from, with that particular effort. NRC license was amended so DOE could take control of the site and, again, as I said, the tech specs were put in place. Just to follow on what you said this morning a little bit, DOE inserted its management systems at that time to where, again, we use the DOE orders, Code of Federal Regulations, all of those things that DOE works with to safely operate the plant, and we have since its inception. In '81 we reached, we have an MOU with the Nuclear Regulatory Commission that outlines our respective roles and responsibilities. I know there was some questions from the panel on that relationship and, again, even though there is some informality there that NRC has not acted as a true regulator, there has been a very good relationship and I think a very good consultation with NRC since the inception of the project. '82 DOE assumed control of the reprocessing site and West Valley Nuclear Services was selected as prime contractor. There's been some ownership changes in that company over time, but they are still kind of the prime contractor at West Valley, so they've been there the whole time.

Getting into operations, the high-level waste was of course our main focus. We pretreated and vitrified the high-level waste. The pretreatment process resulted in almost 20,000 cement drums, and those are stored, as you saw on the tour yesterday, those are stored on the south end of the site, ultimately will be disposed of off site. The vitrification process resulted in 275 canisters of high-level waste. We went through quite a qualification process as we were bringing that technology up so that we could demonstrate that we could safely solidify that waste. The operation went very well, went for about six and a half years. We removed, I think it's in a later slide, but I think we removed about 99 percent of the curies out of the high-level waste tanks. I think the third bullet said there were approximately 24 million curies that were removed from the tank, and what's there now is about 250,000 curies that remains in the bottom of the tank.

The decontamination of major

processing facilities. When we got there, the main process building was very contaminated so we had to go in and decontaminate much of the aisleways, operating aisles, some of the cells so that we could get in and use the facility. We tried to keep the footprint as small as possible so we tried to reuse as much of the plant as we could. As you saw on the tour yesterday, we cleaned out one of the major chemical process cells there, stripped it, put some racks in there and we made it integral to the newer facility we built back in the '90s for vitrification so we could store the canisters where they are currently located in the old main process building.

Since completion in 2002 of vitrification, we went in and decontaminated three of the major high source cells that were used in reprocessing, some of those where the fuel was actually chopped up, moved around, and again the chemical process took place. So a whole lot of work there, we tried to show a bunch of that yesterday on tour.

Low-level waste disposition is one that we are actively working on right now. Basically for a very long time we did not have the ability to ship waste off site, so as you see on the slide from '86 to '97 we stored the waste that we generated on site. Naturally some of the things that were packaged up back in 1986 would not meet waste acceptance criteria today. So a lot of the labor that's going into the work we're doing right now is repackaging that waste so it meets the waste acceptance criteria for two places that we're sending our low-level waste right now, and that would be Envirocare in Utah or the lab test site out in Nevada. We started shipping small amounts in '97. This contract period right now in 2005, we're actually working towards a goal of 400,000 cubic feet which represents about half of the waste that we had in storage at the beginning of this contract period. So again, things are moving along. There's a lot of roll-up-your-sleeves kind of work where we're taking a lot of the old boxes apart, making new packages to meet the criteria so we can ship them out of there.

Removal of unneeded WVDP facilities. That's another focus right now. Earlier this year we took a little over a third of the project site and moved it to off-site office space down to Nashburg Hollow (phonetic). There were about 180 people that were moved off site. That left a lot of excess facilities that had been, trailers that had been office spaces and things like that for the last twenty-some years and a lot of them are showing their age. Fuel efficiency has become an issue. Snowblowers in order to remove snow in the wintertime. Again, we're changing the skyline on the facility right now. As you saw yesterday, there's a lot more open ground, and we have about half the trailers off that are going and within the next two months we'll have the rest of them gone. Then we'll just have the folks that are on site will be the workers and their direct supervision that are working on the project.

Next slide, please. You had asked for us to discuss a few topics, these four, talking about the WVDP buildings and structures. Just for familiarity if there's more to it, please let me know. We'll talk about the general lay of the land, talk about the building structures. We'll talk about the disposal areas. We'll talk about the underground tanks, and groundwater contamination/remediation, which they're ongoing.

I guess I'll just talk to the picture here. Basically if you look off to the left-hand side of the picture, there is waste storage facilities. Those big structures off on the left are full. Okay. Those facilities right there are waste storage areas. This hard stand right here is full of boxes of waste, and there is right over here, right on the very edge, you can't see it very well, there is the chemical process cell waste storage areas. There's a quonset hut building over there. And all of those buildings are full of legacy waste that need to be transported off site, and again, that's one of the major things that we're working on currently.

As you will notice here, when I started off the presentation there was a picture of the old main process plant. Again, that's been about, the estimate is about 70 percent decontaminated. And we've been into the hottest cells. There are still numerous cells, rooms in that building that need to be decontaminated. We intend to work in those cells for the next three, four years and take the waste out of those as well. We built onto the facility over here on the left, this building right here is one where we load in the canisters, loaded in the canisters and any equipment that we needed during the vitrification process, and that is ultimately where the canisters will come out when they are ready to be transported to a repository.

These two buildings right here, the one in front is the cold chemical building. The one behind it is the vitrification facility. Those buildings right there is -- we mixed up the glass formers in here, it's a non-rad building. The vitrification cell, as you saw on tour, now is gutted. We've removed the equipment out of that cell and ultimately that part is ready for disposition at this point. The rest of the buildings, I'm not sure exactly how detailed you want to be, but basically we have all the utilities over here that support us. As I said on tour yesterday, we're a plant that's kind of out in the middle of no where so we have our own substation for electrical distribution. We have our own water supply. We have our own waste water treatment facility down here, so again we kind of maintain ourselves here. We have three or four emergency or back-up generators available to us if we need the power if we have a power outage. This building right here is the remote handled waste facility that we just commissioned last summer. A lot of the waste that has come out of the main process building, some of it that has come out of the vitrification facility and some of it remains to be brought out of the main process building is waste that's too hot to handle. So we basically designed a facility that has some state-of-the-art tools in it that we can remotely size reduce and package the waste for ultimate disposition off site. We expect a lot of the waste that goes through there right now is what we call suspect TRU, so again, we're packaging things up to the contact-handled waste acceptance criteria from the waste isolation pilot project plan. We're also working with, as they develop their remote-handled waste acceptance criteria, we're staying in touch in order to try to package things the best we can now so we don't have to handle it again.

Other than that what you have here are a couple of warehouses. As we've talked about, and we will talk a little more here in the coming slides, there is the state-licensed disposal area there under that geomembrane and this acrage here in front is the NRC-licensed disposal area. This building down on the south end of the site is the drum cell which contains the almost 20,000 cement drums that were processed during the pre-processing, the pre-work that we did on the waste tank farm. And that pretty well covers -- well, let me just cover this right here. That is the tank farm. That is the focus of the majority of our work here is emptying those tanks, there are a couple tanks in there. That is where the tank farm is located.

MR. HINZE: Could you point out the plume area?

MR. JACKSON: The plume originates on the back of the plant and goes down, basically goes down this direction.

Next slide, please. What our vision is in the next few years is to continue to reduce the skyline of the project as we don't need those facilities anymore. As we empty those waste storage facilities, we can take them down. Most of them are just metal buildings on concrete slab, so a lot of those -- and again, as we get smaller, basically by 2009 our hope is to only have the high-level waste stored in the main process building, the majority of the main process building decontaminated to where the scope of work is very small and so, hence, we wouldn't need maintenance shops, storage facilities, all of those ancillary buildings that were in the previous slides. Basically we would have a small work force here that would be managing the oversight of those canisters until such time as we're ready to ship them to a repository.

Next slide, please. The state-license disposal area -- Paul, you want to talk about that?

MS. GERWITZ: A number of you visited the facility yesterday. It's basically a commercial level radon waste disposal area that Nuclear Fuel Services operated as a second commercial venture at the site while they were beginning operations at a new processing facility. So the disposal area operated from 1963 to 1975. There are fourteen disposal trenches there. Generally it is a basic cut and fill operation. They cut the trenches, fill it with waste, and put a cover over it as they were constructing the facility. The trenches are generally just twenty feet deep. They're trapezoidal in shape so they've got a twenty foot wide base with thirty foot at the top. They have about eight to ten foot packed clay cover and they're constructed in the native till clay. It's a very tight clay, very low permeability, so what goes in kind of stays in there.

And the main challenge for that facility from the time of construction has been water management. The water that gets in tends to accumulate there and the trenches fill up like bathtubs. In 1975 two trenches did just that and overflowed through the caps and that's what led to the shutdown of the facility. Since that time Nuclear Fuel Services in the late '70s, early '80s did pump the trenches. Each of the trenches do have a sump that allows you to monitor the water level and allow you to pump water, contaminated water from the trench if you needed to. So that happened on a couple different occasions in the '70s and '80s. That water was pumped out and then went to the lagoon system on the North Plateau and out to the creeks.

Since that time, though, when the transfer came, we came on site in 1983, NYSERDA assumed managment and responsibility for the SDA entirely and completely. So we began a lot of water studies, infiltration studies and looked at what the source of the water was; a vertical infiltration source or a lateral infiltration source. Basically they were non-conclusive so we dealt with both of them. We put the black geomembrane cover over the surface of the trenches as you can see in the picture, which caused a vertical source. And then along the most western edge of the southern trenches, trench 14 up on the top, that trench was experiencing significant water level increases in the early '90s, so we put a barrier wall, slurry wall that runs thirty feet deep along the whole western edge of the southern trenches. Since that time, since the cover and slurry wall were installed, basically water levels have stabilized, we haven't seen any increases, so they've been very effective in dealing with the main near-term challenge of the disposal area. Both those covers and the slurry wall were put as interim measures under a consent order. It's understood to be a temporary solution to an ongoing problem that needs to be continually monitored and watched.

There's an extensive groundwater monitoring program around that facility.

Twenty-one ground monitoring wells that circle the facility, so we do monitor those for contamination. Thus far there are no plumes or anything originating from the facility, and it's been a lateral flow through that till, it is basically nonintrusive, very tight till.

The long-term challenge will be erosion. As with a number of facilities, it's surrounded by three creeks; Urban Brook on the north end and Frank's Creek that wraps around it on the south and the east end. The other thing I should point out in this facility, it's keyed right into the NDA in the project, as you can see it's adjacent to it, but it falls under a completely different regulatory scheme. New York State was an agreement state when the facility was built, so it was licensed by New York State Department of Labor, and also at the time had a Department of Health exemption from the sanitary health code, and so that's how it was constructed and licensed in '63 time frame.

Current day it is now licensed by New York State Department of Labor and regulated under our radiological discharge permit from the New York State Department of Environmental

Conservation as well as the permit for the buildings that are on the site because the leachate that was going to be removed. We did have one tank of leachate that was removed in the '91 time frame that was a mixed waste tank.

MR. HINZE: May I ask, you show drums there. Is the waste that's in the trenches all in drums or are there other packaging schemes?

MS. GERWITZ: That's a good question. Historically in the cut and fill operation the wasteforms came in and in just about any wasteform you can imagine; there was drummed waste, they came in cardboard canisters, they came in plastic bags to concrete casts or loose soil we received loose soil from the Middlesex decontamination as well, and they were put right in these on-line disposal trenches in the tight clay. That picture, it shows the drums, you can see the reflection of the drums in the water in the bottom of the trench. Again, water management has been a problem since the beginning so even when they were putting the waste in the trench, they were removing water as they were filling it into a couple lagoons that were located next to the disposal trenches in order to allow the operation to begin. So that has been a historical challenge.

MR. JACKSON: Next slide, please. NRC-licensed disposal area is on about 5.5 acres there again just west of the SDA. As Colleen said, they're pretty well linked, they're in the same sort of clay and so there's really not a lot of difference other than the regulatory scheme there and what's in them I guess. Basically what you see there is the buildings. There is an interim waste storage facility. This is just a small building where the project stores some waste for an interim period before it gets disposed of. And then in this quonset hut type building here we have, we call it the NDA liquid pretreated system. Back in the, I think it was in the mid-'90s there was some kerosene-like material that surfaced, and there was a trench put in, kind of a French drain that goes in here to capture any fluid. And it's never been used. There's nothing there really. It went all the way over to that particular trench, but we did put a system in to catch it before it reached the creek if we ever needed to. And it is servicable, it still works, it just has never had to operate.

Next slide, please. Basically the description of it: It occupies about five and a half acres. It's about 400 yards south of the former reprocessing center. It's part of the original license for the reprocessing operations. While NFS was operating the facility, the more radioactively contaminated waste that they brought out of the process building is what is buried in that particular facility. I believe they used a clam shell type configuration, they went down to have more of a, as opposed to the trenches, they had more of a hole they dug in and lowered waste down in with cranes. They had, between '66 and '82 NFS operated the site. And then the West Valley Demonstration Project used it for about four years. We put some trenches in and disposed some of the waste, as we were intitially decontaminating the main process building, some of the low-level waste that we had coming out of there is buried in the trenches there.

When we get into the next one, I'll explain how things are buried in there. Between '66 and '82 approximately 162,000 cubic feet were buried, were disposed of in 239 separate holes.

The higher activity went to 50 to 70 feet deep, other material 20 to 30 feet deep. The waste included spent fuel hardware, damaged fuel elements, ion exchange resins, some of the general plant waste, air filters, solvents. As they would chop up the spent fuel, a lot of the, again, the cladding, things like that that were around the spent fuel were buried out there as well.

Next slide, please. This is a layout of the NDA. And basically in the U-shape, NFS utilized the outside, these are the holes that they put in the NDA to bury waste from the NFS operations, and what you see here in the middle are the trenches that WVDP used for those four years. As we talked about a little bit on the tour yesterday, there's really -- the truly hot stuff was put in there during NFS operation. There's about 99 percent of the curies are on the outside holes here in the U-shape. One of the things that, we talked about roles and responsibilities, one of the things that DOE does while we are conducting the project is that we manage that. Now, it was closed back in '86 time frame, but again, we basically keep the cap there. We have a lot of monitorinig wells around it as well to make sure nothing's moving. Again, that's just one of those things where we have an ongoing monitoring operation for that facility.

DR. CLARKE: You said it was closed in '86. Does that have an engineered cover?

MR. JACKSON: Yeah, there is a, I believe there's, I don't have all the details, but I think there's clay, I think there's a geomembrane underneath there. Anybody have details on what kind of cap we have on the NDA?

UNIDENTIFIED SPEAKER: Just clay.

MR. JACKSON: Okay. The high-level waste tank farm. The four underground tanks that we've dealt over the years, 8D-1 and 8D-2 are the larger tanks, carbon steel 750,000 gallons each. 8D-2 was the main receiver of the waste from the Nuclear Service operations, so that is the tank that had the 600,000 gallons in. 8D-3 and 4 are smaller stainless steel tanks, about 14, 15,000 gallons each.

As we operated the waste tank farm and going in to process that waste, we put in a supernatant treatment system. And what we did is take -- 8D-1 was a spare tank. We put ionization columns in that tank so that we could draw the supernatant off the top of 8D-2. This went on for seven or eight years where we made these cement drums to where we could get down to the sludge on the bottom of 8D-2, and that became the candidate for vitrification. Again, we had to do quite a bit of work there as far as, you know, washing it, getting the salts out of it, that sort of thing. That was what wound up becoming those 20,000 drums of cemented waste that we have on site. We've operated the ventilation systems, they're still in operation today. We had mobilization and transfer systems in there. Again, that was an intricate set of pumps that had, were fifty feet long to mobilize so we had a homogeneous mix which was part of our recipe to make sure that we had a fairly consistent recipe as we processed those 275 canisters. There is a nitrogen inerting system in annular space around the tanks and we do have a groundwater management system. So those tanks, again, being carbon steel, they sit, and you can see the base here when they were being built, you know, they're basically, there's a concrete vault around them, they sit on perlite blocks. There's a pan underneath each one of the big tanks, and like I say, it's a carbon steel tank. So we've done erosion studies on those, again, they're carbon steel, they rust. So you could look at the data and it could be anywhere from they have some life left in them to it should be leaking by now. The best we can do is get the waste out of them. We've done that.

If you could, on the next slide, please. We are down to about five inches in one tank, and a little over an inch in the other. So again, we've gotten the majority of the liquid out of the tank. Again just from a construction standpoint so that you know what we're talking about, the tanks are twenty-seven feet high, seventy feet in diameter. They were not made to be a conveniently decontaminated piece of equipment. There's a lot of columns, structural framework in the bottom to hold the columns, because basically they're flat bottom tanks so the columns hold the tank up. As you saw in the tour yesterday, there's quite a grid work over top of the tank farm. That was put in there by DOE to hold the pumps up as we were doing transferring of the waste, we didn't want the weight of those pumps to be on top of the tanks. So that's what the steel structure is, that you saw yesterday in the tank farm. But as I said, they are in a pan, in a vault. 8D-2 pan there is a breach in there and there is a small amount of contamination in the vault.

Next slide, please. As I was saying 8D-1 was a backup tank for 8D-2, so we put the supernatant treatment system in there. As those ionization columns got fully loaded, we would dump that zeolite down into the bottom of the tank, mobilize that and send it over to 8D-2 while we were operating the vitrification facility. So again, a vast majority of cesium and zeolite has been vitrified and is in storage within the 275 canisters. Approximately 79 percent of the cesium was transferred into 8D-2 out of that system. And as I said, there's about 5.1 inches there and about 12,000 gallons. As we decon that tank, there's pumps that need to come out and the tooling that we put in there to clean it.

8D-2, this was the one tank that housed the 600,000 gallons. More than 99 percent of that activity was taken out of there. The -- we used sluicers to mobilize the waste in that tank. We also, towards the end of vitrification we put some robotic arms down in there where they pump they use the water within the tank to wash down the sides of the column, the base so that we could get as much waste out of there as we could. Currently there's about 1.2 inches in there, about 4,500 gallons. There's about, what, 17,000 gallons total between the two tanks in there. We started out, again, with close to 30 million curies in those tanks and now we're down to 250,000 curies that still remain. Again, the inventory that is associated with that tank right now, there's remote pumps, two transfer pumps, and camera and tool delivery systems still there.

Tanks 8D-3 and 8D-4 are over northeast of the 8D-1 and 8D-2. Again, they're in their own pit. Those are the stainless steel tanks that are 42,000 gallons. 8D-3 was a backup for 8D-4. Helped us out a little bit with the supernatant treatment system, that's what that STS is for.

8D-4 stored the Thorex waste. We removed that in '95, neutralized it, put it in with 8D-2 with the Purex waste, and ultimately it became part of the feed stream to the vitrification facility. So, again, it's all been vitirified as well. We washed that tank two times with acid washing. Any questions on the tank farm?

MR. HINZE: Is there any groundwater leakage into the concrete tanks into --

MR. JACKSON: We have had some groundwater leakage, yes, into the tanks, and we have the ability to pump that out, we have a level protection in the vaults, in the pans, and we can pump that out of there.

MR. HINZE: Do you have any humidity control?

MR. JACKSON: That's the nitrogen system, the nitrogen inerting system in the annular space, that's the control that we have currently.

MR. CROFF: Couple questions on the numbers. Quarter of a million curies; how is that split between the cesium sludge and the zeolite and the liquid in the tanks?

MR. JACKSON: This is Dan Meese (phonetic), he works with WB Unesco. He's one of the site managers and responsible for the tank farm.

MR. MEESE: The question is specifically 8D-2 or 8D-1?

MR. CROFF: I asked about both of them.

MR. MEESE: Okay. In 8D-2 essentially there is very little activity on the bottom of that tank. Most of the activity is material that has been crusted onto the interior surfaces of the tank, especially the wall surfaces which we washed with sluicers, but despite washing, a large portion of it is still there. Our best estimate conservatively, total activity in 8D-2 is around 25,000 curies, excluding daughters now. Most of that, nearly all of that would be the cesium and the strontium with a real small amount being Alpha transuranic, although that's the longest-lived material. Roughly 300 curies of the long-lived Alpha transuranic curies, and essentially the rest of the 25,000 cesium and strontium. Now, if you want total activity you have to add the barium and yttrium daughters to those, too.

If you're talking 8D-1, 8D-1 is around 150,000 curies. That's probably 99 percent cesium left on the zeolite product that was used for the pretreatment of the supernatant and sludge wash and maybe a handful at most of the Alpha transuranic curies in that tank. Now, that's the tank itself. In addition to that tank, it has a supernatant treatment system components, the zeolite columns, some of the processing vessels and tanks and filters that were used for the pretreatment process. Now, that system in addition to the numbers I just gave you for 8D-1 has roughly 60 to 90,000 curies of cesium in those vessels within that tank. And again, negligible amount of Alpha transuranics in those vessels.

MR. JACKSON: One of the things Dan mentioned on 8D-2, there is the Alpha transuranic that's crusted on the wall. Just a historical point, in the operations for Nuclear Fuel Services there's a heat exchanger in that tank, and they would turn it off basically, when they used to have water management issues, they would turn it off, and let the level go down, and then turn it back on. As Dan was talking about, we did put a sluicer in there and try to wash that down. It was minimally effective as far as getting that off there.

DR. PARKER: I gather from what we just heard that there's not a really insoluable sludge on the bottom, most of the material that's still there is in the equipment; is that right?

MR. JACKSON: That's correct. There are some piles of zeolite, you know, when we used these large mobilization pumps to move that towards the transfer pumps, but there were some places where we couldn't reach very well so there are a few small piles of zeolite.

DR. PARKER: How did the bottom get pierced, was it corrosion?

MR. JACKSON: Yeah, in the pan I believe it is, yeah.

DR. PARKER: Thank you.

MR. JACKSON: The next topic we're going to cover is groundwater contamination and management. In '93 contaminated groundwater surfaced in some ditches on the North Plateau. And, again, I apologize to those of you who didn't get to go on the tour yesterday because down this road over here where we took our first steps on the erosion tour are the ditches that I'm talking about. We started seeing some contamination surface down in here, so we went searching for the source of where that was coming from. So back in the '94 time frame we did a geoprobe survey to determine the nature and the extent of the plume and of the contamination. And the report which was issued in '95, and I believe it's available if you'd like to see it, reports the results. And basically what we found is the primary isotope was Strontium-90, and the primary source, going back through, it's right here on the back side of the main process building. There was a leak at one point during NFS operations, I believe it was back in the '71 time frame, that leaked down between some expansion joints between the concrete and went down underneath the back part of the plant there. And I believe because of the makeup of the clay underneath there that there's a lot -- cesium is hung up under there, but the Strontium is really what's moving down in that kind of the north easterly direction.

Next slide, please. Here's a layout of basically the levels that we have in there, and I believe it's in curies per liter. Basically this indicates the plume to you here. And a couple things that we have done in the management of this is to, we have a pump and treat system and you see, again, there's all kinds of wells in here where we're monitoring and there's a few we pump from. And then we also put in a permeable treatment well, which I will get to in the next slide or two, but again, this just kind of gives you, as we have mapped this plume out, that's what it looks like. Again, right out at the edge of the project premises there's a fence right here, and it is starting to surface right out here. The point of compliance, by the way, just so that you know is out where Buttermilk Creek reaches Cattaraugus Creek, which is quite a ways, a mile or so away, down off the project premises.

Next slide, please. Okay. We put a pump and treat system in in the fall of '95, and basically we run that water back through our liquid waste treatment system, our LLW-2 plant that we have, which treats all the other water that we have on site before it can be discharged. So, again, we have some pretty stringent standards through a SPDES permit. And ultimately, again, after this water is all treated, it gets discharged out into Frank's Creek.

Infiltration controls and drainage improvements were made during the 1996 and '97 time frame trying to keep the plume from recharging itself. Groundwater and surface water monitoring on and off the site. It doesn't really ensure public protection, but I believe it helps us understand that we don't have a public health and safety problem with this plume. The maximum potential dose, again, this is through studies that we've done, the analysis that we've done over time, we had a report issued in 2004 and the maximally exposed off-site individual could get a, less than a tenth of a millirem.

Next slide, please. As we were exploring other designs and ways to treat this plume, one of the technologies that was out there was a permeable treatment wall. And in '99 we evaluated this in-situ design and, again, where you put a clinoptilolite, a zeolite-type material, that would capture the Strontium as it went through there. And we put that in. It's been, I want to say, minimally effective because, again, as we put those pilings in right here, we drove those into the ground and vibrated it down into the ground, and we found over time as we've been watching the water, that it's not as effective as we wanted it to be going through it. A lot of it just kind of seems to go around this wall. So we believe there was a skinning of sorts as this was vibrated down into the ground. So it's helpful, but I want to say it's not as good as we wanted it to be. There's the specs on it. Basically thirty feet long, six feet wide and twenty-six feet deep.

Next slide, please. We did an assessment report in the fall of 2002 regarding that performance. They removed the Strontium-90, and the treated water is exiting portions of the PTW, but again, like I say, it's marginally effective. In 2003 a draft report assessing the potential doses to humans and biota was completed. And in terms of future doses to humans, it's predicted to remain below existing and recommended standards. So, again, we felt pretty good after that report was completed. Our path forward for that plume is to continue to pump and treat it, continue monitoring, and keep looking at the performance of the permeable treatment wall.

The key challenges for us at this point, we've been working on the decommissioning EIS for quite some time. We've just in the last month or so delivered the predecisional draft or kind of a preliminary draft I guess, not predecisional, to the regulators for, we're going to be reviewing that and taking comments on that for the next four, five, six months resolving those comments and ultimately we're hoping to get that up for public review towards the end of next year. And while we are working through the EIS process and making final decisions for the project, we are going to be conducting the interim waste management facility dismantling work that I've discussed a little bit in the past. Again, we're getting rid of -- as we get rid of waste off site, we're getting rid of the building, we're getting rid of a lot of the infrastructure, a lot of things that we have had to keep in place as we've been conducting the project. That's going to be our focus now for the next four, five years. Questions?

DR. CLARKE: T. J., thank you very much for. I would like to start the questions with the panel, but before I do that I asked my friend Dr. Hinze to defer a question this morning until later. I believe you had a question on roles and responsibilities.

MR. HINZE: It's been answered, thank you.

DR. CLARKE: Thank you. Dave, would

you like to go?

DR. KOCHER: I had a question for Colleen. You're collecting water from trenches in the NDA, right?

MS. GERWITZ: There was water that had infiltrated into the trenches, so there is water in the trenches.

DR. KOCHER: Are you monitoring activity levels over time? I mean this is good data.

MS. GERWITZ: Do we routinely sample the leachate in the SDA? If that's what you're asking, the answer's no, we don't. There was some sampling done back in the, I think, early '80s, late '70s time frame, some analysis from the trenches. And then in '91 we removed about 7,500 gallons of leachate. That's stored in a tank, and we have a complete analysis of that leachate, but we don't track it.

DR. KOCHER: I have no idea about cost benefit and all of that, but somehow this is an opportunity to check on source modeling. It seems a shame not to measure gross output or gross data or something like that to look for a time frame.

MS. GERWITZ: The other thing I think we know or believe kind of happens in the trenches, the interconnectedness between the sump and the rest of the trench is sometimes questionable. The interconnectedness between the trenches is sometimes a question, because we've seen the levels in one trench kind of track with the other when we saw the increases. Now, like I've said, they've stabilized, that was our goal at this point to make sure we didn't have any chemical releases to the environment. We've accomplished that, but right now it's kind of in a maintenance mode.

DR. NAUMAN: T. J., how much of your legacy waste is suspect TRU? You showed us pictures of the buildings, the quonset huts, et cetera, and they're all packed to the gills with drums and boxes and all kinds of materials. How much of that do you think is suspect TRU versus other types of waste?

MR. JACKSON: The estimates that we have, and I believe it's high, is about 50,000 cubic feet of TRU.

DR. NAUMAN: But it's mixed in with all the other stuff?

MR. JACKSON: No. Again, I think there's some of that that ultimately through this sorting process as we package for WIPP and that sort of thing, we may separate out some low-level waste that we can dispose of elsewhere. Most of the TRU we believe is, we've identified it and it's its own drum. I don't believe there's a heavy mixing between that and a low-level waste. As we sort some of this waste, I think the numbers will come down.

DR. NAUMAN: Does all the waste have to be sorted through your remote-handled facilities we saw yesterday?

MR. JACKSON: No.

DR. NAUMAN: It can all be sorted somewhere else?

MR. JACKSON: Yeah, in those big -- this might not help the audience, but I can go over there. Basically in these buildings right here we have a couple of sorting areas where we have some tippers where we're dumping out boxes and they're repackaging them here. Again, the remote-handled waste facility is just that, it's a place where the boxes that the workers can't get physically close to are being done with tooling and behind concrete walls here. But a lot of the low-level waste is being sorted hands-on right down here in these facilities.

So you all know what I just said, those facilities right there, we have a couple of different areas that we, we've cleaned out the western part, this side of that building right there, and there are a couple of sorting facilities in there where we are actively, you know, to the tune of ten, twenty boxes a day now dumping out boxes, resorting them, repackaging them and getting those ready to dispose of off site. We have another little facilities that's in a depot that's just been built off of the side of this one where there's another sorting facility. So we have three, four different places on site where workers are actively resorting waste and getting it ready to ship off site. And, again, a lot of that is due to the nature, this stuff was put in boxes ten, fifteen or more years ago. And so now in order to meet and ensure and guarantee that we meet the waste acceptance criteria for disposal sites, that's why we're resorting and repacking.

DR. NAUMAN: The supernatant drums

that you mentioned, what's the final destination for those?

MR. JACKSON: Those which, again, I'll just repeat are located down here. We've had the Nevada Test Site evaluate the waste profile for those and they believe that they meet their waste profile, and so hence it would be low-level waste. The whole waste determination process right now is under review, as we talked about this morning a little bit. You know 3116 is applicable to -- this is something I really wanted to say as well and he's coming back, so I'll hold off on that a little bit. But right now we're holding off on shipping that waste out of here until we have approval to dispose of that waste.

Dr. Parker, I think you had asked a question earlier today about going through a waste determination process. And maybe you could repeat the question on 3116 being applicable to South Carolina, Idaho and the state of Washington.

DR. PARKER: Not Washington.

MR. JACKSON: One of the things that DOE is doing, and we are working actively with our headquarter's counterparts, we at West Valley are working to have a commensurate program that would pass muster within the 3116 regulations, and also DOE 435.1 which was kind of the regulation that was challenged in court for doing waste incidental to processing evaluations. So again we are actively working to develop a process which is going to have the same sort of process that the 3116 is where it's going to have a public review process, and it will be reviewed by NRC and so again we're just working through all of the implementaion aspects of how we're going to proceed with that.

I believe DOE right now is focused extensively on South Carolina and Idaho to get a process that meets their satisfaction. But ultimately I think that's what's going to hold us up on disposing that waste.

DR. NAUMAN: The basis of my question was 3116 tied to cementous waste that came out of the supernatant.

MR. JACKSON: Well, the answer's no, but ultimately we are going to utilize the lessons learned as we go through and get an approved process for waste determination as we're ultimately looking over their shoulder.

DR. NAUMAN: Finally, who owns the

en reactor fuel in the NDA?

MR. JACKSON: New York State. We're managing it. It is within the project premises, but I do not believe it is part of the West Valley Demonstration Project Act to remediate that particular waste.

DR. PARKER: As long as we brought up 313, one part of it dealt with in there what to do with the tanks. I didn't hear any descriptions of what you plan to do with the tanks here. Are you going to try to recoup more of the material or are you going to actually try to pull the tanks out?

MR. JACKSON: All of those activities are being evaluated right now in the alternatives within EIS. Again, the final decisions haven't been made yet. We internally have been talking about possibly going back and trying to get some more out of there. Just to take you back into our operational history, at the time we were operating the vitrification facility for about a six and a half year period, the first couple of years we would take a straight batch out of the waste tank farm, put it through the vitrification facility and turn it into glass. I want to say the last four years or so of that operation of that facility we would bring diluted mostly water in from the waste tank farm. And all these pumps that were mobilizing the waste and transferring leaked, and so we got a lot of water as other projects have as well that have these types of tanks that need pumping. We had a lot of water going into the tanks from that. So again, we had a lot of diluted waste in those tanks. We'd bring a batch over, boil it down, bring another batch over, boil it down. And so I want to say for the last four years of processing, we were doing water management. And so, again, getting back to your question; what are we going to do with those tanks? Again, the ultimate decision is yet to be made on those.

DR. PARKER: I assume that holds true for the debris in the tanks, the pumps --

MR. JACKSON: Yeah, right. Some of those, again, I could see where we may be able to take some of those things out and dispose of them at this point. But the ultimate disposition of the tanks themselves, whether to exhume them or close them in place, that's yet to be resolved.

DR. PARKER: I have another question

that follows a little bit on what Tom said about the spent fuel and waste disposal ground; are those commercial fuels or Naval fuels?

MR. JACKSON: I think that was en reactor fuel.

UNIDENTIFIED SPEAKER: The fuel that's buried in the NDA was from the en reactor. It's my understanding they reviewed the site, there was local chaos because it was leaking inside, there was no capabilility at the reprocessing facility to deal with that. NRC then allowed NFS to dispose of that waste in the NDA.

DR. PARKER: I'm not sure if my memory's right, I thought at one time you did some Naval fuels here.

UNIDENTIFIED SPEAKER: Oh, you mean the fuel reprocessed here? I believe it was mostly en reactor, I believe it was en reactor fuel.

MR. JACKSON: Come on up here, Herman. This is Herman Moore, he's with the DOE staff.

MR. MOORE: Yeah, there was basically twenty-seven campaigns. Twenty-six were mainly the fuel that was brought in, fuel assemblies and then there was one run of some testing material that they had brought in to get the facility up and running, but basically it was mostly en reactor fuel that came in. The first three campaigns were en reactor, then they brought in some commercial fuel, then back to en reactor. There was two other sites basically that were involved with the DOE and the federal, and one was a site in Peurto Ricco, there was some fuel that came from there. There was one other site, which I can't recall at this time.

DR. PARKER: Thank you.

DR. CLARKE: Please, let me remind you if you have a response, please come up and use the microphone so that our reporter can capture what you say. Dr. Ryan?

CHAIRMAN RYAN: One follow-up to Dave Kocher's question on the liquid that's still in the disposal cell. One of the parameters that would be fabulous to know is what fraction of radioactive material that you claim is in a saturated condition versus some less-than-saturated condition. And that's kind of a laboratory in that regard, I don't know if it's a perfect one because you don't control all the conditions going in, but it would be interesting to think about would that better risk-inform long-term behavior of waste in a saturated environment. I wouldn't go so far as to say let's recommend a study program, but it might be interesting to think about that. And if there is some value to looking at that over time or if there's some historical data that could be used, that might be worth doing because that is a key parameter and we do know, if I'm not mistaken, 1015.61 was informed by some earlier activity at West Valley, and that's the basis for saturated conditions versus unsaturated rated conditions. Just something to think about in follow-up, that might be a real interesting area pursued. That's all.

DR. WEINER: T. J., do you have intermediate milestones? And if you do, who sets them? In other words, you say that by 2008, by 2009 something's to going to happen, but are there intermediate milestones that you have to meet?

MR. JACKSON: Currently -- I'm glad you asked that, Ruth. Actually, the reason I hesitate is that contractually we are coming up on the end of a contract here in December, and so ultimately we are looking ahead at how we're going to proceed and laying out that next scope of work. There is a group in the DOE right now, that's putting together the procurement package for three to four years' worth of work which is in general terms what I just told you as far as shipping the rest of the waste off site, processing the remote-handled waste, getting our relationship established with WIPP so we can dispose of the TRU. So all those things we know we have to do in accordance with the act that may not be dependent on the decisions that come out of the EIS we're going to proceed with. And so there's a lot of work left to do, and that's the only reason I'm not giving you all of those milestones. Will there be milestones? Absolutely, as to how we accomplish those. But there are some of those that are going to require government intervention to resolve this waste determination issue. We do have to get again certified to be able to ship to WIPP. And, again, that's kind of tied up with the whole defense determination, origin of the waste, whether it was comingled here, whether or not, again, WIPP did take something that came from a commercial operation. So there's a lot of interaction that has to occur here before that actual work can be done. We're just preparing that when we finally get those agreements in place, we'll have a wasteform acceptable to ship.

DR. WEINER: Let me rephrase the question to make my point a little better. You obviously set schedules for yourself, and I'm not asking about the details, but in general have you met those schedules that you and that DOE and other people on the site, NRC, NYSERDA, have you generally met those schedules to people's satisfaction, or have there been a lot of delays?

MR. JACKSON: We're on the site now going on twenty-three, twenty-four years. I would say we've had a lot of delays over time. I think the original framers, I'll just throw a few things out at you, I think the framers of the Act originally envisioned the original estimate for this project was in the hundreds of millions, lower hundreds of millions of dollars, and probably take, whatever, five, seven years to get done. I believe that the framers expected that there were disposal cells, that the decontamination that DOE was being required to do in the main process building, that the disposal would be right down here. That would affect the cost, that would affect the schedule. As we've said here in a couple of our presentations, the state-licensed disposal area shut down in '75. The NDA shut down in '85, '86 and so that changes, okay, what are you going to do with this stuff. That's why I said we didn't ship waste for a very long time, we started building storage facilities to house it. And so, again, getting the vitrification recipe and everything ready to go took a little longer than what I believe the original estimation.

Have we met current milestones and getting things done as we went -- when we re-baselined the project back in the late '80s, early '90s, we did meet the schedule as far as getting phase one done to where we had that first couple of years vit done in the '97 time frame. But, like I say, long-term, you look back over your shoulder, say we've been at this for twenty-four years, I would say it was never envisioned it was going to take this long.

DR. WEINER: Are there any facilities that you can foresee are going to give you particular problems? I'm thinking of --

MR. JACKSON: Politically, technically?

DR. WEINER: No, no, technically. I'm thinking an analogue of Building 371 at Rocky Flats which had some severe technical problems, and you don't have anything like that, but is there any particular area or building or site where you see where there is some unique technical problem that would interfere with the schedule for --

MR. JACKSON: You know, I'll focus on the tank farm. That bathtub ring is one where I haven't seen the performance assessment data and depending on the closure engineering the technologies that's used. That's going to be, you know, it's going to be a challenge whether or not we close it in place and the design we have to use to close it, or if we have to exhume it, where am I going to send it? You know, because it does not meet any sort of waste acceptance criteria that I'm aware of that the repository is using, if I'm truly treating it as high-level waste. It's going to be a challenge and politically as well on whatever decision was made.

DR. WEINER: That's the kind of thing I was talking about. Finally, you mentioned that you're meeting standards for human health and biota. I was not aware that we had standards for biota, do we?

MR. JACKSON: This is Bob Stiener, he works for a Washington group, Safety Management Solutions.

MR. STIENER: When T. J. was referring to biota, DOE does have some guidelines in their orders for biota, and actually you'll see in, starting I think a couple years ago, in the annual site environmental reports there is a write-up on the evaluation and what the basis of that is, and also the analysis that we do to show that that standard is being met. But I believe it's some guidelines suggested as well as established guidelines from the DOE orders.

DR. WEINER: I see, thanks.

MR. JACKSON: If you'd like we could get you those.

DR. WEINER: Thank you. That would be very helpful.

MR. HINZE: A brief question. Somewhat tangential, but in the spirit of lessons learned in decommissioning, you have recently constructed the remote-handled waste facility and you're going to be decommissioning that in a few years. What kind of lessons did you incorporate from the previous work in the construction of that facility that might be useful to all of us?

MR. JACKSON: Well, we've done quite a bit of exchange. There's been a lot of technology transfer done throughout the Department of Energy and WB Anesco has participated in, their main company has major contracts throughout WVDP complex. So we have shared lessons learned about, we have valued engineering studies done when we design that building. We've sent, again, our workers, engineers off to other facilities that had remote-handling issues and tooling. And so there's, I don't know that I'm going to answer your question specifically as to all of the lessons learned I've used. All I know is we've done quite a bit of benchmarking before we finalized the design of that building so that -- and we've done some of our own here as we went in when we were on tour when we looked in the chemical processing where the canisters are stored now, back in the early '80s we, WB Anesco, had workers that remotely size-reduced much of the equipment in that chemical process cell. So, again, some of those folks helped us as we were doing design reviews on the remote-handled waste facility to use the lessons learned as we did some of the hotter work a few years back. We also try to use the lessons learned from other DOE facilities.

MR. HINZE: No, I was looking for examples of design characteristics that might have employed lessons learned.

MR. MOORE: I guess we just had a couple of them as far as, you know, from doing the decontamination in some of the PMC cells, head-end cells, you know, they weren't fully lined, stainless steel lined and we basically took that over and built that into that cells with stainless steel lines so when we go to decontaminate and disassemble the facility, it would be a lot easier than what we had as far as these older cells. Basically that was one of them.

And then some of the tooling that we used in decontaminating the head-end cells we transferred some of that technology over as far as some of the cells and things like that. We also have used over in the vitrification facility a block that had snippers on the end, and I know we had been looking at that also if it would help our production in the remote-handled waste facility. But I don't think we're done with the values on that yet.

MR. JACKSON: Anything else? We're ahead of schedule.

DR. FLACK: Just a few questions I want to get in before Latiff, because I know he has about a dozen. T. J., with respect to background, why was this site chosen to begin with just out of curiosity; was it geological reasons? I mean they close the site, I guess, way back.

MR. JACKSON: I guess I want to turn that over to New York as far as, I don't know that I'm the right one to ask for the overall history of why this was chosen. I think for the NDA and SDA, I think there was a reason why those were put in the clay where they are. I think, if I were just venturing my opinion, you know, that this is an area where industry was new, New York State was very interested in getting on board with an upcoming technology. And so, again, I believe as they took the land here by eminent domain, they saw this as a nuclear corridor where there were going to be some other things done as well.

DR. FLACK: My other question relates back to the plume, I guess. I was looking at figure 23 where you showed the plume itself. My question is you talked about the maximum potential dose to an off-site individual is .031 millirem on the follow-up view graph?

MR. JACKSON: Uh huh.

DR. FLACK: Did that come out of the PA, that estimate? I mean how was that calculated?

MR. JACKSON: I'm going to turn it back over to Mr. Stiener again. He is our resident plume expert.

MR. STIENER: As far as the dose calculation, the information provided on 24, that number is actually, I'll say, a present day number that's reported in our site environmental report which is based on, basically I believe it's based on the maximum potential doses of off-site consumer of fish down in Cattaraugus Creek, which is sort of the first publicly accessible point. So based on the activity level -- the plume basically seeps into surface waters in the ditches on site, as T. J. mentioned, and then flows off site via surface water, so the dose calculation to the maximally exposed individual is based on fish consumption in that creek. That's where that number is generated from.

DR. FLACK: Okay. And how far in the future is that calculation?

MR. STIENER: This number right here is actually present day. That's based on present data. There was another, I believe it did refer to some sort of predictive modeling that was done. Let's see. No, I guess that was it -- or no, here, on Page 26 there's a bullet that says future refers to future doses predicted to remain below, I believe that's based on, you know, modeling out the progression of the plume using a model and then, again, I think, I believe that was also based on the same kind of consumption, you know, assuming that the present day controls stayed in place that someone, with the dose being someone consuming fish in the creek. And I believe that number was still quite low, the actual number I believe was still less than, like, one millirem was the peak dose that that modeling showed.

DR. FLACK: Okay. Less than one million. That would be how far into the future, did you say?

MR. STIENER: I'm trying to recall. I believe it was, the year 2029 sticks in my mind, somewhere out I'll say, you know, twenty-five to thirty years.

DR. FLACK: And the I guess the question on the plume and how it's propagating, this is a present day shot now of what we think the plume looks like today?

MR. STIENER: Quite close. The date on the bottom is from January of '04. I think we do have a more recent hard copy here, but it's still quite close to what it looks like today.

DR. FLACK: Is it changing much? Like, could you describe the change, say, over the last five years in size? I mean, is it what is expected?

MR. STIENER: Sure. Basically what we're seeing, this area down here is what we refer to as the, kind of the leading edge of the plume. What we see in the original investigation which was done in 1994, we saw, you know, pretty much this general outline was in place here and this, what we refer to the first lobe of the plume was pronounced, and as T. J. mentioned, we were seeing some seepage into the drainage ditches. And also, this is really off the project premises pathway, it was seeping into this ditch up here and then flowing off site.

This second or eastern lobe of the plume which, without getting too detailed, is based on some differences in geology and the lower portion of the upper aquifer, you know, back, say, five or ten years ago, you know, this area, this is probably where the most changes occur in present day. These levels out here kind of fluctuate up and down and out in this year here, and you know, as we do along this edge we're still seeing some upward trends in these wells out here where things are changing.

I guess how rapidly is somewhat relative. I believe this is maybe a 100,000 picocurie per liter contours. Five years, going by memory, we were probably back somewhat in this area. But if you look at these wells out on the on the very edge here, you know, those trend graphs are still going up. What we see in terms of the level, we monitor where this surface ditch drains off site here, those levels, it's hard to get a real good read because they fluctuate up and down quite a bit as you would expect with precipitation. You know, we have the pump and treat system in here to help mitigate some of the movement through this area. But if you look at the long-term trends, it seems like they have somewhat, somewhat I'll say leveled off. We still see some peaks and valleys in that, and I guess moving back into the main body of the plume, some of the wells which are some of the higher activity wells back upgradient have seemed over the last several years to have somewhat leveled off. So it at least appears that the, since it's been an inactive source other than just contaminated soil, you know, continuing to release Strontium over time that these levels have somewhat leveled off, and have even shown some signs, you know, this 100,000 picocuries has somewhat stabilized, these coutours here, over the last several years. But the leading edge, especially this out in this area is still progressing, I'll say maybe at an intermediate rate.

DR. FLACK: Could you give me just a dimension on that?

MR. STIENER: It's hard for me to give -- I guess it's hard for me to put a number on it right now. We could get that information for you in terms of feet per year or --

DR. FLACK: It would be feet per year though, about?

MR. STIENER: Yes.

MR. ESH: If you think about it, the source was put into the ground in 1969 and this is 2004, so over the thirty-five years this is what you have at this point.

DR. FLACK: Okay. The rate's the same is what you're saying more or less?

MR. ESH: Well, you started with the source up in the bottom corner of the figure up there, and this is now to the extent of over thirty-five years.

DR. FLACK: So you just extrapolate that and add a certain rate and you'd get the numbers. You're not really changing, I guess is what you're saying.

MR. HAMDAN: Yesterday and today you gave us a lot of information which is very good, and to some of us it's a lot of education, so thank you very much. But there's one area that I felt that was not discussed in any way yesterday, and not even today, until you came up and that is your monitoring program. Here you have this facility, you have two disposal areas, you have a contamination plume, and we do not see anything about monitoring implications, what you use the monitoring for, how you document monitoring program. So my first question is, if at all possible, if you can have a very brief overview of the monitoring program at the site. That's one question.

The second one: You show on your slide 14, when you talk about changes you commissioned the tanks, but the tanks eventually you consider them to be a challenge and that could be of interest. But also the plume which John mentioned, is that a challenge or not? What are you going to do about the plume that's the groundwater contamination? Is it going to be a big problem, is it going to be a small problem, is it going to be a challenge or not. These are my comments, thanks.

MR. JACKSON: Well, I don't believe I would be able to justice to the environmental monitoring program that we have. Again, the topics that we were asked to present, that's what we prepared for.

DR. CLARKE: T. J., let me do you a favor and let me try to answer Latiff's question. If you go to the Ohio field office home page, you'll find a document list. They publish a annual monitoring report, it's very extensive, all the different media that are being monitored.

MR. JACKSON: That is true. It's not necessarily on the Ohio, but it's on the WVDP.DOE.GOV, and that is the place to find it.

Now, one of the things that we haven't spent much time on here, and I don't know that I want to spend too much time on it, New York has said, and there are differences of opinion of roles and responsibilities for what the final end state for the project will be and who is ultimately responsible to be the steward, and so again, while DOE is conducting the project that is laid out in the West Valley Demonstration Project Act, we are actively managing the site. So we manage the NDA, we manage the plume. The plume originated prior to DOE coming on site, it is not part of the West Valley Demonstration Project Act as a scope.

We had comminicated back and forth with New York that we would remediate it if they would like us to.

MR. HAMDAN: T. J., my question is strictly technical. Do you see any technical challenges in the plume being there, whether it's remediation, whether it's monitoring?

MR. JACKSON: No, I don't. The studies that have been done have shown that it is not a risk to the off-site population. So it needs to be managed until it decays and goes away. Is there a technical challenge if it needed to be exhumed? No, you just gotta dig up a lot of dirt. Again, is it a technical challenge? I don't think it is. It's time, it's stewardship, it's money that it would take to remediate it if you needed to. But again, the technology's there, it's available.

DR. KOCHER: Your answer to the question about who owns the fuel from Hanford triggered a question to me. I suspect it gets to some of these stewardship issues that we've been dancing around. Can you go to Page 16 of the presentation here. As you described it, the U-shaped shaded area is disposals during reprocessing operations here by NFS, right?

MR. JACKSON: Uh huh.

DR. KOCHER: And the stuff in the middle was put there during project cleanup activities essentially?

MR. JACKSON: Uh huh.

DR. KOCHER: So I guess the question really is: How is this entire facility going to be treated in the EIS? Because if I go way down the road when DOE is gone, the entire site will revert to a license to NYSERDA and the entire site will have to be remediated according to NRC regulations if the license is to be terminated. But in the cleanup plans of this facility, are you treating the shaded areas and the unshaded areas differently in your claim of responsibility?

MR. JACKSON: No, we're evaluating the whole site within the EIS.

DR. KOCHER: And would you then, if the preferred alternative for the EIS called for some kind of remedial action in the shaded area, would you then be responsible for undertaking that action?

MR. JACKSON: Would we be responsible? I would expect that we would have to work that out with New York State with congress. Again, the authorizing legislation that I have to go conduct that project is the Act. It defined for me what my role was and what I'm supposed to do, those five things I said to you. I don't think it was ever envisioned once we were in -- we were actually encouraged to use the NDA when DOE arrived on site. So, again, I don't think it was ever envisioned that we would go back and exhume what we disposed of in that disposal facility. It all comes down to how you cut this thing. If it was required that we needed to go exhume that --

DR. KOCHER: I'm not talking about exhuming, but you could put different caps on it --

MR. JACKSON: Oh, sure.

DR. KOCHER: -- or any kind of remediation?

MR. JACKSON: Sure.

DR. KOCHER: Is it a potential stewardship issue?

MR. JACKSON: Absolutely. I'll give you just an example. If we wanted to cap it, if there was something there that maybe -- it's all doable. There may be a different cost share.

DR. KOCHER: I'm not trying to poke criticism. I'm just trying to understand the lay of the land.

MR. JACKSON: This is one, again, of the overall stewardship issues.

DR. CLARKE: Okay. Thank you. I guess we're into the round table, and I'd like to depart from the format a little bit. Thank you, T. J.

One of the things we want to be sure that we capture are the major observations and the major points that our invited experts would leave us with. I know at least one has some time constraints, so I think this would be a good time to do that. Frank, can we begin with you?

DR. PARKER: Appreciate very much being here. I had been here during the very earliest days during the reprocessing and start of the vitrification and certainly has changed a great deal, so it's been very enlightening for me. The second part is that most of the analysis that we heard about today is still in preliminary form, we've not seen all of the details. We've seen the general outlines. We've seen the differences in approaching performance assessment from the Department of Energy and from the Nuclear Regulatory Commission, but I think they're both doing what would be expected from such experienced people, I don't think there are any real surprises there. They discussed some of them in detail. But in all of these calculations, the devil's in the details, what goes into it the actual numbers and how they're manipulated and what the assumptions are. So I don't think it's possible to make a comprehensive analysis of it, and certainly not in the hours that we have to look at it when teams take weeks or months to do comprehensive analyses like these. It's certainly nothing that jumps out and says that they're on the wrong track.

The Nuclear Regulatory Commission is concerned that this all be a risk-informed approach, which I think I agree with totally, but we've only heard the technical aspects of it here today so we don't know how some of these things would play out or what changes might be made when one takes into account all the other considerations that goes into a risk-informed approach. We haven't heard anything about the exceptions that might be given. We haven't heard anything at all about the trade-offs in doing some of these operations. We haven't heard anything about the risk reductions for the amount of money expended, which again could make a difference in what would actually be done. And so I think we can't really comment on it, it's just too early.

I think the other thing, Mr. Jackson gave a very nice talk and indicated that there are similar problems at the other three sites that have done a reprocessing, he alluded to but we didn't hear any detail about how much technology transfer there is between the sites. Are they actually talking to each other? Are they adopting the best parts that they are learning from each other? The answer may be yes, but at least in some of our recent experience with the other sites, it was not always clear that that was taking place. And I guess that's the only site that's actually cleaned out its, all its tanks. They might have something to learn, and I gather that your tanks look something like the Hanford tanks and Savanah River tanks. You've had the luxury, perhaps, of not having to transfer material from one tank to another, not having to use three different chemical processes which bedevils them, but I think it would be useful if you're not already doing it.

The last question which I would have raised at the round table, in all of the reports that we've seen, not necessarily just here but that deal with the performance assessments and what's going to happen at these very difficult sites that DOE has to deal with, they always talk about DOE's inperpetuity and in the long term. I would certainly like to hear the definition that both DOE and NRC are using for that term. Because the dictionary meaning I don't believe actually portrays what actually takes place or could possibly take place.

DR. CLARKE: Okay. Thank you. Dr. Nauman?

DR. NAUMAN: I also would like to give you or mention my thanks to everyone for opening your doors and inviting us in and giving us a tour and for your discussions yesterday and today. It's very enlighting, and it gives us all a much better appreciation for the challenges and problems that you're trying to deal with here.

From the tour, some of the observations I garnished yesterday from the discussions today is obviously you're focused on the highest risk activities and challenges at the site. Some of the things that you've accomplished to date, vitrification of the waste, cleaning out the spent fuel pools, management of the waste as a whole indicates that your focus is in the right place, eliminating the immediate threat to the environment and the public surrounding that, and I commend you for that effort.

Some of the other observations that I have on the site are not so complimentary, though. There are some challenges there, and in dealing with, and I recognize dealing with the waste problems that you've had not being able to ship off site until recently has congested the site considerably and having the waste stored in various areas is a challenge to any site management program, and you have lots of waste here, there and everywhere on the site that I would commend you for your focus on that. But I would recommend that you continue to focus on that and shrink your waste envelope and get that down to just the, those sources of waste that you can't deal with anymore. But all the low-level waste that you could get off site, the sooner you clean up the various areas, the less risk you would have for the future for an event to happen, a flood, or some other issue that would go through a low-level waste area and spread contamination to other areas. Seeing areas posted, ground areas posted contaminated area, monitor upon exiting is alarming to anybody in the general environment, and the sooner you shrink your footprints the sooner you would be able to imagine those areas more effectively.

My only recommendation is to get on with it and continue to push for funding and efforts to support actively reducing the footprint and get on with the decommissioning activities. Again, I recognize and I appreciate the complexity of the regulatory environment and the responsibility of each party here and how difficult it must be to work together, and what I did hear yesterday and today is various agencies and various groups coming together to try to tackle this problem collectively, and that's a refreshing point of view. Instead of people sitting in different corners pointing fingers, it looks to me like everybody's pulling together, even though they have different opinions on issues, they're pulling together to try to tackle it for the future. Again, thank you for the opportunity to be here.

DR. KOCHER: I would first like to echo a couple of comments that Frank Parker made namely that it's premature to really make judgments about modeling. It seems to me that people are headed in the right direction. I do have a little bit of a concern that the issues of ALARA and cost benefit were not discussed here. But ALARA requirement is just as important to NRC as DOE regulations or NYSERDA requirement.

An idea I had in listening to the modeling, there's all this talk about probabilistic versus deterministic. I'm all for probabilistic modeling, I do think at the same time you have to remember that you're not really solving the problem of uncertainty by doing that, you're just reposing in different terms, because there can be all these uncertainties that are left out of count. Basically what you're trying to do is give a fuller representation of your state of knowledge about something when you do this, but it's not the answer necessarily.

The other thing I came to realize is

that there probably will be important technical issues for the PAs that can't by resolved by observation with field data or past experience. I suspect this erosion issue is going to be out there front and center as a major issue. And my personal opinion on things like this would be when you're faced with a technical issue like that, and you may have a variety of choices that you can make for a basic concept you're going to use to show what happens over the next umpteen thousand years, there's just a temptation to say I'm going to pick this one because I think it's the best, and go model that. If in fact you have two or three alternative interpretations of what might happen and they're all plausible, you really need to model them all, assign subjective weights to your belief that one or the other is true, but don't throw out a plausible model because you like some other model better. You can develop an overall probability distribution incorporating the different concepts with weights on them. You don't have to choose, because if you choose, you are no longer representing your state of knowledge, you have biased your state of knowledge considerably. So keep an open mind about evaluating alternative conceptual models for erosion, flow of the groundwater if that is to be an issue over a long time frame and the like.

And I also, if it's possible to ask a question at this point?

DR. CLARKE: I want to go back and capture Frank's question so go ahead.

DR. KOCHER: For perfectly understandable reasons, the thousand pound gorilla that's not been mentioned here is groundwater protection. I guess I'd like to ask someone from the state of New York if you have regulatory requirements for groundwater protection that would apply to this site or the vicinity of this site. If so, what are they and where would they be applied?

MS. YOUNGBIRD: I'm Barbara Youngbird from the New York State Department of Environmental Conservation. I'm not a water quality expert, I'm in the radiation program. But I am aware of some of the requirements. We do have groundwater quality standards. The Department of Environmental Conservation considers all groundwater a potential source of drinking water; therefore, it is to be protected for its best use as drinking water. At the current time we don't have on our regulations a specific water quality standard for Strontium-90 in groundwater. It was an administrative error that we're looking to correct in the future, but we still believe that groundwater's best use is drinking water, and our department is concerned about the Strontium-90 plume, that it definitely violates that best use issue.

DR. KOCHER: So your inclination would be to apply federal drinking water standards at the source at some location -- not necessarily underneath the source, but somewhere close by? Can you give me an idea of where. Because generally in the waste management business, at least at the federal level, it's generally recognized that there's some area around the scope of the facility itself where drinking water standards cannot apply, it's not practical, but you can get fairly close, I think 100 meters or so. What is the view of the state about the standards; would this entire site eventually be forced to adhere, do you have some buffer zone, some exclusion zone?

MS. YOUNGBIRD: There's not a

specific exclusion zone or buffer zone. A goal is to have groundwater protected, so there's not a cut and dry distance. We're concerned that there's a large plume of very high concentration.

DR. KOCHER: This is likely to be a point of negotiation as we go forward here?

MS. YOUNGBIRD: It's a concern we've certainly raised before and will continue to raise under during the EIS process.

DR. CLARKE: We have a few more minutes before the break. I departed the format to capture all of your observations without really doing a round table just to make sure we did that.

Frank, you had a question about monitoring. If you'd like to ask it at this time, I invite you to do that.

DR. PARKER: Thank you, Jim. The question I asked was in the regulations and in the PAs it always talks about monitoring for very long term, sometimes even said inperpetuity. And I'd like to know what the state and/or DOE and Nuclear Regulatory Commission, how they interpret that. The dictionary definition of inperpetuity doesn't seems to be applicable. Any volunteers?

DR. KOCHER: As far as the eye can see. I think an answer from DOE headquarters would be a thousand years from today every day.

DR. CLARKE: Are there any other questions? Dave?

MR. ESH: If I understand your question correctly, if you remember back to the slide I had up on our regulatory construct for performance assessment. We have unrestricted release, and that's where you don't have monitoring and maintenance, you can maintain the 25 millirem, plus ALARA as Dr. Kocher pointed out.

Then under restrictive release you have 25 millirem, assuming you are able to maintain your monitoring and maintenance, then you have 500 millirem where you assume it fails. So I think under restrictive release, it can extend for as long you need the restrictive release. It may in some circumstances mean that, say you have the Strontium-90 plume, you might need restrictive release for 300 years to ensure that you can protect people from that contamination, because of its half-life, it's roughly down to a reduction of 300 years, it might be acceptable at the end of

300 years.

In our revision to our decommissioning guidance that's ongoing right now and I think it's publicly available for comment right now, there's the concept of a long-term control license. I'm not an expert in this area, but the concept is basically that there may be problems out there in the country that require a long-term active monitoring and maintenance program. And the main difference between that and the restrictive release is that the license is not terminated in the long-term control license, and it basically has a continued NRC oversight of the activities that are ongoing, where for restrictive release, the license is terminated.

Long-term is defined as as long as you need it, depending on the contamination, so it can extend out to extremely long periods of time. Now, myself as a scientist, engineering standpoint, I think it's silly to talk about those time frames. Some sites we talk about, even to put 2 or 300 years in perspective, this country was a lot different 2 or 300 years ago, and it's likely to be a lot different 2 or 300 years in the future. But that is part of the construct that we work in is that we may need to deal with some very long time frames. I think if you are dealing with those time frames, you need to assess the impact of not having that land available for people, and also look at the financial burden of maintaining long-term monitoring and maintenance.

DR. PARKER: I don't disagree with the what you said, but I don't think you answered the question about maintenance if you don't give up the license. How are you going to maintain, how do you provide maintenance for that long-term? That's the question I was really asking.

MR. ESH: Well, the ultimate goal in all of these situations is to not have to rely on those societal aspects. If you can technically solve the problem without relying on some societal presence, control, et cetera, we believe that's the less -- the better, more protective approach to take in the long-term. But there are these situations where you don't have that that are more of a challenge. I don't know what else to say besides that.

You know, under control license there is a mechanism for basically you have to provide financial assurance for whatever monitoring and maintenance you need, so there is an establishment of a fund that provides enough resources based on the, I believe you can earn a minimal amount of interest on your fund, that provides for the financial recourse to make the necessary monitoring and maintenance. So there is an economic thing there, but I guess what you worry about is, you know, legislator decides they need the money somewhere else and they decide to pilfer that fund, that's a legitimate concern, those sorts of things happen. It gets very complicated from a legal and even a financial standpoint.

DR. PARKER: I understand that. I was trying to see if there was any clarity to what the regulators were thinking about.

CHAIRMAN RYAN: You mention in your question something maybe I'd offer a view on. It's the idea of monitoring and modeling as not separate activities but something you could pull together. I think that, you know, when you make a decision and you're moving forward with decommissioning or a decommission site in some status and you're going to monitor a program.

There's two elements to monitoring. One is compliance; did I meet a requirements or did I meet a goal or a calculated goal of some kind. And the other is you can superimpose on the compliance monitoring a value of modeling information, for example, in the leachate example we just kicked around as a possibility is one, water level monitoring and not just water sampling is another for the long-term nature of the saturated zone. Just two simple examples, but I think the strategy is to collect modeling data as well as compliance monitoring maybe, then have a path to increase your confidence in your predictions and maybe decrease your uncertain on future behavior. That's much, much bigger, typically a longer time horizon than a five year or seven year decommissioning project, but I think that's a way to maybe get past the conundrum of, you know, how long is long enough and all of that. You gotta kind of marry up the two. I give my students a problem, well, where do people sample creek water typically? The answer is where the bridge crosses the creek. Well, is that the right spot from a modeling point of view? It might be, it might not, I don't know. But if we could somehow get modeling and monitoring for compliance aligned with each other, it just gives you a strategy to move ahead.

DR. PARKER: Again, I don't disagree with what you said, but you're suggesting that do design a perfect cap, then nothing would happen for a few hundred years. My question is how are we going to be sure there's going to be people out there to do the monitors for that time? We're talking about much longer periods.

CHAIRMAN RYAN: Well, nonetheless, I think the same strategy would apply, then you got the financial assurance questions, and we don't have either the time or energy to deal with many points of view.

DR. PARKER: Someone brought up about whether the financial institutions will last, and we can look back in history and see how long have governments lasted.

CHAIRMAN RYAN: Fair enough.

DR. CLARKE: I think we're seeing where there wasn't a rush to answer your question. This brings us to a break, I'd like to take it, and we're scheduled to come back at 4:15. Let's make it 4:20 we'll have a fifteen minute break, and at that time I will invite comments from the attendees as well.

(RECESS TAKEN)

DR. CLARKE: We'd like to get started again, please. At this time we would like to invite comments from attendees. Please come forward if you'd like to speak, identify yourself and please use the microphone.

MR. BEMBIA: Paul Bembia with NYSERDA. Just a point of clarification just so there's no confusion on the dose estimate that you heard about for the plume. That .031 millirem is only fish consumption and that's at the first public access point and that's down Buttermilk Creek, it's probably three to four miles away from the DOE fence line along the distance of the creek, just so that's clear.

And in terms of the PA. If you assume that there's a driller on site or someone actually drinks the groundwater from that plume, some preliminary dose information from some time ago showed that the doses were tens of thousands of millirem and for someone who actually came onto the site with the plume as it is and drank from it. So the .031 millirem is today's operational dose on Cattaraugus Creek it's three miles away from the fence line, from the DOE fence line where we were yesterday.

DR. FLACK: The question I had, it says maximum potential dose. What do you mean by that?

MR. BEMBIA: I didn't develop that view graph so.

DR. FLACK: Oh, okay. Thank you.

CHAIRMAN RYAN: Paul, just one interesting follow-up on uncertainty. Tens of thousands of millirem in the plume, I understand that. But I don't get .0831.

MR. BEMBIA: Again, I think all it is is they take a concentration --

CHAIRMAN RYAN: The precision is what I'm questioning.

MR. BEMBIA: Absolutely.

CHAIRMAN RYAN: It's around one maybe. I think the uncertainties are such that we miscommunicate when we put three or four significant digits in a number that doesn't have but maybe one.

MR. BEMBIA: Yeah, I agree.

MS. YOUNGBIRD: Barbara Youngbird

from New York State again. I just wanted to answer the question about whether the License Termination Rule applies to the SDA. As you know, the NRC's License Termination Rule does not apply to the SDA because we're an agreement state. New York State will be adopting a compatible rule compatible with the NRC's LTR. We're working on that now. We don't have a proposed rule out yet, that's in the works, so something very similar to the LTR is going to apply to the SDA.

DR. CLARKE: Thank you. Any others wish to speak?

MR. VAUGHAN: I'm Ray Vaughan from the West Valley Citizen's Task Force and Coalition on West Valley Nuclear Waste. Just want to add a few additional observations based on what we heard this afternoon. T. J. Jackson mentioned the kerosene leak that occurred in the NDA in the 1980s. He also mentioned the barrier wall that had been installed to intercept that kerosene leak. He also alluded to the fact that no kerosene was ever intercepted by that wall, well, actually it's more of a French drain. What is important to recognize about that incident or potentially important to recognize is that several thousand gallons of kerosene are not accounted for from that incident where leakage is known to have occurred. Based on the burial records it is clear that several thousand gallons of kerosene was buried in tanks that when exhumed were found to be empty. So that kerosene is not accounted for. To me that suggests that the pathways from the NDA are not fully understood. DOE, when questioned, tends to say, oh, it must have evaporated, but we've never seen as much as a back-of-the-envelope calculation to show that kerosene under those groundwater circumstances would evaporate in that time frame available. Maybe, maybe not. It's a possible concern that we don't fully understand the pathways from the NDA.

In a similar vein, there's some potential for contamination to move into deeper horizons in the glacial fill under the site than are currently being monitored. The glacial fill that my model shows back there as a lift-out section is like a layer cake where you've got alternating layers throughout with low permeability glacial fill and higher permeability recessional layers. Only the uppermost layers are being monitored, the deeper layers are not. This is speculative that there may be downward movement. The one slightly troubling possibility that could provide a pathway downward is the I-beam pilings that were installed to support the big process plant that was built in the 1960s. There were many pilings that penetrate the layers of till and do provide a pathway. Again, that's speculative whether any contamination has moved downward along that pathway, but some testing of some of those deeper layers might be in order.

Lastly, I'd just like to offer the observation that the process by which NRC put site license into abeyance is a bit troubling, and I'm talking about the fact that the Strontium plume is a problem for whom nobody is willing to take clear responsibility at this present day. The license amendment that allowed the license to go into abeyance was based partly on the justification that DOE knew how to take care of the site and therefore no serious environmental problems would develop on DOE's watch. The problem that's occurred with the Strontium plume is that DOE says, and it's correct I believe, that this is leakage that occurred before the demonstration project took over the site, it's not their problem to go after the source. And that is meant that nobody has really gone after the high concentration source that's under the building. We've now been aware of the plume for a number of years and just watched it grow with NRC not in a clear position to require that the licensee, NYSERDA, take action, NYSERDA not in a position where they really have access to it, and DOE doing certain things to limit the spread, but not really dealing with it in a very thorough sense. Thank you.

DR. CLARKE: Thank you, Ray. Any others?

MR. BOYTOCHIK: Good afternoon, my name is Paul Boytochik (phonetic) I'm a Nondestructive Asset Specialist with Canbury Agency. Actually I have a question rather than a comment which I'm wondering if I could address to T. J. or his crew. Characterization of transuranic material in the presence of a lot cesium, for example, tends to be rather difficult. Could T. J. or someone explain some of the methodologies just very briefly that they're using to do those analyses and the sorting of the transuranic from the nontransuranic material.

MR. JACKSON: I don't have the right people here. Give me a call.

DR. CLARKE: Thank you. Any others?

MS. DeRICCO: I'm Diane DeRicco with Nuclear Information and Resource Service and also part of an alliance of organizations in New York State that very much are advocating the full exhumation of this site. So the technical deatails are important, and we'll certainly be paying close attention, but we hope that the ultimate goal of removing the radioactivity from the site will be achieved. And I don't know a whole lot more of what to say about that to this group. I'm not sure whether NRC License Termination Rule would drive that exhumation or not because there are so many alternative methods for complying with it, but I would convey that there is a growing interest in this site, kind of ebbs and flows over the years because the site has been there so long, but there is a strong desire on the part of the populous in the state to completely exhume the site and have complete remediation. Thank you.

DR. CLARKE: Any others wishing to

speak, please come forward.

Okay. Well, before we adjourn, I'll turn the -- well, before I turn the meeting back to our chairman and he adjourns, let me take this opportunity to thank our presenters and those who commented. Really want to thank our expert panel very much for coming and assisting with this. All of you for attending, we really appreciate this. And I have to give a special vote of thanks to Rich Major for organizing this meeting. Thanks, Rich. Mr. Chairman?

CHAIRMAN RYAN: Thank you, Jim. Appreciate an excellent working group session. I want to second Jim's thanks to our hosts in western New York for the folks that toured yesterday at the site and for the time you invested in our information gathering. I really appreciate you being here, and I appreciate the setting in which we have enjoyed the last couple of days, and it's really been a very informative trip for us. And again, I can't thank you enough for all your open and frank and technically excellent presentations and information.

If there are no further items for the open meeting we will come to a formal adjourn and we'll close the record at this point, and I appreciate everybody's participation.

(Whereupon, the proceedings went off the record at 4:45 p.m.)