

**NUCLEAR REGULATORY COMMISSION**

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West Valley Demonstration Project

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UNITED STATES OF AMERICA

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

+ + + + +

WEDNESDAY

OCTOBER 19, 2005

+ + + + +

THE INN AT HOLIDAY VALLEY,

ELLCOTTVILLE, 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

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ADVISORY COMMITTEE ON NUCLEAR WASTE

October 19, 2005

The contents of this transcript of the proceeding of the United States Nuclear Regulatory Commission Advisory Committee on Nuclear Waste, taken on October 19, 2005, as reported herein, is a record of the discussions recorded at the meeting held on the above date.

This transcript has not been reviewed, corrected and edited and it may contain inaccuracies.

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## 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

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1 one of the microphones, identify yourself and your  
2 organization, and speak with sufficient clarity  
3 and volume so that they can be clearly heard.

4 It's also requested that if you have cell phones  
5 or pagers, that you kindly turn them off. Thank  
6 you very much.

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

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

21 Today we will hear presentations  
22 from the NRC and from the DOE. We have also  
23 scheduled time for round table discussions and  
24 time for comments from attendees. And I suspect,  
25 as always, we have an ambitious schedule. I will

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1 try to keep us on schedule. I would ask those of  
2 you at the table that have questions, if you have  
3 several questions, please prioritize them and  
4 maybe leave some for the round table discussions  
5 so we can do everything that we'd like to do  
6 today.

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

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1 DR. PARKER: Thank you.

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

17 And David Kocher was also a  
18 consultant to the ACNW. Dave has a PhD in physics  
19 from the University of Wisconsin. He worked at  
20 Oakridge National Laboratory for twenty-nine years  
21 and now is a senior research scientist assigned to  
22 Oakridge Lab for the past five years. Over thirty  
23 years experience in environmental health physics,  
24 fellow of the Health Physics Society. David is  
25 the principal author of NCRG report 1146, for his

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1 risk management and remediation of radioactive  
2 manmade substance. Welcome, Dave.

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

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

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

13 MR. GLENN: Can you hear me now.

14 CHAIRMAN RYAN: Much better.

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

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

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

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

21                   Next slide, please. Under the West  
22 Valley Demonstration Project Act, NRC's  
23 responsibilities include prescribing  
24 decommissioning for the West Valley Demonstration  
25 Project; informal review and consultation with DOE

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1 on DOE's plans and activities; monitoring project  
2 activities for the purpose of public, assuring  
3 public health and safety. The West Valley  
4 Demonstration Project Act has not given licensing  
5 or regulatory responsibilities to the DOE, so we  
6 do not regulate DOE under this act.

7 Next slide, please. Under the  
8 National Environmental Policy Act, NRC's  
9 responsibilities include participating as  
10 cooperating agency in the decommissioning EIS.  
11 Adopting or supplementing the decommissioning  
12 EIS. And ultimately we conduct an environmental  
13 review for license termination under the Atomic  
14 Energy Act.

15 Next slide, please. As previously  
16 noted, the West Valley Demonstration Project Act  
17 directed NRC to prescribe decommissioning criteria  
18 for the West Valley Demonstration Project. In  
19 February 2002 the Commission issued a final policy  
20 statement prescribing NRC's License Termination  
21 Rule as the decommissioning criteria for the West  
22 Valley Demonstration Project reflecting the fact  
23 that the applicant's decommissioning goal for the  
24 entire site is in compliance with the License  
25 Termination Rule. The License Termination Rule

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1 criteria applies to the decommissioning of the  
2 high-level waste tank and other facilities which  
3 high-level waste solidified under the project was  
4 stored. The facilities used in solidification of  
5 waste and any material and hardware used in the  
6 project. The Commission also provided criteria  
7 for incidental waste to clarify the classification  
8 of any residual waste remaining after the tanks  
9 are clean.

10 Next slide, please. The LTR, as you  
11 know, is the standard decommissioning criteria for  
12 all NRC licensed sites. It will apply to the  
13 termination of NYSERDA's license after the license  
14 is reinstated. In terms of the timing of  
15 decommissioning, the Commission policy statement  
16 contemplates a sequential decommissioning process  
17 at West Valley. First DOE completes its  
18 decommissioning responsibilities under the West  
19 Valley Demonstration Project Act. Then NYSERDA's  
20 license is reinstated, and NYSERDA completes its  
21 decommissioning and license termination  
22 responsibilities under the Atomic Energy Act. The  
23 LTR provides a range of public dose criteria; dose  
24 criteria for unrestricted use and restricted use,  
25 and I think Dave Esh is going to talk more about

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1 that. What I wanted to say here also was that the  
2 Commission's policy statement indicates that the  
3 LTR was sufficiently flexible to allow part of the  
4 site to be released for unrestricted use, part of  
5 the site would be released for restricted use, and  
6 portions of the site may need to remain under  
7 license.

8 Next slide, please. As you know  
9 from looking at the information regarding West  
10 Valley, it's a unique site, complex, and has many  
11 challenges. It's for this reason that the  
12 Commission policy statement emphasized the need  
13 for flexibility while ensuring safe  
14 decommissioning. The Commission recognized that  
15 public health and safety considerations and cost  
16 benefit considerations may justify the evaluation  
17 of alternatives that do not fully comply with the  
18 License Termination Rule criteria. After cleanup  
19 to the maximum extent technically and economically  
20 feasible, the Commission will consider  
21 alternatives to release under the License  
22 Termination Rule, including exemptions from the  
23 LTR if it can be demonstrated that public health  
24 and safety and environment are protected. The  
25 Commission may also conclude that the only way to

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1 ensure adequate protection to public health and  
2 safety might be to maintain a long-term or  
3 perpetual license for some part of the facility.

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

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

16 MS. YOUNGBIRD: Good morning. My  
17 name is Barbara Youngbird. I'm with the New York  
18 State Department of Environmental Conservation.  
19 New York State is an agreement state with the NRC,  
20 and the Department of Environmental Conservation  
21 is one of four state agencies that have  
22 implemented the agreement state program. In that  
23 capacity we regulate the state licensed disposal  
24 area at West Valley. We also have a continuing  
25 interest as the state's environmental agency in

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1 the entire West Valley Demonstration Project.  
2 With me today is Patrick Kinkanan (phonetic) and  
3 from our Region 9 office in Buffalo, and he  
4 represents the other piece of our regulatory  
5 authority which is the Resource Conservation and  
6 Recovery Act. That applies to both the Department  
7 of Energy's activities at the West Valley  
8 Demonstration Project Act and NYSERDA's activities  
9 at the site. So we're available to answer any  
10 questions you have on those two programs.

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

13 MR. BAKER: Hi, I'm Gary Baker. I'm  
14 with the New York State Health Department. We are  
15 the lead agency for protection of the public  
16 health in New York State, and that includes  
17 ionizing radiation, and we also are the agency  
18 that has regulatory responsibility for public  
19 water supplies. We are participating in reviewing  
20 the Environmental Impact Statement and  
21 decommissioning of West Valley primarily through  
22 the Department of Environmental Conservation which  
23 has, which is the lead agency. It is anticipated  
24 that any concerns that we have will be shared with  
25 the Department of Environmental Conservation and

1 worked out with them, and so we would have one,  
2 essentially one voice. And that is not a unique  
3 role because we generally participate in other  
4 inactive hazardous waste site cleanups with the  
5 department in a similar fashion. And the  
6 department is, of course, interested in ensuring  
7 the public health and will continue to monitor and  
8 review the decommissioning project. Thank you.

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

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

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

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

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

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1 State's 10 percent share of the project cost.

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

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

21 Many of you may have heard that  
22 there's areas of disagreement between NYSERDA and  
23 DOE about the scope of DOE's obligations under the  
24 demonstration project for decontamination and  
25 decommissioning, and while those disagreements

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1 have some important implications for the project  
2 and for the Environmental Impact Statement, they  
3 do not affect the performance assessment or some  
4 of the technical calculations and analysis that  
5 are going on. For those of you who may have an  
6 interest, if you have any interest in  
7 understanding any details about those issues or  
8 responsibility differences, I'd be happy to  
9 provide you with a letter that we've provided to  
10 DOE that delineates those issues.

11 Several years ago the government  
12 accountability office did a report regarding West  
13 Valley and regarding the progress of the project  
14 and issues that are affecting the completion. And  
15 among their conclusions was the statement that it  
16 would probably, it would likely require some  
17 legislation to resolve some of the problems that  
18 are there. As such, NYSERDA with input from the  
19 Citizens Task Force that we have at West Valley,  
20 drafted legislation over a, probably a one-year  
21 very public process that would basically address a  
22 number of the issues affecting cleanup of the  
23 site. This legislation has been introduced by  
24 Representative Randy Kuhl who represents the local  
25 district and most recently by Senators Schummer

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1 and Clinton, and I'd be happy to share that  
2 legislation with anybody that would be interested  
3 in seeing that.

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

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

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

15 CHAIRMAN RYAN: None at this time,  
16 go ahead.

17 DR. CLARKE: Allen?

18 MR. CROFF: Yes, I'm a little bit  
19 uncertain about how the decommissioning criteria  
20 fit into the EIS; and that is, you've said that  
21 NRC will prescribe decommissioning criteria,  
22 amongst other things, and has done so, but is DOE  
23 obligated to use those entirely? I mean do they  
24 have the authority to say, well, we'll modify  
25 this, maybe we won't or to interpret them

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1 differently or to have an alternate set? What  
2 obligates them to use them as a decision basis?

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

13 MR. CROFF: Okay.

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

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

22 MR. GLENN: The LTR criteria applies  
23 to all the usual waste of the site. As Paul  
24 Pachulo mentioned, there's a state-licensed  
25 disposal facility on the West Valley site that is

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1 not part of the West Valley licensed site. But  
2 apart from the SDA, state-licensed disposal area,  
3 the LTR is the criteria that applies for all  
4 residual contamination at the site.

5 MR. CROFF: Thanks.

6 DR. WEINER: Thank you, I just have  
7 one question for Chad and one for Mr. Pachulo.  
8 Doesn't NRC have some responsibility for  
9 transportation packaging since a great deal of  
10 this material is being moved off site to other  
11 places, don't you have responsibility under Part  
12 71?

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

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1 others on that.

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

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

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

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

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

22 MR. PACHULO: There are a number of  
23 technical issues that we're following very closely  
24 through the Environmental Impact Statement in  
25 making our comments to be sure that, you know,

1 they're addressed in a very scientific manner.  
2 We've done that over the years, we've provided  
3 comments to DOE on various technical activities.  
4 But under the Demonstration Project Act, they have  
5 the sole responsibility to implement the project  
6 the way they do so that's, again, one reason why  
7 we're very happy the body of ACNW is taking a  
8 close look at what's going on because it's very  
9 important the closure of the site is done in a  
10 very technically sound manner.

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

19 MR. GLENN: Okay. I think what the  
20 policy says is that we're a cooperating agency  
21 because of our involvement in providing the  
22 decommissioning criteria. So the EIS has to  
23 evaluate the impact of applying the License  
24 Termination Rule to the decommissioning  
25 alternatives at this site. So we're reviewing, as

1 part of our cooperating agency responsibilities  
2 with other cooperating agencies, how the criteria  
3 are being applied across all the alternatives.

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

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

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

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

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

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

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

4 MR. GLENN: Okay. Well, in terms of  
5 the informal review and consultation, when the --  
6 that comes out of the West Valley Demonstration  
7 Project Act. Congress apparently did not want us  
8 to regulate DOE so we interpret that word informal  
9 review and consultation can mean something other  
10 than a regulatory relationship with DOE here. So  
11 we review and have reviewed EISs, other documents,  
12 we provide advice to DOE, but we're not reuglating  
13 DOE. So DOE, this advice spans EIS, it -- we also  
14 review WEIR, we will be reviewing WEIRs  
15 terminations. So there's a whole range of plans  
16 or activities that DOE is involved in and could  
17 consult with us and we provide advice. That  
18 advice is usually in the form of comments,  
19 letters. Under the West Valley Demonstration  
20 Project Act we monitor, we meet with DOE on  
21 different topics. NRC Region 1 conducts  
22 monitoring visits, we call them monitoring visits  
23 because they're not a licensee. They visit the  
24 site on several occasions throughout the year, and  
25 it's kind of like an inspection but it's not an

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1 inspection. It's to monitor DOE project  
2 activities from the standpoint of public health  
3 and safety. Does that help answer your question?

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

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

12 DR. PARKER: One more question?

13 DR. CLARKE: Sure.

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

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

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

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

1 general counsel.

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

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

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

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

19 MR. JENSEN: Yes.

20 DR. PARKER: Thank you.

21 DR. NAUMAN: Just a few questions.

22 My issue is with the SDA. Is it covered under the  
23 LTR for the site as a whole or not?

24 MR. GLENN: It's, the Commission's  
25 policy statement says that we will cooperate with

1 the state of New York in applying the LTR in a  
2 manner that's consistent. But the LTR -- I mean  
3 the LTR does not apply specifically to the state-  
4 licensed disposal area simply because the state-  
5 licensed disposal area is not part of the NRC-  
6 licensed site. So the LTR is not, whatever the  
7 criteria that are the decommissioning criteria for  
8 the state-licensed disposal area may or may not  
9 be -- the LTR may or may not apply. But the  
10 Commission said to consult and coordinate in the  
11 application, consult with the state and coordinate  
12 with the state in the application of the LTR to  
13 the state-licensed disposal area. And at this  
14 point in time I don't think there has been, that  
15 consultation hasn't been completed so we don't  
16 know what is going to happen with respect to the  
17 state-licensed disposal area and the LTR.

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

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

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

3 MR. GLENN: Correct.

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

20 MR. GLENN: The EIS, DOE's,  
21 Department of Energy and NYSERDA's EIS, it's a  
22 joint EIS. And as any EIS, it will be issued in  
23 draft form for public comment, and I think they  
24 have a fairly long comment period planned for this  
25 EIS. And I think there'll be, it looks to me like

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1 there will be ample opportunity for the public or  
2 stakeholders to provide comments on the draft EIS  
3 when it's published. I think DOE and NYSERDA also  
4 may have additional information they'll want to  
5 offer on this, but that's my understanding of this  
6 document.

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

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

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

21 MR. JACKSON: My name's T. J.  
22 Jackson, I'm with the Department of Energy here at  
23 West Valley. I'm the deputy director, just wanted  
24 to cover very quickly the role and  
25 responsibilities for DOE as well. I apologize, I

1 thought we were going to do it similarly --

2 DR. CLARKE: I'm sorry.

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

24 So there are a couple other  
25 documents out there that define roles and

1 responsibilities, the cooperative agreement as  
2 Dr. Pachula discussed basically did a lot of  
3 things, but ultimately defined the exclusive use  
4 of the 200 acres approximately that is used for  
5 the demonstration project. And ultimately at the  
6 end of the completion of the Act, DOE is to  
7 facilitate the licensing activities between New  
8 York State and NRC as we turn back over.

9 I think a couple of questions that I  
10 heard you ask maybe I can help out a little bit  
11 with. Because when DOE came in and took over the  
12 project when the license and the tech specs were  
13 put in abeyance, DOE's systems were, DOE orders,  
14 our management systems were basically used and  
15 have been used in the twenty-some years that the  
16 project has been executed and so very formal  
17 processes. We have safety analysis reports that  
18 NRC has reviewed. We have safety evaluation  
19 reports written by the NRC for our safety analysis  
20 reports. Their focus, as Chad was saying, on  
21 public safety and health. DOE supplements those  
22 safety analysis reports basically looking at  
23 worker safety and the environment on the project.  
24 So, again, there are very formal processes that we  
25 conduct the project under. The monitoring visits

1 that NRC does from region one, they come up I want  
2 to say approximately quarterly. Do we have the  
3 ability to disagree with the NRC monitor? I guess  
4 we do. We never have. We get monitoring reports,  
5 we take that advice and consultation very  
6 seriously. If the monitor sees things that are  
7 not going to according to his views, we take that  
8 very seriously and we go correct those.

9 So, trying to think what else we --  
10 we also have an NRC memorandum of understanding  
11 that defines our roles and so, again, I think over  
12 the years -- and I will say NRC has stepped up its  
13 participation and oversight when we have gotten  
14 into very critical stages of the project, such as  
15 when we were starting up the vitrification  
16 facility, we had NRC monitors almost on a monthly  
17 basis and very involved in the review of the  
18 design, the process, the way we were going to  
19 solidify the high-level waste. And, again, that's  
20 continued as we have also, just a couple of years  
21 ago we shipped spent fuel from the project and  
22 that was an NRC-licensed container that, the two  
23 casts that we shipped the spent fuel in and NRC  
24 does on the Type B cast they provide certification  
25 for that. Class A, that is our responsibility and

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1 we also work under the Department of  
2 Transportation requirements for those. And we  
3 also have other various permits. And basically we  
4 are responsible for the safe operation of that  
5 site, so we work with the Department of  
6 Environmental Conservation with RICRA issues and  
7 how we're going to close a facility under RICRA as  
8 well as things we're going to close under the West  
9 Valley Demonstration Project Act. You're going to  
10 hear a lot of information today and tomorrow, I  
11 believe, about where we believe we're going.  
12 We're into the environmental impact process and  
13 evaluation of a range of alternatives, and so  
14 decisions have not been made in the interim. And  
15 I think I talk about this this afternoon, I'll  
16 give you some status of where we are with various  
17 activities that we're doing as far as shipping  
18 low-level waste off site reducing the rest of the  
19 project in the interim while final decisions are  
20 being made. Hopefully I'll answer some of those  
21 questions this afternoon, but I'll take any  
22 questions that you have now.

23 DR. WEINER: I just had one question  
24 T. J., since you mentioned SARs. Can you give us  
25 some idea of how, the history of your safety

1 analysis reports; were they always on target? Did  
2 you violate some of the subs? Have they gotten  
3 better over the years, same over the years? Just  
4 some general idea.

5 MR. JACKSON: The process has  
6 evolved. I believe when I first arrived here back  
7 in '93 we had, I want to say seven or eight  
8 different modules to our safety analysis, very  
9 system oriented so when we brought a new system on  
10 line, we evaluated all of the impacts, all of the  
11 operations and the end results that were going to  
12 go into operating that process. As we progressed,  
13 and again I think I might talk about this a little  
14 later on today, but as we processed say the  
15 supernatant off the high-level waste tank there  
16 was an analysis done for that facility. As we  
17 brought the vitrification facility on line, there  
18 was a specific module for evaluating that  
19 facility, that operation, that process. Where we  
20 are now is we have more of a site-wide safety  
21 analysis, and I again I think some of that has  
22 improved and gotten streamlined because we're not  
23 as complicated as we used to be because of a lot  
24 of the most critical operations are complete. The  
25 major activities are now going in and

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1 disassembling whatever systems we put in to  
2 process the waste over the years. And so I would  
3 say again we probably have a more general safety  
4 analysis now than the more system specific  
5 activities that we analyzed back through the  
6 years. Have we gotten outside of our safety  
7 analysis, no, not to my knowledge. They've done a  
8 very good job, we have a very rigorous unreviewed  
9 safety question process that we go through  
10 whenever things are, designs change, whenever  
11 there are discoveries of issues where, again, we  
12 have trained safety analysts that look at each of  
13 those identified activities and run those through  
14 up against our safety analysis to know whether or  
15 not we've gone outside the line and to my  
16 knowledge we have not had a positive USD on those.

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

20 MR. HINZE: Sure.

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

24 MR. ESH: I'm pleased to be here. I  
25 hope I can meet your goal of volume, but you're

1 going to be on your own in terms of clarity, I'm  
2 afraid. I'm here to talk about our methods and  
3 models for NRC's performance assessment at the  
4 West Valley Demonstration Project. And some of  
5 you may not have been aware of what we're doing,  
6 so we look at this as kind of a first initiation  
7 into our work, and I'll try to make it clear what  
8 our objectives are for our work because I think it  
9 influences how we go about it. I'd like to  
10 acknowledge the contributors to this work.

11 Christian Ridge, Cynthia Barr, Karen Pinkston,  
12 Shaniqua Walker, Anita Turner, John Peckenpaugh,  
13 Chris McKenney and Mark Thaggard. They're a very  
14 talented group, and I'm pleased to have them  
15 helping with this effort.

16                   Next slide, please. As a  
17 presentation outline, I'm going to talk about the  
18 regulatory framework for performance assessment.  
19 I think that's important to put it into the proper  
20 context, but I do realize we're going from roles  
21 and responsibilities at the West Valley  
22 Demonstration Project to performance assessments.  
23 That's a pretty abrupt change, so I'll try to  
24 transition us a little bit. The performance  
25 assessment is going to be used to develop the

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1 risks of the material left on site, and those  
2 risks then will be factored into the  
3 decommissioning process in terms of how much  
4 cleanup is needed and also into the EIS decisions  
5 related to the environmental impact. So  
6 performance assessment plays a key role at this  
7 site, and as I'll indicate a little bit down the  
8 road here there's a few aspects of West Valley  
9 that make performance assessments play even a  
10 larger reason than what it might at some similar  
11 sites. I'm going to cover the objective for our  
12 PA. The overview for our PA going through some of  
13 the methods and models. That's a very daunting  
14 task in a half an hour and I'm only going to be  
15 able to skim the surface, but if you have further  
16 questions, I know we're kind of set up here with  
17 my back turned to the audience, but we're an open  
18 agency, if you have questions, my contact  
19 information is on the first slide feel free to  
20 e-mail or call with questions that you have. And  
21 we do have future plans, right now we're at what I  
22 would call a beta version, it's undergoing  
23 verification and sensitivity testing. And based  
24 on the results of that process, we'll modify the  
25 model as needed. And then I hope to give you a

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1 brief visual demonstration of the model, I think  
2 that will help you understand what we're doing and  
3 that will put things in the proper perspective.

4           Next slide, please. The regulatory  
5 framework for the PA as Chad Glen mentioned  
6 basically the PA dose estimates must satisfy the  
7 requirements of 10 CFR Part 20, Subpart E, of the  
8 LTR. The LTR has really two main provisions. For  
9 unrestricted release, which basically no controls  
10 or maintenance, and you have to meet a 25 millirem  
11 annual public dose limit. And then for restricted  
12 release you can get credit for the institutional  
13 controls that may limit use of the site and  
14 provide for the maintenance and monitoring,  
15 especially for engineered barriers. You have to  
16 meet a 25 millirem annual limit with those  
17 controls in place and with that monitoring and  
18 maintenance occurring, but then you also have to  
19 perform an analysis assuming that the controls  
20 fail that you can meet 100 millirem annual public  
21 dose limit. Whenever you perform the analysis  
22 when the controls fail, you also have to assume  
23 that you can no longer have the monitoring and  
24 maintenance done. But the performance of your  
25 engineered barriers are dependent on the

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1 monitoring and maintenance, and then they evolve  
2 as you would naturally expect them to without  
3 monitoring and maintenance analysis.

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

11           Review of one of these performance  
12 assessments can be a challenge, it's a lot of  
13 information, there's a lot of complicated things  
14 going on and one of the best ways to review  
15 something like that is to do some of the work  
16 yourself. It helps you learn what questions you  
17 need to ask. So that's our main objective for  
18 this model. We intend to base our decisions in  
19 the EIS and decommissioning on DOE's PA model  
20 results. But I believe, as Chad mentioned, or a  
21 question from the committee, there may be a  
22 circumstance where we reach agreement on  
23 something. And if we don't reach agreement on  
24 something and we have an area where we aren't able  
25 to reach a consensus on, we may have to rely on

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1 our own calculations or our own analysis. That  
2 raises the bar substantially for us in terms of  
3 documentation and verification and all the  
4 activities you would need to do to make it a  
5 public process. So if it's an internal review  
6 tool, that gives us one standard. If it's an  
7 external product that we're basing a decision on  
8 then that gives us another standard in terms of  
9 what we need to do for the performance  
10 assessment.

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

21 Next slide, please. This is just a  
22 photograph of the site looking south. The south  
23 plateau in the background and the north plateau's  
24 in the foreground. It shows all the main  
25 facilities. Those of you that were on the tour

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1 yesterday, the only reason I put this here is to  
2 provide you a perspective of the site and  
3 understand what it looks like, all the new  
4 facilities. It is separated into these two  
5 geologic plateaus and two aquifers systems really  
6 that have different implications for dose  
7 assessments. There's the north plateau in the  
8 foreground. There's a higher likelihood that the  
9 water may be able to be used for domestic purposes  
10 than the south plateau.

11                   Next slide, please. As an overview,  
12 as I just mentioned, it's separated into two  
13 plateaus. The receptor considerations may be  
14 different for the different waste management areas  
15 based on the availability of water. The two last  
16 points are the real important points here. The  
17 site experiences relatively high rates of  
18 erosion. Paul Bemia of NYSERDA and Dan Sullivan  
19 of DOE were kind enough to allow us to come up a  
20 couple weeks ago and have what's called the  
21 extended erosion tour where we hiked in the stream  
22 channels and through the gullies, and at one point  
23 almost scaled a fence to get across a ditch and we  
24 had the western New York weather of a cold storm  
25 come through that knocked out power and it hailed,

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1 but it was a good tour. And we took some of our  
2 experts, particularly in the erosion area, along  
3 and they were pretty impressed by the tour, and it  
4 also gave them a new perspective for the site.  
5 One of our erosion experts said the site is going  
6 to be very challenging to mitigate the effects of  
7 erosion and the cost may be very significant for a  
8 design. The last element here, engineered  
9 barriers, are expected to be used as part of the  
10 site decommissioning. That's also a challenge to  
11 predict the long-term performance of engineered  
12 barriers. It does look like they will play a key  
13 role in certain parts of the site.

14 Next slide, please. So as an  
15 overview for our model, I'm going to go through  
16 some of the highest level points here first and  
17 then talk about some of your specifics and  
18 sub-models. I hope to do that fairly quickly. I  
19 know we're already behind schedule. I don't think  
20 I'll be able to catch us up, but I do want to be  
21 able to show you a little bit of the model to give  
22 you some understanding of what we work with. The  
23 methodology that we employed in the PA is the  
24 level of detail that is appropriate for a review  
25 tool and consistent with the information available

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1 to support the model. The second point is a very  
2 important point. NRC's philosophy to perform its  
3 assessment is you're not really gaining anything  
4 besides creating additional efforts if you're  
5 going beyond the support you have available for  
6 your model. You can make a very complicated model  
7 but if you don't have anything constrain it and  
8 say it appropriately represents the site or  
9 reality, then you're not really helping yourself.  
10 So we like to keep things as simple as possible  
11 and consistent with the support for the model.

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

20 Next slide. We began or, I should  
21 say I began development of this in August 2004.  
22 This was on a very part-time basis. Maybe between  
23 August 2004 and early 2005 there was a two or  
24 three month period where I devoted more than half  
25 my time to it, but other than it's an effort that

1 we were trying to plan for the West Valley EIS  
2 coming in, and it was really a part-time effort.  
3 The current model has over 1,950 GoldSim elements,  
4 and eight levels of subcontainment. Hopefully  
5 that will make some sense to you when I show it to  
6 you in a little while here. It has over 700  
7 stochastic elements to represent uncertainty. And  
8 our overall approach is to use a highly-  
9 abstracted, top-down type of approach with  
10 highly-uncertain representation of the system. We  
11 think this gives us what we need for a review  
12 tool. We keep it as simple as possible and we try  
13 to overestimate the uncertainty in things, so that  
14 when we do uncertainty analysis and sensitivity  
15 analysis, we can identify those areas that might  
16 need more refinement that would benefit from  
17 making a more complicated model. As I said  
18 before, we're currently undergoing verification  
19 and sensitivity studies for this internal version  
20 of the model.

21 Next slide, please. Because the  
22 model is visual, at this point we intend to use  
23 the model as documentation. I'll show you that  
24 also coming up here. We think that's sufficient  
25 for an internal review tool and eventually when we

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1 get to a version that we're comfortable with, it  
2 can be made publically available. It would have  
3 to be saved as what's called a player file which  
4 allows somebody in the public without a license to  
5 download the free player which is basically a  
6 viewer for the file, and they would be able to  
7 open the file and look at it. They wouldn't be  
8 able to run it or change it, but they would be  
9 able to look at it to see what was done. The goal  
10 is that this model would be fully transparent to a  
11 technically qualified independent reviewer. I'm  
12 sure my section leader chuckles at that because I  
13 think that's probably an overstatement and a  
14 difficult task. But performance assessments are  
15 complicated and there's no way around it and this  
16 site is complex which makes it worse. So our goal  
17 is to have it fully transparent, but it's not  
18 going to be easy, even if it is.

19 Integration between subject matter  
20 experts and PA analysts of course has been easy  
21 for us because up to this point in terms of  
22 building the model I was the team of subject  
23 matter experts and the team of PA analysts, so I  
24 hope that I've integrated with myself  
25 appropriately, but we have a team now that's doing

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1 this verification and sensitivity studies, and  
2 they do have expertise in a variety of subject  
3 areas, so it will take a little more effort to  
4 ensure that we get some consistency there.

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

19 The model currently contains 30  
20 radionuclides including decay chains. That's  
21 based on DOE's previous analysis, and generally  
22 we've developed this model independently of DOE.  
23 We understand what they've done, but we go about  
24 it our own way, analyze the information in our own  
25 way, make our own models. But this is one area

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1 where we did rely on their previous analysis and  
2 our own professional judgment as to what  
3 radionuclides were likely to dominate the risk  
4 when applied to various scenarios. It is an area  
5 we think we might go back and reevaluate, if  
6 needed. But the whole performance assessment  
7 process is iterative, so if we see that under  
8 certain scenarios there's short liberated  
9 radionuclides that are causing a big risk, then we  
10 may go back and look at the whole list of short  
11 liberated radionuclides and see which ones might  
12 have behavior in the environment that would also  
13 maybe cause risks that we didn't include on the  
14 list. We don't expect to be surprised by that,  
15 but you never know.

16 Next slide. NRC model overview of  
17 our sources. We have six primary waste management  
18 areas. I know there are more waste management  
19 areas than that, but we've selected the ones for  
20 representation in the model that we believe are  
21 likely to drive the risks at the site, and those  
22 are the high-level waste tanks, the process  
23 building, the lagoons, the strontium-90 plume, and  
24 the NDA and the SDA. The NDA and SDA are broken  
25 out into different disposal types because they

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1 have different depths for disposal and also  
2 geometries and they may have different  
3 implications for release rates and risks, so we  
4 represented all those disposal types explicitly.

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

13 Next slide, please. For our  
14 receptors in the model, we basically have a  
15 selector that the user can pick what type of  
16 receptor he wants to analyze. A resident, a  
17 farmer, an intruder well-driller that you can  
18 evaluate acute or chronic effects, and also a  
19 recreational intruder or receptor that can on site  
20 or off site. The receptor can be located any  
21 distance from the sources, the waste management  
22 areas, within physical constraints so you can't  
23 put them on the other side of the stream 1,000  
24 meters away if the distance between the waste  
25 management area and the stream is only 500

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1 meters. So there are some constraints where you  
2 can locate them, but you can look at the impact of  
3 where the receptors are located. And the user can  
4 set the institutional control and intruder periods  
5 so that gets to the restricted release component,  
6 you can evaluate different alternatives under  
7 restricted release.

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

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

24 Next slide, please. Our release  
25 submodel includes the ability to represent

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1 temporal effects on infiltration as a result of  
2 maybe the presence of engineered barriers or an  
3 infiltration diverting cap. The radionuclides are  
4 partitioned between the waste, soil, water and air  
5 and can be transported by diffusion or advection.  
6 And then we also allow different distribution  
7 coefficients and solubilities to be defined for  
8 each waste management area. And that can be  
9 important because some of the radionuclides could  
10 be sensitive to the geochemistry of the system and  
11 also the geologic material type that may be  
12 there. The failure of engineered barriers as well  
13 as maybe binding of the waste in some sort of  
14 matrix are also included in the release submodel  
15 where needed.

16 Next slide, please. Transport  
17 through the vadose zone, we represent that as a  
18 series of one-dimensional cells. I'll talk about  
19 that in a little bit. You know, you might be  
20 thinking, well, these are in some cases big  
21 three-dimensional or at least two-dimensional  
22 waste management areas or systems so how are you  
23 representing that with a one-dimensional series of  
24 cells. We did some GIS modeling to develop what  
25 we thought the uncertainty distribution in both

1 where the waste is located, so what it's  
2 saturation may be, and then also the transport  
3 distance through, say, the vadose zone may be from  
4 a given waste management area. So the approach  
5 we're really taking is to convert real variability  
6 in the system into uncertainty and represent that  
7 as a probability distribution. Then when we go  
8 through our analysis if we find, well, that's a  
9 key parameter that's influencing the releases from  
10 that waste management area, maybe we'll go back  
11 and try to make a two-dimensional representation,  
12 like a two-dimensional plan view of the waste  
13 management area. Similar to the waste release  
14 submodel, the vadose zone submodel we have  
15 partitioning between the different environmental  
16 media. You can use different  $K_d$ 's and  
17 solubilities. And as I said, the uncertainty in  
18 the degree of saturation is included and we use  
19 this variable vadose zone thickness.

20 Next slide, please. The transport  
21 through the saturated zone is represented by  
22 one-dimensional pipe elements, and we did the same  
23 thing here with the GIS model that we developed and  
24 3-D geologic model is to develop a probability  
25 distribution for transport length from the source

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1 to the surface water body. It also includes some  
2 of those waste management areas. Part of it will  
3 flow in one direction and part of it will flow in  
4 another direction, so we have a partitioning or  
5 fractioning between the different areas of the  
6 source to the different streams. I'll show you  
7 that in a minute here, it'll make more sense to  
8 you. We have the main processes; dispersion,  
9 advection, decay and sorption are all included in  
10 these transport models.

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

22 The dose modeling can be  
23 challenging. We have all the main pathways we  
24 believe. You can add a lot more pathways and get  
25 a lot more complicated, but we feel what we have

1 is probably sufficient for a review tool, it gives  
2 us an indication of what dominates. It looks to  
3 us like the groundwater consumption that's  
4 occurring is one of the dominant pathways for most  
5 of the protection of the public type of analysis.

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

15 We have the packages here that are  
16 ways to organize material in the model, and it's  
17 been separated into pop-up areas that I'll show  
18 you here. When I talked about documenting things  
19 in the model, we've used this feature where you  
20 can put basically links to other files in the  
21 model so I can double click on this, and hopefully  
22 it comes up. There's a picture of the NDA there  
23 from one of DOE's reports. So if one of my staff  
24 members is working on this model and they don't  
25 understand a lot about the NDA, hopefully we could

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1 put a link in there that'll pop up the report or a  
2 section of the report that they can look at and  
3 understand what's going on with that.

4 And I mentioned the GIS modeling,  
5 that's the work I did with Allen Gross at the  
6 NRC. This work was basically we took information  
7 from DOE that had a lot of data and GIS data, and  
8 then basically reanalyzed that and developed a 3-D  
9 geologic model for the site, and we used that to  
10 develop tables of information, the various  
11 thicknesses of the hydrologic units at different  
12 areas, and also we used it to develop this figure  
13 here, figure one, which was an estimate of the  
14 flow paths of the various waste management areas  
15 through the surface water bodies. So as I had  
16 mentioned when we were trying to figure out how to  
17 represent this, say, two-dimensional or  
18 three-dimensional NDA waste management area in the  
19 model, there's a lot of effort involved with  
20 trying to make a, say a 3-D model or even a 2-D  
21 model of this waste management area and  
22 representing it in a performance assessment. As  
23 it is, this model runs, if we're performing a  
24 stochastic analysis, it might run 250 realizations  
25 in about fifteen minutes or so. If we went and we

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1 made this within an area into two- or  
2 three-dimensions with say 100 or 500 elements,  
3 we'd be looking at a significant computational  
4 burden to run that analysis. So we have to try to  
5 balance that needing complexity in the model with  
6 being able to use it as a review tool. What this  
7 shows is, say, that in the 3-D geologic model and  
8 GIS analysis that a certain fraction of this waste  
9 management area may flow to this section of the  
10 surface water body, and the other fraction may  
11 flow to this surface water body. So when we  
12 abstracted it in a performance assessment, that's  
13 what we did, we basically made an uncertainty  
14 sampler that would send part of the waste  
15 management area with this flow path in the  
16 analysis a fraction of the time and part of the  
17 waste management area to other surface water  
18 bodies a fraction of the time. So we've put in  
19 these various descriptors and things to hopefully  
20 have it make sense to somebody that's using it.

21 Then the model itself is all  
22 contained within the packages -- oh, one other  
23 thing first; reviewer comments. After I made what  
24 I would consider maybe a pre-beta version of the  
25 model, we had some of our staff on my first slide

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1 review it, and they submitted comments to me. And  
2 I basically gave a response and modified the  
3 model. The text here is small intentionally so  
4 you can't read whatever they said, Dave, what are  
5 you doing here, you're an idiot. This is a  
6 comment from Christian Ridge and it had to do with  
7 solubility limits and the changes I made. This  
8 was a way to document where we were and where  
9 we're going, the comments that we got and the  
10 changes we made to the model.

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

23 The highest level are these main  
24 packages. I'll show you maybe the simulation  
25 settings here. One thing I talked about is that

1 you can specify the receptors. So in this case  
2 you have a data element so you can choose what  
3 type of receptor you want to run; farmer,  
4 resident. So these are in there and then they  
5 change from 2 to 1 if they want to run farmer  
6 instead of resident. And that changes the  
7 receptor you're going to run. And then we also  
8 have the ability to look at different waste  
9 management areas so if you want to run the  
10 high-level waste tanks, the lagoons, etc. Or you  
11 can run all of them for one plateau and all of  
12 them for the other plateau. But it's a way of  
13 being able to perform different analyses.

14 In this simulation package we also  
15 have some technical triggers so there's question  
16 about like, well, are the solubilities what you  
17 think they are or are the Kd's what you think  
18 they. In these things we've built in the ability  
19 to turn them on and off. So you can have sorption  
20 in the waste area, you can turn them off and see  
21 how does that change your results without  
22 sorption. It's a good way to analyze what's going  
23 on with your model and see what things are really  
24 driving the limitation of the risks or driving the  
25 risks themselves. So we put in a lot of, I call

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1 this, like, conceptual model uncertainty in this  
2 manner. We didn't ignore conceptual model  
3 uncertainty. We realized that our strategy in  
4 some cases was fairly simple, so wanted to be able  
5 to look at the implications of some of these other  
6 higher order complexities. As you see, though, as  
7 I'm over here browsing the model that if you have  
8 the file you could go through and generally get an  
9 understanding of what's being done, it's expanding  
10 the tree over here on the side and it can get  
11 pretty complicated. It's not easy to understand  
12 if you don't have some training in GoldSim.

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

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1 different situations in the model.

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

23           The source term, we do some basic  
24 GoldSim elements like a source element which  
25 provides for different inventories you can put

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1 different types of inventories, and you can put  
2 whether it's bound in a matrix or not as it's  
3 released from the waste area or whether it's  
4 freely available and mixed with the soil. And  
5 then you can specify different barriers, too. So  
6 in this case we have assumption about maybe this  
7 is a high-level waste tank, you're gonna have  
8 grout in there, and say the grout hydraulically is  
9 going to prevent releases for a period of time,  
10 then it's going to fail and you can get a higher  
11 infiltration rate. So conceptually that's what  
12 we're doing.

13 A lot of these waste management  
14 areas are somewhat the same once you get in them,  
15 besides the NDA and SDA which, in this case, we've  
16 broken them out into different disposal types.  
17 And there's, it's a little bit different in the  
18 representation of release, too, especially for the  
19 NDA there was some question about whether the  
20 disposal areas, you would have diffusion from them  
21 up to the WLT, whether you would have maybe a  
22 bathtubting type of process that goes on, as the  
23 precipitation cycles, it fills the waste area and  
24 you can potentially get it up to the weathered  
25 lavery till, WLT, and transport it laterally off

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1 the disposal area. Or whether you can get  
2 vertical transport from the waste management area  
3 through the clay. So we've tried to account for  
4 that by allowing the user to say, okay, what  
5 pathway do you want to analyze for this waste  
6 management area. And I'd be happy to spend some  
7 time at the end of the day if anybody wants to  
8 look at this in a little more detail. I think it  
9 gives you a little idea of the tool we use and how  
10 we go about using it. I can't really spend much  
11 more time going through it.

12 But those assessments, I'll show you  
13 that real briefly, it's fairly complicated. It  
14 gets complicated in a hurry. Here's a description  
15 of the different scenarios you can analyze. And  
16 you can provide most of the documents in here,  
17 too. I don't have this document on this computer,  
18 but when you get it all set up, you can provide  
19 links to the reference documents in here too. But  
20 in this case there's general calculations where we  
21 estimate environmental concentrations. You have  
22 to estimate them in the soil, the air, and the  
23 water for each area. And in this case for say the  
24 resident we have this representation of what's the  
25 concentration in a garden getting contaminated

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1 irrigated water. And the, let's see, we have the  
2 plant concentration ratios for food. This is  
3 done, it's a little bit tricky but it's basically  
4 a way of using the geometric means for different  
5 -- different based on the plant, the isotope and  
6 the plant type. Here we have all the different  
7 isotopes, then we have the different plant  
8 components, but you can specify different  
9 geometric mean for the soil-to-plant transfer  
10 factor. But then we wanted to use in this case  
11 the same geometric standard deviation for all  
12 those, we didn't want to just use constants for  
13 those. We had to do this little tricky thing  
14 here, this is something that if you didn't have  
15 GoldSim training, it would take you a while to  
16 figure out what it was doing. And then we used  
17 those conversion factors from FGR 11 and 12, and  
18 those are basically a factor of information.

19 So our verification process was to  
20 go through, check all the data. Then they're also  
21 going through essentially hand calculations where  
22 they can do them of these various model component  
23 and seeing that they can produce the values that  
24 the model produces, and we're performing  
25 sensitivity analysis. I use, it's a software

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1 product called NorWare (phonetic) that has genetic  
2 variable selection algorithms in it, and we use  
3 that to take the output of this model and run that  
4 on it, and basically we can identify the top  
5 sensitive parameters very clearly with that  
6 technique. So we intend to use that in the  
7 future, running it for each of these scenarios  
8 within probably the next month time frame. So we  
9 wanted to get through this verification type  
10 activity first to make sure we don't have any  
11 major errors in here, we're comfortable with the  
12 output. So let's go back to the presentation  
13 now.

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

20 The Strontium-90 plume poses maybe  
21 the largest immediate risk impact for a North  
22 Plateau water user primarily because it's already  
23 in the water and it's fairly mobile and that  
24 clearly is, on a concentration basis, is fairly  
25 high. It's pretty clear to us that the high-level

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1 waste tanks will require a large amount of  
2 engineering or source removal in order to meet the  
3 performance objectives, and I think DOE as done  
4 calculations that would basically confirm that  
5 statement. And the groundwater, if not used on  
6 the South Plateau, it looks like the surface water  
7 systems that are surrounding the site dilute those  
8 releases quite a bit. There's a big difference at  
9 some sites between using groundwater and using  
10 surface water, even for a small stream, like you  
11 saw Frank's Creek you could step over it that  
12 provides for a lot of dilution if it's receiving a  
13 lot of its water -- not all of its water from the  
14 aquifer that's feeding it. And direct contact  
15 with the waste or residual contamination in the  
16 intruder scenario such as the well-driller  
17 scenario which is the only one we've put in here  
18 to date, that posed a significant challenge for  
19 any waste management areas, especially the  
20 disposal areas it seems like.

21 Our future plans are to complete  
22 this verification and sensitivity evaluations and  
23 modify the model as needed. And we are working on  
24 a separate assessment of erosion impact at the  
25 site. The model is already complicated as it is,

1 and to overlay erosion on top of that with then  
2 variable thicknesses above the waste and when the  
3 waste might be exposed, and then turning on our  
4 assessment scenarios and changing how it may be  
5 released and transferred, it just seemed like it  
6 would be much too complex, it would be too complex  
7 for us to do and to review and be comfortable in  
8 the output and it would be too complex for  
9 somebody else to understand what was being done  
10 either. So we're going to do it separately as an  
11 off-line analysis. And that's partly why we had  
12 the tour of a few weeks ago to get more  
13 information on the erosion impact for our experts  
14 in that area who will be helping us in that  
15 effort. And we hope to develop risk insights to  
16 share with the reviewers of the PA to help  
17 risk-inform their review.

18 As a conclusion here, we expect this  
19 review, and it has been in the past, to be very  
20 difficult. The site is challenging and has a lot  
21 of complexity. We'll develop these insights from  
22 our modeling to help risk-inform, and we believe  
23 our model is highly flexible and reasonably  
24 represents uncertainty in both the parameters and  
25 the model. So therefore we're pretty comfortable

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1 with it as a review tool. As I had indicated, if  
2 we needed to move forward and say we got to a  
3 point where we didn't agree with something that  
4 DOE was producing and had to do our own analysis,  
5 then that's a whole 'nother level of effort in  
6 terms of documentation and clarification and all  
7 those other things. So I'll entertain any  
8 questions you may have.

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

12 DR. KOCHER: I'm collecting my  
13 thoughts.

14 DR. CLARKE: Tom.

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

21 MR. ESH: That's a very good  
22 question, and I think it's directly in line with  
23 what we did two weeks ago when we came up here.  
24 We've developed the model basically with the  
25 information sources that we had; i.e., documents,

1 those sorts of things and DOE's results. But we  
2 felt that there's a lot of knowledge out there  
3 that's not represented on paper and even there's a  
4 lot of paper out there that is difficult to locate  
5 and access. So we thought, well, let's talk to  
6 the source on some of this information. We in  
7 particular had questions about the disposal  
8 technology of the NDA and the SDA; how the waste  
9 was disposed, depths, geometry, what it was  
10 contained in, those sorts of things. And so when  
11 we came up for the erosion tour a couple weeks  
12 ago, we spent the afternoon talking about those  
13 areas. They had spent some time to pull out  
14 relevant documents and sections of documents, both  
15 DOE or SAIC, the contractor for DOE, and NYSERDA,  
16 both groups have pulled out a lot of information  
17 for us to help revise or at least improve those  
18 areas of the model.

19 So, yeah, I think there's a great  
20 value to it. There's always -- up to this point  
21 this was a one-man internal effort. We're moving  
22 ahead, and I think there's a value to trying to do  
23 that going forward. We certainly are open to  
24 people reviewing it and giving us comments or at  
25 least I am. I don't know if my management would

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1 agree with that. We don't want to get caught up  
2 in the burden of responding to comments on our  
3 review tool, but that's all it is, it's just a  
4 review tool. If there's something that we can do  
5 to improve it or that might influence our review,  
6 we would want to know that. But we wouldn't want  
7 to spend an inordinate amount of time because it  
8 is a fairly complicated model and it is, I think  
9 it's a pretty easy thing to pick up, but that  
10 might just be me. Somebody without the training  
11 might ask a lot of questions that they wouldn't  
12 ask if they had the training. Similar to -- the  
13 way I look at this effort is we want to try to  
14 avoid asking questions in our review that we  
15 wouldn't ask if we hadn't done this activity. So  
16 we did this activity to try to ask better  
17 questions and less questions, not ask every  
18 questions we could think of. So we don't think  
19 we're doing a good job in our review if we just  
20 asked everything we could think of.

21 DR. NAUMAN: Well, that answers part  
22 of my question. My issue is any time you have a  
23 GoldSim type product, there's different opinions  
24 of the quality of that product or how it works and  
25 until you are trained on it, you really don't

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1 thoroughly understand it. And if the other  
2 individuals, the other parties that are involved  
3 like the DOE, NYSERDA and DPC, if they don't have  
4 that thorough understanding, then it leads to  
5 conflict later, my model's better than your  
6 model. And I think that's going to not serve the  
7 overall good if you can get -- I don't want to get  
8 into a group think scenario where everybody does  
9 the same thing, but I would recommend that you  
10 push for active participation and not just to get  
11 more information but participation and  
12 understanding by those other groups.

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

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

20 MR. ESH: I have curie quantities.  
21 It might be easier to even show you what's -- the  
22 amount of inventory that we have in there is based  
23 on DOE's waste characterization reports. The  
24 amount of material that's going to be left in the  
25 high-level waste tanks is a small volume on the

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1 bottom, a small layer. I don't know if it's --  
2 maybe someone from DOE can comment.

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

10 MR. ESH: I was going to tell you  
11 that the curie numbers are such that, curies can  
12 be misleading. There can be a lot of curies of,  
13 say, cesium 137 in there that provide very small  
14 risk because of the mobility of it and the short  
15 half-life, and generally it looks like americium  
16 241, and therefore the neptunium 237, new lead  
17 (PH) 210, maybe a few of the uranium species, and  
18 also Technesium-99, those look like the more  
19 challenging ones for that element. So that there  
20 might only be 10 curies of Technesium-99, but it  
21 still causes a problem, just like the Strontium-90  
22 plume was estimate that maybe the source of the  
23 Strontium-90 plume was only on the order of 500  
24 curies that's in the groundwater and causing that  
25 plume now that's has caused a problem. The amount

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1 of Strontium-90 that might be in the tank  
2 residuals might be 20, 30,000, something like  
3 that, on the order of thousands. I don't remember  
4 the exact number.

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

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

16 MR. ESH: Yeah, it's reasonably  
17 close. We looked at the groundwater  
18 concentrations and the arrival times that are  
19 being estimated from the model for the  
20 Strontium-90, and they're in reasonable agreement  
21 with the evolution of the Strontium-90 that you  
22 see in that aquifer right there. It's not exact  
23 and we didn't do a calibration exercise. We  
24 basically put in parameters -- a lot of our  
25 parameter distributions are, unless we have site

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1 specific information, they're generic  
2 distributions from a literature source, say, for  
3 Kd's we might use Shepard and Theebo (phonetic)  
4 that has a compilation for sand units, loam units,  
5 clay units, you know, and organic influence  
6 units. So when you're using the generic  
7 distributions, they tend to overestimate the  
8 uncertainty that may be experienced at the site if  
9 you had site specific information. Site specific  
10 information is always preferred, but if it's not  
11 available, we feel you have to use some fairly  
12 uncertain generic distribution to fully  
13 characterize the risk. In something like  
14 Strontium-90, the results are strongly dependent  
15 on the Kd as you can imagine. When the Kd is low  
16 you get a very high, fast transport and high  
17 Strontium-90 concentration. When the Kd is high,  
18 you get retention of it and much lower risk. The  
19 mean output agrees fairly well, but on either end  
20 of the calculation it might not agree very well  
21 because of that uncertain distribution.

22 DR. PARKER: That was going to be my  
23 last question, but I'll take that up now then.  
24 Since you have 750 units that are stochastic,  
25 meaning you're going to have a very wide range of

1 variability or uncertainty, when you tell us that  
2 you're meeting the dose criteria, what percentile  
3 are you using?

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

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

20 MR. ESH: I think taken at first  
21 glance the one-dimensional representation does not  
22 represent the three-dimensional problem well at  
23 all. But when you think about it from a PA  
24 standpoint, we probably err on the side of  
25 overestimating the risk if we have to. So like,

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1 I'll try to step back and give you an example. If  
2 you have variable geology under a waste management  
3 area, you have a sand unit but then part of it  
4 sees a loam unit or something like that, that  
5 might have higher sorption, if we simplify it and  
6 represent it only as a sand unit, we're going to  
7 overestimating the risk from the part that sees  
8 the loam unit, of course. That's what I tried to  
9 convey with the GIS. In using the one-dimensional  
10 representation, we're not ignoring the variability  
11 in the site, we're representing it as  
12 uncertainty. We representing it in a different  
13 way. What we've done is we've taken the real  
14 variability and converting it into an uncertain  
15 distribution to allow us to use a one-dimensional  
16 representation. We're going to try going forward  
17 to do some analysis to show that that approach  
18 works fairly well for this project. And if we  
19 find that it doesn't, then we'll go back and we'll  
20 expand it and make it more complicated.

21 DR. KOCHER: Fairly minor question  
22 here. I wanted to be a little clearer about some  
23 of the definitions of your receptors. Are you  
24 assuming in some of these situations that a person  
25 is actually residing at the physical location,

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1 say, of the NDA, is living on top of that site and  
2 is drilling through the waste in that kind of  
3 situation, or are you putting someone at a  
4 boundary somewhere?

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

22 For the South Plateau, we don't have  
23 the resident or the farmer using groundwater on  
24 the South Plateau currently in the model. We can  
25 change that if we need to, but it looked like the

1 water availability was somewhat limited from our  
2 perspective. So they can live on the South  
3 Plateau, but they don't get exposed through  
4 drinking water. They can -- there was a concern  
5 by one of the agencies that somebody can build a  
6 dam on the streams and provide a water source to  
7 irrigate crops. So there's a trigger in the model  
8 somebody can dam up the stream and take water from  
9 the stream and use it to irrigate the crops,  
10 somebody could get exposed through a, say the  
11 vegetable consumption pathway in that scenario.

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

19 DR. KOCHER: That's getting close.  
20 The basic idea here is you're doing sort of a  
21 balancing act between allowable releases to some  
22 environmental medium and what's your exposure to  
23 radioactive material that has not moved, and it's  
24 kind of the latter scenarios I was interested in.  
25 Obviously it's different for the building where

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1       vitrification took place or reprocessing took  
2       place. But it's very conceivable they have this  
3       nice graded area out where the waste units are and  
4       it's high ground, I put my house on high ground  
5       whenever I can, and I'm going to be digging into  
6       the waste, that kind of thing, that has not  
7       moved.

8                       MR. ESH: I believe in most cases,  
9       besides the alternative of no action, they are  
10      looking at some sort of capping or cover on a lot  
11      of the areas, especially the waste disposal  
12      areas. But we do look at depth to waste, and  
13      generally if the depth to waste is more than three  
14      meters, then we won't have a resident scenario for  
15      that area, unless there's residual soil  
16      contamination they can get some direct exposure to  
17      or pathways like that. But if the depth is less  
18      than three meters, then we would evaluate a  
19      resident scenario where they could build a house,  
20      exhume material and spread it on the land surface  
21      around the house. So it's dependent on the depth  
22      to waste, and that's one of the complexities with  
23      the erosion scenario is the erosion is changing  
24      that depth to waste. So it could change when a  
25      receptor is a valid type of analysis to perform at

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1 a given location at some time in the future. It  
2 gets very complicated when you throw in the  
3 erosion process.

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

6 DR. CLARKE: Bill?

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

13 MR. ESH: Yeah, it's currently set  
14 up right now that we'll run it for 10,000 years  
15 usually. In decommissioning phase, the analyses  
16 are usually performed for 1,000 years remember,  
17 but I believe Chad had made a comment on one in  
18 the West Valley policy statement, it says  
19 something about considering longer impact to the  
20 EIS. I don't know if it says going out to peak  
21 impact or not. For the types of analyses that  
22 we've performed so far it looks like those peaks  
23 generally occur within 10,000 years depending on  
24 what you're assuming about the engineering, of  
25 course. That's the big uncertainty. The two

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1 biggest uncertainties for the longer-term impact  
2 that may increase or you would expect would  
3 increase, would be your ability to estimate the  
4 long-term performance of the engineered barriers  
5 over long periods of time, and your ability to  
6 assess the erosion impacts at the site over long  
7 periods of time.

8 MR. HINZE: Does that include  
9 climate then?

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

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1 that's how we consider climate change in our  
2 methodology.

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

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

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

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

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

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

6 MR. ESH: Yes.

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

9 MR. ESH: Well, not a problem for  
10 our review. I think it helps us identify what  
11 parts of the deterministic model things, we may  
12 need to look more strongly at the parameter  
13 selections. And then also it can help us when  
14 looking at sensitivity analysis because the  
15 typical approach for sensitivity analysis for the  
16 deterministic model is to look at one parameter at  
17 a time and see, okay how much did it change the  
18 output. But you aren't fully capturing the impact  
19 of the uncertainty when you do that type of  
20 analysis for a model that has lots of  
21 uncertainties that can influence one another or  
22 can cause a combined effect of those  
23 uncertainties. So you may see limited dose impact  
24 for varying some Kd and then you see a limited  
25 dose impact for varying the groundwater flow rate,

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1 so if you have both probabilistic and the model  
2 behaves nonlinearly, well, lo and behold when both  
3 of them are sampled, one sampled low, one sampled  
4 high. All the sudden you get a big result in the  
5 risk sample. So that's the type of problem using  
6 the deterministic approach. We're well aware of  
7 it and we use our model to learn and then do a  
8 better review of DOE.

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

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

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

18 MR. ESH: I don't know how realistic  
19 it is. There's a big impact on the dose results  
20 with what receptor you use and where he's  
21 located. We generally try to make reasonably  
22 conservative selections when it comes to  
23 receptors. If you have a gully and you have very  
24 steep slopes, we would generally believe that it's  
25 unlikely somebody is going to reside on those

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1 slopes. But if you have a gully forming on site  
2 and you have a big flat area that the gully is  
3 slicing into, remember there's this issue of the  
4 the temporal scales that we're dealing with.  
5 Somebody can farm and live on the order of thirty  
6 to fifty years where it may be 3,000 years that  
7 we're talking for this gully to form and  
8 encroach. So it can be challenging to put it into  
9 context in our minds when you're analyzing it  
10 what's reasonable and what's not reasonable. We  
11 would expect the receptors that are selected  
12 should be consistent with the regional practices  
13 and consider the topography of the site as it  
14 evolves and the rate of the evolution of the  
15 topography.

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

19 MR. ESH: Right now it's just  
20 represented as deterministic vectors based on the  
21 reports that DOE has generated, but we intend to  
22 make them stochastic in the future because we  
23 reviewed the inventory reports and it looks like  
24 in some cases there's a fair degree of uncertainty  
25 in the inventory. Especially for the disposal

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1 areas, but maybe even for, say, the high-level  
2 waste tanks.

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

25 You don't have to answer that now,

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

8 MR. ESH: I'll answer it briefly.

9 I'm sure as we were looking at the model you  
10 probably felt like a hamster in a very cruel maze,  
11 but I think as I showed earlier, we had some area  
12 for documentation. There was one file called  
13 model description when the very first version even  
14 pre-beta was put together, I wrote up maybe five  
15 pages describing what was being done in the  
16 model. I think what we could do, depending on  
17 what we need to use it for, if it's an internal  
18 review tool, we'll document it a lot less as long  
19 as we understand it that's our main goal. But if  
20 we have to share it externally and it's being used  
21 for any sort of decision making, then all of that  
22 would have to be documented and we would have to  
23 decide whether we try to do it within the model  
24 providing links to documents that would explain  
25 why we have these six waste management areas or

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1 why are we doing the dose modeling this way. You  
2 could do that pretty easily in two or three pages  
3 here or there, four or five maybe, I don't know  
4 but you would provide all the linkage there. Or  
5 you could make one big report that describes it  
6 all, but I think if you try to make a report of a  
7 model like this, it makes it more difficult. I  
8 think if somebody can look at the model and link  
9 to the documentation, it's a lot more  
10 understandable.

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

19 DR. CLARKE: David, thank you. I  
20 have a few questions I'm going to reserve for the  
21 round table. I would ask the rest of you to do  
22 the same. We're scheduled for a fifteen minute  
23 break. Let's take it, and we'll resume at 10 to  
24 11.

25 (RECESS TAKEN)

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

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

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

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

24 The next slide we give a summary of  
25 the order of the presentation. There are about

1 seven topics. First we'll discuss the approach  
2 that we use for long-term PA. We'll give first  
3 level results from the types of scenarios  
4 analyzed. And we'll say something about the  
5 receptors. And the balance of the presentation  
6 will give some detail on analysis and results for  
7 groundwater release and integrated code for direct  
8 intruder.

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

19 On the next slide we start to edge  
20 through our seven steps. Upper-level statement of  
21 the approach is to develop and analyze the  
22 statement of scenarios, a set of scenarios that  
23 stands for the range of conditions you're going to  
24 see at the site. To do that we use mathematical  
25 models, and we can talk a little bit about

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1 selecting and developing models. In developing  
2 these models we have analytic requirements, the  
3 configuration of the environment, environmental  
4 pathways, et cetera. We want to have our codes be  
5 flexible enough that they can handle minor changes  
6 in the closure designs.

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

21 Step two identify inventories of  
22 constituents of concern and engineered barriers.  
23 Estimates of inventory have been developed for  
24 both radionuclides and chemical constituents, and  
25 they're documented in what's called waste

1 characterization reports. They form basis for  
2 analysis. The engineering designs are described  
3 and documented in what are called closure  
4 engineering reports. One of these is developed  
5 for each of the alternatives that we analyze.

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

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

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

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

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

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

24                   Next slide is the upper-level  
25 description of the type of models we use. For

1 residual contamination of surface soil we use a  
2 computerized program called RESRAD. We can use  
3 this code to calculate cleanup levels that we call  
4 CDLs, and we also use it to calculate unit dose  
5 risk factors that we use in analysis of the  
6 groundwater release scenarios.

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

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

20 For direct intrusion we basically  
21 are using Part 61 home construction and  
22 well-drilling intruders. Each of these involves a  
23 worker who contacts waste either in the process of  
24 digging the foundation for the home or in drilling  
25 a well, and they also initiate residential

1 agricultural scenarios when the intruder removes  
2 some portion of the waste from the ground surface  
3 and spreads it on the land surface.

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

21 The next slide is a cartoon that  
22 introduces the concept used to analyze groundwater  
23 release scenarios. The three arrows to the left  
24 represent near-field flow through engineered in  
25 the vicinity of the waste. Little box waste form

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1 represents the, a release module from the waste.  
2 The larger box represents movement through the  
3 aquifer. And the well is an example of possible  
4 exposure route for receptors. The groundwater  
5 models have these four main modules that I'll talk  
6 about in a little more detail on the next slide.

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

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

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1 and holes, stuff like that.

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

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

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

18                  Next slide shows how things work on  
19                  the South Plateau. On the South plateau we again  
20                  for the closure alternatives have a tumulus with  
21                  the same type of drainage layer and upper clay  
22                  layer. For the NDA we represent the two flow  
23                  paths. The upper ten feet or so of the South  
24                  Plateau is what is called weathered till and it's  
25                  fairly transmissive, and water can move through

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1 that layer in a horizontal direction. So we run  
2 the model to calculate the horizontal release to  
3 the nearby creek. Also some water can move, only  
4 a portion of the waste would be exposed in that  
5 upper transport layer, so we also analyze a second  
6 vertical transport layer where water moving  
7 downward can move through the entire length of the  
8 wasteform and into a unit called Lacustrine and  
9 Kent recessional and flows over toward Buttermilk  
10 Creek. When we do that analysis we take account  
11 of the different depths of the waste; for example,  
12 the holes in which the hulls are buried are 55  
13 feet deep, and the holes in which, in the process  
14 area, NFS process area, averages about 20 feet  
15 deep, and the WVDP areas down about 28 feet. The  
16 vertical downflow model has three segments; one of  
17 which represents weathered till, one of which  
18 represents this clear portion of what we call  
19 unweathered till, and the third piece represents  
20 movement through the unweathered lavery till below  
21 the waste.

22 The next slide shows another  
23 cartoon, if you will, representation of the things  
24 that take place when we model the tumulus. We  
25 take credit for the drainage layer and for a

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1 single clay layer from the central core of the  
2 tumulus. When we modeled horizontal flow through  
3 either the sand and gravel or the weathered till  
4 on the South Plateau, we take account of the  
5 French drain and slurry wall, and of the aquifer  
6 drains around that.

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

23 Let's see, the next slide would give  
24 an example of a time series of dose because the  
25 dose here is rather low, this would be typically a

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1 off-site individual. The plot shows an early peak  
2 which is very common in the analysis we do, we see  
3 that typically carbon, iodine, generally  
4 technesiums produce this early peak. That peak is  
5 frequently followed by neptunium plateau,  
6 neptunium and uranium, and finally in the very  
7 long term we may see a plateau or a pulse coming  
8 through from plutonium. We can of course add all  
9 of these time series to calculate cumulative  
10 impacts for off-site individuals.

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

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

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1 For our analysis we have picked the hydraulic  
2 conductivity and distribution coefficients for the  
3 aquifers. The hydraulic conductivity for the  
4 drainage layer, for the clay layer, for the  
5 tumulus, the hydraulic conductivity of the slurry  
6 walls in the tumulus closure designs, and the  
7 distribution coefficients for the different  
8 constituents in the wasteform. So we come up with  
9 in our current analysis about 67 random  
10 variables.

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

20           On the next page the doses from each  
21 of the realizations that contributed to that peak  
22 mean dose. One of the things we do with this is  
23 we compare our deterministic dose with this time  
24 series probabilistic dose, and generally we're  
25 above the 90th percentile with our deterministic

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1 results. The last thing that we do here is we  
2 want to try to get some sort of idea what are the  
3 sensitivity parameters using the correlation  
4 analysis that didn't come out real well. So in  
5 our uncertainty code, we input a dose threshold  
6 for every year in which the dose threshold is  
7 exceeded, the dose by pathway, and the vector of  
8 random variables that gave that dose, so that we  
9 then can look at that and see which combinations  
10 of those random variables are coming up to give  
11 you that peak dose -- or those larger doses.

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

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

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

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

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1 incorporate storms of all magnitude when we carry  
2 that information forward into use in SIBERIA.

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

15 When we run SIBERIA, we get two  
16 types of results. The first is the elevation of  
17 each of the nodes in the system. Each place in  
18 our study area has a function in time. Second  
19 output that we get out of this is we can draw  
20 transects through different areas, and we use the  
21 shape of those transects to select the receptor  
22 location. And what we have found is that when you  
23 get into the waste areas, the slope is great and,  
24 therefore, we have analyzed for creek water  
25 receptors and an on-site recreational receptor but

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1 not for an intruder. We're making the claim that  
2 because the slope of the area is high, somebody's  
3 not going to try to build their house in this  
4 developing creek bed waters.

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

25 All right. What we get out of the

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

16 Final slide talks about our intruder  
17 analysis. As I said before, it's patterned after  
18 the Part 61 guided scenarios. We took parameter  
19 values from the Part 61 analysis. We left out a  
20 discovery scenario. If you note, Part 61 analysis  
21 there was a discovery scenario that was really  
22 just a variation in home construction, so we left  
23 that out. In the home construction scenario, a  
24 worker comes and excavates the foundation of a  
25 house. As David said earlier, in the course of

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1 doing that he gets an exposure dose for inhalation  
2 and direct. If he goes down ten feet, in the  
3 course of doing that he contacts waste, he takes  
4 that waste out of his foundation and distributes  
5 it over the area near the home and initiates a  
6 residential agriculture scenario where he's  
7 getting a dose from the usual pathways; dust  
8 inhalation, soil ingestion, crop and animal  
9 product ingestion.

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

23 And the last of the direct intruder  
24 doses we have is for recreational hiking. This is  
25 for the person that walks through the area each

1 day and in the course of doing that, from  
2 radionuclides he would get exposure, inhalation  
3 and inadvertent. And, as I said, we analyze these  
4 scenarios for each alternative's waste management  
5 area, and we are saying we look at that for the  
6 NDA and SDA also. And that was the last slide.  
7 Go backwards and go to questions.

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

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

19 MR. PRICE: The basis was our  
20 geomorphologists reviewed the available models out  
21 in the literature, and I think basically there  
22 were two available at the time; SIBERIA and  
23 CHILD. At that time CHILD was at an early stage  
24 of development. So they selected SIBERIA on the  
25 basis of it being the best available model at the

1 time. And, no, we have not checked it against  
2 other landscape evolution models. It's a pretty  
3 labor-intensive job just to run this model as it  
4 is.

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

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

19 MR. HINZE: Is it a nonlinear  
20 model?

21 MR. PRICE: Yes.

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

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

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

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

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

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

1 topography.

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

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

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

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

1 do that.

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

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

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

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

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

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1 that we analyze.

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

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

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

21 MR. PRICE: Well, that would be  
22 true, yes, but part of the reason why we do the  
23 uncertainty analysis is to help us look at exactly  
24 where we stand with respect to that. And in NRC  
25 guidance they have said they would like for your

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1 determination to be somewhere around or above the  
2 90th percentile. And so you could say you keep  
3 piling things up, you're gonna end up with  
4 99.9999. Generally, we're not finding that, we're  
5 finding ourself in the 95 range.

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

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

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

22 MR. PRICE: For the chemicals, yes.

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

25 MR. PRICE: On the South Plateau the

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

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

12 MR. PRICE: Certainly.

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

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

21 DR. WEINER: Finally, I'm just  
22 curious, you coded your own models and every time  
23 you use a different model you will clearly get a  
24 different result. Did you do this before you knew  
25 what kind of model NRC was going to use to review

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1 your model, or did you make any attempt to use  
2 models that had been used for other projects?

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

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1 concentration in the center of the tank.

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

4 MR. PRICE: Yes.

5 DR. WEINER: Thank you.

6 MR. CROFF: No questions.

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

16 MR. PRICE: Could you point to it.

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

23 I'm struggling with the question of,  
24 in the same question I posed to David, if you're  
25 not extremely careful in documenting where and how

1 you've made a deterministic decision and how  
2 they'll string together along the lines of  
3 Dr. Weiner asked about how, you know, how you  
4 could lose track of your results pretty quickly.  
5 The second risk is you can lose track of risks,  
6 you can actually mask things if you're not  
7 careful. So are you addressing those kind of  
8 things, is that in your upcoming plans? How do  
9 you address the question of uncertainty and  
10 various approaches to it?

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

24 CHAIRMAN RYAN: I recognize, for  
25 example, on these graphs we're dealing with

1 different facilities, but when I see a factor of  
2 two, I ask myself are they different? What's  
3 different about it? Typically I'd want to see an  
4 uncertainty bar on that line. So again, maybe  
5 that's coming along but I think that documenting  
6 deterministic values in a calc package is one  
7 thing, but justifying the selection of a value  
8 based on a range of values that could be selected,  
9 that's a different matter. That's more of what  
10 I'm asking about. For example, we all know Kd's  
11 vary all over the place. If you do a  
12 deterministic value and you picked one Kd, why did  
13 you pick that one? And are you going to get into  
14 that kind of detailed documentation, how you do  
15 these calculations and how you do sensitivity  
16 studies around them?

17 MR. PRICE: Yes, that sort of base  
18 information that's documented in EIS. So, for  
19 example, for the Kd's we have reviewed site  
20 specific information and we feel as if there are  
21 enough measurements only for two radionuclides to  
22 support a site specific analysis, that's the  
23 strontium and uranium. The balance of our peak  
24 evaluation depends on that Shepard and Theebo  
25 reference that David referred. That's a national

1 sample of each distribution coefficient and that,  
2 photocopies of that information is in the data  
3 files.

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

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

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

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

23 CHAIRMAN RYAN: And, again, if you  
24 lay out a probabilistic approach to that and do  
25 that kind of analysis, I didn't glean that you had

1 done that as well?

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

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

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

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

23 MR. PRICE: The next curve gives you  
24 some of that information for the year of peak mean  
25 dose, it tells you what the distribution

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1 coefficients. I guess I did not write down what  
2 the peak mean dose was, but we could add some of  
3 that information.

4 CHAIRMAN RYAN: The details would be  
5 helpful.

6 MR. PRICE: Okay.

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

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

16 MR. PRICE: Right so --

17 DR. KOCHER: So frequency --

18 MR. PRICE: That's the wrong term.

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

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

24 DR. KOCHER: I have no other  
25 questions.

1 DR. NAUMAN: How many WMAs did you  
2 consider?

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

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

18 MR. GLENN: I think it generally  
19 aligns. We also have the Strontium-90 plume in  
20 there. Because we weren't analyzing a particular  
21 scenario or a particular alternative in the EIS,  
22 we have the waste management areas in there that  
23 can be analyzed, but if you're looking at a  
24 particular alternative in the EIS then you choose  
25 which ones you simulate. I think in terms of a

1 risk perspective, we have the same ones that Joe  
2 had mentioned in addition to the Strontium-90  
3 plume.

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

7 DR. PARKER: Found it very  
8 interesting, but I'm confused, not unusual, but  
9 perhaps you can help me. Slide 20 you look at  
10 only the first thousand and 10,000 years. Then on  
11 slide 24 you show the results of that which seem  
12 to be in line with what you've stated as the  
13 probability over 10,000 years. But if you go over  
14 to figure 18 -- 16, 17 and 18, now we go up to  
15 100,000 years. It's not clear to me whether or  
16 not -- obviously, you're not taking into account  
17 erosion after 10,000 years. What is the impact of  
18 erosion assuming it continues, what is the impact  
19 of that erosion on these results?

20 MR. PRICE: We don't take into  
21 account the effects of erosion in evaluating the  
22 groundwater scenarios. We felt that its very  
23 difficult to determine what sort of -- Page 16,  
24 for example, is a groundwater release result. And  
25 it's difficult to analyze what's going to be the

1 future flow distribution for the aquifer based  
2 upon change in the topography due to erosion so we  
3 have groundwater modeling that gives a better  
4 understanding of how the groundwater system works  
5 now. But if we tried to couple that with an  
6 erosion model, I think we would lose confidence in  
7 it relatively quickly.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

21 MR. PRICE: No, we don't, especially  
22 for the South Plateau we analyze the system as  
23 saturated all the time. And on the North Plateau,  
24 we make a similar approach with the vadose zone  
25 being relatively thin and narrow there, and most

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1 of the facilities, for example, the tanks being  
2 below the level of the groundwater.

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

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

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

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

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

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

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

18 MR. PRICE: Right, we did not, but  
19 when we do the EIS -- I did describe we have what  
20 we called a distributed source curve. We use that  
21 to describe concentrations out at the aquifer now  
22 to predict out into the future, and we report on  
23 two points. One at 100 meters, and one at 300  
24 meters, and the EIS have the traces of those at  
25 these two locations as a function of time. And

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1 it's about 150 years or so for the dose at Powder  
2 Point goes below, say, 500 millirem a year.

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

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

8 DR. FLACK: And how did it come  
9 out?

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

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

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

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

22 MR. PRICE: Yes, I agree.

23 DR. KOCHER: I did have one  
24 additional question. You were the first person to  
25 mention the issue of residual contamination on

1 surface soil, and I'm wondering where it falls, as  
2 you see it, where it falls in importance as a  
3 potential source of exposure? It might be, for  
4 example, important for this recreational hiker.  
5 Obviously it would be a concern only to the people  
6 who are physically on the site, but where does  
7 this fall in the spectrum of potential sources of  
8 risk as you see it?

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

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

21 MR. PRICE: Sure. The results that  
22 the model would predict in relation to the size  
23 and the extension of the gullies depends in part  
24 on the parameterization of the model. In 1999 we  
25 gave a presentation to the NRC where we had a

1 parameterization of the model that used relatively  
2 low down-cutting rates from the creeks. The  
3 results that were shown at that time showed  
4 extensive movement of the gullies, that would be  
5 in particular NP-1 and NP-3, but on the average  
6 lower down-cutting rates in others areas.

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

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

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

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

21 MR. ESH: Sure. This is Dave Esh.  
22 I do have to say that the erosion modeling that is  
23 being done or has been done is a considerable  
24 effort, and we've been critical of it and -- well,  
25 it's easy to cast stones, but if you've understood

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1 what's involved in doing it, we tend to be a  
2 little more understanding. Regardless of that,  
3 the issue of the gully formation and landform  
4 evolution, it does seem to be potentially driven  
5 by some of the selections for parameters for  
6 initial conditions in the model. One of the  
7 questions or concerns that we had with the erosion  
8 modeling is, of course, how well does it represent  
9 reality. And we thought maybe there are some  
10 analogue sites that you can look at in the region  
11 that might give you an indication, if you could  
12 get some sort of estimate of when those systems  
13 were formed and where they potentially are  
14 located, whatever, they may be an older system,  
15 how they evolved, how they compare.

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

25 When we reviewed the work back in

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

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

1 some other locations.

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

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

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

14 MR. ESH: Yeah, our contractor, the  
15 Center For Nuclear Waste Regulatory Analysis, they  
16 have used the CHILD model in the past that Joe  
17 mentioned, and they have some experience with it.  
18 Our intentions at first pass are to develop an  
19 assessment of the erosional impact but not to do  
20 process modeling of the erosion process itself.  
21 So we'll try to do a pretty open-minded, highly  
22 uncertain analysis of the erosion impact and see,  
23 okay, if the gully formation rate is 500 years and  
24 it gets to this waste management area, what are  
25 the impacts. That sort of analysis. If we find

1 there's a big influence on the timing and expense  
2 in a particular type of erosional process and its  
3 impact in the facilities, then we may need to go  
4 back and do our own process modeling. It's a  
5 challenge, especially with the level of resources  
6 that we have.

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

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

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

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

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

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

23 MR. HAMDAN: I have a question for  
24 Dave, and one for Joe. Dave, I was surprised that  
25 you're doing the source system as deterministic in

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1 your modeling. The power of GoldSim is the  
2 stochastic to handle uncertainty. And the source  
3 team for this slide and this slide seems to be  
4 uncertain. You have surface contamination, you  
5 have groundwater contamination, so the first thing  
6 that I would think about is that you would want to  
7 take advantage of the GoldSim capability and make  
8 a source team stochastic.

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

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

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1 assessment.

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

14 MR. ESH: Yeah, I think to develop,  
15 say, a table of inventories called for in the  
16 waste characterization report for the NDA and the  
17 SDA, there's a huge amount of effort went into to  
18 generate even those table of numbers because there  
19 were all these shipments of all this material, and  
20 as you indicated, many times you had information  
21 like the contact dose rate of the container.  
22 Maybe you had a volume or a mass number, maybe you  
23 didn't. Maybe you didn't even have a contact dose  
24 information. You certainly didn't have, in most  
25 cases, information on the isotopic distribution

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1 for those disposals. So there's a really  
2 difficult effort in trying to estimate the  
3 inventory for the disposal areas. I think in that  
4 respect the uncertainty for those is probably  
5 going to be much higher than, say, the high-level  
6 waste tanks. There's still uncertainty in that  
7 process, too, so I think the best you can do is  
8 try to understand what that certainty may do and  
9 then consider it whenever you're assessing the  
10 impact, because it is in many cases a direct  
11 influence on the risk, the uncertainties in the  
12 inventory.

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

22 MR. PRICE: The integration on  
23 performance of the models has been sort of in  
24 cooperation with the CERs, so over the years we've  
25 analyzed different closure designs or different

1 combinations of, say, distribution coefficients  
2 parameters, sort of integrated to where we are  
3 now. With respect to using predictions of the  
4 models to -- I'm not sure. Can you restate the  
5 last part of the question?

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

19 MR. PRICE: A primary example of how  
20 we use the results of the sensitivity analysis is  
21 to design a wasteform for the high-level waste  
22 tank, what kind of retention capability you should  
23 have, and over time we've increased the retention  
24 capability for Neptunium. That's the sort of  
25 thing we've used the models for in terms of

1 improving the design. I don't think that we can  
2 say that we have gone back and used those results  
3 because they're predictive in nature to help us  
4 understand something about, say, the inventory.  
5 The estimates of the inventory are difficult to  
6 develop. Some of the inventory we had to input  
7 the best estimate how much we had in each case.  
8 In the analysis we used a conservative  
9 deterministic pound, but we haven't gone back and,  
10 because it's predictive in the future, compared it  
11 with existing site contamination, if that's where  
12 you want me to go.

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

22 MR. PRICE: Not explicitly. We  
23 reviewed it and felt that for the buried waste,  
24 that it wasn't, the magnitude of the earthquakes  
25 that are predicted to affect the site are on a

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1 calibration of zero to ten per the seismic  
2 analysis. But with respect to the landsliding as  
3 you see it in the erosion analysis, that was  
4 partly why we went to this conservative basis, try  
5 to subsume in a conservative way things that will  
6 varify and therefore cause us to modify the model,  
7 such as an earthquack induced landslide. That's  
8 partly why we went to this conservative basis to  
9 try to bound the analysis, have more of a feeling  
10 of confidence that we had bounded the analysis.

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

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

15 DR. CLARKE: Okay. Go ahead.

16 MR. COLEMAN: A comment on  
17 communicating results to the public. Dave, you've  
18 mentioned several times that people might need  
19 GoldSim training to fully understand the results.  
20 I've had some GoldSim training, and I would  
21 definitely believe that. One thing that could  
22 help is to show a few simple models representing  
23 key parts of the GoldSim representation. For  
24 example, you described the Strontium-90 plume as  
25 posing the largest immediate risk. The

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1 groundwater plume could be represented by a  
2 relatively simple stand-alone mathematical model  
3 that captures most of the GoldSim results and most  
4 of the observed plume behavior. Just one way to  
5 help the public understand and sort of avoid the  
6 appearance of results coming out of a black box.  
7 Have you considered this sort of approach?

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

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

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

8 MR. BEMBIA: Thank you. My name is  
9 Paul Bembia. I'm a program manager with the New  
10 York State Energy Research and Development  
11 Authority. I've been with NYSERDA at the West  
12 Valley site for fifteen years. I have a bachelors  
13 degree and a masters degree in geology. Prior to  
14 joining NYSERDA in 1990 I was with an  
15 environmental consulting firm, and prior to that I  
16 was with the Nuclear Regulatory Commission in the  
17 geotechnical branch in the Division of Waste  
18 Management in the office of Nuclear Material  
19 Safety and Safeguards. I am a primary reviewer of  
20 the decommissioning EIS, and I have been working  
21 on the decommissioning EIS for about as long as  
22 I've been with NYSERDA. My purpose here today is  
23 to identify several issues that NYSERDA believes  
24 may be critically important to the outcome of the  
25 long-term performance assessment. From the

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1 discussion that's gone on here today and also the  
2 discussions yesterday, I believe the ACNW also  
3 recognizes those issues and I don't think I'm  
4 going to bring up any new issues here, but I do  
5 want to make these concerns clear.

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

24           The second issue is groundwater  
25 modeling. Due to the geologic complexity of this

1 site, the ACNW and NRC staff should look closely  
2 at the approach for groundwater modeling used in  
3 the long-term performance assessment. We believe  
4 it's important to assess how the methods and  
5 results from the updated performance assessment  
6 compare with any independent NRC analysis of  
7 previous groundwater modeling work; for example,  
8 the work that was done for our 1996 DEIS or the  
9 extensive work sponsored by the NRC in the 1980s  
10 and 1970s. If the methods and the results differ  
11 significantly, the reason for those differences  
12 should be understood. We also believe the model  
13 results should be compared to the real site data  
14 wherever possible as a way to test the  
15 predictions. For example, will the model  
16 adequately duplicate the distribution of  
17 contaminants actually in the groundwater plume  
18 today.

19 And the third issue is receptor  
20 locations. We ask you to look carefully at the  
21 basis for receptor locations and the exposure  
22 scenarios identified for each of these receptor  
23 locations. We ask the ACNW and the NRC staff to  
24 consider whether additional receptor locations and  
25 exposure scenarios may be required to assess

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1 whether the entire licensed facility can meet the  
2 decommissioning criteria set by the NRC.

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

18           And finally, the last issue is the  
19 technical basis for the performance assessment.  
20 And there have been many analyses of site and  
21 facility performance conducted at the Western New  
22 York Nuclear Service Center over the last 30 years  
23 using different conceptual models, different  
24 computer codes, different assumptions and  
25 different input data sets. At times the different

1 modeling approaches have resulted in significantly  
2 different performance outcomes for the same  
3 facility. This begins to raise a question for us  
4 as to how we should view any one set of these  
5 modeling results. How certain were we in the  
6 first set of PA results before the second set came  
7 along? The second before the third? Or the work  
8 done by the NRC here in the 1980s.

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

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

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

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

15 A few comments. NRC's use of  
16 probabilistic methods will be very useful as a  
17 benchmark against which other agencies'  
18 deterministic assumptions can be judged, assuming  
19 that these other agencies continue to use  
20 deterministic methods. We also look forward to  
21 NRC's separate erosion analysis and erosion  
22 modeling. That's a very crucial part of this  
23 effort to close the site safely. There seems to  
24 be general agreement that erosion is a severe  
25 problem at the site. The problem is not just

1 local site erosion, but geomorphic evolution of  
2 the whole valley within which the site sits. It's  
3 a natural geologic process that may be difficult  
4 to stop or slow down at the rate needed as long as  
5 the facilities remains in place. As you probably  
6 know from your site tour yesterday, the facilities  
7 at the site are built on glacial fill, not on  
8 bedrock. If you have a chance either before or  
9 after lunch, you might want to take a look at the  
10 map or physical model I brought in, it's on the  
11 table at the back of the room. It's one that I  
12 and a friend of mine put together a couple years  
13 ago to represent the material as glacial fill as  
14 opposed to the hills such as the one you see here  
15 and the one right across the road from the site.  
16 The site itself, the facility, it's built on  
17 several hundred feet of glacial fill, and that's a  
18 big part of the erosion problem.

19 The issue of global warming is  
20 potentially important. The greater peak stream  
21 flows that may be associated with global warming  
22 need to be taken into account as part of the  
23 calibration and/or operation of any erosion  
24 model. In my judgment WEPP appears to be  
25 inappropriate for erosion model calibration unless

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1 it can somehow be ground truth against actual data  
2 for this particular site. It's not clear, for  
3 example, that WEPP and/or SIBERIA properly take  
4 into account processes such as piping and  
5 landsliding or for that matter landsliding that  
6 may be aggravated by seismic activity. One of the  
7 previous pieces of evidence that's rendered  
8 important for model calibration is the surveying  
9 that was done by Survey Methods, people who are  
10 professional surveyors I believe, surveyed along  
11 the access of Frank's Creek and Urban Brook, which  
12 is a little creek that immediately bounds the  
13 burial ground. In two consecutive survey  
14 sessions, one in the year 1980, another in the  
15 year 1990, those two surveys showed readily  
16 measurable down-cutting along both those creeks  
17 during that ten-year period. And if you're  
18 familiar with the 1996 draft EIS for this site,  
19 the down-cutting during that ten-year period was  
20 largely used as a calibration for the erosion  
21 modeling or erosion predictions that were  
22 presented in that draft EIS. But in the last nine  
23 years or so the Department of Energy and the  
24 consultant SAIC tended to ignore that evidence.  
25 That is a piece of evidence without calibration

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1 any erosion model that may be questionable given  
2 the short duration, ten years, but it is at least  
3 some amount of real data during a period of time  
4 during which rainfall and parameters that affect  
5 erosion rates are fairly well known. That needs  
6 to be taken into consideration.

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

25 In closing let me just say in

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

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

18 (NO RESPONSE)

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

24 (RECESS TAKEN)

25 DR. CLARKE: Okay. Could you take

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

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

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

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

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

4 On the slide number 3, there's kind  
5 of a chronology of how West Valley came to be. In  
6 1961 New York State acquired the parcel on which  
7 the West Valley New York Nuclear Service Center is  
8 located. And in '62 Nuclear Fuel Services had  
9 reached an agreement with the AEC and with the  
10 state of New York to construct the plant. 1963  
11 the state of New York opened the disposal area,  
12 the SDA begins operations. From '66 to '72 is  
13 when Nuclear Fuel Services operated the plant,  
14 processed about 600 metric tons I believe of  
15 fuel. About 60 percent of that was supplied under  
16 contract by the federal government from en  
17 reactor, and then the other 40 percent coming from  
18 commercial entities. What remained at the end of  
19 1972 was about 600,000 gallons of liquid  
20 high-level waste in one of the, one of the  
21 high-level waste tanks.

22 '72, reprocessing operations  
23 halted. There was going to be modifications to  
24 the facility, it was going to get bigger, they  
25 were going to process a little more. And as

1 regulations increased and the job just seemed to  
2 get bigger and Nuclear Fuel Services basically  
3 opted out of operations for the center.

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

23 Next slide, please. As I just kind  
24 of ran through, the act authorized the department  
25 to conduct this demonstration project. The five

1 things that I just mentioned are there with the  
2 next bullet. And ultimately one of the things I  
3 think I want to bring up is that at the time of  
4 the transition, New York State transitioned the  
5 licensed facility there was a lot of work done to  
6 put that license in abeyance and to turn the  
7 facility over to DOE for exclusive use to conduct  
8 the project. So again, where you took the tour  
9 yesterday, those approximate 200 acres is where we  
10 conduct the project, and that is basically again  
11 our key focus for the project.

12 As we said earlier today, the tech  
13 specs were put in place, the bullet towards the  
14 bottom there. One of the things we haven't really  
15 talked about too much is the Act specifies 90  
16 percent to be paid by the federal government and  
17 10 percent to be paid by New York State as a cost  
18 share for this project. And NRC is required by  
19 the Act to establish decommissioning criteria  
20 which in 2002 they did when they put the policy  
21 statement out which prescribed the License  
22 Termination Rule.

23 In 1981 we reached agreement with  
24 NYSERDA, a cooperative agreement. Again, it  
25 provided the working relationship, the

1 arrangements for DOE to manage the project. There  
2 was a supplemental agreement in February of '91  
3 which talked a lot about the EIS and how we were  
4 going to proceed from, with that particular  
5 effort. NRC license was amended so DOE could take  
6 control of the site and, again, as I said, the  
7 tech specs were put in place. Just to follow on  
8 what you said this morning a little bit, DOE  
9 inserted its management systems at that time to  
10 where, again, we use the DOE orders, Code of  
11 Federal Regulations, all of those things that DOE  
12 works with to safely operate the plant, and we  
13 have since its inception. In '81 we reached, we  
14 have an MOU with the Nuclear Regulatory Commission  
15 that outlines our respective roles and  
16 responsibilities. I know there was some questions  
17 from the panel on that relationship and, again,  
18 even though there is some informality there that  
19 NRC has not acted as a true regulator, there has  
20 been a very good relationship and I think a very  
21 good consultation with NRC since the inception of  
22 the project. '82 DOE assumed control of the  
23 reprocessing site and West Valley Nuclear Services  
24 was selected as prime contractor. There's been  
25 some ownership changes in that company over time,

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1 but they are still kind of the prime contractor at  
2 West Valley, so they've been there the whole  
3 time.

4 Getting into operations, the  
5 high-level waste was of course our main focus. We  
6 pretreated and vitrified the high-level waste.  
7 The pretreatment process resulted in almost 20,000  
8 cement drums, and those are stored, as you saw on  
9 the tour yesterday, those are stored on the south  
10 end of the site, ultimately will be disposed of  
11 off site. The vitrification process resulted in  
12 275 canisters of high-level waste. We went  
13 through quite a qualification process as we were  
14 bringing that technology up so that we could  
15 demonstrate that we could safely solidify that  
16 waste. The operation went very well, went for  
17 about six and a half years. We removed, I think  
18 it's in a later slide, but I think we removed  
19 about 99 percent of the curies out of the high-  
20 level waste tanks. I think the third bullet said  
21 there were approximately 24 million curies that  
22 were removed from the tank, and what's there now  
23 is about 250,000 curies that remains in the bottom  
24 of the tank.

25 The decontamination of major

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

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

23                   Low-level waste disposition is one  
24 that we are actively working on right now.  
25 Basically for a very long time we did not have the

1 ability to ship waste off site, so as you see on  
2 the slide from '86 to '97 we stored the waste that  
3 we generated on site. Naturally some of the  
4 things that were packaged up back in 1986 would  
5 not meet waste acceptance criteria today. So a  
6 lot of the labor that's going into the work we're  
7 doing right now is repackaging that waste so it  
8 meets the waste acceptance criteria for two places  
9 that we're sending our low-level waste right now,  
10 and that would be Envirocare in Utah or the lab  
11 test site out in Nevada. We started shipping  
12 small amounts in '97. This contract period right  
13 now in 2005, we're actually working towards a goal  
14 of 400,000 cubic feet which represents about half  
15 of the waste that we had in storage at the  
16 beginning of this contract period. So again,  
17 things are moving along. There's a lot of  
18 roll-up-your-sleeves kind of work where we're  
19 taking a lot of the old boxes apart, making new  
20 packages to meet the criteria so we can ship them  
21 out of there.

22 Removal of unneeded WVDP  
23 facilities. That's another focus right now.  
24 Earlier this year we took a little over a third of  
25 the project site and moved it to off-site office

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1 space down to Nashburg Hollow (phonetic). There  
2 were about 180 people that were moved off site.  
3 That left a lot of excess facilities that had  
4 been, trailers that had been office spaces and  
5 things like that for the last twenty-some years  
6 and a lot of them are showing their age. Fuel  
7 efficiency has become an issue. Snowblowers in  
8 order to remove snow in the wintertime. Again,  
9 we're changing the skyline on the facility right  
10 now. As you saw yesterday, there's a lot more  
11 open ground, and we have about half the trailers  
12 off that are going and within the next two months  
13 we'll have the rest of them gone. Then we'll just  
14 have the folks that are on site will be the  
15 workers and their direct supervision that are  
16 working on the project.

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

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

15 As you will notice here, when I  
16 started off the presentation there was a picture  
17 of the old main process plant. Again, that's been  
18 about, the estimate is about 70 percent  
19 decontaminated. And we've been into the hottest  
20 cells. There are still numerous cells, rooms in  
21 that building that need to be decontaminated. We  
22 intend to work in those cells for the next three,  
23 four years and take the waste out of those as  
24 well. We built onto the facility over here on the  
25 left, this building right here is one where we

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1 load in the canisters, loaded in the canisters and  
2 any equipment that we needed during the  
3 vitrification process, and that is ultimately  
4 where the canisters will come out when they are  
5 ready to be transported to a repository.

6           These two buildings right here, the  
7 one in front is the cold chemical building. The  
8 one behind it is the vitrification facility.  
9 Those buildings right there is -- we mixed up the  
10 glass formers in here, it's a non-rad building.  
11 The vitrification cell, as you saw on tour, now is  
12 gutted. We've removed the equipment out of that  
13 cell and ultimately that part is ready for  
14 disposition at this point. The rest of the  
15 buildings, I'm not sure exactly how detailed you  
16 want to be, but basically we have all the  
17 utilities over here that support us. As I said on  
18 tour yesterday, we're a plant that's kind of out  
19 in the middle of no where so we have our own  
20 substation for electrical distribution. We have  
21 our own water supply. We have our own waste water  
22 treatment facility down here, so again we kind of  
23 maintain ourselves here. We have three or four  
24 emergency or back-up generators available to us if  
25 we need the power if we have a power outage. This

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1 building right here is the remote handled waste  
2 facility that we just commissioned last summer. A  
3 lot of the waste that has come out of the main  
4 process building, some of it that has come out of  
5 the vitrification facility and some of it remains  
6 to be brought out of the main process building is  
7 waste that's too hot to handle. So we basically  
8 designed a facility that has some state-of-the-art  
9 tools in it that we can remotely size reduce and  
10 package the waste for ultimate disposition off  
11 site. We expect a lot of the waste that goes  
12 through there right now is what we call suspect  
13 TRU, so again, we're packaging things up to the  
14 contact-handled waste acceptance criteria from the  
15 waste isolation pilot project plan. We're also  
16 working with, as they develop their remote-handled  
17 waste acceptance criteria, we're staying in touch  
18 in order to try to package things the best we can  
19 now so we don't have to handle it again.

20 Other than that what you have here  
21 are a couple of warehouses. As we've talked  
22 about, and we will talk a little more here in the  
23 coming slides, there is the state-licensed  
24 disposal area there under that geomembrane and  
25 this acreage here in front is the NRC-licensed

1 disposal area. This building down on the south  
2 end of the site is the drum cell which contains  
3 the almost 20,000 cement drums that were processed  
4 during the pre-processing, the pre-work that we  
5 did on the waste tank farm. And that pretty well  
6 covers -- well, let me just cover this right  
7 here. That is the tank farm. That is the focus  
8 of the majority of our work here is emptying those  
9 tanks, there are a couple tanks in there. That is  
10 where the tank farm is located.

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

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

16 Next slide, please. What our vision  
17 is in the next few years is to continue to reduce  
18 the skyline of the project as we don't need those  
19 facilities anymore. As we empty those waste  
20 storage facilities, we can take them down. Most  
21 of them are just metal buildings on concrete slab,  
22 so a lot of those -- and again, as we get smaller,  
23 basically by 2009 our hope is to only have the  
24 high-level waste stored in the main process  
25 building, the majority of the main process

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1 building decontaminated to where the scope of work  
2 is very small and so, hence, we wouldn't need  
3 maintenance shops, storage facilities, all of  
4 those ancillary buildings that were in the  
5 previous slides. Basically we would have a small  
6 work force here that would be managing the  
7 oversight of those canisters until such time as  
8 we're ready to ship them to a repository.

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

12 MS. GERWITZ: A number of you  
13 visited the facility yesterday. It's basically a  
14 commercial level radon waste disposal area that  
15 Nuclear Fuel Services operated as a second  
16 commercial venture at the site while they were  
17 beginning operations at a new processing  
18 facility. So the disposal area operated from 1963  
19 to 1975. There are fourteen disposal trenches  
20 there. Generally it is a basic cut and fill  
21 operation. They cut the trenches, fill it with  
22 waste, and put a cover over it as they were  
23 constructing the facility. The trenches are  
24 generally just twenty feet deep. They're  
25 trapezoidal in shape so they've got a twenty foot

1 wide base with thirty foot at the top. They have  
2 about eight to ten foot packed clay cover and  
3 they're constructed in the native till clay. It's  
4 a very tight clay, very low permeability, so what  
5 goes in kind of stays in there.

6 And the main challenge for that  
7 facility from the time of construction has been  
8 water management. The water that gets in tends to  
9 accumulate there and the trenches fill up like  
10 bathtubs. In 1975 two trenches did just that and  
11 overflowed through the caps and that's what led to  
12 the shutdown of the facility. Since that time  
13 Nuclear Fuel Services in the late '70s, early '80s  
14 did pump the trenches. Each of the trenches do  
15 have a sump that allows you to monitor the water  
16 level and allow you to pump water, contaminated  
17 water from the trench if you needed to. So that  
18 happened on a couple different occasions in the  
19 '70s and '80s. That water was pumped out and  
20 then went to the lagoon system on the North  
21 Plateau and out to the creeks.

22 Since that time, though, when the  
23 transfer came, we came on site in 1983, NYSERDA  
24 assumed managment and responsibility for the SDA  
25 entirely and completely. So we began a lot of

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1 water studies, infiltration studies and looked at  
2 what the source of the water was; a vertical  
3 infiltration source or a lateral infiltration  
4 source. Basically they were non-conclusive so we  
5 dealt with both of them. We put the black  
6 geomembrane cover over the surface of the trenches  
7 as you can see in the picture, which caused a  
8 vertical source. And then along the most western  
9 edge of the southern trenches, trench 14 up on the  
10 top, that trench was experiencing significant  
11 water level increases in the early '90s, so we put  
12 a barrier wall, slurry wall that runs thirty feet  
13 deep along the whole western edge of the southern  
14 trenches. Since that time, since the cover and  
15 slurry wall were installed, basically water levels  
16 have stabilized, we haven't seen any increases, so  
17 they've been very effective in dealing with the  
18 main near-term challenge of the disposal area.  
19 Both those covers and the slurry wall were put as  
20 interim measures under a consent order. It's  
21 understood to be a temporary solution to an  
22 ongoing problem that needs to be continually  
23 monitored and watched.

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

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

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

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

1 Conservation as well as the permit for the  
2 buildings that are on the site because the  
3 leachate that was going to be removed. We did  
4 have one tank of leachate that was removed in the  
5 '91 time frame that was a mixed waste tank.

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

10 MS. GERWITZ: That's a good  
11 question. Historically in the cut and fill  
12 operation the wastefirms came in and in just about  
13 any wastefirm you can imagine; there was drummed  
14 waste, they came in cardboard canisters, they came  
15 in plastic bags to concrete casts or loose soil we  
16 received loose soil from the Middlesex  
17 decontamination as well, and they were put right  
18 in these on-line disposal trenches in the tight  
19 clay. That picture, it shows the drums, you can  
20 see the reflection of the drums in the water in  
21 the bottom of the trench. Again, water management  
22 has been a problem since the beginning so even  
23 when they were putting the waste in the trench,  
24 they were removing water as they were filling it  
25 into a couple lagoons that were located next to

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1 the disposal trenches in order to allow the  
2 operation to begin. So that has been a historical  
3 challenge.

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

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1 it just has never had to operate.

2 Next slide, please. Basically the  
3 description of it: It occupies about five and a  
4 half acres. It's about 400 yards south of the  
5 former reprocessing center. It's part of the  
6 original license for the reprocessing operations.  
7 While NFS was operating the facility, the more  
8 radioactively contaminated waste that they brought  
9 out of the process building is what is buried in  
10 that particular facility. I believe they used a  
11 clam shell type configuration, they went down to  
12 have more of a, as opposed to the trenches, they  
13 had more of a hole they dug in and lowered waste  
14 down in with cranes. They had, between '66 and  
15 '82 NFS operated the site. And then the West  
16 Valley Demonstration Project used it for about  
17 four years. We put some trenches in and disposed  
18 some of the waste, as we were initially  
19 decontaminating the main process building, some of  
20 the low-level waste that we had coming out of  
21 there is buried in the trenches there.

22 When we get into the next one, I'll  
23 explain how things are buried in there. Between  
24 '66 and '82 approximately 162,000 cubic feet were  
25 buried, were disposed of in 239 separate holes.

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

9 Next slide, please. This is a  
10 layout of the NDA. And basically in the U-shape,  
11 NFS utilized the outside, these are the holes that  
12 they put in the NDA to bury waste from the NFS  
13 operations, and what you see here in the middle  
14 are the trenches that WVDP used for those four  
15 years. As we talked about a little bit on the  
16 tour yesterday, there's really -- the truly hot  
17 stuff was put in there during NFS operation.  
18 There's about 99 percent of the curies are on the  
19 outside holes here in the U-shape. One of the  
20 things that, we talked about roles and  
21 responsibilities, one of the things that DOE does  
22 while we are conducting the project is that we  
23 manage that. Now, it was closed back in '86 time  
24 frame, but again, we basically keep the cap  
25 there. We have a lot of monitorinig wells around

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1 it as well to make sure nothing's moving. Again,  
2 that's just one of those things where we have an  
3 ongoing monitoring operation for that facility.

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

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

11 UNIDENTIFIED SPEAKER: Just clay.

12 MR. JACKSON: Okay. The high-level  
13 waste tank farm. The four underground tanks that  
14 we've dealt over the years, 8D-1 and 8D-2 are the  
15 larger tanks, carbon steel 750,000 gallons each.  
16 8D-2 was the main receiver of the waste from the  
17 Nuclear Service operations, so that is the tank  
18 that had the 600,000 gallons in. 8D-3 and 4 are  
19 smaller stainless steel tanks, about 14, 15,000  
20 gallons each.

21 As we operated the waste tank farm  
22 and going in to process that waste, we put in a  
23 supernatant treatment system. And what we did is  
24 take -- 8D-1 was a spare tank. We put ionization  
25 columns in that tank so that we could draw the

1 supernatant off the top of 8D-2. This went on for  
2 seven or eight years where we made these cement  
3 drums to where we could get down to the sludge on  
4 the bottom of 8D-2, and that became the candidate  
5 for vitrification. Again, we had to do quite a  
6 bit of work there as far as, you know, washing it,  
7 getting the salts out of it, that sort of thing.  
8 That was what wound up becoming those 20,000 drums  
9 of cemented waste that we have on site. We've  
10 operated the ventilation systems, they're still in  
11 operation today. We had mobilization and transfer  
12 systems in there. Again, that was an intricate  
13 set of pumps that had, were fifty feet long to  
14 mobilize so we had a homogeneous mix which was  
15 part of our recipe to make sure that we had a  
16 fairly consistent recipe as we processed those 275  
17 canisters. There is a nitrogen inerting system in  
18 annular space around the tanks and we do have a  
19 groundwater management system. So those tanks,  
20 again, being carbon steel, they sit, and you can  
21 see the base here when they were being built, you  
22 know, they're basically, there's a concrete vault  
23 around them, they sit on perlite blocks. There's  
24 a pan underneath each one of the big tanks, and  
25 like I say, it's a carbon steel tank. So we've

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1 done erosion studies on those, again, they're  
2 carbon steel, they rust. So you could look at the  
3 data and it could be anywhere from they have some  
4 life left in them to it should be leaking by now.  
5 The best we can do is get the waste out of them.  
6 We've done that.

7 If you could, on the next slide,  
8 please. We are down to about five inches in one  
9 tank, and a little over an inch in the other. So  
10 again, we've gotten the majority of the liquid out  
11 of the tank. Again just from a construction  
12 standpoint so that you know what we're talking  
13 about, the tanks are twenty-seven feet high,  
14 seventy feet in diameter. They were not made to  
15 be a conveniently decontaminated piece of  
16 equipment. There's a lot of columns, structural  
17 framework in the bottom to hold the columns,  
18 because basically they're flat bottom tanks so the  
19 columns hold the tank up. As you saw in the tour  
20 yesterday, there's quite a grid work over top of  
21 the tank farm. That was put in there by DOE to  
22 hold the pumps up as we were doing transferring of  
23 the waste, we didn't want the weight of those  
24 pumps to be on top of the tanks. So that's what  
25 the steel structure is, that you saw yesterday in

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1 the tank farm. But as I said, they are in a pan,  
2 in a vault. 8D-2 pan there is a breach in there  
3 and there is a small amount of contamination in  
4 the vault.

5 Next slide, please. As I was saying  
6 8D-1 was a backup tank for 8D-2, so we put the  
7 supernatant treatment system in there. As those  
8 ionization columns got fully loaded, we would dump  
9 that zeolite down into the bottom of the tank,  
10 mobilize that and send it over to 8D-2 while we  
11 were operating the vitrification facility. So  
12 again, a vast majority of cesium and zeolite has  
13 been vitrified and is in storage within the 275  
14 canisters. Approximately 79 percent of the cesium  
15 was transferred into 8D-2 out of that system. And  
16 as I said, there's about 5.1 inches there and  
17 about 12,000 gallons. As we decon that tank,  
18 there's pumps that need to come out and the  
19 tooling that we put in there to clean it.

20 8D-2, this was the one tank that  
21 housed the 600,000 gallons. More than 99 percent  
22 of that activity was taken out of there. The --  
23 we used sluicers to mobilize the waste in that  
24 tank. We also, towards the end of vitrification  
25 we put some robotic arms down in there where they

1 pump they use the water within the tank to wash  
2 down the sides of the column, the base so that we  
3 could get as much waste out of there as we could.  
4 Currently there's about 1.2 inches in there, about  
5 4,500 gallons. There's about, what, 17,000  
6 gallons total between the two tanks in there. We  
7 started out, again, with close to 30 million  
8 curies in those tanks and now we're down to  
9 250,000 curies that still remain. Again, the  
10 inventory that is associated with that tank right  
11 now, there's remote pumps, two transfer pumps, and  
12 camera and tool delivery systems still there.

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

20 8D-4 stored the Thorex waste. We  
21 removed that in '95, neutralized it, put it in  
22 with 8D-2 with the Purex waste, and ultimately it  
23 became part of the feed stream to the  
24 vitrification facility. So, again, it's all been  
25 vitirified as well. We washed that tank two times

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1 with acid washing. Any questions on the tank  
2 farm?

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

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

10 MR. HINZE: Do you have any humidity  
11 control?

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

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

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

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

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1 MR. CROFF: I asked about both of  
2 them.

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

21 If you're talking 8D-1, 8D-1 is  
22 around 150,000 curies. That's probably 99 percent  
23 cesium left on the zeolite product that was used  
24 for the pretreatment of the supernatant and sludge  
25 wash and maybe a handful at most of the Alpha

1 transuranic curies in that tank. Now, that's the  
2 tank itself. In addition to that tank, it has a  
3 supernatant treatment system components, the  
4 zeolite columns, some of the processing vessels  
5 and tanks and filters that were used for the  
6 pretreatment process. Now, that system in  
7 addition to the numbers I just gave you for 8D-1  
8 has roughly 60 to 90,000 curies of cesium in those  
9 vessels within that tank. And again, negligible  
10 amount of Alpha transuranics in those vessels.

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

23 DR. PARKER: I gather from what we  
24 just heard that there's not a really insoluble  
25 sludge on the bottom, most of the material that's

1 still there is in the equipment; is that right?

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

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

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

12 DR. PARKER: Thank you.

13 MR. JACKSON: The next topic we're  
14 going to cover is groundwater contamination and  
15 management. In '93 contaminated groundwater  
16 surfaced in some ditches on the North Plateau.  
17 And, again, I apologize to those of you who didn't  
18 get to go on the tour yesterday because down this  
19 road over here where we took our first steps on  
20 the erosion tour are the ditches that I'm talking  
21 about. We started seeing some contamination  
22 surface down in here, so we went searching for the  
23 source of where that was coming from. So back in  
24 the '94 time frame we did a geoprobe survey to  
25 determine the nature and the extent of the plume

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1 and of the contamination. And the report which  
2 was issued in '95, and I believe it's available if  
3 you'd like to see it, reports the results. And  
4 basically what we found is the primary isotope was  
5 Strontium-90, and the primary source, going back  
6 through, it's right here on the back side of the  
7 main process building. There was a leak at one  
8 point during NFS operations, I believe it was back  
9 in the '71 time frame, that leaked down between  
10 some expansion joints between the concrete and  
11 went down underneath the back part of the plant  
12 there. And I believe because of the makeup of the  
13 clay underneath there that there's a lot -- cesium  
14 is hung up under there, but the Strontium is  
15 really what's moving down in that kind of the  
16 north easterly direction.

17           Next slide, please. Here's a layout  
18 of basically the levels that we have in there, and  
19 I believe it's in curies per liter. Basically  
20 this indicates the plume to you here. And a  
21 couple things that we have done in the management  
22 of this is to, we have a pump and treat system and  
23 you see, again, there's all kinds of wells in here  
24 where we're monitoring and there's a few we pump  
25 from. And then we also put in a permeable

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1 treatment well, which I will get to in the next  
2 slide or two, but again, this just kind of gives  
3 you, as we have mapped this plume out, that's what  
4 it looks like. Again, right out at the edge of  
5 the project premises there's a fence right here,  
6 and it is starting to surface right out here. The  
7 point of compliance, by the way, just so that you  
8 know is out where Buttermilk Creek reaches  
9 Cattaraugus Creek, which is quite a ways, a mile  
10 or so away, down off the project premises.

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

21 Infiltration controls and drainage  
22 improvements were made during the 1996 and '97  
23 time frame trying to keep the plume from  
24 recharging itself. Groundwater and surface water  
25 monitoring on and off the site. It doesn't really

1 ensure public protection, but I believe it helps  
2 us understand that we don't have a public health  
3 and safety problem with this plume. The maximum  
4 potential dose, again, this is through studies  
5 that we've done, the analysis that we've done over  
6 time, we had a report issued in 2004 and the  
7 maximally exposed off-site individual could get a,  
8 less than a tenth of a millirem.

9                   Next slide, please. As we were  
10 exploring other designs and ways to treat this  
11 plume, one of the technologies that was out there  
12 was a permeable treatment wall. And in '99 we  
13 evaluated this in-situ design and, again, where  
14 you put a clinoptilolite, a zeolite-type material,  
15 that would capture the Strontium as it went  
16 through there. And we put that in. It's been, I  
17 want to say, minimally effective because, again,  
18 as we put those pilings in right here, we drove  
19 those into the ground and vibrated it down into  
20 the ground, and we found over time as we've been  
21 watching the water, that it's not as effective as  
22 we wanted it to be going through it. A lot of it  
23 just kind of seems to go around this wall. So we  
24 believe there was a skinning of sorts as this was  
25 vibrated down into the ground. So it's helpful,

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1 but I want to say it's not as good as we wanted it  
2 to be. There's the specs on it. Basically thirty  
3 feet long, six feet wide and twenty-six feet  
4 deep.

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

20 The key challenges for us at this  
21 point, we've been working on the decommissioning  
22 EIS for quite some time. We've just in the last  
23 month or so delivered the predecisional draft or  
24 kind of a preliminary draft I guess, not  
25 predecisional, to the regulators for, we're going

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1 to be reviewing that and taking comments on that  
2 for the next four, five, six months resolving  
3 those comments and ultimately we're hoping to get  
4 that up for public review towards the end of next  
5 year. And while we are working through the EIS  
6 process and making final decisions for the  
7 project, we are going to be conducting the interim  
8 waste management facility dismantling work that  
9 I've discussed a little bit in the past. Again,  
10 we're getting rid of -- as we get rid of waste off  
11 site, we're getting rid of the building, we're  
12 getting rid of a lot of the infrastructure, a lot  
13 of things that we have had to keep in place as  
14 we've been conducting the project. That's going  
15 to be our focus now for the next four, five  
16 years. Questions?

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

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

25 DR. CLARKE: Thank you. Dave, would

1 you like to go?

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

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

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

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

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

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

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

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

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

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

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

14 MR. JACKSON: No.

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

17 MR. JACKSON: Yeah, in those big --  
18 this might not help the audience, but I can go  
19 over there. Basically in these buildings right  
20 here we have a couple of sorting areas where we  
21 have some tippers where we're dumping out boxes  
22 and they're repackaging them here. Again, the  
23 remote-handled waste facility is just that, it's a  
24 place where the boxes that the workers can't get  
25 physically close to are being done with tooling

1 and behind concrete walls here. But a lot of the  
2 low-level waste is being sorted hands-on right  
3 down here in these facilities.

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

25 DR. NAUMAN: The supernatant drums

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

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

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

21 DR. PARKER: Not Washington.

22 MR. JACKSON: One of the things that  
23 DOE is doing, and we are working actively with our  
24 headquarter's counterparts, we at West Valley are  
25 working to have a commensurate program that would

1 pass muster within the 3116 regulations, and also  
2 DOE 435.1 which was kind of the regulation that  
3 was challenged in court for doing waste incidental  
4 to processing evaluations. So again we are  
5 actively working to develop a process which is  
6 going to have the same sort of process that the  
7 3116 is where it's going to have a public review  
8 process, and it will be reviewed by NRC and so  
9 again we're just working through all of the  
10 implementaion aspects of how we're going to  
11 proceed with that.

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

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

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

25 DR. NAUMAN: Finally, who owns the

1 en reactor fuel in the NDA?

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

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

14 MR. JACKSON: All of those  
15 activities are being evaluated right now in the  
16 alternatives within EIS. Again, the final  
17 decisions haven't been made yet. We internally  
18 have been talking about possibly going back and  
19 trying to get some more out of there. Just to  
20 take you back into our operational history, at the  
21 time we were operating the vitrification facility  
22 for about a six and a half year period, the first  
23 couple of years we would take a straight batch out  
24 of the waste tank farm, put it through the  
25 vitrification facility and turn it into glass. I

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1 want to say the last four years or so of that  
2 operation of that facility we would bring diluted  
3 mostly water in from the waste tank farm. And all  
4 these pumps that were mobilizing the waste and  
5 transferring leaked, and so we got a lot of water  
6 as other projects have as well that have these  
7 types of tanks that need pumping. We had a lot of  
8 water going into the tanks from that. So again,  
9 we had a lot of diluted waste in those tanks.  
10 We'd bring a batch over, boil it down, bring  
11 another batch over, boil it down. And so I want  
12 to say for the last four years of processing, we  
13 were doing water management. And so, again,  
14 getting back to your question; what are we going  
15 to do with those tanks? Again, the ultimate  
16 decision is yet to be made on those.

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

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

25 DR. PARKER: I have another question

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

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

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

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

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

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

23 MR. MOORE: Yeah, there was  
24 basically twenty-seven campaigns. Twenty-six were  
25 mainly the fuel that was brought in, fuel

1 assemblies and then there was one run of some  
2 testing material that they had brought in to get  
3 the facility up and running, but basically it was  
4 mostly en reactor fuel that came in. The first  
5 three campaigns were en reactor, then they brought  
6 in some commercial fuel, then back to en reactor.  
7 There was two other sites basically that were  
8 involved with the DOE and the federal, and one was  
9 a site in Peurto Ricco, there was some fuel that  
10 came from there. There was one other site, which  
11 I can't recall at this time.

12 DR. PARKER: Thank you.

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

17 CHAIRMAN RYAN: One follow-up to  
18 Dave Kocher's question on the liquid that's still  
19 in the disposal cell. One of the parameters that  
20 would be fabulous to know is what fraction of  
21 radioactive material that you claim is in a  
22 saturated condition versus some  
23 less-than-saturated condition. And that's kind of  
24 a laboratory in that regard, I don't know if it's  
25 a perfect one because you don't control all the

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1 conditions going in, but it would be interesting  
2 to think about would that better risk-inform long-  
3 term behavior of waste in a saturated  
4 environment. I wouldn't go so far as to say let's  
5 recommend a study program, but it might be  
6 interesting to think about that. And if there is  
7 some value to looking at that over time or if  
8 there's some historical data that could be used,  
9 that might be worth doing because that is a key  
10 parameter and we do know, if I'm not mistaken,  
11 1015.61 was informed by some earlier activity at  
12 West Valley, and that's the basis for saturated  
13 conditions versus unsaturated rated conditions.  
14 Just something to think about in follow-up, that  
15 might be a real interesting area pursued. That's  
16 all.

17 DR. WEINER: T. J., do you have  
18 intermediate milestones? And if you do, who sets  
19 them? In other words, you say that by 2008, by  
20 2009 something's to going to happen, but are there  
21 intermediate milestones that you have to meet?

22 MR. JACKSON: Currently -- I'm glad  
23 you asked that, Ruth. Actually, the reason I  
24 hesitate is that contractually we are coming up on  
25 the end of a contract here in December, and so

1 ultimately we are looking ahead at how we're going  
2 to proceed and laying out that next scope of  
3 work. There is a group in the DOE right now,  
4 that's putting together the procurement package  
5 for three to four years' worth of work which is in  
6 general terms what I just told you as far as  
7 shipping the rest of the waste off site,  
8 processing the remote-handled waste, getting our  
9 relationship established with WIPP so we can  
10 dispose of the TRU. So all those things we know  
11 we have to do in accordance with the act that may  
12 not be dependent on the decisions that come out of  
13 the EIS we're going to proceed with. And so  
14 there's a lot of work left to do, and that's the  
15 only reason I'm not giving you all of those  
16 milestones. Will there be milestones?  
17 Absolutely, as to how we accomplish those. But  
18 there are some of those that are going to require  
19 government intervention to resolve this waste  
20 determination issue. We do have to get again  
21 certified to be able to ship to WIPP. And, again,  
22 that's kind of tied up with the whole defense  
23 determination, origin of the waste, whether it was  
24 comingled here, whether or not, again, WIPP did  
25 take something that came from a commercial

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1 operation. So there's a lot of interaction that  
2 has to occur here before that actual work can be  
3 done. We're just preparing that when we finally  
4 get those agreements in place, we'll have a  
5 wasteform acceptable to ship.

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

14 MR. JACKSON: We're on the site now  
15 going on twenty-three, twenty-four years. I would  
16 say we've had a lot of delays over time. I think  
17 the original framers, I'll just throw a few things  
18 out at you, I think the framers of the Act  
19 originally envisioned the original estimate for  
20 this project was in the hundreds of millions,  
21 lower hundreds of millions of dollars, and  
22 probably take, whatever, five, seven years to get  
23 done. I believe that the framers expected that  
24 there were disposal cells, that the  
25 decontamination that DOE was being required to do

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1 in the main process building, that the disposal  
2 would be right down here. That would affect the  
3 cost, that would affect the schedule. As we've  
4 said here in a couple of our presentations, the  
5 state-licensed disposal area shut down in '75.  
6 The NDA shut down in '85, '86 and so that changes,  
7 okay, what are you going to do with this stuff.  
8 That's why I said we didn't ship waste for a very  
9 long time, we started building storage facilities  
10 to house it. And so, again, getting the  
11 vitrification recipe and everything ready to go  
12 took a little longer than what I believe the  
13 original estimation.

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

24 DR. WEINER: Are there any  
25 facilities that you can foresee are going to give

1 you particular problems? I'm thinking of --

2 MR. JACKSON: Politically,  
3 technically?

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

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

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

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

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

19 DR. WEINER: I see, thanks.

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

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

24 MR. HINZE: A brief question.  
25 Somewhat tangential, but in the spirit of lessons

1 learned in decommissioning, you have recently  
2 constructed the remote-handled waste facility and  
3 you're going to be decommissioning that in a few  
4 years. What kind of lessons did you incorporate  
5 from the previous work in the construction of that  
6 facility that might be useful to all of us?

7 MR. JACKSON: Well, we've done quite  
8 a bit of exchange. There's been a lot of  
9 technology transfer done throughout the Department  
10 of Energy and WB Anesco has participated in, their  
11 main company has major contracts throughout WVDP  
12 complex. So we have shared lessons learned about,  
13 we have valued engineering studies done when we  
14 design that building. We've sent, again, our  
15 workers, engineers off to other facilities that  
16 had remote-handling issues and tooling. And so  
17 there's, I don't know that I'm going to answer  
18 your question specifically as to all of the  
19 lessons learned I've used. All I know is we've  
20 done quite a bit of benchmarking before we  
21 finalized the design of that building so that --  
22 and we've done some of our own here as we went in  
23 when we were on tour when we looked in the  
24 chemical processing where the canisters are stored  
25 now, back in the early '80s we, WB Anesco, had

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1 workers that remotely size-reduced much of the  
2 equipment in that chemical process cell. So,  
3 again, some of those folks helped us as we were  
4 doing design reviews on the remote-handled waste  
5 facility to use the lessons learned as we did some  
6 of the hotter work a few years back. We also try  
7 to use the lessons learned from other DOE  
8 facilities.

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

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

22 And then some of the tooling that we  
23 used in decontaminating the head-end cells we  
24 transferred some of that technology over as far as  
25 some of the cells and things like that. We also

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1 have used over in the vitrification facility a  
2 block that had snippers on the end, and I know we  
3 had been looking at that also if it would help our  
4 production in the remote-handled waste facility.  
5 But I don't think we're done with the values on  
6 that yet.

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

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

15 MR. JACKSON: I guess I want to turn  
16 that over to New York as far as, I don't know that  
17 I'm the right one to ask for the overall history  
18 of why this was chosen. I think for the NDA and  
19 SDA, I think there was a reason why those were put  
20 in the clay where they are. I think, if I were  
21 just venturing my opinion, you know, that this is  
22 an area where industry was new, New York State was  
23 very interested in getting on board with an  
24 upcoming technology. And so, again, I believe as  
25 they took the land here by eminent domain, they

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1 saw this as a nuclear corridor where there were  
2 going to be some other things done as well.

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

9 MR. JACKSON: Uh huh.

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

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

16 MR. STIENER: As far as the dose  
17 calculation, the information provided on 24, that  
18 number is actually, I'll say, a present day number  
19 that's reported in our site environmental report  
20 which is based on, basically I believe it's based  
21 on the maximum potential doses of off-site  
22 consumer of fish down in Cattaraugus Creek, which  
23 is sort of the first publicly accessible point.  
24 So based on the activity level -- the plume  
25 basically seeps into surface waters in the ditches

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1 on site, as T. J. mentioned, and then flows off  
2 site via surface water, so the dose calculation to  
3 the maximally exposed individual is based on fish  
4 consumption in that creek. That's where that  
5 number is generated from.

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

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

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

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

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

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

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

20 MR. STIENER: Sure. Basically what  
21 we're seeing, this area down here is what we refer  
22 to as the, kind of the leading edge of the plume.  
23 What we see in the original investigation which  
24 was done in 1994, we saw, you know, pretty much  
25 this general outline was in place here and this,

1 what we refer to the first lobe of the plume was  
2 pronounced, and as T. J. mentioned, we were seeing  
3 some seepage into the drainage ditches. And also,  
4 this is really off the project premises pathway,  
5 it was seeping into this ditch up here and then  
6 flowing off site.

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

18 I guess how rapidly is somewhat  
19 relative. I believe this is maybe a 100,000  
20 picocurie per liter contours. Five years, going  
21 by memory, we were probably back somewhat in this  
22 area. But if you look at these wells out on the  
23 on the very edge here, you know, those trend  
24 graphs are still going up. What we see in terms  
25 of the level, we monitor where this surface ditch

1 drains off site here, those levels, it's hard to  
2 get a real good read because they fluctuate up and  
3 down quite a bit as you would expect with  
4 precipitation. You know, we have the pump and  
5 treat system in here to help mitigate some of the  
6 movement through this area. But if you look at  
7 the long-term trends, it seems like they have  
8 somewhat, somewhat I'll say leveled off. We still  
9 see some peaks and valleys in that, and I guess  
10 moving back into the main body of the plume, some  
11 of the wells which are some of the higher activity  
12 wells back upgradient have seemed over the last  
13 several years to have somewhat leveled off. So it  
14 at least appears that the, since it's been an  
15 inactive source other than just contaminated soil,  
16 you know, continuing to release Strontium over  
17 time that these levels have somewhat leveled off,  
18 and have even shown some signs, you know, this  
19 100,000 picocuries has somewhat stabilized, these  
20 contours here, over the last several years. But  
21 the leading edge, especially this out in this area  
22 is still progressing, I'll say maybe at an  
23 intermediate rate.

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

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

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

7 MR. STIENER: Yes.

8 MR. ESH: If you think about it, the  
9 source was put into the ground in 1969 and this is  
10 2004, so over the thirty-five years this is what  
11 you have at this point.

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

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

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

22 MR. HAMDAN: Yesterday and today you  
23 gave us a lot of information which is very good,  
24 and to some of us it's a lot of education, so  
25 thank you very much. But there's one area that I

1 felt that was not discussed in any way yesterday,  
2 and not even today, until you came up and that is  
3 your monitoring program. Here you have this  
4 facility, you have two disposal areas, you have a  
5 contamination plume, and we do not see anything  
6 about monitoring implications, what you use the  
7 monitoring for, how you document monitoring  
8 program. So my first question is, if at all  
9 possible, if you can have a very brief overview of  
10 the monitoring program at the site. That's one  
11 question.

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

23 MR. JACKSON: Well, I don't believe  
24 I would be able to justice to the environmental  
25 monitoring program that we have. Again, the

1 topics that we were asked to present, that's what  
2 we prepared for.

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

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

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

1 We had communicated back and forth  
2 with New York that we would remediate it if they  
3 would like us to.

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

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

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

1 reprocessing operations here by NFS, right?

2 MR. JACKSON: Uh huh.

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

6 MR. JACKSON: Uh huh.

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

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

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

24 MR. JACKSON: Would we be  
25 responsible? I would expect that we would have to

1 work that out with New York State with congress.  
2 Again, the authorizing legislation that I have to  
3 go conduct that project is the Act. It defined  
4 for me what my role was and what I'm supposed to  
5 do, those five things I said to you. I don't  
6 think it was ever envisioned once we were in -- we  
7 were actually encouraged to use the NDA when DOE  
8 arrived on site. So, again, I don't think it was  
9 ever envisioned that we would go back and exhume  
10 what we disposed of in that disposal facility. It  
11 all comes down to how you cut this thing. If it  
12 was required that we needed to go exhume that --

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

16 MR. JACKSON: Oh, sure.

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

19 MR. JACKSON: Sure.

20 DR. KOCHER: Is it a potential  
21 stewardship issue?

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

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

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

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

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

16 DR. PARKER: Appreciate very much  
17 being here. I had been here during the very  
18 earliest days during the reprocessing and start of  
19 the vitrification and certainly has changed a  
20 great deal, so it's been very enlightening for  
21 me. The second part is that most of the analysis  
22 that we heard about today is still in preliminary  
23 form, we've not seen all of the details. We've  
24 seen the general outlines. We've seen the  
25 differences in approaching performance assessment

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1 from the Department of Energy and from the Nuclear  
2 Regulatory Commission, but I think they're both  
3 doing what would be expected from such experienced  
4 people, I don't think there are any real surprises  
5 there. They discussed some of them in detail.  
6 But in all of these calculations, the devil's in  
7 the details, what goes into it the actual numbers  
8 and how they're manipulated and what the  
9 assumptions are. So I don't think it's possible  
10 to make a comprehensive analysis of it, and  
11 certainly not in the hours that we have to look at  
12 it when teams take weeks or months to do  
13 comprehensive analyses like these. It's certainly  
14 nothing that jumps out and says that they're on  
15 the wrong track.

16 The Nuclear Regulatory Commission is  
17 concerned that this all be a risk-informed  
18 approach, which I think I agree with totally, but  
19 we've only heard the technical aspects of it here  
20 today so we don't know how some of these things  
21 would play out or what changes might be made when  
22 one takes into account all the other  
23 considerations that goes into a risk-informed  
24 approach. We haven't heard anything about the  
25 exceptions that might be given. We haven't heard

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1 anything at all about the trade-offs in doing some  
2 of these operations. We haven't heard anything  
3 about the risk reductions for the amount of money  
4 expended, which again could make a difference in  
5 what would actually be done. And so I think we  
6 can't really comment on it, it's just too early.

7 I think the other thing, Mr. Jackson  
8 gave a very nice talk and indicated that there are  
9 similar problems at the other three sites that  
10 have done a reprocessing, he alluded to but we  
11 didn't hear any detail about how much technology  
12 transfer there is between the sites. Are they  
13 actually talking to each other? Are they adopting  
14 the best parts that they are learning from each  
15 other? The answer may be yes, but at least in  
16 some of our recent experience with the other  
17 sites, it was not always clear that that was  
18 taking place. And I guess that's the only site  
19 that's actually cleaned out its, all its tanks.  
20 They might have something to learn, and I gather  
21 that your tanks look something like the Hanford  
22 tanks and Savannah River tanks. You've had the  
23 luxury, perhaps, of not having to transfer  
24 material from one tank to another, not having to  
25 use three different chemical processes which

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1 bedevils them, but I think it would be useful if  
2 you're not already doing it.

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

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

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

24           From the tour, some of the  
25 observations I garnished yesterday from the

1 discussions today is obviously you're focused on  
2 the highest risk activities and challenges at the  
3 site. Some of the things that you've accomplished  
4 to date, vitrification of the waste, cleaning out  
5 the spent fuel pools, management of the waste as a  
6 whole indicates that your focus is in the right  
7 place, eliminating the immediate threat to the  
8 environment and the public surrounding that, and I  
9 commend you for that effort.

10 Some of the other observations that  
11 I have on the site are not so complimentary,  
12 though. There are some challenges there, and in  
13 dealing with, and I recognize dealing with the  
14 waste problems that you've had not being able to  
15 ship off site until recently has congested the  
16 site considerably and having the waste stored in  
17 various areas is a challenge to any site  
18 management program, and you have lots of waste  
19 here, there and everywhere on the site that I  
20 would commend you for your focus on that. But I  
21 would recommend that you continue to focus on that  
22 and shrink your waste envelope and get that down  
23 to just the, those sources of waste that you can't  
24 deal with anymore. But all the low-level waste  
25 that you could get off site, the sooner you clean

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1 up the various areas, the less risk you would have  
2 for the future for an event to happen, a flood, or  
3 some other issue that would go through a low-level  
4 waste area and spread contamination to other  
5 areas. Seeing areas posted, ground areas posted  
6 contaminated area, monitor upon exiting is  
7 alarming to anybody in the general environment,  
8 and the sooner you shrink your footprints the  
9 sooner you would be able to imagine those areas  
10 more effectively.

11 My only recommendation is to get on  
12 with it and continue to push for funding and  
13 efforts to support actively reducing the footprint  
14 and get on with the decommissioning activities.  
15 Again, I recognize and I appreciate the complexity  
16 of the regulatory environment and the  
17 responsibility of each party here and how  
18 difficult it must be to work together, and what I  
19 did hear yesterday and today is various agencies  
20 and various groups coming together to try to  
21 tackle this problem collectively, and that's a  
22 refreshing point of view. Instead of people  
23 sitting in different corners pointing fingers, it  
24 looks to me like everybody's pulling together,  
25 even though they have different opinions on

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1 issues, they're pulling together to try to tackle  
2 it for the future. Again, thank you for the  
3 opportunity to be here.

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

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

25 The other thing I came to realize is

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

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1 evaluating alternative conceptual models for  
2 erosion, flow of the groundwater if that is to be  
3 an issue over a long time frame and the like.

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

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

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

17 MS. YOUNGBIRD: I'm Barbara  
18 Youngbird from the New York State Department of  
19 Environmental Conservation. I'm not a water  
20 quality expert, I'm in the radiation program. But  
21 I am aware of some of the requirements. We do  
22 have groundwater quality standards. The  
23 Department of Environmental Conservation considers  
24 all groundwater a potential source of drinking  
25 water; therefore, it is to be protected for its

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1 best use as drinking water. At the current time  
2 we don't have on our regulations a specific water  
3 quality standard for Strontium-90 in groundwater.  
4 It was an administrative error that we're looking  
5 to correct in the future, but we still believe  
6 that groundwater's best use is drinking water, and  
7 our department is concerned about the Strontium-90  
8 plume, that it definitely violates that best use  
9 issue.

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

25 MS. YOUNGBIRD: There's not a

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

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

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

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

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

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

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

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

6 MR. ESH: If I understand your  
7 question correctly, if you remember back to the  
8 slide I had up on our regulatory construct for  
9 performance assessment. We have unrestricted  
10 release, and that's where you don't have  
11 monitoring and maintenance, you can maintain the  
12 25 millirem, plus ALARA as Dr. Kocher pointed  
13 out.

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

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1 300 years.

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

16 Long-term is defined as as long as  
17 you need it, depending on the contamination, so it  
18 can extend out to extremely long periods of time.  
19 Now, myself as a scientist, engineering  
20 standpoint, I think it's silly to talk about those  
21 time frames. Some sites we talk about, even to  
22 put 2 or 300 years in perspective, this country  
23 was a lot different 2 or 300 years ago, and it's  
24 likely to be a lot different 2 or 300 years in the  
25 future. But that is part of the construct that we

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1 work in is that we may need to deal with some very  
2 long time frames. I think if you are dealing with  
3 those time frames, you need to assess the impact  
4 of not having that land available for people, and  
5 also look at the financial burden of maintaining  
6 long-term monitoring and maintenance.

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

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

24 You know, under control license  
25 there is a mechanism for basically you have to

1 provide financial assurance for whatever  
2 monitoring and maintenance you need, so there is  
3 an establishment of a fund that provides enough  
4 resources based on the, I believe you can earn a  
5 minimal amount of interest on your fund, that  
6 provides for the financial recourse to make the  
7 necessary monitoring and maintenance. So there is  
8 an economic thing there, but I guess what you  
9 worry about is, you know, legislator decides they  
10 need the money somewhere else and they decide to  
11 pilfer that fund, that's a legitimate concern,  
12 those sorts of things happen. It gets very  
13 complicated from a legal and even a financial  
14 standpoint.

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

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

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

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1 could somehow get modeling and monitoring for  
2 compliance aligned with each other, it just gives  
3 you a strategy to move ahead.

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

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

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

20 CHAIRMAN RYAN: Fair enough.

21 DR. CLARKE: I think we're seeing  
22 where there wasn't a rush to answer your  
23 question. This brings us to a break, I'd like to  
24 take it, and we're scheduled to come back at  
25 4:15. Let's make it 4:20 we'll have a fifteen

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1 minute break, and at that time I will invite  
2 comments from the attendees as well.

3 (RECESS TAKEN)

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

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

18 And in terms of the PA. If you  
19 assume that there's a driller on site or someone  
20 actually drinks the groundwater from that plume,  
21 some preliminary dose information from some time  
22 ago showed that the doses were tens of thousands  
23 of millirem and for someone who actually came onto  
24 the site with the plume as it is and drank from  
25 it. So the .031 millirem is today's operational

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1 dose on Cattaraugus Creek it's three miles away  
2 from the fence line, from the DOE fence line where  
3 we were yesterday.

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

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

9 DR. FLACK: Oh, okay. Thank you.

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

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

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

18 MR. BEMBIA: Absolutely.

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

24 MR. BEMBIA: Yeah, I agree.

25 MS. YOUNGBIRD: Barbara Youngbird

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

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

13 MR. VAUGHAN: I'm Ray Vaughan from  
14 the West Valley Citizen's Task Force and Coalition  
15 on West Valley Nuclear Waste. Just want to add a  
16 few additional observations based on what we heard  
17 this afternoon. T. J. Jackson mentioned the  
18 kerosene leak that occurred in the NDA in the  
19 1980s. He also mentioned the barrier wall that  
20 had been installed to intercept that kerosene  
21 leak. He also alluded to the fact that no  
22 kerosene was ever intercepted by that wall, well,  
23 actually it's more of a French drain. What is  
24 important to recognize about that incident or  
25 potentially important to recognize is that several

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1 thousand gallons of kerosene are not accounted for  
2 from that incident where leakage is known to have  
3 occurred. Based on the burial records it is clear  
4 that several thousand gallons of kerosene was  
5 buried in tanks that when exhumed were found to be  
6 empty. So that kerosene is not accounted for. To  
7 me that suggests that the pathways from the NDA  
8 are not fully understood. DOE, when questioned,  
9 tends to say, oh, it must have evaporated, but  
10 we've never seen as much as a back-of-the-envelope  
11 calculation to show that kerosene under those  
12 groundwater circumstances would evaporate in that  
13 time frame available. Maybe, maybe not. It's a  
14 possible concern that we don't fully understand  
15 the pathways from the NDA.

16 In a similar vein, there's some  
17 potential for contamination to move into deeper  
18 horizons in the glacial fill under the site than  
19 are currently being monitored. The glacial fill  
20 that my model shows back there as a lift-out  
21 section is like a layer cake where you've got  
22 alternating layers throughout with low  
23 permeability glacial fill and higher permeability  
24 recessional layers. Only the uppermost layers are  
25 being monitored, the deeper layers are not. This

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1 is speculative that there may be downward  
2 movement. The one slightly troubling possibility  
3 that could provide a pathway downward is the  
4 I-beam pilings that were installed to support the  
5 big process plant that was built in the 1960s.  
6 There were many pilings that penetrate the layers  
7 of till and do provide a pathway. Again, that's  
8 speculative whether any contamination has moved  
9 downward along that pathway, but some testing of  
10 some of those deeper layers might be in order.

11 Lastly, I'd just like to offer the  
12 observation that the process by which NRC put site  
13 license into abeyance is a bit troubling, and I'm  
14 talking about the fact that the Strontium plume is  
15 a problem for whom nobody is willing to take clear  
16 responsibility at this present day. The license  
17 amendment that allowed the license to go into  
18 abeyance was based partly on the justification  
19 that DOE knew how to take care of the site and  
20 therefore no serious environmental problems would  
21 develop on DOE's watch. The problem that's  
22 occurred with the Strontium plume is that DOE  
23 says, and it's correct I believe, that this is  
24 leakage that occurred before the demonstration  
25 project took over the site, it's not their problem

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1 to go after the source. And that is meant that  
2 nobody has really gone after the high  
3 concentration source that's under the building.  
4 We've now been aware of the plume for a number of  
5 years and just watched it grow with NRC not in a  
6 clear position to require that the licensee,  
7 NYSERDA, take action, NYSERDA not in a position  
8 where they really have access to it, and DOE doing  
9 certain things to limit the spread, but not really  
10 dealing with it in a very thorough sense. Thank  
11 you.

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

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

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

3 DR. CLARKE: Thank you. Any  
4 others?

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

25 DR. CLARKE: Any others wishing to

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1 speak, please come forward.

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

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

24 If there are no further items for  
25 the open meeting we will come to a formal adjourn

**NEAL R. GROSS**

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WASHINGTON, D.C. 20005-3701

1 and we'll close the record at this point, and I  
2 appreciate everybody's participation.

3 (Whereupon, the proceedings went off  
4 the record at 5:15 p.m.)

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CERTIFICATE

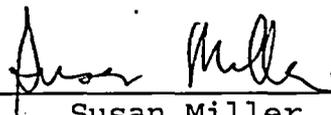
This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: Advisory Committee on  
Nuclear Waste  
Decommissioning Criteria  
Of the West Valley  
Demonstration Project

Docket Number: n/a

Location: Rockville, MD

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



---

Susan Miller  
Official Reporter  
Neal R. Gross & Co., Inc.



## West Valley Demonstration Project

# Current WVDP Site Status & Decommissioning Activities

TJ Jackson, Deputy Director  
DOE-WVDP Office

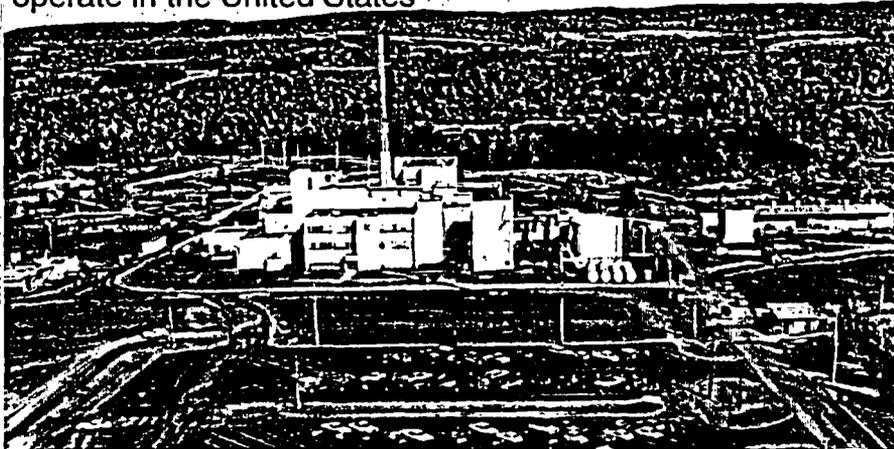
October 19, 2005  
Advisory Committee on  
Nuclear Waste Meeting

18435\_1



## West Valley Demonstration Project

Only commercial spent nuclear fuel reprocessing facility to  
operate in the United States



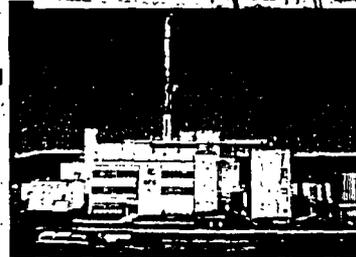
18435\_2



## West Valley Site Background

- 1961 New York State (NYS) acquires a 3,345-acre parcel that becomes the Western New York Nuclear Services Center
- 1962 Nuclear Fuel Services (NFS) reached an agreement with the Atomic Energy Commission and New York State to construct the first commercial nuclear fuel reprocessing plant in the United States
- 1963 New York State-licensed Disposal Area (SDA) begins operation
- 1966 - 1972 Spent nuclear fuel was reprocessed; majority (~60 percent) supplied by federal government  
—600,000 gallons of liquid high-level waste resulted
- 1972 Reprocessing operations halted; plant shut down for modifications
- 1975 SDA ceases acceptance of waste
- 1976 NFS notifies NYS of its intent to withdraw from reprocessing operations

1962 - 1966 — Reprocessing Plant Constructed



1982 — Main Reprocessing Plant as it looked when DOE took control of the site.

18435\_3



## WVDP Act Development



1977 New York Times

- ◆ NYS seeks federal involvement in addressing site waste management through legislation
- ◆ High-level liquid waste stored in underground tanks primary focus
- ◆ WVDP Act (Public Law 96-368) signed by the President on October 1, 1980

18435\_4



## WVDP Background — The Act

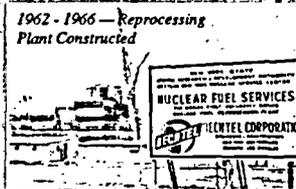
- ◆ Act authorizes the U. S. Department of Energy (DOE) to conduct a high-level radioactive waste management demonstration project at the Western New York Nuclear Service Center (the Center)
- ◆ DOE is directed to:
  - Solidify the high-level radioactive waste at the Center
  - Develop containers suitable for permanent disposal of the waste
  - Transport the solidified waste to a federal repository for permanent disposal
  - Dispose of low-level radioactive waste and transuranic waste
  - Decontaminate and decommission the HLW tanks, facilities, and any material and hardware used in connection with the Project
- ◆ Key Points:
  - Required the New York State Energy Research and Development Authority (NYSERDA) to make facilities and waste available to DOE
  - Technical Specifications of NYSERDA's Nuclear Regulatory Commission (NRC) License in abeyance while DOE has operational control of the 164-acre "Project Premises"
  - Act specifies 90/10 (DOE/NYSERDA) cost share arrangement
  - NRC required by WVDP Act to establish Decommissioning Criteria (NRC Prescribed License Termination Rule Criteria in 2/02 Policy Statement)

18435\_5



## Initial Agency Agreements for the WVDP

- ◆ September 1981
  - Cooperative Agreement between DOE and NYSERDA
  - Provided working arrangements
  - Supplemental Agreement executed in February 1991
  - NRC license amended so DOE could take control of the site
  - Technical Specifications of NRC license for the reprocessing operation was placed in abeyance while DOE controls the WVDP site
- ◆ November 1981
  - DOE and NRC signed a Memorandum of Understanding to outline respective roles and responsibilities for the Project
- ◆ 1982
  - DOE assumes control of reprocessing site; WVNS selected as prime contractor



1982 — Main Reprocessing Plant as it looked when DOE took control of the site.

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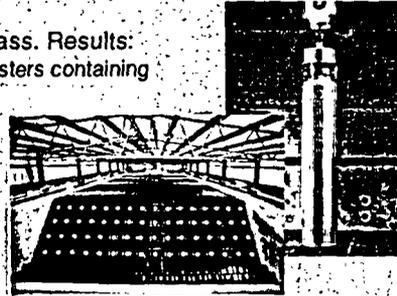


## WVDP Achievements and Results

### ◆ High-level Waste

— Pretreated and vitrified in borosilicate glass. Results:

- 275, 10-foot by 2-foot stainless steel canisters containing vitrified HLW
- 19,877 71-gallon square drums of cemented decontaminated salt solution produced during pre-treatment
- 600,000 gallons of HLW removed and processed; radioactive tank contents reduced from approximately 24 million curies to approximately 250,000 curies



### ◆ Decontamination of Major Processing Facilities

- 70 percent of reprocessing plant decontaminated in 1980s to levels allowing reuse
- Since completion of vitrification in 2002, three major, high-source term reprocessing cells have undergone initial decontamination and all vitrification equipment has been removed from the Vitrification Facility

18435\_7



## WVDP Achievements and Results (cont.)

### ◆ Low-Level Waste Disposition

- All WVDP-generated wastes placed in storage from 1986-1997
- Limited shipment of LLW for disposal began in 1997
- 158,569 cubic feet of LLW has been shipped to date (2005)

### ◆ Removal of Unneeded WVDP Facilities

- Removal of excess office and storage trailers began in 1997
- In 2005, remaining support staff were relocated off-site and excess facility removal accelerated

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## West Valley Demonstration Project

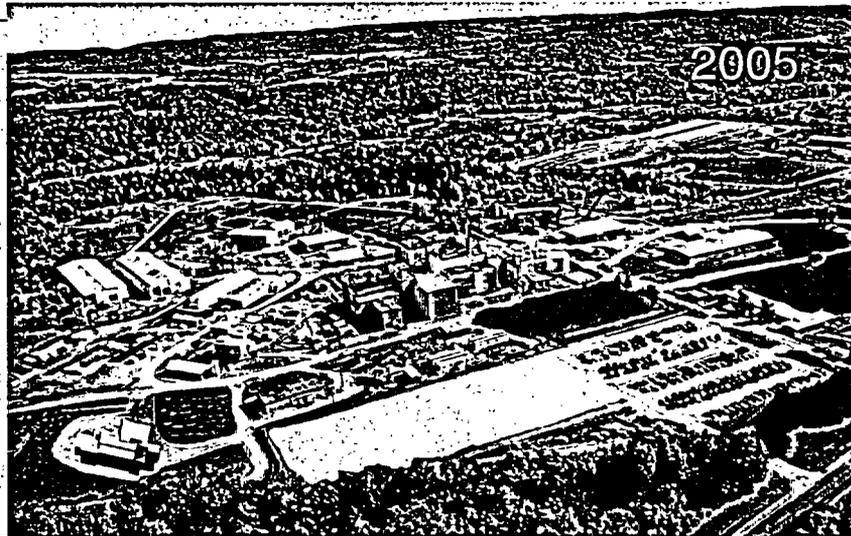
### ◆ Topics

- WVDP Buildings/Structures
- NYS- and NRC-licensed disposal areas
- Underground Tanks
- Groundwater Contamination/Remediation

18435\_9



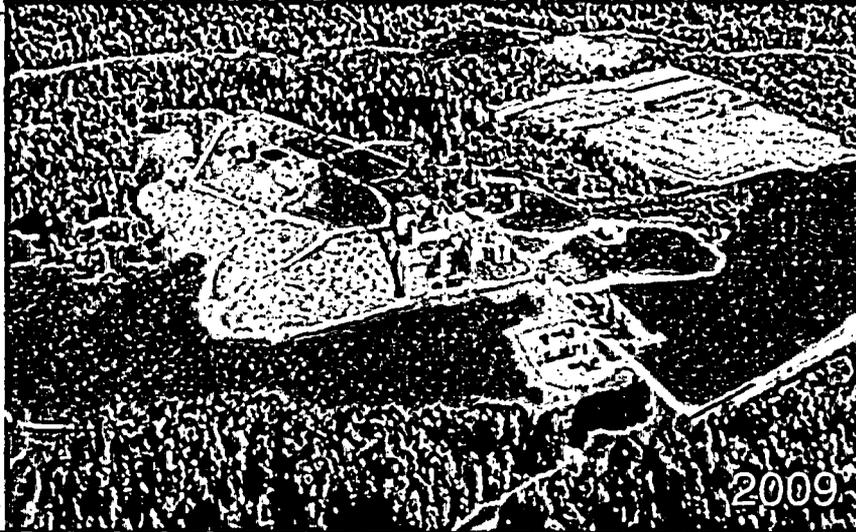
## WVDP Buildings and Structures



18435\_10



# WVDP Buildings and Structures



18435\_11



# SDA

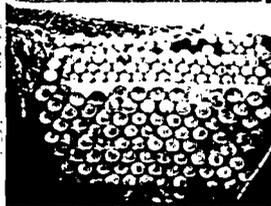
NYSERDA

- ◆ 16-acres shut-down disposal area
- ◆ 2.4 million cubic feet of waste disposed
- ◆ NFS operated as commercial LLW disposal facility from 1963-1975
- ◆ NYSERDA assumed management responsibility in 1983
- ◆ Geomembrane covers and subsurface barrier wall have stopped water accumulation in the trenches



State Licensed Disposal Area

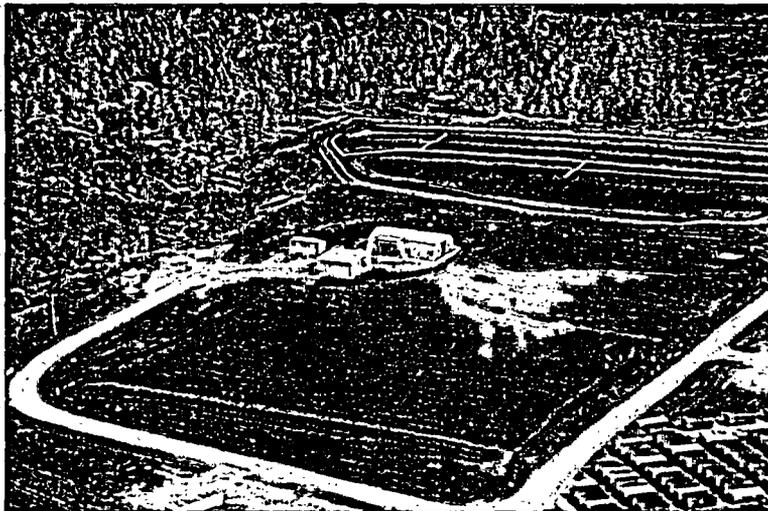
SDA during operations



18435\_12



## West Valley Demonstration Project - NDA



18435\_13



## NRC-Licensed Disposal Area (NDA)

- ◆ **Size**
  - Approximately 5.5 acres
- ◆ **Location**
  - 400 yards south of the former reprocessing plant
- ◆ **License**
  - Part of original 1963 Atomic Energy Commission license for reprocessing operations
- ◆ **Operational History**
  - Received wastes from site activities
  - 1966 - 1982 reprocessing and site wastes (Nuclear Fuel Services - NFS)
  - 1982 - 1986 low-level wastes (West Valley Demonstration Project - WVDP)

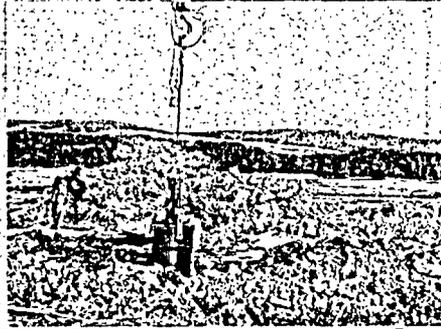
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## NDA Disposals

### ◆ 1966 - 1982 NFS

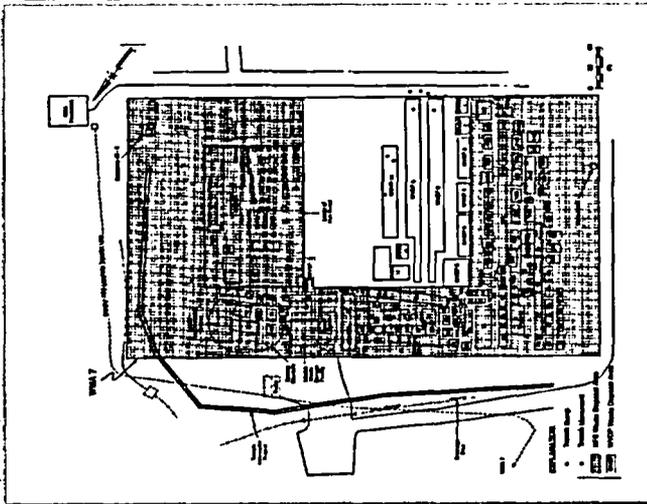
- Approximately 162,000 cubic feet (~298,000 curies as of January 2000)
- Disposed of in 239 separate holes
  - higher activity materials 50-70 feet deep
  - other materials 20-30 feet deep
- Wastes included
  - spent fuel hardware and cladding
  - damaged fuel elements
  - ion exchange resins
  - process solvents
  - air filters
  - general plant wastes



18435\_15



## NDA Disposals (cont.)

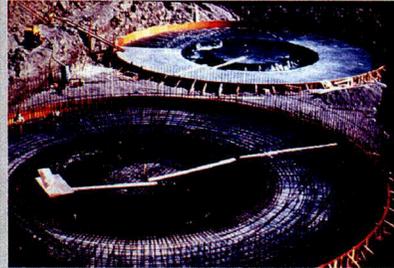


18435\_16



## HLW Tanks

- ◆ HLW Tank Farm: Four underground tanks
  - 8D-1 and 8D-2
    - Carbon steel, approximately 750,000 gallon capacity
  - 8D-3 and 8D-4
    - Stainless steel, approximately 14,000 gallon capacity
  - Associated Systems
    - Supernatant Treatment System
    - Ventilation systems
    - Mobilization and transfer systems
    - Nitrogen inerting system
    - Groundwater management system



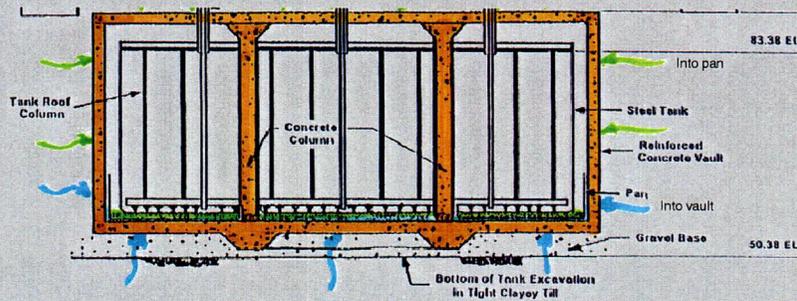
HLW Tanks under construction

18435\_17



## HLW Tanks 8D-1 and 8D-2

- ◆ 8D-1 and 8D-2 are:
  - Circular; 27' high and 70' in diameter
  - Single walled, carbon steel; 5/8" thick on the bottom grading to 7/16" thick on the roof
  - Contained in concrete vaults
  - 8D-2 pan is breached and vault water is contaminated



18435\_18



## HLW Tanks

- ◆ **HLW Tank 8D-1**
  - Backup tank for 8D-2 (primary HLW tank)
  - Housed Supernatant Treatment System (STS) for HLW pretreatment
  - Post-STS:
    - Combination of mobilization pumps and sluicer used to suspend zeolite
    - Approximately Cs-137 transferred to Tank 8D-2 for vitrification
  - Current Liquid Inventory (January 2005)
    - 5.1 inches
    - 12,800 gallons
  - Current Equipment Inventory
  - STS vessels
  - Five mobilization pumps
  - Two transfer pumps
  - Camera and tool delivery systems

18435\_19



## HLW Tanks

- ◆ **HLW Tank 8D-2**
  - Initial inventory of approximately 600,000 gallons of HLW from reprocessing
    - More than 99 percent of Sr-90 and alpha-TRU activity vitrified
    - Approximately 97 percent of Cs-137 vitrified
    - Sluicers used to wash/mobilize tank heel
  - Current inventory (January 2005)
    - 1.2 inches
    - 4,560 gallons
  - Current equipment inventory
    - Four mobilization pumps
    - Two transfer pumps
    - Camera and tool delivery systems

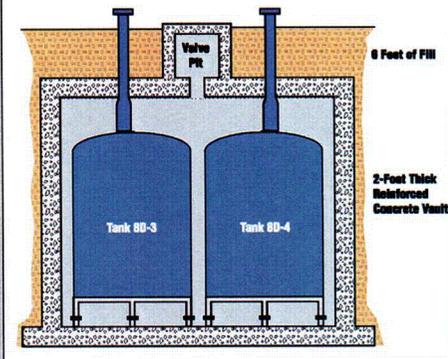
18435\_20



## HLW Tanks

- ◆ HLW Tanks 3 & 4
  - Share common concrete vault with 18-inch high stainless steel liner
  - 8D-3
    - Backup for Tank 8D-4
    - Housed portions of STS
  - 8D-4
    - Stored THOREX waste
    - Approximately 97 percent removed in 1995
    - Two acid washes of tank internals

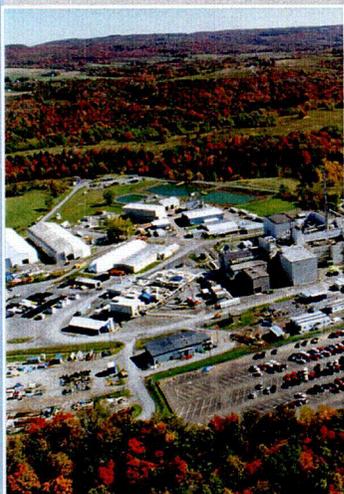
**Stainless Steel High-Level Waste Tanks**



18435\_21



## Groundwater Contamination & Management

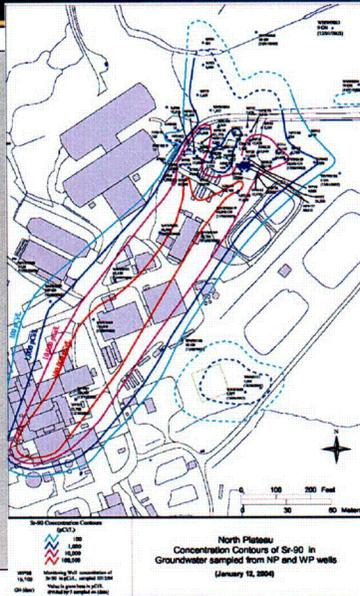


- ◆ In late 1993, contaminated groundwater surfaced in ditches on North Plateau, maximum 1,000 picocuries/liter
- ◆ Geoprobe survey conducted in summer of 1994 to determine nature and extent of contamination
- ◆ Report issued April 1995 presented the results of the Geoprobe investigation
  - Strontium-90 was identified as the primary isotope
  - Primary source determined to be process line leaks from acid recovery phase of reprocessing operations

18435\_22



## Groundwater Contamination & Management



18435\_23



## North Plateau Groundwater Plume

- ◆ Pump and treat system installed in the Fall of 1995 to mitigate the surfacing and off-site movement of contaminated groundwater
  - Three recovery wells; combined flow averages approximately 8-10 gallons/minute
  - Water treated by ion exchange and water is discharge through a SPDES permitted outfall to Frank's Creek
- ◆ Infiltration controls and drainage improvements were made during 1996 and 1997 to reduce surface water recharge of the plume
- ◆ Groundwater and surface water monitoring on and off-site ensure protection of public health and safety
- ◆ The maximum potential dose to an off-site individual from North Plateau groundwater releases was calculated to 0.031 mrem in CY2004 (the 2004 average concentration of SR-90 in the ditch was 1310 picocuries/liter)

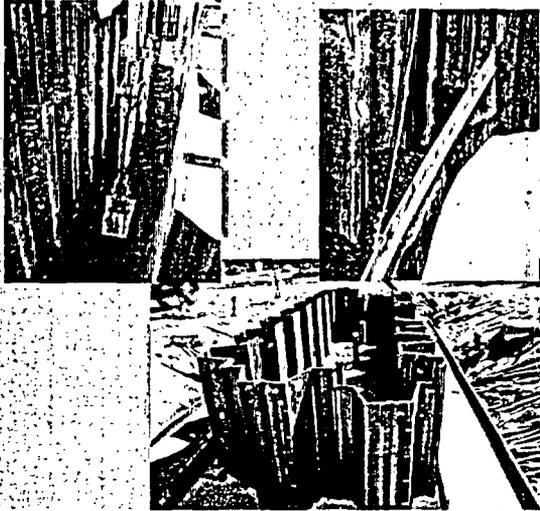


18435\_24



## North Plateau Groundwater Plume

- ◆ A pilot permeable treatment wall (PTW) was installed in November 1999 to evaluate passive, in-situ treatment technology
- ◆ The pilot test is 30 feet long, 6 feet wide and approximately 26 feet deep and uses zeolite (clinoptilolite) to remove SR-90 as groundwater flows through



18435\_25



## North Plateau Groundwater Plume

- ◆ Assessment report completed in Fall of 2002 regarding PTW performance
  - Monitoring shows media removes Sr-90 and that treated water is exiting portions of the PTW
  - A combination of factors are affecting PTW performance: complex hydrogeology, reduced permeability at the soil/media interface, and soil characteristics
- ◆ In July 2003, a draft report assessing potential doses to humans and biota was completed
  - Future doses to humans and biota predicted to remain below existing and recommended standards
- ◆ Path Forward
  - Continue pump and treat system
  - Continue monitoring to ensure public health and safety and to assess ongoing performance of the Pilot PTW and pump and treat system

18435\_26



## West Valley Demonstration Project

### ◆ Key Challenges

- Complete Decommissioning EIS and determine WVDP end state; Final EIS targeted for 2008
- Plan and conduct interim waste management and facility dismantlement work to reach point for implementation of WVDP completion action by 2009

18435\_27

West Valley  
Demonstration  
Project

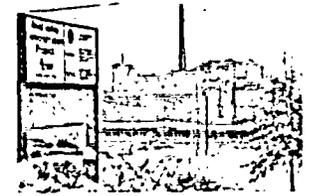
# West Valley EIS Long-Term Performance Assessment

SAIC

October 19, 2005

# Objective of Presentation

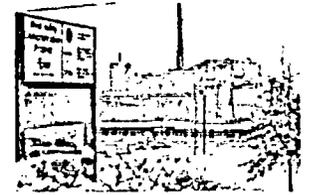
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- **Overview of approach to long-term performance assessment for the West Valley EIS**
- **Overview of methods for assessing compliance with human health (dose, hazard, and risk) criteria**
- **Overview of type of results**

# Presentation Topics

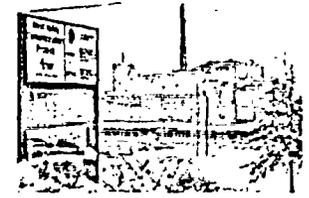
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- Approach to long-term performance assessment
- Types of scenarios analyzed
- Integrated code of groundwater releases
- Illustration of groundwater results
- Integrated code for erosion releases
- Illustration of erosion results
- Integrated code for direct intruder

# Objectives of EIS Long-Term Performance Assessment

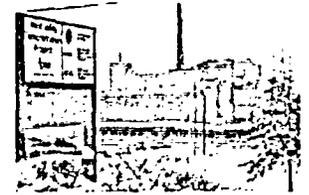
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- Reasonable basis for estimating long-term health impact for EIS alternatives
- Basis for estimating compliance with relevant dose and risk standards
- Gain insight into how inventory, design features and environmental processes affect health impacts

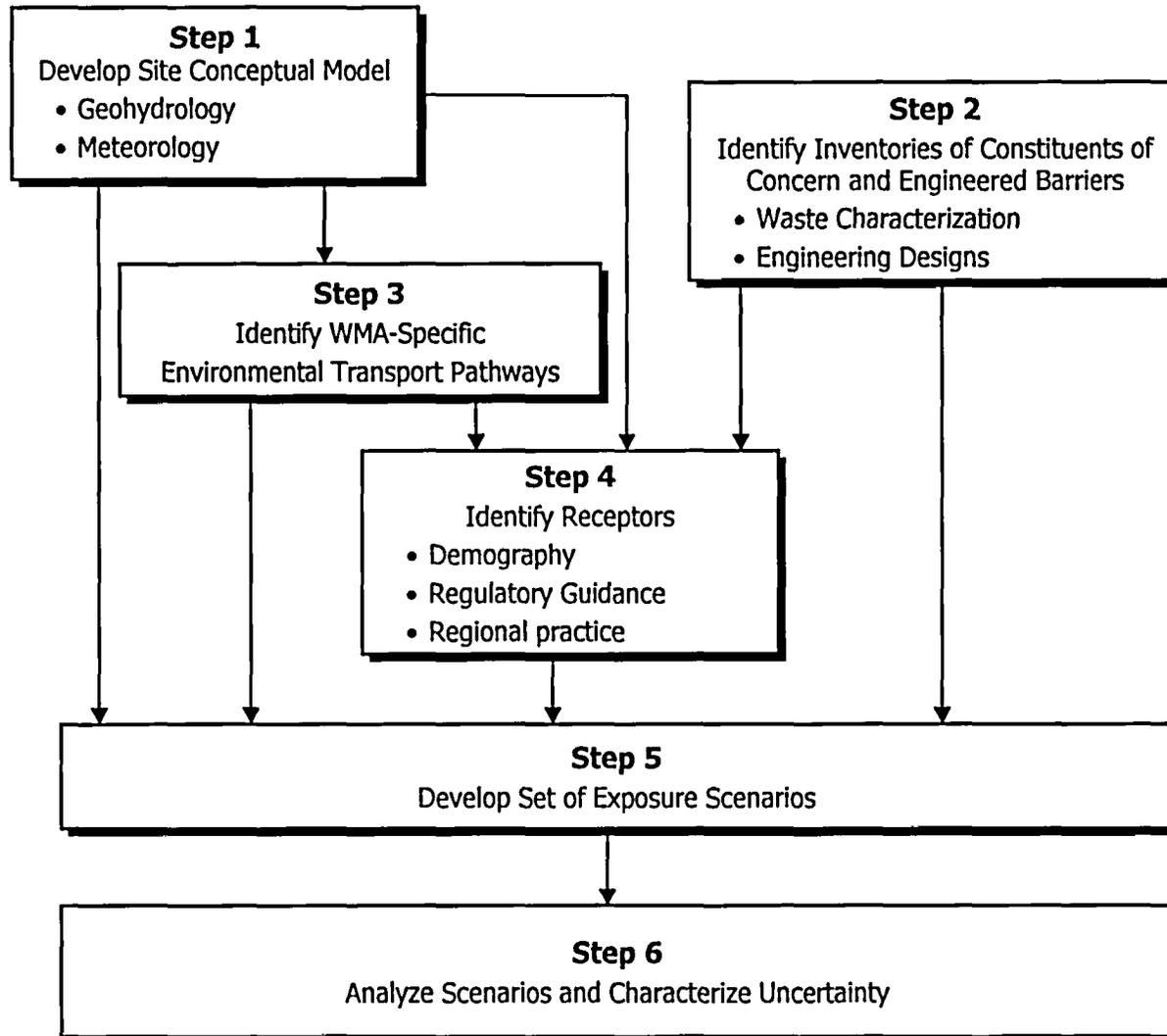
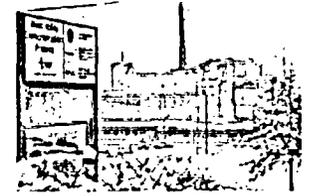
# **I: Approach to Long Term Performance Assessment**

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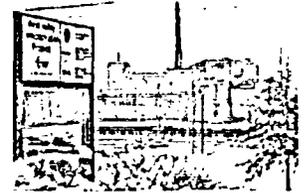
- **Identify scenarios that need to be analyzed to estimate environmental impact and assess compliance with relevant regulatory standards**
- **Establish codes that can analyze the identified scenarios while accommodating site and design features.**
- **Use codes that have enough flexibility to analyze the spectrum of facilities and set of radiological and chemical constituents, and adapt to design changes.**

# I: Steps in Approach to Long-Term Performance Assessment



# I: Guidance for Long-Term Performance Assessment

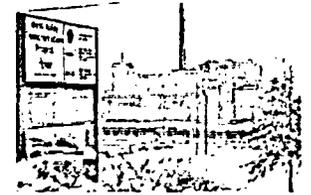
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- **NRC guidance:**
  - NUREG-1549, -1727,- 1757,
  - NUREG/CR-5512 Vol 3 and past practice:
  - NUREG-0945
  - NUREG/CR-4370
- **EPA directives/guidance:**
  - 9285.6-03 and EFH exposure factors,
  - 9355.7-04 land use,
  - 9355.4-23 soil screening for chemicals,
  - 9355.4-16A soil screening for radionuclides
- **DOE guidance:**
  - DOE M 435.1-1 (Radioactive Waste Management Manual), DOE G 435.1-1 (Implementation Guide),
  - SRP for disposal facility PAs,
  - Federal Review Group Manual

## II: Types of Scenarios

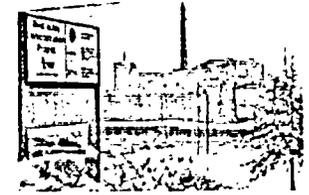
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- **Residual contamination of surface soil – onsite receptors**
- **Groundwater release to onsite and offsite receptors**
- **Erosion release to onsite recreational hiker and to onsite and offsite creek/lake water receptors**
- **Direct Intrusion – onsite receptor**

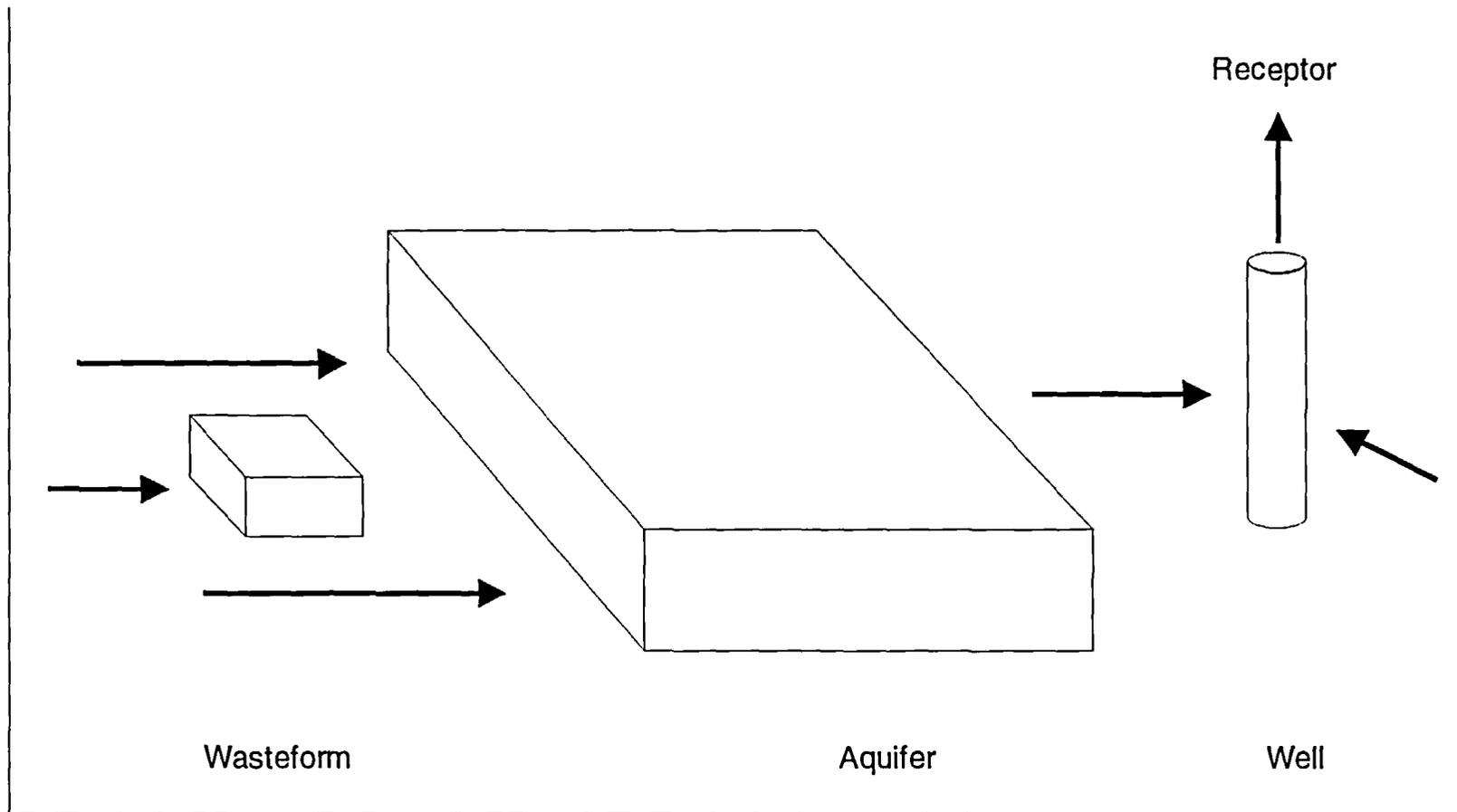
## **II: Analysis Techniques**

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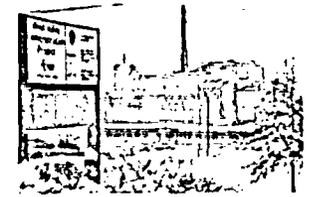
- **Residual contamination of surface soil: RESRAD**
- **Groundwater release: project specific codes for combinations of near-field flow and closure designs**
- **Erosion release: SIBERIA landscape evolution model for erosion rate, project specific code for analysis of impacts of release to creeks**
- **Direct Intrusion: project specific code for Part 61 EIS home construction and well drilling intruders**

# III: Groundwater Release Concept



# III: Groundwater Releases: Integrated Human Health Impact Codes

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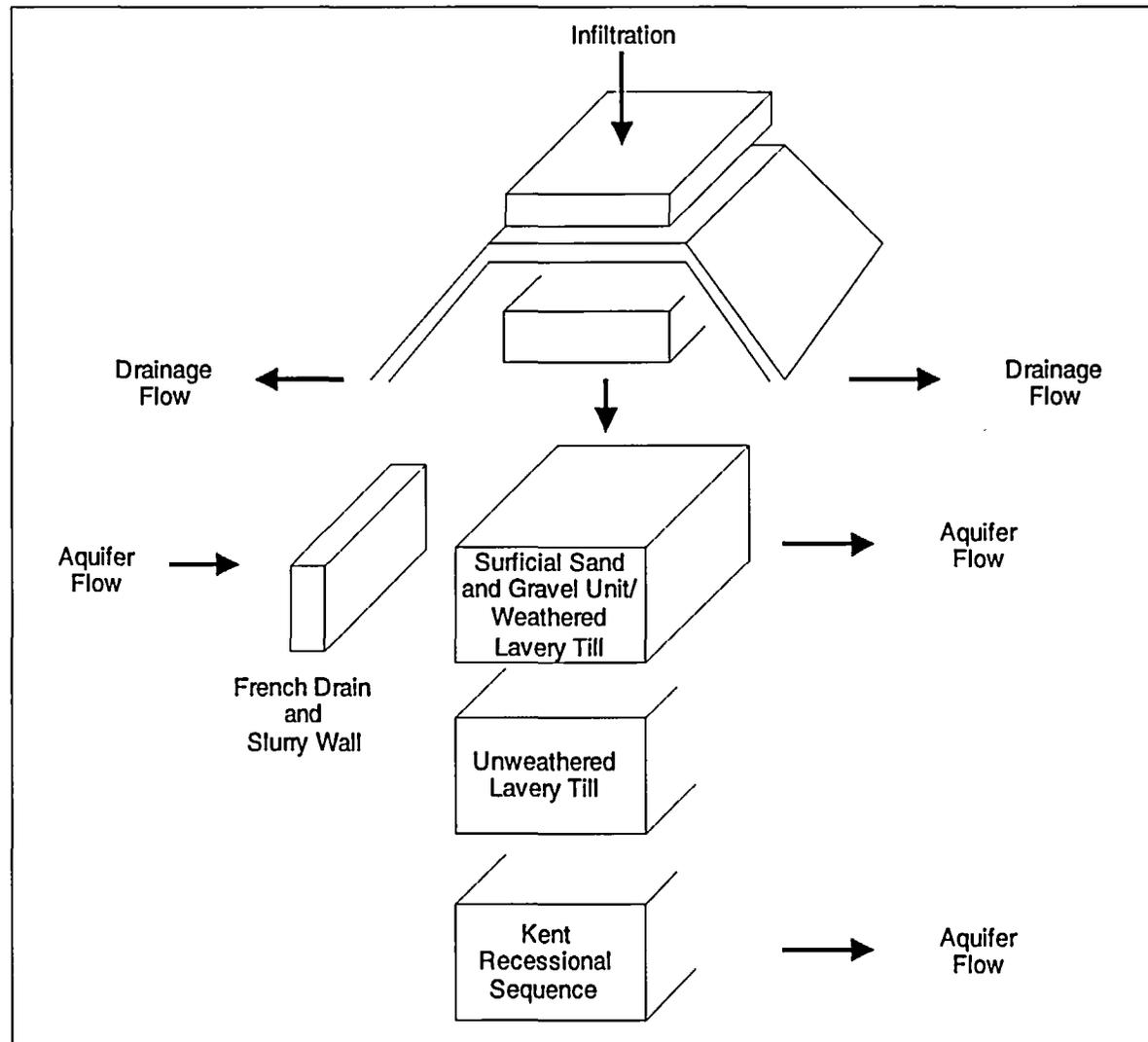
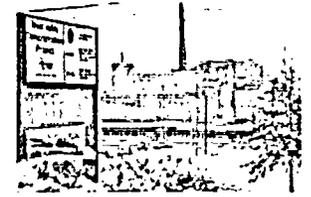


- **Near-field flow module:** analytic node-branch network model based on CER designs and groundwater modeling
- **Wasteform release modules:** groundwater plume, burial grounds, engineered closure designs
- **Groundwater transport module:** one-dimensional flow tube with dispersion, retardation and decay, concentration at well or discharge to surface water
- **Human health impact module:** calculation of dose and risk (radionuclide) using FGR 11, 12 and 13 and hazard index and cancer risk (chemicals) using IRIS



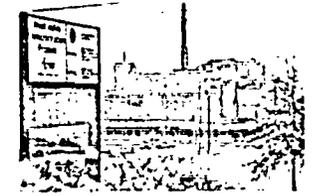


# III: Near-Field Flow Concept



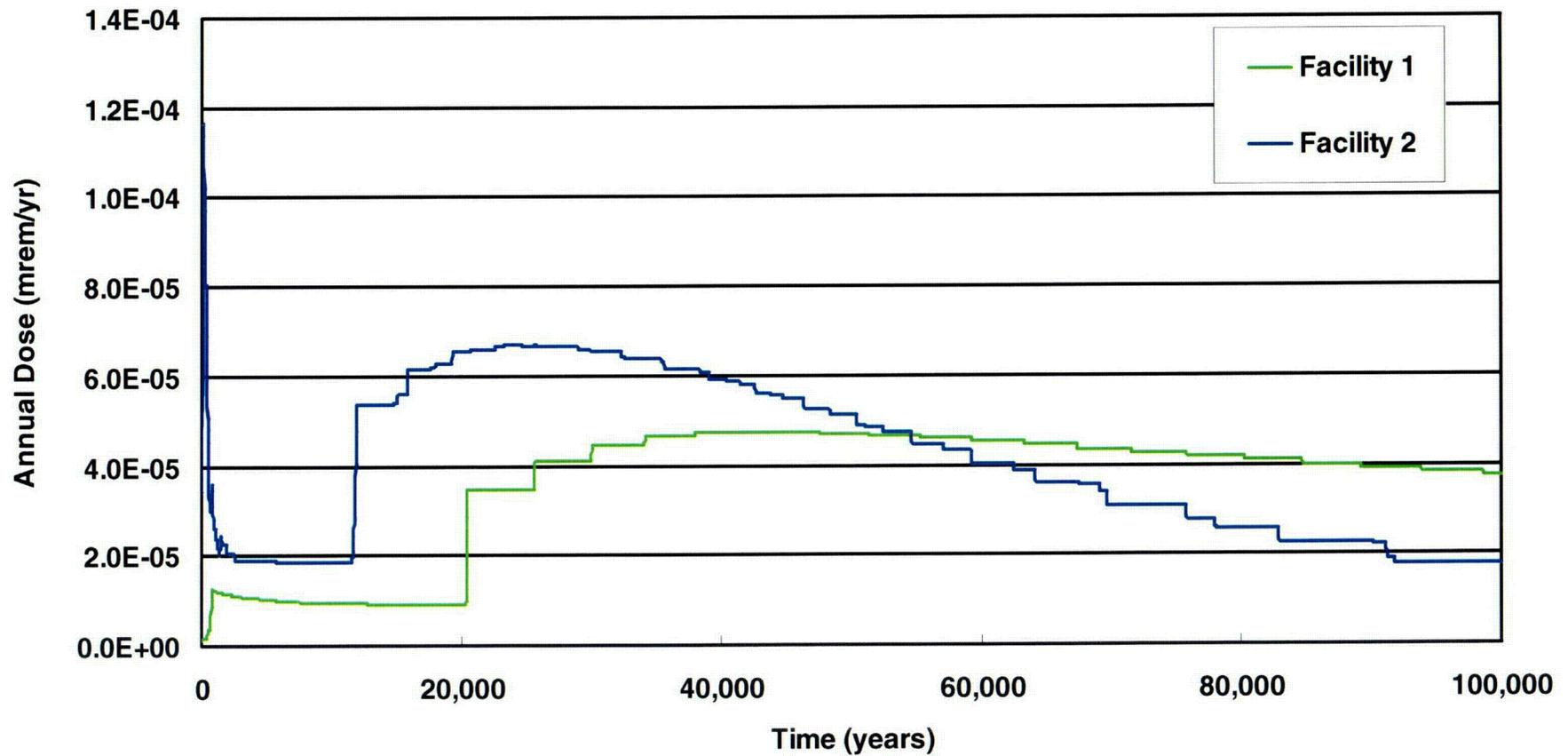
# IV: Example of Results for Groundwater Releases

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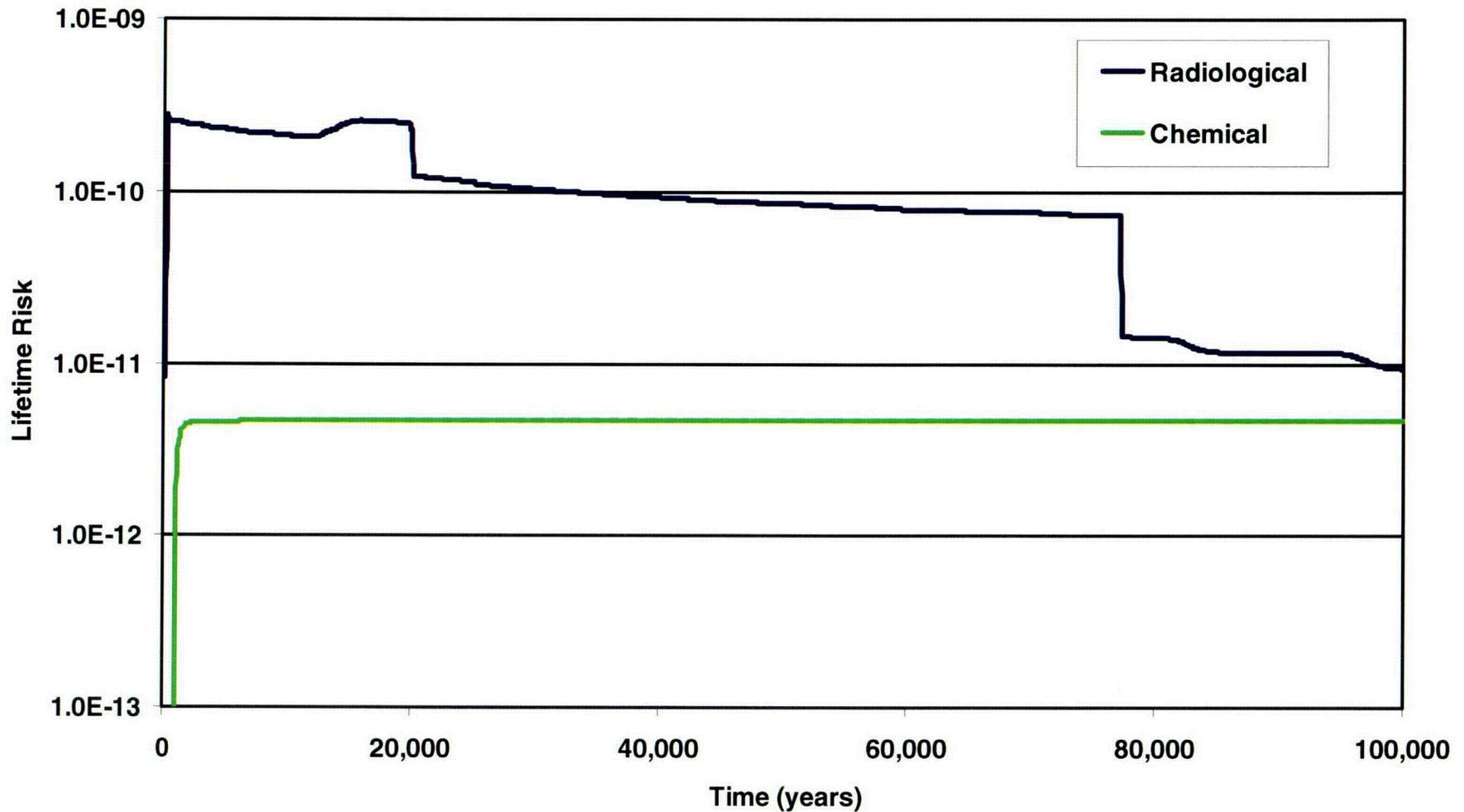
- **Deterministic base cases**
- **Deterministic sensitivity analysis**
  - Inventory
  - $K_d$
  - Hydraulic conductivity
  - Receptor location
- **Monte-Carlo uncertainty analysis**

# IV: Deterministic Results Groundwater Release

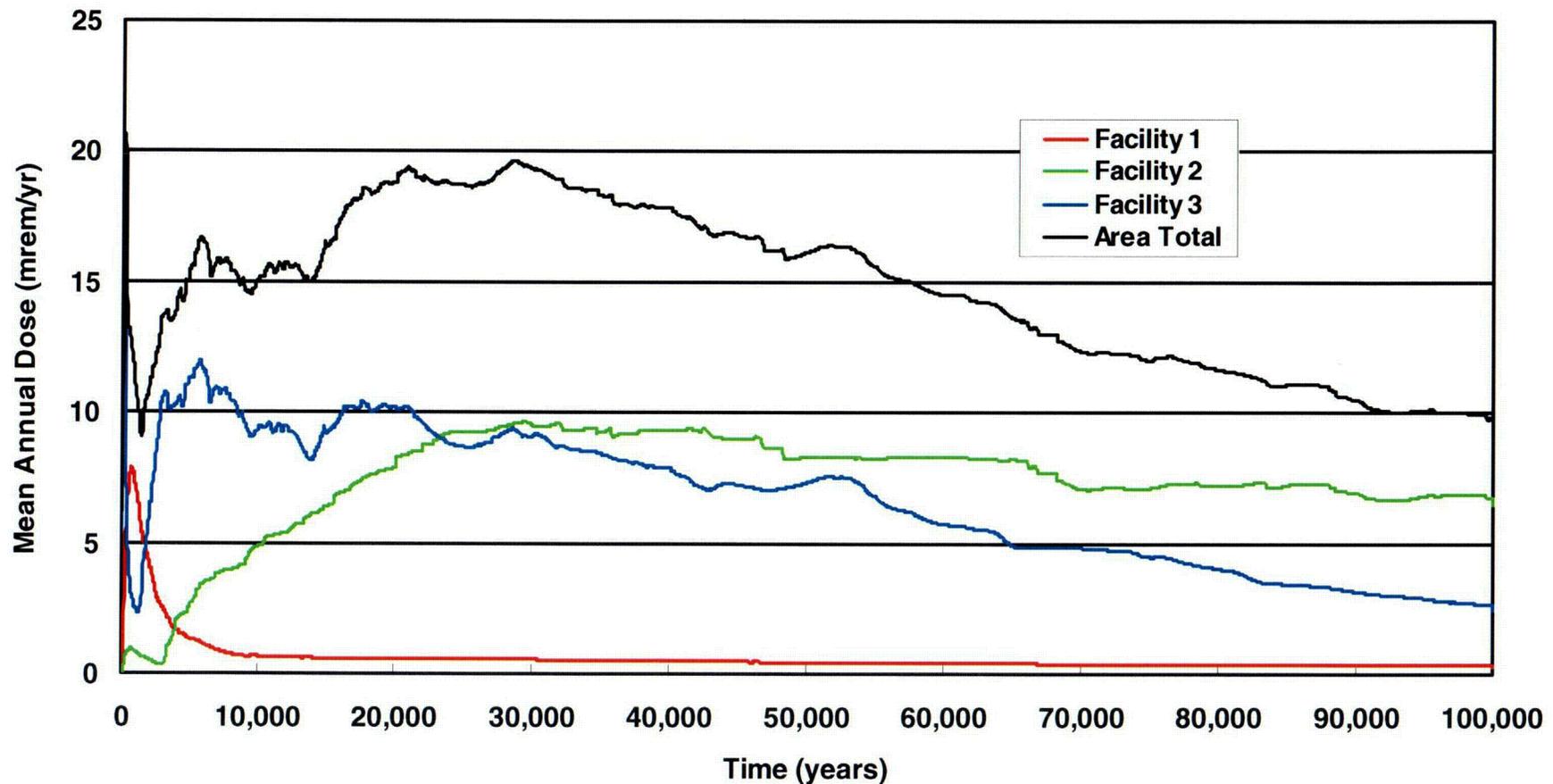
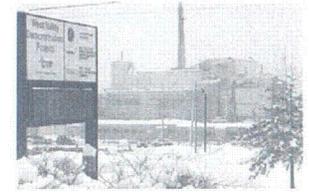


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# IV: Deterministic Result Groundwater Release



# IV: Monte-Carlo Uncertainty Analysis Groundwater Release Time Series of Mean Dose

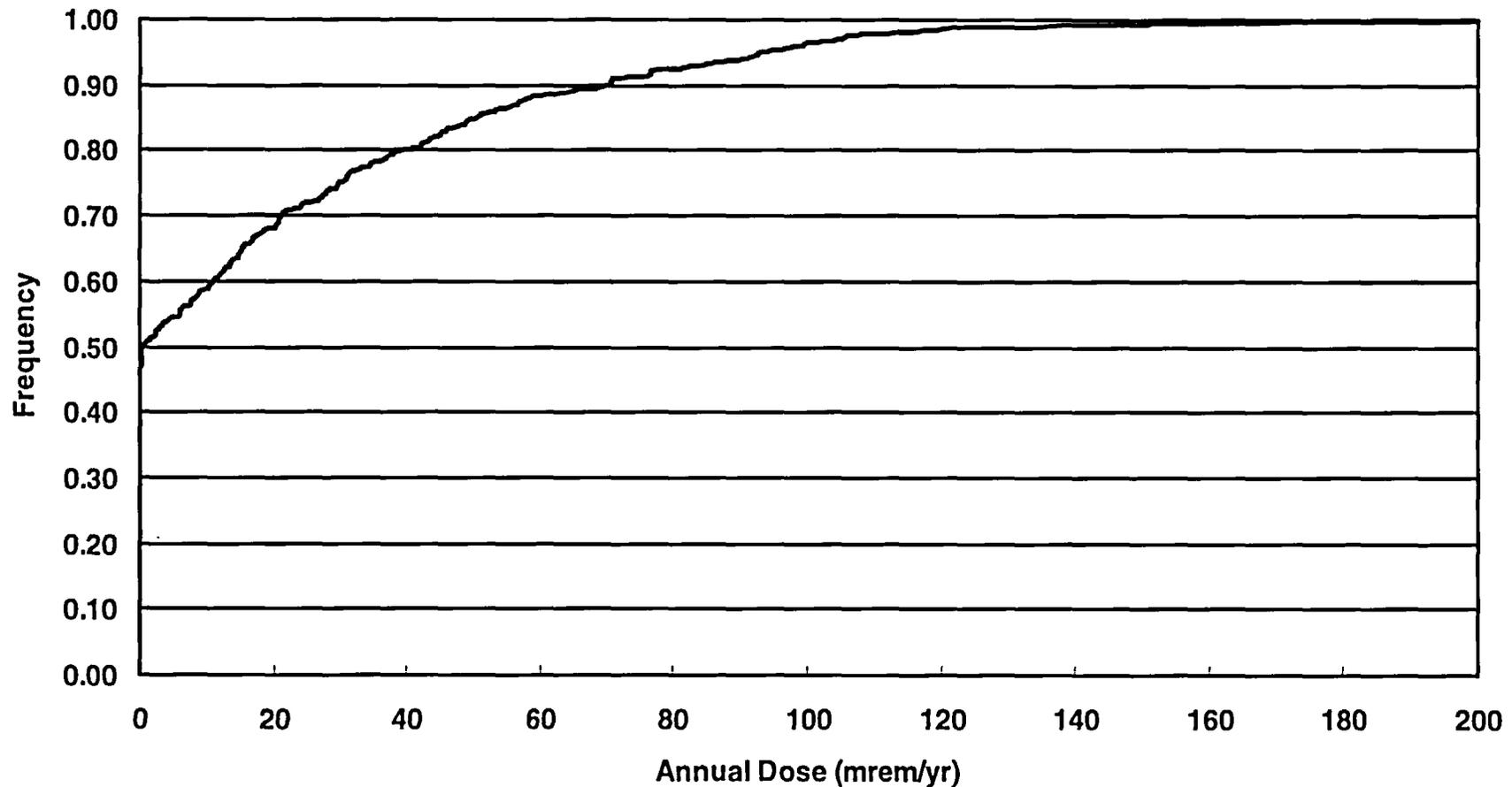
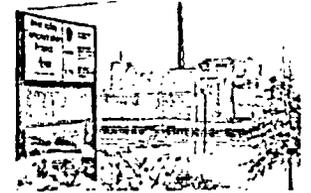


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# IV: Monte-Carlo Uncertainty Analysis

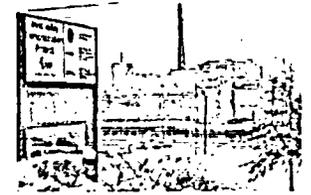
## Groundwater Release

### Frequency Distribution of Dose for Year of Peak Mean Dose



# V: SIBERIA Landscape Evolution Model

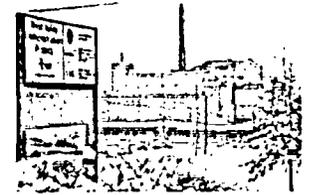
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- **Model area represented as grid of nodes and elements**
- **Input data: current topography (elevation of each node) and runoff**
- **Input precipitation routed through watershed in direction of greatest slope**
- **Sediment balance at each node**
- **Sediment transport to and from nodes represented as functions of discharge and slope**
- **Transport functions calibrated to WEPP predictions of runoff and sediment yield**
- **Uncertainty represented using 3 cases spanning range of conditions**
- **Results: topography (elevation of each node) in the distant future (1,000 and 10,000 years)**

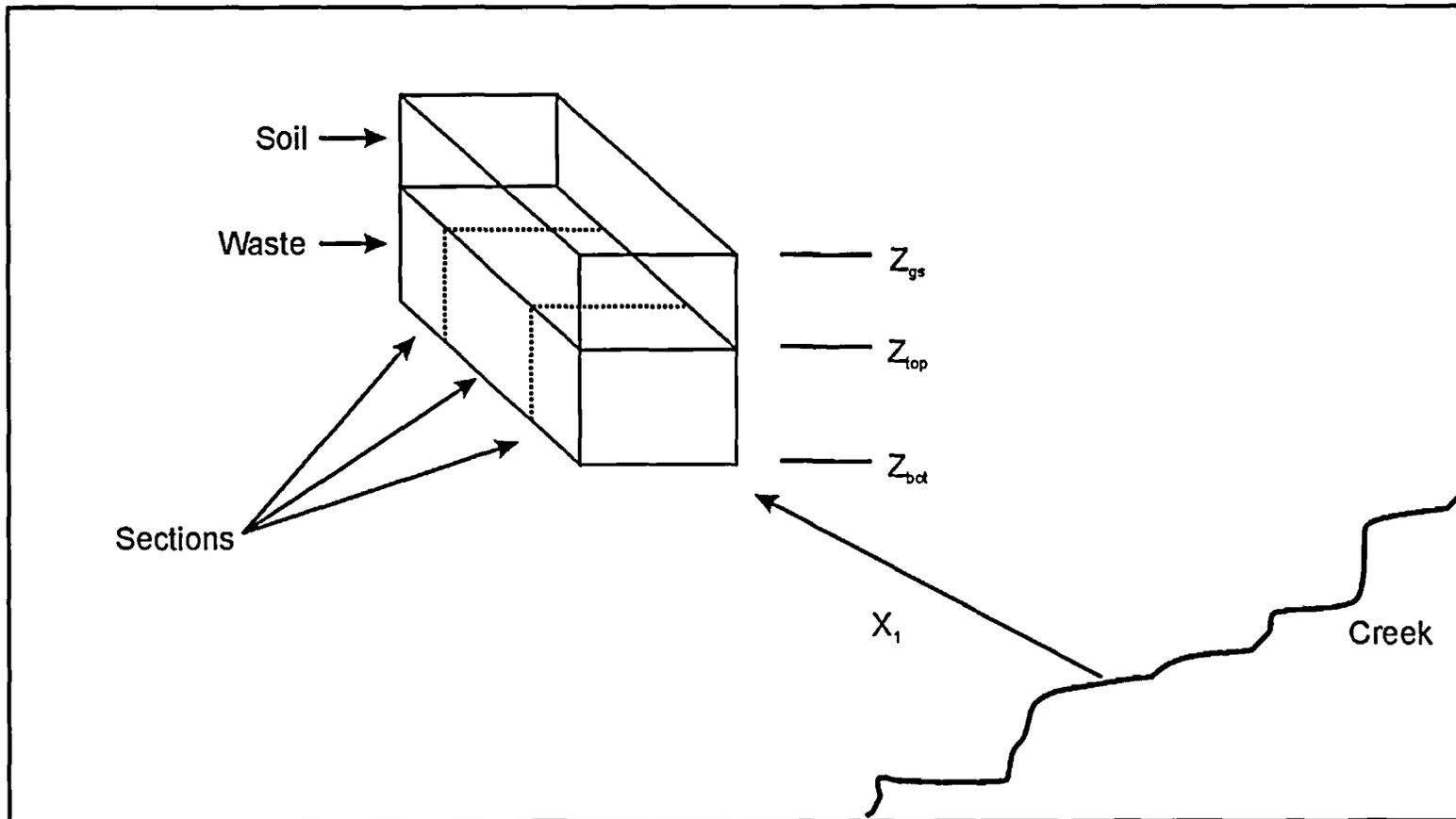
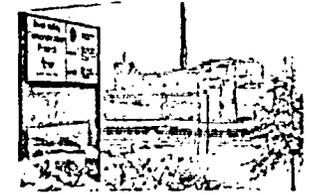
# **V: Erosion Impacts Integrated Code**

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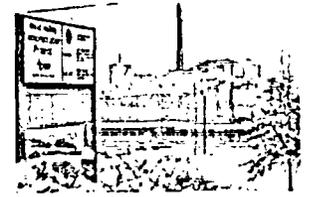
- **Erosion release module:**  
Release of constituents to creeks driven by SIBERIA estimate of soil removal
- **Human health impact module:**  
same as groundwater module

# V: Erosion Impacts Model Concept



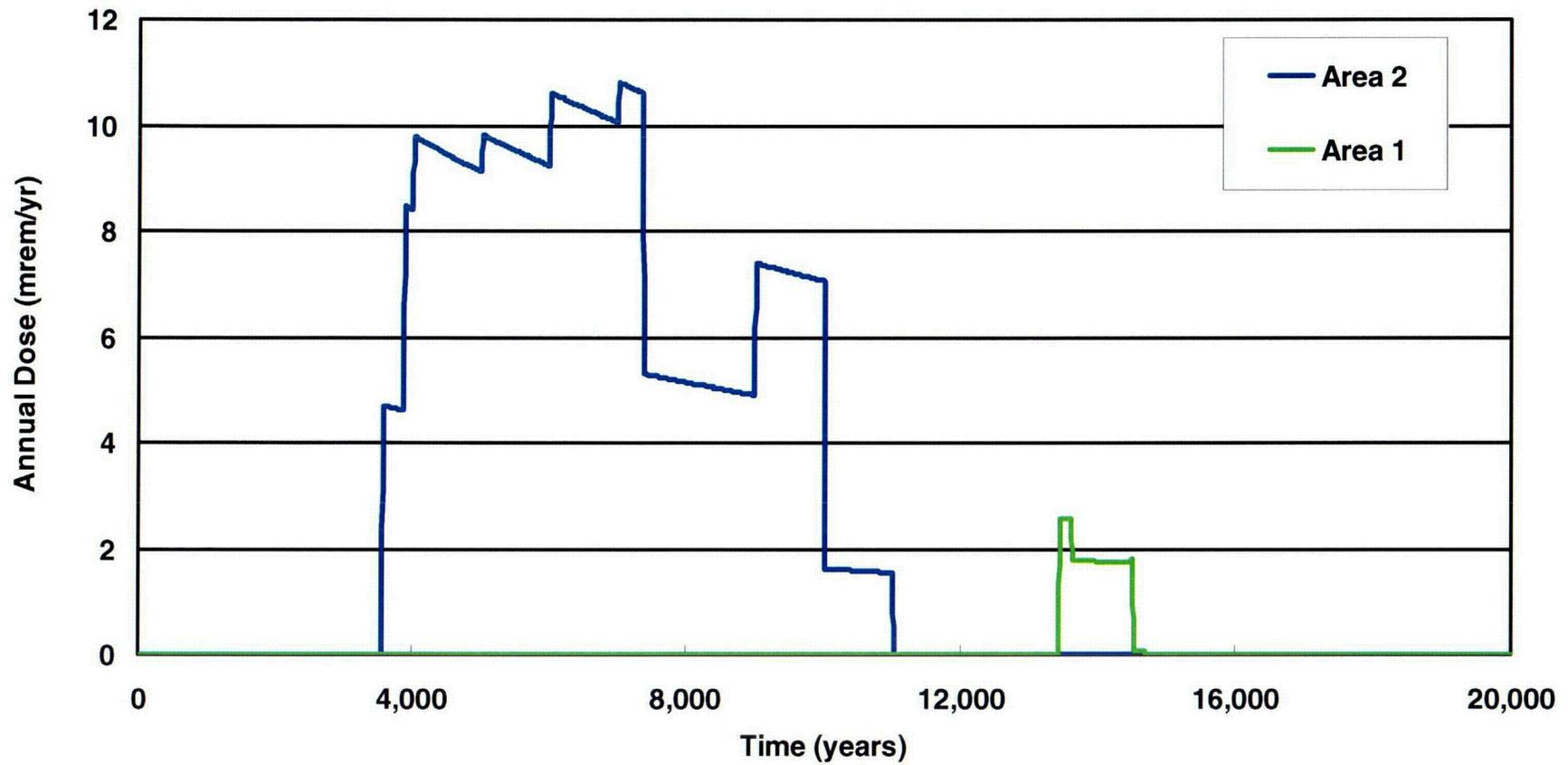
# **VI: Example of Results for Erosion Releases**

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- **Best estimate deterministic case**
- **Deterministic sensitivity analysis**

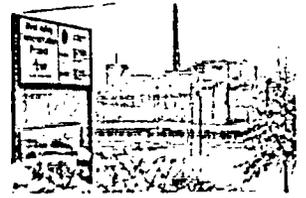
# VI: Deterministic Result Erosion Release



C07

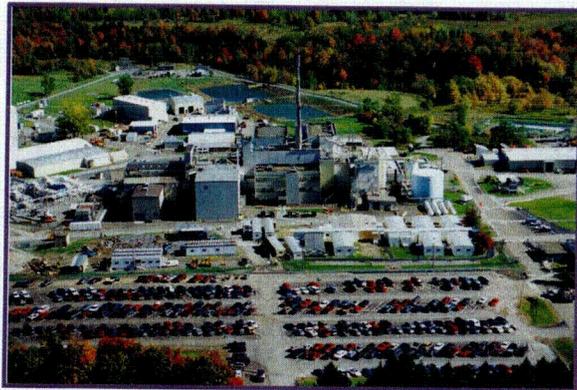
# VII: Direct Intruder Integrated Code

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- **Home construction:**
  - **Worker:** excavate foundation, inhalation and direct exposure
  - **Residential agriculture:** excavate waste, distribute into garden, dust inhalation, soil ingestion, crop and animal product ingestion
- **Well drilling:**
  - **Worker:** intersect waste in borehole, bring to cuttings pond, inhalation and direct exposure.
  - **Residential agriculture:** excavate pond, distribute into garden, dust inhalation, soil ingestion, crop and animal product ingestion
- **Recreational Hiking**
  - Walk through area each day

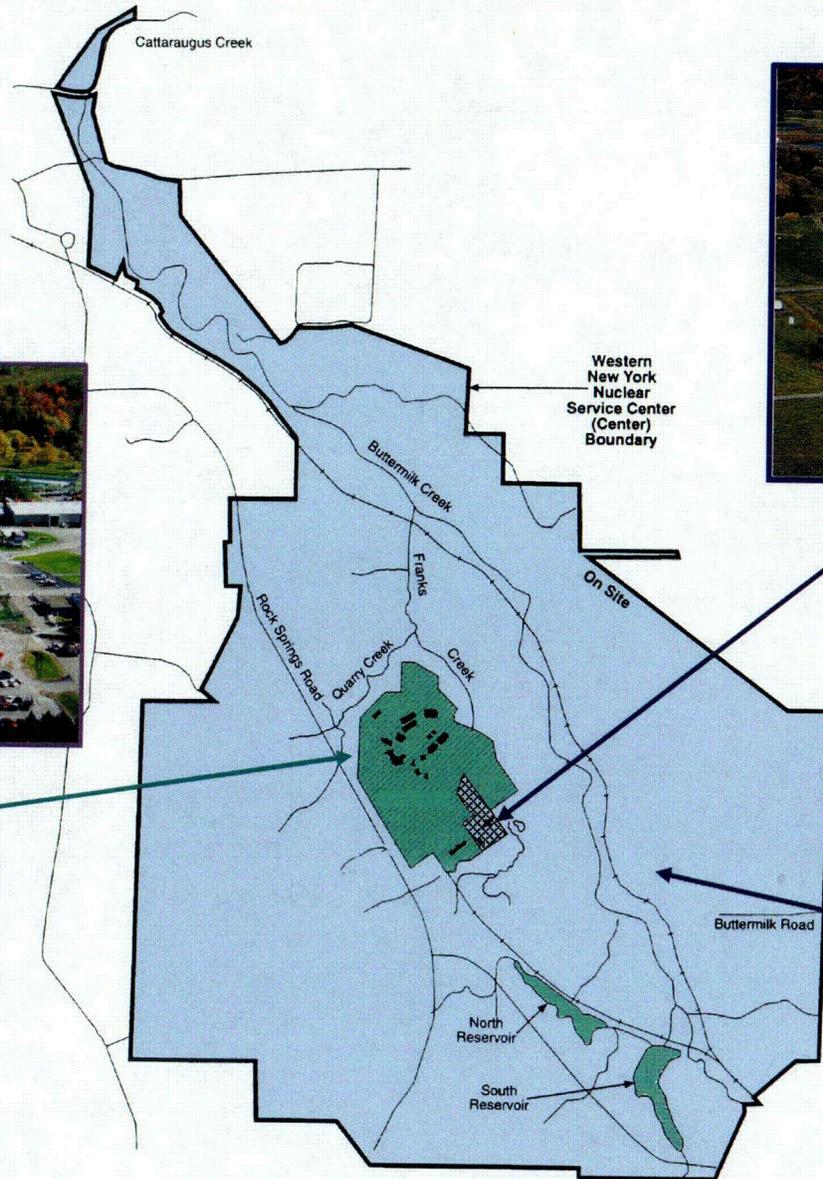
# Western New York Nuclear Service Center



## West Valley Demonstration Project Premises

DOE-managed

~ 200 acres



## State-Licensed Disposal Area

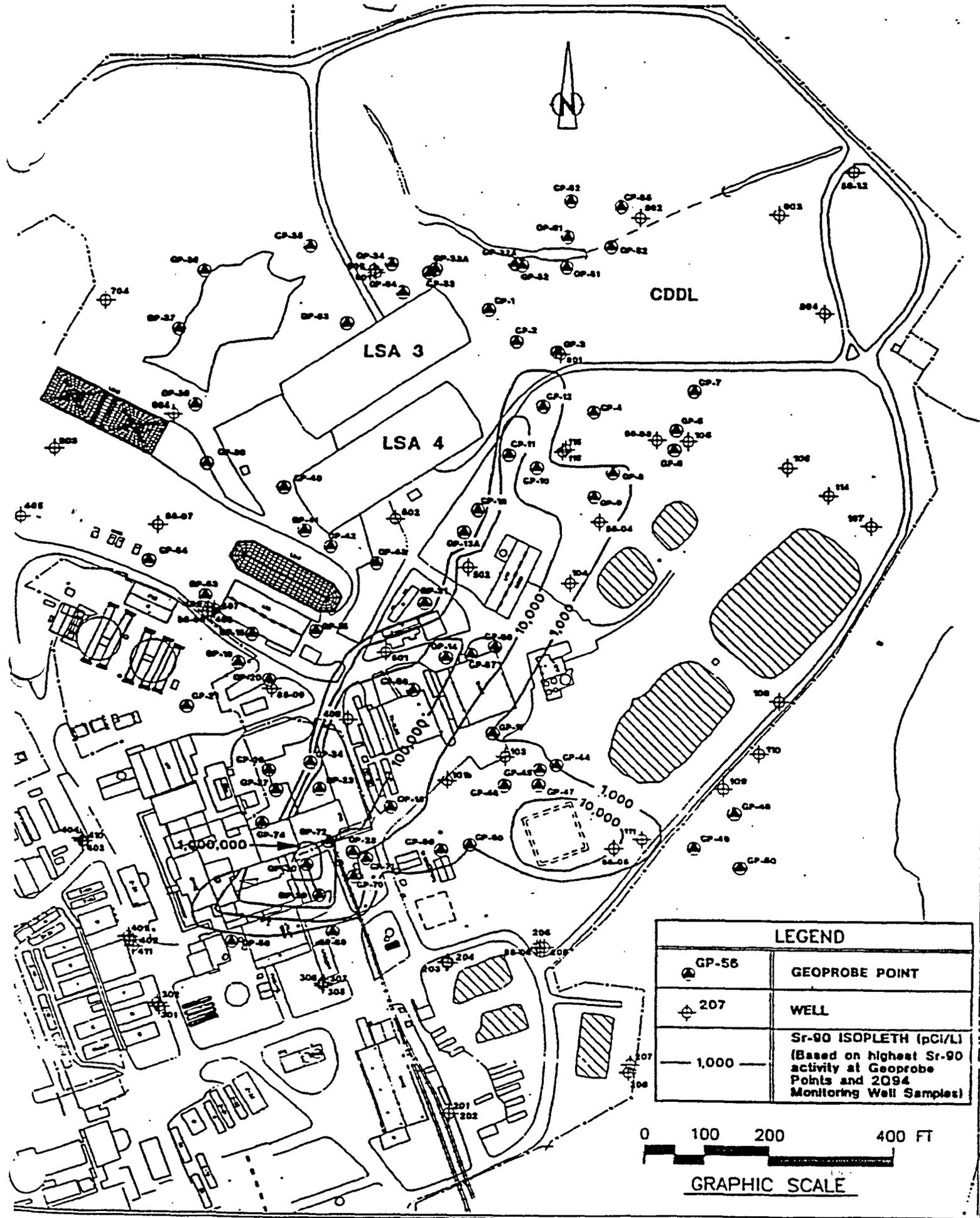
State-managed

16 acres

## Retained Premises

State-managed

~ 3100 acres



LEGEND	
GP-56	GEOPROBE POINT
207	WELL
1,000	Sr-90 ISOPLETH (pCi/L) (Based on highest Sr-90 activity at Geoprobe Points and 2094 Monitoring Well Samples)



GRAPHIC SCALE



**United States Nuclear Regulatory Commission**

## **NRC Roles and Responsibilities**

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**Presented to:** The 164<sup>th</sup> meeting of the Advisory Committee on Nuclear Waste, October 18-19, 2005

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**United States Nuclear Regulatory Commission**

## **Presentation Outline**

- NRC Statutory Responsibilities
- Commission Final Policy Statement

2



**United States Nuclear Regulatory Commission**

## **NRC Statutory Responsibilities**

- Atomic Energy Act (AEA):
  - Regulatory authority of Part 50 license
  - Assure public health and safety
  - Inspection
  - Terminate license

3



**United States Nuclear Regulatory Commission**

## **NRC Statutory Responsibilities**

- West Valley Demonstration Project Act (WVDPA):
  - Prescribe decommissioning criteria
  - Review and consultation on DOE plans
  - Monitor project activities for purpose of assuring public health and safety

4



**United States Nuclear Regulatory Commission**

**NRC Statutory Responsibilities**

- National Environmental Policy Act (NEPA):
  - Participate as a cooperating agency in Decommissioning EIS
  - Adopt or supplement Decommissioning EIS
  - Conduct environmental review for license termination



**United States Nuclear Regulatory Commission**

**Commission Final Policy Statement**

- Commission prescribed the License Termination Rule (LTR) as the decommissioning criteria for WVDP
- LTR criteria applies to decommissioning of:
  - High Level Waste (HLW) tanks and other facilities in which HLW, solidified under project, was stored;
  - Facilities used in solidification of waste; and any
  - Material and hardware used in project
- Commission issued criteria for Incidental Waste



**United States Nuclear Regulatory Commission**

**Commission Final Policy Statement**

- LTR is standard decommissioning criteria for NRC licensed sites
- LTR will apply to the termination of NYSERDA's license after license is reinstated
- LTR provides a range of public dose criteria:
  - Unrestricted use
  - Restricted use
  - Alternate criteria



**United States Nuclear Regulatory Commission**

**Commission Final Policy Statement**

- Provides flexible approach to decommissioning
- Commission recognized that public health and safety and cost-benefit considerations may justify the evaluation of alternatives that do not fully comply with LTR criteria.
- After cleanup to maximum extent technically and economically feasible, Commission will consider alternatives to release under the LTR:
  - exemptions from LTR, if it can be demonstrated that public health and safety and environment protected
  - long-term or perpetual license



**United States Nuclear Regulatory Commission**

**Methods and Models for NRC's Performance  
Assessment (PA) at the West Valley  
Demonstration Project (WVDP)**

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***Division of Waste Management and Environmental Protection  
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***Contributors: C. Ridge, C. Barr, K. Pinkston, S. Walker,  
A. Turner, J. Peckenpaugh, C. McKenney, M. Thaggard***

**Presented to: The 164<sup>th</sup> meeting of the Advisory Committee on  
Nuclear Waste, October 18-19, 2005**

1



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**Presentation Outline**

- Regulatory framework for Performance Assessment (PA)
- Objective for NRC's PA
- Overview of NRC's PA – Methods and Models
- Future plans for further development of NRC's PA
- Visual demonstration of NRC's PA model

2



**United States Nuclear Regulatory Commission**

**Regulatory Framework for PA**

- PA dose estimates must satisfy the requirements of 10 CFR Part 20, Subpart E, the License Termination Rule (LTR)
- LTR has provisions for:
  - Unrestricted release
    - no controls or maintenance
    - 25 mrem annual public dose limit
  - Restricted release
    - institutional controls limiting use of the site and/or providing for maintenance and monitoring,
    - 25 mrem annual public dose limit,
    - 100 [or 500] mrem annual public dose assuming the institutional controls fail

3

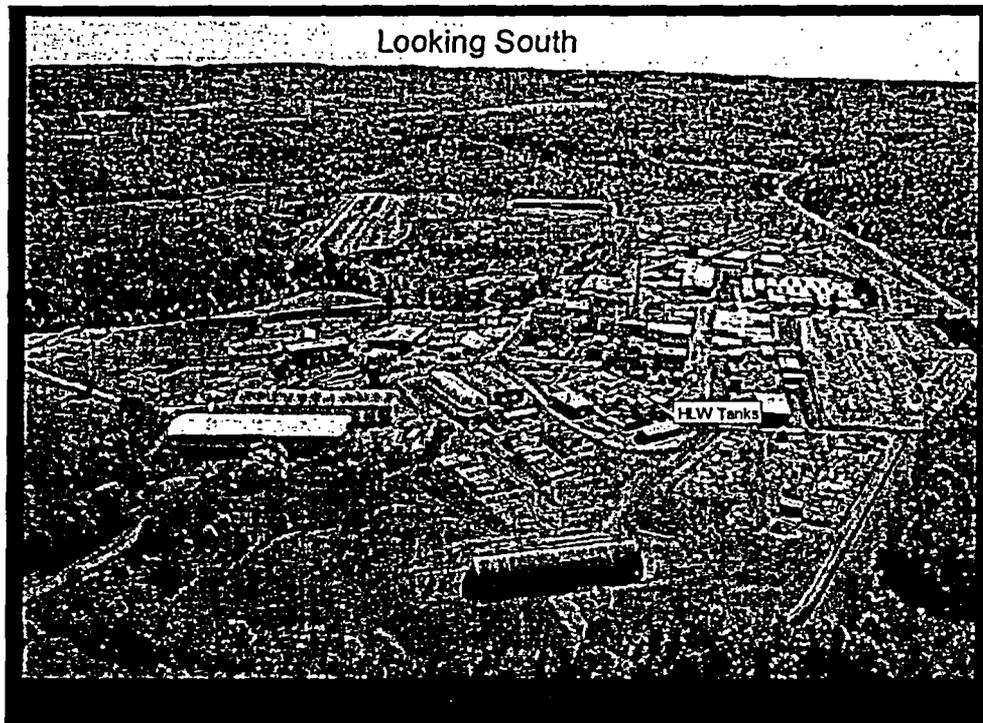


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**Objectives for NRC's PA**

- The primary objective for NRC's PA is to be used as an internal review tool:
  - Identify risk significant issues
  - Explore parameter and model uncertainty
  - Perform a risk-informed review of DOE's PA model
- The NRC intends to base decisions (EIS and decommissioning) on DOE's PA model results.
- The PA model should be flexible and easily modified.

4



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**Brief Overview- West Valley Site**

- Site is separated into a North Plateau and a South Plateau primarily based on hydrogeology considerations.
- Receptor considerations may be different for the different waste management areas based on the availability of water (e.g., water availability may be limited on the South Plateau).
- The site experiences relatively high rates of erosion.
- Engineered barriers are expected to be used as part of the site decommissioning.



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**NRC Model Overview**

- The methodology employed in development of the PA is to use a level of detail that is:
  - Appropriate for a review tool
  - Consistent with the information available to support the model
- NRC has used the software product GoldSim, which is a visual probabilistic simulation environment.
- NRC's PA is probabilistic.
- The methodology and approach allow for a high degree of flexibility to modify the model.

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**NRC Model Overview**

- Model development began in August 2004.
- Current model has over 1950 GoldSim elements and eight levels of subcontainment.
- Over 700 stochastic elements are used to represent various forms of uncertainty.
- Overall approach is to use a highly-abstracted (top down), highly-uncertain representation of the system.
- Verification of and sensitivity studies with the current beta version of the model are ongoing.

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**NRC Model Overview**

- Because the model is visual, staff intends to use the model as documentation.
- Goal is that the model would be fully-transparent to a technically-qualified independent reviewer (may need GoldSim training).
- Integration between subject matter experts and PA analysts has not been needed because they are one and the same.
- GoldSim has two features that prevent common errors: internal unit conversions and visual linking of information (data, equations, outputs, etc.)
- Model contains 30 radionuclides, including decay chains.

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**NRC Model Overview – Sources**

- Six primary waste management areas (WMA) are represented in the model (based on risk considerations):
  - HLW tanks, Process building, Lagoons, Sr-90 plume
  - NDA, SDA
- NDA is represented as four disposal types: deep holes, special holes, WVDP trenches, WVDP caissons.
- SDA is represented as two disposal types: Trenches and special purpose holes.

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**NRC Model Overview - Receptors**

- Receptor can be selected as:
  - Resident
  - Farmer
  - Intruder, well-driller (acute or chronic)
  - Recreational (onsite or offsite)
- Receptor can be located any distance from the sources (within physical constraints).
- User sets the institutional control and intruder periods.

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**NRC Model Overview - Submodels**

- Submodels are developed for waste release, transport through the vadose zone, transport through the saturated zone, and calculation of concentrations in environmental media (water, soil, air) to which receptors may be exposed.
- Exposure pathways depend on source and receptor selection.
- Pathways included: water ingestion, soil ingestion, plant ingestion, animal product ingestion (meat, milk, eggs), direct exposure, inhalation of gas and soil, fish ingestion, deer ingestion.

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**NRC Model Overview – Release Submodel**

- Release model includes the ability to represent temporal effects on infiltration as a result of engineered barriers.
- Radionuclides are partitioned between waste, soil, water, and air and can be transported via diffusion or advection.
- Different Kd's (distribution coefficients) and solubilities can be defined for each WMA.
- Failure of engineered barriers as well as congruent dissolution of the waste matrix are included (where needed).

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**NRC Model Overview – Vadose Submodel**

- Transport through the vadose zone is represented by a one-dimensional series of environmental cell elements.
- Radionuclides are partitioned between waste, soil, and water.
- Different Kd's (distribution coefficients) and solubilities can be defined for each vadose zone material type.
- Uncertainty in the degree of saturation is included.
- Variability in vadose thickness and extent was developed through GIS modeling and is included in the approach.

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**NRC Model Overview – Saturated Zone  
Transport Submodel**

- Transport through the saturated zone is represented by one-dimensional transport pipe elements.
- Radionuclides are partitioned between the geologic materials and water.
- Dispersion, advection, decay, and sorption are included.
- Variability in transport length was developed through GIS modeling and is included in the approach.

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**NRC Model Overview – Dose Modeling**

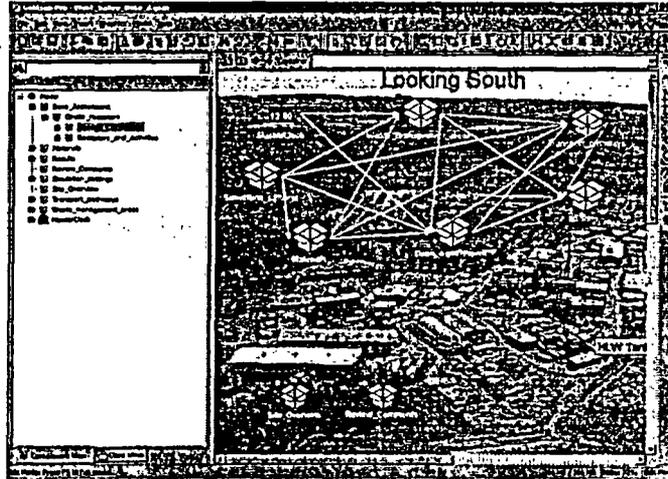
- Environmental concentrations in water (both surface and groundwater), air, and in soil for garden and fields irrigated with contaminated water are developed.
- Pathway dose conversion factors (PDCF) are developed on a receptor and radionuclide basis.
- Total effective dose equivalent (TEDE) is calculated as the product of the PDCFs and the concentrations in soil, water, and air obtained from the transport models.

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**Visual Demonstration**



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**Principal Preliminary Insights**

- The Sr-90 plume poses the largest immediate risk impact for a North Plateau water user.
- The HLW tanks will likely require a large amount of engineering or source removal in order to meet the performance objectives.
- If groundwater is not used on the South Plateau, the surface water systems dilute the releases substantially thereby limiting risks to likely acceptable levels.
- Direct contact with waste or residual contamination in intruder scenarios (well driller) pose a significant challenge for many WMA's.

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**Future Plans**

- Complete verification and sensitivity evaluations, modify model as needed.
- Develop separate assessment of erosion impacts at the site.
- Develop risk insights to share with reviewers of WVDP PA.

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**Conclusions**

- Review of DOE's West Valley PA is expected to be very difficult.
- NRC's insights developed from independent modeling will help risk-inform the review.
- NRC's PA model is highly flexible and represents uncertainty in both parameters and models.

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