Official Transcript of Proceedings ACNWT-0195

NUCLEAR REGULATORY COMMISSION

Title: Advisory Committee on Nuclear Waste
174th Meeting

Docket Number: (not applicable)

PROCESS USING ADAMS
TEMPLATE: ACRS/ACNW-005

SUNSI REVIEW COMPLETE

Location: Rockville, Maryland

Date: Tuesday, November 14, 2006

Work Order No.: NRC-1322 Pages 1-248

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UNITED STATES NUCLEAR REGULATORY COMMISSION'S

ADVISORY COMMITTEE ON NUCLEAR WASTE

November 14, 2006

The contents of this transcript of the proceeding of the United States Nuclear Regulatory Commission Advisory Committee on Nuclear Waste, taken on November 14, 2006, 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.

1 UNITED STATES OF AMERICA

2 NUCLEAR REGULATORY COMMISSION

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4 ADVISORY COMMITTEE ON NUCLEAR WASTE (ACNW)

5 174th MEETING

6 SECOND DAY

7 + + + + +

8 TUESDAY,

9 NOVEMBER 14, 2006

10 + + + + +

11 The meeting was convened in Room T-2B3 of

12 Two White Flint North, 11545 Rockville Pike,

13 Rockville, Maryland, at 8:30 a.m., Dr. Michael T.

14 Ryan, Chairman, presiding.

15 MEMBERS PRESENT:

16 MICHAEL T. RYAN Chair

17 ALLEN G. CROFF Vice Chair

18 JAMES H. CLARKE Member

19 WILLIAM J. HINZE Member

20 RUTH F. WEINER Member

21

22

23

24

25

1 ACNW STAFF PRESENT:

2 JOHN T. LARKINS Executive Director, ACRS/ACNW

3 LATIF HAMDAN

4 ANTONIO DIAS

5 DEREK WIDMAYER

6 JIM SHEPHERD

7 MIKE SNODDERLY

8 RAFAEL RODRIGUEZ

9 WILLIAM OTT

10 STEVEN KOENIG

11 JOHN FLACK

12

13 MEMBERS OF THE SUBJECT MATTER EXPERT PANEL PRESENT:

14 RALPH ANDERSEN

15 HANS HONERLAH

16 TRACY IKENBERRY

17 ERIC L. DAROIS

18 LARRY BOING

19 JEFF LUX

20 THOMAS L. NAUMAN

21 DAVID KOCHER

22

23

24 ALSO PRESENT:

25 TOM CONLEY

C-O-N-T-E-N-T-S

AGENDA ITEM	PAGE
WELCOME AND INTRODUCTIONS	4
SESSION I: DECOMMISSIONING LESSONS LEARNED	
Ralph Andersen Presentation	7
Jeff Lux Presentation	42
Ralph Boing Presentation	58
Hans Honerlah	87
SESSION II: IMPLEMENTING DECOMMISSIONING LESSONS LEARNED IN NRC RULES AND GUIDANCE	
Thomas Conley	149
Panel Discussion	161
Wrap-Up	245
Adjourn	

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

2 (8:39 a.m.)

3 OPENING REMARKS AND INTRODUCTIONS

4 CHAIR RYAN: The meeting will come to order

5 please.

6 This is the second day of the 174th

7 meeting of the Advisory Committee on Nuclear Waste.

8 During today's meeting the committee will

9 conduct a working group meeting on decommissioning

10 lessons learned.

11 This meeting is being conducted in

12 accordance with the provision of the Federal Advisory

13 Committee Act. Derek Widmayer is the designated

14 federal official for today's session.

15 We have received no written comments or

16 requests for time to make oral statements from members

17 of the public regarding today's sessions. Should

18 anyone wish to address the committee, please make your

19 wishes known to one of the committee staff.

20 It is requested that speakers use one of

21 the microphones, identify themselves and speak with

22 sufficient clarity and volume so that they can be

23 readily heard.

24 It is also requested that if you have cell

25 phones or pagers that you kindly turn them off. Thank

1 you.

2 So without further ado I will turn the

3 meeting over to our cognizant member for this working

4 group meeting, Dr. Jim Clarke.

5 Jim.

6 MEMBER CLARKE: Thank you, Dr. Ryan.

7 Welcome, all of you, to this working group

8 meeting on decommissioning lessons learned.

9 In our first session this morning we will

10 hear from representatives of industry groups,

11 licensees and practitioners, providing information to

12 us on decommissioning lessons learned, focusing of

13 course on those lessons that can lead to reduced

14 environmental impact and decommissioning costs.

15 We have an invited panel of experts, and

16 let me quickly introduce them to you and thank them

17 all for coming. They've been with them on several

18 occasions, all of them, and we really appreciate their

19 willingness to participate in these meetings.

20 Eric Darois to my right is the owner of

21 Radiation Safety and Control Services in New

22 Hampshire. He's presently supporting Connecticut

23 Yankee and Yankee Road decommissioning projects.

24 And Eric holds a master's of science

25 degree in radiological science and protection from the

1 University of Lowell.

2 Dave Kocher to my left is the senior
3 research scientist at SENES Oak Ridge, and a
4 consultant to the committee. He has over 30 years of
5 professional experience in environmental health
6 physics, a Ph.D. from the University of Wisconsin.

7 Tracy Ikenberry to my right has been an
8 associate and senior health physicist with Dave
9 Moeller & Associates since 1998. He has over 22 years
10 of experience in environmental and occupational health
11 physics. Tracy graduated summa cum laude from
12 McPherson College with a BA in biology, and received
13 an MS from Colorado State University in radiological
14 health sciences.

15 And Tom Nauman to my left, vice president
16 of Shaw, Stone & Webster Nuclear Services. Over 30
17 years of experience in nuclear engineering and
18 management, construction, maintenance, outage
19 management and decommissioning. Tom has a BS in
20 environmental engineering from Southern Illinois
21 University, and is a graduate of the Northwestern
22 University Kellogg School of Business executive
23 program for nuclear business leadership.

24 Welcome, all of you, and we thank you for
25 coming back yet again.

1 Our first speaker is Ralph Anderson, chief
2 health physicist for the Nuclear Energy Institute.
3 Ralph's been working with the NRC decommissioning
4 staff in their lessons learned efforts, and as we
5 heard yesterday, supported efforts of the liquid
6 radioactive relief lessons learned task force.
7 Ralph, thank you.
8 SESSION I: DECOMMISSIONING LESSONS LEARNED
9 DR. ANDERSEN: Thank you.
10 Well, as always it's a pleasure to be able
11 to address the ACNW. I'm beginning to think of this
12 as my home away from home, because it's generally an
13 enjoyable experience.
14 What I want to talk about this morning is
15 the integrated program between NEI and EPRI. Hence
16 the coauthorship. My colleague, Sean Bushart, from
17 EPRI wasn't able to make it out this week. However,
18 I strongly encourage that at some future time Sean
19 might be very appropriate to provide you must more
20 details about the robust program, international
21 program especially, that EPRI has been conducting for
22 some almost 10 years now in the area of
23 decommissioning.
24 In short our complementary roles, EPRI as
25 our industry's research and development organization

1 has the lead responsibility for documenting or
2 experiencing lessons learned for decommissioning, for
3 technology development and transfer, and also provides
4 a considerable amount of on site support for
5 licensees, reactor licensees undergoing
6 decommissioning.
7 The other part of our coin is Nuclear
8 Energy Institute. Basically we have an executive
9 oversight group which meets less frequently now as we
10 complete our decommissionings, but it's made up of
11 chief nuclear offices from those facilities undergoing
12 decommissioning to provide both policy oversight and
13 policy development.
14 We also maintain the interface with the
15 Nuclear Regulatory Commission, the Environmental
16 Protection Agency and Congress.
17 I want to note at this point my colleague
18 who preceded me, Paul Genoa, who I believe members of
19 the committee have met in the past, really has done an
20 outstanding job over the years. We actually had a
21 handoff at the beginning of this year. Paul is alive
22 and well and working in other arenas at NEI.
23 Then finally our real mission is resolving
24 economic and regulatory issues associated with
25 decommissioning. Some of that occurs in legislation,

1 some fo that occurs in regulation, but some of it
2 occurs also at the state level, at the PUC level.
3 The status currently for commercial
4 nuclear power plants in the U.S. is that two have
5 terminated their licenses - actually three if we count
6 Shoreham. Shoreham always stands somewhat as an
7 outlier. And we're entering the home stretch at the
8 other plants.
9 What this is going to do is create a very,
10 very extensive gap in our view from the time of
11 decommissioning of current plants that are actually
12 doing dismantling and decontamination, potentially for
13 as much as 25 or 30 years or more before we enter into
14 decommissioning again.
15 And then at that time we will potentially
16 enter into it with a vengeance as the extended
17 licenses of the current fleet expire.
18 In some cases it will not only involve
19 decommissioning of plants that operate up until that
20 time, but also some plants that are simply sitting in
21 a status - safe-store status effectively right now for
22 decommissioning concurrently with the other units.
23 One other element I should mention when we
24 look out into the future is the impact of new plants.
25 A number of the new plants - in fact all but a few

1 that are going to be in the first wave, and that's
2 some 21 sites that would be involved, and potentially
3 up to 30 plus units at this point in the head count -
4 many of them will be colocated will operating units.
5 The likelihood is that when those
6 operating units shut down, if there is a nuclear power
7 plant continuing in operation, that those plants will
8 not go into immediate decommissioning.
9 So there is a large lesson unlearned that
10 we don't really have much experience with. Ironically
11 this was envisioned in the original regulations as the
12 standard, but in fact it has not been the standard, it
13 is the exception.
14 And that is the whole issue of the impacts
15 of safe-store, and particularly enhanced permanent
16 storage type of situations. They've been called
17 intumen (phonetic) and other names, assured isolation
18 and so forth.
19 But there are a number of options out
20 there that could come into play in the far future that
21 we've really not exercised to any significant degree.
22 So I stress that in general the experience
23 that we've gained have been plants that have shut
24 down, and most of these with one or two exceptions
25 shut down earlier in their lifetime than expected, and

1 pretty much immediate went into decommissioning.

2 So the effects of long term decay and

3 other things really haven't come into play much with

4 these units.

5 The issues that we are focusing on as we

6 complete our whole series of technical reports

7 associated with decommissioning are listed under the

8 remaining issues.

9 The third one isn't really intended to be

10 a hot button, but it recognizes some of the experience

11 that we gained, certainly with one unit in particular,

12 and our continued quest to find some reasonable

13 approach to disposition a very low level radioactive

14 materials.

15 And of course yesterday we learned from a

16 lessons learned task force, and they are really

17 responding, although they're operating plants, to the

18 long term issue of groundwater contamination and soil

19 remediation.

20 These are the plants that are in progress.

21 I'm going to briefly touch on each of these, highlight

22 a few things where we've gained particular lessons

23 learned out of them.

24 And then what I would like to do is

25 provide you with a brief summary of lessons learned

1 for decommissioning, but most importantly, picking up
2 a theme I heard yesterday, I really want to spend a
3 little bit of time on how we see our lessons learned
4 from decommissioning applying to new plants.
5 We think that given the time frames that
6 we are dealing with for license applications, given
7 the discovery of a regulatory requirement that many of
8 us had overlooked for applying such lessons learned to
9 new plant design and operations, this has really
10 become a critical factor for renaissance in nuclear
11 energy.
12 Big Rock Point is certainly a fantastic
13 success story. It's a plant that virtually operated
14 its full expected lifetime, went into its
15 decommissioning, has now reached Greenfield status.
16 In fact it is intended that it will be turned over as
17 a recreational area.
18 And also it engaged on a particular issue
19 that I want to take a moment on only because it's a
20 story worth telling that I hope we might be able to
21 tell in the future at a number of sites.
22 Big Rock Point actually pursued an option
23 where they had intended to basically crumple down all
24 the building debris and then spread it out over the
25 site. They came up with a plan for that, how that

1 would mitigate potential dose to future publics, and
2 actually gained approval for that approach from the
3 NRC.
4 But in their interactions with
5 stakeholders, what they recognized was the value of
6 being able to actually remove that material. It's
7 just that the cost of shipping it halfway across the
8 country when it had such radioactive content bordered
9 on ludicrous, and certainly wasn't cost effective.
10 A number of those external stakeholders,
11 NRC included, but particularly the state and the local
12 municipality and so forth, worked with Big Rock to
13 come up with an alternative, which was to dispose of
14 that debris, again, extremely low activity,
15 essentially in a landfill.
16 And what paved the way for was, rather
17 than disposing of that material on site, and leaving
18 it there permanently, albeit the dose consequence
19 would have been small, the public concern issue would
20 not.
21 They were able to take advantage of this
22 alternative disposal process and arrive at a true
23 Greenfield.
24 So there is a moral to the story, and I
25 think it's important that this organization in

1 particular continue to remind the NRC that they are
2 the keepers of the keys on that kind of an issue.
3 Doing that on a case-specific basis, as
4 you know, makes it a very, very political process.
5 I'm from Michigan. I worked at the Fermi II nuclear
6 power plant for a number of years. And I'd just like
7 to think that a lot of people up there have good
8 common sense and that's why it was successful.
9 I can't say that about all states in the
10 country, but I won't name names.
11 Maine Yankee, really the lesson learned
12 there is that Maine Yankee discovered the United
13 States Environmental Protection Agency. And that
14 actually is where was born the jurisdictional issues
15 between the NRC and the EPA that occupied the trade
16 press for a considerable amount of time. A lot of
17 missiles were fired back and forth between the two
18 agencies. Fortunately no permanent damage was done,
19 and it finally took Congress to help them work towards
20 the memorandum of understanding, which we somewhat
21 take for granted today, but believe me, as somebody
22 who was very directly engaged in that, it wasn't easy.
23 What we don't have is a true test of
24 jurisdictional lines and what constitutes adequate
25 protection of health and safety beyond that MOU, which

1 is primarily just geared to information exchange.

2 But that really came to fruition at the

3 Maine Yankee plant. That's very much it's claim to

4 fame.

5 I should mention that under the corner in

6 key EPRI interactions, I am not touching on those

7 particulars, and I apologize. I think I better go

8 back one just to clarify what those are. Sorry to

9 have gotten so low for you.

10 We took each plant and tried to capture

11 particular lessons learned from the specifics of that

12 plant decommissioning, and then held a series of

13 technical workshops.

14 And by the way NRC participated heavily in

15 these workshops along with industry, so there was a

16 lot of information exchanged back and forth.

17 And then also we were able to test out

18 other technology, so that's what's denoted in the

19 corner of each of these slides. So I apologize for

20 not mentioning that at the outset.

21 The next plan I'd like to mention si the

22 Trojan Nuclear Power Plant, which of course is now

23 decommissioned. An interesting comment there is that

24 the plant actually sits waiting for a repowering at a

25 future date. That is the intent. And it was

1 interesting not too long ago when I was talking with
2 people who should know something about it, I happened
3 to mention, I said, oh, okay, talked about combined
4 gas or coal plant or what are you thinking would be
5 there, obviously I'm sure you've ruled out nuclear.
6 And the surprised expression I got was kind of
7 exciting for me, because they said, well, not
8 necessarily. We'll just have to see how things stand
9 when that time comes. So just an interesting thought.
10 I wouldn't take that as an announcement of any kind,
11 but just a case in point that there is no reason why
12 decommissioned nuclear power plants can't be replaced
13 by new nuclear power plants.
14 The Yankee Row (phonetic) plant, we
15 certainly gained a lot of experience with groundwater
16 at the Yankee Row plant, how to bound that, how to
17 deal with uncertainties, how to factor that into
18 decommissioning.
19 My understanding is that now I believe
20 they are in the final status survey and verification
21 process for license termination.
22 Connecticut Yankee intends to go
23 Greenfield. A couple of things came out of
24 Connecticut Yankee. This was another case of really
25 understanding stakeholder expectations in terms of

1 endpoints that need to be achieved.

2 As with Maine Yankee, there was a lot of
3 discussion about what the acceptable, truly
4 acceptable, dose criteria should be, and in fact in
5 both states that actually was worked out through state
6 legislators and state regulations and a grievance with
7 the companies. So both of those plants are not
8 decommissioning to 25 millirem standards. They are
9 decommissioning to standards somewhat lower than that,
10 or in Maine Yankee's case, did so.

11 But the big experience that we gained out
12 of Connecticut Yankee was in the actual demolition of
13 the facility, is when they discovered that there had
14 been significant leakage through the spent fuel pool
15 into the soil underneath the reactor building and into
16 the groundwater.

17 This wasn't an anticipated finding that
18 had been originally factored into the plant, so there
19 had to be a considerable amount of regrouping and
20 reconsideration of how to deal with that, and it did
21 of course result in additional costs associated with
22 decommissioning.

23 The key here is that for Connecticut
24 Yankee, and because of that situation and some other
25 leakage that had occurred in a radway (phonetic)

1 storage tank area, the real driver to decommissioning
2 in Connecticut Yankee is the MCLs for groundwater.
3 So it's recognition that beyond license
4 termination you still ultimately are going to fall
5 under state and federal statutes, and fall under
6 regulatory regimes that are derived out of the EPA
7 where that real emphasis of achieving the MCLs becomes
8 the ruling factor.
9 I think strontium-90 is actually one of
10 the radionuclides at Connecticut Yankee.
11 So among other things it's given NRC and
12 EPA an opportunity to exercise their memorandum of
13 understanding.
14 Rancho Seco, Rancho Seco has several
15 unique aspects to it. It's not engaged in a rapid
16 decommissioning. It's engaged in a very deliberate
17 decommissioning process over time. It's intent is to
18 go to a Brownfield, not a Greenfield, for potential
19 industrial reuse in the future.
20 But what probably is most intriguing is it
21 is owned by SMUD, which is the Sacramento Municipal
22 Utility District. And the district itself made a
23 conscious decision that they weren't going to ship
24 Class B, Class C or greater, obviously greater than
25 Class C waste, but Class B or C waste, all the way

1 across the country to Barnwell.

2 So they actually are pursuing a process

3 where all of that waste will be stored in site. So

4 it's not intended that license termination is going to

5 arrive any time real soon. But again that's kind of

6 a unique factor, and what's important about it is that

7 we all recognize the specter that even most of the

8 operating plants may be in a similar circumstance as

9 earlier as two years from now.

10 I mentioned that EPRI's program is

11 international. It truly is. The U.S. industry,

12 because of our lead experience gained with

13 decommissioning has really become the global leader

14 not only on having first of a kind experience which

15 hopefully others will embellish on and improve our

16 lessons learned, but also the fact that we already had

17 a very robust R&D based program in place that could

18 easily be expanded to other countries, and easily

19 allow engagement by other companies in other countries

20 to utilize that experience and then carry it forward.

21 It's obvious, the experience that we bring

22 to bear is invaluable to them. But what is exciting

23 about it is that with different approaches, different

24 regulatory regimes, different cultures, they are

25 bringing to bear on common problems really different

1 approaches that are associated with the way that they
2 do things. And that might include waste disposal, it
3 might include deconstruction, it might include the
4 whole gamut.
5 So the key is, what we look at is that now
6 we're engaged in the evolution of what I will call
7 U.S. best practices into international best practices,
8 and I personally find that very exciting.
9 EPRI conducts a number of international
10 workshops. I had the opportunity to attend one of
11 those, and found it very, very productive, very
12 enlightening. So I commend that as the new thing in
13 decommissioning.
14 The simple overview then of all of this is
15 that EPRI continues its collaboration with plants who
16 are decommissioning. Its focus is on reducing both the
17 risks and the cost. And they really have a tremendous
18 rich library of technical reports, software and so
19 forth.
20 But now I need to make the comment, all of
21 this material was really developed at considerable
22 cost to the companies that participated in the
23 process, and also by its own venue, EPRI isn't a
24 nonprofit organization per se. It's not profit
25 driven, but it certainly needs to raise its funds to

1 be able to continue its very robust research.

2 So these are in fact intellectual

3 property. They are copyrighted products. They are

4 available for public sale. You will find a single

5 report is somewhat expensive. It can range anywhere

6 from 25- to $100,000. But again that is reflective of

7 the types of costs that go into putting these things

8 together.

9 However what EPRI has done continually

10 throughout, because we confronted this problem right

11 in the very beginning is that they have held a number

12 of technical workshops, which anyone can attend who

13 cares to register and pay the registration fee, and

14 also which has involved considerable participation by

15 the Nuclear Regulatory Commission.

16 So there has in fact been a lot of

17 information transfer. It's not like this is all

18 molding away in a library somewhere.

19 Additionally EPRI and NEI are working very

20 closely with NRC staff on the specific subject of

21 capturing decommissioning lessons learned. We are

22 working with Rafael Rodriguez.

23 And what EPRI is engaged in now is writing

24 a fairly decent summary of lessons learned derived out

25 of these reports that at least would help people

1 understand the types of information that's available
2 in these reports, and where to find it.
3 Also, they are able to cross-reference
4 somewhat to where it came from as an alternative means
5 of gaining information.
6 But I will stress again that when it comes
7 to the how-to level, the reports themselves are means
8 of retaining this knowledge for this very, very
9 extended time frame, until we get back into the
10 decommissioning game again.
11 Okay. I want to touch briefly on some
12 lessons learned. These have been many told tales, so
13 I wouldn't expect a lot of burning bushes in this
14 particular slide. But again, it's always good to
15 reemphasize the obvious.
16 Probably the most obvious one, it kind of
17 gets overlooked every time, is that moving from the
18 process of operating an electricity generating machine
19 to ultimately releasing a site, you go through several
20 paradigm shifts that really require that you think
21 quite differently about issues like workforce,
22 organization, culture, safety issues. And that, we've
23 seen over and over again that that isn't necessarily
24 well understood at the outset.
25 Let me give you a simple example. A

1 person who was a highly effective plant manager,
2 highly effective at operating the plant safely, making
3 sure that outages were conducted efficiently and
4 safely, maximizing generating of electricity, in other
5 words an outstanding production manager, isn't
6 necessarily the best person for what is essentially a
7 deconstruction project. That might call for quite
8 different management skills.
9 And if you just reflect that thought
10 process all the way through it leads you to understand
11 how you need to plan this gradual transition into
12 ultimately what is a waste disposal project. Because
13 at the end of the day that's what decommissioning is,
14 and when you are done with disposing of the waste then
15 you are really done.
16 Of course you have to cap it off with one
17 last challenging state of the art final status survey.
18 But that paradigm shift is the one that I
19 hope we always capture on the front end of our lessons
20 learned.
21 I'm only going to highlight a few others
22 on here. Another front end issue I think often we
23 overlook is the internal and external stakeholders,
24 getting them engaged, getting expectations set and
25 understood, and getting endpoints agreed to up front.

1 A simple story: what about your plant
2 employees? Do you really want them to all race out
3 the door when they hear that you are going to be
4 shutting down soon for decommissioning because they
5 want to go to a plant that is going to operate at
6 least through their remaining career? Or do you want
7 to have some well conceived transition plan?
8 And given external stakeholders, at the
9 end of the day the local community are the ones that
10 are going to have to say that they are entirely
11 satisfied with the end state that you've achieved. So
12 you might as well get them involved up front rather
13 than finding yourself in some debate down the road on
14 what constitutes a safe standard.
15 The outcome of the property - you know, is
16 it going to be a park, is it going to be another power
17 generating station, or is it going to be another
18 source of employment, is it going to impact employment
19 in the area?
20 So there are a tremendous number of
21 considerations that go on there, and sometimes I think
22 all facilities have certainly involved stakeholders,
23 but sometimes they've overlooked some key groups at
24 the outset.
25 Figuring out which agencies really need to

1 be involved, and what the real standards you need to
2 meet, I've already touched on that.
3 The historical site review is an important
4 one. What the lesson learned is, you better be doing
5 that from the day you start the plant up. I'll say
6 that again, it really should start - well I'll go0
7 back before that - it should start with plant
8 construction. Because rom that time on, things are
9 happening that you knew about when you did your
10 ultimate decommissioning plan.
11 So one of the things that we've certainly
12 captured, lessons learned, is that people have been
13 going back now trying to do their historical site
14 reviews while folks are still there to remember
15 things. Five or 10 years from now 40 percent of those
16 people will be gone. And of course a number of them
17 already are gone that were there in the early days
18 during startup.
19 But that's an issue that really is a
20 lifecycle, lifetime of facility type of process. And
21 again it really should start with construction. Where
22 did we put that tight piping again? What did we do
23 with that debris when we did backfill on the
24 construction site? Very nice things to know when you
25 are trying to figure stuff out at decommissioning

1 time, but since that was 40 or 50 years ago it's kind
2 of hard to find people that are still around that can
3 tell you about it.
4 I think we hit on some of the issues.
5 Many times on site characterization and groundwater
6 modeling, for soil and groundwater remediation, that
7 is certainly an area where NRC recognizes as well, we
8 need to give a lot more thought to criteria and
9 approaches, the right thing to do. And we also need
10 to understand again the stakeholder input that is
11 necessary, because again the license termination
12 criteria may not necessarily be the correct endpoint.
13 Thinking about groundwater for example as
14 a resource that you're going to make unrestricted
15 release of the property might cause you to make
16 different decisions than if it's purely a dose-based
17 type of approach.
18 The final site survey I want to touch on
19 just to mention that it's important that it be
20 extremely well coordinated with NRC, and with the
21 ORISE as the organization that primarily does the
22 verification surveys.
23 There have been emergent issues more
24 recently of some lack of coordination and the impact
25 that it has is that any delays in verifying the final

1 status survey can be really really highly impacting if
2 the people who performed the final status survey left.
3 If you are sitting around for months it's kind of hard
4 to rationalize telling people to go sit in the trailer
5 until ORISE is done.
6 It used to be, at least from the last time
7 I was involved in this issue, that that was somewhat
8 of a parallel activity. You survey it, I survey it,
9 you survey it. My understanding is it has evolved
10 somewhat to being more sequential. If that is the
11 case, that is something that needs to be corrected.
12 And then finally on low-level waste
13 management options, I'll just mention that we went
14 into that issue in great detail in a workshop held by
15 ACNW earlier this year, a very outstanding workshop,
16 and the whole issue here is we need to continue to
17 work for flexibility and options.
18 It won't bode well for ultimate
19 decommissioning of a large number of plants if it's
20 expected that everything is going to go to our
21 standard Part 61 land waste disposal site.
22 Okay, now we're where I really wanted to
23 be, which is to talk about new plants. And that is
24 what's really been exciting is that in looking at
25 decommissioning we're learning a lot about doing

1 things better, all the way from our design and
2 construction through our operation.
3 So I'm going to touch on several issues,
4 refer to my notes on this.
5 What I'll mention again is we're actually
6 working on a very detailed report, and it's in
7 progress, and expect that we'll probably have a
8 workshop on that at some future time.
9 But in the meantime there will be a series
10 of meetings that kick off on November 21st with NRC
11 staff to talk about regulatory guidance and standard
12 review plan for 10 CFR 20.1406 which is the regulatory
13 requirement for all applications submitted after 1997
14 to reflect this kind of experience, specifically to
15 facilitate decommissioning and to minimize radioactive
16 waste generation.
17 So we already have the obligation. What
18 we've got now is a body of knowledge to apply to that
19 obligation. And that's the report that is in
20 progress, and actually the notes I'm referring to are
21 taken from our draft outline for that report.
22 But I do want to just highlight a few
23 issues quickly, but I need to do a time check. I
24 neglected to look closely at the schedule. What are
25 we working to?

1 MEMBER CLARKE: Ralph, you're fine. You're
2 scheduled to 9:30.
3 DR. ANDERSEN: Okay, very good. So I'll
4 roll this up enough so that we've got ample time for
5 questions.
6 You know first and foremost, and that's
7 why I say historic -
8 MEMBER CLARKE: It's been our practice, and
9 I neglected to say so in the introduction, it's been
10 our practice in working group meetings with invited
11 panels to hold the questions until the end of the
12 sessions.
13 DR. ANDERSEN: Oh, very good, so that's our
14 panel session at the end? Okay, thank you, I
15 appreciate that Jim.
16 In that case I will take a little time
17 with this, and I appreciate the opportunity to do so.
18 Looking at design and construction it's
19 issues like taking detailed photos and videos during
20 construction at different stages to have things to
21 refer back to. It's nice to know how things were put
22 together when you go to take them apart again. We all
23 learned that as children when we played with our
24 Tinker Toys and our erector sets. We've kind of
25 forgot it a little bit in large structure

1 construction.

2 Another one is, that's more new and
3 innovative is using GPS readings to accurately
4 determine where things are that are out of sight like
5 underground structures and piping and so forth.
6 Certainly an easier way to get back to where you want
7 to be than a drawing that may or may not be close to
8 right. And performing asphalt laser scans for
9 structures. Precise measurements are helpful, and
10 that kind of database is very useful especially in
11 decommissioning planning.

12 One of the things we really see is, to the
13 extent practice, you really ought to prohibit onsite
14 construction debris disposal onsite. All it does is
15 create an exceedingly complicated geohydrology, and
16 you touched on that yesterday, Mike. It just makes
17 your life very, very complex. So that whole backfill
18 issues needs to be reconsidered, and the whole issue
19 of debris needs to be considered from that
20 perspective. What does this mean when I want to
21 figure out clothes and so forth? Soil configurations
22 at the time of decommissioning, not to mention during
23 operation.

24 Any of the temporary underground systems
25 that were used during construction, I will say that my

1 general recollection having been through some of the
2 construction projects, they're usually abandoned in
3 place, covered up. So that's troublesome when you're
4 decommissioning when you discover a pipe, and you have
5 no idea what it's for or what it came from. You spend
6 an awful lot of time figuring out that it really isn't
7 important.
8 But removing all of that important
9 instruction, also it's a helpful tip.
10 And then additionally, and this is the
11 issue that we really learned big time with the recent
12 issue with groundwater. The time to update your
13 geohydrological evaluation and characterization is
14 really when you completed your construction. I mean
15 you've taken an environment that you characterize for
16 the purpose of siting and licensing, you changed it
17 around, we talked about that, that's really the time
18 when you put in place your baseline geohydrology
19 characterization. And then work from that over time,
20 keep it current, not to try and go back and do it 20
21 years later, which is where most of us are right now.
22 So those are some of the types of items
23 that came out of the considerations for the architect
24 engineer and for the construction stage.
25 Now I'll briefly go through some of the

1 actual design considerations for the NSSS suppliers.
2 And this of course is an issue that they're grappling
3 with now with their design certification process.
4 In regard to sumps, obviously you want to
5 have a controlled collection of sump overflow and you
6 want to route it places that you can deal with easily.
7 If it's expected it's going to be contaminated, you're
8 really want to route it to what's going to be
9 ultimately a monitored discharged path.
10 Alternatively, if you expect it not to be,
11 you don't want it routed in ways where it can become
12 contaminated.
13 Welding all the subpipe penetrations,
14 other types of fixtures have been used and they
15 haven't done well. And certainly requiring a liner
16 for all sumps. You know the technologies are there
17 now especially with certain types of poly materials,
18 to really enable that in a way that can change a sump
19 from a major decommissioning issue to a somewhat
20 straightforward decommissioning issue.
21 Structures and outside areas, simple
22 things like berms and moats for all outside doors.
23 Guess what happens sometimes when big systems leak
24 lots of water? Sometimes it actually goes out the
25 door.

1 It would kind of be nice to capture that
2 instead of just having it disappear into the ground.
3 Additionally a big need that we see, and
4 I think this is an area that is very fertile, and I
5 think we have a lot to learn from our Canadian
6 colleagues, is to structure your site with - they're
7 using - their term of art - it's establishing a grid
8 system to create zones of influence. But it's
9 essentially designing your site so that groundwater
10 flow is directed the way you want it to go.
11 For instance, preferentially running away
12 from structures toward structures, and again, what
13 we're looking into with the Canadians now is exactly
14 how they've been applying some of these concepts.
15 They deal with tritium on a much larger scale than we
16 do, and they've gained a lot of interesting experience
17 about it. They tell me that it's really done on a
18 building by building basis. Additionally they build
19 in capabilities for ready and easy monitoring at the
20 outset.
21 It makes sense to me. To be honest I'm
22 not sure I fully appreciate how challenging it might
23 be, but that's certainly an area we want to
24 investigate a lot more.
25 Additionally we see the need to make sure

1 that all of our structures that we would expect to
2 have a potential for contamination are either lined or
3 coated, lining being preferable. Again it's strange
4 to think of a building having all of these poly walls
5 until you think about it for a minute and you go, boy,
6 I'd love to work in one of those.
7 It took us awhile to learn about coatings.
8 We generally use them quite well across our industry
9 now, but I do remember once upon a time that the
10 average plant was bare concrete, and we dealt with the
11 problems associated with that.
12 Concrete characterization in itself in
13 terms of depth of contamination, and particularly with
14 issues like tritium, makes contamination - or excuse
15 me, decommissioning, much more complex than it needs
16 to be.
17 So we think we ought to go to massive
18 overkill with liners and coatings throughout
19 structures.
20 A particular area of interest, and one
21 that's under a lot of review right now to figure out
22 how we can deal with it properly are seismic gaps
23 within the buildings between structures.
24 Looking again at potentially useful
25 advanced poly or metallic seals for those

1 applications. And certainly we want to create better
2 access for inspection and maintenance. But in
3 decommissioning that is always learned as an issue.
4 One of my favorites, this is one of those
5 commonsense people participating in this effort, you
6 need to think hard about snow removal. Snow removal
7 actually has turned out to be a common mechanism for
8 redistributing contamination on the site.
9 The primary reason for that is because,
10 guess what, we legally and intentionally discharge
11 gaseous radioactive effluents from the site, and they
12 don't just magically vanish when they come out the end
13 of the stack.
14 Particularly in snow situations, they
15 become captured in the snow and basically deposited,
16 and you come along and you relocate the snow hither
17 and yon, the snow melts, and what happened to that
18 contamination?
19 Although it was legally discharged from
20 the plant, although it had potential impacts at very
21 low doses, the fact is that if you just keep
22 continually redistributing the contamination around on
23 the site and again create problems for yourself at the
24 point of decommissioning.
25 So the key is, that what we look at is

1 probably much more extensive paving needs to be done
2 in those areas that you truly believe that you are
3 going to need to keep clear under snow conditions.
4 So like with the interior of the plant
5 where you are thinking about really excessive lining
6 and coating, outside this paving issue really comes
7 into play the more you think about it, and the types
8 of surfaces that you would use, and the way you would
9 maintain those.
10 But again, it's something that could have
11 a very useful impact, positive impact, on the
12 decommissioning.
13 The spent fuel pool and transfer canal,
14 spent fuel pool of course is one of the primary issues
15 associated with groundwater contamination from
16 undetected leakage in the past. There is a very good
17 I&E notice on that subject.
18 But the key here is, beside some of the
19 obvious welded seams, clearly you want to look more at
20 a single continuous pour for the spent fuel pool and
21 the fuel transfer canal, and also we really need to
22 improve our technologies for leak detection,
23 especially the ability to flush and hydrotest and
24 inspect those.
25 And then finally making sure that in terms

1 of liners that are used is to make sure that they are
2 set up to be tested easily and frequently, to make
3 sure that we understand what we're dealing with.
4 The piping, some key points that have been
5 identified through there is, if you are going to have
6 piping between buildings and underground why not think
7 about tunnels, tunnels that people can walk in. If
8 there are good reasons not to have the piping up on
9 the surface, then for this very very large amount of
10 money that is going to be spent to construct this
11 facility it incrementally not looking at that
12 significant changes in cost to consider issues of
13 tunnels between buildings.
14 It's nice to be able to see things. It's
15 the easiest way to identify leakage.
16 In essence you really try to prevent
17 altogether buried or trenched piping. That would be
18 the ideal you want to pursue. You also want to do
19 away with underground conduit. I had our own
20 experience at Fermi I'll recount briefly. We actually
21 365 days apart twice ruptured our condensate storage
22 tank. It was within two hours of each other. We
23 tended to think at the time maybe it was an
24 intentional celebration of the previous event.
25 But most of the water - we had put in a

1 rubber ladder to capture everything. It worked very
2 well, but some of the water nevertheless did get away,
3 and it all vanished into our underground conduit
4 system. And we spent months working on recovery to
5 get as much of that water out as we could.
6 But it certainly remains an issue that
7 will need to be dealt with at recommissioning.
8 So those are something else that it would
9 be nice to prevent altogether.
10 Cathodic protection of course is well
11 known and is used, should be used more extensively.
12 And then some obvious things like looking at pipes
13 that are used and determining interior lining for
14 pipes that would make them much easier to clean. That
15 could be one of the answers to the well understood
16 issue of embedded piping. The issue is well
17 understood; the solution is not.
18 They are a tremendous challenge during
19 decommissioning to deal with piping that we've
20 embedded in concrete. So finding solutions to that is
21 important, but one that is being looked at are these
22 interior poly type linings that are reasonably
23 impermeable.
24 As far as tanks go, shoot anyone who
25 designs underground tanks. That's a good start. But

1 follow that up with folks that envision flat bottom
2 large storage tanks, and send them down the road as
3 well.
4 We've had some pretty significant
5 experience. I remember years ago working at a plant
6 on the Eastern seaboard, had a very, very large
7 outside storage tank with a flat bottom where the
8 material had essentially caked up and finally left us
9 with the only real way of getting it out there was
10 sending people in and shoveling it out. This predated
11 robotics. That dates me a little bit.
12 But the point being that flat bottom tanks
13 just aren't a good idea in the first place if you are
14 going to be dealing with radioactive liquids.
15 And then overflows should certainly be
16 hard-piped back to that location in which you intend
17 to disposition that water, either recirculated back to
18 where it came from or routed to an area where you can
19 discharge it in a reasonable way.
20 Then I touch on the issue of site water
21 management. Things to consider there is the storm
22 drain system. You should minimize the number of storm
23 drains, really be a lot more thoughtful about site
24 design. You know now, sort of the other way around,
25 design the site and then figure out where all the

1 storm drains go. It should be more of an interactive
2 process.
3 It wouldn't hurt to have effluent smart
4 people involved in that process. Those are great
5 collectors for runoff that again is contaminated with
6 legal discharges from plants, but redeposited it
7 becomes an issue for decommissioning.
8 Having a composite sampler for all storm
9 drains, and then isolating the potentially
10 contaminated systems from storm drain systems that,
11 you know, again, it's a thought process. If this
12 system leaks, if this tank for some reason leaks,
13 where is it going to go? I'd like it not to go to the
14 storm drains.
15 So this kind of thought process in advance
16 offers a lot of opportunity.
17 The other simple thing, and this is
18 something that emerged in some of the recommendations
19 in the lessons learned report is the use of onsite
20 water.
21 There are a number of plants who by design
22 discharge into a lake or a cooling source that is
23 located on the site, then through a weir or some other
24 process that water eventually is discharged off into
25 the open environment, and again, carefully controlled,

1 carefully monitored, with a small fraction of the
2 Appendix I criteria.
3 But the point is that plants are also
4 designed in many cases to reuse that water in a number
5 of applications. And as we figured out recently, what
6 you need to be thinking about is, although you may
7 legally have put radioactivity o8ut into those
8 sources, you are still going to have to deal with the
9 issue that if you pull it back in and circulate it in
10 some fashion, that you need to know what you are doing
11 with it.
12 One way to know is to simply analyze those
13 things in the license and make sure they're called
14 out.
15 Another way to know is to recirculate it
16 back to where it came from. I will say that we've got
17 an issue with staff over whether this represents
18 unlicensed material after discharge somehow becoming
19 relicensed by virtue of the fact that it's been
20 recaptured.
21 But just as a practical matter for
22 decommissioning, it requires some thought and design.
23 And then finally, discharge lines,
24 probably two good lessons there. Design them so that
25 you can inspect them. And most importantly don't run

1 a discharge line across someone else's property.
2 That's something that in hindsight strikes us all as
3 obvious now, but at the time it seemed like a good
4 idea.
5 So thank you all very much. And I
6 appreciate this, I look forward to our panel
7 discussion later then for your questions.
8 MEMBER CLARKE: Thank you, Ralph.
9 Our next speaker is Jeff Lux. Jeff is
10 project manager for Tronox, Incorporated. And he is
11 the project manager on an NRC complex decommissioning
12 sites.
13 Recently the project manager of the
14 Cushing, Oklahoma refinery site, when its NRC license
15 was terminated earlier this year.
16 Jeff is also representing the fuel cycle
17 facilities forum. Jeff thank you.
18 MR. LUX: Thank you very much.
19 I do appreciate the opportunity to
20 present. I'm actually presenting on behalf of Dave
21 Culberson who is the chairman of the Fuel Cycle
22 Facilities Forum who is not able to be here due to
23 extenuating circumstances.
24 The topics I'd like to present today will
25 first of all introduce the Fuel Cycle Facilities Forum

1 to those who aren't already familiar with it.

2 I'd like to recognize a few of the

3 successes that have already been or are being achieved

4 by NRC, and improving the regulatory process as it

5 pertains to decommissioning fuel cycle facilities.

6 I'll also identify those aspects of

7 decommissioning that represent the major cost

8 components of decommissioning fuel cycle facilities,

9 and then I'm going to try to present lessons learned

10 by environmental design and construction and technical

11 issues.

12 The Fuel Cycle Facilities Forum is a

13 voluntary industry organization that was established

14 in 1987. It represents both source and special

15 nuclear material licensees, including fuel processors

16 and specialty metal refiners.

17 We focus on decommissioning issues. We

18 meet to discuss primarily complex sites which require

19 special NRC consideration. And our membership

20 represents most of the licensees that are responsible

21 for those sites.

22 The Forum provides the vehicle for

23 licensees to address both technical and regulatory

24 decommissioning issues. And in the past the forum has

25 provided feedback and recommendations to NRC staff

1 regarding decommissioning experience, as well as
2 lessons learned at fuel cycle facilities.
3 The Fuel Cycle Facilities Forum is
4 developing a philosophy that the term,
5 decommissioning, should really be applied as an end of
6 plant life process, and NRC should recognize a source
7 term removal concept, or an interim remediation
8 concept to be applied to remedial activities that are
9 performed during a plant's operating years, and we'll
10 explain a little more about why later on.
11 Successes that have already been achieved,
12 or are being achieved by the Nuclear Regulatory
13 Commission, related to decommissioning, that are
14 already being incorporated into the consolidated
15 decommissioning guidance, which is published as NUREG-
16 1757, include the use of intentional mixing under
17 certain conditions; the use of reasonable exposure
18 scenarios; and the layering of institutional controls
19 to achieve a level of confidence or a level of
20 durability not formerly considered sufficient through
21 those types of vehicles.
22 In addition the NRC has established the
23 integrated decommissioning improvement program which
24 continues to identify issues of interest and provide
25 guidance to staff and licenses.

1 Management from the decommissioning
2 directorate has met with the Fuel Cycle Facilities
3 Forum on a consistent basis to discuss technical and
4 regulatory issues that are being encountered during
5 decommissioning. And they've participated in the
6 development of resolutions to several of those issues.
7 Those aspects of site decommissioning
8 which represent the most significant cost impacts
9 include the following. First, the transportation and
10 disposal of contaminated material. This is usually the
11 single most costly component of decommissioning.
12 NRC and states really need to cooperate in
13 the siting and licensing of additional disposal
14 facilities to promote both availability and
15 competition. I'll translate that, cost competitive.
16 Next in process identification and
17 subsequent removal of unanticipated material. That
18 would be identified as material not identified during
19 characterization that was created through the
20 migration of licensed material through preferential
21 pathways. This is far more common that was
22 anticipated, and the excavation, shipping and disposal
23 of this material represents significant unanticipated
24 costs to licensees.
25 Another significant cost component is the

1 decontamination and/or removal of inaccessible
2 components. It's often necessary to dismantle or
3 demolish clean materials under license controls just
4 to be able to access contaminated or potentially
5 contaminated material.
6 This is done at significant expense while
7 possibly finding no material at all that requires
8 decommissioning.
9 Next, site characterization and final
10 status surveys can represent substantial costs if
11 there is inadequate information concerning the
12 historic disposal of license material once considered
13 clear.
14 Finally, the implementation of health
15 physics programs covering decommissioning activities
16 may cost more than the decommissioning activity
17 itself. Licensees should be able to categorize
18 decommissioning activities based on the potential for
19 exposure, and modify health physics monitoring as
20 appropriate.
21 Environmental impacts can expand the scope
22 of decommissioning significantly. Aspects of
23 licensing or operation that may affect the scope of
24 decommissioning include, Ralph mentioned the effluents
25 that may concentrate downwind, downstream, or downhill

1 through repeated discharges, all of which may have
2 been far below the limits, but due to various
3 reactions or physical phenomena can concentrate
4 downstream.
5 Several licensees, fuel cycle licensees,
6 have had to excavate and ship sediment containing
7 elevated concentrations of licensed material that had
8 accumulated downstream from effluent release points,
9 even though their effluents all have been far below
10 effluent limits.
11 Environmental monitoring programs could
12 identify such concentrations in advance of
13 decommissioning so that licensees can modify their
14 effluent controls program and prevent that.
15 Derive concentration goal levels, or
16 DCGLs, are often derived with limited consideration of
17 intermediate impacts. I'm aware of a number of
18 licensees that have gone to great extents to derive as
19 generous a DCGL as possible for soil only to find that
20 a few years down the road that the clean soils they
21 did not have to excavate are now causing groundwater
22 contamination above the groundwater DCGL.
23 This is definitely not cost effective,
24 because it's usually far more expensive to remediate
25 groundwater than to excavate source material.

1 Penetration of contaminated liquids into
2 porous media can increase the volume of material
3 exceeding DCGLs, and that impacted media is often more
4 difficult or expensive to remove than the liquid
5 source material that initially caused the impact.
6 Finally, fuel cycle licensees often note
7 that the soil at their sites was contaminated beneath
8 every penetration, conduit, piping, drains, that
9 penetrated their concrete slabs.
10 This can result not only in an increased
11 volume of contaminated soil, but in contamination of
12 groundwater beneath the site.
13 The design and construction of facilities
14 can have a significant impact on future
15 decommissioning. I feel like I'm just going to be
16 repeating a number of the comments that have already
17 been made here. But fuel cycle licensees have learned
18 that the following considerations can yield
19 significant savings if provided for during design and
20 construction.
21 First, embedded piping should be
22 minimized. When impractical to avoid embedded piping,
23 some provision for future access or at least survey
24 should be made if at all possible to enable access for
25 survey decontamination or removal.

1 Corroded materials have proven very
2 difficult to survey and are also susceptible to
3 leaching. The use of higher grades of steel or
4 plastic, whenever possible, to minimize the impact of
5 corrosion, would be a tremendous benefit when it comes
6 time to decommission.
7 Provision of secondary containment for any
8 process equipment containing liquids could minimize
9 the potential for leaks to penetrate building
10 materials or migrate into soil would be a great
11 benefit.
12 This concept of secondary containment
13 could apply to underground piping as well as to above
14 ground or implant piping in containers.
15 Also avoid floor penetrations in wet areas
16 as much as possible. When penetrations are required,
17 there should be provision for removable seals and
18 preventive maintenance programs to minimize the
19 potential for the migration of license material into
20 underlying soil or groundwater.
21 Additional design and construction issues
22 include the application of scrubbable, impermeable
23 coatings to surfaces in wet process areas, or the
24 incorporation of permeability reducing materials into
25 concrete to reduce the potential for liquids to

1 penetrate building materials.

2 Minimize the physical extent of wet

3 processing as much as is reasonable. Liquids are so

4 mobile that it is advisable to convert to dry

5 processes as quickly as possible.

6 And finally the cost of waste packaging

7 and transportation can exceed the cost of disposal for

8 low level rad waste.

9 Licensees should consider the construction

10 of a rail line to the site. Even of a rail line is

11 marginally justifiable, based on facility operating

12 cost, it may prove to be well worth the investment

13 during decommissioning.

14 Second category of issues affecting

15 decommissioning are regulatory issues. Variability in

16 the implementation of regulations related to

17 decommissioning tends to cause delays as licensees

18 strive to understand how regulations are going to be

19 implemented by their licensing agency.

20 Inconsistency between NRC regions and

21 states stems from differing degrees of emphasis on

22 risk, cost, and degree if strictness in interpretation

23 of regulations.

24 For example some agencies take the

25 position, you license does not address NORM, neither

1 will we. And other agencies take the position NORM
2 contributes to total residual dose, so you need to
3 address NORM in order to address your residual dose.
4 When multiple agencies share jurisdiction
5 over different aspects of decommissioning, lack of
6 coordination between agencies can cause delays and
7 commensurate cost increases.
8 NRC could proactively engage other
9 agencies to expedite the approvals needed for
10 decommissioning.
11 Most licensees have experience that
12 indicates that a state agency and NRC tend to follow
13 their separate path, and licensees struggle to gain
14 consensus between regulatory agencies.
15 10 CFR 70.38 addresses the decommissioning
16 of buildings or areas that are not used for licensed
17 activities anymore. Some agencies have required
18 licensees to decommission such areas to unrestricted
19 release criteria, creating an island of purity in the
20 middle of radiologically restricted areas. This is
21 not a reasonably risk-informed policy.
22 Decommissioning directorate staff have
23 proposed the use of alternative schedule provisions
24 than 70.38 to enable licensees to perform source
25 control in the near future, and leave decommissioning

1 for unrestricted release to some point in the future,
2 but this is not consistently applied.
3 Fuel Cycle Facility Forum believes that as
4 part of the IDIP NRC should generate position papers
5 that explain the intent of regulations and provide
6 assistance to regulatory agencies in achieving
7 consistent implementation.
8 The multiagency radiation site survey and
9 investigation manual provides for the subdivision of
10 licensee owned property into categories based on their
11 potential for contamination.
12 For instance unimpacted areas have
13 essentially no impact from licensed materials. A
14 problem for licensees who own long operated sites is
15 the lack of information from former disposal sites or
16 burial facilities, permissible under former
17 regulations but no longer acceptable under either
18 release criteria or current regulatory requirements.
19 Many of these burial areas which were not
20 well documented contain material that now exceeds
21 DCGLs. Licensees should minimize the footprint of any
22 storage and disposal facilities, and thoroughly
23 measure and document all disposition of material.
24 This will minimize the uncertainty related
25 to categorizing areas for decommissioning.

1 Alternately, licensees should make it
2 clear in the license application which portions of the
3 property they own will be subject to license
4 conditions and restrict the placement of material
5 outside of those areas to material which has been
6 released for unrestricted use.
7 NRC has begun performing in process
8 surveys and inspections during decommissioning. These
9 surveys and inspections provide NRC assurance that
10 licensees survey methodology, instrumentation,
11 analyses, data evaluation and quality program all meet
12 the requirements for decommissioning and potentially
13 for final status survey.
14 This reduces the need for and the scope of
15 extensive and expensive post decommissioning
16 confirmatory surveys. This streamlines the
17 decommissioning process and reduces the time between
18 completion of decommissioning and license termination.
19 One example would be the elimination of
20 confirmatory surveys for each and every excavation
21 would allow backfill sooner, eliminating both a safety
22 hazard and a potential environmental impact due to
23 creating a bathtub that can form a driving force for
24 groundwater.
25 The last category of issues are technical

1 issues. For new licenses, control of the spread of
2 license material, and surveys documenting the extent
3 of migration of licensed material can provide a basis
4 for modifying health physics monitoring during
5 decommissioning based on the potential for exposure to
6 licensed material.
7 This can save significant cost and time
8 when decommissioning.
9 Unnecessarily rigorous health physics
10 procedures are often implemented today in areas
11 because our current philosophy is, we may find
12 something here, so we must be fully protected just in
13 case.
14 Characterization data that meets the data
15 quality requirements for final status surveys can be
16 used for final status surveys if licensees ensure that
17 areas in which characterization data will be used for
18 final status survey isn't disturbed during the
19 decommissioning process. This reduces the time and
20 cost for final status surveys.
21 Significant costs are incurred when
22 licensees have to go through file boxes or file
23 cabinets full of survey documentation and input that
24 data long after the records had been created.
25 Many licensees have identified QC problems

in old paper files which cannot be rectified, such as not being able to match calibration records with survey data.

Obviously this is more common with older data than it is with newer data.

Significant costs can be saved by minimizing the time between data collection, review and import, linking separately recorded data effectively, maximizing the electronic entry of data over generation of paper, and, finally, electronically linking data to location.

The use and availability of GPS instrumentation and the ability to link that instrumentation to survey instruments provides a vehicle whereby effective databases linking separately recorded records and locations can all be performed effectively.

In addition some licensees have found that making docketed information and some survey data accessible to regulatory agency personnel via a website or similar electronic vehicle can expedite review processes in ways similar to the in process inspections and surveys.

The second slide on technical issues actually highlighted the first two bullets, because

1 these may be the most critical presented in this
2 presentation.
3 NRC needs to allow licensees maximum
4 flexibility to decommission under their operating
5 license and safety programs. This enables licensees
6 to utilize their people cost effectively, and to
7 benefit from the experience of their staff rather than
8 rely on a separate contractor new to the site and new
9 to the license requirements to perform their
10 decommissioning.
11 Schedule, cost and quality can all
12 benefit.
13 Agencies typically require a substantial
14 amount of characterization data prior to the
15 development of DCGLs. The information that is
16 required for licensing provides sufficient data for
17 the development of DCGLs during the licensing process,
18 rather than waiting until initiating decommissioning.
19 These DCGLs may need to be preliminary
20 DCGLs to enable modification over time.
21 Knowing their approved DCGLs during
22 operating years would enable licensees to plan their
23 operations more effectively, and to plan for
24 decommissioning long in advance of performing it.
25 There is currently no provision for

volumetric averaging for groundwater, and little provision for volumetric averaging for subsurface soils. NRC should develop risk-informed guidance based on reasonable exposure scenarios and intermediate impacts to enable licensees to plan for decommissioning in subsurface soil and groundwater.

Some licensees have incurred significant costs characterizing areas with heterogeneously distributed license material.

In spite of completing extensive characterization they were unable to quantify that required excavation and disposal.

When licensees identify areas in which material is very heterogeneously distributed, characterization should be less extensive, and decommissioning plans should emphasize in process measurements.

Finally licensees must typically excavate and ship all material that their characterization surveys identify as exceeding the DCGLs. However, when that material is excavated, it's often discovered that most of the material generated does not exceed the decommissioning limits.

Allowing for the survey of excavated material after excavation, prior to segregation for

disposal can save substantial transportation and disposal costs, and eliminate sending tens of thousands of cubic yards of material into landfills that have limited space.

Now that I know that questions are appropriate later, I'll just right past this slide, and say thank you very much.

MEMBER CLARKE: Thank you, Jeff.

Lawrence Boing is our next speaker. He is the manager of special programs department, nuclear engineering, decommissioning and decommissioning division from Argonne National Laboratory.

He serves as a decommissioning technical expert to the IAEA for various standards, reports, and agency technical missions.

You are very welcome. Thank you.

DR. BOING:

What I'm going to present here this morning is actually what I'm going to describe as a 35,000 foot level overview of what we've done both at our own site, Argonne National Laboratory, as well as some of the other Department of Energy sites.

I think probably the most important thing before we even start out is, decommissioning is not really rocket science per se, but there is an awful

1 lot of good project management skills that have to be
2 used in really making the project be able to be
3 completed, and that's really I think probably the
4 secret, if we take anything away from decommissioning
5 and lessons learned, that is one of the key things to
6 take away from it all.
7 And a lot of what I'm going to present
8 here are things that Jeff and Ralph have already
9 touched on as kind of what I think are the trend in
10 the industry of what the key lessons are from the
11 decommissioning area.
12 So we'll take a look at an historical
13 perspective of some of the Department of Energy's
14 activities. We'll look at cost issues, environmental
15 issues, design and construction issues, and other
16 improvements that we can make.
17 Many of the Department of Energy sites or
18 facilities are in closure. These include sites that
19 were formerly used in the defense program activities,
20 things like the Rocky Flats sites, the Fernald site,
21 the Mound site.
22 It also includes a number of other sites
23 that have a limited number of closure activities, or
24 decommissioning projects underway at those sites. And
25 these are sites like our site, the Oak Ridge National

1 Lab site, Brookhaven National Lab site, other sites
2 and facilities which are still active and have ongoing
3 research programs, but do have a limited number of
4 facilities that need to be decommissioned.
5 Some of those will be demolished in the
6 end and turned into Greenfield or made available for
7 other development or other research programs or
8 infrastructure programs at those sites, and others
9 will be - will have the decommissioning process
10 completed, and then the facilities will be available
11 for reuse in some way, shape or form, possibly just as
12 new laboratory space, possibly a space that will then
13 be modified in some way, shape or form to be converted
14 into new research space, or whatever other needs are
15 present.
16 Some facilities also are privately owned,
17 but have been contaminated with government
18 radioactivity. These are sites like the Battel
19 (phonetic), Columbus laboratory site; sites like
20 General Atomics down in La Jolla, California; and
21 those different sites, as part of the contract closure
22 of the Department of Energy's activities at those
23 sites, requires that decommissioning occur at those
24 sites.
25 So it's really a combination of different

1 sorts of decommissioning activities underway at DOE
2 sites.
3 Many of these facilities are one of a kind
4 facilities, that were designed and operated and have
5 their own unique history, their own unique set of
6 problems, each one being a new egg to crack so to
7 speak unto itself. And that applies to both the
8 defense facilities and to a lot of the research
9 facilities as well.
10 Many of these facilities, especially the
11 defense facilities, were quickly constructed and
12 operated and brought on line with really not a whole
13 lot of concern, and rightfully so in a lot of ways,
14 about closure. That would come later, and we would
15 deal with that as it comes along.
16 So really there was no design with any
17 decommissioning or site closure in mind at many of
18 these facilities.
19 Record keeping issues, as several of the
20 speakers have talked about already, things like
21 asphalt records, documentation of construction
22 activities as construction was occurring, different
23 operating history of these sites.
24 There's a few cases where you will find
25 some good records in those areas, but in many cases

1 you won't. It just doesn't exist, wasn't retained, or
2 for whatever reason it's just not there.
3 Many of the facilities that are in the
4 decommissioning program and at our site as well, did
5 not really go through any sort of formal or detailed
6 planning for deactivation of those sites. So what we
7 have inherited at these sites and at these facilities
8 are a number of conditions that under really optimal
9 planning and analysis we really shouldn't have
10 inherited. Things like operational waste that are
11 left behind, or other issues that really should have
12 been handled as a part of the deactivation or the safe
13 shutdown of these facilities that really just didn't
14 happen because the programs weren't in place.
15 Starting in the mid to late 1990s a lot of
16 that emphasis was placed on those kinds of activities,
17 sites like the Fernald site, sites like Rocky Flats,
18 some of these other sites, did go through the
19 deactivation process. And that has really helped I
20 think a lot in eliminating a lot of those problems
21 that we inherited in some of these various facilities
22 that we decommissioned.
23 There also was a lot of poor past
24 communication and past operational limitations on
25 openness with what was going on at the site, a

1 different kind of dialogue with the public, as a part
2 of dialoguing with the public and keeping the public
3 informed. It just did not happen as well as it in
4 some cases needed to, or in other cases, as it could
5 have.
6 The labor forces that are being used to do
7 the different decommissioning activities, also in many
8 cases it's really a mixed bag of things. We have some
9 sites that are using in house forces, in many cases,
10 this is laboratory staff or other support staff are
11 available to do this work. In other cases there's
12 project specific contractors that are used. These are
13 dedicated contractors that are brought on for a
14 specific project or a specific activity, and in other
15 cases contractors are brought on board where they are
16 really an integrating contractor; they are doing a
17 minimal amount of the work themselves at a site, and
18 are subcontracting as a part of their work scope a
19 large portion of the work to be done at that site.
20 And what I've done in the next several
21 slides here is include a few photos of some of the
22 different kinds of facilities. The photo on the left
23 is a photo of a fuel fabrication facility. The photo
24 on the right in this slide, it's a picture of the
25 Shipping Port Reactor which has been decommissioned

now.

This is a picture of the plant one structure at the Fernald site, showing one of the structures there. And in this case, the Fernald site used extensive use of controlled demolition fo their facility to knock the superstructure to the ground and then bring in ground based equipment to further size reduce and prepare the material for disposal.

This is a before - I label it a before and after photo of the Tokamak Fusion Test Reactor facility at the Princeton Plasma Physics Lab. This was a fusion research facility, large hot cell facility that the device was situated in. And the photo on the left shows all this conglomeration of equipment and materials that were used in the research programs, and the photo on the right shows that same facility with a couple of the - I think they are neutral particle beam boxes they are called that are left there that are going to be saved for other research program use.

But pretty much that cell has been cleared and downgraded from I want to say a category two or a category three nuclear facility to what's now just a radiological facility, and it's made available for other programs to come in and reuse that space.

1 The next slide shows a little bit
2 different situation. This was at the Argonne site.
3 The photo on the left shows one of the old support
4 facilities that was adjacent to the CP-5 research
5 reactor, and in this case, the area was cleaned out.
6 There was really a minimal amount of contamination if
7 anything in that facility.
8 And what we did here is, we modified that
9 structure and turned it over to the onsite grounds and
10 facility maintenance staff who made use of it in their
11 operation.
12 And the photo on the right shows, the
13 upper photo shows a Glovebox Laboratory before
14 decommissioning activities were commenced at that
15 facility, and the photo in the lower right shows that
16 same area after the area has been cleared out.
17 Just to give you a little flavor for what
18 some of the different facilities look like. And we'll
19 touch a little bit more on Rocky Flats and some of the
20 other sites a little bit later here.
21 Moving on to the cost issues, the major
22 cost elements in decommissioning at our site, and a
23 lot of the DOE sites as well, is really two major cost
24 elements: the cost to manage the waste that is
25 generated in doing the work, decommissioning work

1 that's occurring at those sites; and the labor that is
2 actually involved in performing that work, the hands-
3 on workers out there doing the size reduction, the
4 decon, the packaging of the waste, and the preparation
5 of moving that material off site.
6 One thing I don't think we've done as good
7 a job at, I know at our site, is doing as much cost
8 benefit analysis and really forward planning really as
9 much as we should on how we're going to deal with the
10 large volumes of waste that some of the projects that
11 we have undertaken, we just really haven't done as
12 good of a job in forward looking and forward planning
13 for that work.
14 It takes an awful lot of cost benefit
15 analysis and careful consideration of what the best
16 path forward is. And an awful lot of the effort that
17 goes into that, once you've even made the decision as
18 to how you are going to do that, is managing the
19 interfaces that are associated with keeping those
20 paths open and keeping that material moving, because
21 once you start going down that path, you don't want to
22 have any kind of obstacle or problems come up that are
23 going to create difficulties, and kind of cause the
24 system to start backing up in and of itself, and on
25 itself.

1 So the management of those interfaces is
2 very important. And as I think Jeff and Ralph have
3 already touched on as well, not to be forgotten is the
4 fact that site characterization and things like the
5 storage site assessment activities that you can
6 undertake early on and really understand what the
7 scope of the problem is, at the same time, not wading
8 into it to a point where you're doing it for academic
9 reasons or just for general interest reasons, but to
10 really understand what the magnitude of the problems
11 are, and what the history of the site is, is also very
12 important, and is really money well spent, and yet
13 something you have to be aware of and have to track
14 it.
15 Clearance, materials, is an issue that if
16 we could come up with a way that would streamline
17 clearance for large volumes of material, or even
18 smaller volumes of material, would not require that we
19 have to then pursue management of those same materials
20 as waste, and costs that are associated with those
21 activities.
22 One of the things that I know the
23 commercial nuclear industry has done a lot of is this
24 intact large component removal, and that's been
25 something that recently has been undertaken at a

1 number of Department fo Energy sites. This includes
2 removal of some of the large Glovebox and other
3 equipment items from the Rocky Flat site, as well as
4 a number of those that we have also done in research
5 reactor projects, where large heat exchangers were
6 able to be removed intact as opposed to taking the
7 time, the dose, and all the effort that goes with size
8 reducing those components.
9 So we've done an awful lot, I think we've
10 made some strides forward in that area as far as
11 minimizing costs to the extent we can.
12 Finding ways to optimize the
13 decommissioning process, again through these
14 optioneering studies, cost-benefit analyses, things
15 like that, the value engineering studies that can be
16 done and help look at ways of eliminating problem
17 areas in the past.
18 The last item on this slide is the item of
19 industrial safety, and this is one that really as much
20 as we think we've addressed it, we always seem to keep
21 finding it coming up again and again. And these I
22 think really go back to the operational records, the
23 as built records, and things like that, the as built
24 drawings.
25 We just don't have as good a set of

1 documentation of that, or as complete a record of
2 that, as we really could use. So things like
3 electrical safety issues, a lot of different
4 activities that are going on, rip out activities that
5 are occurring such as lifting, rigging, moving heavy
6 loads, things like that, all can have major impacts on
7 the project, if something happens or some incident
8 occurs, there is an opportunity then for a delay, and
9 lots of staff that are sitting around and trying to
10 find work around plants to keep them busy as well as
11 how to handle the problem.
12 So industrial safety issues are a major
13 issue, and really need close monitoring, and trying to
14 control them to the greatest extent you can.
15 Technologies, really there is nothing here
16 that is really like I mentioned earlier that is really
17 rocket science. The technologies to do
18 decommissioning work with are out there, they are
19 commercially available. Go down to your local
20 McMaster Carr supplier and pick up what you need to do
21 to do a job. Not a major cost issue.
22 One thing that can be a major cost issue
23 if you don't have agreement right up front from the
24 start of the project is what the final endstate is
25 going to be, and having buy-ins from everyone as to

1 what that is going to be, as opposed to let's say we
2 start off doing a project, and we think we are going
3 to clean up the facility, or we have some application
4 up to a certain level, we're going to have to perform
5 cleanup, and then we have a change in that cleanup
6 level that we're going to work to. Then we have to go
7 back and see where we now need to go back and address
8 still cleaning up more additional residual
9 contamination or materials from different areas. And
10 it really can become very costly and very - a very
11 involved process. So we try to really avoid that at
12 any cost.
13 This next slide is just a little pie chart
14 that shows one of the research reactors we did at the
15 site, the JANUS reactor. And the point I'll make here
16 is that a lot of the Department of Energy sites, and
17 I know our site at least, the percentage of the waste,
18 and you see the one bloc here, the eight percent bloc
19 on the slide, the pink color, this is the budget
20 breakout for this particular project. We ended up
21 spending only eight percent of our budget really for
22 waste disposal.
23 Now the one thing that kind of skews that
24 data a little bit is the fact that we have access to
25 the Hanford site and other Department of Energy sites

1 which have much lower disposal rates than a lot of the
2 commercial sites do have, and the NRC licensed sites,
3 would be shipping their wastes to. So that number is
4 a little bit lower, an artificially low number, I'll
5 call it, really, compared to the commercial nuclear
6 power decommissioning industry might have. But still
7 it gives you a little feel for how in some ways the
8 waste disposal issue for some kinds of projects, and
9 this is a smaller project, this isn't really a larger
10 project, several millions of dollars in costs in this
11 particular case, but in this case, the waste disposal
12 cost was not as bad as it might have been.
13 Forty one percent of the overall cost for
14 the project, though, went to the actual labor to do
15 the dismantling. So we had roughly 50 percent of the
16 costs that went into the actual disposal, packaging
17 and transport and disposal of the waste, and about 40
18 percent went into the labor. So a total of about 50
19 percent went into the labor cost and the waste
20 disposal costs.
21 Okay, really moving on to the next issue,
22 environmental issues, really the environmental issues
23 on our site, and again what I put on this slide,
24 really, a lot of this comes from our site and our
25 experience, is highly site specific and site dependent

1 concerns.

2 If you are working at a site like ours

3 where we have I'll call it a little bit more maybe

4 streamlined environmental process that some other

5 sites may have, maybe a whole lot easier issue for our

6 site as opposed to another site that might be

7 undergoing closure.

8 NEPA environmental documents, to comply

9 with the NEPA requirements, are prepared for each of

10 the decommissioning projects and activities, typically

11 in the form of an EA, and Environmental Assessment

12 document.

13 The guideline there I guess I can give you

14 is a careful consideration needs to be given to the

15 lead times for everyone to do their reviews; get the

16 necessary approvals on those sorts of documents, in

17 order to keep things on track.

18 And generally speaking it's been in our

19 case really where we go through a process of

20 evaluating and documenting what the issues are, and

21 how we are going to address those or mitigate those.

22 Okay, waste management issues, we've

23 actually already touched on a fair number of these,

24 and kind of reemphasize some of these, though, because

25 the waste management issue is really a critical one

1 for a lot of these kinds of projects. And the easier
2 and quicker that you can get the material that you
3 have on your site processed, have it packaged or
4 prepared to be shipped and moved off site, the better.
5 Some of the larger waste generators, sites
6 that have larger volumes of material they're
7 generating, have gone out and negotiated and have
8 worked out some commercial disposal site arrangements
9 to dispose of those materials, and it has proved to be
10 kind of a lesson learned there I guess for larger
11 waste volume generators at these kinds of sites.
12 Easier and more cost effective actions
13 have been taken at a lot of the project sites, which
14 is simply to not spend a whole lot of time and effort
15 going into doing decontamination or different
16 materials, but to simply package the material into a
17 waste package and send it off site.
18 It comes down to a dollars and cents kind
19 of decision needs to be made. It's difficult to
20 justify implementing any sort of a large scale
21 decontamination process or decontamination activity.
22 Many of the sites have also undertaken the
23 development of onsite disposal cells, which will kind
24 of optimize and quicken the pace of the processing of
25 materials, to get material out of the facility and

1 into a disposal cell to move on to the next activity.
2 Another one that we probably have heard in
3 the past, or all have dealt with, is use of previous
4 unregulated materials in a currently regulated space,
5 from where they were originally installed, and how
6 they were originally considered, things like asbestos,
7 PCBs, other heavy metal materials that are now - have
8 been used in these different operations and now have
9 to be handled as waste products and waste streams.
10 Management of mixed waste on some projects
11 can be an issue. It hasn't - isn't so much of a
12 problem as it had been in the past maybe.
13 Disposal of low levels of radioactively
14 contaminated soils, we're sending an awful lot of
15 material out from one part of the country and putting
16 it into another part of the country in a disposal cell
17 wherever it may be disposed of at, and it seems like
18 there should be some way - I think the industry as a
19 whole would like to see some way - maybe we deal with
20 some of those types of waste streams in the future
21 maybe a little bit differently, looking at things like
22 disposing of some of those materials in different RCRA
23 landfills, and maybe some of those sites.
24 The last item on this slide, meet the
25 Waste Acceptance Criteria for the disposal site.

1 Don't make the process any more complicated than it
2 needs to be to try to keep it simple as long as we can
3 and wherever you can.
4 And this next slide is one that's from an
5 EM slide that the office of EM and DOE really came up
6 with. But really what it's really intending to show
7 here is that really it depends on where your
8 particular facility and your particular site is
9 located at and this whole waste management issue.
10 You may have yourself or your site like at
11 a site like ours is in the Midwest where we have to
12 transport that material from that location to either
13 Hanford for disposal or to other sites across the
14 complex, maybe a Nevada test site, and it really has
15 a major impact on the whole project flow, and the
16 whole process of how to plan and optimize and
17 implement the decommissioning process.
18 Again some photos here of just different
19 decommissioning activities. This was at the CP-5
20 research reactor, it shows a Brokk piece of equipment
21 in here removing some material in the foundation of
22 the CP-5 pedestal.
23 And then the next slide is some demolition
24 debris. This I believe is at Frenald showing staged
25 rubble that's come from some of the building;

1 demolition activities as it's being readied to be sent
2 to the on site disposal cell.
3 And this is kind of a different sort of a
4 waste package here than you might have seen. This is
5 some waste boxes coming out of one of the facilities
6 at our site that have been packaged and are being
7 shipped off site to Hanford for disposal.
8 Again, a little bit of a difference there,
9 if you look back at that first one. It shows a little
10 bit how easy it is, depending on what kind of a
11 disposal option you are pursuing, if you have this
12 kind of material, placing it into an on site cell, or
13 if you have this kind of box material where material
14 has been placed into the waste boxes and then shipped
15 cross country to the disposal site, as I showed the
16 map earlier.
17 This is the dedicated site at the DOE
18 Hanford site, the environmental restoration disposal
19 facility. This is where all of the debris generated
20 at the Hanford site and the cleanup activities there
21 will be disposed of in this cell. This is actually I
22 think an earlier photo of the cell. The cell is
23 actually expandable, can be expanded to accommodate
24 all the waste they'll have at that site.
25 I think this is an early version of that

1 site.

2 Okay. The Rocky Flats closure project was
3 one of the sites that is now out of - totally
4 Greenfield, or nearly Greenfield. And this slide
5 gives kind of a few of those what I'll call secrets of
6 the Rocky Flats closure project success story. And
7 these are from a GAO report that came out on the
8 project, really kind of summarized what a lot of those
9 secrets to that success were.

10 And some of those here are ones we've
11 touched on already, but we'll run over them rather
12 quickly.

13 Really in the technologies area, we
14 touched on, they spent a fair amount of effort and
15 dollars into trying to find a way to optimize the
16 technology process of performing the decommissioning,
17 and really what it came down to in the end was, there
18 really wasn't any time to really develop or to come up
19 with anything. It's going to be kind of a silver
20 bullet to solve all the problems. They really had to
21 go out and find things that were going to work now,
22 help them get the process done now, and get it done
23 right away.

24 So really they went out, and like we
25 already mentioned, took a lot of off the shelf things,

1 borrowed a number of different simple techniques or
2 enhanced already existing techniques, and optimized
3 the performance of those techniques, just in a small
4 way or a small margin just to increase their
5 efficiency.
6 They also in the way this contract was
7 structured tried to avoid micromanaging the
8 contractor; told the contractor what they needed to
9 have done, not how to do it, but just what they wanted
10 done, and when they wanted it done by, and that seemed
11 to be very effective and very efficient in how they
12 approached that.
13 They also held the contractor accountable
14 for compliance with the environment safety and health
15 requirements, as well as other quality impacting
16 requirements, and other requirements that DOE had put
17 in place in the contract, but yet they properly
18 incentivized the contractor to do the job they were
19 being paid to do.
20 Also there was on the other side of the
21 coin there was concern with the way this contract had
22 been structured, was it proper for us to really be
23 incentivizing the contractor to the extent we really
24 were, and is that really the best way to be doing what
25 we're doing? Are we really paying them too much to do

1 the job too well?

2 And lastly it was a compromise on the soil

3 action level, so I think this was an activity where

4 they involved the stakeholders and helped the

5 stakeholders understand that really, as much as they

6 wanted to have maybe a much more refined clean up of

7 the site done, that we had to compromise on the soil

8 action clean up levels, that it simply wasn't going to

9 be able to be accomplished in the - to the level they

10 might have really wanted under optimal conditions to

11 achieve.

12 So those are what I'll call the secrets of

13 the Rocky Flats closure project success.

14 Okay, a lot of these - the next several

15 slides are items that, again, Ralph and Jeff have

16 touched on already. But some of these are really

17 reinforced by some of the lessons we've had in doing

18 work we've done at our site, so I'll run over them

19 rather quickly here.

20 Stay away from embedded piping. Again we

21 showed the Brokk in the earlier slide. We had to use

22 a Brokk to do the excavating of some embedded piping

23 in the concrete foundations of a couple of our

24 facilities, and if we wouldn't have had that embedded

25 piping there, if it hadn't been designed that way and

1 implemented that way, in the facility when it was
2 constructed, we wouldn't have had to spend a lot of
3 time and effort in tearing down those materials, or
4 tearing those materials out.
5 Stay away from large massive concrete
6 structures, things like large massive bioshield
7 concrete. If you could come up with some type of
8 modular type configuration where you could arrange
9 those material so that you could simply remove
10 different modularized pieces as opposed to sending a
11 Brokk or taking a demolition hammer in and demolishing
12 and removing the concrete using that technique.
13 Use of a secondary containment to contain
14 leakages, if you have - use a pipe and pipe type of
15 design rather than having just a single run of pipe
16 going out to remove materials for an area.
17 Any sort of - or many of what's now I
18 think touted as operations and maintenance features on
19 a lot of the newly designed facilities. Many of these
20 features would help - could be used as decommissioning
21 friendly features, things like reduced impurities in
22 different fabrication materials, operating the plant
23 as cleanly as the plant can be operated, within
24 different plant operating condition requirements and
25 needs. Try to reduce the contamination levels to the

1 extent that's possible.

2 Optimizing the plant layout for
3 decommissioning, this would include things like
4 preplacing different aids that would assist in
5 removing different components or equipment items from
6 different areas, and also, waste minimization in
7 facilities design. This ties into the modularization
8 concept I mentioned earlier where if you could use
9 some kind of modularization of, say, concrete
10 shielding that will go into bioshield construction so
11 you could remove simply as many modules as you needed
12 to until you got down to where it was clean material
13 and you didn't have to handle it as waste.

14 And the last item on this slide is maybe
15 looking a little more into the future than where we're
16 at right now, but use of some sort of a standardized
17 type of design for reactors or different kinds of
18 facilities where you would have repetitive type design
19 as opposed to each design being a unique design unto
20 itself, that would optimize implementation of
21 decommissioning at those facilities.

22 And one thing I'd point out here is that
23 there was an IAEA technical report that was done on
24 design and construction features, which optimizes
25 implementation of decommissioning. That's TRS-382.

1 That was done some, maybe five to ten years ago now,
2 but also a number of other design and construction
3 features in it that would be maybe useful.
4 Okay, other possible improvements is the
5 next slide we're looking at here, and these are some
6 other ideas that just popped up that we might
7 consider. And this is to really go back to some
8 things we've done, I think probably a little better
9 job of in the past, and that is sharing lessons
10 learned. We're not doing as good a job I don't think
11 in this area as we had in the past.
12 We are doing a better job of gathering
13 those in some ways in some places, in some times, but
14 we're not doing maybe quite as good of a job in
15 sharing some of those as we have in the past.
16 The IAEA has a number of different
17 documents they've prepared, which gather - some of
18 this information to gather in one place.
19 DOE has a number of different lessons
20 learned, and operating experience reports that are on
21 the web, and you can get web access to those.
22 The NRC also has their regulatory
23 information summaries, which are very good summaries
24 of information based on experiences in
25 decommissioning.

1 The next bullet I think we need to do a
2 little better job of preparing for decommissioning in
3 advance by having almost I'll call it a living
4 decommissioning plan that goes with the facility,
5 maybe a skeleton of a plan or an outline that is
6 fleshed out and further developed as the facility goes
7 along its operating life. A minimal effort would be
8 required to undertake something like that, and it
9 might be a good way to stay current in the planning
10 and lend a lot to a good public relations effort as
11 far as showing that we are ready to deal with the
12 facility when time comes to shut down the facility as
13 well.
14 Okay. So this is just kind of - I labeled
15 this the top 10 lessons learned. And a lot of these
16 are ones that a lot of us speakers today already have
17 touched on a number of these. Touching on a couple of
18 the ones that we might not have addressed as much on,
19 communications is an important lesson learned I
20 believe, and that is dealing with facility personnel
21 as facilities are getting ready to shut down,
22 communicating with those personnel and working with
23 those personnel to understand how the process is going
24 to occur, what the process is going to consist of, and
25 when the need for different skillsets are going to go

1 away, and when the opportunities are going to come
2 along to joint - be looking for operations staff to
3 join the decommissioning team, or when the jobs are
4 going to go away and be gone permanently.
5 The second one is specialist support.
6 There is an awful lot of specialist contractors that
7 are out there in the industry, and you need to take
8 advantage of that, and tap into those resources and
9 use those where the opportunity presents itself.
10 The third item I think we've already
11 touched on, a little bit about the need for final
12 status surveys, a good definition of endpoints.
13 Planning and cost estimating, an
14 expression I use here is failing to plan is planning
15 to fail. We need to do a good job on planning, on
16 laying out, optioneering and cost benefit analysis,
17 and finding out what the best methods to move forward
18 are on the different projects.
19 Deactivation process is one that I think
20 we've lived with some of the problems that improper
21 deactivation of facilities in the past have caused,
22 and we need to make sure that we implement
23 deactivation and bring facilities to a safe shutdown
24 condition in the future, before we lose the personnel
25 and the operating knowledge at those facilities.

1 The six one we've touched on already, the
2 waste management aspect. The seventh item is a
3 hazards assessment, again, just a good standard
4 operating practice to find ways of - and understand
5 what the hazards are at the site, and assess what
6 those hazards are, mitigate and control those, or
7 eliminate those if possible, as the work progresses.
8 Site and facility history, we've actually
9 touched on that a little bit already.
10 Off-the-shelf technologies, OTS stands for
11 off the shelf technologies. There are a lot of
12 technologies out there already that you can use to do
13 decommissioning with.
14 And the last one there is facilitating
15 information exchange, and building effective teamwork
16 to make the work be able to happen.
17 Okay, next slide just kind of a summary
18 again of some lessons learned, websites we've touched
19 on that really already. This is something I lifted
20 out of a different presentation that I wanted to
21 share. But it gives some information there you can
22 access on other websites.
23 And then in closing or in summary, as I
24 think I've mentioned probably several times already,
25 decommissioning is not rocket science. Don't try to

1 make it that. There's a lot of simple things that
2 occur in decommissioning, and there's a couple of real
3 important complex things that need to occur, that
4 having a couple of good technical staff working with
5 a good project manager and some good project staff to
6 make things be able to happen.
7 And the other couple of bullets on that
8 slide are self-explanatory. I'm not going to beat up
9 on them too much.
10 Okay, and that's it. I turn it back to
11 you.
12 MEMBER CLARKE: Larry, thank you very much.
13 We're a little ahead of schedule, but
14 let's take a break and come back at 20 to 11:00. We
15 will resume then.
16 (Whereupon at 10:26 a.m. the
17 proceeding in the above-
18 entitled matter went off the
19 record to return on the record
20 at 10:46 a.m.)
21 MEMBER CLARKE: On the record. Our next
22 speaker is Hans Honerlah. He represents the Army
23 Corps of Engineers and has experience with the
24 Formerly Utilized Sites Remedial Action Program
25 (FUSRAP) and the Base Realignment Enclosure efforts.

1 These represent the Corps' several NRC-sponsored
2 decommissioning activities to provide the perspective
3 from the compensative decontamination and
4 decommissioning efforts that they undertake. Hans,
5 thank you.
6 MR. HONERLAH: Thank you. I just wanted
7 to start off for some of the folks in the room who may
8 not be aware of what the Corps does for our mission
9 work we'll go through a quick slide or two on what we
10 do as an organization and who we work for and support.
11 Some of our more predominant missions in the
12 radiological or hazardous toxic waste arena are
13 associated with the FUSRAP which is the Formerly
14 Utilized Sites Remedial Action Program, also FUDS
15 which Formerly Used Defense Sites, very similar
16 programs. The FUDS program is associated with former
17 military bases where FUSRAP is mainly associated with
18 former complexes or former facilities associated with
19 weapons development in the Manhattan engineering
20 district.
21 BRC which is a Base Realignment Closure,
22 we do a significant amount of support for EPA in their
23 Superfund Program and actually implementing a lot of
24 their remedial actions and removal actions. We also
25 control and oversee the environmental monitoring

1 associated with the Army's deactivated nuclear power
2 plants.
3 We typically generate large volumes of
4 waste annually and most of the common radionuclides
5 that we deal with in our remedial actions are uranium,
6 thorium and radium. However, almost I'd say 99
7 percent of our sites and our facilities have multiple
8 hazards. None of them are just contaminated with
9 radiological materials or radiological constituents.
10 So there's always a little twist in there with some
11 chemical material or debris or asbestos or TSCA-
12 regulated stuff. The physical form that we deal with
13 is typically in soil. We have some building remedial
14 actions that take place and a majority of the
15 radionuclides that we deal with are very low-specific
16 activity.
17 Most of the work that we perform as an
18 agency we perform under CERCLA and its implementing
19 regulation, the National Contingency Plan. As a lead
20 Federal agency, we handle releases at many DoD FUSRAP
21 installations and/or facilities. As a support agency,
22 we do work with EPA. We've done with NASA, other
23 Federal agencies, even with the Department of Energy
24 when they seek some additional support.
25 There's typically a close correlation

1 between CERCLA and the way we implement CERCLA and the
2 MARSSIM remedial action process. However, I think
3 everyone in the room is aware that MARSSIM has some
4 significant limitations that are currently trying to
5 be addressed. Some of the most probably important are
6 the assumption of homogeneity as well as the
7 assumption of surface contamination which I don't
8 think we can say that about any of the sites that
9 we've gone out and started working on.
10 The four significant issues associated
11 with D&D and the Corps' experiences that we're going
12 to talk about, that I'm going to talk about today are
13 what we call ARARs as defined in CERCLA, the
14 Applicable Relevant and Appropriate Regulations, waste
15 classification and disposal, transportation and
16 release of material from radiological D&D project and
17 typically what I'm discussing there is release of
18 material that is either within an impacted or just
19 adjacent to an impacted area. However, it's in the
20 confines of the project site and therefore has the
21 stigma of coming from a radioactive remediation site
22 and those are posing significant concerns.
23 The challenge that we have as an agency is
24 that we support the Army and the DoD as well as our
25 additional customers nationwide, whereas some of the

1 facilities that are located within one state, they're
2 known their regulators. They know the specifics
3 requirements as set forth and they've established
4 those relationships. However, as an agency some
5 things that we bump into are regulations that apply to
6 a D&D project that we may be implementing in a
7 specific state. Specifically, if the material is a
8 source material, for an example we would call 10 CFR
9 20 Subpart E the 25 millirem per year criteria that we
10 would try to meet and we would identify that as an
11 ARAR under CERCLA.
12 However, when we go into a different state
13 and depending on the state that we were in, the State
14 of New Jersey has promulgated 15 millirem per year.
15 Now they don't authority as an agreement state that's
16 granted by the NRC, however, regardless of the
17 material is they're going to try to call it T_{NORM} or
18 something of that nature. Therefore, we must
19 implement their 15 millirem per year that they've
20 promulgated within their regulation.
21 The State of Massachusetts promulgated 10
22 millirem per year and again if the facility is a
23 Federal facility under control of the NRC we would
24 identify the NRC as the ARAR. If it's a commercial
25 facility under CERCLA if it's promulgated, we need to

1 consider the more stringent of the two which in
2 Massachusetts 10 millirem per year for the Bureau of
3 Radiological Control and then for the environmental
4 group they also want to see you comply with $1E^{-5}$ risk.
5 The State of Connecticut, they're in the
6 process of trying to promulgate 19 millirem per year.
7 How some of these numbers comes up are quite
8 interesting. They're proposing it, yet it's not been
9 promulgated.
10 The State of New York, while they would
11 enjoy that we go to 10 millirem per year and they've
12 issued it in what they call TGAM which is guidance.
13 However, as a Federal agency implementing a program
14 and spending Federal dollars unless it's promulgated,
15 we don't have the authority to take that extra step.
16 Then we go into the U.S. EPA realm where
17 we have multiple regions that we cross and each region
18 has their own interpretation of CERCLA and the
19 guidance that's put in by the EPA which are the OSWER
20 Directives from $1E^{-5}$ to $1E^{-6}$. Also some of the other
21 interesting things that the EPA threw out that aren't
22 necessarily risk based are the 40 CFR 192, the Five
23 and Fifteen Radium Rules which per the regulation
24 states five at surface, 15 at subsurface. Per OSWER
25 Guidance what they really meant was five at all depths

1 across the entire site. So the changes that we come
2 across throughout our different programs make the
3 decommissioning very challenging because it's not the
4 same at any specific site.
5 Let's see. What are some of the other
6 things that are out there right now within the ARARs?
7 We may meet the criteria associated with the release
8 of an NRC license or satisfy the Bureau of Radiation
9 Control or the environmental areas within the states
10 or Federal agencies and then other rules may be
11 imposed on us by property transfer groups. If we
12 aren't going to make the effort to get down to their
13 10 millrem per year or to their 15 millirem per year,
14 then that property won't be transferred under
15 different rules and requirements that the legal staff
16 within the state will pull out since they didn't have
17 their radiological criteria promulgated.
18 Those are many of the issues that we tried
19 to bring up front. However, we request this
20 information and these requirements from the state when
21 we get into our projects if they seem to sneak out
22 continually as we go deeper and deeper into our
23 project and have spent significant time, energy and
24 effort into getting to a point of finality.
25 I think the next one is implementing the

1 dose and/or risk assessment guidance to determine the
2 concentrations that we're going to require removal or
3 remedial actions. 10 CFR 20 uses the average member
4 of the critical group which is what we typically try
5 to go to. However, other state and Federal agencies
6 may see an industrial scenario as a restricted release
7 which would require then at that point some form of
8 deed restriction onto the property to ensure that that
9 industrial scenario is really truly the only thing
10 that that property is going to be used for.
11 Other states may suggest that while the
12 property may be only industrial, what happens if
13 materia leaves the property after the cleanup and goes
14 to a non-industrial property and is there potential
15 for that? So with those types of arguments which are
16 all valid statements, they try to impose that we clean
17 up to a residential or a residential farmer with all
18 of our modeling throughout our different programs.
19 The other thing that's come up in recent
20 past and it gets answered differently across the
21 country is how to implement the radiological
22 carcinogen risk into a CERCLA risk assessment when
23 your CERCLA site also has chemical carcinogen risks
24 and the additive versus non-additive, that can have a
25 significant impact on your cleanup costs associated

1 with your site.

2 Finally, I think on this last slide, our
3 multiple agency support, different guidance documents
4 associated with specific input parameters to either a
5 risk assessment and/or a dose assessment. To come to
6 concurrence with three or four agencies in a room on
7 each specific parameter that's going to be placed into
8 the assessment or into the risk assessment/dose
9 assessment can be a challenge at times especially when
10 there are some confusing approaches.

11 We have the NRC's benchmark dose which
12 says don't be restrictive. Now explaining that to a
13 state who is typically restrictive and conservative in
14 their risk assessment guidance can be a challenge and
15 actually a timely and costly effort. So with the
16 multiple approaches to even risk assessment and/or
17 dose assessment within the Corps' decommissioning
18 experiences that can be a challenge.

19 Waste disposal and classification and I
20 think we as an agency have discussed multiple times
21 these specific issues and we'll go ahead and bring
22 them back on the table one more time. For
23 characterization classification prior to disposal, we
24 must review both the historical information from the
25 site as well as the analytical data developed from our

1 site characterization activities. Based on
2 information from both of those inputs, we can then
3 make a determination on what the material is
4 classified as a waste. However, the current system is
5 a source based system and it doesn't necessarily allow
6 for you to look at the specific risk. Materials
7 within a single waste classification don't represent
8 a similar risk. So it's kind of a false hope of
9 saying that we have this material and it's classified
10 as A. We want to deal with it as A. However, you
11 could have significantly different risks from those
12 materials.
13 One of the other shortcomings of the
14 source based system, it's complex due to the multiple
15 levels and/or I guess definitions of specific waste
16 streams. We have not found it to be an efficient use
17 of our resources to go through and try to define and
18 explain the multiple potential classifications. It is
19 difficult to defend on the grounds of health
20 protection. It has significant impact on the
21 competition for specific disposal facilities for each
22 specific waste classification system and essentially
23 it unnecessary uses up portions of our Part 61
24 facilities which could be better utilized for material
25 of much more significant risk.

1 A quick example, we had a facility that
2 has special nuclear material, highly enriched uranium
3 contamination that's very, very heterogenous across
4 the site. However, it's contaminated with a very
5 homogenous mix of very low levels of radium. The
6 cleanup criteria for the radium was a couple
7 picocuries per gram. For the uranium it was several
8 hundred. However, since it was commingled with the
9 enriched uranium, all that material needed to go to
10 Part 61 facility as low-level radioactive waste at a
11 significantly higher cost transportation. So those
12 are the things that the complexity of each specific
13 project makes it a challenge dealing within the
14 system.
15 Some other things -- disposable facilities
16 have a isotopic waste acceptance criteria which
17 provide a maximum concentration in picocuries per gram
18 for the entire cell. I'm not completely sure on the
19 licensing requirements, the risk assessments that take
20 place within these facilities. However, I feel that
21 a majority of the material that we send to these Part
22 61 facilities represent only a fraction of their waste
23 acceptance criteria as identified either within their
24 license or within their EPA permits. I'm not sure how
25 within the current system or if it at all would be

1 possible to take consideration into the given volume
2 of the entire disposal facility to where you would
3 have a volume weighted average of the specific
4 radionuclide within your disposal cell versus just a
5 set limit. If 90 percent of your material in that
6 cell is only ten percent of what you're licensed to
7 accept why couldn't that last ten percent be a little
8 bit higher than that and is there a way to better
9 track that risk within the entire disposal cell versus
10 to have a set limit?
11 There's a facility within Oak Ridge the
12 EPA and the DOE put in for their disposal facility
13 where they are doing such a very similar system where
14 they're using some of the fractions and volume
15 weighted some of the fractions for disposal. It's a
16 very unique concept. I do believe they have some
17 papers coming up on it at the Health Physics Society
18 meeting in Knoxville this January which will be
19 interesting for maybe you folks to try to look at and
20 share and see if that has any impact.
21 The utilization of RCRA facilities for
22 disposal of low activity radioactive waste has really
23 stabilized the disposal costs that we typically deal
24 with to the point where we have some very long-term
25 contracts associated with it, very fixed costs and

1 disposal is no longer a significant cost in a lot of
2 our projects and I'll get to that a little later down
3 into the transportation discussion.
4 The acceptance of RCRA facility disposal
5 is typically on a state-by-state basis. It's not a
6 national system and currently there are really only
7 two facilities that we're willing to work with their
8 state regulators to step up to the plate and bid on
9 some of our large scale contracts. Both those
10 facilities are out west while a significant portion of
11 our cleanup sites are in the east and northeastern
12 part of the U.S.
13 Currently, we still feel that there are
14 certain limitations with the disposal of LLRW and
15 those I think need to be addressed and I think they're
16 currently trying to be addressed and I think we're all
17 kind of hopeful within the industry, but I don't think
18 we're all necessarily sure that it's going to happen.
19 Transportation, as I just spoke of, the
20 disposal is no longer the primary cause factor in a
21 lot of our D&D efforts. A large portion of the
22 efforts typically focused in the eastern U.S., waste
23 disposal sites in the western area. We've kind of
24 seen this trend for over the last five or six years.
25 Since we've put in our disposal contract with the

1 large volumes our disposal costs have really just kind
2 of crept over time. However, due to energy any small
3 change in the energy costs and within the railroad
4 industry has a significant impact on our
5 transportation costs because typically we're
6 transporting this material several thousand miles. So
7 we've gotten to a point now where our transportation
8 cost can be 300 percent higher than our disposal cost.
9 Release of non-impacting material from D&D
10 projects and this involves anything from over burden
11 to get to the contaminated material. Can we place it
12 back in the ground with concurrence from the state and
13 localities to debris that may be commingled in and can
14 be washed and released and the level of effort
15 associated with it or even to debris and, I guess,
16 foliage and whatnot on the surface of the contaminated
17 property, how do you get rid of that, release it and
18 then allow you to get down into your actual remedial
19 actions?
20 And I think Larry and Jeff kind of spoke
21 of it a little bit in their slides. Sometimes it's
22 easier just to dispose of it. Is that the smartest
23 thing to do? Is that the best thing to do for our
24 environment to dispose of non-contaminated material
25 into a Part 61 facility, probably not but on a project

1 specific basis, it's a cost factor that we need to
2 look at and typically the level of effort associated
3 with conducting the surveys to release these volumes
4 as well as to gain concurrence with both state,
5 municipality and the Feds can be a significant cost
6 that the decision is made to place non-impacted or
7 non-contaminated material within to a disposal
8 facility.
9 I guess establishing a release for
10 disposal versus a release for returning into commerce
11 would be I think something that could potentially
12 significantly assist this issue. Whereas if we're
13 taking the level of risk that a project and/or a
14 regulator may be willing to take to place material
15 into a local D&D facility or a Subtitle B or a
16 Subtitle C facility versus releasing material to be
17 placed back in the commerce, I think they are two
18 significantly different risks for the industry and the
19 project regulators and everyone and I think if we
20 could try to define that, make that separation, that
21 would assist the C&D efforts.
22 Real quick in summary, providing harmony
23 between Federal and state agencies on acceptable dose
24 and/or risk would be a beautiful thing especially for
25 those of us who have to work across the country within

1 many different regions, states, different authorities.
2 Developing a waste classification system
3 based on risk that could arise from waste disposal.
4 Currently the source based system, the pedigree where
5 it came from, is a challenge. There are avenues
6 within the NRC to seek specific exemptions and those
7 avenues do tend to work. However, they can be costly,
8 timely and have significant impacts in your schedule.
9 If you go down the road with an assumption
10 that you're going to get that and then you don't get
11 that, that's a significant roadblock.
12 Support regional dispose facilities, both
13 existing and new for numerous waste classifications to
14 reduce the cost associated with transportation.
15 I think that the RCRA facilities and
16 utilizing the capacity nationwide with RCRA facilities
17 would require some national type guidance. I'm not
18 sure every state that's out there that has RCRA
19 facilities would be willing to step up to the plate to
20 accept some of these low activity wastes but I think
21 it's something that would significantly assist us with
22 conducting our D&D operations.
23 Then finally, I guess, to identify a
24 general class of exempt waste that are exempt for the
25 purpose of disposal versus exempt for the purpose of

1 release back in the commerce where you're doing your
2 green tagging in the DOE world, where you're doing 100
3 percent surveys, nothing above background before it
4 can be released back in the commerce. That concludes.
5 MEMBER CLARKE: Hans, thank you. Thank
6 you very much. At this point, I'd like to turn to
7 questions and discussions beginning with the panel and
8 let me allocate a half hour for the panel at this
9 point. So you may wish to ask questions. You may
10 wish to give us comments, but let's just approach it
11 that way. Tracy, would you like to start?
12 MR. IKENBERRY: Sure. I had a question
13 regarding some of the actual costs of decommissioning
14 and I was wondering -- I guess this would apply to all
15 of the presenters. The costs of the decommissioning,
16 do they get back to the costs estimators at some point
17 so that the basis for cost estimating can take into
18 account the actual data? My understanding is that the
19 cost estimating process is actually quite difficult
20 and a lot of uncertainty with that. Does that
21 information actually get back to be able to improve
22 that estimating process?
23 MR. ANDERSON: I'll start off. One of the
24 things I kind of glossed over is that EPRI has
25 developed a lot of software tools that are continually

1 refined and updated and among those are cost
2 estimating and resource estimating tools for planning
3 and scheduling and budgeting purposes. So the answer
4 is yes in our business that that type of information
5 is captured and fed back into the process for further
6 use.
7 I'll make a comment. Because of the waste
8 graph we looked at versus transportation, actually
9 transportation waste disposal costs comprise somewhat
10 more than one-third of the overall decommissioning
11 costs for nuclear power plants. So maintaining that
12 current and projecting that is a real important part
13 of that cost estimating and changes that can be made
14 that impact where that waste has to go have a
15 significant impact on the overall costs.
16 MR. IKENBERRY: In your experience, Ralph,
17 how do the costs compare to the pie chart that Larry
18 presented?
19 MR. ANDERSON: Substantially different and
20 I think Larry made the point that their disposal
21 options are considerably different than ours and if
22 you think about it when you recognize that ultimately
23 you're creating a waste disposal project in many cases
24 that helps determine selected alternatives for how you
25 even approach the deconstruction and the

1 decommissioning because you're ultimately creating
2 waste products. So you try to do it preferentially in
3 ways that save you the ultimate waste disposal costs.
4 So it's kind of driven by those backend costs, your
5 whole planning process.
6 MR. LUX: I think the ability to estimate
7 costs is probably more significantly impacted by our
8 inability to quantify the amount of material that will
9 require excavation and transportation and disposal
10 such that I think we have fairly good information
11 regarding unit costs. Our cost estimators were very
12 effective at estimating the costs of exporting a given
13 volume of material for disposal and disposing of that
14 material. But when several million dollars worth of
15 characterization didn't enable us to estimate the
16 volume of material to be shipped within 50 percent it
17 made the accuracy or the ability to estimate unit cost
18 precisely somewhat irrelevant.
19 MR. BOING: Yes, most of the cost
20 estimating work that we do is contracted out to
21 subcontractors to support us in that effort and one of
22 the things we do try to do is to after we implement
23 the project get that result back to them so they can
24 do a comparison between what we estimated and what
25 actualities turned out to be. So in that case, we do

1 try to work with them and give them that feedback.

2 The other thing I'd mentioned is I believe

3 there is a group that the Department of Energy has, a

4 group that looks at cost and collecting cost and

5 trying to make those kind of comparisons between

6 planned and actuals and methodologies that explain the

7 differences or to understand at least how people are

8 implementing and using different processes to do that

9 work with. But I'm not sure how active that group is

10 or if they're still very active or if they're still

11 out there or not.

12 MR. IKENBERRY: One more quick question.

13 Larry, you had spoken specifically about some

14 cost/benefit analyses as well and I'm interested in if

15 you've done any cost/benefit analyses on the cost of

16 the decontamination first disposal and make it just

17 kid of broad categories. Can you speak generally

18 about that? I realize that's kind of a tough topic.

19 MR. BOING: We've looked at that and we've

20 done probably several years ago now, if not longer ago

21 now, some studies of how long it takes, like for

22 example, how much per hour does it cost to survey

23 things for release let's say. How many dollars an

24 hour does it really cost if I had a skid of material

25 that I want to release? How much does it really cost

1 to survey that material and say, yes, it's ready to go
2 or, yes, it's ready to go to our lead bank, let's say
3 maybe, to where it can be stockpiled? We had done
4 some calculations like that, but nothing real recent
5 really. But we do go through that process of again
6 evaluating what the options are because a lot more now
7 than it was in the past 10 or 20 years ago it's about
8 dollars and cents.
9 MR. IKENBERRY: Yes, I was kind of
10 wondering what some of the new techniques, if there
11 was any way to look at the cost of decontamination for
12 example with a metric like cost per square meter
13 readily and compare that to demolition?
14 MR. BOING: I think one of the things that
15 happens in the states at least is we're very spoiled
16 by the fact that we have so much open spaces and one
17 of the things that works really to advantage of the
18 Europeans and the Asians is the fact that they don't
19 have and they have to find a way to optimize the
20 process. So they are driven more by their regulators
21 probably and their space limitations too. That they
22 have to really focus on that is really a major focus.
23 If you go and talk to them about technologies, you'll
24 find that they're doing a lot of work because of that
25 in those areas, in those technology areas, decon and

1 trying to find different ways, better ways to do
2 things than what we have. We've been a little bit
3 spoiled by the fact that we have all this available
4 real estate.
5 MEMBER CLARKE: Eric.
6 MR. DAROIS: Yes, I had I guess more
7 comments than questions and part of it is on the
8 discussions we've just had. So I have just four
9 topical areas that I'll throw out some comments again.
10 One is I think Jeff mentioned in his presentation it
11 would be nice to have DCGLs up front during the
12 operating cycle of a facility and I think that's a
13 great idea. However, as we all know, I mean in order
14 to do that we need to define the endstate and that can
15 certainly change over time whether you're doing DCGLs
16 for industrial use, residential use, etc. So I think
17 there are some challenges to doing that and in some
18 cases, it may be quite obvious what the endstate is
19 but my guess in most cases it's not. But I like the
20 idea nonetheless.
21 I've toyed with the idea on another note
22 here of wondering if it would be beneficial to have
23 facilities at their design phase, maybe building by
24 building, develop a demolition plan along with the
25 design and I've almost talked myself in through some

1 circular logic on this thinking it would be a real
2 good idea in the beginning. The case in point is I've
3 seen three different ways of taking containment
4 buildings down in operating plants, one with
5 explosions, the other with a big machine that knocks
6 it down really slowly from the bottom and have the
7 thing come down on itself and the other surgical
8 removal.
9 All of those three decisions were not
10 driven by the mechanics of being able to do it. I
11 think they were in large part driven by waste disposal
12 costs. So that's where the circular logic comes in
13 thinking that it would be nice to have the plan up
14 front, but if you're going to change your mind later
15 because the costs are going to be one way or another
16 down the road 20 or 30 or 40 years from now it may not
17 do you any benefit to come up with that in advance.
18 It kind of speaks to the fact that those
19 that are operating plants or thinking of building
20 plants today have no idea what we're going to be doing
21 for disposal decades from now and I think as a nation
22 we lack that vision of where we're going and where is
23 the stuff going to go when we're done. That restricts
24 us in terms of how creative we can get up front in
25 making this process go well.

1 And one other thought that came to mind I
2 think in Hans' presentation was that we are putting a
3 lot of low-level radioactive waste into facilities
4 that were designed for much higher level wastes and
5 even though we have plenty of space in the country
6 it's really not the right thing to do. I mean these
7 places have a lot of money and time licensing these
8 facilities and I don't even know how you do this as
9 well but is there any way we could put some sort of a
10 penalty for disposing of too low a level waste in a
11 place that's been designed for higher level waste
12 because we're limited as to how many places we can put
13 the lower level waste too and that needs to be solved.
14 Those were my four commentaries anyway. Thanks.
15 MEMBER CLARKE: Thank you. Let's go to
16 Tom Nauman.
17 MR. NAUMAN: Thanks, Jim. Interesting
18 comments there, Eric. Food for thought.
19 MR. DAROIS: Yes.
20 MR. NAUMAN: Looking to the future --
21 First, I would like to comment on a historical
22 perspective. Twelve years ago, give or take, D&D was
23 not a concern. The waste issues, everything
24 associated with D&D, was not a concern until
25 deregulation hit. Economics changed and nuclear wave

1 was crested and we ended up moving into D&D due to
2 economy forces basically.
3 Fifty years ago, well, 45 years ago when
4 the plants were first coming online, no one envisioned
5 some of the waste issues that we're dealing with
6 today. No one, they didn't factor in the design of
7 the buildings for D&D. They factored in making them
8 super strong and build them and we'll relicense them
9 and continue on making power with these plants. So
10 for us to sit here today and project ahead into the
11 future is pretty difficult for us to do.
12 When it comes to design of new plants and
13 the amount of effort we've put into capturing lessons
14 learned, I question a little bit as to the value of
15 those lessons learned. At least 20 years into the
16 future, the next wave is not going to hit until the
17 relicensing era is over. So that's really more like
18 30 years in the future and the lessons that we've
19 learned today while they're important the key drivers
20 on how to tear the plants apart are pretty fundamental
21 construction practices that will continue to learn as
22 we go and equipment will evolve and methodologies will
23 evolve, but what will apply to nuclear plants 30 years
24 from now it's pretty hard to predict.
25 The question is for you, Ralph. What

1 money do we spend today in the design of new plants
2 that would be cost effective for planning ahead for
3 D&D? When you factor in a nuclear plant right now, it
4 costs approximately $500 million to D&D including
5 waste disposal and everything else, a total of $500
6 million. What dollars do we spend today that would be
7 effective 30 -- Actually the new wave of new plants
8 will be 50 or 60 years into the future. Where can we
9 apply the reasonability check? I like some of the
10 things that I heard about sealants and containment and
11 modularization, but I can't imagine it would be too
12 cost effective to take it to too far an extreme.
13 What's your views on that?
14 MR. ANDERSON: I think probably the way to
15 capture it and it goes to some of the comments that
16 you made on the front end about predicting the future
17 because I tend to agree with you on those is to look
18 at the issues associated with operations that would be
19 partially addressed by some of the things that would
20 also facilitate decommissioning and take into account
21 both tangible and intangible benefits of those things
22 that would really benefit you from initial operation
23 all the way through decommissioning.
24 I suspect that to do a straight line cost
25 evaluation of if I do this now, I would expect that to

1 have this benefit arguably 60 to 80 years from now if
2 I'm just starting. Actually if you count the design,
3 licensing and all that, you're probably talking about
4 an 80 year period at a minimum.
5 MR. NAUMAN: Probably.
6 MR. ANDERSON: And I agree with you. It's
7 kind of ridiculous to imply that you know where you're
8 going to be at that period of time. But I think
9 prioritizing some of the -- It's almost like doing
10 ALARA in my mind. Prioritizing some of the things
11 that are not terribly difficult to do and not terribly
12 expensive and also offer benefit and operations could
13 at least give one kind of priority list of things to
14 approach partially as much to see how well they work
15 and to begin technology development over that period
16 of time as to put something in place with the
17 expectation that you get this tangible benefit 80
18 years from now and it's interesting to me that in the
19 creation of a lot of these items although we are
20 capturing them under decommissioning lessons learned,
21 though a lot of them came out of people who thought
22 about how they're impacted during operations.
23 In summary, I don't really think you can
24 do that cost. I think you're correct that to do that
25 cost evaluation dollars for dollars probably fantasy.

1 MR. NAUMAN: Yeah. One of the points I'd
2 like to make is we've changed the way we regulate and
3 manage the business as the pre-Three Mile Island era
4 and the post-Three Mile Island era when the industry
5 changed and the way we regulate and manage risk now
6 and manage the operation of the plant is completely
7 different than the way it used to be and a lot of the
8 D&D legacy is from that pre-'79 era that predated the
9 controls that are in place. So a lot of the mess that
10 we're cleaning up is from that and a lot of the design
11 flaws were things that were not -- People didn't
12 predict that you'd overflow tanks and store water on
13 the floor of rad waste rooms in the past, but that's
14 happened prior to the current ways that we manage
15 plants and I think some of the lessons learned from
16 that and where we're going in the future will help us
17 in the design.
18 Another question on new plants is when you
19 factor in the licensing of the new plants there are
20 designs that are out there in review. There are
21 designs that have been reviewed, designs that are in
22 review. I wouldn't recommend that we in the licensing
23 of those plants put too much weight into controls. We
24 all looked ahead into the design of the plants for
25 some of these efficiencies and minimizations of water

usage and shrinkage of the operating equipment envelope. I would assume that those factors would help the D&D process ultimately and that we wouldn't try to go back and recreate the wheel on some of the designs that already have been approved. Does NEI or EPRI in the process for licensing new plants take that into account?

MR. ANDERSON: Yes, we do, but we have a challenge. The challenge is that we have a regulatory requirement that at least on the face of it is pretty clear that may or may not have been factored into the certified designs that we already have in place and there has been some discussion that that requirement may not have been applied in the review of those certified designs. So there's a dilemma.

I think that if you look at Regulatory Guide 8.8 for ALARA, it's a compendium of lots of things that you should think about and consider and it really tries to stop short of saying and this is a prescriptive document that you should really be able to check off every paragraph. I think that's the way we need to go with this existing regulatory requirement. I think we need to apply an ALARA type philosophy, is it really reasonable, and not necessarily get down to that being a monetary

1 calculation but applying a certain amount of common
2 sense. I think that applies to the certified designs
3 and I think it applies to the future licensing
4 process.
5 MR. NAUMAN: I agree.
6 MEMBER CLARKE: Thank you, Tom. Dave.
7 MR. KOCHER: Now, Hans, I had a couple of
8 specific questions and a comment for you before I make
9 some general comments. You made some comments about
10 the problems of waste classification systems for you
11 and I'm guessing that this mainly has to do with this
12 pre-1978 and post-1978 stuff that contains NORM. Is
13 that your major issue whether or not something is
14 included in 11E2 byproduct material?
15 MR. HONERLAH: That's one of the issues
16 but we also go into the unimportant quantity of source
17 material which is specifically exempt as well as there
18 is no lower level or no exempt quantity necessarily of
19 some of your other contaminants, enriched uranium,
20 11E1 and things like that.
21 MR. KOCHER: Okay. You raised an issue
22 about basically combining risks from radionuclides and
23 hazardous chemicals and I didn't see the problem
24 there. Yes, we've kind of turned a blind eye to
25 combining radionuclides and noncarcinogenic hazardous

1 chemicals, but I don't see any problem with combining
2 radiation risk with risk from chemical carcinogens.
3 So maybe you need to explain to me what your problem
4 is.
5 MR. HONERLAH: I just think it's
6 implemented differently across the country.
7 MR. KOCHER: It could be. I mean EPA has
8 their heat stables which supposedly cover the
9 waterfront. One specific comment for you. You
10 pointed out what's probably a real problem about
11 having concentration limits in disposal facilities.
12 I don't want to push Mike's button on this. At least
13 in the DOE system the sites I'm familiar with, they
14 have basically inventory limits. Unless you have an
15 unusual really hot package of something that requires
16 special considerations, they don't much pay attention
17 to package by package concentration limits per se and
18 so this may be more an issue in the commercial sector
19 where the disposal facility doesn't really know where
20 the waste is coming from necessarily. I don't know,
21 but I don't think this is a problem in the DOE system.
22 MR. HONERLAH: I actually think it's
23 something that they're doing well in the DOE system as
24 opposed to the commercial system.
25 MR. KOCHER: In regard to general

1 comments, gosh, it's just, you know, obvious stuff.
2 I mean we have a problem here today because it was not
3 possible to plan for the future 40 years ago. That
4 seems pretty obvious to me and it's clear from Ralph's
5 talk and all these others that we're doing our best to
6 plan for the future and I think several of you have
7 expressed cautions about whether we can really do this
8 or not and I think those cautions are appropriate but
9 it's certainly worth trying.
10 My guess is that at least the legal
11 environment for the near term is fairly stable. We
12 went through a period of 20 years or so where we had
13 a new environmental haul every week and that seems to
14 have slowed down. We're now sort of arguing about the
15 nuances of what the Clear Air Act requires and all of
16 that kind of stuff. But major new environmental
17 legislation is probably not coming.
18 Ralph, you said something that triggered
19 a thought when you were talking about how snow removal
20 and snow melt move stuff around and it ends up
21 concentrating somewhere. So we create a problem and
22 I wonder whether we still have somewhat of a
23 disconnect between acceptable releases to the
24 environment during operations and what will be
25 acceptable environmental levels of contamination when

1 you're through.

2 I think we still have a problem here and
3 I would pose the problem this way. For the most part,
4 this is not 100 percent, but for the most part when we
5 do an assessment of operating releases and whether
6 they are meeting dose criteria, we are evaluating
7 annual doses based on that year's release. And I'm
8 not aware of any really good formal mechanism by which
9 we can take into account long-term accumulations of
10 stuff in the environment. Not everything has an eight
11 day half-life. So it's conceivable that we still may
12 have a problem even in planning for the future that
13 we're going to acceptable environment releases that
14 will lead to clean up problems because we didn't think
15 of something.

16 I wonder whether there is a regulatory
17 problem here between cleanup standards and acceptable
18 release standards in that the acceptable release
19 standards put their blinders on and take one year at
20 a time and once the clock turns over again on January
21 1st we don't worry anymore about the consequences of
22 what happened in the past year.

23 One of the things I want to quick comment
24 about, sort of directed at yesterday's talk about the
25 tritium releases and it was fairly apparent that the

1 problem there was that there were releases that we
2 didn't know about rather than the releases were large
3 because you might put out a curie or two of tritium
4 that you didn't know about and there are large numbers
5 of curies every year going out a pipe under a
6 permitted release. Where am I going with this? I'm
7 not sure.
8 The key is to somehow have a way to
9 monitor the unforeseen or the unexpected or maybe in
10 some perverse way make these off-normal occurrences
11 part of an expected condition that you plan for and
12 somehow try to monitor. The problem is that we had
13 surprises, not that the surprises caused a problem.
14 MR. ANDERSON: I'd just like to make a
15 comment to your comment. In my own view, the fact
16 that there was no health and safety impact or at least
17 that conclusion was drawn in itself is not surprising.
18 That's how we design the plants. In fact, we assume
19 total loss of contents from virtually every system
20 that interfaces and show that the ultimate impact
21 would be small fraction of Part 20. That was part of
22 the licensing basis and somehow that got overlooked.
23 But I think your point is sort on target
24 and that is the issue of we designed our monitoring
25 programs to monitor those things that we expected. We

1 didn't really design our monitoring programs to check
2 for other things and I think that's what set us up.
3 First leaks aren't good things and second leaks you
4 don't know about are particularly not good things. So
5 I'm with you on that. But again, I want to stress the
6 fact of no health and safety impacts shouldn't have
7 surprised the staff or anybody else. That's what they
8 required us to design to.
9 MR. KOCHER: And to somehow take into
10 account in evaluating normal performance if you can.
11 I would also say in response to something, some things
12 I heard yesterday, that the onsite groundwater
13 monitoring is nice but that's a problem that's hard to
14 correct if it gets out of hand and it would be nice to
15 know what's going on before stuff gets in the
16 groundwater because the NRC may not care about onsite
17 groundwater, but I guarantee that the states do for
18 the most part. Enough said about that. Thank you.
19 MEMBER CLARKE: Thank you, Dave. I would
20 like to turn to the Committee now with a couple of
21 comments of my own first. I guess, one, I think the
22 National Environmental Policy Act, the guidance
23 developed by the Council on Environmental Quality,
24 does provide for looking at cumulated impacts and for
25 what it's worth, I thought that was an interesting

1 comment that you had there, Dave. And, Hans, I
2 thought you did a great job with ARARs which is a
3 particularly troublesome component of CERCLA. I
4 wonder. Have you had any success with ARARs waivers
5 for some of the sites you've been working on?
6 MR. HONERLAH: No.
7 MEMBER CLARKE: Okay. Well, I'm not
8 surprised to hear that either. Let me start with our
9 Chairman. Dr. Ryan.
10 CHAIR RYAN: Thank you. It's been a
11 fascinating morning. I appreciate everybody's
12 insights. I've been sitting and listening carefully
13 and integrating. A number of thoughts strike me.
14 First of all, I wonder what people around the table
15 like this would have said in 1960 when they started
16 designing the first reactors and that's Tom's comment.
17 Waste disposal costs back then was 19 cents a cubic
18 foot, not $350 a cubic foot. So it was a whole
19 different world.
20 The restricted area of a power plant was
21 the fence around it and now we have restricted areas
22 that are very tiny fractions of spaces inside plants.
23 So the world has changed. Outages were six months
24 long. Now they're 16 days long in some cases. So the
25 world really has changed a lot and I think that's part

1 of the lesson learned. The lesson learned is what we
2 think is going to happen today probably won't happen
3 down the line whether it's the power uprated plants
4 that are looking at decommissioning or even new
5 generations of reactors.
6 That being said, I think, Tom, you also
7 touched on the points that Ralph talked about that
8 some aspect of modularization, ease of disassembly,
9 maybe a little better and creative engineering in
10 putting a plant together might be a way to optimize,
11 at least, the aspect of deconstruction, just that part
12 of it. Just making it easier to take apart is a good
13 goal. Maybe not the real driver which I found, Larry,
14 your information fascinating that in your world the
15 disposal cost is in essence not an eye-catching part
16 of your total budget.
17 Whereas in the commercial world, it is the
18 driver from many points of view. First of all, Eric
19 and his folks and Tracy and others are making
20 decisions, do I scaffold it three more times and spend
21 that money to meet a contamination or a dose criteria
22 and how much waste do I generate and where are the
23 dollars going on that. Is it an optimization or it
24 more expensive? You know, that's a tough equation to
25 balance, but you don't have that kind of real intense

1 cost pressure that I think exists in the commercial
2 sector, four to six to eight dollars a pound or $350
3 a cubic foot is a lot of money to spend on waste. And
4 the waste acceptance criteria, at least in my own
5 experience and I think I've heard several say this,
6 are the driver of the bus. I have to meet the waste
7 acceptance criteria and it's from that that I design
8 my decommissioning plan because if I don't meet the
9 waste acceptance criteria, I have a mound of stuff I
10 can do nothing with. So that's a real key issue.
11 I'm also sensitive to the idea of
12 concentration versus quantity. I don't think we've
13 wrestled that to the ground yet. Concentration is
14 very effective for transportation. It's very
15 effective as a characterization parameter because when
16 we measure a sample we're measuring a concentration in
17 essence and we've used as a metric, but we have not
18 done a complete job of translating concentrations into
19 risk.
20 This Committee just finished a NUREG
21 document from the history of low-level waste, very
22 exciting bedtime reading, but also produced a letter
23 that addressed some of these issues and recognized, I
24 think, what is another theme on taking away which is
25 flexibility in that there are many parts of the

1 existing regulations 61.58, 20.2002, I may have these
2 backwards, 30.11 and 40.15 or is it 40.11 and 30.15?
3 I forget, but there are two other parts in the other
4 material sections that give the Commission the
5 authority to consider alternatives and I think in
6 general our letter indicates that it would be helpful
7 if the Commission developed more detail than perhaps
8 more applicable guidance in using those provisions of
9 the regulations to recognize the circumstances that
10 we're in today and maybe even builds in flexibility as
11 circumstances evolve that things could change to meet
12 whatever that evolution dictates.
13 I think we also recognize this fundamental
14 problem of definitions. My favorite reference is the
15 Atomic Energy Act of '46, not '54, but '46. Safety is
16 mentioned four times as a word in the document, three
17 with regard to dynamic and one with regard to sewer
18 treatment facilities. Those definitions that we deal
19 with of special nuclear material, source material and
20 byproduct material clearly are based on security and
21 safeguards for weapons-related parts and pieces and
22 components and materials from the '46 Act. When we
23 went to kind of the health and safety view in '54, we
24 left the definitions there. So we're wrestling with
25 those and I think our view is manage the radionuclides

1 based on their inherent risk in the material and
2 forget about source, special nuclear and byproduct
3 material for that purpose of risk assessment.
4 Certainly it has value in other context. So I think
5 we're thinking of that.
6 I guess I would ask a question. Maybe we
7 answer it now or maybe in our second session, but if
8 you were kings of the world, what would you advise
9 this committee as the top five things we ought to tell
10 the Commission to do or to fix with regard to these
11 issues? And again, I'm not necessarily putting
12 anybody on the spot now, but I think as we discuss all
13 these issues it would be nice to hear some views on
14 what the priorities are. Each of you have different
15 experiences and views and it would be nice to hear if
16 I had one thing I could fix I would take care of this
17 issue or this problem and that would be a helpful
18 thing for this panel to help us think through.
19 MEMBER CLARKE: Excuse me, Mike. If I
20 could interrupt. Are all of you staying for the full
21 day?
22 (No verbal responses.)
23 MEMBER CLARKE: You are? I would suggest
24 you think about that and we close with that.
25 CHAIR RYAN: Yes, that would be really

1 helpful because I mean it's a fabulous transcript.
2 We've got lots of good information and ideas, but the
3 one thing I think would be great from everybody's
4 arena and you all have different backgrounds and
5 experiences is what should we fix first and there are
6 lots of things to address. But if it could be one
7 thing, what would it be? I think that would really
8 help us advise the Commission from really quite an
9 expert panel of practitioners what's on the horizon
10 that you would like to address. So I leave that with
11 you to think about and I'll turn it back to you, Jim.
12 Thanks very much.
13 MEMBER CLARKE: Thank you, Mike. Alan.
14 VICE CHAIR CROFF: Very interesting, but
15 I have no questions. It's like drinking from a fire
16 hose.
17 MEMBER CLARKE: Ruth.
18 MEMBER WEINER: Thank you, Jim. I have a
19 question that has been bothering me since Ralph's
20 presentation and I recognize that we are focused on
21 technical issues. But I really do want to ask
22 especially Ralph and the rest of you how do you
23 address the workforce issue? How do you address the
24 question that when you are in a decommissioning phase
25 you are telling people in X months or Y years your job

1 is going to be gone? And what happens over and over
2 again is that the very people who are the best
3 technically are the ones who find something else. As
4 soon as somebody knows they're not going to have a
5 job, they go looking for another one. How is that
6 address?
7 MR. ANDERSON: Although this will sound a
8 little bit tongue-in-cheek, it's real and it actually
9 formed our strategy when as Tom mentioned we entered
10 a period when we thought we would be decommissioning
11 most or all the plants. What you do is right next
12 door to the decommissioning site, you start
13 constructing a new nuclear power plant.
14 (Laughter.)
15 MEMBER WEINER: There you go.
16 MR. ANDERSON: Now I will tell you as a
17 policy matter in the mid to late '90s, we really took
18 a look at exactly that and we said even if we accepted
19 that the idea here is to as efficiently and safely as
20 we can continue to operate the existing fleet
21 potentially through license renewal. How do we solve
22 that problem? How does the whole infrastructure not
23 collapse before you get to the end of the trail and
24 the simple answer that everyone came to is we have to
25 build new plants. And I think that's the most simple

1 answer.

2 MR. NAUMAN: I'd like to expand a little

3 bit too. It depends on where your point of view is.

4 If you're an operator at a nuclear plant, if you're an

5 engineer, if you're a maintenance guy at a nuclear

6 plant, your job is tied to that plant and its long-

7 term future. But you have to recognize that in a

8 refuel outage, take for example, two-thirds of

9 everybody working in the plant is a supplemental

10 worker, is a construction worker, rad tech, a

11 transient workforce, who do that type of transition

12 for a living. They recognize when they go build a new

13 building that when that building's done if they did a

14 good job, they're on a crew to build the next new

15 building and whether it's to build a new nuclear plant

16 after you finish the decommissioning or whether it's

17 to go from outage to outage, that's the natural

18 transition.

19 The real concern like you pointed out is

20 the availability of those resources. The average

21 carpenter, for example, the age of the average

22 carpenter is exceeding 45 years old right now and

23 there's not an influx of new people into the trades an

24 that is going to have a major impact on the cost of

25 building new plants and even be able to do multiple

1 projects at the same time and I agree with you.
2 That's probably the key problem for the future is
3 managing people and we're going to have to get
4 workforces from other places.
5 MEMBER WEINER: Thank you. To get more
6 back to the technical, on-the-ground issues, what
7 about reuse of facilities and, Ralph, you touched on
8 it a little bit. But the notion that you have this
9 massive facility and I'm thinking of the vitrification
10 facility that we saw at Hanford which is the this
11 gigantic, monestrous facility that they intend to
12 simply once they're through, it's no more use. It's
13 going to be entombed or whatever. What is being done
14 about reuse of facilities and to tie this a little bit
15 to something Dr. Kocher said, do we need a relook at
16 the sort of exposure standards that we have in order
17 to reuse some of these facilities? And anybody on the
18 panel.
19 MR. LUX: Right now, it's a little bit
20 difficult to justify decontaminating and bringing a
21 building to the status that it can be reused for
22 nearly any use as long as the cost of demolition and
23 disposal is substantially cheaper than the cost of
24 decontamination and final status survey that would be
25 required to justify its use.

1 Having said that, I think -- I don't know
2 how to say this without sounding hokey, but it's a
3 shame that when in the environmental field, the brown
4 fields concept has at times been so successful that
5 there isn't a similar provision for something similar
6 within the nuclear material community. I don't know
7 how to say that.
8 MEMBER WEINER: Are you saying that you
9 think that the brown field concept is something that
10 should be expanded?
11 MR. LUX: I think the site program within
12 EPA for evaluating innovative technologies, I think,
13 there are several programs like that that there isn't
14 a parallel for within NRC or within radioactive
15 materials regulatory communities that could be
16 effective. But I don't know if it's that we're behind
17 a learning curve or if it's that we're a little more
18 reluctant to step out because of public perception
19 about exposures.
20 MR. BOING: I'm sorry. I think there's
21 just a lot of factors and you really need to decide
22 where you're going to base your decision upon facility
23 reuse. Are you going to base it upon a policy that
24 exists? Are you going to look at costs? Should we
25 say we should reuse whatever it takes to reuse it?

1 That would be a policy statement you would make or do
2 you say based on cost/benefit? Are we going to make
3 our decision based on cost/benefit or policy or which
4 is it going to be?
5 Another example would be if we're looking
6 at -- I just read an article a couple weeks ago about
7 recycling programs in the country for household and it
8 costs more to recycle and a lot of cities are doing
9 away with it because they say it doesn't make sense
10 for us to do it. It costs us more than it's worth.
11 But what the ones that are being successful are doing
12 is they are charging people more to dispose of the
13 waste they dispose of and in some cases that's how
14 they're funding their recycling programs is with some
15 of those kinds of things.
16 So it all depends on what kind of an
17 approach do you want to take because I know I feel the
18 same way. I look at a lot of the decommissioning
19 waste we throw away and I think, boy, there's a lot of
20 valuable resources in there. If you could find a way
21 to recycle a lot of that and save dollars doing it, it
22 would be great. But the dollars and cents of it is
23 you really just can't justify it.
24 CHAIR RYAN: Follow-up question.
25 MEMBER WEINER: Yes.

1 CHAIR RYAN: I want to follow up with you,
2 Larry, because I think a lot about that. I struggle
3 with recycle. I've read for years that DOE has all
4 this fabulous metal that they want to recycle. I
5 learned in going to a recycle steel mill near
6 Pittsburgh that their radius from which they collect
7 steel, scrap steel, is 15 or 20 miles because
8 transporting it any more distance than that isn't cost
9 effective and DOE's entire inventory of scrap steel is
10 drop in the national bucket of what is recycled
11 annually. So the idea that it's a valuable commodity
12 is something that you have to think about.
13 You know recycle companies typically
14 provide service for a fee, but they're out of the
15 commodity business with the exception of aluminum and
16 copper and maybe a couple of the precious or semi-
17 precious kind of metals. So I think in the
18 cost/benefit equation you really have to be careful of
19 defining a benefit and we're on a particular benefit
20 of recycle and I think sometimes you have to be
21 careful.
22 The one that struck me which is a non-
23 nuclear example is Vermont collects all kinds of
24 switches from automobiles that have mercury in them,
25 old cars. They sell it on the commodity market. It

1 goes to Bolivia where it's resmelted and put into the
2 atmosphere and ends up guess where? Back in Vermont.
3 And it's not my idea. It was in a news magazine,
4 *Newsweek*, or one of those and it was one of the
5 ironies of what's the benefit.
6 So I think you really have to scratch real
7 hard on what you're really trying to accomplish when
8 you start thinking of recycle as part of the equation.
9 Now recycle as a disposal cost avoidance mechanism is
10 fabulous, but it's not because we're putting valuable
11 materials back into the world for us. It's disposal
12 cost avoidance is the secret.
13 And I just want to kind of generalize that
14 thought in that you used the word "cost/benefit."
15 I've heard other folks say "optimization."
16 Cost/benefit, I think, doesn't really capture the full
17 range of issues on the whole area of decommissioning.
18 A couple of folks have tried, for example, to recycle
19 steam generators. It failed miserably because the
20 minute they get the can open the doses go right
21 through the ceiling and they find out the steam tubes
22 are really contaminated. But if you ground them all
23 in place in a foot and a half thick vessel it's a
24 great disposal container. But does it use volume?
25 Sure. Does it optimize ALARA? It's better for direct

disposal. It's an optimization of many different variables but not just cost versus some narrow range of benefits and I would caution us to not dial that in too tight because we might miss some good opportunities. Thanks, Ruth. I appreciate that.

MEMBER WEINER: Eric had something.

MR. DAROIS: Yes. The other aspect of it, I mean you're kind of going towards materials and material reuse per se. But I think the way I understood your question, Ruth, was more what do we do with these buildings.

MEMBER WEINER: That is included.

MR. DAROIS: We can take all the stuff out and do whatever the optimization equation says and we've talked about several times this morning that what we've been doing at least in the commercial sector is demolishing the building and throwing it away. I think we have to look at what drives us there. One of them is waste disposal costs, but the other why answer to that is it costs us too much to survey to the limits we've established for in most cases a building occupancy scenario. That building occupancy scenario generally driven by RESRAD build or something of the like assumes that someone's going to throw an office in this containment building and work

1 in there and there's going to be a resuspended
2 component and all that goes with that.
3 We don't often get more creative than that
4 with this and we were down the path when we were doing
5 the Connecticut Yankee DCGLs. When we were going to
6 be disposing the material onsite, we went through
7 several iterations and we sat with some of the NRC
8 staff people discussing the possibility of somebody
9 living inside of a pipe and therefore the building --
10 Did we specifically model the pipe for a cave dweller
11 and do the building surface DCGLs apply? I mean it
12 gets to the point of a ridiculous assessment.
13 CHAIR RYAN: That's the day the plan
14 changed, right?
15 MEMBER WEINER: Yes. Right.
16 MR. DAROIS: That's the day the plan
17 changed. So you get into this scabbling thing. We're
18 scabbling for three inches deep in concrete. If
19 anybody is going to use the building for something,
20 they're not going to go that deep and we shouldn't
21 have to consider that material resuspended. So it
22 seems there's more realistic applications we can have.
23 CHAIR RYAN: And there are examples there.
24 We heard, I don't know, a year or so ago we heard
25 about the Flannery Bank Building in Pennsylvania where

1 they actually have a reuse. It's now store space and
2 actually some residential space and they had to do
3 some very creative thinking along the lines that
4 you're talking about because if they went strictly by
5 DCGLs they would have removed so much of the
6 structural foundation that the building would have
7 collapsed. So they had to actually deal with what's
8 occupied and what's not and things like that. So
9 that's one of those issues of flexibility, I think,
10 that we've heard a little bit about.
11 MR. DAROIS: Right. We need to exercise
12 that more.
13 CHAIR RYAN: Yes.
14 MEMBER CLARKE: Ruth has one more quick
15 question. Then I really need to get to Professor
16 Hinze.
17 MEMBER WEINER: Hans had a --
18 MR. HONERLAH: I just wanted -- Everyone
19 is focusing on buildings. Buildings have a finite
20 life span. One thing that Jeff brought up was the
21 land. That never goes away. Where he talked and
22 spoke of the brown field and maybe bringing in a new
23 building on land that isn't necessarily cleaned up to
24 a residential standard, that building as an industrial
25 type scenario, I think that's a bigger focus because

1 long term the land doesn't go away but the life span
2 of the buildings, they will go away.
3 MEMBER WEINER: I have one more question.
4 Thank you by the way for those comments. One more
5 question and this may be something like Chairman Ryan
6 has said to think about until the end. Hans, your
7 slide on the multiple standards that you have to meet
8 in different states was very revealing and I think
9 that is faced by everyone. It was also faced by
10 several who said once the NRC goes away you're left
11 with the state and local regulations.
12 What should we recommend about that?
13 Should there be uniform standards? Should we put some
14 pressure on -- I'm not saying how you get there, but
15 what would be a way to mitigate the impact of having
16 to meet different local standards and along with that,
17 this is just a question. Are you grandfathered? In
18 other words, suppose the state promulgates something
19 after you've started a decommissioning action. Do you
20 have to meet the new one?
21 MR. HONERLAH: We're grandfathered if we
22 have a decision document under CERCLA, a record of
23 decision.
24 MEMBER WEINER: Thank you.
25 MR. HONERLAH: Similar to an EA or an EIS.

1 MEMBER WEINER: So I'd like to leave that
2 with everybody to think about until the end of the
3 panel.
4 MEMBER CLARKE: Professor Hinze.
5 MEMBER HINZE: Thank you, James. A very
6 useful discussion and comments. I'd like to ask Larry
7 a question that would be of help to me. In one of
8 your summary slides, you made a statement similar to
9 we are doing as well in terms of lessons learned
10 transmitting and sharing lessons learned as we had in
11 the past. Could you expand upon that? Where is the
12 problem here and what is this originating from and why
13 have things changed?
14 MR. BOING: I think kind of what I was
15 referring to when I made that comment is we're not
16 doing as much outreach I guess or I don't see things,
17 people being quite as willing to go and participate in
18 lessons learned sharing venues, things like technical
19 society meetings, conferences and things like this and
20 some of that's based on different contracting
21 arrangements out at a place where people aren't really
22 advocated to go and do that. Maybe people don't feel
23 as much of a need to go and do that because the
24 industry as a whole is kind of "dying out" in the U.S.
25 At least in the past it's been looked at that way.

1 And that's kind of where I was going with that was I
2 don't see as much of us doing things because we should
3 do things, because they're the right things to help
4 the industry grow forward and to share and learn from
5 what we've done as much as we had in the past where we
6 seemed to have more involvement and more interaction
7 in technical societies and other organizations and
8 even some things like the RAPIC at DOD, had funded at
9 Oak Ridge for a long time and that's now gone away and
10 I just see opportunities like that are really lost
11 opportunities to really even build upon what we've
12 done in the past and shared and make them even better.
13 MEMBER HINZE: Do you have any ideas on
14 how we can improve that?
15 MR. BOING: Not really any that are more
16 obvious than people just saying that we need to as an
17 industry, as a nuclear industry, as folks that work in
18 the environmental industry, everything related to
19 that. I think we have to go out, kind of think about
20 and say what I want to share with people about what
21 I've done, what have I learned from what I've done, as
22 opposed to saying that job is done and I'm moving onto
23 my next one. What can I share and help the industry
24 grow, expand, continue to be vibrant and start to go
25 in the right direction and share what I've learned.

1 I think it's kind of a personal obligation
2 you almost have to take onto yourself and try to make
3 it build into one where -- And corporations need to do
4 the same thing too, I think, and say we have to learn
5 from this and learn from what we've done and at least
6 share what we've done so that others can see what
7 we've done and try to use it as they can best see fit
8 to use it.
9 MEMBER HINZE: Also you referred to your
10 association with IAEA and their work in
11 decommissioning and we've also heard the problems of
12 predicting into the future and perhaps there is
13 something that we can do about looking at the
14 situation in other countries that might help us to
15 look into the future in a clearer manner. Can you
16 share with us some of your interaction with IAEA in
17 terms of lessons learned from other countries?
18 MR. BOING: The lessons learned probably
19 coming from other countries is a lot of the same
20 lessons learned. You know, things that we're
21 experiencing they've experienced as well. I think the
22 key, maybe a big difference between the two, several
23 big differences, No. 1, there's a lot more emphasis
24 there on avoiding generating waste and having to
25 dispose of this waste because it's a liability. It's

1 a major liability. They don't have the space and the
2 resources to really deal with it like we do. So in
3 a lot of cases, they're putting a lot more emphasis on
4 technologies, looking at ways of decon-ing, you know,
5 optimization of the decon process, which is really the
6 best method to recycle material, how can we recycle
7 material and kind of reintroduce that material back
8 into the nuclear cycle and reuse it, metals and
9 different materials possibly and fabricating new
10 materials for new plants. They're doing things in
11 those areas.
12 CHAIR RYAN: Larry, just on that point.
13 MR. BOING: Yes.
14 CHAIR RYAN: If I may, Bill. I think one
15 of the things that's very different in Europe we can't
16 forget is they have the EU Safety Directive 6. They
17 can dispose of slightly contaminated solid materials
18 and I think my own view is that process of decon-ing
19 and getting to those endpoints is critically dependent
20 on the fact they have that outlet. We don't at this
21 point.
22 MR. BOING: Agreed.
23 CHAIR RYAN: So just for reference, I
24 think that's an important difference.
25 MR. BOING: Right, and that's an important

1 point, Mike, like you made. Likewise, I think a lot
2 of the lessons learned are really the same. If you
3 look at that slide I had of the ten lessons learned,
4 a lot of the very same lessons learned be it a project
5 in the U.K. or Japan or wherever, a lot of the same
6 lessons learned. We have to know where we're going.
7 We have to communicate with people. We have to look
8 at the waste management issue. What's the final
9 endstate and how are we going to know when we reach
10 that final endstate, that we're actually there?
11 A lot of the things from a technical
12 standpoint that we've been talking about this morning,
13 site facility reuse and site reuse, the agency has
14 prepared several good technical reports which deal
15 with what the international community is doing in that
16 area. Same with design and construction features to
17 facilitate decommissioning. They've prepared some
18 documentation in these areas too and that's something
19 I think that we should really look upon that our tax
20 dollars have paid for in our contribution to the
21 agency and the UN agencies and take advantage and go
22 on download all those documents for free at the IAEA's
23 website. I mean there's a lot of a good reading, a
24 lot of good reference material in there. You can go
25 and read in more detail if you want about what

1 difference countries are doing, different kinds of
2 facilities are doing worldwide.
3 I just like to try to point people to that
4 because sometimes I think we sometimes overlook that.
5 It's out there. It's free. It's available. It's
6 good summary information, things like we're talking
7 about here this morning with an international
8 perspective.
9 MEMBER HINZE: Thank you. That helps.
10 Ralph, I'd like to follow up on something that you
11 were talking about with your integrated program with
12 EPRI and particularly concerning new facilities. Has
13 your work -- Has your review of this situation
14 identified issues which have led to something other
15 than reports? Has this led to any research
16 activities, for example, on decontamination or the
17 implementation or the implanting of sensors into
18 subsurface that might give some clue as to the
19 migration of fluids? We've heard about this as a
20 problem. Do we see any real research going on in how
21 to improve our ability to do decommissioning of new
22 facilities?
23 MR. ANDERSON: Yes. I touched lightly on
24 that but actually there is a very strong technology
25 development and technology transfer program. Looking

1 at an issue like better ways to monitor groundwater is
2 more one of technology transfer just because it's not
3 specifically nuclear/radiological focused. So there
4 is an effort to understand better how to draw in, to
5 use Larry's phrase from earlier, off-the-shelf
6 technologies and reapply them to our needs.
7 From a technology development point of
8 view, probably a good example I could give is a
9 process that's actually been used several times now.
10 It's called DFDX which stands simply for
11 decontamination for decommissioning where existing
12 processes that were being used for large system and
13 component decommissioning were taken to the extreme
14 with the understanding that you couldn't use it in an
15 operating plant because you would destroy the systems
16 in the way but very aggressive full-system
17 decontamination to use at the start of a project just
18 to knock down if nothing else the overall dose rates
19 and so forth and it's had a very beneficial impact on
20 worker efficiency and on dose reduction. Now it's
21 something that needs to be applied with great thought
22 to make sure which situations it works for.
23 But the answer is yes, there are actual
24 projects aimed at technological development. I would
25 suggest that either at a future date or in follow-up

1 something more specific from EPRI on that you'd
2 probably find quite interesting and I can try to
3 arrange that.
4 MEMBER HINZE: I'm sure we'd find it very
5 useful. There's a lot of technological development in
6 terms of sensors that could be inserted into the earth
7 and you get tomographic visualization and in terms of
8 fluid migration or determining the amount of material
9 that needs to be excavated, these kind of things, this
10 could be very useful in trying to solve some of those
11 problems if you had a heads-up and you could put these
12 into the earth at the new sites. There's a lot that
13 could be done. Certainly the technology will change,
14 but at least you would have a change using at least
15 the present day technology. I'll pass.
16 MEMBER CLARKE: Mike, I think you have one
17 more question. Excuse me. We are ahead of schedule,
18 but I'd like to stay ahead of schedule.
19 CHAIR RYAN: Okay.
20 MEMBER CLARKE: And maybe break in about
21 five minutes if we could do that.
22 CHAIR RYAN: Sure.
23 MEMBER CLARKE: And the reason is we've
24 just given you an in situ homework assignment and
25 we're going to need that 15 minutes. So go ahead,

1 Mike.

2 CHAIR RYAN: A follow-up, Ralph. I think
3 about INPO measurables based on what you were just
4 talking about and boy, those have really had an
5 impact. If you think about outages are very short,
6 contamination circumstances throughout the plant are
7 generally much lower than they've been in the years
8 past, contamination events like overflowing tanks and
9 sumps and all that sort of stuff are the exception
10 rather than more common than they have been in the
11 years past and that to me comes together with a graph
12 you've shown us before which is the doses per year per
13 plant are just going right down and I think that
14 speaks to this idea that the current plants, let's say
15 a plant for whatever reason decommissions in 2020,
16 it's going to be in a better starting place than it
17 would have been in 1980. So I think that's a -- And
18 that kind of ties, Bill, to a little bit of what
19 you're saying.

20 We haven't touched on how that's had an
21 impact, but could you maybe speak to the idea of the
22 INPO measurables and how that process that's been
23 implemented in the industry has had an impact?

24 MR. ANDERSON: Yes, there are three that
25 come to mind. One is collective dose and the second

1 one is rad waste volumes and the third one is
2 contaminated square footage within the plants and each
3 of those was brought into play specifically to cause
4 things to go in the right direction. There was
5 aggressive goal setting on a five year basis. The
6 goal setting was a product of plants developing their
7 own plans for improvement and then really just
8 sticking the median of what people projected they were
9 going to accomplish in the next five years and then
10 this process over the last 15 years has had a dramatic
11 effect in all three areas.
12 In the dose reduction area, you've seen
13 those graphs and we continue to track that and
14 continue to try to drive down. We are considering how
15 we -- We brought the doses low enough. We're
16 considering how to refocus that indicator to
17 incorporate individual dose.
18 Volume reduction is an interesting one
19 because we drove it down so far that we actually gave
20 it up as a performance indicator. Economics have
21 taken over certainly as well, but the point is that
22 those graphs are even more dramatic than the graphs
23 associated with dose reduction. So we actually
24 stopped tracking it because the ability to further
25 reduce volume is such a minuscule increment that it

1 was almost meaningless to be projecting out on a five
2 year basis.
3 Contaminated square footage is one that we
4 continue to work at. It's been de-escalated to being
5 a high level indicator and again it's a victim of its
6 own success. But all of those were created with a
7 problem in mind that we wanted to address and really
8 got very much at the word you mentioned earlier which
9 was optimization. We've reached some level at which
10 we thought we were probably beginning to see kind of
11 a cyclic behavior with the exception of dose.
12 CHAIR RYAN: Some of the coolant water
13 quality criteria have a very direct effect on
14 contamination conditions in plants.
15 MR. ANDERSON: As well as source term in
16 general.
17 CHAIR RYAN: Sure.
18 MR. ANDERSON: Yes.
19 CHAIR RYAN: Okay. Thanks. So I think
20 there's a dimension here of just operational
21 parameters that kind of directly relate to this issue
22 of what I'm going to face if I face decommissioning at
23 some point in the future. Thanks.
24 MEMBER CLARKE: Thank you. Thank you all.
25 Before I do anything too rash, Derek is our first

speaker for the second session here.

MR. WIDMAYER: Yes, he's here.

MEMBER CLARKE: Yes. Okay. Then let's take an hour and let's resume at 1:15 p.m. Thank you. Off the record.

(Whereupon, at 12:16 p.m., the above-entitled matter recessed and reconvened at 1:15 p.m. the same day.)

MEMBER CLARKE: The first speaker for this session is Tom Conley. He is the Program Director for the Radiation and Asbestos Control, Kansas Department of Health and Environment.

And thank you, Tom, for coming. You are a representative from an agreement state. And you will share with us your perspective of decommissioning lessons learned from the viewpoint of the states that are regulating decommissioning efforts under agreements with the NRC. So thank you for coming. It's all yours.

MR. CONLEY: I thank you for inviting me. I do appreciate it. And on behalf of the states, I thank you.

In preparing for this, I did speak to some of the other states. I've got some ideas and some things that I'm going to touch on here and I won't go

1 into a great deal of detail on those because I'm not
2 that familiar with those types of things.
3 Okay, what I'd like to do is, like I said,
4 talk about some of the things some of the other states
5 have fed me and talk about some of these specific
6 things that we have learned in the State of Kansas
7 with some of the issues that we have had. We have had
8 some interesting decommissionings.
9 And so basically what we have learned is
10 that the keys to control costs are prevention,
11 regulation, characterization, and disposal. I'm going
12 to go through -- try to go through each of these and
13 discuss them in a little more detail.
14 Prevention is just what it sounds like.
15 You heard a great deal about that this morning and
16 most of what you have heard applies to not only the
17 large nuclear facilities, the power plants, DOE
18 facilities, but it can also apply to the smaller
19 licensees such as the ones that we states deal with.
20 We typically deal with a lot smaller
21 facilities. The biggest problem now is the cost.
22 Getting a small facility to spend money up front to
23 save them money in the long run is very difficult to
24 do. But we do try.
25 Basically we try to look at the best

1 available technologies. Some of the things you heard
2 about this morning, surfaces, coatings, that sort of
3 thing. Ventilation systems, that is one that we have
4 had some issues with.
5 We have got some licensees that deal with
6 radiolabelling organic compounds for research. Those
7 can be quite interesting. We've got a couple of
8 facilities that -- well one in particular that got
9 away from them. What they didn't have was detection
10 and monitoring systems.
11 Some of the things the other states were
12 talking about to me was retention pond designs. The
13 ones that I talked to, particularly Colorado and Texas
14 who have uranium mills, tailing ponds, you know, that
15 sort of thing, things they have learned is leachate
16 detection, using liners, pond liners, that sort of
17 thing. Like I said, that is out of my expertise. But
18 you've heard a number of speakers this morning talk
19 about similar things.
20 All right. Monitors, one thing that is
21 important is finding the problem areas before they
22 become major issues. Area monitors, exhaust monitors
23 on your ventilation, those can help you identify
24 problem areas before they become major decommissioning
25 issues.

1 When you've got, for example, one licensee
2 we had -- we are still dealing with, their fume hoods,
3 where they are dealing with organic vapors, to save
4 money he liked to turn them off at night. The end
5 result was every plastic surface in the building was
6 contaminated. His computer, everything from the front
7 door to the back. And that is one of the things that
8 we are dealing with.
9 We've had issues with culture. The
10 licensee's culture, the decommissioning is not in the
11 forefront during startup, particularly with these
12 small companies. It is kind of like retirement. You
13 don't think about it when you are 20. You think about
14 it when you are old like me. And then you start
15 wondering well how are you going to feed yourself for
16 the rest of your life.
17 But it is incumbent upon us as regulators
18 to educate them and try to point these things out.
19 Decommissioning also comes when the income goes away.
20 They are trying to get it done as quickly and as
21 cheaply as possible. And I'll give you an example of
22 a site that we have got and we are working with right
23 now.
24 It is two companies, both make
25 radiolabelled organic compounds. One wants to get out

1 of the business and sell it to the other. The one
2 that wants to get out of the business is in a real big
3 hurry to sell it and sell the facility to the other
4 company. They are in a big hurry to buy it but what
5 they haven't thought about is the potential of what
6 they are getting into.
7 The facility was in place for 20 years.
8 We've had regulatory issues with them in the past.
9 There is potential for contamination of the site
10 outside of the laboratories. We expect contamination
11 in the laboratories and we expect that to transfer
12 over to the new company which they are willing to
13 accept.
14 What they don't expect or don't expect to
15 happen is to find the soil on the property to be
16 contaminated. What we have done as the regulatory
17 agency is we have required the seller to do a site
18 characterization survey so that everyone knows what
19 they are getting into and so that we can have the
20 proper responsible party address any issues that are
21 identified.
22 That is going on right now so I don't
23 really have any detailed information of what may or
24 may not have been found there.
25 Regulatory issues, again, you heard this

1 this morning. Address decommissioning during the
2 licensing process. We are not doing anyone any favors
3 by accommodating a company who wants to take shortcuts
4 up front and then end up spending a great deal of
5 money down the road trying to decommission the site.
6 It really is in their best interest for us, as
7 regulators, to help them through that process.
8 One thing that is needed -- you heard Hans
9 talk this morning about the differences in the
10 regulatory limits across the country -- the licensees
11 need clear clean-up standards. And that is something
12 that at this point doesn't exist. That is one of the
13 biggest frustrations I have had as a state regulator
14 is trying to figure out what standard to hold people
15 to.
16 And, you know, these standards really need
17 to be consistent. And be able to be translated
18 between different agencies. We deal with EPA. We
19 deal with our own environmental remediation people,
20 our own waste management people. We all need to
21 basically speak the same language.
22 During the inspection process is another
23 area that we found the one facility I talked about
24 earlier that got away from them is carbon-14 organic
25 compounds. During inspections, the inspectors need to

1 be looking at these issues.

2 We tend to look at the here and now. When

3 you go in and you are doing a performance-based

4 inspection, you observe the daily operation, what is

5 going on right then. You need to be more imaginative

6 and think about what could be going on.

7 At this particular facility, the soil

8 outside, although there was never any indication of

9 releases exceeding the release limits, the soil now

10 does. It does exceed the unrestricted release limits.

11 It is because, we found out in this

12 process, organic vapors are not readily dispersible in

13 air so they go out the stack and settle out on the

14 ground very nearby.

15 Inspectors need to be aware of those

16 things. Think about the facility that they are in,

17 you know, look around doors, get up on the roof, do

18 surveys, look downwind, that sort of thing. Identify

19 these things before they become issues that are going

20 to be very difficult to clean up later on.

21 It is a lot easier to clean up and a lot

22 cheaper to clean up a spill now than it is to let it

23 sit, you know, for 30 years and become a larger

24 problem. Identify these leaks, these pathways out of

25 the facility.

1 Another thing that is important is
2 characterization. We had another facility, a thorium
3 lantern mantel production facility. They shut down
4 operation in the late '80s, started to do a
5 decommissioning. They looked at it from a hear and
6 now standpoint.
7 We were doing our production in this part
8 of the facility. And we happened to know that over in
9 this other area, the radiation safety officer's office
10 was contaminated. So they cleaned up those areas.
11 Then came to us with a final status survey and said we
12 are ready to terminate our license.
13 We looked at it and said no, you need to
14 look at the rest of the facility. So they went back
15 and did some more surveys, identified some more areas.
16 Again, tried to look at the site from a piecemeal
17 standpoint. And ended up they -- I don't know the
18 numbers but I suspect that they could have cleaned the
19 place up for probably a fourth of what they ended up
20 spending on it.
21 It turned out it is a site that covers
22 about a square block almost -- two- to five-story
23 buildings. And they went in and deconned specific
24 areas. And what they ended up doing in the final
25 story was they ended up basically taking the entire

1 facility back to the original surfaces and demolished
2 a number of the buildings on site.
3 All the work that they had done up until
4 then was wasted money because they simply went back
5 and redid it because they didn't look hard enough.
6 They need to look at everything, especially these
7 older facilities. That facility had been in operation
8 since 1909.
9 Had they done surveys looking everywhere,
10 they would have found the lantern mantels material
11 that they used for insulation around windows. They
12 would have found the material they used as a filler in
13 penetrations. They would have found the 50-some-odd
14 penetrations into the main sewer line that not even
15 the city knew about, the hidden rooms underneath
16 basement floors.
17 Had they been keeping track of things all
18 along like you've heard this morning, they would have
19 known about a lot of those things. Like I said,
20 hidden rooms, contaminated fire pits under the parking
21 lot.
22 That was an interesting item. It was a
23 parking lot they used for -- employees used for
24 baseball games. At one point, they paved it over
25 right over a fire pit, complete with -- I think it

still had some charred wood that was contaminated even.

The exhaust systems, tracking long-term plumes, like I said, in the one facility that as far as we have ever been able to tell, they never exceeded any of the release limits or the effluent release limits. But the soil outside the facility, out the back door, does now exceed the unconditional release levels.

A good indication or a good way to look is look at wind rose plots when you are doing inspections, you know? Get a wind rose for that area. If you have got a facility that is routinely releasing material and look in the predominant directions. Like I said, they are not necessarily as readily dispersible as you may think.

Ground water issues, uranium tailings impoundments -- like you heard this morning, pond liners, leachate detection systems, finding the problems before they get out of hand.

Another issue we have, we deal with quite a bit is solvent issues. We have a lot of radium dial shops in Kansas, being the air capital of the world. Radium dials are fixed by stripping them with solvent and repainting them. That solvent carrier the radium

1 through the soil. It is real good for killing weeds
2 which is a problem.
3 With large sites, we need to come up with
4 creative ways to deal with these large volumes of
5 waste. Either creative ways to decrease the
6 concentration or just reduce the volume of waste. You
7 know like you have heard over and over, the disposal
8 costs are a major part of the costs involved with
9 decommissioning. Anything you can do to reduce that
10 volume reduces your costs within reason. You can
11 increase it if you are not careful.
12 And there are other reclamation issues.
13 You can -- you know if you get into an area where you
14 essentially make a strip mine, then you have got other
15 reclamation issues you have to deal with just because
16 you have removed all the topsoil. Then you have got
17 to replace that.
18 Disposal, major contributor of the cost.
19 You've heard it this morning and I'll say it again.
20 We need competition for disposal options. We need to
21 minimize the volumes and better characterize what we
22 have got before you even start and as you are
23 disposing of it. You've got to meet the disposal site
24 criteria.
25 But you can -- a lot of times we are

1 tempted to be conservative with how we do our
2 analysis. We err on the side of conservatism. That
3 can be carried too far. But that is a good thing.
4 And it may sound strange to hear a state regulator say
5 that but it can be carried too far.
6 You know I would rather err on the side of
7 conservatism but also not so far that you put people
8 completely into bankruptcy and you end up, as a state,
9 having to take over the site yourself. And, like you
10 have heard before, don't dispose of more than
11 necessary.
12 Here is a picture of what happens or what
13 can happen with discrete sources. The Energy Policy
14 Act 2005, NRC now has authority over discrete sources
15 of radium-226. Radium dials fall into that
16 definition. This is a site -- the building itself is
17 about 20 by 40 feet. It was a radium dial shop.
18 These numbers are in micro-r per hour. If
19 you look in the red area, the soil concentration in
20 that area is up to about 12,000 picocuries per gram
21 radium.
22 These were licensed activities with
23 discrete sources. So this is something to take back
24 to the NRC. This is what they are getting into with
25 discrete sources of radium. And we are working with

1 these people to clean this up.

2 Some of these are in very interesting

3 locations. This particular site -- north is at the

4 top. On the east is a residence. On the south is

5 another residence. On the west is an alley. Across

6 the alley is Birthright. You can imagine the stares

7 we got when we were going out doing these surveys.

8 But in summary, basically to achieve the

9 most cost-effect end result, you have got to plan from

10 the beginning, from the first day of operation all the

11 way through decommissioning until you are complete.

12 We need to take a hard look at preventive measures,

13 the regulatory issues, and plans for characterization

14 and disposal.

15 I can't stress enough how important it is

16 for the regulators to first of all speak the same

17 language, give a clear direction to the licensees, and

18 to work with the licensees to achieve our common goal,

19 which is the protection of the health and safety of

20 the public.

21 And with that, I'll defer the questions

22 until later as I understand. So thank you for the

23 opportunity to speak to you.

24 MEMBER CLARKE: Thank you, thank you, Tom.

25 Our next session is a panel from the NRC.

1 And let me tell you who they are: Rafael Rodriguez
2 from the Decommissioning Directorate of the Office of
3 Federal and State Materials and Environmental
4 Programs, William Ott, from the Waste Research Branch
5 of the Office of Nuclear Regulatory Research, Steven
6 Koenig, from the Division of New Reactor Licensing of
7 the Office of New Reactors, and Jim Shepherd, also
8 from the Decommissioning Directorate of the Office of
9 Federal and State Materials and Environmental
10 Programs.
11 We appreciate that your folks are very
12 early in the regulatory guidance process. And what
13 you share with us is very preliminary. We know that
14 and we appreciate that.
15 The Committee has benefitted greatly from
16 early involvement in decommissioning efforts and we
17 appreciate your willingness to give us a feel for
18 where you are now and how you are approaching your
19 work. So thank you.
20 Rafael, it is all yours.
21 MR. RODRIGUEZ: Oh, thank you.
22 Good afternoon. My name is Rafael
23 Rodriguez and I am a project manager in the Division
24 of Waste Management and Environmental Protection. And
25 this afternoon I'm going to give you an update of the

1 staff efforts on decommissioning lessons learned.

2 Basically the outline for my presentation

3 is going to be as follows. I'm going to briefly talk

4 about the accomplishments of the staff since the last

5 meeting to the ACNW in summer of 2005.

6 Also I'm going to talk about the current

7 efforts that the staff is pursuing to capture and

8 preserve decommissioning lessons learned. And finally

9 I'm going to briefly touch on the subject of

10 incorporating the lessons learned into the design and

11 construction of new facilities.

12 The last time we met with the ACNW back in

13 2005 we briefly discussed what the staff was going to

14 do at that time. As of now, the staff has published

15 roughly 23 lessons learned in the public website.

16 These lessons learned have been obtained from ongoing

17 decommissioning projects within the Directorate.

18 Just to give you a quick summary of these

19 lessons, some of the lessons identified, which are

20 included in the public website, include coordination

21 between licensees and NRC staff as well as

22 coordination between licensees and all regulatory

23 agencies involved in the decommissioning process, not

24 only the NRC, adequate characterization of the site

25 before starting decommission activities, and how

1 important it is. And also the use of realistic
2 scenario and some of its benefits.
3 We also -- the working group, so to speak,
4 the NRC is working right now with members of the
5 Electrical Power Research Institute, the Fuel Cycle
6 Facilities Forum, the Organization of Agreement States
7 and we have this working group assembled to develop
8 ways to capture and preserve decommissioning lessons
9 learned.
10 And the working group published a
11 preliminary bibliography that contains documents that
12 in some way touch the subject of decommissioning
13 lessons learned. And this bibliography was published
14 in early 2006. And this bibliography, it is intended
15 to serve as guidance for licensees and stakeholders
16 rather than an all-inclusive source of information.
17 Also, the NRC staff participated in a
18 panel discussion on the decommissioning lessons
19 learned during the Waste Management Conference 2006,
20 this past February.
21 And finally, the staff is assisting the
22 Office of New Reactors and the Office of Nuclear
23 Reactor Regulation as well as the Office of Nuclear
24 Regulatory Research in developing documents for new
25 reactor licensing.

1 And this item basically addresses the idea
2 of using the lessons learned that are being captured
3 from current decommissioning projects and
4 incorporating those lessons into the design and
5 operation of new facilities, thus leading to the
6 concept of less environmental impact and more
7 efficient decommissioning.
8 There are current efforts that the staff
9 is pursuing to capture and preserve decommissioning
10 lessons learned. The staff recently updated the
11 decommissioning lessons learned web page and I'm
12 providing the weblink so people can take a look at
13 some of the new lessons that are being published.
14 In addition to that, the working group is
15 also focusing on other mechanisms to capture and
16 preserve decommissioning lessons learned. Right now,
17 the staff -- the working group is using the NRC's
18 public website as the repository. But the working
19 group is also working on other mechanisms to develop
20 a more aggressive approach so to speak instead of just
21 relying on this public website.
22 And finally we are engaging in discussions
23 with DOE on the subject of lessons learned. And DOE
24 successfully interacted with the staff in a meeting
25 with the working group that was held this past August.

1 And the working group expects to have more
2 interactions with DOE staff in the future to
3 facilitate the exchange of information and ideas.
4 So regarding the subject of incorporation
5 of lessons learned into the design and construction of
6 new facilities, as recent as last month, October 2006,
7 the Division of Waste Management and Environmental
8 Protection issued a memo to the Office of Nuclear
9 Reactor Regulation and the Office of New Reactors.
10 And this memo provided a list of high-
11 level lessons learned. And I'm providing the session
12 number for those members of the industry and the
13 public that would like to take a look at the document.
14 Obviously this document was based on a
15 review of several references that discuss
16 decommissioning lessons learned. And the staff
17 selected those lessons learned that it felt were at a
18 very high level. And the selection was based on
19 decommissioning experience from the staff in the
20 division.
21 This input will be used by the Office of
22 Nuclear Reactor Regulation for an updated version of
23 NUREG-0800, which is the standard review plan for
24 reactor licensing. And also the input is going to be
25 used by the Office of Nuclear Regulatory Research to

1 develop a RegGuide for new reactor licensing.

2 So basically this is a quick summary of

3 where we are right now in terms of decommissioning

4 lessons learned. So obviously, we are going to

5 address any questions later in the meeting.

6 Thank you.

7 MEMBER CLARKE: Thank you, Rafael. I

8 don't know your sequence. Bill Ott, are you next?

9 MR. OTT: I don't know. I am here.

10 MEMBER CLARKE: Thank you.

11 MR. OTT: I am just going to start off

12 with this because basically what I want to at least

13 leave you with was the impression that there is a lot

14 of things going on in the Commission right now. There

15 is the Standard Review Plan development that Steve

16 Koenig is going to talk to you about when he gets

17 here.

18 But there is the work that Rafael is doing

19 and the work that Jim Shepherd will describe later.

20 And then there is the Regulatory Guide development.

21 They don't all necessarily have the same

22 single objective. And they aren't necessarily all

23 inclusive. In other words, Rafael is very much

24 focused on what his staff has learned from

25 decommissioning. The scope of the activities in the

1 Office of Research are directed at all phases of
2 20.1406, which I will get to in a second. And that
3 goes far beyond decommissioning.
4 What I have tried to show here is that we
5 have got a rulemaking going on, which is what Jim
6 Shepherd will talk about in terms of modifications to
7 20.1406. We have got this guidance development work
8 going on in the middle. And that includes both the
9 Standard Review Plan and the development of a
10 Regulatory Guide. And I will get into that in more
11 detail in a minute.
12 And then at the bottom, we've got the
13 parallel activities going on by NEI and the industry,
14 which were discussed this morning.
15 We can keep this handy-dandy little chart.
16 We tried to put ML numbers in there when documents are
17 available. We are going to be trying to make this
18 accessible in a way that anybody can get to it and see
19 what the latest is.
20 Okay, 20.1406 was the modification to Part
21 20 that was issued in 1997, 1998. And the interesting
22 things about it are that the language in the rule
23 presently addresses licenses other than renewals. It
24 didn't speak specifically to things like standard
25 design. It just said applicants for new licenses.

1 There are questions about how that applies
2 to standard designs that are currently being
3 addressed. There is a Part 52 rulemaking that is
4 before the Commission right now which essentially says
5 that it does apply to standard plant designs. There
6 are also two sections of it. And I'm not going to go
7 into that in detail.
8 This is the regulation as it stands right
9 now. And it says that the objectives of the
10 regulation are to minimize to the extent practical the
11 contamination of the facility and the environment,
12 facilitate eventual decommissioning, and minimize to
13 the extent practical the generation of radioactive
14 waste. Only one of these specifically refers to
15 decommissioning.
16 The other two would of necessity lead you
17 to think of the entire life cycle of the facility in
18 applying developing guidance that would help you
19 review at the design stage how well you have achieved
20 each one of these goals.
21 Now if you will look at the history of
22 20.1406 since it was promulgated, we haven't reviewed
23 any reactors since August 1997. We haven't had any
24 new applications to review. There is no effort to
25 develop guidance.

1 And listening to Ralph Anderson this
2 morning, he said that was one of his problems with the
3 way the Commission does business sometimes. They put
4 out rules and don't develop guidance to go with them.
5 In this particular case, the modification
6 to Part 20 was a very small part of those
7 modifications that were issued in 1998. The first
8 standard design reviews did not address this issue.
9 One of them came in and asked us how to do it. The
10 others just went through the process and there was no
11 consideration given to 20.1406.
12 Multiple independent publications may
13 provide relevant information. And I think it was
14 clear from this morning that there is a lot of
15 information out there than can be gleaned from the
16 decommissioning of old sites. Probably not the only
17 place to look for information but it is certainly a
18 very good place.
19 Another place to look is documentation of
20 problems at existing facilities and existing sites
21 that haven't yet gone into decommissioning. And this
22 is one of the reasons why listed on that diagram is
23 the report of the Lessons Learned Task Force on
24 Contamination, quite often referred to as the Tritium
25 Task Force, which I understand you heard about

1 yesterday.

2 We have passed those on to the contractor

3 that is helping us with developing a technical basis

4 for this RegGuide. And those are certainly issues

5 that we think need to be addressed or at least

6 considered in developing the guidance.

7 I was really interested this morning in

8 the description of the IAEA information available and

9 how readily available it was in terms of being out

10 there and accessible to everybody.

11 I wish that were also true of EPRI

12 documents. We are aware of a number of documents in

13 EPRI that probably would be extremely valuable in

14 developing the guidance. We have access to them at

15 the staff level but we have difficulties in

16 transferring the information. So we have an

17 accessibility problem with regard to EPRI

18 documentation which we are trying to solve -- have

19 been trying to solve for the last three months with

20 limited success.

21 The scope of the guidance development

22 effort, I've already mentioned this. The Standard

23 Review Plan and one of the things in our contract was

24 for the contractor to review not just -- not the

25 Standard Review Plan but the Regulatory Guide

1 structure.

2 What NRR requested us to do is develop a
3 standalone guidance for 1406. But if you look at the
4 Standard Review Plan in the existing Regulatory Guide
5 structure, we could easily run into situations where
6 we can provide guidance on 1406 implementation that
7 might run contrary to guidance in other parts of the
8 existing Regulatory Guide structure or the Standard
9 Review Plan.

10 So we wanted to find locations in the
11 Regulatory Guide structure that addressed issues that
12 we thought should receive consideration from a 1406
13 perspective, from that direction. And the report from
14 our contractor on that comprehensive review of the Reg
15 Guide structure is, I believe, due in January. It is
16 on the diagram that I passed out.

17 In addition, we've got the work that
18 Rafael discussed, the compilation of lessons learned.
19 We have a lessons learned document that our contractor
20 is supposed to be developing. He is trying to look at
21 IAEA documentation, everything opined in the
22 literature, EPRI documents that are available. And
23 there are previous NRC reports that have discussed
24 lessons learned.

25 The last slide is a slide on milestones.

1 And this just discusses -- it says what our schedule
2 is. NRR has committed to publish the Standard Review
3 Plan final in March.
4 They have committed to publish the graphic
5 Standard Review Plan in January. They would like us
6 to get as much information to them as we can in terms
7 of the technical basis development, which we are. We
8 are providing weather reports and pre-decisional
9 information to NRR as we get it for their
10 consideration.
11 But the general process of putting
12 together a Regulatory Guide is going to wind up with
13 us providing them with an actual draft of the guide in
14 April. We expect to go out for public comment in
15 July.
16 If we are able to accelerate that
17 schedule, we will. But at the present time, this
18 looks to me like a complicated enough document that I
19 am not certain that we will be able to do any
20 acceleration.
21 And that's basically all that I wanted to
22 discuss today. I just wanted to tell you where we are
23 in the process we are following to try and develop
24 guidance for 1406 and include in that guidance
25 development information that we are getting from FSME

1 and other sources on lessons learned in
2 decommissioning.
3 MR. KOENIG: Excuse me. This is Steve
4 Koenig with NRR. And sorry I showed up at two o'clock
5 when we started. So I apologize for being late but I
6 can expand on what we are doing for the Standard
7 Review Plan.
8 MEMBER CLARKE: Steve? I guess you are
9 next, aren't you? I don't know.
10 MR. KOENIG: Am I next? It is really hard
11 to take these two and separate them because they are
12 really tied together.
13 MEMBER CLARKE: That's fine. We broke
14 early for lunch and you didn't realize that, I'm sure.
15 So please go ahead.
16 MR. KOENIG: Okay.
17 MR. OTT: Do you have any slides?
18 MR. KOENIG: I don't have slides.
19 MR. OTT: Okay.
20 MR. KOENIG: Good afternoon. I'm Steven
21 Koenig. And I'm leading the Standard Review Plan
22 update effort as Bill Ott had mentioned. We are on
23 track to issue a revised SRP by March 31st.
24 This is to be in effect six months prior
25 to the docket date of an application as specified by

1 right now it is 50.34(h) which is the regulation that
2 says an application has to consider the Standard
3 Review Plan in effect six months prior to the docket
4 date of an application. That is how we backtrack from
5 a combined license application submittal in September
6 to have our SRP schedule to track to March 31st.
7 I presented to the ACRS a couple of times
8 but this is the first time to the ACNW so I can go
9 back and provide any additional information as to the
10 approach with the Standard Review Plan.
11 But basically in order to meet that March
12 31st date, we are not issuing this revision for public
13 comments. We are making preliminary SRP sections
14 publicly available in advance of this March time
15 frame. But we are not issuing them for public
16 comment.
17 We did not have time to meet that schedule
18 to go through an iteration of here it is for public
19 comments, take all the public comments, incorporate,
20 and then issue a revision. We opted for this route of
21 publishing a revision.
22 As you know -- or may or may not know, we
23 attempted to update the Standard Review Plan. We have
24 been attempting to for a long time. But we tried in
25 earnest to do it in 1996 and we issued a draft

1 document.

2 We have not issued a final document and we
3 are still somewhere in between for the majority of
4 sections. We are in a position where we have a draft
5 in '96 and we have a last official document in 1981.

6 So the approach we are taking is to have
7 a baseline -- this is is -- March 31st. And by way of
8 our regulation, the applicant does a comparison
9 against the acceptance criteria contained in the
10 Standard Review Plan and they state whether they are
11 following the acceptance criteria or whether they are
12 deviating from that in order to satisfy our
13 regulations, which is what they are supposed to do.

14 The bottom line is that the Standard
15 Review Plan is not a substitute for the regulations.
16 That is what they have to meet. The acceptance
17 criteria is one approach that we have found acceptable
18 for meeting that. So that is why we can go forward
19 with this revision without public comment. Okay?

20 What we are doing with 20.1406 is we were
21 looking through the applicable sections and it is
22 really Chapter 11 and Chapter 12. Chapter 11 is
23 radioactive waste. And Chapter 12 is radiation
24 protection.

25 We looked through the applicable sections

1 and what we are doing is we are articulating that
2 20.1406 is an applicable regulation. And we are
3 providing high-level interim acceptance criteria in
4 advance of the Regulatory Guide that Mr. Ott had
5 discussed, okay?
6 So -- and this high-level acceptance
7 criteria is really just a reference to this lessons
8 learned report as something to consider. But as Mr.
9 Ott described, this is a very complex issue.
10 We don't want to put something in that
11 hasn't been well thought out, well conveyed. So we
12 are going with interim acceptance criteria.
13 The applicant is supposed to demonstrate
14 how they satisfy our regulations. And we are
15 providing them that, like I said, interim criteria.
16 Okay? So that is really it in a quick discussion of
17 the Standard Review Plan.
18 I'd be happy to field specifics.
19 MEMBER CLARKE: Steven, thank you for
20 that. And as I said in my introductory remarks that
21 you may not have heard, we know you are early in this
22 and this is preliminary. And we appreciate your
23 willingness to share with us, you know, how you are
24 approaching it.
25 So if you can stay, we will entertain

1 questions after the next presentation.

2 MR. KOENIG: Okay.

3 MEMBER CLARKE: And you are certainly

4 welcome to stay for that.

5 MR. KOENIG: Okay. Thanks.

6 MEMBER CLARKE: Thank you.

7 Jim Shepherd?

8 MR. WIDMAYER: It might be a good time for

9 a break. I had to send an emissary to find Jim. I

10 think he was waiting until a later time.

11 MEMBER CLARKE: Yes. Somehow they didn't

12 get the word. Okay. Yes, how about ten minutes?

13 Will that do it, Derek, do you think?

14 MR. WIDMAYER: I hope so, yes.

15 MEMBER CLARKE: Let's break until 25

16 after.

17 (Whereupon, the foregoing

18 meeting went off the record at

19 2:12 p.m. and went back on the

20 record at 2:30 p.m.)

21 MEMBER CLARKE: Okay. We have one more

22 speaker on the NRC panel, Jim Shepherd. Thank you,

23 it's all your's.

24 MR. SHEPHERD: Okay. Thank you, Dr.

25 Clarke. It's a pleasure to be here for a quarterly

1 briefing on the status of the Rule Making. I'll begin
2 with a little background for those of you who aren't
3 completely familiar with where we are, some of the
4 operational requirements, what we have in mind for
5 legacy site prevention, and then an update on our
6 proposed action.
7 We began about four years ago actually
8 reviewing the license termination rule, and how to
9 best implement it. One of the things we looked at in
10 SECY-03-0069 was to identify actions that we, the
11 staff, could take to reduce the likelihood of future
12 legacy sites by changing operational requirements and
13 some funding requirements for plants.
14 We previously discussed this with the
15 committee a few months ago on a proposed rulemaking,
16 and a little over a year ago, the results of our first
17 study to identify the types of sites that were most
18 likely to contribute to this legacy problem.
19 Okay. Here we are. We're looking at,
20 first of all, revising contamination control both in
21 the design of new facilities, and in the monitoring
22 for existing facilities, enhancing the NRC oversight,
23 primarily the inspection program, and for changes to
24 risk-informed Subparts E and F to Part 20, as part of
25 the increased monitoring requirements.

1 Monitoring for the contamination can occur
2 inside the facility through existing instrumentation,
3 sumps, and so on, walkdowns, whatever. Outside the
4 facility, there's case of surface deposition.
5 Monitoring in the subsurface, by definition, would
6 require some kind of subsurface wells that would take
7 samples either of the soil, or of the groundwater.
8 And we believe there should also be a plan to respond
9 to identification of a release. If a facility
10 identifies a problem, they should have a plan in place
11 as to how to address that problem.
12 Initially, we begin changing, or
13 considering changes to 10 CRF 20.1406. It currently
14 applies only to new applicants. We would change that
15 exclusion and apply it to everyone, but it would
16 require a reply only to certain classes of licensees,
17 those that, in fact, have the physical ability to
18 cause contamination in subsurface. The reason is,
19 what we found is that the subsurface contamination is
20 essential to the dramatic increase in decommissioning
21 costs that we've seen. If someone doesn't have this
22 stuff migrating through the subsurface, it's not
23 generally going to have a large impact on
24 decommissioning. The problems have been small leaks
25 over long periods of time that have migrated 10, 20,

1 30 years, and now, rather than having a few tens of
2 square meters contaminated with a few hundred or a
3 couple of thousand gallons of fluid, we now have
4 literally millions of cubic feet that need to be
5 excavated, disposed, handled, and so on.
6 The working group looked at the initial
7 proposal and said, number one, we need to ensure that
8 the scope of the applicability of this rule is
9 appropriate, that we do not include those sites that
10 shouldn't really have to do this enhanced monitoring,
11 that we do not exclude those that really should be
12 doing it.
13 Secondly, it pointed out that there are,
14 in fact, existing survey requirements in Subpart F of
15 20.1501, in addition to the very general requirements
16 in 1406, and that we should consider addressing those,
17 rather than limiting the changes to 1406.
18 Since our last briefing, NRR, or NRO, I'm
19 not sure which, has proposed some revisions to the
20 existing 20.1406 to accommodate Part 52, the approval
21 of the new license applications. They have included
22 or excluded certain parts of Part 52 from this. In
23 particular, the early design, or the early site
24 permit, there's nothing there to monitor, so they
25 would be excluded. The manufacturing licenses

1 wouldn't need to do anything. Only when we get to the
2 combined operating license would there be direct
3 applicability.
4 In response to that, we would then
5 consider adding what would now be Subparagraph C, that
6 the licensees must identify and minimize contamination
7 in the facility and the environment, including the
8 subsurface, so we would specifically include a
9 statement on subsurface monitoring.
10 20.1501 currently says "necessary and
11 reasonable surveys to define the magnitude and extent
12 of radiation." It does not specifically say that
13 should include the subsurface, but it can be
14 interpreted that way. What we are considering in
15 order to clarify that is a new 1503. We would limit
16 the applicability to those that have enough material
17 to cause a problem, which we will use the existing
18 requirements for financial assurances, possession
19 limits, have relatively long-lived isotopes. We feel
20 that for the shorter lived isotopes, there are
21 provisions in the rule that we could simply delay
22 license termination, or issue a control license that
23 would allow those to decay, much as the material
24 facilities are already authorized for decay in storage
25 for the medical applications, for example. And we

1 feel that five years, 10-year half-life, or 10 half-
2 lives for decay would be adequate to address that.
3 And, also, the sites would have the potential for
4 unmonitored releases.
5 In order to do this, what we would
6 establish is a routine monitoring program beginning
7 with a definition of the site hydrogeology, as a basis
8 for the placement of the wells, then developing a plan
9 that would identify specific increments in the routine
10 monitoring in the case that radioisotopes generated by
11 the facility were found in the subsurface in
12 concentrations greater than background.
13 Along with that, we would have guidance to
14 the inspectors on how to review these programs. Tom
15 Fredrichs is working on some financial assurance
16 issues, specifically for those material sites whose
17 financial assurance is a function of a specific
18 decommissioning cost estimate, would be required to
19 include the results of this monitoring in that cost
20 estimate, and then the supporting guidance.
21 So that is where we are right now. There
22 is still considerable work to be done. I think, as
23 you've heard beginning yesterday afternoon with Stu
24 Richards talk through this morning, there is much
25 agreement, at least in principal on what should be

1 done in terms of monitoring. The question now is how
2 we do best implement that. I'm done.
3 MEMBER CLARKE: Okay, Jim. Thank you.
4 What we'd like to do now is entertain questions from
5 the committee and the panel to Tom Conley and to the
6 NRC folks.
7 MR. WIDMAYER: Yes. Theron told me there
8 is a limitation to the ability of the microphones to
9 pick up everybody over there, so we can add a couple
10 of folks.
11 (Off the record comments.)
12 MEMBER CLARKE: Yes. I think it's really
13 better if we can all see each other. Okay. Let's
14 start with Tom Nauman.
15 CHAIR RYAN: Tom, use the microphone,
16 please.
17 MR. NAUMAN: Just passing to someone else.
18 Please come back to me in a few minutes, Jim.
19 MEMBER CLARKE: Dave.
20 MR. KOCHER: I wanted to ask Tom Conley
21 something. He made a point in his presentation that
22 alluded to something that I speculated about before
23 lunch; and that is, situations where effluent release
24 limits are complied with, with no problem, but then
25 clean up levels are exceeded. And I understand that

1 he really can't talk about the particulars of this,
2 but I wonder if he would comment on, to the extent to
3 which this is a real problem, and his experience.
4 MR. CONLEY: Well, our experience has been
5 somewhat limited, in that we don't have too many
6 licensees that routinely release - have effluent
7 releases, but this particular licensee is one that
8 deals with radio labeled organic compounds, and in the
9 process of producing those compounds did have routine
10 releases out his fume hoods. And during all the years
11 of his operation and our inspections, we never
12 identified any releases that exceeded the effluent
13 release limits; yet, at this point, we've done soil
14 sampling out behind his facility, and there is
15 activity in soil that does exceed the unrestricted
16 release levels.
17 MR. KOCHER: I've got sort of a general
18 question for the NRC staff. Do you have some goal in
19 mind in terms of how much cleanup and decontamination
20 that you expect sites will have to do if they play by
21 the rules, as you foresee them? I realize you can't
22 get down to zero, but do you have some general idea of
23 where you'd try to get to? Have you decided that the
24 amount of cleanup activity that licensees are
25 undergoing today is just unacceptable, and we've got

1 to do a lot better than that? Sort of what do you see
2 as the grand vision of sort of the end state, if all
3 this works out right?
4 MR. SHEPHERD: We do not envision ongoing
5 cleanup during operations as a regulatory requirement
6 at this point. The decommissioning requirements
7 exist. Before a licensee can terminate its license,
8 it must meet 25 millirem for whatever land use and
9 pathways we agree to for an unrestricted release. I'm
10 not aware, at this point, of any move to change those
11 numbers.
12 Also, because of the wide variability in
13 the sites, and the potential for adverse interactions
14 between operations and decommissioning, we do not
15 envision at this point requiring any active remedial
16 activities during operation, as a result of a
17 measurement.
18 Having said that, certainly, if we go back
19 and look historically at large events that have
20 occurred, ruptures of condensate lines at reactors, or
21 major spills in materials facilities, that disrupts
22 operations, and generally they will go in and clean
23 things up to some level that is agreed to at that
24 time. It need not be the unrestricted release level
25 until they apply for license termination.

1 MR. KOCHER: Well, then this is a really
2 dumb question, and I apologize in advance for asking
3 it, but what is the problem that you're trying to
4 solve?
5 MR. SHEPHERD: The problem we're trying to
6 solve is, we have facilities that have ongoing leaks
7 that get into the ground water, generally, or disperse
8 otherwise through the subsurface, that create very
9 large volumes of decommissioning waste, that far
10 exceed the financial ability of the licensees to clean
11 up. We've had several materials sites that have
12 actually entered bankruptcy because they've been
13 unable to meet the requirements. A specific example,
14 Sequoyah Fuels Facility in Gore, Oklahoma; by their
15 estimate, they had between 10 and 11 million cubic
16 feet of material to clean up, and their estimated cost
17 is between $275-300 million, against a financial
18 assurance system of about $10 million.
19 CHAIR RYAN: Jim, could I ask just a
20 follow-up question that is related to the NRC and the
21 agreement states' point of view. I mean, as Jim has
22 pointed out, significant sites that kind of have the
23 NRC license in-hand, but there are literally thousands
24 of licensees in agreement states from very small to
25 significant, and I'm wondering how the hand-off is

1 going to happen between the developing guidance and
2 how the states use it, and interpret it. I guess the
3 question I'm asking is, how can a state be sure that
4 if they interpret one of the requirements in a way
5 that seems to make good sense, and good health and
6 safety practice, and meets those goals from a state's
7 perspective, that that's going to stand as being
8 satisfactory under an agreement state review. Who's
9 first?
10 MR. CONLEY: Well, I can say that our
11 experience has been that the -- what we have done has
12 been found acceptable during our IMPEP reviews. If it
13 were not, we would have had some discussions about it
14 in great detail.
15 CHAIR RYAN: Tom, do you think your
16 experience is reflective of agreement states, in
17 general, would you say?
18 MR. CONLEY: I think so. I think, in
19 general, it is. We're actually a very small state.
20 My materials program consists of five people. We've
21 got 300 licensees. We just finished probably - I
22 think one of the larger decommissioning projects in
23 the country quite successfully. So, yes, I think it's
24 -- our experience has been typical.
25 CHAIR RYAN: And just a short follow-up.

1 Do you think -- do you use the MARSSIM methodology?
2 MR. CONLEY: Yes.
3 CHAIR RYAN: I get fairly positive
4 comments when I ask about it, as being a relatively
5 uniform and relatively well-accepted, although there
6 are some questions that come up on it from time to
7 time, but somebody uses MARSSIM, I think a lot of
8 folks know what they're doing and why. Is that your
9 experience?
10 MR. CONLEY: I think so. Yes. I think
11 so. Obviously, MARSSIM has its limitations, and quite
12 frankly, I was -- at the beginning, I was not thrilled
13 with MARSSIM, until I started using it, and saw that
14 it does work. And I've become a believer.
15 CHAIR RYAN: Okay. So that connection
16 seems to be --
17 MR. SHEPHERD: I think so. We're
18 fortunate to have Tom on the working group for this
19 particular rule. And the situation he described a few
20 minutes ago has given us, again, pause to consider
21 exactly what wording we put in there in order not to
22 screen out. In fact, a related-type condition, Palo
23 Verde with their tritium contamination, their initial
24 explanation is that it is precipitation of tritiated
25 vapor going up the stack, rather than any releases

1 from the subsurface. I'm not a meteorologist, I'm
2 just skeptical, but we have had a number of other
3 facilities that have had reconcentration events, but
4 they are generally from some other physical process,
5 such as sewerage treatment plant, so this has raised
6 an interesting question. And, hopefully, with these
7 kinds of interactions as we write the rule, it will be
8 clear enough, both to the staff and to the agreement
9 states that there won't be a concern over the
10 implementation.
11 CHAIR RYAN: Thanks. I appreciate the
12 interruption.
13 MR. SHEPHERD: I'd say one other thing on
14 MARSSIM. Whatever its benefits may be, in Table 1.1
15 is a list of areas to which it does not apply. Two of
16 them, in particular, are groundwater and subsurface,
17 so we have to be a little more creative than just
18 reading MARSSIM.
19 MEMBER CLARKE: Thanks, Jim, Mike. Tom.
20 MR. NAUMAN: Yes. I'd like to follow up
21 a little bit deeper on what David was asking. Getting
22 back -- and sticking strictly with commercial reactors
23 and standard review plans for future reactors, and the
24 effects of this new ruling, or this new interim
25 guidance - what's the real driver, is it the cost for

1 future decommissioning 60 years out?

2 MR. SHEPHERD: The driver starting in 2003

3 was the fact that we had licensees that could not

4 afford to clean up the site, and that it was in a

5 highly contaminated condition; and, therefore,

6 presented at least a future potential exposure path to

7 public health and safety.

8 MR. NAUMAN: But that's not related to new

9 or existing commercial reactors. Correct?

10 MR. SHEPHERD: The current rule, as

11 written today, applies only to new applications.

12 MR. NAUMAN: Okay. Because in my

13 experience on decommissioning at Connecticut Yankee,

14 at Maine Yankee, at Yankee Row, interim

15 decommissioning at Dresden and other facilities, the

16 contamination that we're talking about due to leakage

17 paths, and the meeting the cleanup criteria was not

18 substantially affected, the total cost, as compared to

19 the decommissioning effort that was taking place.

20 MR. SHEPHERD: What I heard from Yankee

21 Row is that since they started decommissioning,

22 they've drilled 55 wells, three of them to over 300

23 feet. And I've heard cost estimates everywhere from

24 five to fifty million dollars. Well, maybe $50

25 million isn't substantial, but it still sounds big

1 when you're talking to the general public. We have
2 not had the problem that nobody's been able to afford
3 it. I mean, they've come up with the money.
4 MR. NAUMAN: Exactly, that's my point.
5 They have - if you look at the overall decommissioning
6 cost, it does not amount to 1 percent increase in the
7 overall cost. And Connecticut Yankee was probably one
8 of the worst cases with its leaking reactor water
9 storage tanks, and they knew were leaking ahead of
10 time, and they knew that they had the groundwater
11 contamination issues early-on. So I can't imagine
12 that predicting the effects of cost here is going to
13 help the re-licensing effort or gain substantial
14 benefit in the long run.
15 I'm somewhat concerned that we're throwing
16 out interim guidance in the middle of the standard
17 review plan process, without really doing a cost
18 justification of that effort. We're using things from
19 five to fifty million dollar estimates, as reasons for
20 going forward with this; whereas, my perspective
21 before was lessons learned for decommissioning was a
22 valuable bit of information to capture at this point
23 in time, because we're going to go into a period of 20
24 years, 30 years before we do any more decommissioning,
25 in reality, and we want to capture the things we've

1 learned and set it down for posterity to be used in
2 the future. But to hamstring new construction, new
3 plants based upon this information seems overly
4 ambitious here.
5 MR. SHEPHERD: Well, I think you're mixing
6 a couple of things.
7 MR. NAUMAN: I could be.
8 MR. SHEPHERD: One Lessons Learned, as
9 Rafael addressed, are Lessons Learned, and they're
10 focused primarily on the physical aspects of
11 decommissioning. The existing rule today that was
12 passed in 1997, applies to reactors. NRR is seeking
13 our assistance and the assistance of the Office of
14 Research in developing interim guidance on how to
15 apply the existing rule.
16 There is Change One to the rule, which
17 parses out parts of Part 52, manufacturing licenses,
18 for example. Then there is the proposal that we are
19 considering. As part of a proposed rulemaking, there
20 is a regulatory analysis that includes a cost benefit.
21 Only after that is done, will the exact scope of the
22 applicability of the rule be determined. That has not
23 been finished yet. The rough schedule for this rule,
24 as it stands today is, we would send forward to the
25 commission a proposed rule with the proposed guidance,

1 and the preliminary regulatory analysis, cost-benefit
2 analysis this spring, to determine what their response
3 would be. Their response, to oversimplify it, can be
4 go forward or stop. More likely, it may be go forward
5 with, perhaps, some changes.
6 MR. NAUMAN: The other question I had was
7 response to measurements, if you put in subsurface
8 monitoring, area monitors and the likes, and you
9 stated earlier that the response would not require
10 immediate cleanup efforts under the operating
11 scenario, would be just response for the future, so
12 that it's documented, you knew where the leaks were,
13 you knew how to control them, and you could take
14 corrective actions to minimize the damage from those
15 leaks early-on. Isn't that what 50.75(g) does now,
16 documents spills?
17 MR. SHEPHERD: 50.75(g) says "document
18 significant events". The question, and, in fact, it's
19 one of the recommendations from the Tritium Task
20 Force, is to define significant, because what we see
21 is a fairly wide variation in how facilities interpret
22 that, and what goes into the 50.75(g) file. So we
23 hope to provide a consistent basis of what should be
24 put in there.
25 MR. NAUMAN: Okay. I won't pursue it any

1 further at this point.

2 MEMBER CLARKE: Okay, Tom. Thank you.

3 MR. SHEPHERD: And I'd just say, as a

4 proposed rule, when it does go to the public, you will

5 also have ample opportunity to comment on it, at that

6 point.

7 MEMBER CLARKE: Eric.

8 MR. DAROIS: Yes. There's two issues,

9 comments I want to make. I might as well stick with

10 the theme with Tom's questions first. I guess I would

11 put some caution in terms of the wording you're

12 proposing here. And before I go into that, let me

13 just reiterate something we heard earlier, that Ralph

14 mentioned, that none of the groundwater issues that we

15 saw from the power plant side represented any

16 significant increases in doses to members of the

17 public, so certainly they were low.

18 We do know that groundwater

19 contaminations, and we'll go right to Tritium here,

20 although it's more than just Tritium, but generally

21 speaking, what we're seeing in groundwater is slight

22 increases over background, up to, I don't know,

23 several hundred thousand picocuries per liter,

24 depending on the site and the source of the leakage,

25 so we're dealing with many orders of magnitude of

1 possible scenarios. We've got varying background
2 levels, and certainly, the question of redeposition of
3 Tritium may or may not be an issue with regards to
4 that, so in light of all of that, we've got proposed
5 regulations that say we've got to minimize
6 contamination, identify it in the subsurface, et
7 cetera, et cetera. At what point, I guess, is what
8 I'm wrestling with myself, 10 gallons of secondary
9 coolant, versus 10 gallons of primary coolant, versus
10 100,000 gallons, you know, there's a whole range of
11 possibilities in respect to activity and volume that
12 could enter the subsurface. And where do we draw the
13 line?
14 The industry has been, in the last year or
15 two, dealing with fractions of an MCL, for instance,
16 but those issues are more on the political side of it,
17 I guess. From a dose point of view, it's all very
18 small, and how does that fit into adequacy and
19 minimization? Maybe you don't have an answer, but it
20 needs to be considered.
21 MR. SHEPHERD: We certainly are
22 considering those things. One of the considerations
23 is, we heard several times that there is no off-site
24 dose from anything that's been released, but if we
25 take Rightwood, just because I think it's the worst

1 case where there's about 600,000 in the vicinity of
2 one of the vacuum breakers, when we come to
3 decommissioning, there is no on-site/off-site. If
4 people are right there, 600,000 is a potential issue.
5 Now if we compare that, for example, to
6 the effluent limits of Appendix B, it's still below
7 that. So even at that, it's not a health issue, so
8 your point is well-taken, that we do need to be very
9 cautious that we're not creating problems that don't
10 exist.
11 I think one of the problems that does
12 exist is one of public perception. I think their
13 major issue is, they're not really listening to dose
14 numbers. They don't care about dose numbers. What
15 they care about is somebody crapped up their
16 groundwater, and either didn't know, or didn't tell,
17 and it really irritates them.
18 MR. DAROIS: Yes. It's just hard to
19 capture that in the regulatory framework.
20 MR. SHEPHERD: It is. It is, very much.
21 But when we come to decommissioning, looking at it
22 from that perspective, it's 25 millirem. Now many
23 states have adopted either the EPA limit of 4
24 millirem, or some variation, which we do not
25 specifically enforce, but to which many licensees

1 commit as part of their decommissioning plan, so we're
2 really talking about, perhaps a difference in time,
3 and when you find out how bad things are, or aren't,
4 as the case may be.
5 At decommissioning, it's all got to be
6 evaluated. How much of that should be done earlier on
7 is part of the discussion we're having.
8 MR. DAROIS: It just gets a little
9 interesting when a plant might sink some wells in the
10 ground and find they've got, what might appear to be
11 detectable Tritium leaving the site boundary through
12 that pathway, somewhere between 500 and 1,000
13 picocuries, quite low in a dose sense, and almost a
14 no-never-mind from a dose point of view, but it's
15 licensed material, nonetheless, so it's just hard -- I
16 just find it's going to be hard to capture that in the
17 regulatory framework. That's all.
18 MR. SHEPHERD: Well, that's one of the
19 issues, is okay, so an inspector goes out and he looks
20 at the data that the licensee has collected, and there
21 are some elevated numbers. And let's say 2,000, just
22 to ensure that it's above background. Now what does
23 he do with it? And that is an issue that we need to
24 address.
25 MR. DAROIS: Okay. That's all. Thank

1 you.

2 MEMBER CLARKE: Thank you, Eric. Tracy.

3 MR. IKENBERRY: I don't really have any

4 questions, I guess. I did want to say to Rafael, I

5 had a chance to look at the Lessons Learned website,

6 and it looks pretty good. I was wondering where are

7 you getting your information for the website that

8 you're developing? Where does it come from?

9 MR. RODRIGUEZ: The current input that we

10 put on the web was mostly based on experience from our

11 own staff. I talked to each one of our staff. We did

12 like a one-on-one interview, and I said, you have been

13 working on several decommissioning projects, based on

14 what you have seen in the last few years, what do you

15 think is an item that should be shared with the rest

16 of the decommissioning community? And I think I

17 received a comment, I don't know if it was from Eric,

18 or from somebody, last year that says when you talk

19 about lessons, remember that this is something for

20 industry, so you need to consider money. I mean,

21 whatever you do that you define as a lesson, there has

22 to be some money-savings to us. So, basically, that's

23 another, let's say, criterion that I use when I talk

24 to some of the PMs, but the long story short, based on

25 the experience from our own staff, which each one of

1 the staff and our director.

2 MR. IKENBERRY: So is that primarily from

3 reactors, also, from other licensees, as well?

4 MR. RODRIGUEZ: Reactors and materials

5 facilities, as well.

6 MR. IKENBERRY: Okay.

7 MEMBER CLARKE: Okay. Rafael, I wanted to

8 compliment you, as well. It looked like very good

9 information, and I remember when we met with you the

10 first time, we had some concerns about how you were

11 going to do this; and, in particular, what you were

12 going to do to, if you will, ensure the quality of the

13 information. So far, it's all coming from NRC Staff.

14 Is there an intent to capture information from others,

15 as well? Is there a mechanism to do that?

16 MR. RODRIGUEZ: Oh, yes. What we are

17 doing right now is, is part of the bibliography that

18 we have in place, we're capturing documents from

19 external sources, like EPRI has collaborated a lot,

20 the Fuel Cycle Facilities Forum, NEI, and also, Thomas

21 Conley gave me some help, so it's not going to be only

22 NRC's Lessons Learned. There's going to be experience

23 reports, so to speak, from different groups. We're

24 going to make sure that the information that we make

25 available covers a broad spectrum of decommissioning

activities, from NRC's perspective, as well as from industry and agreement states' perspective.

MEMBER CLARKE: Okay. Well, good. My compliments, again. Bill Hinze.

MEMBER HINZE: Jim, I'd like to go to your Slide 10, if I might, and comment, or get some clarification. As I understand this, your first bullet really gets to the point of finding out if there is a problem. And your second is, if there is a problem, that they adequately detail monitoring plan that's imposed upon the site.

MR. SHEPHERD: Yes.

MEMBER HINZE: I worry about this term "routine monitoring". Is that routine in space and time, both; because there may be temporal variations in leakages. I am also concerned that there is really a continuum of hydrogeology, there are just step functions, and so there's a continuum. And, yet, you're putting this in to try to help and clarify 1501, and be more specific about what is needed. But, yet, I worry about these terms "routine", and about the continuum of the site hydrology. Do you have any comments?

MR. SHEPHERD: It's always a challenge to not emulate the EPA in rule making, and to draw the

1 line between what we put in the rule language, and
2 what we put in the guidance. Certainly, I agree with
3 your concept that each site is different. There are
4 certainly changes occur at different rates during
5 different times of the year. If there are specific
6 events that can cause changes, be it a rainfall, a
7 rain event, a drought, floods, tsunami, if that's
8 appropriate to the site, that would cause the
9 groundwater to change.
10 By "routine", I don't necessarily mean a
11 fixed, regular schedule that at 3:00 every Thursday
12 afternoon, if it falls on a full moon, I'm going to go
13 out and measure groundwater levels. In my mind, the
14 routine monitoring program should take those things
15 into account, as known. The water levels, the
16 chemistry should be measured at times appropriate to
17 when it might be changing, but not -- it could be, if
18 we take some of Tom Nicholson's favorite ideas from
19 USDA over at Beltsville, where they have real-time
20 monitoring that remotely logs things on a continual
21 basis. That could fall within the definition of
22 routine. Perhaps that's not the best word to use, but
23 certainly, in the guidance, we will expand on the idea
24 of doing sufficient characterization to identify
25 where, at least, the major preferential flow paths

are, so that we're monitoring in the proper place, have some idea of the rate of change of the hydrology, the geochemistry, if there are periodic changes to that caused by events. It would have to take into account, I believe, off-site changes. Currently, reactors, by and large, are in areas that are not closely affected by human activities; although, as the population goes up, as you recall, only a couple of weeks ago we passed 300 million and climbing. I think that will change as times goes on, and people will be moving closer to the facilities; or, perhaps, using groundwater to a greater or lesser extent that could affect the on-site facilities, as well.

MEMBER HINZE: And if I understand correctly, the NRC would review this plan for monitoring, whether it's routine or not, and pass on it, on the basis of the hydrology of the site, as presented by the applicant.

MR. SHEPHERD: Yes.

MEMBER HINZE: The "routine" might not be the best word.

MR. SHEPHERD: Okay. I'll keep that in mind.

MEMBER CLARKE: Thanks, Bill. Ruth.

MEMBER WEINER: I'd like to go back a

1 moment to something that came out this morning. And,
2 Jeff, do you mind if I bring up your point? I have to
3 give credit where credit is due. Jeff raised a point
4 that when you go to decommissioning there is a
5 paradigm shift. And there's also a paradigm shift in
6 the community that surrounds the facility. And the
7 paradigm shift, which occurred to me thinking about,
8 was that all of a sudden, you're going from providing
9 something to the community, power, whatever, to being
10 just simply a polluter. And the community suddenly
11 sees the facility in a completely different way, as
12 providing no benefit, and nothing but a perceived
13 detriment, no matter how minor that detriment may
14 actually be. Is there any way that this can be
15 addressed? Anybody on the panel.
16 MR. SHEPHERD: Well, in my opinion, being
17 the regulator, I say it's the job of the licensee, and
18 I would point to Consumer's Energy at Big Rock Point,
19 who had an excellent public communications plan. They
20 made their decision to shutdown somewhat before they
21 actually did, although, not very long. They have an
22 employee retention plan that was applauded
23 internationally. When we went to the meetings, unlike
24 a number that I've been to in the northeast, where
25 there was a great deal of opposition to anything the

1 licensees were proposing, the only question we were
2 asked was, couldn't we make them continue to operate,
3 which, of course, we can't.
4 The fire department was very disappointed
5 that they were actually going to take the standpipe
6 out of the lake, because it was now more difficult to
7 fill their fire trucks, and there has been - while
8 there was some concern, they also began a two-point
9 2002 off-site disposal of their very low contaminated
10 waste into a RCRA landfill. They worked very well
11 through the community, they had a community oversight
12 board. They hired a health physicist who represented
13 the community to evaluate all of their shipments, and
14 I think just their forethought in dealing with the
15 community, not only at decommissioning, I think it
16 probably started well before decommissioning. It was
17 a relatively small facility, but they were still a
18 major contributor to the economy of the area. I think
19 the economics is one of the biggest impacts that we
20 see, because I have been to a number of reactors in
21 the northeast where during construction, of course,
22 they're running several thousand people, during
23 operation several hundred. When they come to
24 decommission and shutdown, they're down to a few tens,
25 and just the visual impact driving down the street,

1 seeing the closed businesses that no longer have a
2 support base, those things I'm not sure that there is
3 - well, other than Ralph's suggestion, is to replace
4 the old reactors with new ones, I'm not sure there is
5 an antidote, but I think that the public relation
6 effort by the licensee before shutdown can contribute
7 significantly to that.
8 MEMBER CLARKE: Ruth, if I could
9 interject, the term "end use" has come up more than
10 once today, and I'm thinking should we be thinking
11 about end use sooner than - kind of in a position
12 where we'll take any end use we could get on some of
13 these sites. Clean them up, do whatever we can, but
14 the end use might be that it might be beneficial,
15 might be a recreation area, might be well received.
16 If that were communicated somewhere closer to the
17 decommissioning period, if that went, in fact, into
18 the planning, I wonder if that might not be a good
19 thing? So I just throw that out. I'm sorry, I didn't
20 mean to interrupt you.
21 MR. LUX: I hate to sound too Oklahoman,
22 but you all are generating some tremendous arguments
23 for developing DCGLs in advance of beginning
24 decommissioning. But I think, to borrow a term from
25 the EPA, when reactors shut down, they take on the

1 appearance of an uncontrolled site. Very few people,
2 perception of significant controls that were in place
3 are no longer in place, and there's a guy named Dr.
4 Peter Sandman from Rutger's University that developed
5 a program called "Communicating Risk", concept is risk
6 equals hazard, plus outrage. And, although, I agree
7 with Jim's assertion, that it's really primarily the
8 licensee's responsibility to communicate with the
9 public and establish a program, such that the public
10 can be reassured that things aren't becoming
11 uncontrolled, but that, in fact, there can be, to some
12 extent, a shift in the perception of control from
13 entirely within the licensee's court, to the neighbors
14 in the community feeling like they have some control,
15 some level of influence over what is done, is not a
16 panacea, but it can be very effective. But I also
17 believe that it's very necessary for the regulatory
18 agency to backup the licensee's assertions that there
19 is still control, there is still protection, et
20 cetera.
21 MEMBER WEINER: I have another question
22 for Jim. You said that once a site is decommissioned,
23 there is no more on-site and off-site, if I'm quoting
24 you correctly. But decommissioning, itself, takes
25 quite a while. I haven't been involved with any plant

1 decommission. I'm sure it took more than a few years
2 to bring Big Rock Point down to greenfield status.
3 MR. SHEPHERD: About 10.
4 MEMBER WEINER: Well, and during that
5 time, you've almost gone through a half-life of
6 Tritium, and during that - the decommissioning period,
7 there still is an on-site, and an off-site.
8 MR. SHEPHERD: That's correct.
9 MEMBER WEINER: So that it's only if
10 you're looking at a release that is a significant
11 amount on-site, when you start to decommission, you
12 can also project what is that going to be? Is that
13 correct?
14 MR. SHEPHERD: Right. And, in fact, Big
15 Rock did that. In 1984, they had a condenser line
16 break, by which they estimated one million curies of
17 Tritium went under the turbine building. When they
18 began decommissioning, they were 30-50,000 picocuries
19 per liter, so two to three times the EPA limit. And,
20 primarily through decay, it's now down into a few
21 thousand, and they did not have to do any active
22 remediation. So you're correct, but to bring up
23 Jeff's point, when we're establishing the DCGLs, the
24 assumption is that there is no fence line there, and
25 that's the level to which it must be remediated.

1 MEMBER WEINER: But some of the
2 remediation will take place just because of decay.
3 MR. SHEPHERD: Natural attenuation, and
4 decay can be a part of that, yes.
5 MEMBER WEINER: Thank you.
6 MEMBER CLARKE: Allen? Mike?
7 CHAIR RYAN: I'm kind of waiting for my
8 homework questions to come around, so I'll hold a
9 little bit for that.
10 MEMBER CLARKE: A few minutes. How's
11 that?
12 CHAIR RYAN: That's fine. But there's two
13 things I think, looking ahead to the guidance, that I
14 think are important to address. One is, my favorite
15 question is, when am I done? How can I assess whether
16 I'm moving toward closure in my decommissioning,
17 whether it's a relatively small, relatively
18 straightforward site, like many agreement state
19 circumstances, small buildings with a little bit of
20 licensed material, and they had a liquid sump, and
21 they've got to clean up a little bit around that. How
22 do I decommission the soils and all that?
23 Clarity in closure and completion in the
24 guidance, I think, is really something to try and
25 instill at every step of the way. My own view is that

1 will help agreement state regulators, and agreement
2 state licensees, assess whether they are taking
3 actions that comport with what NRC would do, if it was
4 an NRC-licensed facility.
5 In South Carolina, where I live, there's
6 been a couple of big ones; Agnes, big in terms of
7 size, small in terms of radioactive material, but the
8 Naval Ship Yard, which was a fairly complicated site,
9 and I think there was participation through IMPEP and
10 agreement state program oversight, and lots of work
11 done. Now that work is, my goodness, 20 years old, so
12 I think there's a great value in trying to address
13 that connectivity to the licensee, and to the
14 agreement state, because that's where a lot of the
15 action is going to be.
16 The other part of it is a general
17 question. I recognize fully that sometimes criteria
18 are negotiated not only on the basis of dose, but on
19 the basis of community desires and negotiated
20 approaches, and all the things we've heard today, but
21 I think if the guidance addresses what is risk-
22 informed, what is a good solid risk-informed approach
23 as a basis, would be good, and to be specific about
24 that. And then if there are other negotiated
25 settlements where we'll do this in addition to what's

1 risk-informed, because of the community preference, or
2 some other approach, I think it would be interesting
3 to see how you could address those each in their own
4 turn.
5 If one state does 25, while another will
6 do 15, figuring it's 27 percent better, I'm not sure
7 that's always the case, but that's sometimes what you
8 do to get the job done. So addressing - that's part
9 of the "When am I done" question, when am I finished,
10 from a risk perspective. When have I managed the risk
11 satisfactorily? I know that's a tough thing to
12 address, but the more you --
13 MR. SHEPHERD: Especially when there's a
14 difference between the state requirements and the
15 federal requirements.
16 CHAIR RYAN: But I think explicitly
17 recognizing --
18 MR. SHEPHERD: I'm not an agent of the
19 state government.
20 CHAIR RYAN: Oh, no, I understand that.
21 MR. SHEPHERD: I can't go out and
22 negotiate on behalf of the licensee.
23 CHAIR RYAN: Not saying you should, but
24 I'm saying it should be clear to the licensee what the
25 agency is requiring, and then recognizing somehow in

1 the guidance that there might be other drivers; for
2 example, state requirements, or community negotiated
3 requirements that might be more restrictive, perhaps,
4 or comport with your guidance completely, and that you
5 recognize that's a possibility, just so that that
6 issue is on the table in the guidance is something
7 that may be completely aligned, and may be somewhat
8 different, but doesn't necessarily impact what --
9 MR. SHEPHERD: Right. Well, our risk
10 basis is 25 millirems all pathways.
11 CHAIR RYAN: That's a risk basis. That
12 does mean the approach is risk-informed.
13 MR. SHEPHERD: Volume II to NUREG-1757
14 goes to, to some extent, and, in fact, it was just
15 revised two weeks ago it came out, I think.
16 CHAIR RYAN: I'm not up on that one.
17 MR. SHEPHERD: That there is an expanded
18 discussion of realistic land use scenarios, pathways,
19 and so on.
20 CHAIR RYAN: And that's the kind of stuff
21 that I think is very, very helpful to really lay that
22 out in as much detail as possible. I'll have to get
23 that update and re-educate myself. That's good news,
24 and things that go down that path even further I think
25 will really help do a couple of things; one is, inform

1 licensees about realism and how to use it. And, also,
2 help everybody understand how that works in the
3 process, so thanks.
4 MEMBER CLARKE: This is probably a good
5 time for your question, for those of you who weren't
6 here this morning, our Chairman posed a question to
7 the speakers, and to the panel, and gave them some
8 time to think about it. So, Mike, do you want to ask
9 it?
10 CHAIR RYAN: Jim, I'll be happy to have
11 you lead the discussion, if you like, but the question
12 was, if you were king of the world, what would the top
13 five things be that you'd like to ask the commission
14 to address in this arena of decommissioning, and
15 decommissioning guidance? What would you want to see
16 addressed, and what would you ask specifically that
17 you would want to see from the commission, in terms of
18 specifics. What problems do you want solved? I'll
19 keep going, whatever way you want.
20 MEMBER CLARKE: Whoever wants to answer
21 it, answer.
22 MR. DAROIS: I've only got three then.
23 CHAIR RYAN: That's all right.
24 MR. DAROIS: I'm not going to fail the
25 assignment.

1 CHAIR RYAN: No, no. That was kind of a
2 collective top five.
3 MR. DAROIS: Okay. Yes, I have three, I
4 think, that has risen to the top of my list. And one
5 we were just talking about, really; that's alignment
6 of the decommissioning criteria across all states. I
7 mean, king of the world, stuff, Mike, so I'm not sure
8 it's possible, but now one just commentary on that, if
9 I may, and I think David alluded to it earlier this
10 morning.
11 The criteria is really quite different.
12 I mean, we're applying an annual dose-basis to
13 releasing the sites, and when we get into state
14 criteria, EPA criteria, it's 10 to the minus 4, to 10
15 to the minus 6 lifetime risk. And we're into that at
16 Yankee Row, we have to comply with a 10 to the minus
17 5 standard total risk that's rad and non-rad. And it
18 turns out that some of the values that we generate for
19 radionuclides are quite, quite low, and the site has
20 committed to the state to cover the majority of the
21 industrial area, not 100 percent, close to it, with
22 three feet of clean cover. It's a lot of soil. And
23 that, basically, eliminates risk from some of the
24 radionuclides; and, hence, they can easily pass the
25 standard, so I can't imagine every site in the country

1 having to comply in that manner. It's a relatively
2 small site, but it's very expensive to do, so I think
3 it's very important if we could get some alignment
4 there.
5 I think the other two are related more to
6 waste disposal. If we can drive to completion more
7 nationally, and more uniformly, the ability to dispose
8 of low, low levels of radioactivity in local
9 landfills, whether they be RCRA, or whatever they may
10 be, I think that's going to be important for operating
11 and decommissioning sites.
12 And, lastly, I think we need more options
13 for the higher level waste disposal sites. And I
14 think that's - we're in a situation today where
15 competition has been limited, transportation costs are
16 very high, especially if you're on the east coast, and
17 I think that's going to weigh heavily into future
18 costs for decommissioning, so I think those are my top
19 three items.
20 CHAIR RYAN: Great. Thanks, Eric.
21 MR. DAROIS: Yes.
22 MEMBER CLARKE: Anyone else? Go ahead,
23 Dave.
24 MR. KOCHER: Well, number one on my list,
25 which will never happen, is to have a comprehensive

1 risk-based waste classification system. Now given
2 that we can't do that, what can you do? And I think
3 Eric was hinting at the idea that there are potential
4 sort of ad hoc solutions, situation-by-situation
5 solutions, but certainly, if you can open the door to
6 sensible cheap dispositions of slightly contaminated
7 materials, you've got to be doing a lot of good. How
8 to do this, I don't know.
9 Number two, and this is not helpful to
10 you, Mike, because it's more in the line of a
11 question, and it's what I attempted to ask before, and
12 I bungled it totally. Is it feasible to design, to
13 have a system -- is it feasible to design, build, and
14 operate facilities so that the cost of cleanup to meet
15 NRC criteria is essentially zero? Is this a
16 worthwhile goal? Do we have good information? Have
17 we analyzed what it takes, what it would take to do
18 that? And if it's not possible to do that, how good
19 can we do? I mean, that was what I was trying to ask
20 before.
21 The overall goal here, the pie-in-the-sky
22 goal would be to have zero cost to clean up your land.
23 You're always going to have something to do with
24 buildings and equipment, I suppose. But when I asked
25 the question before, what's our real goal here, what's

1 our overall global objective? The objective might be
2 to, basically, have zero impact on the land when we're
3 done. I don't know.
4 Related to that is, do we really have a
5 seamless regulatory system that allows the licensees
6 to follow the rules from construction permit, right on
7 through everything to where, at the end of the day,
8 you haven't created problems that are really
9 troublesome? You somehow want to avoid causing
10 problems just because you followed the rules. An
11 example of this, this is not a problem for DOE, per
12 se, but there's this compensation program for energy
13 workers who get sick, and lot of these guys who are
14 getting paid were exposed in accordance with
15 regulatory limits. They were below the limits. Now
16 that's not a problem that DOE is directly responsible
17 for, but what happens -- is everything okay when you
18 follow the rules? And if it isn't, can we do
19 something to fix that?
20 Oh, gosh, the rest just seems pretty
21 obvious, standardized designs, and design for
22 monitoring the things that you don't expect to happen.
23 And I think everybody talked about that.
24 MEMBER CLARKE: Thanks, David. Tom.
25 MR. NAUMAN: Well, it's good to go third,

1 because a lot of the things have already been covered.
2 Eric hit upon an issue that I had, and that was,
3 basically, federalization of end-state criteria, have
4 one criteria nationally that all states abide by, all
5 licensees abide by, so it's simple, and it's clear.
6 And we're now doing negotiations on a local, state,
7 and federal basis.
8 My number one issue, though, I'm surprised
9 it made it this far, was high-level waste and spent
10 fuel. Spent fuel is a decommissioning problem. Each
11 site that's already had its license terminated, each
12 site that's going through D&D has to deal with its
13 spent fuel. And until we nationally solve the spent
14 fuel issue, we're all hamstrung going into the future.
15 And if I was king, that would be number one on my hit
16 list, is dealing with high-level waste and spent fuel.
17 Separating nice-to-do versus regulatory
18 driven - back a little bit to the Big Rock Point
19 issue, Big Rock Point did a great job. The public
20 perception, community buy-in was wonderful. They had
21 the pipes march out and put the unit to bed when they
22 shut it down. It was wonderful. But the problem with
23 that is, all that costs money. And back to it's the
24 licensee's responsibility to deal with community
25 involvement, well, Big Rock costs as much as Maine

1 Yankee, and the sites weren't comparable in size, and
2 reactor, and contamination. It costs as much to
3 decommission Big Rock as it did Maine Yankee, and it
4 took two years longer, so the nice-to-dos need to be
5 separated from the have-to-dos. And that's a
6 regulatory - to be their marching orders.
7 And then stay the course, stay focused on
8 risk-based guidance. I think it's important not to
9 let political, and issues that come and go. The
10 Tritium issue is not a new issue. Brookhaven issue
11 came up 10 plus years ago with the Tritium, and it was
12 a public outcry for a while, and then it kind of faded
13 away, and it's been up and down through the commercial
14 industry since then. So right now, there's focus, it's
15 important attention to detail that we're focusing on,
16 but I think we're somewhat being whiplashed by it, and
17 I think we want to be careful about that going forward
18 with new guidance. And we need to stay focused on
19 risk-based and where is the best money spent for the
20 highest return. Those are my wish list. Michael.
21 CHAIR RYAN: Thank you, Tom.
22 MEMBER CLARKE: Anyone else?
23 CHAIR RYAN: Jeff? Anybody else?
24 MR. LUX: I feel bad about coming with
25 such small issues after federalized everything,

1 establish world peace and harmony between all states.

2 CHAIR RYAN: Different kings look at it in

3 different ways.

4 MR. LUX: First of all, I think it would

5 be important to improve the definition of reasonable

6 exposure scenario. I just question, are we being a

7 little bit over-protective when the exposure scenario

8 that yields a 10 to the minus 4 risk, has a 10 to the

9 minus 4 likelihood of ever occurring.

10 Second, I think we should expand MARSSIM

11 to address volumetric averaging for subsurface

12 contamination, both for soil and groundwater, as well

13 as addressing heterogeneous distribution of

14 contamination, which is currently difficult to do

15 within MARSSIM.

16 I think we should integrate the monitoring

17 of effluents or releases, both planned, and unplanned,

18 with the monitoring of impact to the environment, and

19 I know this sounds like a catch phrase, but harmonize

20 the risk from the release with the risk due to

21 environmental impact. Right now, licensees are able

22 to either pull a limit out of 10 CFR 20, or model a

23 release, and develop a limit, and then they can

24 merrily sample at the end of the pipe to the end of th

25 stack for years without every saying where would this

1 be going, and what impact could it be having? And
2 that's where we have an effluent or a discharge limit
3 that's based on short-term protection, causing
4 problems when we get down the road with resident
5 farmer unrestricted release scenario.
6 I think NRC really needs to provide
7 guidance to regions and states regarding how to
8 interpret and/or implement regulatory requirements,
9 such as creating an island of purity in the midst of
10 restricted area.
11 And, finally, I think that the
12 consolidated decommissioning guidance should address
13 the concept that the presentation of final status
14 survey data should mimic the basis upon which the
15 limits that are being measured against are developed.
16 Right now, we develop a limit for a residential farmer
17 scenario based on 10,000 square meters, or 2-1/2
18 acres, or whatever, and raising so much food, et
19 cetera, et cetera. And then we apply that to a plot
20 that's 10 meters by 10 meters, and you are not going
21 to -- at that point, our survey violates the basis for
22 the model that you rise the limits, and I think that
23 should be reconciled. That's it.
24 CHAIR RYAN: That's a good list. I take
25 note of the one comment, where you talked about

1 reconciled the release requirement with the
2 environmental impact. I'm reminded of the sewer
3 discharge change that occurred some years ago, which
4 was probably that exact kind of issue, that what was
5 showing up in sewer treatment plants seemed to be out
6 of wack with what certain sewer releases were
7 occurring, so maybe that's an example to build on.
8 MR. LUX: I didn't have any good examples,
9 except for the release of a liquid effluent, and then
10 I was delighted today to hear, I think it was Ralph,
11 talk about snow, and Tom talked about air effluents,
12 resulting in contamination on the ground, and there's
13 a lot of ways you can have a release that complies
14 with your limits, but still creates an undesirable
15 impact.
16 CHAIR RYAN: Thanks. Tom?
17 MR. CONLEY: Well, to kind of keep along
18 the theme that's been said, I'll stick my neck out a
19 little bit and make a prediction, that if the federal
20 agencies were ever to come to an agreement, the states
21 would follow. I think the reason, one of the reasons,
22 anyway, why you see states having different limits is
23 because they don't have a standard to follow. That's
24 probably at the top of my list.
25 The other thing that I would say to take

1 back to the NRC is my second to the last slide, the
2 picture of the facility with the impact from licensed
3 activities from discrete sources, not necessarily just
4 Radium, but discrete Radium sources is a new issue for
5 NRC, and I think that's something that they need to
6 look at very carefully as they get into it.
7 CHAIR RYAN: Okay. Thank you. Anything
8 else?
9 MR. LUX: Everything else has been
10 covered.
11 CHAIR RYAN: Okay, great. Ralph.
12 MR. ANDERSEN: I agree that just about
13 everything has been covered. I'll second the motion
14 on a few, nevertheless. I certainly would put at the
15 top of the list the issue of waste for which we
16 currently don't have a means for disposal. Used fuel
17 and greater than Class C waste just reside in an
18 indefinite limbo land, which means that virtually
19 every nuclear power plant really won't have its
20 license terminated. It will have a part of its
21 license terminated.
22 Additionally, we need the continued
23 emphasis on improving the flexibility in options for
24 safe disposal of waste, based on risk. We've talked
25 about how that really drives the whole train, because

1 you end up looking at what you will have to deal with
2 at the end of the day, and then planning your
3 decommissioning accordingly.
4 There's a lot of opportunities. I believe
5 the staff got a lot of suggestions through the request
6 for comment on the strategic assessment process, so
7 there's a lot there to work through. And I think that
8 that will have a profound impact, for a couple of
9 reasons, the Big Rock Point story, being an example.
10 The ability to remove the material, rather than to
11 distribute the material on-site, in my mind, was
12 profound. And if you think about it, it was done by
13 an existing regulation, but in a sense, it was done by
14 an exception to the normal pre-approved methods of
15 disposal. So continuing to use existing flexibility
16 within the regulation on the basis of risk, I think is
17 very important.
18 Certainly, the alignment of criteria is
19 vital, even though, perhaps unachievable. The other
20 piece, and I think one of the speakers addressed that
21 earlier. I believe you did, Hans, but it's equally
22 important that methodology be standardized, ranging
23 all the way from the assumptions that are used in
24 scenarios, to the actual calculational methods, not to
25 mention that weird thing called which version of ICRP

1 are you going to use to calculate the dose? Twenty
2 thousand picocuries per liter categorically cannot
3 produce 4 millirem of exposure, not unless you drink
4 yourself to death. In fact, it's about 1 millirem of
5 exposure, if that's your sole source of drinking water
6 for the entire year.
7 The current concentration values in Part
8 20, I can't imagine anyone in the universe could
9 actually achieve 50 millirem of exposure from those
10 concentrations, because, again, it presumes that
11 that's their sole and singular source of drinking
12 water, 2.2 liters per day. I don't know about you,
13 but I don't drink 2.2 liters of water a day. I might
14 of fluid, some of it has a small alcohol content, and
15 some of it has a little sugar and some flavor, but
16 it's not water. So getting that straight, and that
17 applies to the realistic scenarios, too, is helpful to
18 what may main recommendation is.
19 The NRC-DOE task force that looked at
20 radiological dispersion devices, had a series of
21 recommendations. One of those, which I thought was
22 applicable to decommissioning and a lot of other
23 things we do that involve relatively small doses, was
24 that, as a strategic measure, the government needs to
25 better communicate to people the real story about

1 radiation and risk, so that we don't have what's
2 essentially an hysterical response to a non-issue.
3 The government sees clearly that that's
4 vital to convince terrorists that it's not worthwhile
5 to set off dirty bombs, because in many cases, people
6 might just clean up the immediate mess and say well,
7 what's the issue? But it's based on really changing
8 the public understanding. I would contend the same
9 thing applies to decommissioning. We're talking about
10 25 millirem a year as a conservatively derived limit,
11 but I think that most of your public, for instance, at
12 least in the meetings that I went to, believes that 26
13 millirem will kill you, because 25 millirem, after
14 all, is the limit, so we need to help with those
15 issues. I'll just leave it at that.
16 CHAIR RYAN: Okay. I skipped passed you,
17 Larry, because you were hiding behind Jeff when I went
18 around, so why don't you pick up.
19 MR. BOING: That's okay, no problem.
20 CHAIR RYAN: All right.
21 MR. BOING: No, I actually kind of boiled
22 it down to my top three, I guess, actually. And a
23 couple of these, well, one of them, at least, we've
24 already touched on, Eric did, and a couple of the
25 others did, too; and that's just finding some way to

1 deal with these very low levels of soil and materials
2 that we're shipping halfway across the country, or
3 nearly all the way across the country to dispose of
4 now, as opposed to doing things that make a little
5 more sense, which is like sanitary landfill disposal,
6 and other landfills to put them into.
7 CHAIR RYAN: Just to clarify, if I may,
8 and the others that have endorsed that concept -
9 there's three things that come to my mind in that
10 regard. One is the Disposal of Solid Materials Rule
11 Making that has been suspended. The EPA ANPR in its
12 notice for proposed rule making on allowing some small
13 concentrations to go into RCRA Subtitle C, and perhaps
14 D landfills, and then vice versa, small trace
15 quantities of RCRA materials that might end up in low-
16 level waste on the other side of it, so are all three
17 of those in play when you folks thing about solid
18 materials of very low concentration? I'm getting nods
19 on all that, so I just want to make sure you were
20 integrating those three issues all as aspects of that
21 one question. Thanks for the interruption, Larry.
22 MR. BOING: No problem. The second one
23 would be, we've talked a lot here about Lessons
24 Learned, and a lot of experiences, try to find some
25 way to help integrate all of those Lessons Learned

1 into the way we're going to do operations, and find
2 ways to apply those, to really take these Lessons
3 Learned now, as opposed to them just being things
4 we've said these are the lessons we've learned, and
5 actually build upon those in how we design plants,
6 operate plants, prepare for eventual decommissioning
7 of sites yet to come down the pike.
8 And the third one I had was - kind of
9 touches, I think, on maybe a little bit about what Jim
10 was presenting here, but try to find some way to
11 integrate a little bit more, if I want to call it kind
12 of characterization on the run as we're going, and
13 still operating sites, try to find ways to document
14 and identify when we're having problems, and try to
15 catch those as they're developing, as opposed to
16 waiting until decommissioning, and find wow, we've got
17 a tremendously big problem here that we're not able to
18 solve. It's easier to solve it as it's going along,
19 as opposed to waiting until you reach the end of the
20 path, and say wow, we've really got a problem. So
21 those are really what I kind of would top off as my
22 top three out of that list, Mike.
23 CHAIR RYAN: Okay, thanks. I think, Hans,
24 we're up to you.
25 MR. HONERLAH: I don't have anything left

1 to say. I agree with what Ralph said, and I think
2 that was something we really didn't talk about today,
3 was communication to the public. I mean, we look at
4 EPA, and Jeff brought up Brownfield, and how it's been
5 a great success story for certain chemicals of
6 concern; yet, if you were to consider it from a
7 radiological site, just simply probably because the
8 communication and lack of education within the
9 community, it would never really fly, so I think that
10 was a great point that you brought up, Ralph.
11 Again, nationwide standards for D&D, and
12 how to implement those, specific guidance on the risk
13 assessment, risk-based disposal everyone has
14 discussed. But I think the one thing that we've kind
15 of all said, but maybe tap danced around, that the
16 Low-Level Radioactive Waste Policy Act and the Compact
17 System that was established, was supposed to address
18 the assistance for all these facilities across the
19 country, and hopefully, get rid of the whole NIMBY
20 issue, not in my backyard for this waste. And,
21 essentially, it's stalemated. Nothing has ever taken
22 place since it's been enacted. No facilities have
23 been licensed for disposal. As a matter of fact,
24 facilities have closed since it's been put in play.
25 CHAIR RYAN: Just a friendly amendment

1 there. One license was granted in California, the
2 land transfer was prohibited.
3 MR. HONERLAH: Correct. I guess the
4 frustrating part is regionalization, and to address
5 the transportation system. There are numerous RCRA
6 facilities around the country, and there are numerous
7 other sanitary landfills, and C&D landfills, but
8 coming up with some national guidance that is readily
9 implemented by the states, rather than I have a
10 facility in one state that says no more than 10
11 picocuries per gram total activity from your facility,
12 or your facility had discharges into the sanitary PTW,
13 and there's 20 picocuries per gram Tritium in your
14 sediments; therefore, it's got to be LLRW because it
15 came from a licensed facility. Those things have to
16 be overcome, as well as, I guess, just making some
17 changes. I think it's going to be a hard point, and
18 again, on the education thing to both the folks at our
19 state level, not necessarily the Bureau of Radiation
20 Control, because they're not the ones that monitor or
21 permit those other facilities. It's the RCRA folks,
22 it's the solid waste folks that do that.
23 CHAIR RYAN: Hans, would you let me call
24 that risk-based or radionuclide risk-based disposal,
25 rather than origin or definition-based disposal?

1 MR. HONERLAH: Yes.

2 CHAIR RYAN: Okay. Fair enough.

3 MR. HONERLAH: But, again,

4 regionalization.

5 CHAIR RYAN: Right.

6 MR. HONERLAH: Because we've currently got

7 a system in place that allows for some 2002

8 exemptions, and for disposal at RCRA facilities, but

9 the only states that have stepped up to the plate and

10 sort of, I guess, allowed this to happen within their

11 states are out west, again. So, again, we're still

12 stuck traveling over 2,000 miles with this material.

13 CHAIR RYAN: Remember, just for a little

14 history sake, and, again, I'm plugging the NUREG that

15 you'll see soon on the newsstand. But you've got to

16 remember the states asked for it, nobody forced it on

17 them. Nobody forced compacts on the states, and so

18 they got what they asked for. Now they don't want it,

19 so there is an element of kind of an interesting

20 history there, and compacts were kind of marching

21 along until South Carolina with Governor Beasley made

22 a decision, I'm now in the nationwide business again,

23 compacts just stopped, just like that. So that's some

24 very interesting history, and I keep thinking about

25 what lesson we take from that, but it's as much kind

1 of a political history, as it is a technical history.
2 MR. HONERLAH: And I guess the concern of
3 having one compact facility and every waste stream in
4 that compact has to go to -- would, again, be price
5 controls, and how do you afford competition to
6 industry to help control prices?
7 CHAIR RYAN: And I would remind everybody
8 to also recall that price had two components; one was
9 cost, the other was tax. And in a case I'm familiar
10 with, tax dwarfed the cost, so there is an issue
11 there, as well. But thank you, I appreciate it.
12 Anything else on your list? Tracy. Last and
13 certainly not least.
14 MR. IKENBERRY: Yes. Well, I agree,
15 there's probably much of anything new left to say.
16 It's all been well covered. I think that of interest
17 is this decommissioning block that Ralph mentioned
18 that we're going to hit in 25 to 30 years, and I think
19 it's pretty certain in 30 years that we won't do
20 decommissioning then like we do today. It'll have to
21 be much different. I don't think we'll have the same
22 radioactive waste capacity in 30 years that we have
23 today, so I think something is going to have to be
24 really different. And Dave actually made me think
25 about this when he mentioned facilities that could be

1 built to be completely cleaned up, or could be built
2 with no impact. And that made me think, I think it's
3 going to, in terms of some of the design, it seems
4 like facilities are going to have to be made to be
5 decontaminated, and then the buildings and much of the
6 structure gotten rid of as completely clean, or
7 certainly, as some low levels of contamination,
8 because it's going to change.
9 We've talked about now, of course, that
10 the choice is to demolish and dispose. I think at some
11 point in the future, we're going to reach the point
12 where decontamination is going to become cost-
13 effective with demolition and disposal. And that
14 will, I think, completely change our outlook that we
15 have now on D&D. I don't know when that will come.
16 I don't think I'll be around for it when it does, but
17 I think it certainly is going to come.
18 CHAIR RYAN: The interesting thought, and
19 I'm glad you came back to that, because I was thinking
20 when Dave spoke, as well; I would be curious to know
21 how many licensed facilities, other than reactors, are
22 in buildings that were designed specifically for that
23 activity, or they're in buildings that were designed
24 for something else, and they're just in that facility
25 now. I think most of them are in that last category,

1 where well, that looks like a good building, we'll do
2 little renovations and they've got sewer lines, and
3 water lines, and electrical and all that stuff, and we
4 can figure out how to make that work. And I wonder if
5 we took Dave's thinking and said well, let's start
6 with a clean sheet of paper, and say we're going to
7 use this particular process, and it's got these
8 amounts of materials, and how do we keep it from being
9 a decommissioning headache? That's an interesting
10 prospect to think about, so thank you for that.
11 Yes, Eric.
12 MR. DAROIS: Let me just add, as you go
13 out and change the state regulations, Mike, in the
14 near future --
15 CHAIR RYAN: Yes, right.
16 MR. DAROIS: I wanted to just share one
17 thing that I failed to mention about the Massachusetts
18 situation. As we heard earlier, they do have
19 regulations that impose a 10 millirem criteria.
20 However, in addition to that, they've got another
21 piece of legislation that's about two lines long, that
22 basically says that they will not, the state will not
23 allow any radioactive waste dumps in the State of
24 Massachusetts. And it seems pretty innocuous when you
25 first read it. It basically says well, we're not

1 going to have any large scale waste disposal sites
2 here.
3 As we face that issue at Yankee Row, we
4 got the interpretation, which I think they made up as
5 we were discussing the issue with them, but the
6 utility, at the time, wanted to bury some of the
7 clean, very clean concrete on-site, crush it up, use
8 it as part of the backfill to get the three foot
9 elevation. But because there was a possibility there
10 could be a few atoms of radioactivity in it, and they
11 were going to survey it against the DCGL criteria,
12 they said no, that will constitute a radioactive waste
13 dump, and we won't let you put any of that concrete in
14 the ground. So that's just a case in point where
15 you're looking at the release criteria part of the
16 regulations, thinking you're okay, but there's another
17 gotcha on the other side. So as you go change the --
18 CHAIR RYAN: I'll keep that on my to-do
19 list. Thank you. But it does bring up an interesting
20 dimension. I've been involved in solidifying liquid
21 radioactive waste, and the solidification agent had
22 more radioactive material in it than the waste. Now
23 lots of solidification agents have lots of naturally
24 occurring radioactive material in it. I would be
25 curious to know if your concrete has a higher Radium

1 and Uranium content than any Cobalt, or any other --

2 MR. DAROIS: And none of those arguments

3 mattered in these negotiations.

4 CHAIR RYAN: That gets us back to the

5 other main point, which I think you made, and others

6 have made, which is, if we can get to a risk-informed

7 approach, that's helpful. And I think some of those

8 benchmarks, this is just one of my own to add to the

9 list, that if you can somehow bring in background as

10 a benchmark of some way to think about these things,

11 other than 10 millirem. Ten millirem is very small.

12 I mean, it's 1 percent or so, or 3 percent of

13 background, maybe. And if you look at natural and

14 hand-made, it's pretty small, a typical chest x-ray,

15 maybe, your annual chest x-ray. And, by the way, you

16 pay for that, so that's good radiation, so I think

17 some of those things are worth exploring. How do we

18 get that information across? How do we communicate

19 the risk in the proper perspective and so forth? So

20 it's one to wrestle with.

21 Anything else? John Flack, you have been

22 patiently waiting.

23 MR. FLACK: Yes, John Flack, ACNW Staff.

24 When you said I could be king, and not an ex-New York

25 City cab driver, I was ready to jump in.

1 CHAIR RYAN: All right, yes.

2 MR. FLACK: But just picking up where you
3 left off on the risk, I think part of this is not only
4 that it's small, but the fact that it was a surprise.
5 I think that was the issue. There was no barrier
6 there, and suddenly - barrier being detectability
7 there - suddenly, there was a surprise there. And I
8 think the issue is the surprise, and thinking forward,
9 what would you do to prevent the surprise from taking
10 place? I think PRA plays a role in all this, and I
11 don't think it's fully developed in its field yet, but
12 thinking of the system as it's built, and likelihoods
13 of where things could go wrong, and the consequences
14 of that, whether it even be small amounts. But being
15 aware that things can go wrong, and where it's likely
16 to happen, and where it's likely to be detected is all
17 part of that model. And I think that thinking along
18 those lines ahead of time for new reactors, for
19 example, would go a long way in being able to defend
20 and protect the environment, at the same time, letting
21 people know when things are found and they're not a
22 surprise, that we've been looking for things, we're
23 monitoring the plants, we're on top of it. That's why
24 we found it, is the issue, I think here, for the
25 advance plants. And I think that kind of thinking,

1 more probabilistic, more thinking of likelihoods and
2 consequences, is needed.
3 And, of course, you could certainly
4 capitalize on all the Lessons Learned that you heard
5 here today, and build that into some principles and
6 design criteria, but you're still left with
7 likelihoods of things happening. And I think you have
8 to also look at that piece, as well. And I think
9 that's part of the equation that might be missing
10 here, as well.
11 CHAIR RYAN: That's an interesting
12 thought. I mean, I quickly jotted down some numbers
13 yesterday. I forget what it was, it was 14 out of
14 104. Well, that's roughly 14 percent is the
15 probability of the leak, all other things being equal,
16 which I know is wrong, but it's not 10 to the minus 6,
17 so that's something to think about, that if we could
18 get away from deterministic absolutes as the way we
19 communicate, but talk more in the risk language of
20 probabilities, and communicate effectively in that
21 arena, which is a challenge on its own, that's worthy
22 of thinking about. Thank you. Professor Hinze.
23 MEMBER HINZE: Mike, this is probably a
24 non-issue, because I haven't heard it in any of the
25 discussion here, but one of the things that we know

1 looking into the future is that most of the new plants
2 will be co-located with existing plants, which will be
3 decommissioned during the operation of the other
4 plant. Are there any implications, or problems, or
5 concerns with this happening?
6 MR. DAROIS: Can I address that?
7 CHAIR RYAN: Please.
8 MR. DAROIS: I just work here. I think
9 the problem - I think we may have more of a problem if
10 we wait, rather than decommission early.
11 MEMBER HINZE: That's what I'm saying,
12 what's going to happen later?
13 MR. DAROIS: When we wait 80 years to
14 decommission a site, you've effectively lost all of
15 the Cobalt-60, which is an easy way to detect the
16 presence of anything that may be there, in some
17 regards can be a surrogate radionuclide for those more
18 difficult nuclides to detect. If there were fuel
19 failures, there's plenty of transuranics, and possibly
20 Strontium-90, and they just present a more expensive
21 challenge to go in and clean up, decommissioning,
22 monitoring and all that, so that is something we
23 haven't heard much about, but I do - having been
24 involved in a plant that's had significant transuranic
25 contamination, that can be very expensive.

1 Now let's hope the new plant designs don't
2 have significant fuel failures, but there are sites
3 with older plants that have life extensions.
4 MR. NAUMAN: And to expand on that a
5 little bit, I'm not quite sure that they will. I
6 think the premise that you will decommission while
7 you're operating the other plant on the co-located
8 site, today's experience doesn't reflect that out,
9 except for San Onofre. And even San Onofre is not --
10 it's still going to decommission to a point, places
11 like Dresden, Peach Bottom, Millstone, Zion, you name
12 it, all the plants that have a decommissioned unit on
13 site, they're going to stay that way until the plant
14 that's operating reaches the end of its life, even
15 Three Mile Island. It's going to stay in the state
16 it's in until such time as the other unit reaches the
17 end of its life, and then they'll decommission
18 together. That's pretty much the plan with the
19 ongoing plants, and it wouldn't surprise me if that
20 will be the evolution for the new plants that are
21 being built on co-located sites.
22 CHAIR RYAN: One of the things that's
23 interesting to think about is, I'm going to assume
24 that not operating doesn't mean not inspected by the
25 licensee. They still have pretty robust program of

1 inspection and observation of a plant. Maybe it's not
2 as routine as an operating plant, and for good reason,
3 circumstances aren't changing as rapidly, but the
4 other aspect is with power uprates, the life extension
5 of plants, that's changed the dynamics, too.
6 I guess it's certainly a question to
7 watch, I think, Bill, that are there groundwater
8 issues developing in the old versus the new, and how
9 do you separate monitoring issues, one from the other.
10 How do you know it's the operating unit, or the closed
11 unit? There's lots of interesting questions to think
12 about.
13 MEMBER HINZE: It just seems to me that
14 NRC in their regulations have to think about this.
15 MR. OTT: I think if you look at the
16 provisions of 1406, you'll see that the requirements
17 for minimization of contamination for the new plants
18 are going to make them -- are going to require them to
19 know what's there.
20 CHAIR RYAN: Yes.
21 MR. OTT: So you're going to wind up going
22 through some kind of a survey of that existing site,
23 and defining whatever contamination exists, so you're
24 going to have to establish a baseline when you start.
25 MEMBER HINZE: And that should be done,

1 anyway. Right.

2 MR. OTT: But it's going to be much more

3 expensive than it was in the past, because in the

4 past, we had no information, basically, in terms of

5 radiological characterization of a new reactor site.

6 MEMBER CLARKE: We have a couple of other

7 folks who want to ask questions. Dave.

8 MR. KOCHER: I wanted to make a comment on

9 this holy grail of uniform regulations that everybody

10 calls to. And I know I'm going to be raining on the

11 parade, as we all go charging off, but it's not going

12 to solve all your problems. It would be a good idea

13 to have a benchmark like that for a minimally

14 acceptable cleanup situation, but as far as I know,

15 ALARA has not been repealed. And what that means in

16 the real word is that virtually every site, especially

17 one that has any kind of a significant contamination

18 problem, you are going to have to go through a process

19 of negotiating what the final outcome is going to be.

20 And this doesn't matter, it doesn't matter whether

21 you're doing this under the Atomic Energy Act, or

22 CRCLA. The negotiating process is different in new

23 cases, but you still have to do it, so the standard is

24 some number out there, plus ALARA. The standard is

25 not the number.

1 MR. HONERLAH: I think on most large soil
2 jobs in construction, I guess D&D facilities, it's
3 never been ALARA to take more dirt and haul it 2,000
4 to 3,000 miles because of the risk associated with
5 that. And that's just something that - we always
6 consider it. It's never impacted anything that we've
7 done.
8 MEMBER WEINER: This is just a challenge
9 to NRC, I guess. One of the things that continues to
10 haunt me is, are these numbers, 25 millirem, 19
11 millirem, 10 millirem. In the uncertainty bands that
12 you have in getting to those numbers, they're all the
13 same. And I don't know - perhaps this is something
14 that NRC, as the federal regulator, could manage to
15 communicate to the public, and this is something that
16 goes right along with risk-informing any regulation.
17 We need to inform people that, as Ralph so cogently
18 put it, if the standard is 25 millirem, 26 isn't going
19 to result in corpses all over the place. But we
20 really do need to communicate the uncertainties in all
21 of these numbers.
22 MR. SHEPHERD: Remember that the real
23 limit is 100.
24 MEMBER WEINER: Yes, that's accurate. And
25 --

1 MR. SHEPHERD: What we said is for
2 decommissioning, we are going to rather arbitrarily
3 allow for multiple site exposures, and for no firmly
4 documented reason that I've been able to define is, we
5 divide by 4. And you're quite right, which is why we,
6 at the technical level, don't get particularly excited
7 about the difference between 25 for the NRC standard,
8 and the 15 for the EPA standard, because by the time
9 you go through all the back calculations, what's
10 actually measured is a concentration. And the
11 difference in the measurements of the concentration is
12 so small, it's totally overwhelmed by the uncertainty.
13 That's not the same perception that occurs on the top
14 floor next door and downtown.
15 MR. HONERLAH: I think just real quick to
16 follow up with that; technically in the field to
17 implement any concentration-based criteria with the
18 excavator, with the scabbler, you're not drawing the
19 line between 99 and 100 picocuries per gram. You're
20 getting 90 percent of it, you might leave some small
21 residual amounts there, so you're, by essence of the
22 project, you're typically taking more, anyway. But I
23 agree, it's typically, it's the legal folks that say
24 we can't make that commitment to spend the extra
25 federal dollars. We can't set that precedent.

1 MEMBER CLARKE: Ruth, I think -- I'm
2 sorry, Eric. Go ahead.
3 MR. DAROIS: One of the resulting impacts
4 - well, we can't take that too far, because one of the
5 resulting impacts is, if you throw another factor of
6 2 onto the 15 and bring it down to 7-1/2, you
7 eventually run into a problem of detectability, survey
8 design, and now the survey costs are exponentially
9 increasing, so you can only use that multiple a few
10 times before you reach that point.
11 MEMBER CLARKE: I think that's a very
12 interesting area. And just to throw out another
13 example - as you know, from the EPA side, the states
14 can take primacy for certain acts, and they can set
15 their own limits. As I recall, the primary drinking
16 water standard for benzene is 5, and I think New
17 Jersey adopted 2, so where does that leave us? I
18 mean, somehow in the educational piece we have to find
19 a way to get these things out to the people.
20 I think this would be a good place to
21 wrap-up. We don't want to discourage --
22 CHAIR RYAN: I think everybody got an A on
23 their homework. What do you think?
24 MEMBER CLARKE: Oh, yes, I think so. I
25 think so. And no good deed goes unpunished, so what

1 we'd like you to do is write all this up, and --

2 (Laughter.)

3 MEMBER CLARKE: Let me take this

4 opportunity. I think this has been a very interesting

5 day. And I want to take this opportunity to thank all

6 of you, our speakers, and our panel, very much, for

7 your help.

8 MEMBER HINZE: And thanks to Derek and

9 you.

10 MEMBER CLARKE: Well, yes, I was coming to

11 Derek. I think he's - there he is. Derek, as you

12 know, had a great deal to do in organizing this.

13 Thanks, Derek, and thank all of you for coming, and

14 back to you.

15 CHAIR RYAN: Let me add my thanks to a

16 real expert panel. I know all of you have been here

17 many times, some of you, I guess, at least, most of

18 you, and we really appreciate the time you take to

19 share your experiences from practice. It is, at least

20 for the committee, I know for sure, and I'm sure for

21 the staff, of hearing the real world experiences in a

22 forum where we're looking ahead, rather than trying to

23 fix a particular problem, really gives them insights

24 that I hope are very helpful to them, as they are to

25 us. So we're going to try and capture all of this, I

1 think Jim will clearly write a letter to the
2 commission, try to capture particularly some of these
3 key issues that you see, and you've identified, with
4 some explanation, to give them some sense of what the
5 practitioner community and the broader regulatory
6 community see as key issues in this area. So I want
7 to add my thanks to Jim's, and we'll, I think,
8 conclude the working group at this point.
9 MEMBER CLARKE: Yes, Mike, if I could just
10 make
11 one comment.
12 CHAIR RYAN: Sure.
13 MEMBER CLARKE: Really several things
14 struck me in the discussions and the presentations.
15 When we were talking about the dynamics and the
16 ability to predict the future, I was thinking back to
17 a site in Lawrence, Massachusetts that you might know,
18 you may have run into at some point. It had 22
19 buildings, some seriously, others not so seriously
20 contaminated with PCBs. The decommissioning went on,
21 I think it started in 1983, and I think it's a
22 Brownfields project now. Those buildings were
23 decontaminated so that they could be torn down and
24 taken to a disposal facility. And those dynamics are
25 just - when you look at the time horizons that we're

1 trying to think ahead, those dynamics are going to be
2 hard to predict. Thank you.
3 CHAIR RYAN: Okay. Thank you. Let's see.
4 I think on our agenda, that is the conclusion of our
5 working group. We finished a little bit ahead of
6 schedule, so if there's no other business for the
7 committee this afternoon, we will adjourn our record,
8 and adjourn the meeting for the day. We'll reconvene
9 at 8:30 tomorrow morning.
10 I might just as a little teaser, we're
11 very fortunate to have scientists from the French
12 Academy of Sciences here tomorrow to discuss their
13 study of low dose effects, and it's a very interesting
14 view that they have, and where they're going to share
15 that with us face-to-face, so we'll be happy to have
16 that tomorrow, and you're all more than welcome to
17 stay. Thank you.
18 (Whereupon, the proceedings went off the
19 record at 4:14 p.m.)
20
21
22
23
24
25

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 174ND Meeting

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.

Charles Morrison
Official Reporter
Neal R. Gross & Co., Inc.

U.S. Army Corps of Engineers' D & D Experiences

Hans Honerlah, CHMM

ACNW Meeting

Nov 13, 2006

USACE Environmental Mission

- Supports and manages numerous environmental missions;
  - FUSRAP
  - FUDS
  - BRAC
  - EPA Superfund
  - Army Deactivated Nuclear Power Plants
- Generates large volumes of waste
  - Common radionuclides: U, Th, Ra, and 11e.(1)
  - Physical Form Soil or Building Debris

USACE D & D Framework

- Most work performed IAW CERCLA and its implementing regulation, the NCP
- As lead Federal Agency
  - Responding to releases at DoD and FUSRAP Sites
- As Support Agency
  - Supporting EPA Superfund and other Federal Agencies
- Close correlation between CERCLA and the MARSSIM remedial Process

Outline of USACE D & D Issues

- Applicable Relevant and Appropriate Regulations (ARAR)
- Waste Classification and Disposal
- Transportation
- Release of Material from a Radiological D & D project

ARAR

- Many current regulations applicable to D & D of facilities are conflicting to the NRC requirements of 25 mrem/yr outlined in 10 CFR 20 Subpart E
  - Examples:
    - State of NJ – 15 mrem/yr (promulgated)
    - State of MA – 10 mrem/yr and 1e-5 risk (promulgated)
    - State of CT - 19 mrem/yr (proposing, not yet promulgated)
    - State of NY – 10 mrem/yr (guidance)
    - U.S. EPA 1e-4 to 1e-6 risk
- Several States have these rules promulgated, however others only have criteria as guidance documents
- Many States are considering limiting transfer of released properties under other than radiological regulations

ARAR

- Implementing the Dose and/or Risk Assessment to determine concentration requiring removal
  - 10 CFR 20 uses "an average member of the critical group" to support unrestricted release
  - Other State and Federal agencies may consider using an industrial scenario to determine clean-up criteria as a restricted release
  - How to implement the radiological carcinogen risk into CERCLA for risk assessments with commingled chemical contaminants of concern
  - Multiple agencies support many different guidance documents to determine inputs into the risk/dose calculations

Waste Classification and Disposal

- Must review BOTH:
  - Historical information about the site operations to determine how, and when, waste was produced
  - Analytical data to determine the nature and extent of radioactive contamination
- Current system is source based "pedigree"
- Shortcomings of source based system
  - It's complex
  - Not an efficient use of resources
  - Cannot be defended on grounds of health protection
  - Adverse impacts on competition, project schedule
  - Unnecessary use of Part 61 facility capacity

Waste Classification and Disposal

- Many disposal facilities has isotopic waste acceptance criteria which provide a maximum concentration in pCi/g for the entire cell
- This does not represent the true risk from the material placed into the facility if you consider the largest volumes of waste disposed of into each cell typically represents a small fraction of the WAC concentration
- Consideration could be given to a volume weighted criteria which would track source term in each disposal cell
- This would allow for tracking of the risk within the entire disposal impoundment

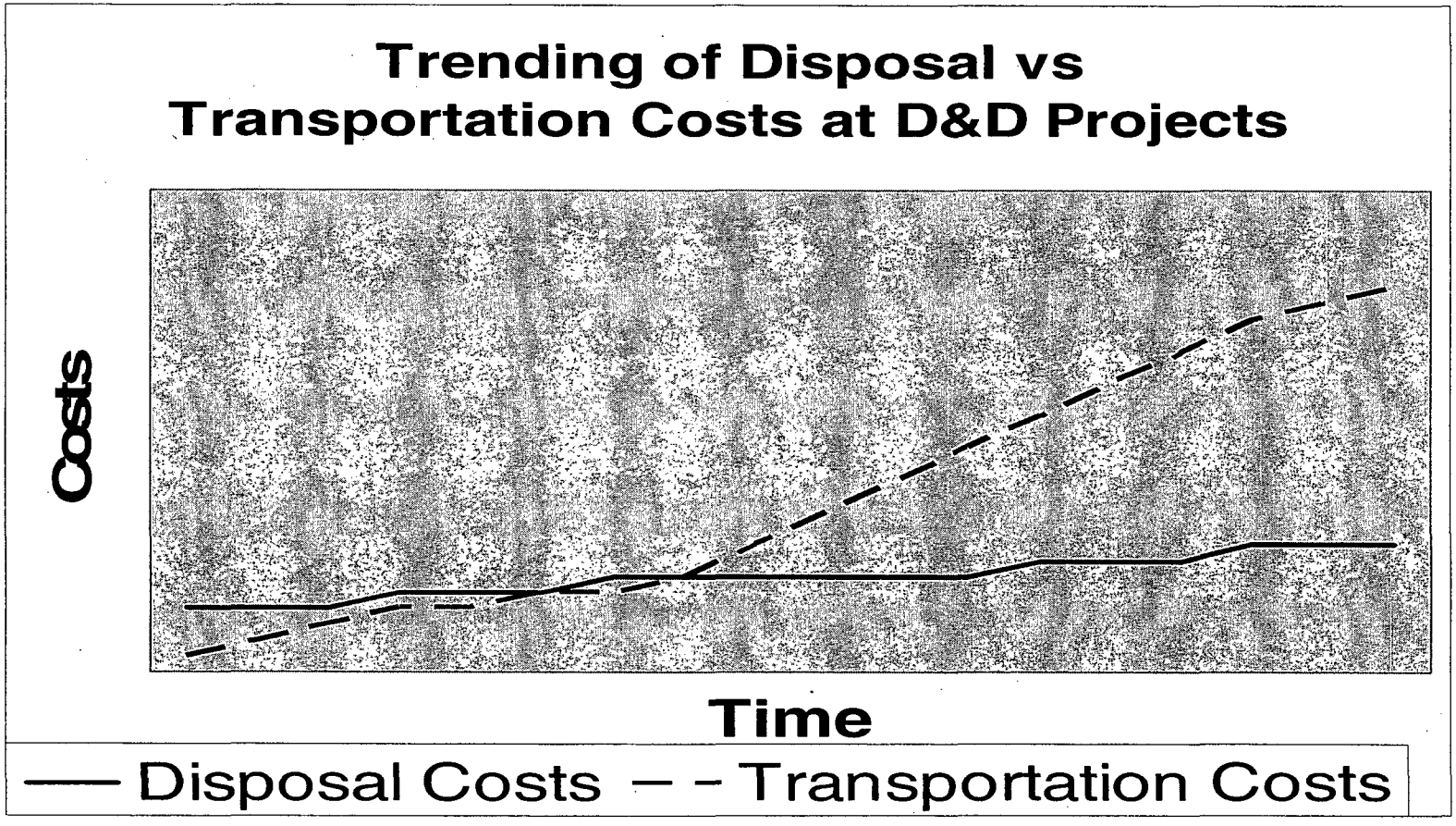
Waste Classification and Disposal

- The utilization of RCRA disposal facilities for LARW has stabilized the disposal costs for these materials
- The acceptance of RCRA facility disposal is on a State by State basis vs. national consistency (currently acceptance is limited to a few western states)
- Current LLRW disposal has significant limitations

Transportation

- A majority of the Disposal facilities (both LLRW and RCRA) are located in the western United States
- With a large portion of the USACE D & D efforts focused in the northeastern United States there is a significant percentage of project costs associated with transportation

Transportation



Release of Non-Impacted Material from D & D Projects

- The cost associated with release of non impacted material is at times greater than the cost associated with disposal due to the following:
  - Acquiring and documenting sufficient negative data
  - Coordination with State Regulatory Agencies to gain concurrence (sometime never gaining concurrence)
  - Acceptance by a local solid waste disposal facility
- Establishing a release for disposal limit vs. a release for return to commerce (each provide a significantly different risk)

Summary

- Provide harmony between Federal and State Agencies Regulations on acceptable dose and/or risk
- Develop a waste classification system based on risk that could arise from waste disposal
- Support regional disposal facilities (both existing and new) for numerous waste classifications to reduce costs associated with transportation
- Identify a general class of exempt waste that are exempt for the purpose of disposal

Reactor Decommissioning Program Lessons-Learned

Ralph Andersen, CHP (NEI)
Sean Bushart, Ph.D (EPRI)

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Industry Program

- EPRI
  - Document experience and lessons-learned
  - Technology development & transfer
  - On-site assessment and technical support
- NEI
  - Executive oversight & policy development
  - Interface with NRC, EPA and Congress
  - Resolve generic economic & regulatory issues

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Currently for Power Plants in USA

- **Decommissioning of closed units proceeding well**
  - 2 plants have terminated their licenses
  - significant progress at other plants
  - transfer of fuel to dry storage completed
  - funding appears to be adequate in most cases
  - completion of several plant projects in next 1-2 years
- **Remaining issues**
  - Final site characterization
  - License termination and site release
  - Materials clearance
  - Groundwater contamination/ soil remediation

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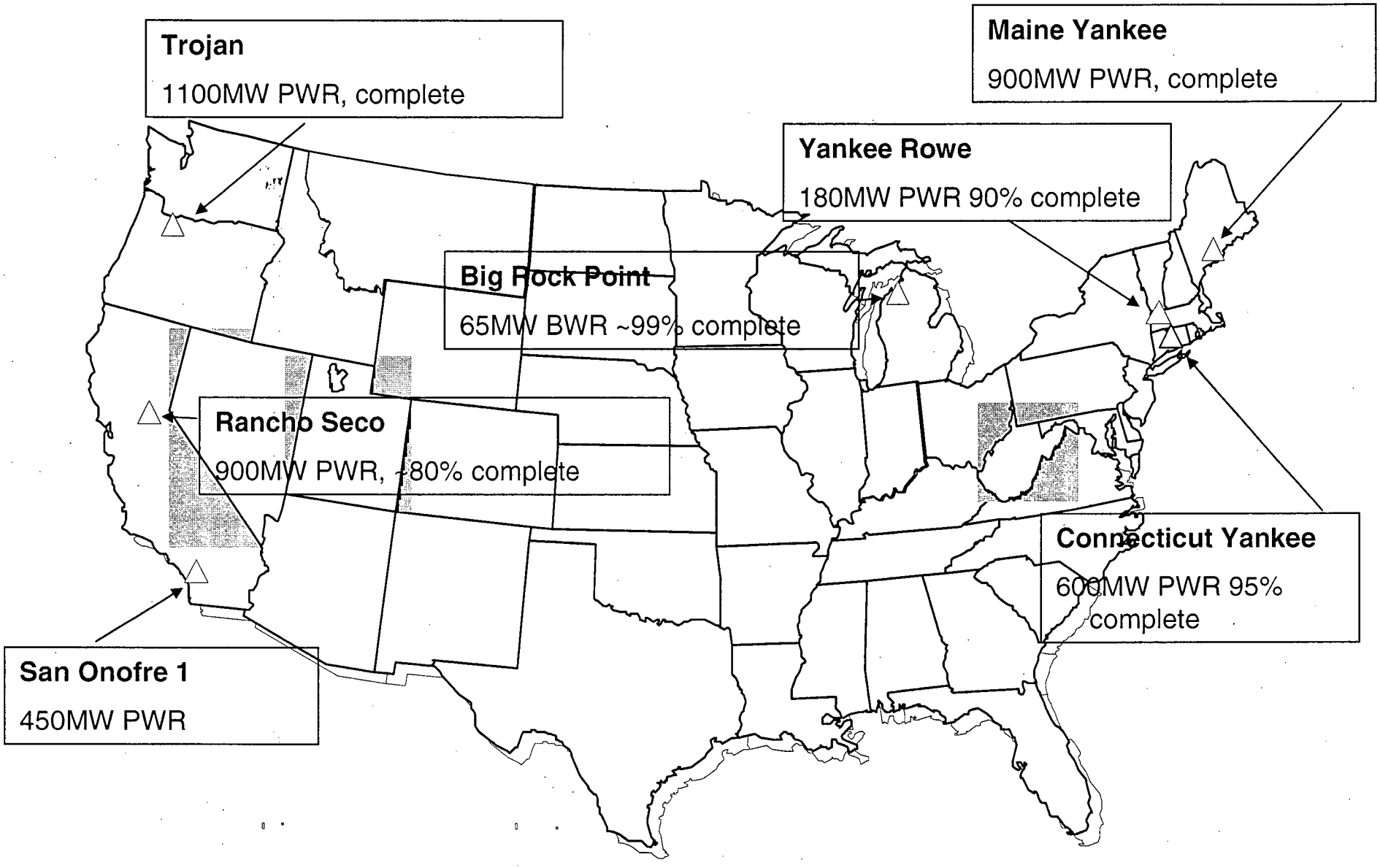
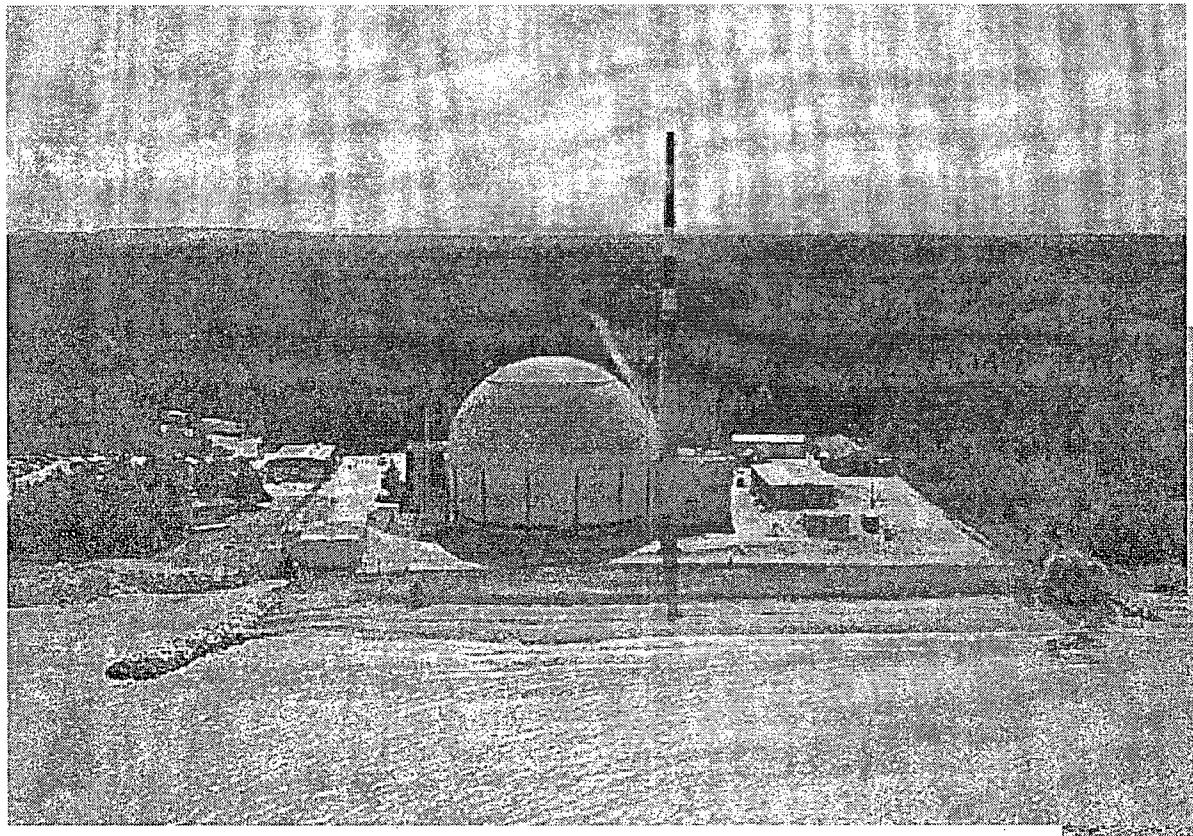
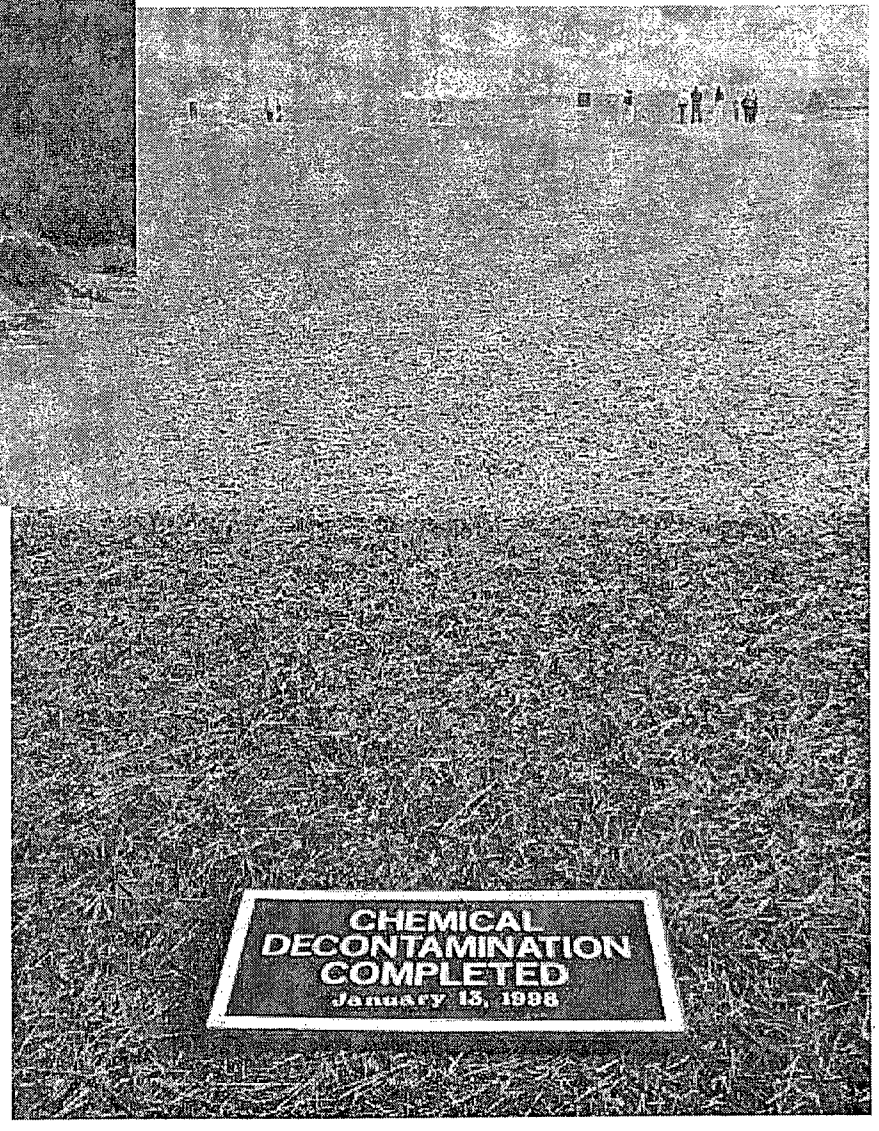
7 US Plants in Progress - fuel in dry storage



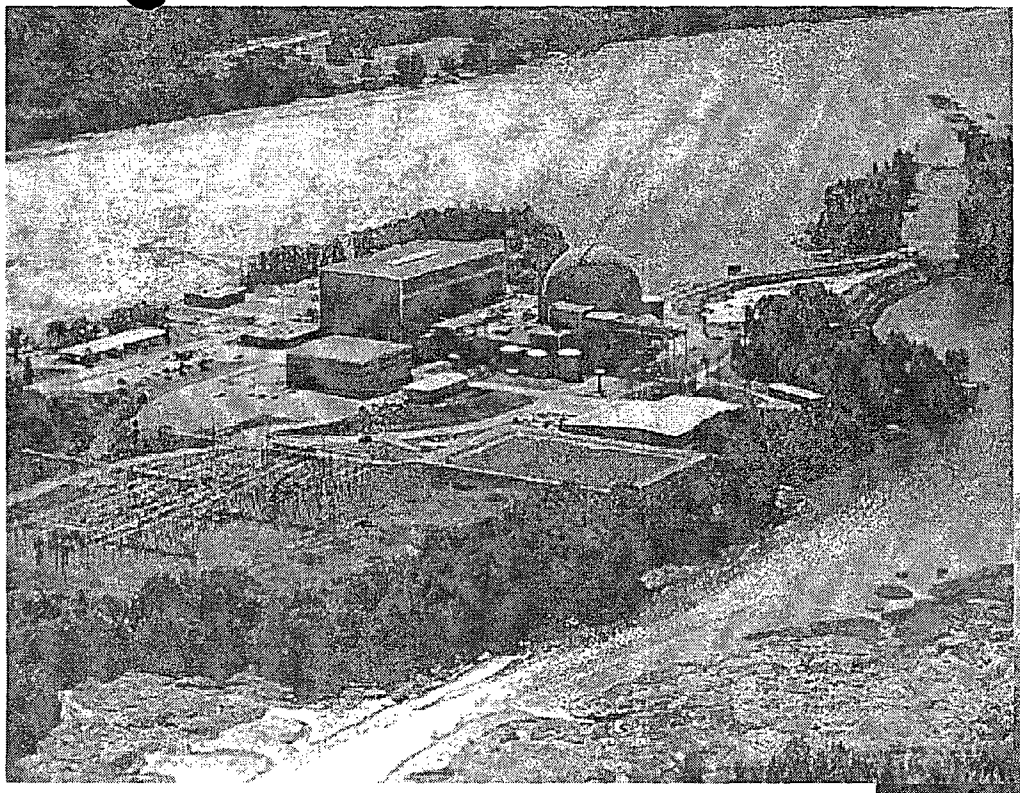
Big Rock Point



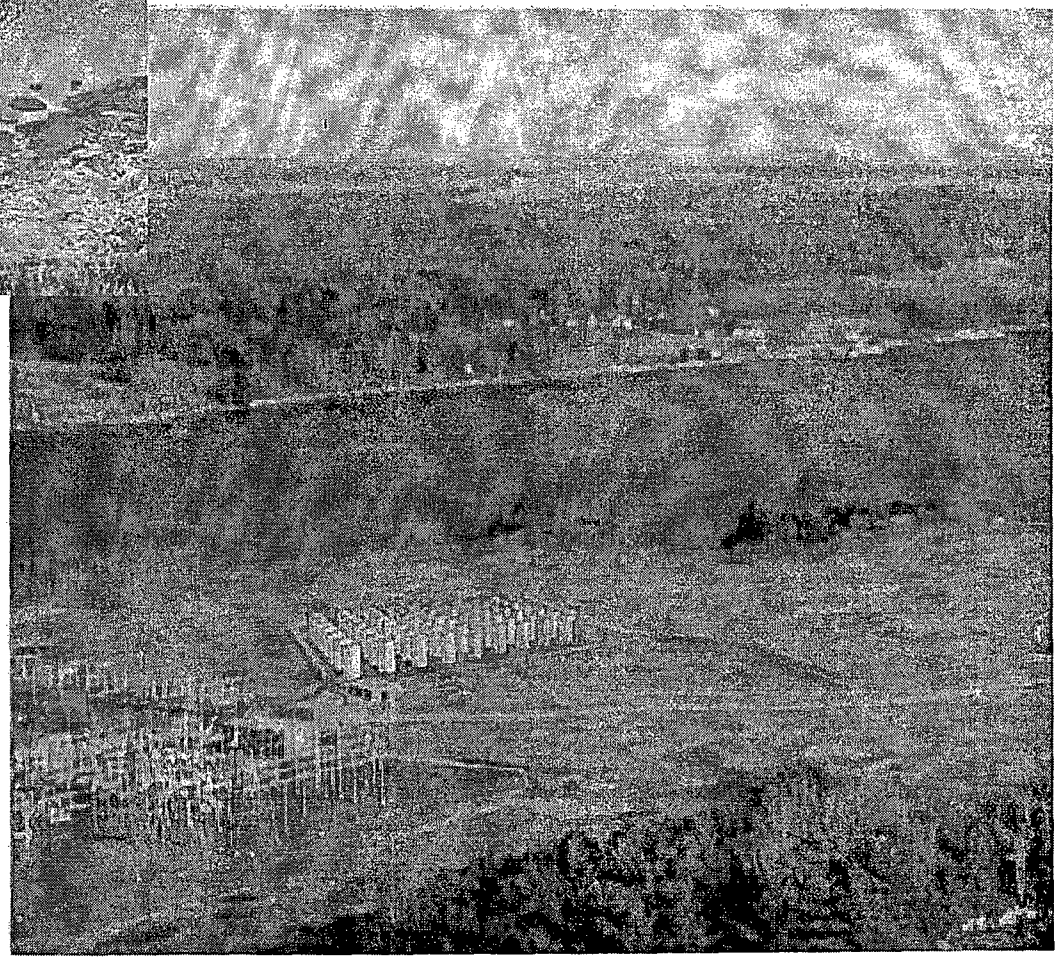


Key EPRI Interactions:

- 2 Technical Workshops
  - -Hazardous Waste Remediation
  - -LTP and Final Site Release
- Full System Decon with EPRI DFD process

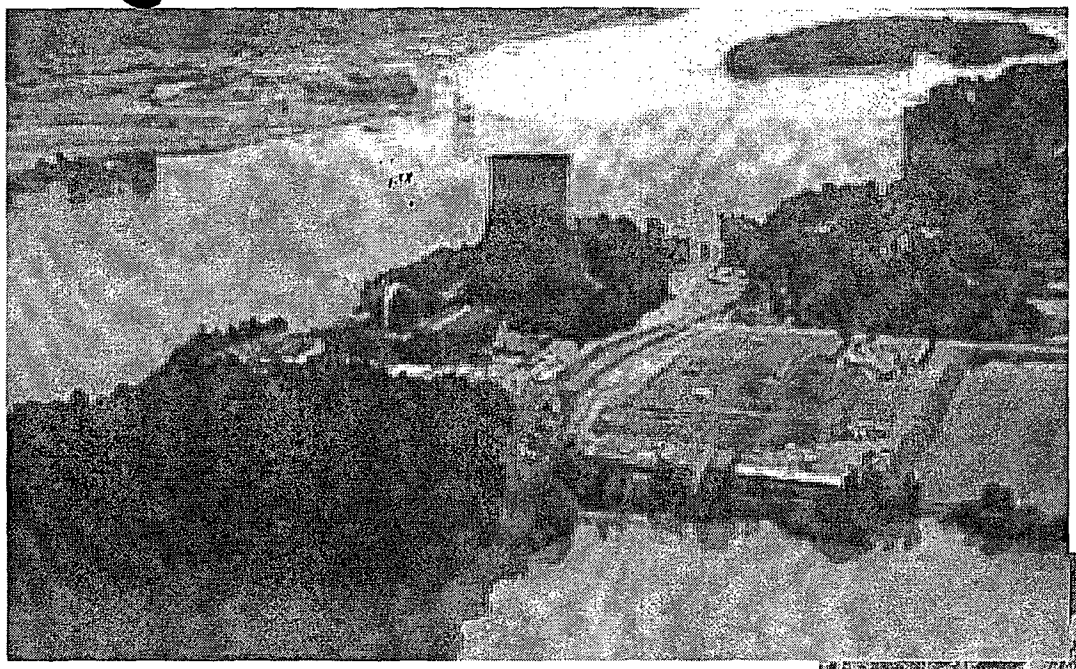


Maine Yankee

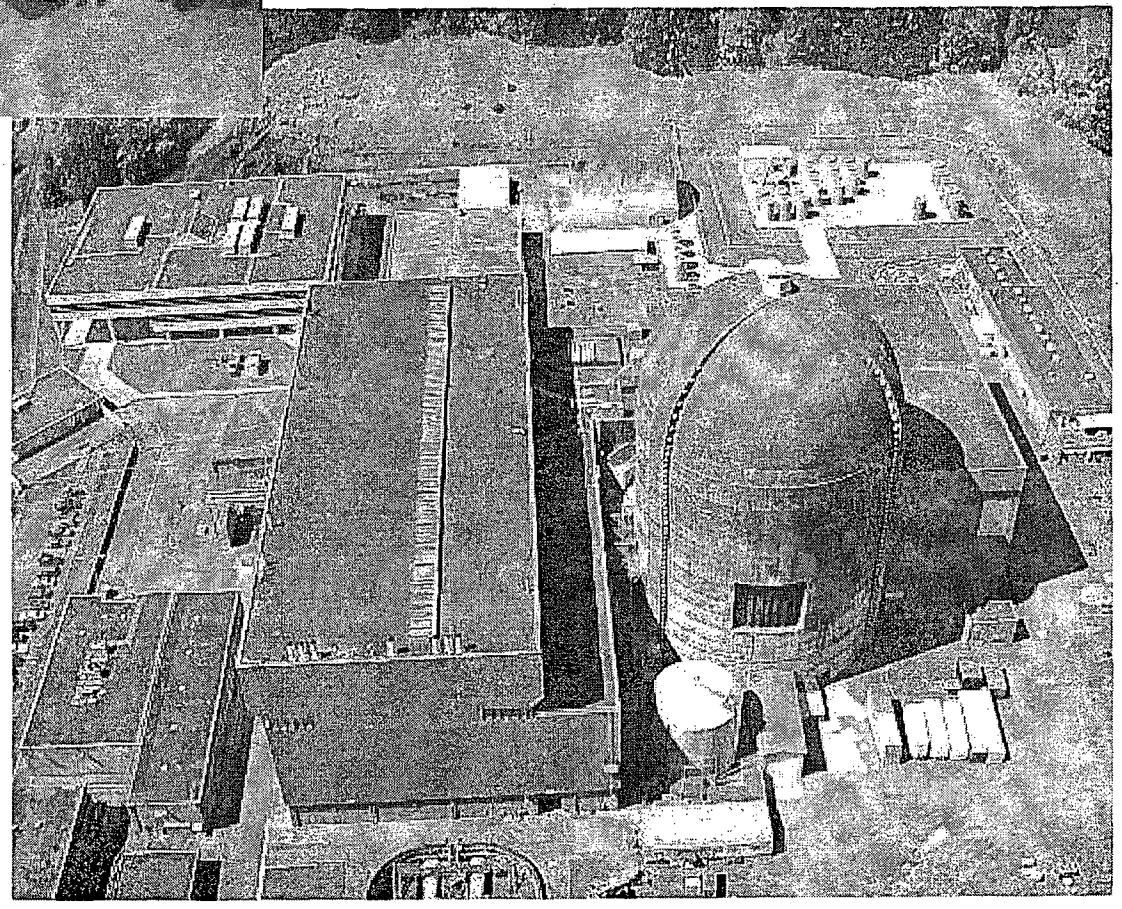


Key EPRI Interactions:

- Technical Workshops
  - -Radiation Exposure Control
  - -Final Status Survey
- Full System Decon with EPRI DFD process
- Experience Summary Report

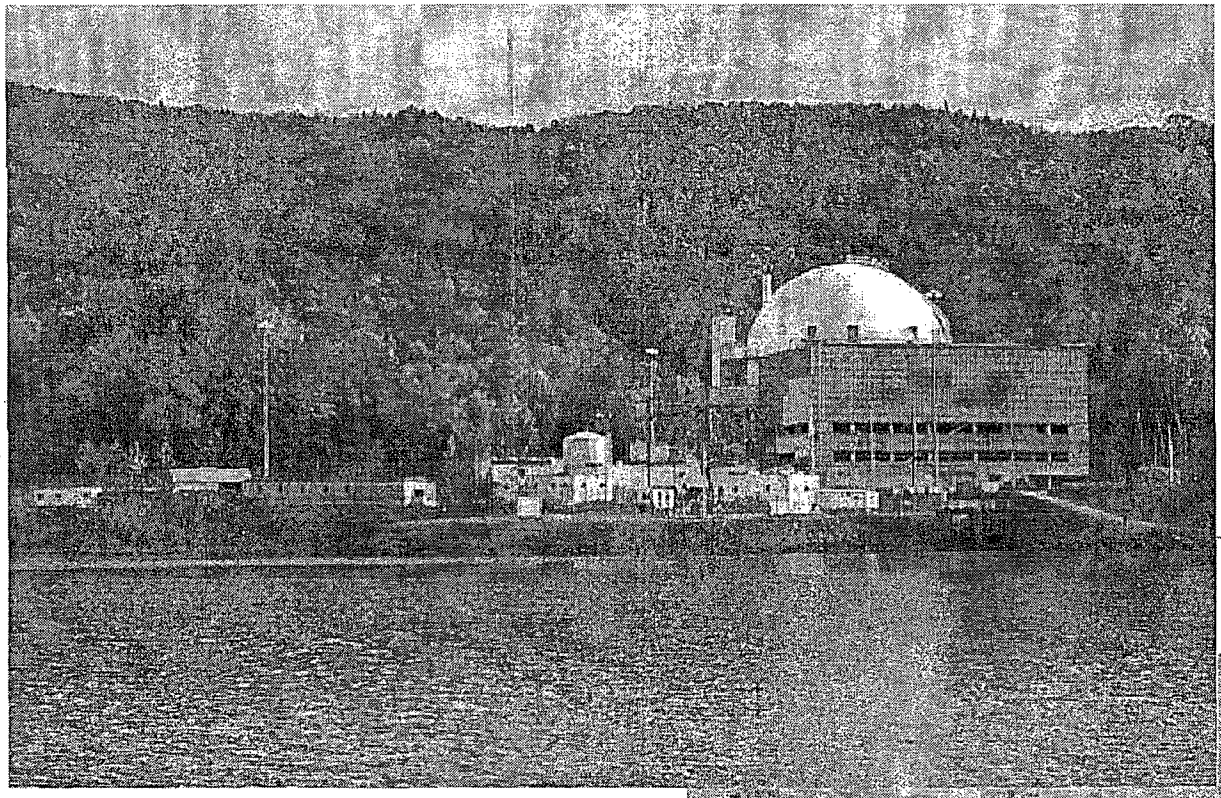


Trojan

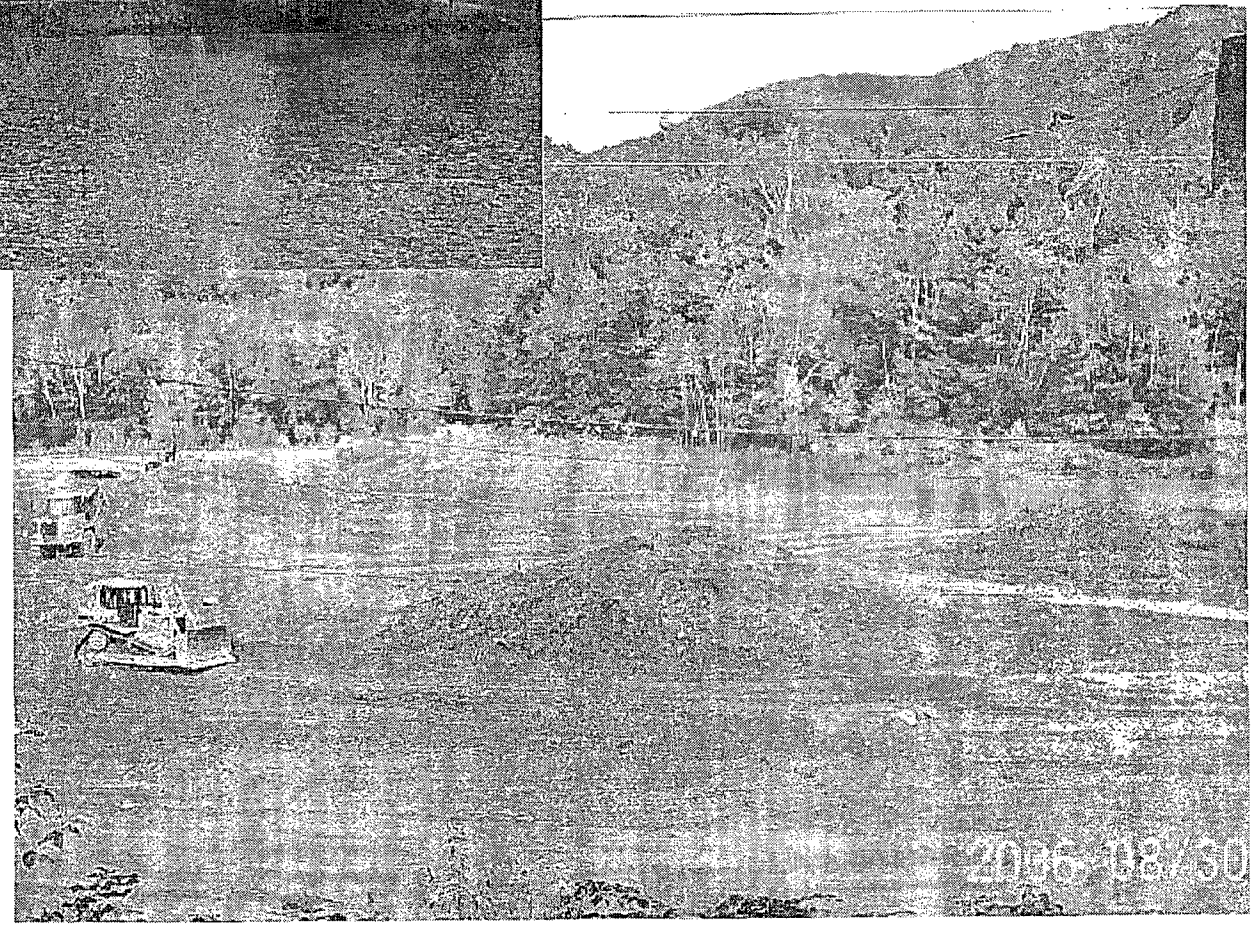


Key EPRI Interactions:

- Technical Workshop
  - Embedded Piping Removal
- Evaluation of Decommissioning Strategy
- SFP Cleanup and Cooling Report

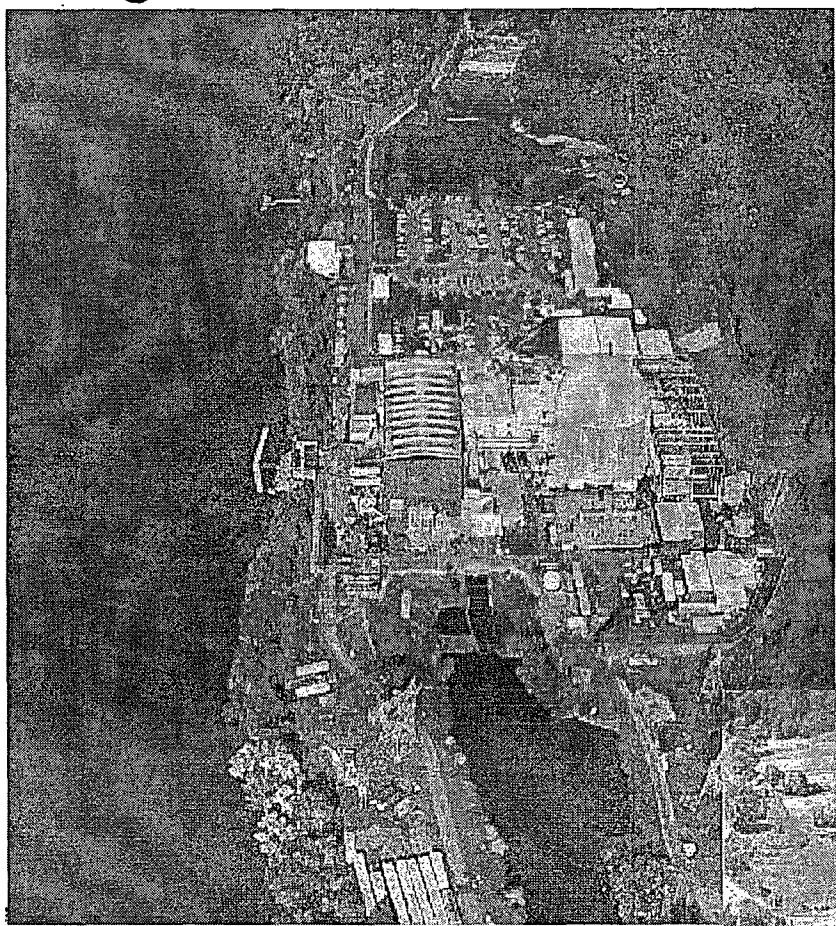


Yankee Rowe

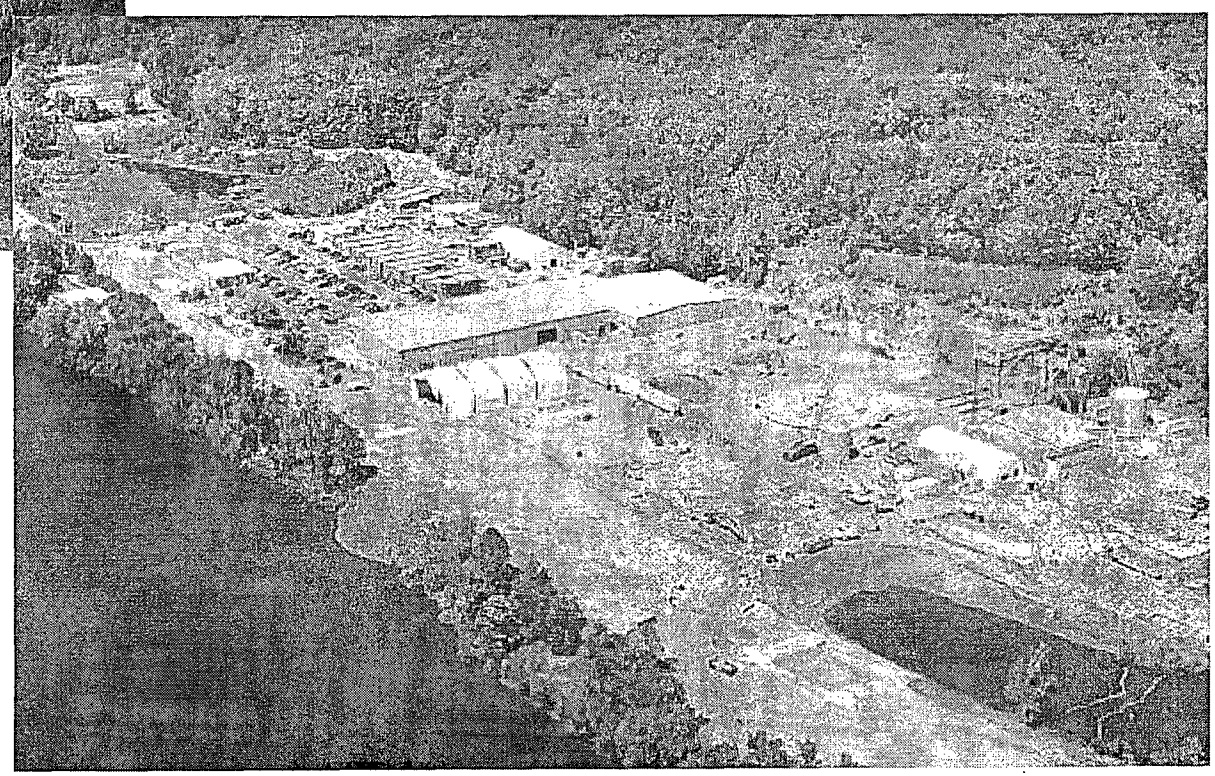


Key EPRI Interactions:

- Technical Workshop
  - -Concrete Removal
- Groundwater Experience Report

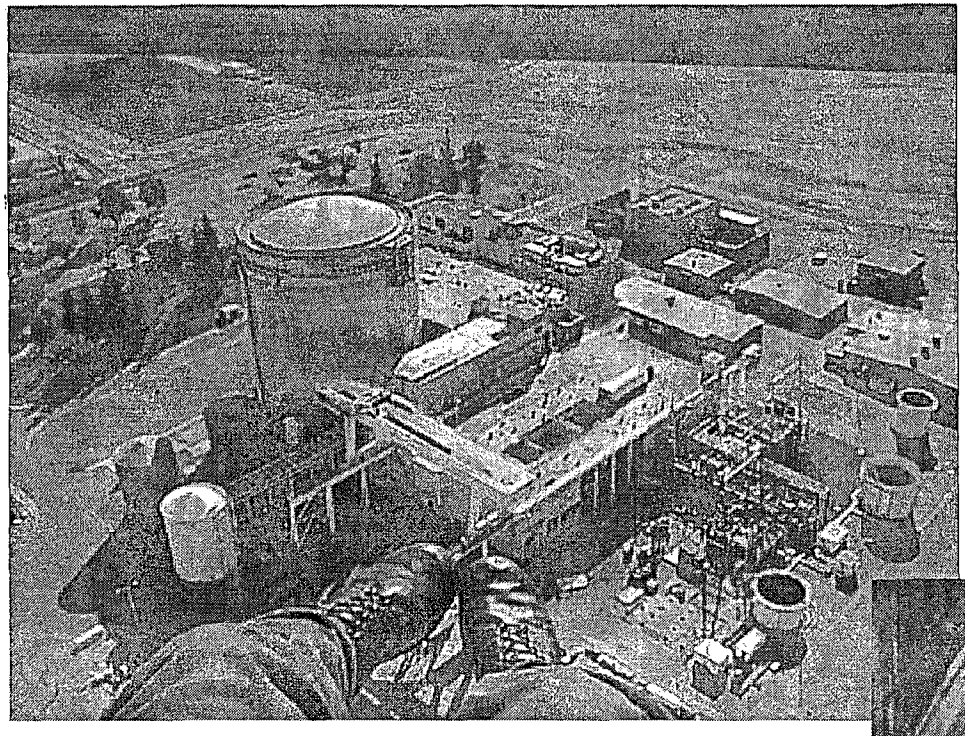


Connecticut Yankee

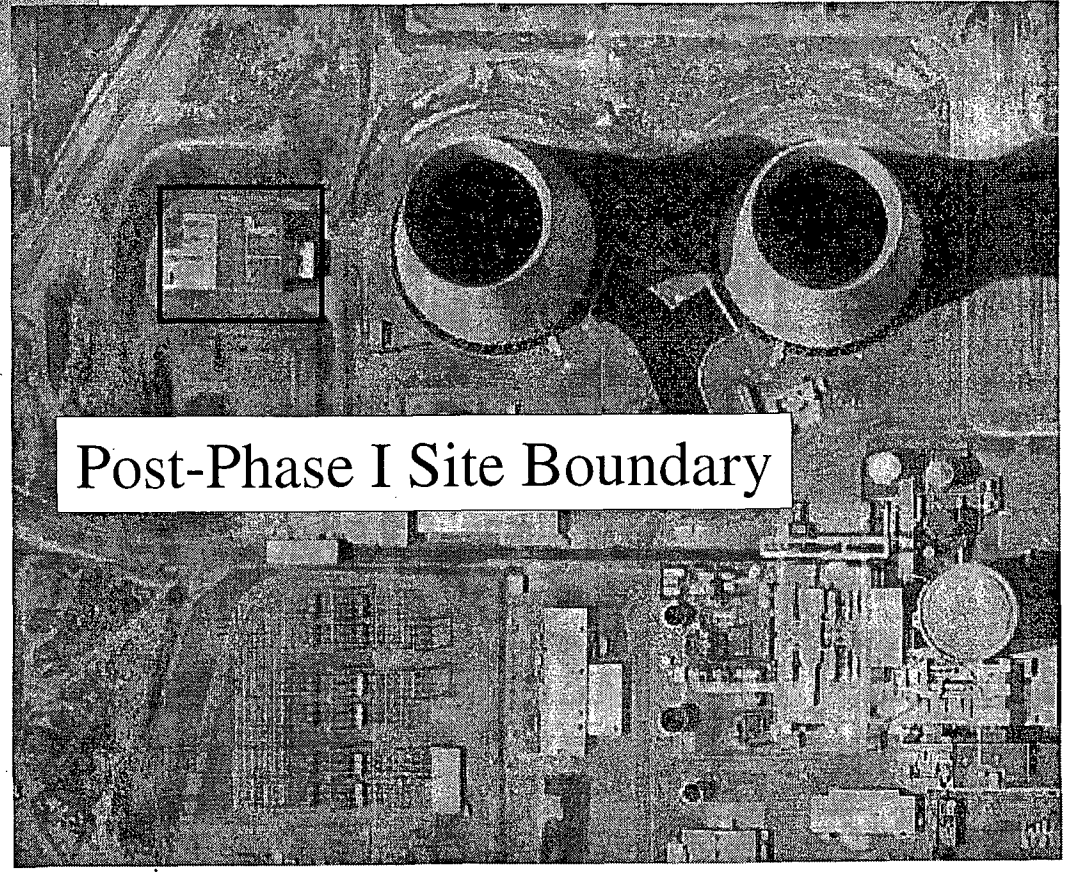


Key EPRI Interactions:

- Technical Workshops
  - -Final Site Survey and LTP
  - -Groundwater Management
- Experience Summary Report



Rancho Seco



Key EPRI Interactions:

- Technical Workshop
  - -LLW Management
- ALARA Evaluation for Reactor Internals Segmentation
- Experience Summary Report
- Decommissioning strategy peer review team

Technology Transfer Focus of EPRI Program Continues Internationally

- **Growing membership internationally in the EPRI Program**
  - UKAEA- Scotland, British Energy, BNG- UK
  - EdF- France, SOGIN- Italy, JAPC- Japan, TaiPower- Taiwan
  - UNESA (All Spanish Utilities), ENRESA, & Iberinco- Spain
- US technical and regulatory experiences are invaluable to ALL members
- New technologies/experiences being transferred to U.S. as well

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EPRI Collaboration

Reducing the Costs and Risks of Decommissioning Nuclear Facilities

Examples: EPRI Reports/Software Available to Members

Planning Regulatory Issues

- Pre-planning Manual
- License Termination Plan

Initial Activities

- Site Characterization**
- Site Release Modeling and Characterization
- Optimization of Radioactive Waste Management*

Major Removal Tasks

- Reactor Primary System Decontamination**
- Removal of Graphite Cores**
- Reactor Vessel Internals Segmentation
- Removal of Major Components and Structures

Major Site Release Tasks

- Site Survey and Final Release**
- Site Groundwater Characterization Studies**
- Demolition of Major Structures
- Disposal of site materials (concrete, soil)

Closure Tasks

- Final Site Survey**
- License Termination

** Technical Topics Available for Site-specific Evaluations

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Lessons-Learned - Decommissioning

- Paradigm shifts (operation-shutdown-deconstruction-disposal)
- Internal and external stakeholders
- Applicable agencies and standards
- Historical site review
- Site characterization
- Groundwater modeling and monitoring
- Decontamination for decommissioning
- Reactor vessel/large component disposal
- Soil and groundwater remediation
- Low-level waste management options
- Final site survey

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Lessons Learned – New Plants (Examples)

- AE/Construction considerations
  - Design and construction documentation
  - On-site construction practices
  - Hydro-geological characteriaztion
- NSSS Design Considerations
  - Sumps
  - Structures and outside areas
  - Spent fuel pool and transfer canal
  - Piping
  - Tanks
  - Site water management
  - Discharge lines

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Lessons Learned in the Decommissioning of Fuel Cycle Facilities

ACNW Decommissioning Lessons Learned Working Group Meeting

November 14, 2006

Two White Flint
11545 Rockville Pike, Rockville, MD

presented by:
Jeff Lux
Fuel Cycle Facilities Forum

Topics

- Introduction – The Fuel Cycle Facilities Forum
- Successes Achieved
- Decommissioning Cost Issues
- Environmental Impact Issues
- Design & Construction Issues
- Technical Issues

Introduction to the FCFF

- Voluntary industry organization established in 1987
- Represents Source and Special Nuclear Material licensees
- Primary focus is on decommissioning
- Membership represents licensees requiring special NRC consideration
- Provides industry voice on decommissioning issues
- Provides feedback and recommendations to NRC staff

Successes Already Achieved

- Intentional Mixing
- Use of Reasonable Exposure Scenarios
- "Layering" of Institutional Controls
- Integrated Decommissioning Improvement Program (IDIP)

Decommissioning Costs

- Transportation and Disposal of Contaminated Material
- In-process Measurement and Removal of "Migrated" Material
- Decontamination or Removal of "Inaccessible" Components
- Characterization and Final Status Surveys
- Health Physics Monitoring of Decommissioning Activities

Environmental Issues

- Concentration of Effluents Causing Unanticipated Exceedences of DCGLs
- DCGL Derivation not Accounting for Inter-Media Impact
- Penetration of Liquids Into or Through Porous Material
- Migration of Liquids Through Penetrations

Design & Construction Issues - I

- Minimize Embedded Piping or Design for Access to Embedded Piping in Future
- Use Stainless Steel or Plastic when Possible; Corrosion is Problematic
- Provide Secondary Containment of Liquids when Possible
- Avoid Floor Penetrations or Design Seals for Penetrations

Design & Construction Issues - II

- Apply Coatings to Porous Surfaces or Make Porous Surfaces Non-Porous in Acid Areas
- Use Dry Processes when Possible
- Consider a Rail Line to the Site

Other Issues – Regulatory - I

- Address Inconsistency Between NRC-HQ, NRC Regions, and States via Technical Documents
- Multi-Agency Jurisdiction Requires Proactive Involvement by NRC to Avoid Delays (and Cost Impact)
- Provide Clarification to 10 CFR 70.38 re: Alternate Schedule for Decommissioning
- Address Regulatory Issues Through IDIP Position Statements

Other Issues – Regulatory II

- Provide for Periodic Site Surveys During Operating Years to Justify Area Classification
- Maximize In-Process Inspection to Minimize Confirmatory Survey & Inspection

Other Issues – Technical - I

- Design the Decommissioning Plan to Minimize Health Physics Monitoring and Surveys
- Consider Requiring Characterization Data to Meet Final Status Survey Quality Requirements
- Streamline Data Collection & Import; Link Data to Location
- Minimize Paper and Maximize Electronic Data Entry
- Establish Electronic Vehicle (e.g., Website) to Enhance Access to Data

Other Issues – Technical - II

- Maximize Licensee's Ability to Decommission Under Operating License
- Develop DCGLs During Licensing Process
- Provide for Volumetric Averaging for Groundwater and Subsurface Soil
- Allow Reduced Characterization under Specified Conditions

Questions??

Argonne NATIONAL LABORATORY

... for a brighter future

Lessons Learned from DOE and Other Site Decommissioning

Lawrence E. Boing
Argonne National Laboratory

Advisory Committee on Nuclear Waste –
Working Group Meeting on Decommissioning Lessons Learned

Rockville, MD
November 14, 2006

U.S. Department of Energy

UChicago Argonne LLC

A U.S. Department of Energy laboratory managed by UChicago Argonne, LLC

Presentation Outline

- Historical Perspective
- Cost Issue
- Environmental Impact Issue
- Design and Construction Issue
- Other Improvements
- Summary

Historical Perspective - 1

- Some DOE sites/facilities are in closure
- Some DOE sites have limited number of facilities or areas in closure
  - Some will be demolished
  - Some will be reused after decommissioning
- Some facilities are privately owned, but contaminated with Government radioactive materials (contract closure requires restoration)

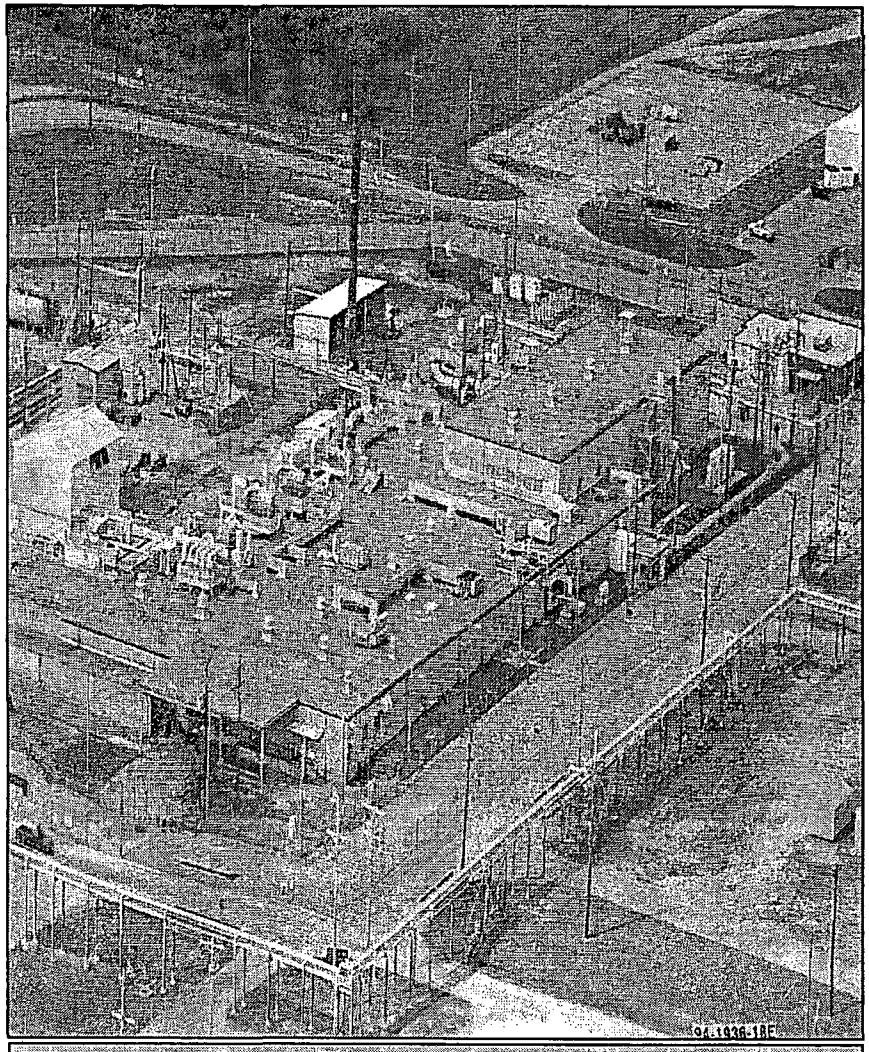
Historical Perspective - 2

- Many 'one-of-a-kind' facilities designed, operated and with their own unique history and problems
- Many quickly constructed and operated - or at the least not to current day standards – little concern about closure issues
- Recordkeeping issues – 'as built' records, operational history data – some good but lots of poor examples

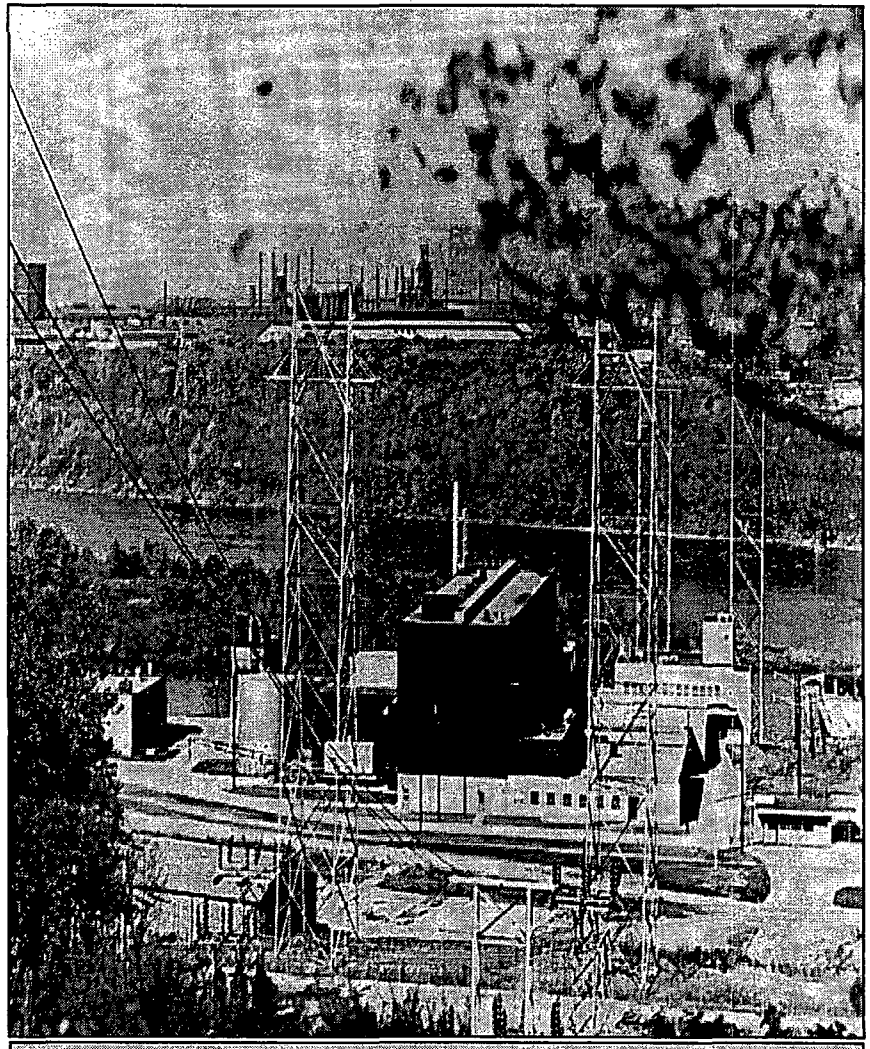
Historical Perspective - 3

- Many facilities poorly deactivated to a safe shutdown condition in 1950's-1990's; decommissioning inherited these problems
- Generally speaking there are no Decommissioning Funds – slows process of implementing decommissioning
- Poor past communication and past operational limitations on openness complicated stakeholder engagement process and comfort levels
- Labor forces used for decommissioning vary – some 'in-house' forces, others project specific contractors and at closure sites - integrators with subcontractors

Variety of Facilities



DOE – SRS Fuel Fabrication Facility



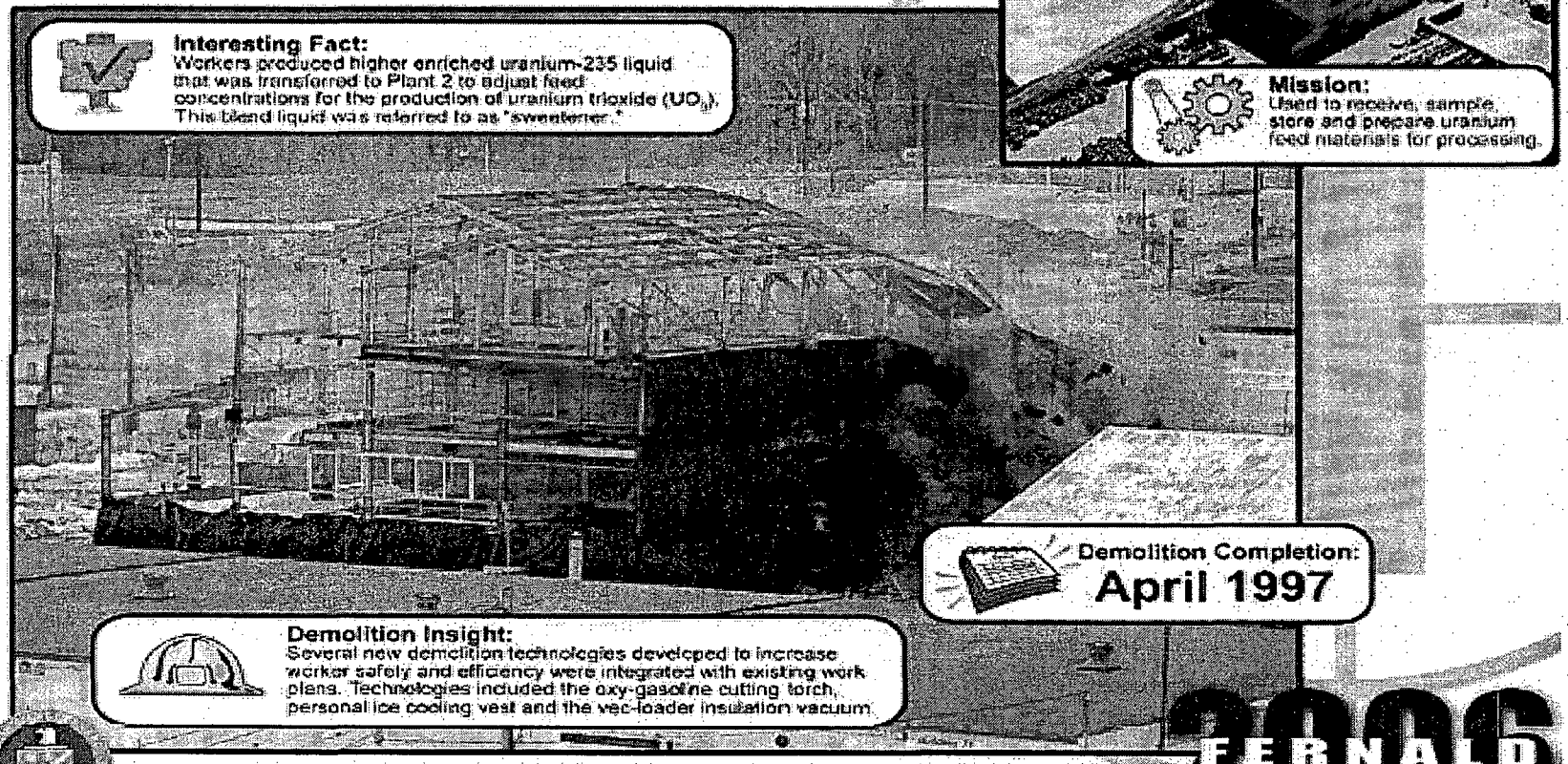
DOE-Shipping Port Reactor

Fernald Site - Plant 1

Plant 1, Sampling Plant

Interesting Fact:
Workers produced higher enriched uranium-235 liquid that was transferred to Plant 2 to adjust feed concentrations for the production of uranium trioxide (UO_3). This blend liquid was referred to as "sweetener."

Mission:
Used to receive, sample, store and prepare uranium feed materials for processing.



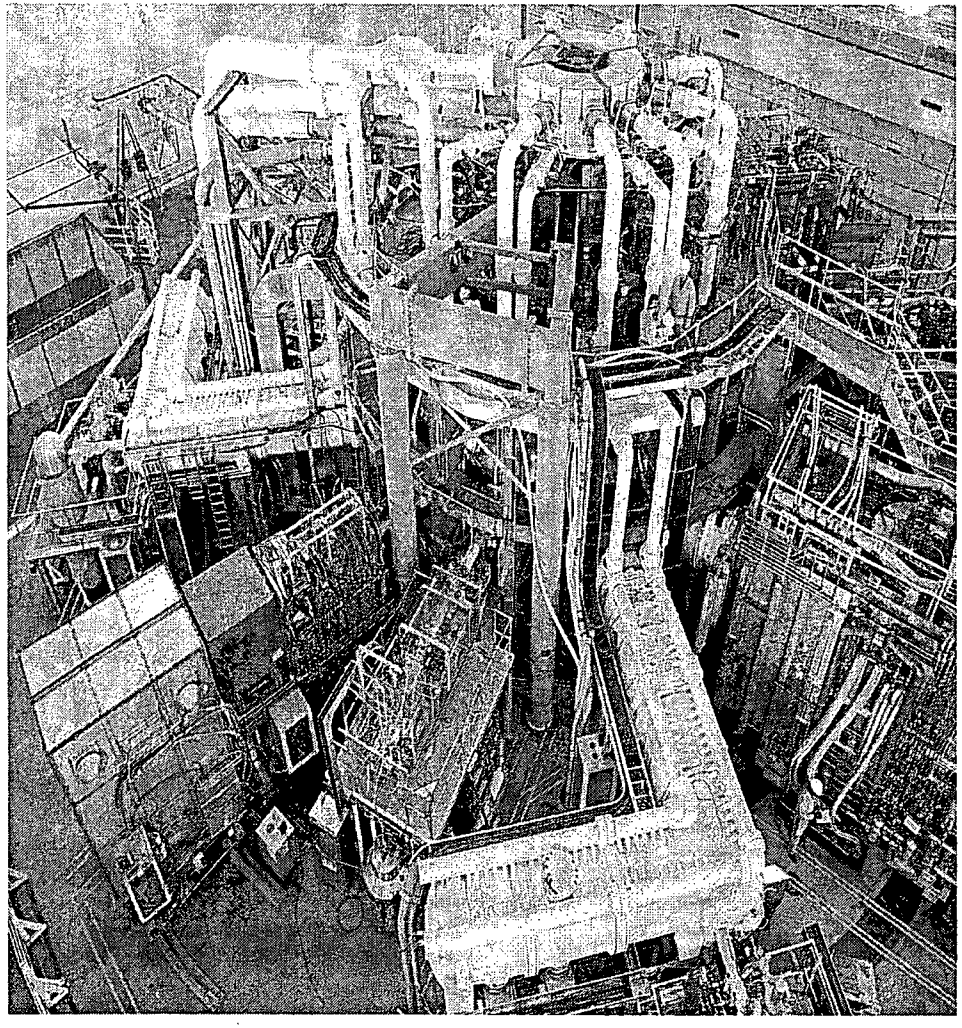
Demolition Completion:
April 1997

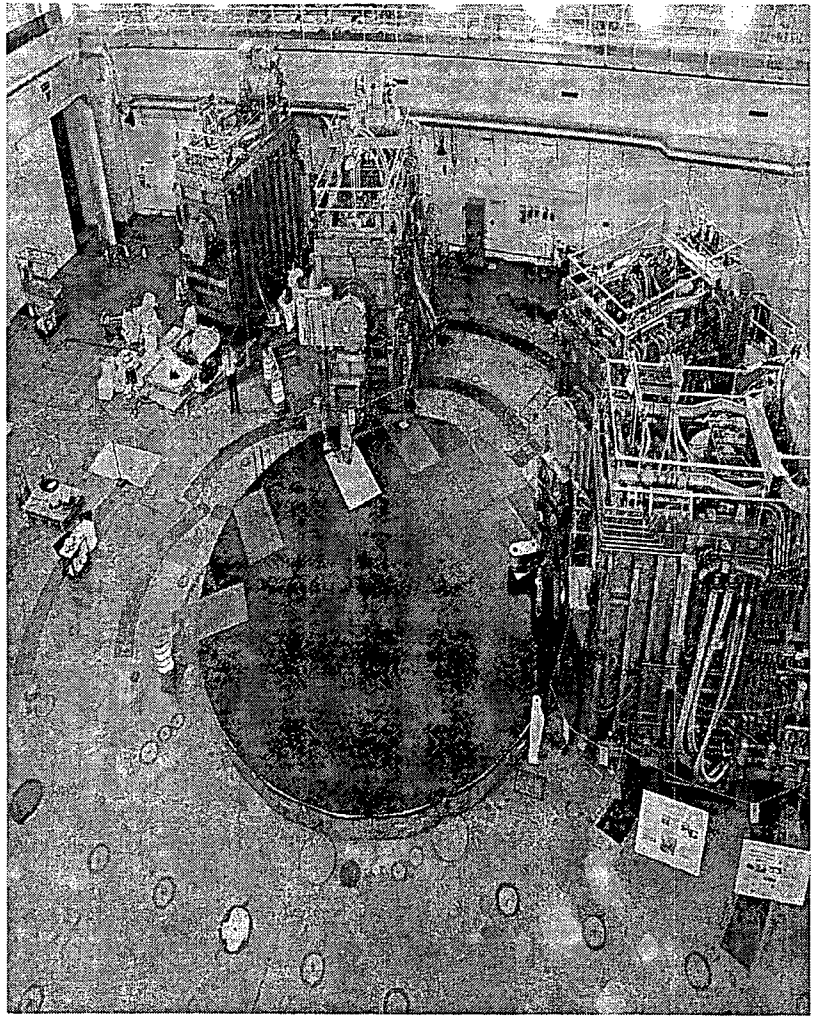
Demolition Insight:
Several new demolition technologies developed to increase worker safety and efficiency were integrated with existing work plans. Technologies included the oxy-gasoline cutting torch, personal ice cooling vest and the vac-loader insulation vacuum.

Fluor Fernald

2006 FERNALD *committed to Safe closure*

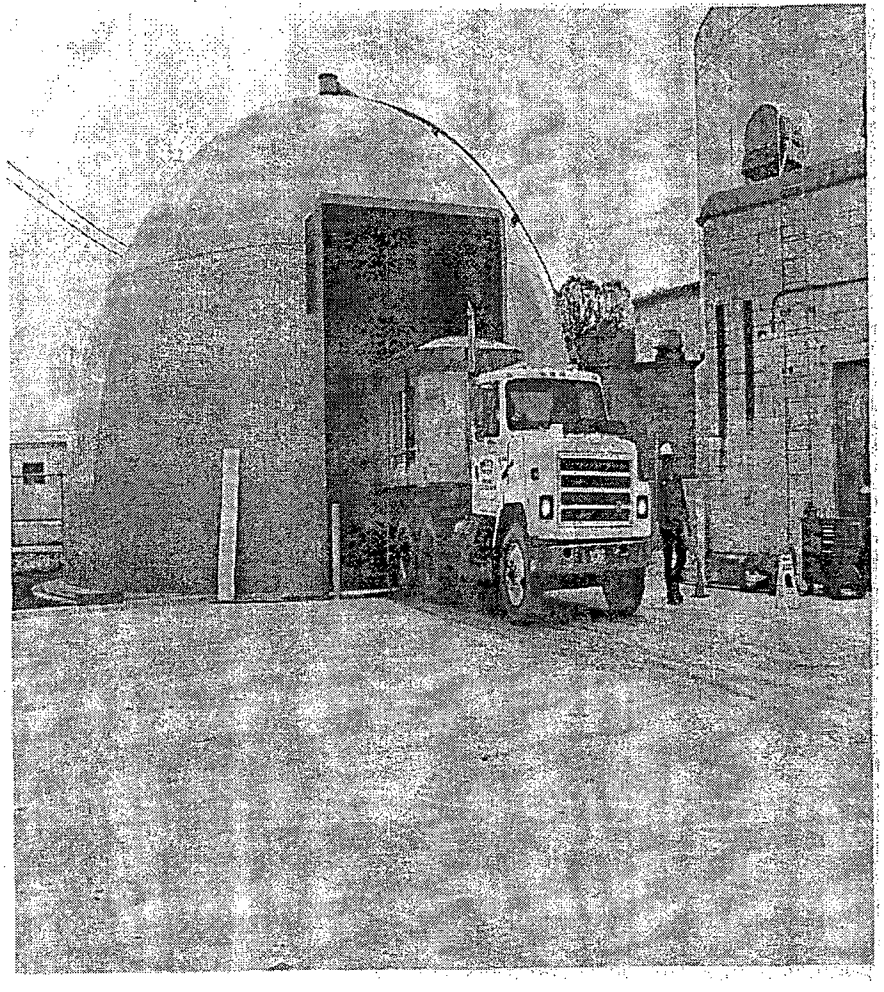
Before & After Decommissioning - TFTR



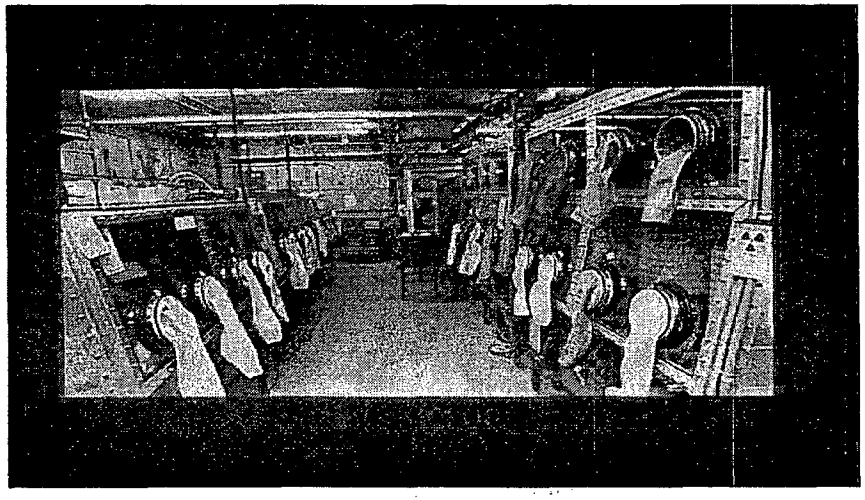


Tokamak Fusion Test Reactor at DOE-PPPL Site, Princeton, NJ

Facility Re-Use at ANL



CP-5 Vaporsphere



Building 212 Gloveboxes Laboratory

Cost Issue - 1

- Major cost elements are:
  - the labor cost to perform the decommissioning and
  - the cost to manage the generated wastes
- Waste disposal at large waste volume generating project sites requires careful planning and cost-benefit analysis for decision making
- Management of the interfaces associated with off-site shipments and the associated work involved in establishing and maintaining that process is typically time-consuming
- Not to be forgotten is site characterization and the historic site assessment

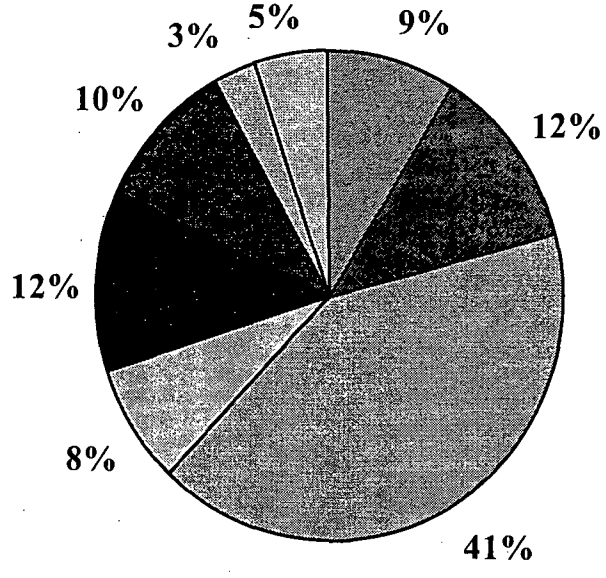
Cost Issue - 2

- Clearance (for free release) of larger volumes of material that would not require management as wastes would reduce the costs
- Intact large component/equipment removals save funds as well as schedule and reduce risks
- Find ways to optimize the decommissioning process through 'optioneering' studies including cost-benefit analyses and value engineering
- Industrial safety issues need close monitoring – electrical safety, rigging and lifting, control of contractors - to mention just a few – its very expensive to 'sit and wait' due to work stoppages or other problems

Cost Issue - 3

- Technologies are available off the shelf to support decommissioning
- Final site end-state must be developed and agreed to early to avoid costly delays and re-work of areas

ANL JANUS Reactor D&D - Costs Detail



- Project Management
- D&D
- Project Engineering
- Equipment & Materials
- Surveillance & Maintenance
- Waste
- Characterization
- Closeout

Environmental Issues - 1

- Highly site specific and site dependent concerns
- NEPA environmental document prepared for each decommissioning project
- Careful consideration to lead times, permitting and regulatory approvals
- Generally speaking has been an evaluate and document issue

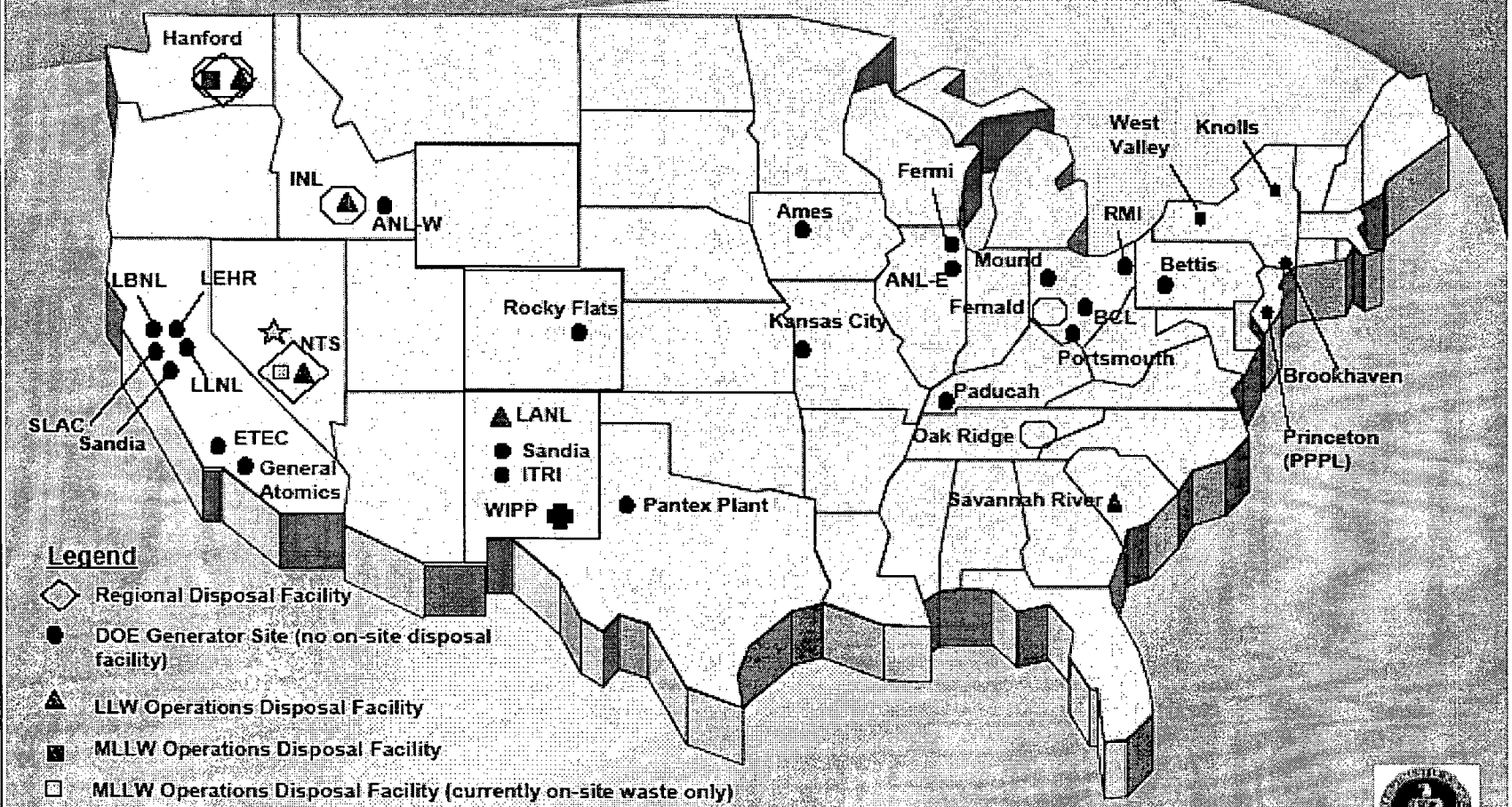
Waste Management Issues - 1

- Waste management - the easier and quicker you can move material off the work site the better
- Larger waste material volumes have allowed sites to negotiate for much better rates for some wastes at some commercial disposal sites
- Easier and more cost effective to dispose of material than to decontaminate it – disposal is cheap and clearance is a historic issue
- Many DOE sites have on-site disposal cells which alleviate many waste disposal issues and make the 'flow process' easier – cheaper and whatever bounds the process

Waste Management Issues - 2

- Use of previously unregulated materials - lead based paints, heavy metals, PCB's and asbestos and other chemicals - in a currently regulated materials space
- Management of mixed waste on some projects
- Disposal of very low levels of radioactively contaminated soils with approvals in sanitary landfills or RCRA landfills
- Meet the Waste Acceptance Criteria for the disposal site – don't complicate it any more than necessary

DOE's Waste Disposal Facility Configuration



Legend

- Regional Disposal Facility
- DOE Generator Site (no on-site disposal facility)
- LLW Operations Disposal Facility
- MLLW Operations Disposal Facility
- MLLW Operations Disposal Facility (currently on-site waste only)
- CERCLA Disposal Facility
- Waste Isolation Pilot Plant (WIPP)
- Planned geologic repository

Office of Environmental Management

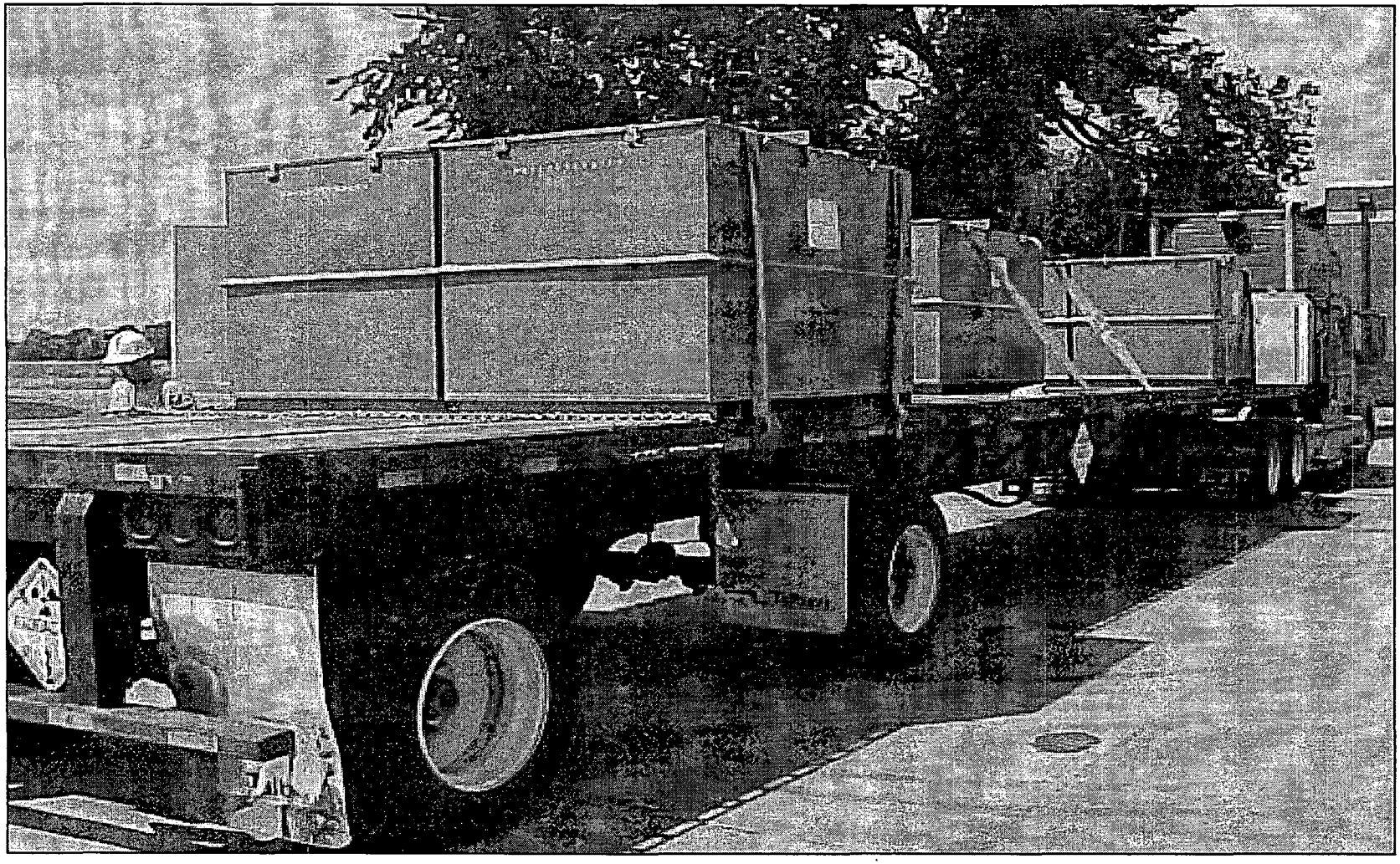
Safe for the Workers, Protective of the Environment, and Respectful of the Taxpayer

CP-5 Research Reactor D&D

Demolition Debris

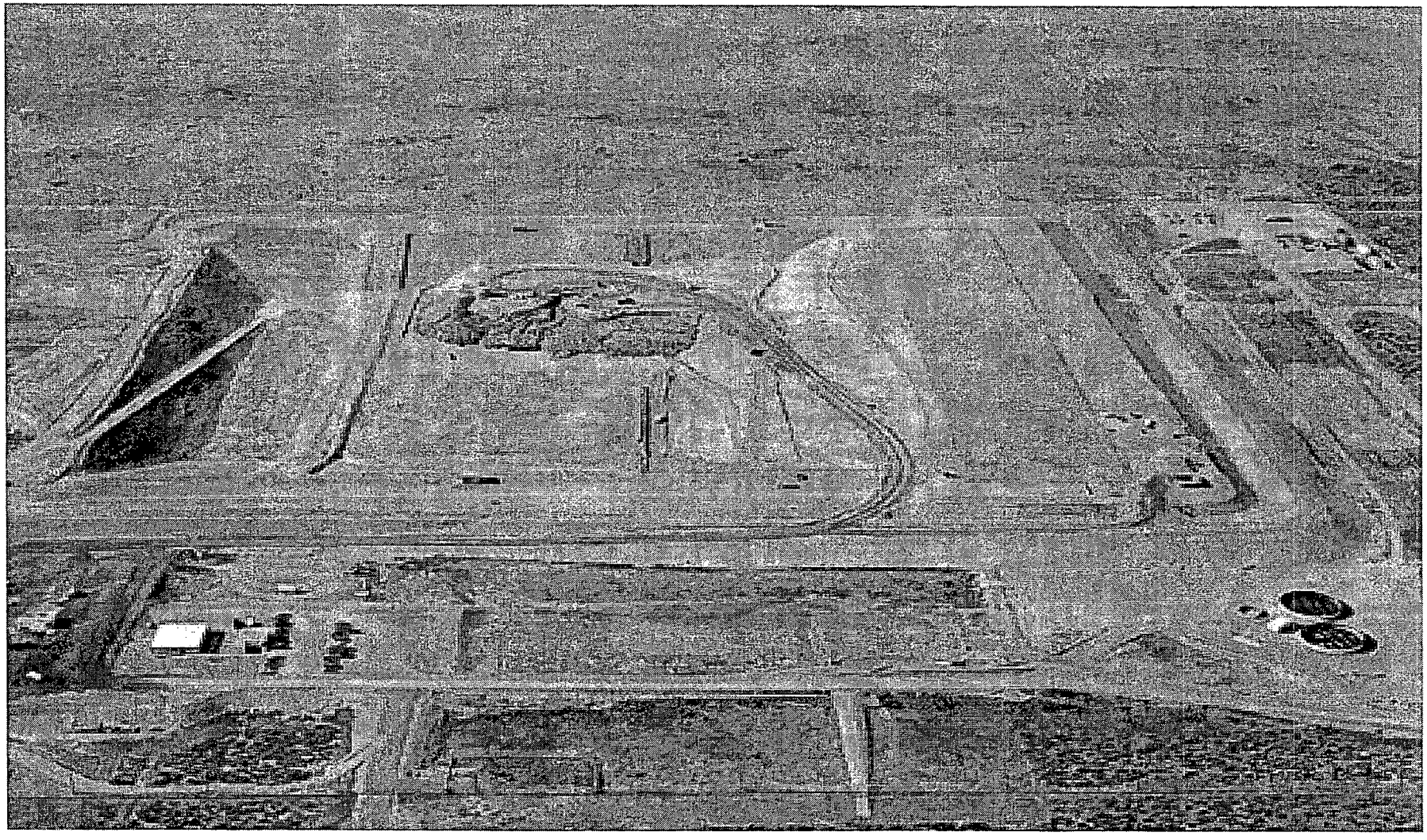
Staged rubble from building dismantling activities

Packaged Waste



Typical low level radioactive waste shipment for off-site disposal

DOE-Hanford Environmental Restoration Disposal Facility (ERDF)



*Secrets of RFCP Success**

- Technological and operational innovation
  - Technology experimentation
  - No time to 'develop' something – 'steal' something !
  - Big technological busts
- No micromanaging
- Proper contract in place to hold accountable yet properly incentivize
- Are we overly compensating/ incentivizing the contractor ?
- Compromise on "Soil Action Levels"

*Also see GAO report – GAO-06-352

Design & Construction Features - 1

- Stay away from embedded piping – difficult to assess if contaminated and to remove if needed
- Stay away from large massive concrete structures made by use of a 'one pour' construction technique – disassembly difficult
- Use secondary containment to contain leakages - soil contamination issues from spills, leaks and legacy practices

Design & Construction Features - 2

- Any NPP or other features which are often touted as an 'O&M' feature can actually also be thought of as a 'decommissioning friendly' feature
  - Reduced impurities in fabrication materials
  - Reduced contamination from plant operations
  - Optimize plant layout for decommissioning – pre-place aids for removal of equipment
  - Waste minimization in facility design/modularization
- Use of standardized 'cookie cutter' designs for future plants allows for optimization of decommissioning implementation

Other Possible Improvements

- Share lessons learned – we are not doing as good of a job as we did in the past in this area
  - IAEA documentation
  - DOE Lessons Learned and Operating Experiences reports
  - NRC Regulatory Information Summaries

- Prepare for decommissioning in advance better than we do now – have a 'living' decommissioning plan and develop the decommissioning strategy and path forward as the facility is being used – minimal effort and good way to stay current in planning and good public relations

- For nuclear industry to remain viable and grow – we must be able to handle legacies of the past - closure of current facilities/sites

'Top Ten Lessons Learned'

1. Communications
2. Specialist Support
3. Final Surveys and Endpoints
4. Planning/Cost Estimating
5. Deactivation
6. Waste Management
7. Hazards Assessment
8. Site/Facility History
9. 'OTS' Technologies
10. Facilitate Info Exchange & Teamwork

Understand what the industry has done and is doing – spend some early planning funds to accomplish this !! Training, Site Visits, Mock ups

Expect the unexpected because it will occur sometime or even multiple times during the project !! Contingencies, emergency plans, etc required

Lessons Learned Sources

- www.energy.gov
  - DOE Operating Experience weekly reports
  - DOE Lessons Learned website
- www.iaea.org
  - IAEA TECDOC-1394
- www.nrc.gov
  - NUREG-1757 Volume 2, Appendix O
  - USNRC RIS-02-002 LTP and DP process
  - USNRC RIS-04-008 LTP process
- www.orau.gov/ddsc/
  - DDSC Website

A Closing Note

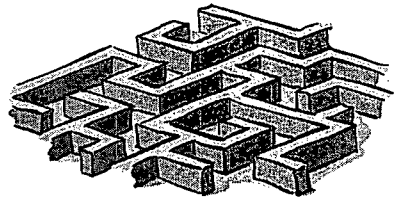
- Remember that decommissioning is not "rocket science" – do not make it any more complicated than necessary

- Learning from experience is difficult – the test comes first and the lessons come later - the exact opposite of how learning typically occurs

- Learn from what others have done and not done – many have walked down this path before you – don't be afraid to seek out help and ask questions

Decommissioning Lessons Learned a State's Perspective

Thomas A. Conley, CHP, RRPT
Radiation Control Program Director
Kansas Department of Health and Environment
Board Member Organization of Agreement States

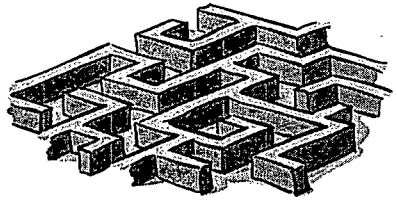


Keys to control costs

- Prevention
- Regulation
- Characterization
- Disposal

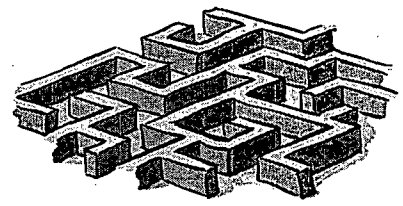
Prevention

- Begins with design
  - Technologies
    - BAT mandate
  - Surfaces
    - Easy to perform decontamination procedures
  - Ventilation systems



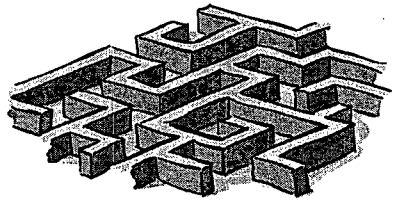
Prevention

- Detection
  - Retention pond designs with leachate detection, liners
- Monitors
  - Area & exhaust air monitors
- Design of hot cells



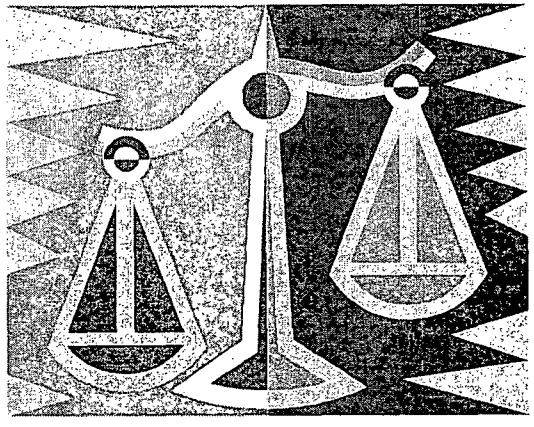
Culture

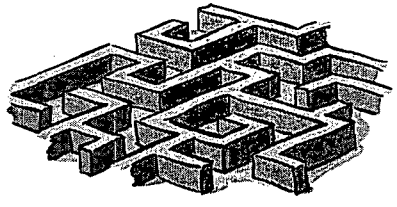
- Decommissioning not at the forefront during startup
- Decommissioning comes when the income goes away
- Need to look to the future



Regulatory

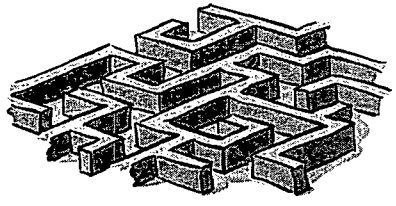
- Address decommissioning during licensing
  - We do them no favors by accommodation
  - In the licensee's best interest
- Need clear direction on cleanup standards
- Must be consistent and equitable across agencies





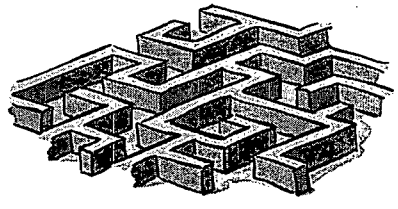
Inspections

- Look for problems and spills
- Don't get stuck in a rut
  - Be imaginative
- Check
  - Around doors
  - On roofs
  - Downwind etc
- Take soil samples



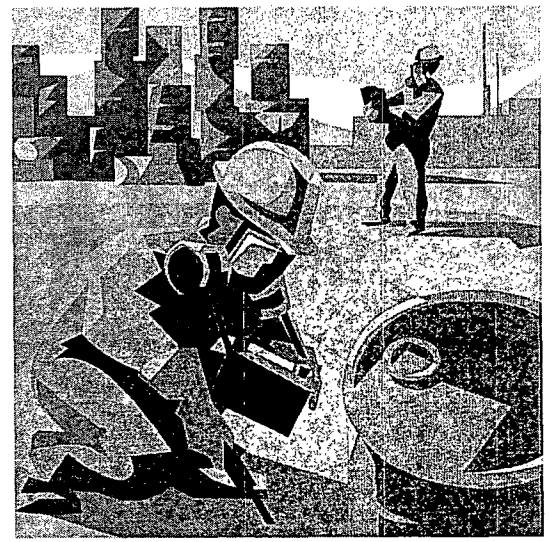
Characterization

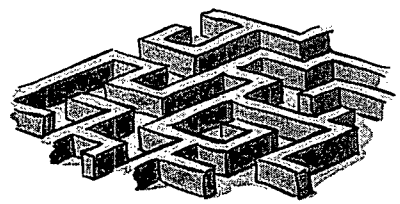
- During Operation
  - Mechanism for identification and quantification
    - Spills
    - Leaks



Initial characterization surveys

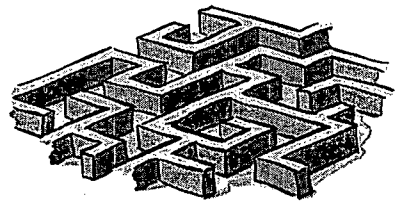
- Look everywhere
- Especially at older facilities
- Hidden rooms
- Unknown spills
- Unknown disposal



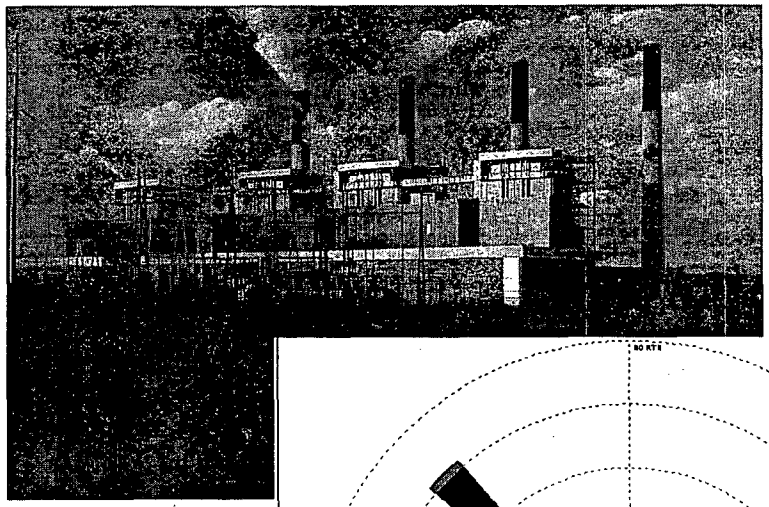


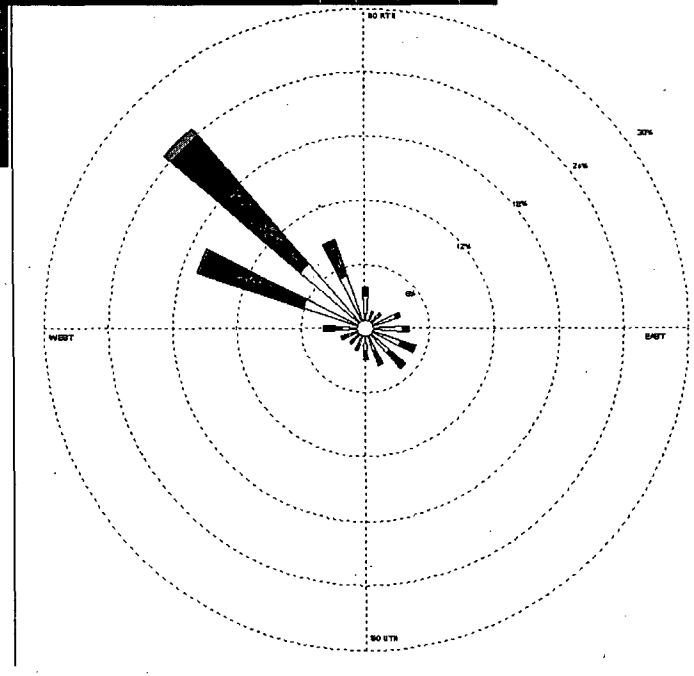
Look for the unexpected

- Hidden rooms
- Contaminated fire pits under parking lots
- Organic vapors stick to plastics

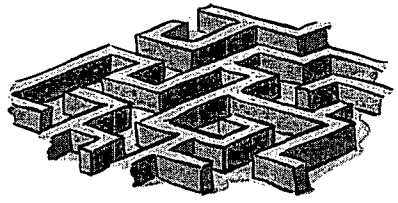


Exhaust systems



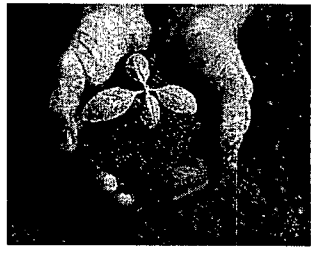


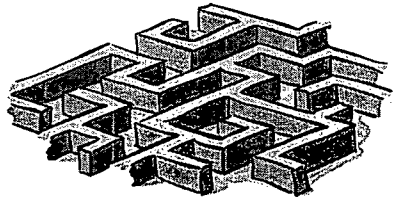
- Track long term plumes
  - Can exceed cleanup levels without exceeding effluent release limits
- Look at wind rose plots
- Effluents may not be as readily dispersible as you thought



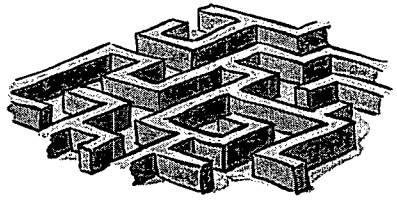
oundwater and Soil

- Groundwater Issues
  - Uranium tailings impoundments
  - Sites with history of solvent use
- Large sites contaminated with radioactive material
  - Need creative ways to decrease the concentration
  - Reduce amounts of waste
  - Avoid other reclamation issues.



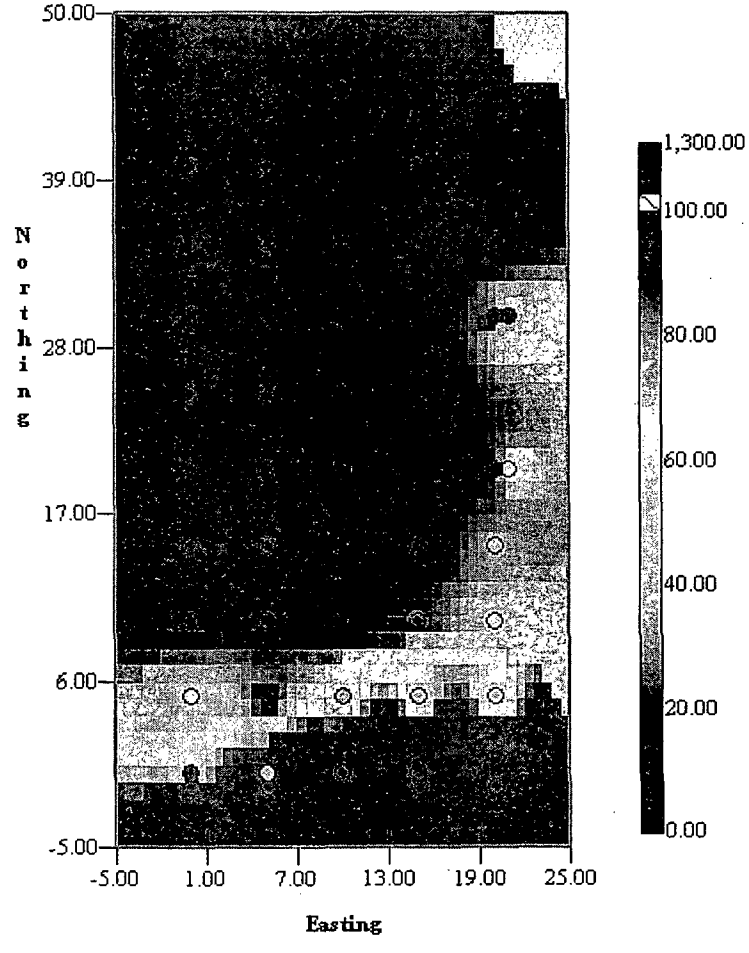


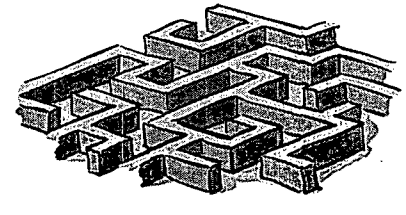
- Major contributor of cost
- Need competition for disposal options
- Minimize volume
- Better characterization equals better control of amount of waste
- Don't dispose of more than necessary



"Discrete" Sources Don't Stay Discrete

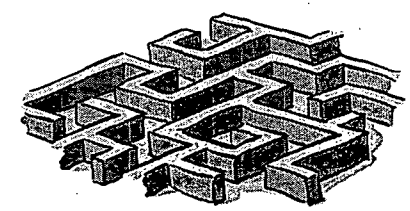
Contamination from Licensed Activities with Discrete Ra-226 Sources (uR/hr)





Decommissioning Summary

To achieve the most cost effective end result, decommissioning planning must begin before the first day of operation and include a hard look at preventative measures, regulatory issues and plans for site characterization and disposal



Questions?

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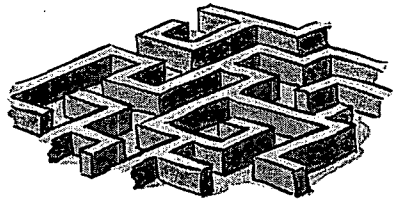
785-296-1565



Update on Decommissioning Lessons Learned

Rafael L. Rodriguez, Project Manager
FSME/DWMEP/DURLD

Tuesday, November 14, 2006

Outline

- Accomplishments since the last meeting in summer 2005
- Current efforts to capture and preserve decommissioning lessons learned
- Incorporation of lessons into the design and construction of new facilities

Accomplishments since the last meeting – Summer 2005

- Publication of 23 lessons learned in the public website from ongoing decommissioning projects
- Publication of a preliminary bibliography with lessons-learned documents from EPRI, FCFF, OAS, and NRC
- Participation in a panel discussion during WM 2006
- Assist NRO/NRR and RES in developing documents for new reactor licensing

Current efforts to capture and preserve decommissioning lessons learned

- Lessons learned webpage has been updated

http://www.nrc.gov/what-we-do/regulatory/decommissioning/lessons-learned.html

- Working group focusing on other mechanisms to capture and preserve the information

- Interactions with DOE on lessons learned

Incorporation of lessons into the design and construction of new facilities

- Memo to NRO/NRR providing high level lessons learned (ML062620355)
- Input to be used by NRO for updated version of NUREG-0800
- Input to be used by RES to develop a RegGuide for new reactor licensing

Questions ?

Guidance Development for 10 CFR 20.1406

Presentation to ACNW Working Group on Lessons Learned in Decommissioning
November 14, 2006

William R. Ott, Chief, Waste Research Branch
Office of Nuclear Regulatory Research
US Nuclear Regulatory Commission

Provisions of 10 CFR 20.1406

- Applicants for licenses other than renewals
- Describe how facility design and procedures for operation will
  - Minimize, to the extent practicable, contamination of the facility and the environment
  - Facilitate eventual decommissioning
  - Minimize, to the extent practicable, the generation of radioactive waste

Status of Implementation

- No reactors licensed since August, 1997, when 20.1406 became effective.
- No effort to develop guidance since original publication.
- First standard design reviews did not address (specifcally addressed in Part 52 rulemaking)
- Multiple independent publications may provide relevant information (e.g. Electric Power Research Institute reports -access has been an issue)

Scope of Guidance Development Effort

- NRR - Revision of Standard Review Plan
- FSME - Compilation of lessons learned from decommissioning actions
- RES - Technical basis development for Regulatory Guide and Regulatory Guide
  - FSME Lessons learned
  - Review of regulatory guide system
  - Review of literature including available industry reports
  - Previous NRC publications (e.g. NUREG/CR-3587)

Milestones

- Consolidated lessons learned from decommissioning experience - December, 2006.
- Recommendations in January 2007 including
  - content of stand-alone guidance
  - existing regulatory guides which should be modified to reflect the provisions of 20.1406
- Draft Regulatory Guide for internal review - April, 2007
- Publication for public comment - July, 2007

UPDATE ON PROPOSED RULEMAKING

ADDITIONAL REQUIREMENTS FOR SUBSURFACE MONITORING

J.C. SHEPHERD, T.L. FREDRICHS, *et al*

NOVEMBER 14, 2006

OUTLINE

- BACKGROUND
- OPERATIONAL REQUIREMENTS FOR LEGACY SITE PREVENTION
- UPDATE TO PROPOSED ACTIONS

BACKGROUND

- SRM-SECY-03-0069 INCLUDED ACTIONS TO PREVENT FUTURE LEGACY SITES BY CHANGING OPERATIONS & FUNDING

- ACNW BRIEFINGS
  - JULY 2006: PROPOSED RULEMAKING
  - JUNE 2005: IDENTIFYING SITES WITH HIGH POTENTIAL FOR SUBSURFACE CONTAMINATION

OPERATIONAL CHANGES

- REVISE CONTAMINATION CONTROL
  - NEW FACILITY DESIGN
  - OPERATING FACILITY MONITORING
- ENHANCE NRC OVERSIGHT
- RISK INFORM SUBPARTS E, F TO PART 20

MONITOR FOR CONTAMINATION

- INSIDE FACILITY
- OUTSIDE FACILITY
  - SURFACE
  - SUBSURFACE (ALL MEDIA)
- RESPONSE(S) TO RELEASES

INITIAL PLAN: §20.1406

- CHANGES BEING CONSIDERED
  - INCLUDE EXISTING LICENSEES
  - REQUIRE CERTAIN CLASSES TO MONITOR SUBSURFACE MEDIA

- WORKING GROUP COMMENTS
  - SCOPE OF APPLICABILITY
  - EXISTING SURVEY REQUIREMENTS IN SUBPART F TO PART 20

CHANGES SINCE LAST BRIEF

- §20.1406: NRR/NRO HAS PROPOSED REVISED PARAGRAPHS (a) & (b) TO EXCLUDE SOME OF PART 52

- CONSIDERING ADDING NEW SUB: (c) LICENSEES MUST IDENTIFY AND MINIMIZE CONTAMINATION IN THE FACILITY AND THE ENVIRONMENT, INCLUDING THE SUBSURFACE

SUBPART F

- EXISTING §20.1501 REQUIRES LICENSEES TO MAKE SURVEYS THAT ARE NECESSARY AND REASONABLE TO DETERMINE MAGNITUDE AND EXTENT OF RADIATION AND POTENTIAL RADIOLOGICAL HAZARDS

SUBPART F CONSIDERATION

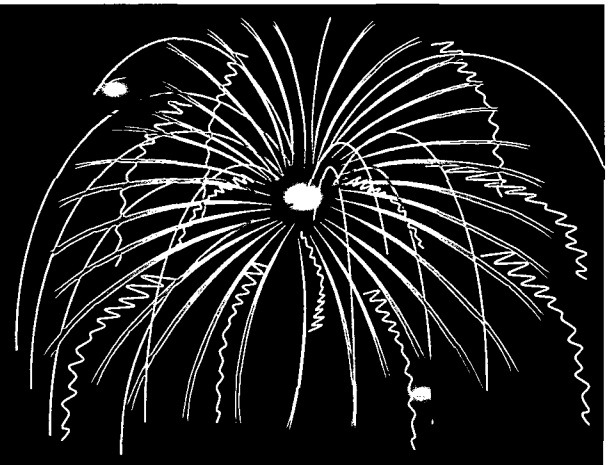
- **CONSIDERING NEW** §20.1503: SURVEYS AND MONITORING OF SUBSURFACE
  - COULD APPLY TO LICENSEES THAT HAVE
    - POSSESSION LIMITS REQUIRING FINANCIAL ASSURANCE FOR DECOMMISSIONING
    - ISOTOPES WITH HALF-LIVES GREATER THAN FIVE YEARS FROM LICENSED OPERATIONS
    - POTENTIAL FOR UNMONITORED RELEASES

§20.1503 CHANGE CONSIDERED (2)

- COULD REQUIRE, IN ADDITION TO §20.1501:
  - ESTABLISHING A ROUTINE MONITORING PROGRAM BASED ON SITE HYDROGEOLOGY
  - DEVELOPING A SUBSURFACE MONITORING PLAN THAT SPECIFIES INCREMENTAL INCREASES TO ROUTINE MONITORING WHEN INDICATED

RELATED TASKS

- NRC INSPECTION OVERSIGHT
- FINANCIAL ASSURANCE
- SUPPORTING GUIDANCE



THE INTERMEDIATE STOPPING POINT

U.S. Army Corps of Engineers' D & D Experiences

Hans Honerlah, CHMM

ACNW Meeting

Nov 13, 2006

USACE Environmental Mission

- Supports and manages numerous environmental missions;
  - FUSRAP
  - FUDS
  - BRAC
  - EPA Superfund
  - Army Deactivated Nuclear Power Plants
- Generates large volumes of waste
  - Common radionuclides: U, Th, Ra, and 11e.(1)
  - Physical Form Soil or Building Debris

USACE D & D Framework

- Most work performed IAW CERCLA and its implementing regulation, the NCP
- As lead Federal Agency
  - Responding to releases at DoD and FUSRAP Sites
- As Support Agency
  - Supporting EPA Superfund and other Federal Agencies
- Close correlation between CERCLA and the MARSSIM remedial Process

Outline of USACE D & D Issues

- Applicable Relevant and Appropriate Regulations (ARAR)
- Waste Classification and Disposal
- Transportation
- Release of Material from a Radiological D & D project

ARAR

- Many current regulations applicable to D & D of facilities are conflicting to the NRC requirements of 25 mrem/yr outlined in 10 CFR 20 Subpart E
  - Examples:
    - State of NJ – 15 mrem/yr (promulgated)
    - State of MA – 10 mrem/yr and 1e-5 risk (promulgated)
    - State of CT - 19 mrem/yr (proposing, not yet promulgated)
    - State of NY – 10 mrem/yr (guidance)
    - U.S. EPA 1e-4 to 1e-6 risk
- Several States have these rules promulgated, however others only have criteria as guidance documents
- Many States are considering limiting transfer of released properties under other than radiological regulations

ARAR

- Implementing the Dose and/or Risk Assessment to determine concentration requiring removal
  - 10 CFR 20 uses "an average member of the critical group" to support unrestricted release
  - Other State and Federal agencies may consider using an industrial scenario to determine clean-up criteria as a restricted release
  - How to implement the radiological carcinogen risk into CERCLA for risk assessments with commingled chemical contaminants of concern
  - Multiple agencies support many different guidance documents to determine inputs into the risk/dose calculations

Waste Classification and Disposal

- Must review BOTH:
  - Historical information about the site operations to determine how, and when, waste was produced
  - Analytical data to determine the nature and extent of radioactive contamination
- Current system is source based "pedigree"
- Shortcomings of source based system
  - It's complex
  - Not an efficient use of resources
  - Cannot be defended on grounds of health protection
  - Adverse impacts on competition, project schedule
  - Unnecessary use of Part 61 facility capacity

Waste Classification and Disposal

- Many disposal facilities has isotopic waste acceptance criteria which provide a maximum concentration in pCi/g for the entire cell
- This does not represent the true risk from the material placed into the facility if you consider the largest volumes of waste disposed of into each cell typically represents a small fraction of the WAC concentration
- Consideration could be given to a volume weighted criteria which would track source term in each disposal cell
- This would allow for tracking of the risk within the entire disposal impoundment

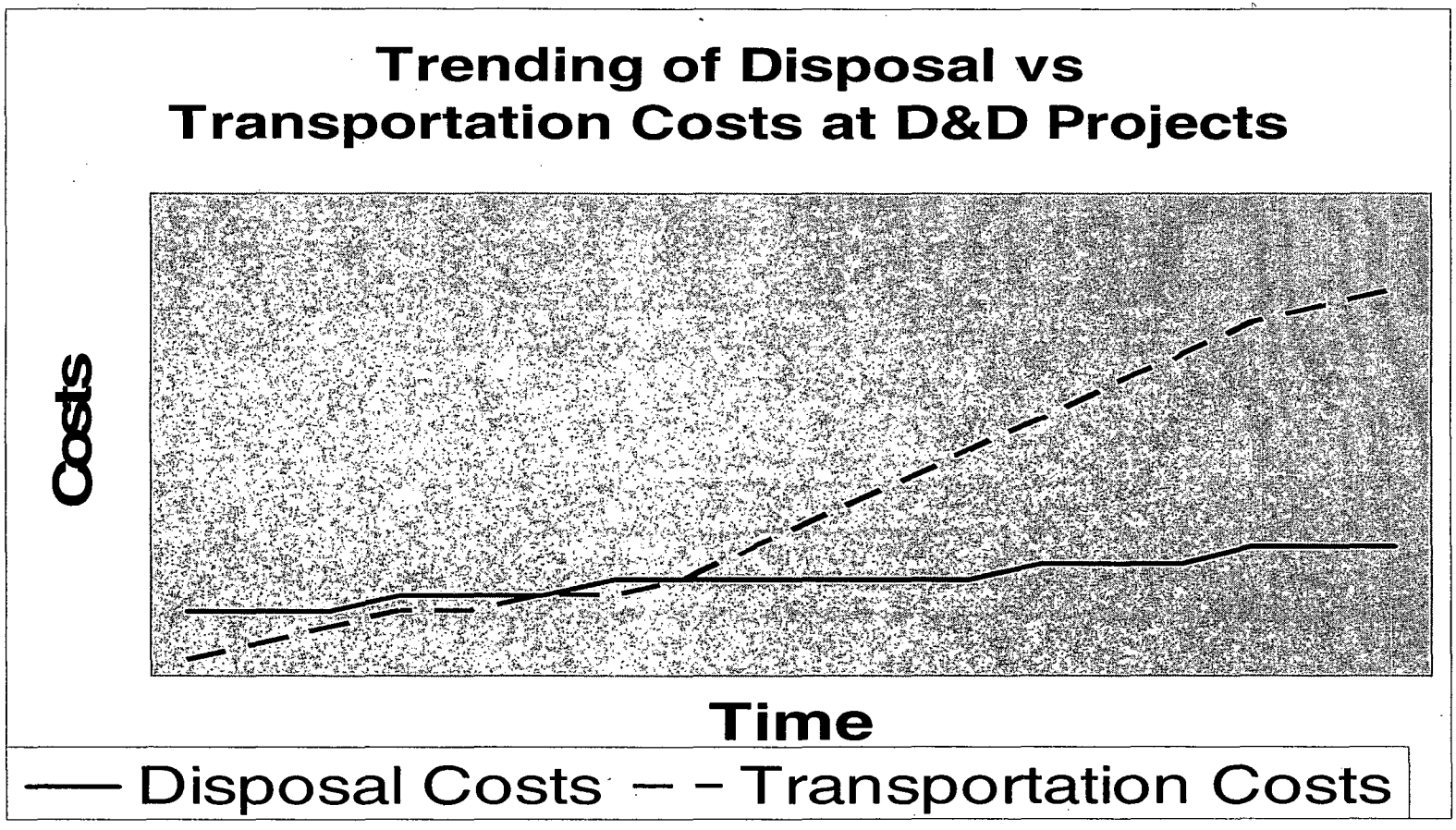
Waste Classification and Disposal

- The utilization of RCRA disposal facilities for LARW has stabilized the disposal costs for these materials
- The acceptance of RCRA facility disposal is on a State by State basis vs. national consistency (currently acceptance is limited to a few western states)
- Current LLRW disposal has significant limitations

Transportation

- A majority of the Disposal facilities (both LLRW and RCRA) are located in the western United States
- With a large portion of the USACE D & D efforts focused in the northeastern United States there is a significant percentage of project costs associated with transportation

Transportation



Release of Non-Impacted Material from D & D Projects

- The cost associated with release of non impacted material is at times greater than the cost associated with disposal due to the following:
  - Acquiring and documenting sufficient negative data
  - Coordination with State Regulatory Agencies to gain concurrence (sometime never gaining concurrence)
  - Acceptance by a local solid waste disposal facility
- Establishing a release for disposal limit vs. a release for return to commerce (each provide a significantly different risk)

Summary

- Provide harmony between Federal and State Agencies Regulations on acceptable dose and/or risk
- Develop a waste classification system based on risk that could arise from waste disposal
- Support regional disposal facilities (both existing and new) for numerous waste classifications to reduce costs associated with transportation
- Identify a general class of exempt waste that are exempt for the purpose of disposal

Reactor Decommissioning Program Lessons-Learned

Ralph Andersen, CHP (NEI)
Sean Bushart, Ph.D (EPRI)

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Industry Program

- EPRI
  - Document experience and lessons-learned
  - Technology development & transfer
  - On-site assessment and technical support
- NEI
  - Executive oversight & policy development
  - Interface with NRC, EPA and Congress
  - Resolve generic economic & regulatory issues

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Currently for Power Plants in USA

- **Decommissioning of closed units proceeding well**
  - 2 plants have terminated their licenses
  - significant progress at other plants
  - transfer of fuel to dry storage completed
  - funding appears to be adequate in most cases
  - completion of several plant projects in next 1-2 years
- **Remaining issues**
  - Final site characterization
  - License termination and site release
  - Materials clearance
  - Groundwater contamination/ soil remediation

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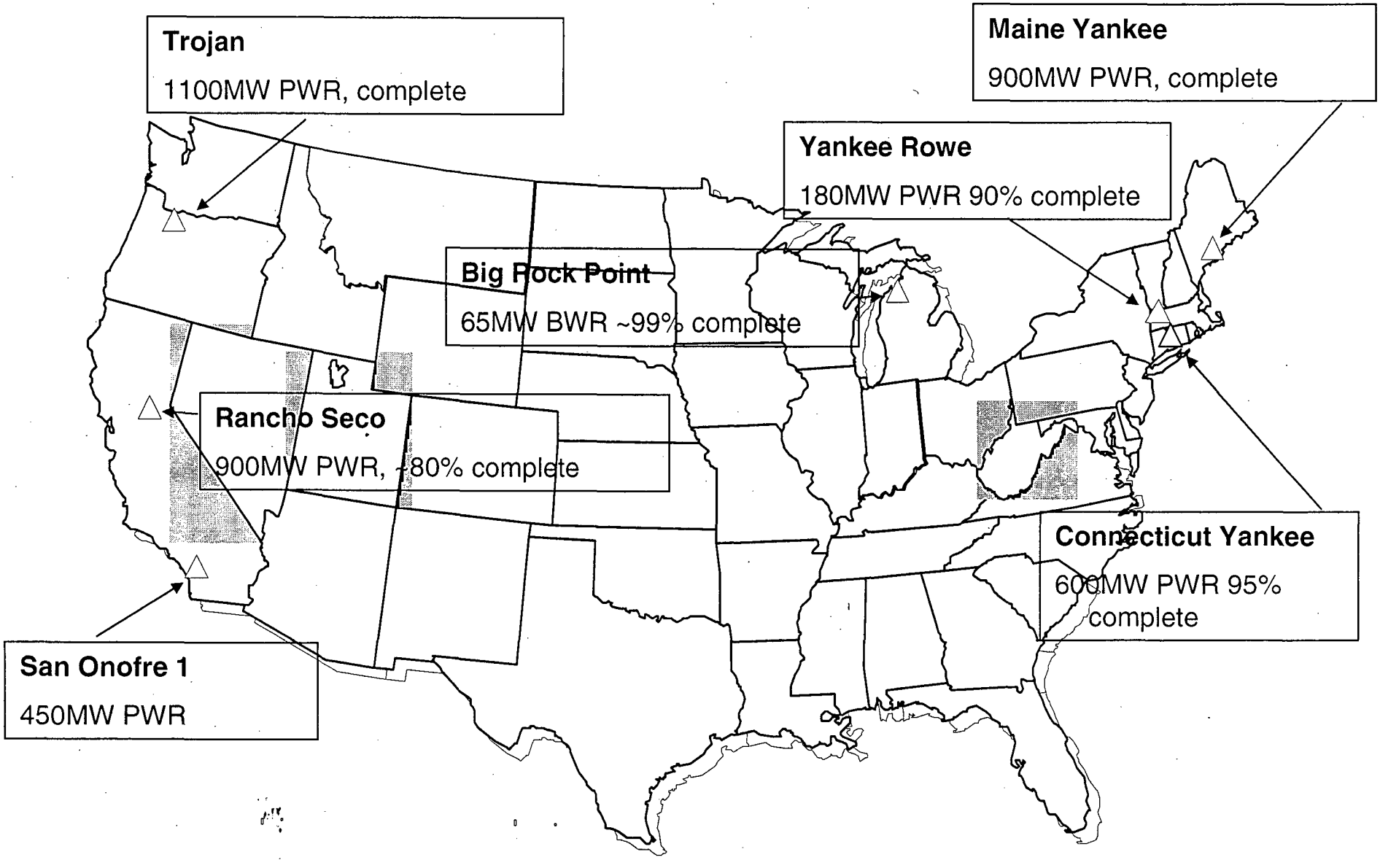
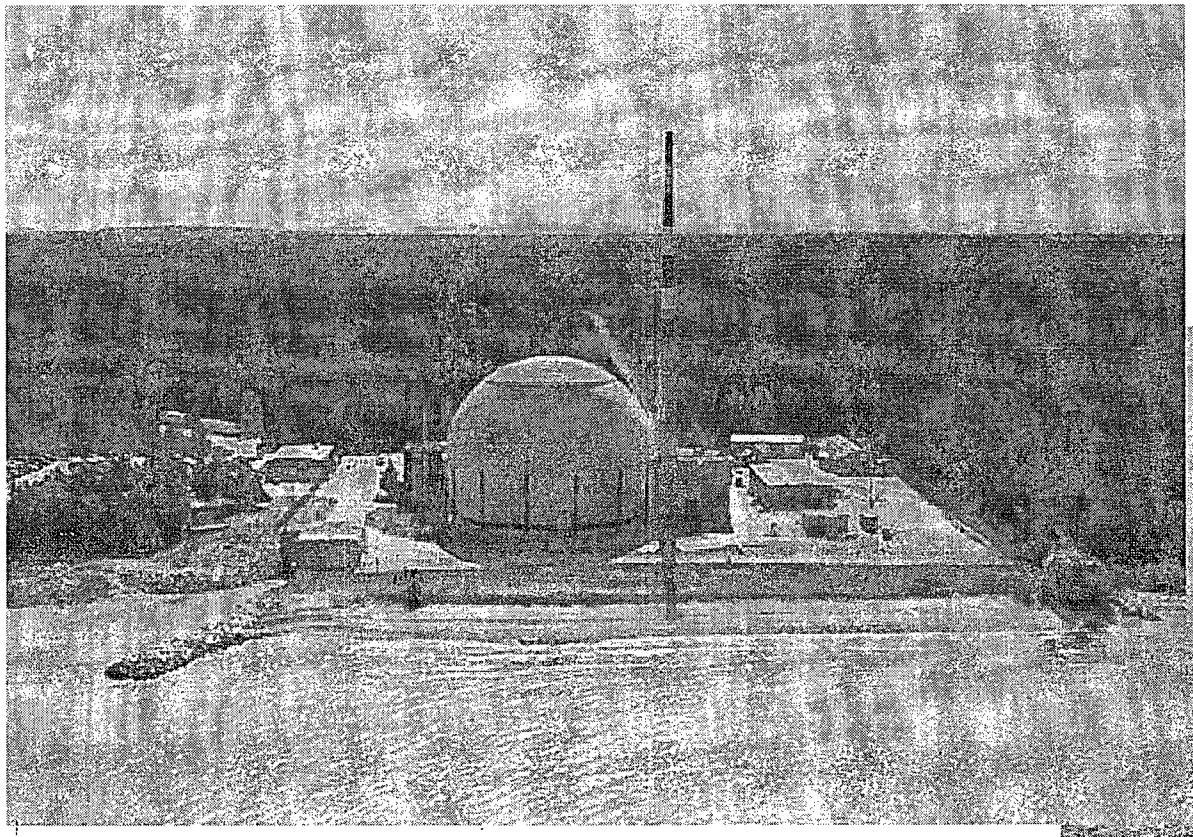
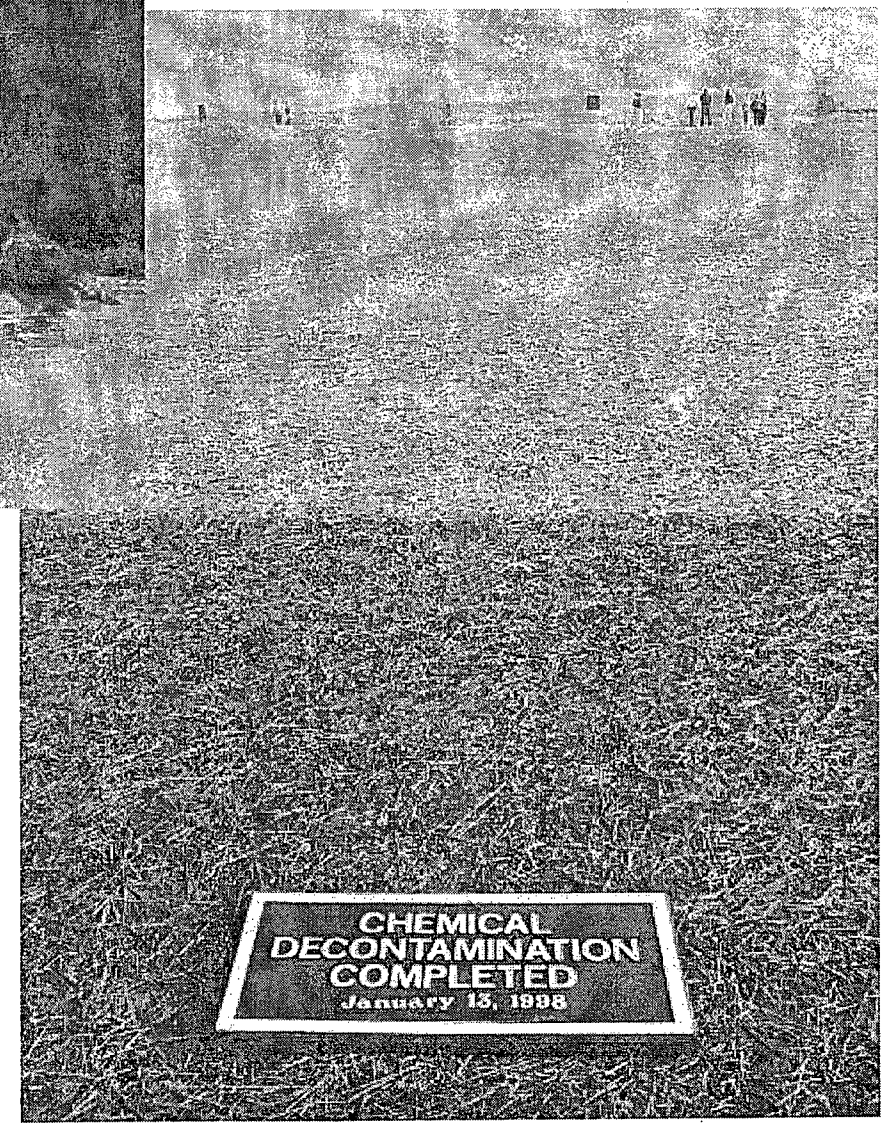
7 US Plants in Progress - fuel in dry storage



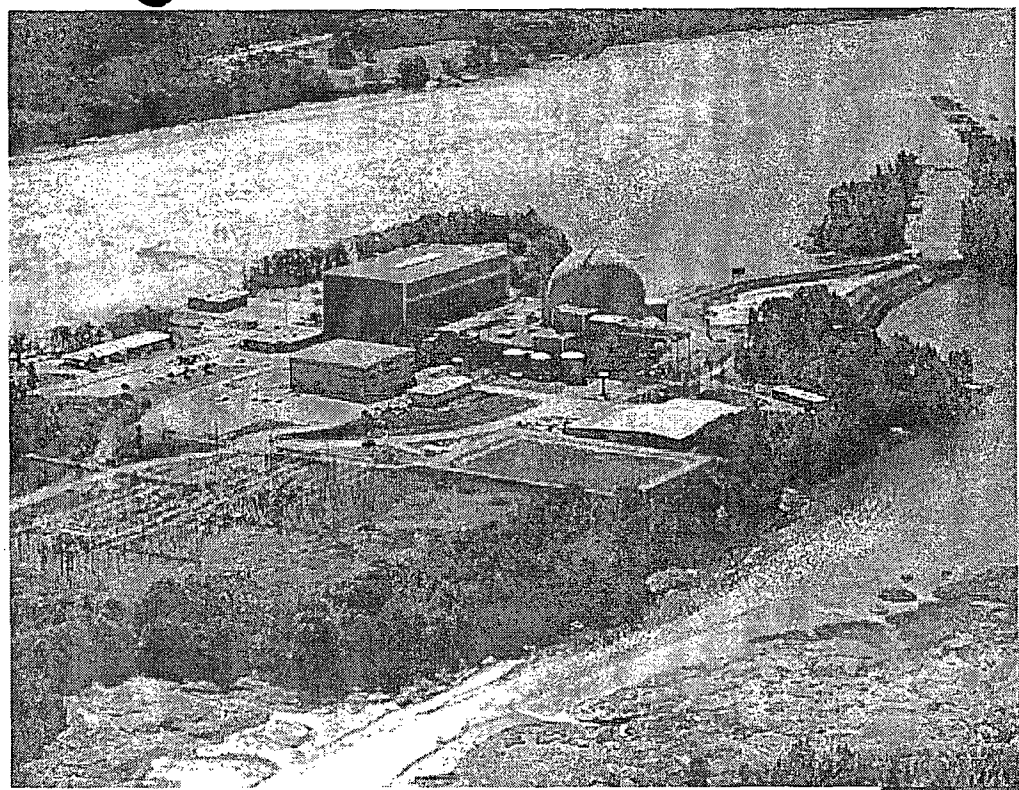
Big Rock Point



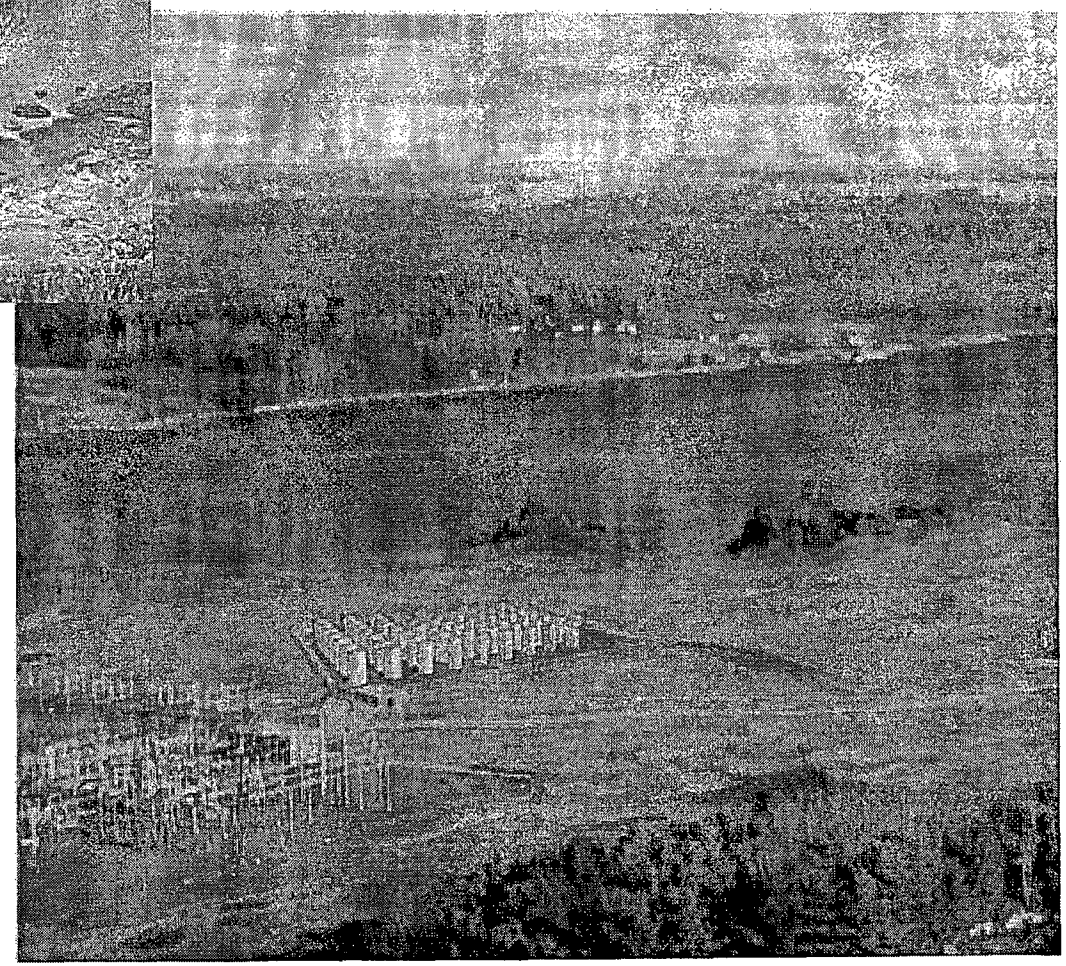


Key EPRI Interactions:

- 2 Technical Workshops
  - -Hazardous Waste Remediation
  - -LTP and Final Site Release
- Full System Decon with EPRI DFD process

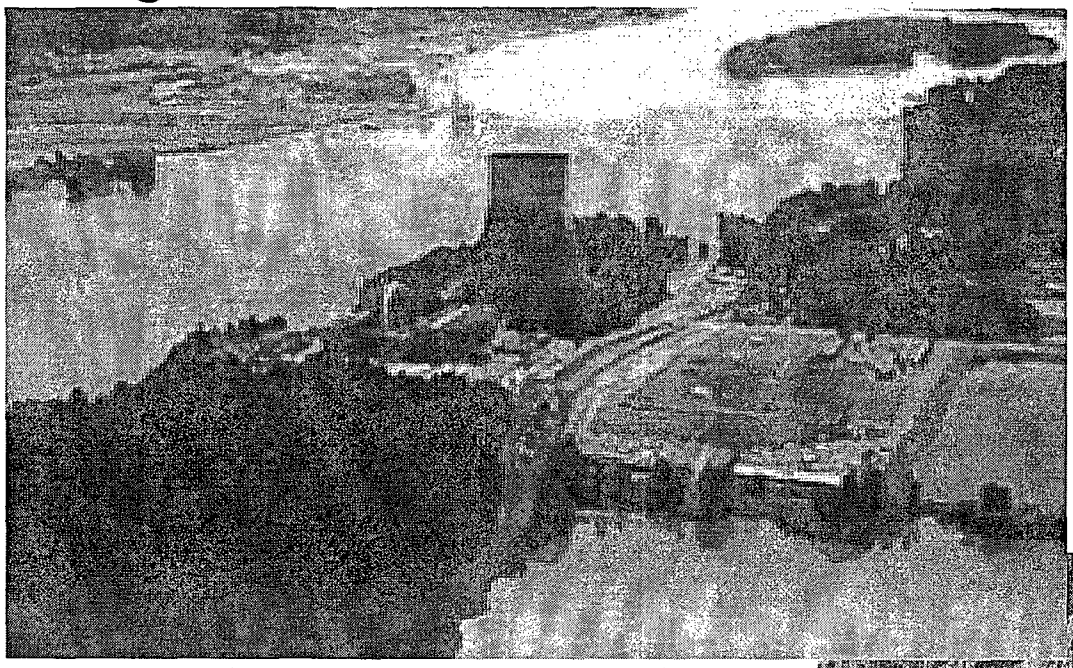


Maine Yankee

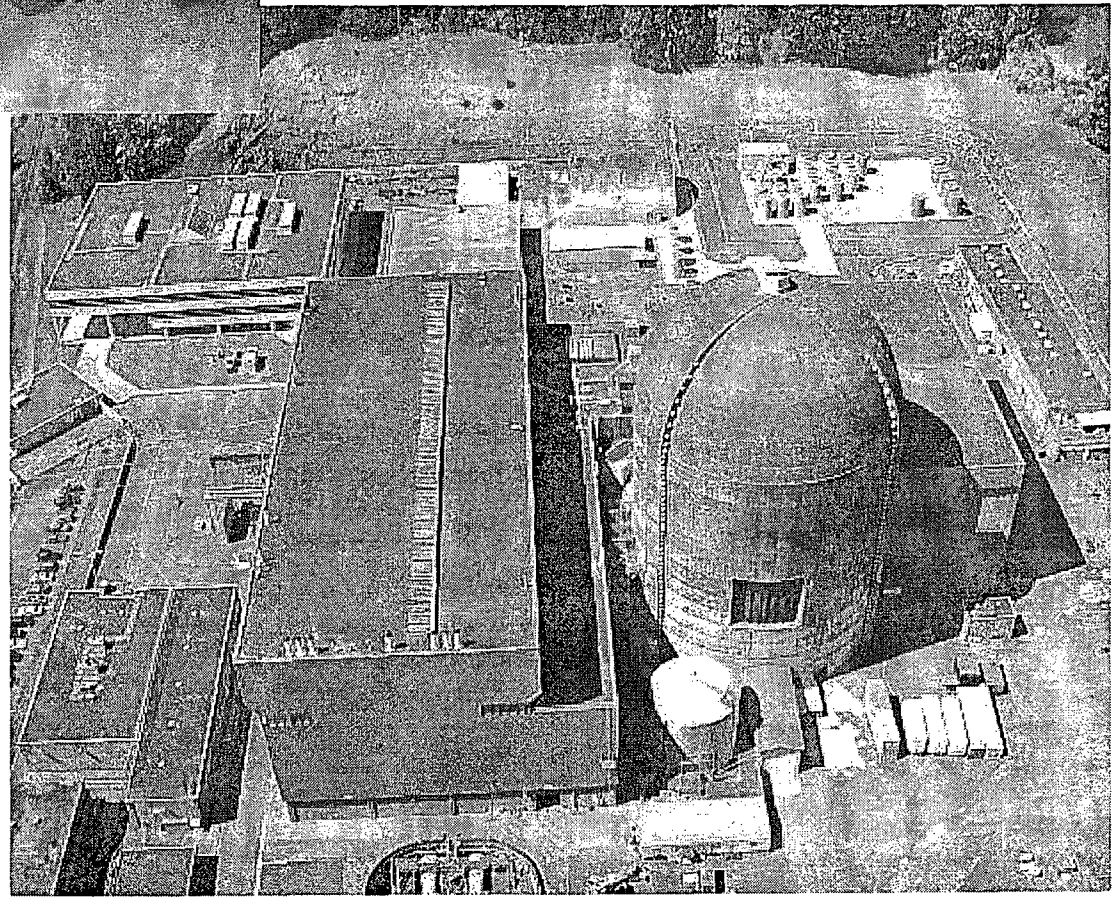


Key EPRI Interactions:

- Technical Workshops
  - -Radiation Exposure Control
  - -Final Status Survey
- Full System Decon with EPRI DFD process
- Experience Summary Report

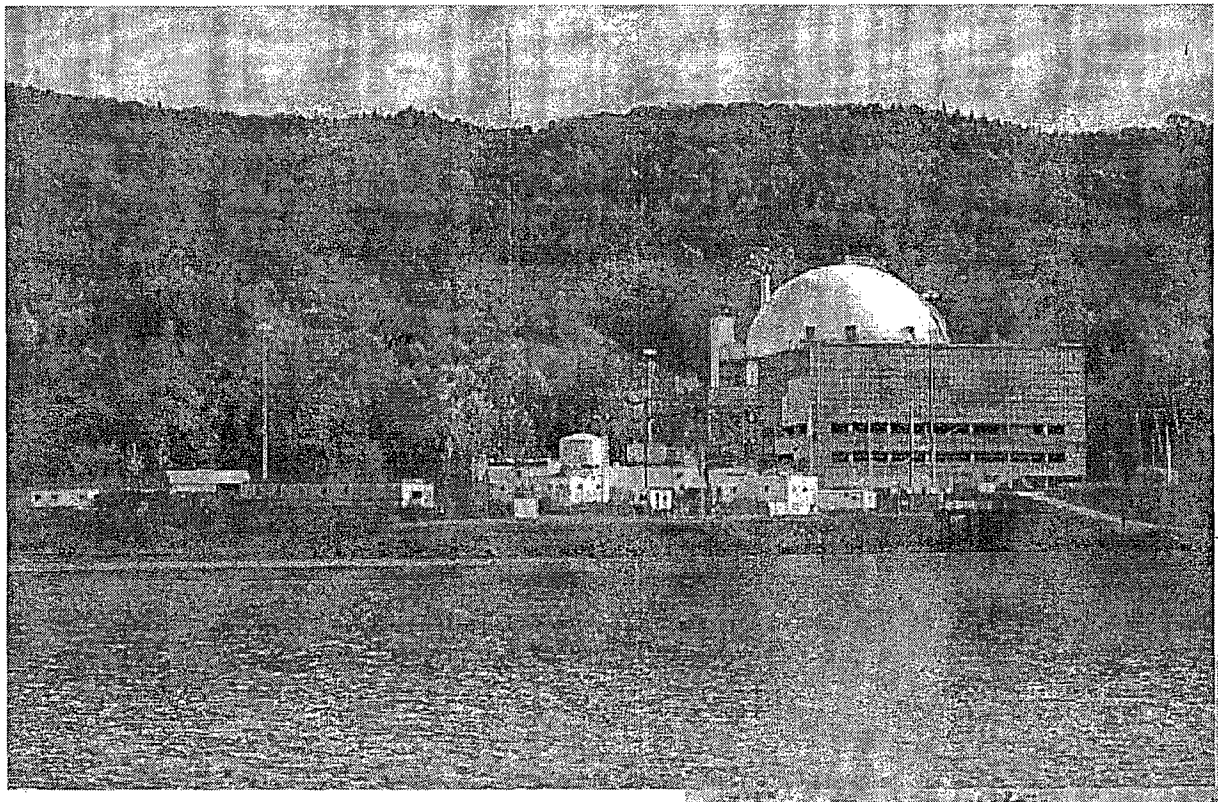


Trojan

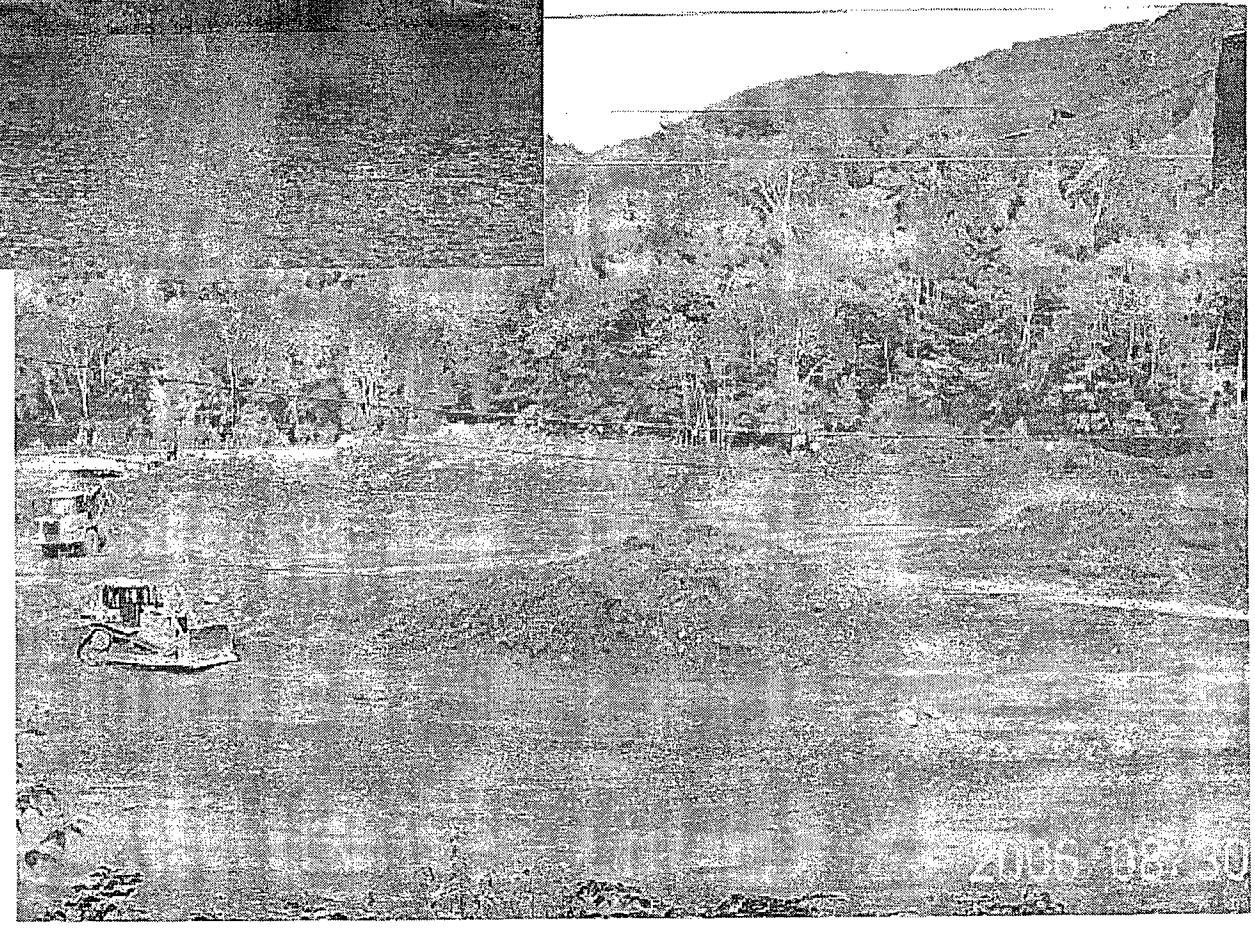


Key EPRI Interactions:

- Technical Workshop
  - -Embedded Piping Removal
- Evaluation of Decommissioning Strategy
- SFP Cleanup and Cooling Report



Yankee Rowe



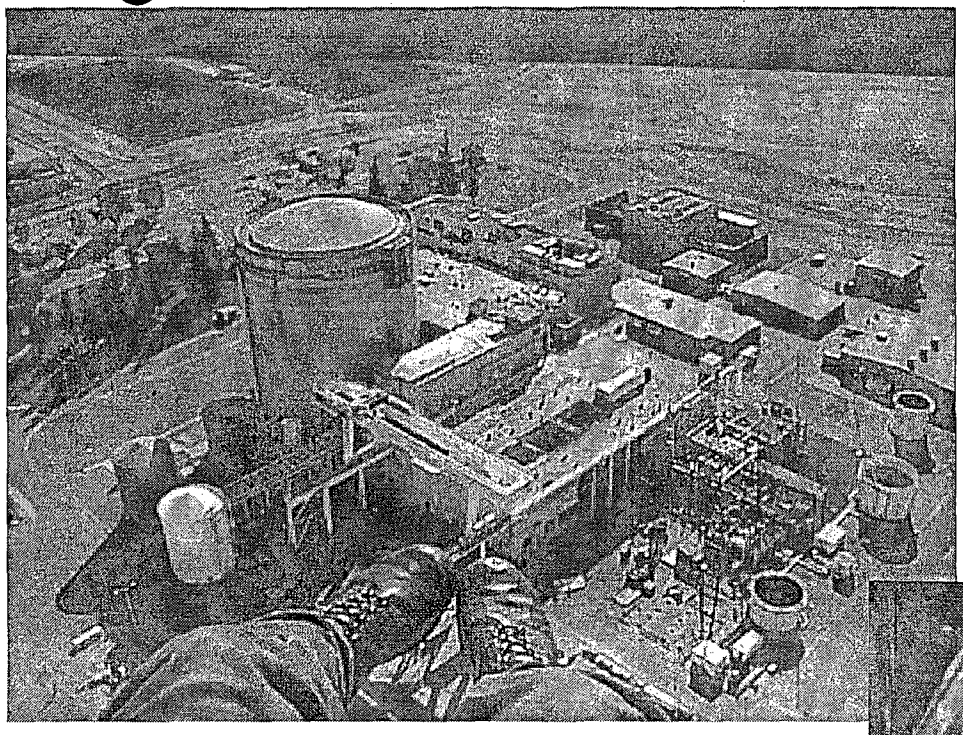
Key EPRI Interactions:

- Technical Workshop
  - -Concrete Removal
- Groundwater Experience Report

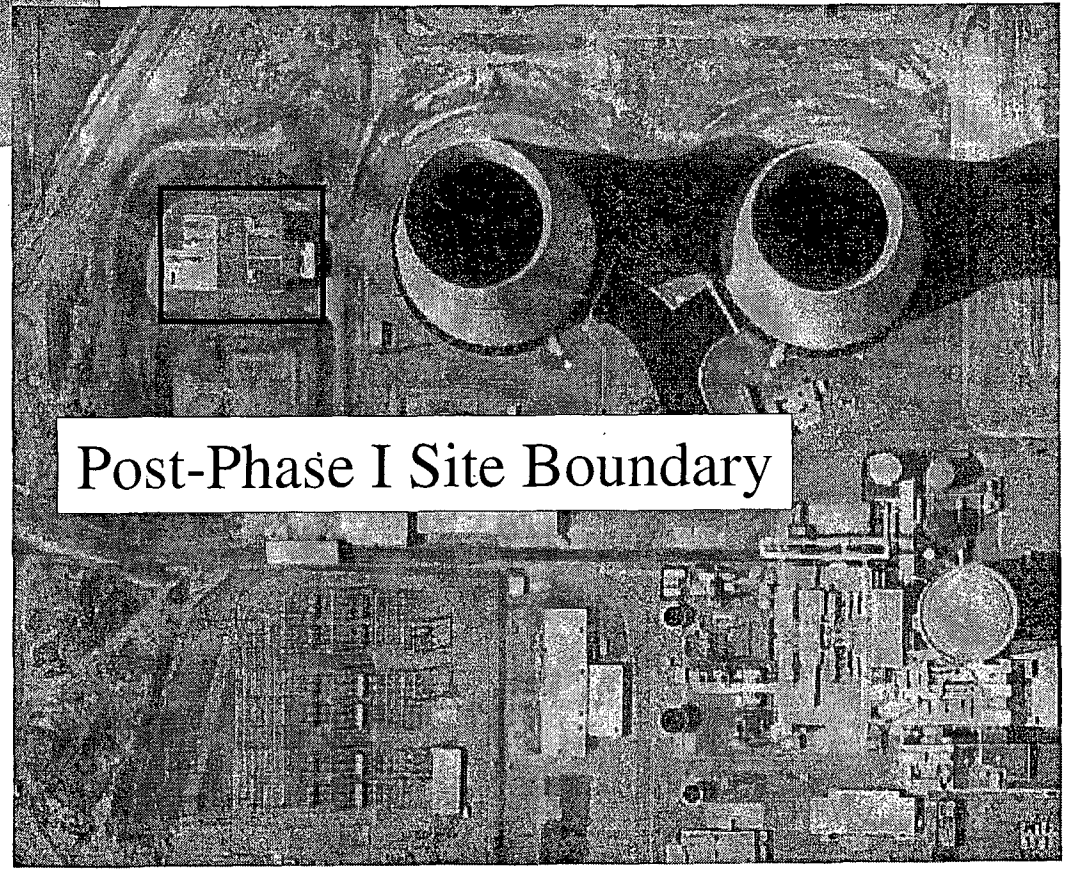
Connecticut Yankee

Key EPRI Interactions:

- Technical Workshops
  - -Final Site Survey and LTP
  - -Groundwater Management
- Experience Summary Report



Rancho Seco



Key EPRI Interactions:

- Technical Workshop
  - -LLW Management
- ALARA Evaluation for Reactor Internals Segmentation
- Experience Summary Report
- Decommissioning strategy peer review team

Technology Transfer Focus of EPRI Program Continues Internationally

- **Growing membership internationally in the EPRI Program**
  - UKAEA- Scotland, British Energy, BNG- UK
  - EdF- France, SOGIN- Italy, JAPC- Japan, TaiPower- Taiwan
  - UNESA (All Spanish Utilities), ENRESA, & Iberinco- Spain
- US technical and regulatory experiences are invaluable to ALL members
- New technologies/experiences being transferred to U.S. as well

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EPRI Collaboration

Reducing the Costs and Risks of Decommissioning Nuclear Facilities

Examples: EPRI Reports/Software Available to Members

Planning Regulatory Issues

- Pre-planning Manual
- License Termination Plan

Initial Activities

- Site Characterization**
- Site Release Modeling and Characterization
- Optimization of Radioactive Waste Management*

Major Removal Tasks

- Reactor Primary System Decontamination**
- Removal of Graphite Cores**
- Reactor Vessel Internals Segmentation
- Removal of Major Components and Structures

Major Site Release Tasks

- Site Survey and Final Release**
- Site Groundwater Characterization Studies**
- Demolition of Major Structures
- Disposal of site materials (concrete, soil)

Closure Tasks

- Final Site Survey**
- License Termination

** Technical Topics Available for Site-specific Evaluations

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Lessons-Learned - Decommissioning

- Paradigm shifts (operation-shutdown-deconstruction-disposal)
- Internal and external stakeholders
- Applicable agencies and standards
- Historical site review
- Site characterization
- Groundwater modeling and monitoring
- Decontamination for decommissioning
- Reactor vessel/large component disposal
- Soil and groundwater remediation
- Low-level waste management options
- Final site survey

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Lessons Learned – New Plants (Examples)

- AE/Construction considerations
  - Design and construction documentation
  - On-site construction practices
  - Hydro-geological characteriaztion
- NSSS Design Considerations
  - Sumps
  - Structures and outside areas
  - Spent fuel pool and transfer canal
  - Piping
  - Tanks
  - Site water management
  - Discharge lines

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Lessons Learned in the Decommissioning of Fuel Cycle Facilities

ACNW Decommissioning Lessons Learned Working Group Meeting

November 14, 2006

Two White Flint
11545 Rockville Pike, Rockville, MD

presented by:
Jeff Lux
Fuel Cycle Facilities Forum

Topics

- Introduction – The Fuel Cycle Facilities Forum
- Successes Achieved
- Decommissioning Cost Issues
- Environmental Impact Issues
- Design & Construction Issues
- Technical Issues

Introduction to the FCFF

- Voluntary industry organization established in 1987
- Represents Source and Special Nuclear Material licensees
- Primary focus is on decommissioning
- Membership represents licensees requiring special NRC consideration
- Provides industry voice on decommissioning issues
- Provides feedback and recommendations to NRC staff

Successes Already Achieved

- Intentional Mixing
- Use of Reasonable Exposure Scenarios
- "Layering" of Institutional Controls
- Integrated Decommissioning Improvement Program (IDIP)

Decommissioning Costs

- Transportation and Disposal of Contaminated Material
- In-process Measurement and Removal of "Migrated" Material
- Decontamination or Removal of "Inaccessible" Components
- Characterization and Final Status Surveys
- Health Physics Monitoring of Decommissioning Activities

Environmental Issues

- Concentration of Effluents Causing Unanticipated Exceedences of DCGLs
- DCGL Derivation not Accounting for Inter-Media Impact
- Penetration of Liquids Into or Through Porous Material
- Migration of Liquids Through Penetrations

Design & Construction Issues - I

- Minimize Embedded Piping or Design for Access to Embedded Piping in Future
- Use Stainless Steel or Plastic when Possible; Corrosion is Problematic
- Provide Secondary Containment of Liquids when Possible
- Avoid Floor Penetrations or Design Seals for Penetrations

Design & Construction Issues - II

- Apply Coatings to Porous Surfaces or Make Porous Surfaces Non-Porous in Acid Areas
- Use Dry Processes when Possible
- Consider a Rail Line to the Site

Other Issues – Regulatory - I

- Address Inconsistency Between NRC-HQ, NRC Regions, and States via Technical Documents
- Multi-Agency Jurisdiction Requires Proactive Involvement by NRC to Avoid Delays (and Cost Impact)
- Provide Clarification to 10 CFR 70.38 re: Alternate Schedule for Decommissioning
- Address Regulatory Issues Through IDIP Position Statements

Other Issues – Regulatory II

- Provide for Periodic Site Surveys During Operating Years to Justify Area Classification
- Maximize In-Process Inspection to Minimize Confirmatory Survey & Inspection

Other Issues – Technical - I

- Design the Decommissioning Plan to Minimize Health Physics Monitoring and Surveys
- Consider Requiring Characterization Data to Meet Final Status Survey Quality Requirements
- Streamline Data Collection & Import; Link Data to Location
- Minimize Paper and Maximize Electronic Data Entry
- Establish Electronic Vehicle (e.g., Website) to Enhance Access to Data

Other Issues – Technical - II

- Maximize Licensee's Ability to Decommission Under Operating License
- Develop DCGLs During Licensing Process
- Provide for Volumetric Averaging for Groundwater and Subsurface Soil
- Allow Reduced Characterization under Specified Conditions

Questions??

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Lessons Learned from DOE and Other Site Decommissioning

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Argonne National Laboratory

Advisory Committee on Nuclear Waste –
Working Group Meeting on Decommissioning Lessons Learned

Rockville, MD
November 14, 2006

Presentation Outline

- Historical Perspective
- Cost Issue
- Environmental Impact Issue
- Design and Construction Issue
- Other Improvements
- Summary

Historical Perspective - 1

- Some DOE sites/facilities are in closure
- Some DOE sites have limited number of facilities or areas in closure
  - Some will be demolished
  - Some will be reused after decommissioning
- Some facilities are privately owned, but contaminated with Government radioactive materials (contract closure requires restoration)

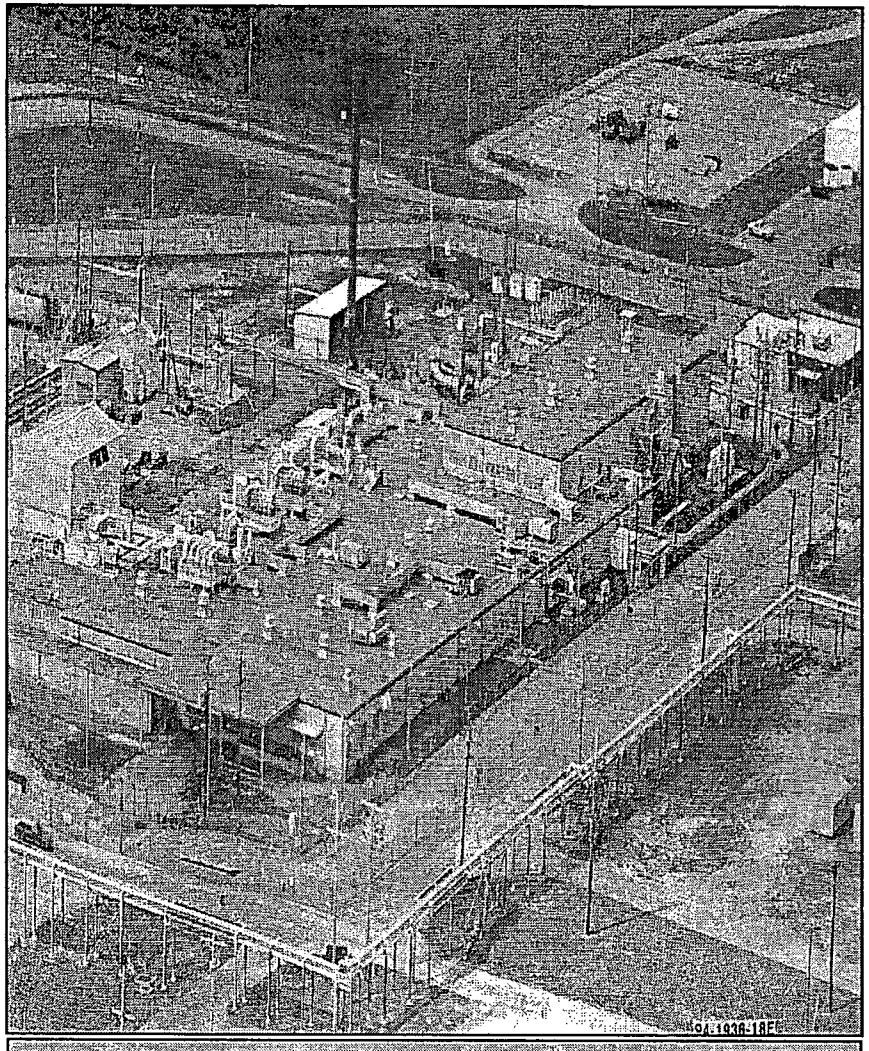
Historical Perspective - 2

- Many 'one-of-a-kind' facilities designed, operated and with their own unique history and problems
- Many quickly constructed and operated - or at the least not to current day standards – little concern about closure issues
- Recordkeeping issues – 'as built' records, operational history data – some good but lots of poor examples

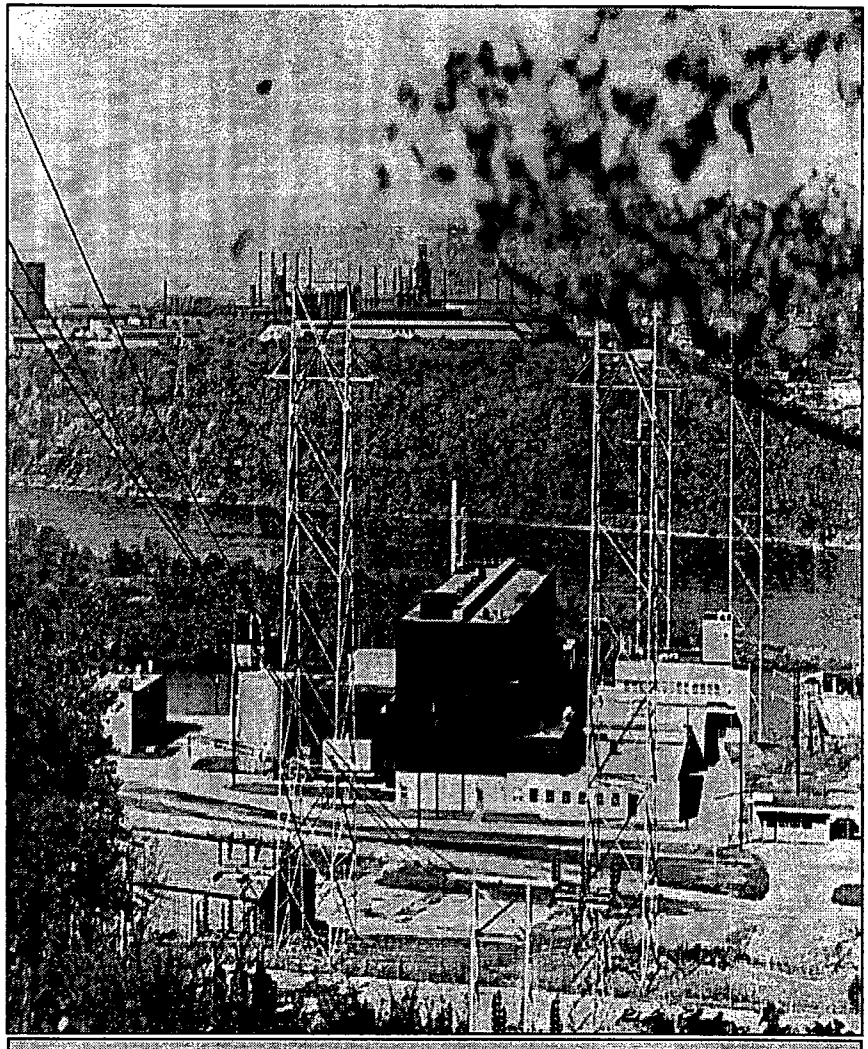
Historical Perspective - 3

- Many facilities poorly deactivated to a safe shutdown condition in 1950's-1990's; decommissioning inherited these problems
- Generally speaking there are no Decommissioning Funds – slows process of implementing decommissioning
- Poor past communication and past operational limitations on openness complicated stakeholder engagement process and comfort levels
- Labor forces used for decommissioning vary – some 'in-house' forces, others project specific contractors and at closure sites - integrators with subcontractors

Variety of Facilities



DOE – SRS Fuel Fabrication Facility



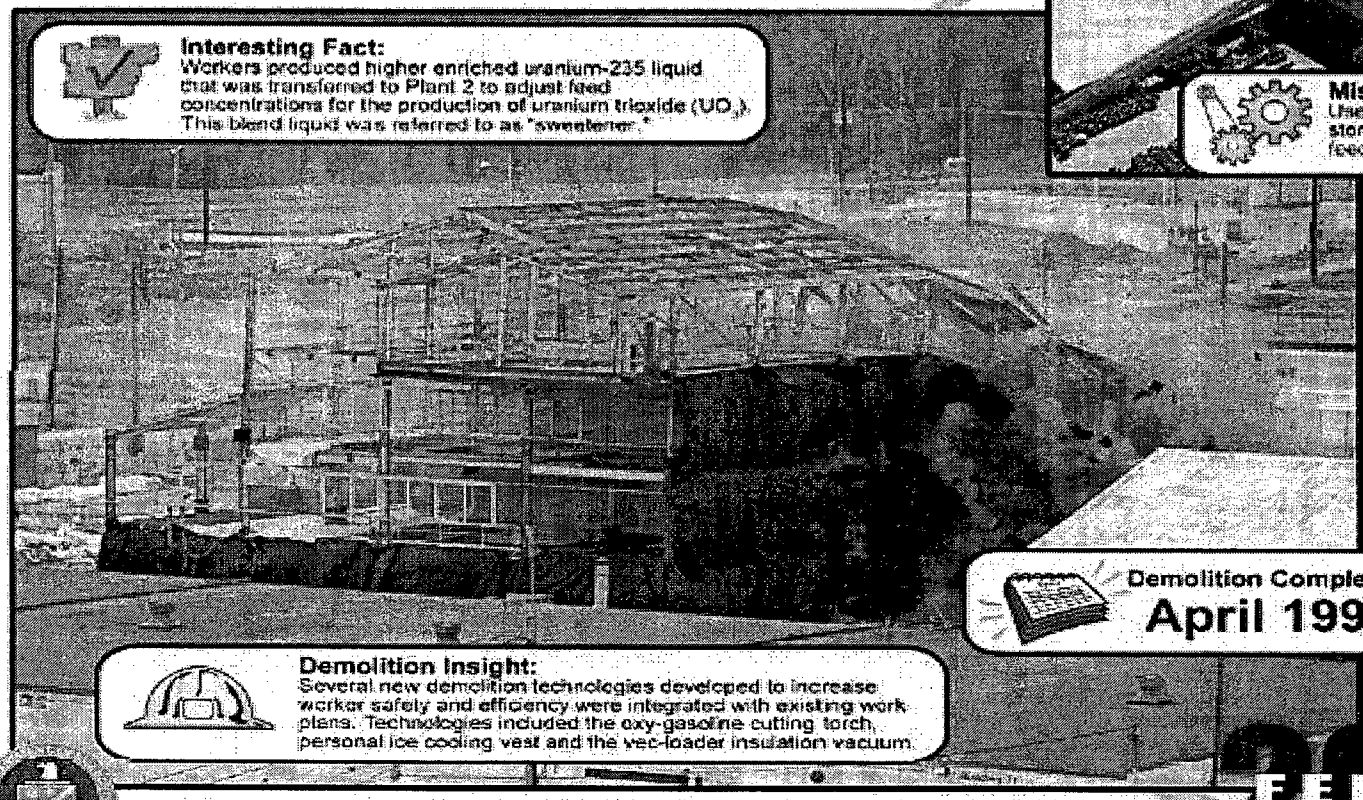
DOE-Shipping Port Reactor

Fernald Site - Plant 1

Plant 1, Sampling Plant

Mission:
Used to receive, sample, store and prepare uranium feed materials for processing.

Interesting Fact:
Workers produced higher enriched uranium-235 liquid that was transferred to Plant 2 to adjust feed concentrations for the production of uranium trioxide (UO_3). This blend liquid was referred to as "sweetener."



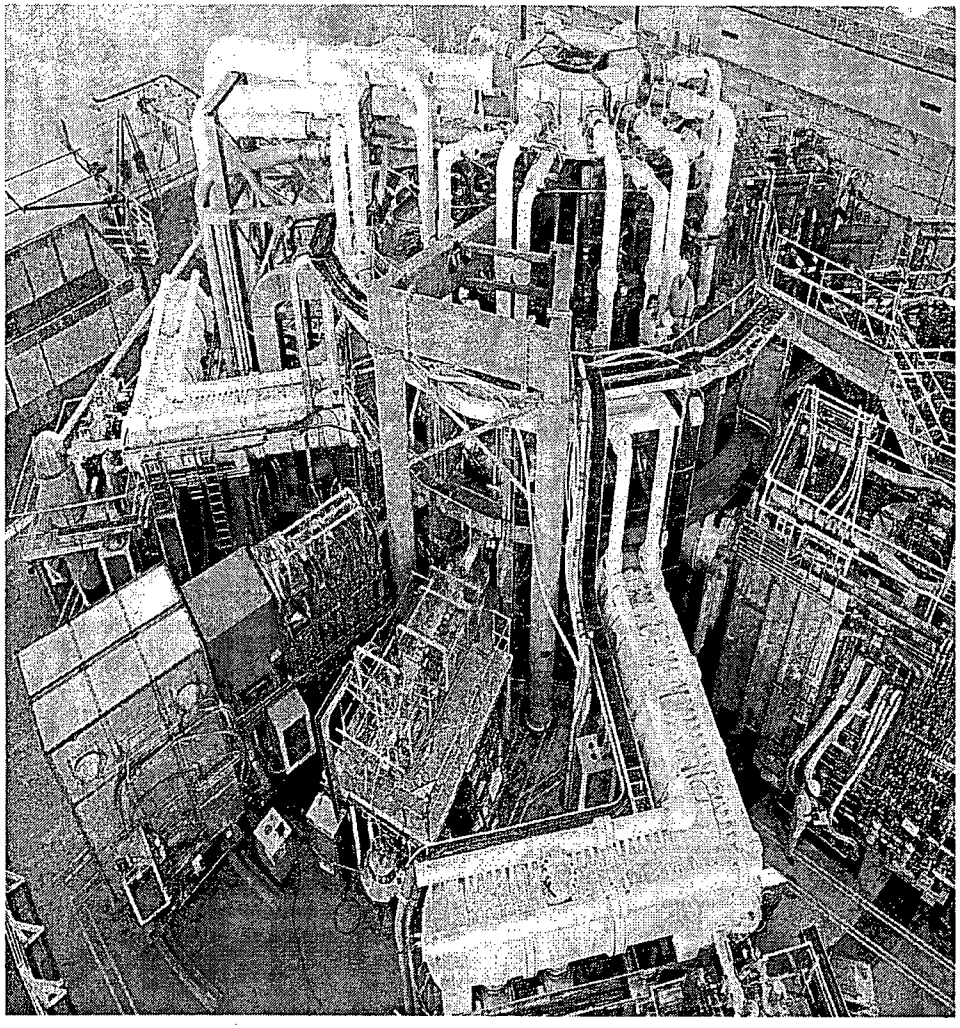
Demolition Completion:
April 1997

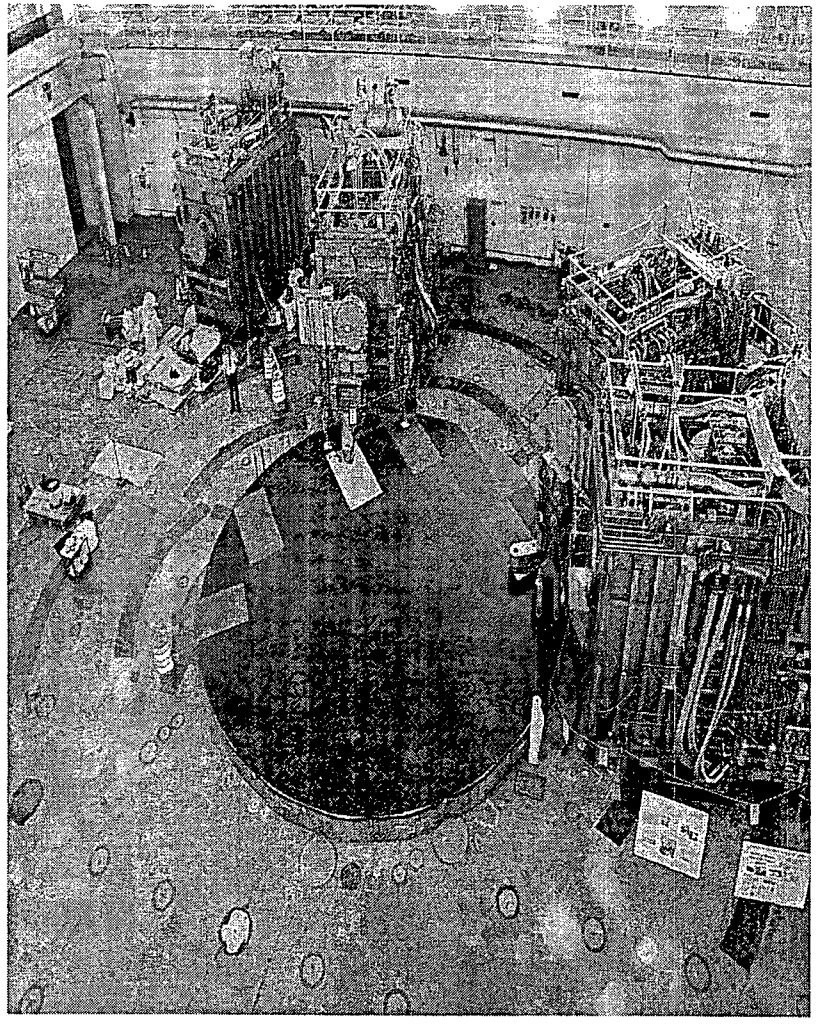
Demolition Insight:
Several new demolition technologies developed to increase worker safety and efficiency were integrated with existing work plans. Technologies included the oxy-gasoline cutting torch, personal ice cooling vest and the vac-loader insulation vacuum.

Fluor Fernald

FERNALD 2006 committed to Safe closure

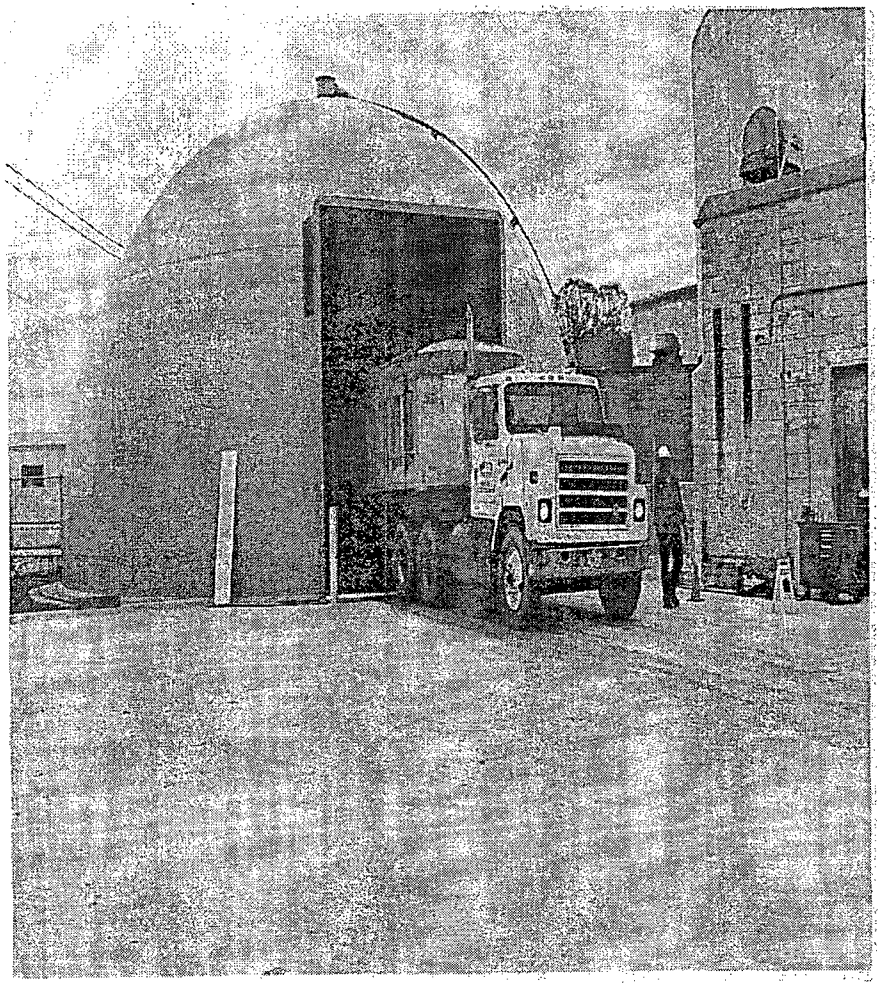
Before & After Decommissioning - TFTR



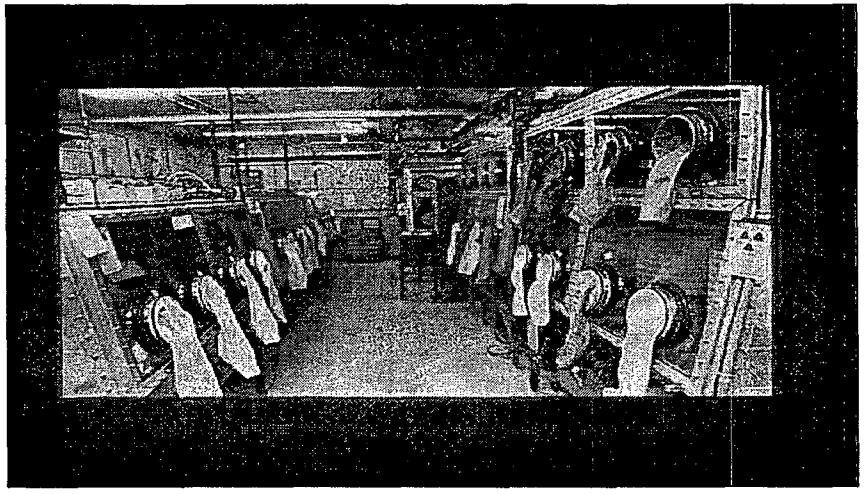


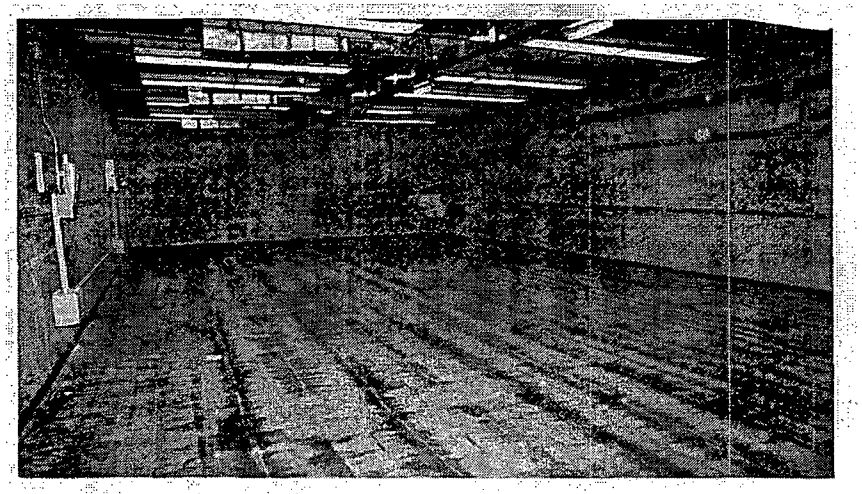
Tokamak Fusion Test Reactor at DOE-PPPL Site, Princeton, NJ

Facility Re-Use at ANL



CP-5 Vaporsphere





Building 212 Gloveboxes Laboratory

Cost Issue - 1

- Major cost elements are:
  - the labor cost to perform the decommissioning and
  - the cost to manage the generated wastes
- Waste disposal at large waste volume generating project sites requires careful planning and cost-benefit analysis for decision making
- Management of the interfaces associated with off-site shipments and the associated work involved in establishing and maintaining that process is typically time-consuming
- Not to be forgotten is site characterization and the historic site assessment

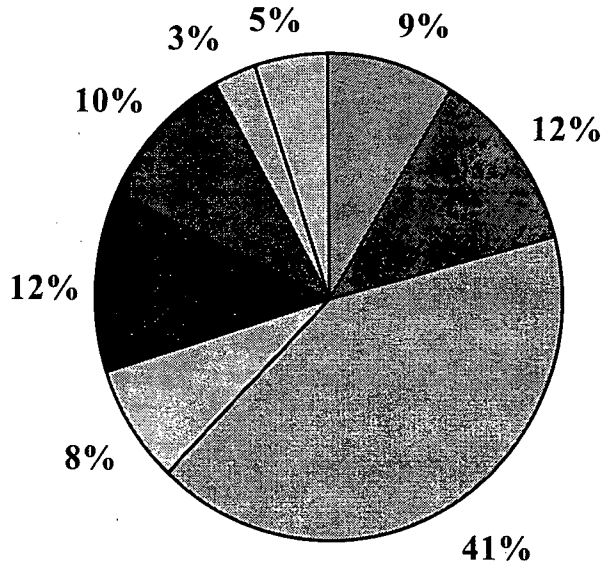
Cost Issue - 2

- Clearance (for free release) of larger volumes of material that would not require management as wastes would reduce the costs
- Intact large component/equipment removals save funds as well as schedule and reduce risks
- Find ways to optimize the decommissioning process through 'optioneering' studies including cost-benefit analyses and value engineering
- Industrial safety issues need close monitoring – electrical safety, rigging and lifting, control of contractors - to mention just a few – its very expensive to 'sit and wait' due to work stoppages or other problems

Cost Issue - 3

- Technologies are available off the shelf to support decommissioning
- Final site end-state must be developed and agreed to early to avoid costly delays and re-work of areas

ANL JANUS Reactor D&D - Costs Detail



- Project Management
- D&D
- Project Engineering
- Equipment & Materials
- Surveillance & Maintenance
- Waste
- Characterization
- Closeout

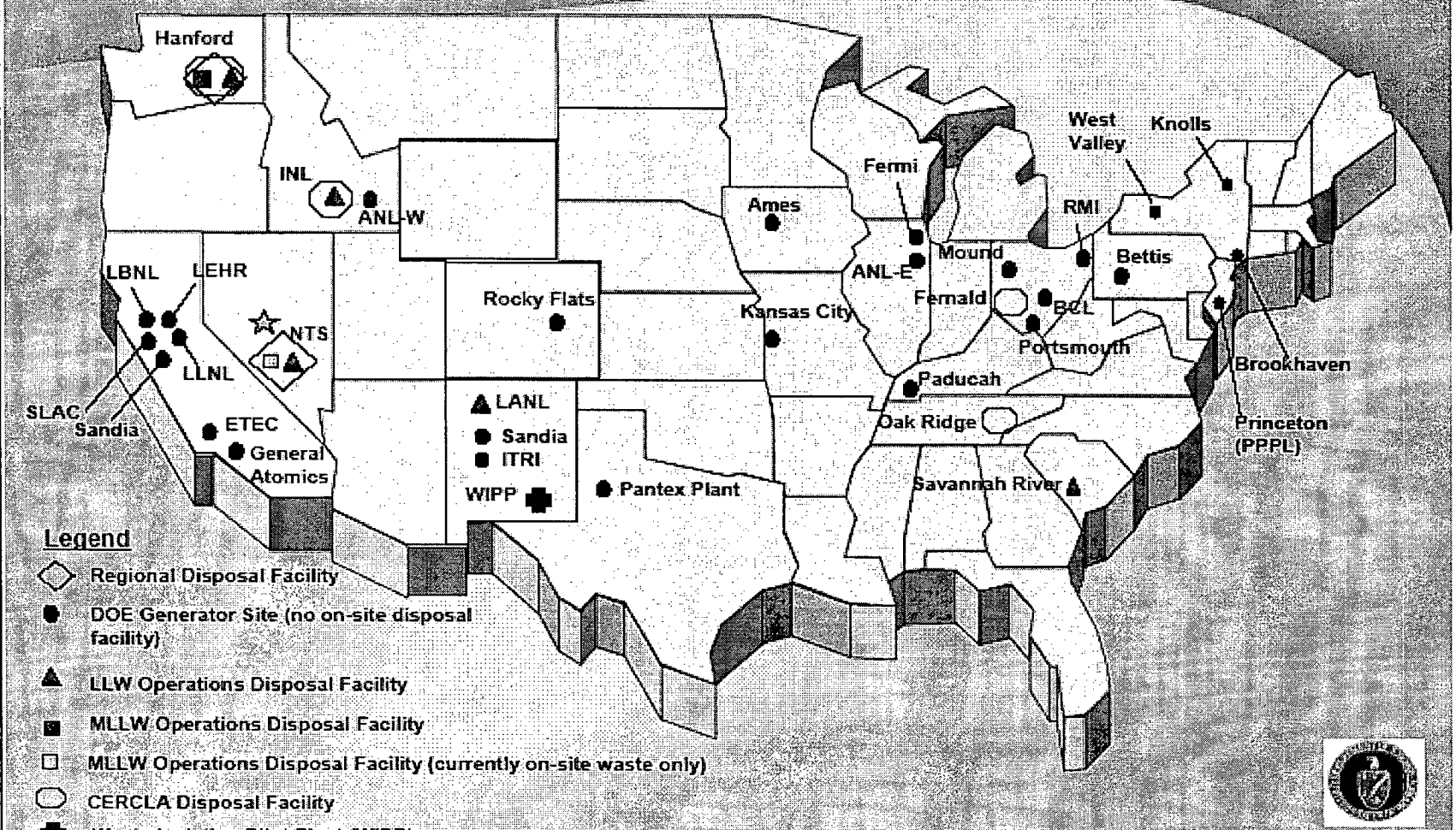
Waste Management Issues - 1

- Waste management - the easier and quicker you can move material off the work site the better
- Larger waste material volumes have allowed sites to negotiate for much better rates for some wastes at some commercial disposal sites
- Easier and more cost effective to dispose of material than to decontaminate it – disposal is cheap and clearance is a historic issue
- Many DOE sites have on-site disposal cells which alleviate many waste disposal issues and make the 'flow process' easier – cheaper and whatever bounds the process

Waste Management Issues - 2

- Use of previously unregulated materials - lead based paints, heavy metals, PCB's and asbestos and other chemicals - in a currently regulated materials space
- Management of mixed waste on some projects
- Disposal of very low levels of radioactively contaminated soils with approvals in sanitary landfills or RCRA landfills
- Meet the Waste Acceptance Criteria for the disposal site – don't complicate it any more than necessary

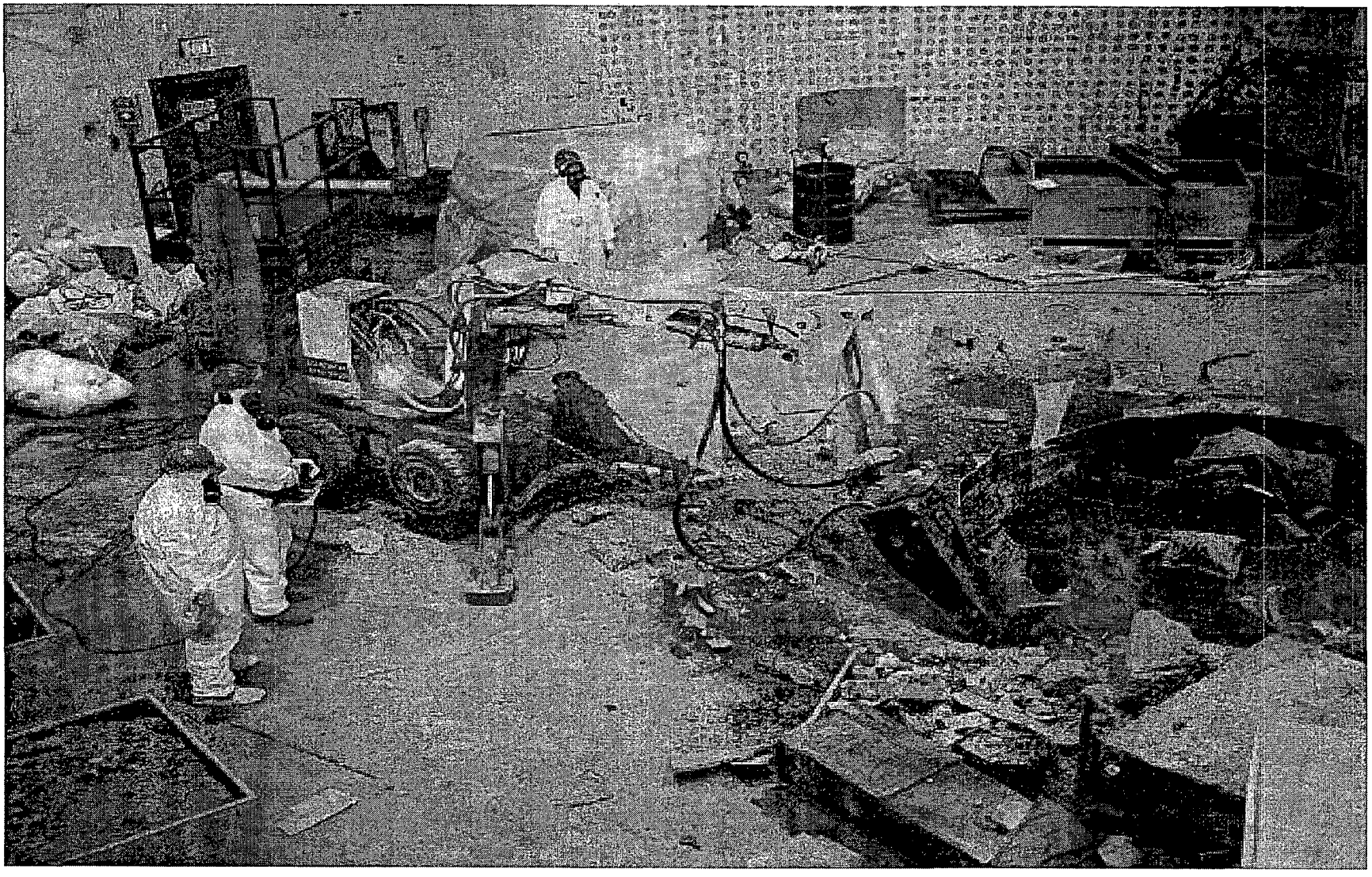
DOE's Waste Disposal Facility Configuration



Office of Environmental Management

Safe for the Workers, Protective of the Environment, and Respectful of the Taxpayer

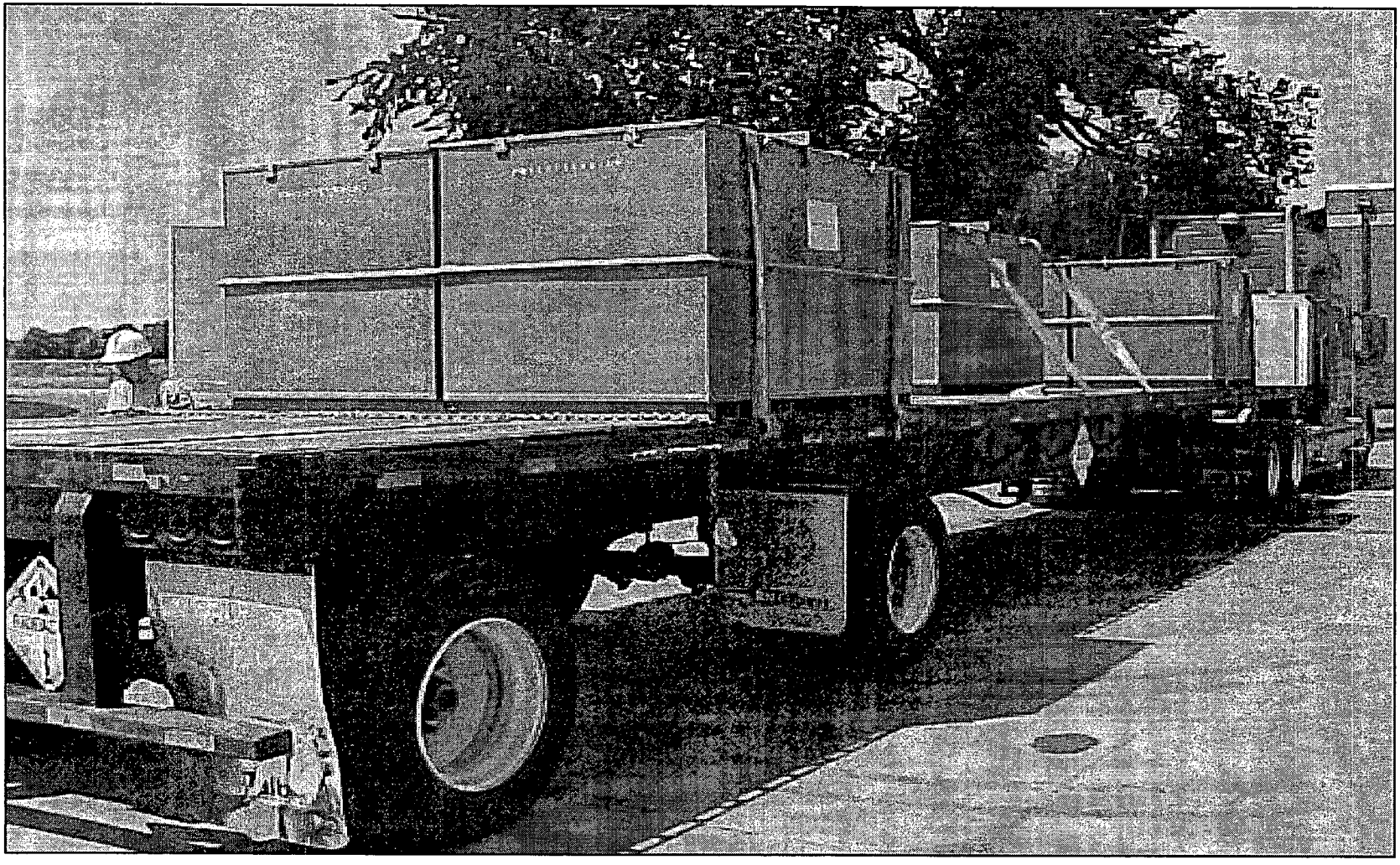
CP-5 Research Reactor D&D



Demolition Debris

Staged rubble from building dismantling activities

Packaged Waste



Typical low-level radioactive waste shipment for off-site disposal

DOE-Hanford Environmental Restoration Disposal Facility (ERDF)

*Secrets of RFCP Success**

- Technological and operational innovation
  - Technology experimentation
  - No time to 'develop' something – 'steal' something !
  - Big technological busts
- No micromanaging
- Proper contract in place to hold accountable yet properly incentivize
- Are we overly compensating/ incentivizing the contractor ?
- Compromise on "Soil Action Levels"

*Also see GAO report – GAO-06-352

Design & Construction Features - 1

- Stay away from embedded piping – difficult to assess if contaminated and to remove if needed
- Stay away from large massive concrete structures made by use of a 'one pour' construction technique – disassembly difficult
- Use secondary containment to contain leakages - soil contamination issues from spills, leaks and legacy practices

Design & Construction Features - 2

- Any NPP or other features which are often touted as an 'O&M' feature can actually also be thought of as a 'decommissioning friendly' feature
  - Reduced impurities in fabrication materials
  - Reduced contamination from plant operations
  - Optimize plant layout for decommissioning – pre-place aids for removal of equipment
  - Waste minimization in facility design/modularization
- Use of standardized 'cookie cutter' designs for future plants allows for optimization of decommissioning implementation

Other Possible Improvements

- Share lessons learned – we are not doing as good of a job as we did in the past in this area
  - IAEA documentation
  - DOE Lessons Learned and Operating Experiences reports
  - NRC Regulatory Information Summaries

- Prepare for decommissioning in advance better than we do now – have a 'living' decommissioning plan and develop the decommissioning strategy and path forward as the facility is being used – minimal effort and good way to stay current in planning and good public relations

- For nuclear industry to remain viable and grow – we must be able to handle legacies of the past - closure of current facilities/sites

'Top Ten Lessons Learned'

1. Communications
2. Specialist Support
3. Final Surveys and Endpoints
4. Planning/Cost Estimating
5. Deactivation
6. Waste Management
7. Hazards Assessment
8. Site/Facility History
9. 'OTS' Technologies
10. Facilitate Info Exchange & Teamwork

Understand what the industry has done and is doing – spend some early planning funds to accomplish this !! Training, Site Visits, Mock ups

Expect the unexpected because it will occur sometime or even multiple times during the project !! Contingencies, emergency plans, etc required

Lessons Learned Sources

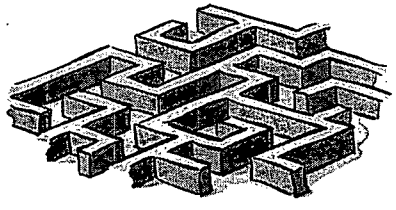
- www.energy.gov
  - DOE Operating Experience weekly reports
  - DOE Lessons Learned website
- www.iaea.org
  - IAEA TECDOC-1394
- www.nrc.gov
  - NUREG-1757 Volume 2, Appendix O
  - USNRC RIS-02-002 LTP and DP process
  - USNRC RIS-04-008 LTP process
- www.orau.gov/ddsc/
  - DDSC Website

A Closing Note

- Remember that decommissioning is not "rocket science" – do not make it any more complicated than necessary
- Learning from experience is difficult – the test comes first and the lessons come later - the exact opposite of how learning typically occurs
- Learn from what others have done and not done – many have walked down this path before you – don't be afraid to seek out help and ask questions

Decommissioning Lessons Learned a State's Perspective

Thomas A. Conley, CHP, RRPT
Radiation Control Program Director
Kansas Department of Health and Environment
Board Member Organization of Agreement States

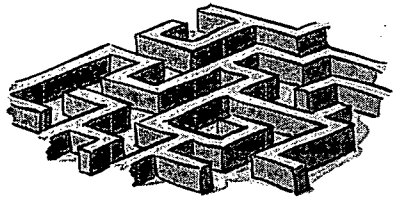


Keys to control costs

- Prevention
- Regulation
- Characterization
- Disposal

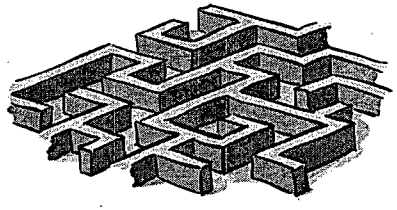
Prevention

- Begins with design
  - Technologies
    - BAT mandate
  - Surfaces
    - Easy to perform decontamination procedures
  - Ventilation systems



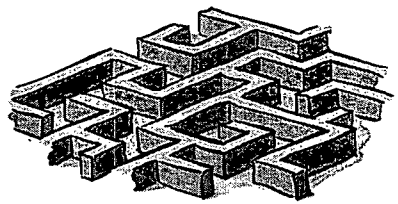
Prevention

- Detection
  - Retention pond designs with leachate detection, liners
- Monitors
  - Area & exhaust air monitors
- Design of hot cells



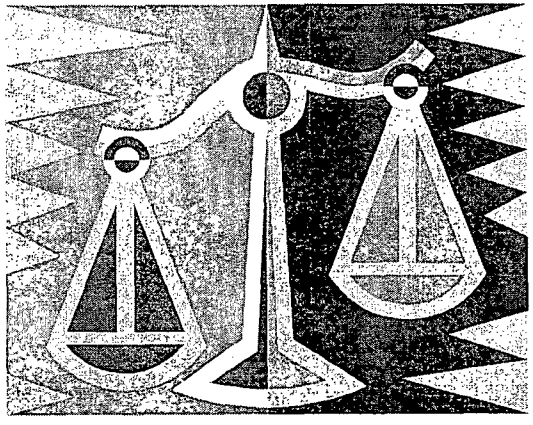
Culture

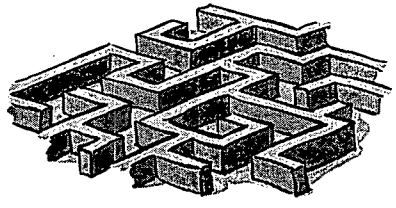
- Decommissioning not at the forefront during startup
- Decommissioning comes when the income goes away
- Need to look to the future



Regulatory

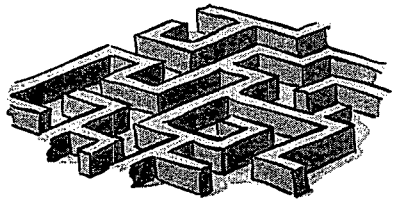
- Address decommissioning during licensing
  - We do them no favors by accommodation
  - In the licensee's best interest
- Need clear direction on cleanup standards
- Must be consistent and equitable across agencies





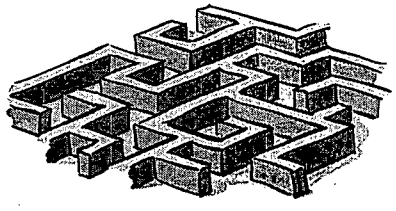
Inspections

- Look for problems and spills
- Don't get stuck in a rut
  - Be imaginative
- Check
  - Around doors
  - On roofs
  - Downwind etc
- Take soil samples



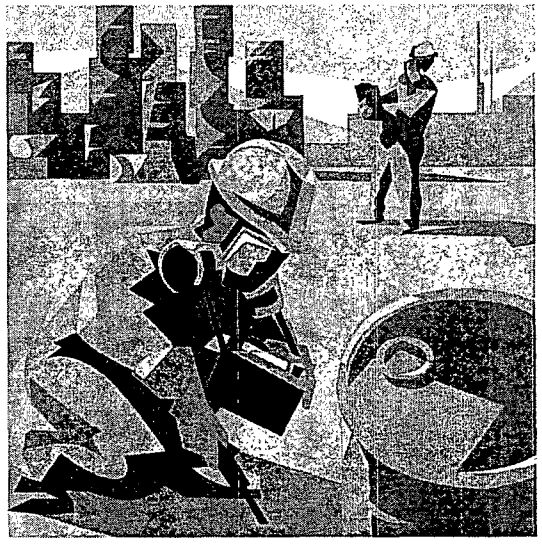
Characterization

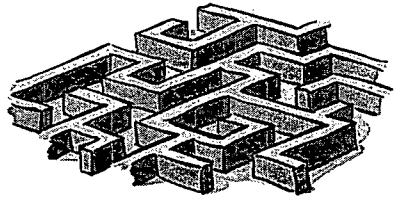
- During Operation
  - Mechanism for identification and quantification
    - Spills
    - Leaks



Initial characterization surveys

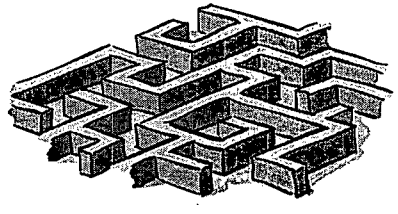
- Look everywhere
- Especially at older facilities
- Hidden rooms
- Unknown spills
- Unknown disposal



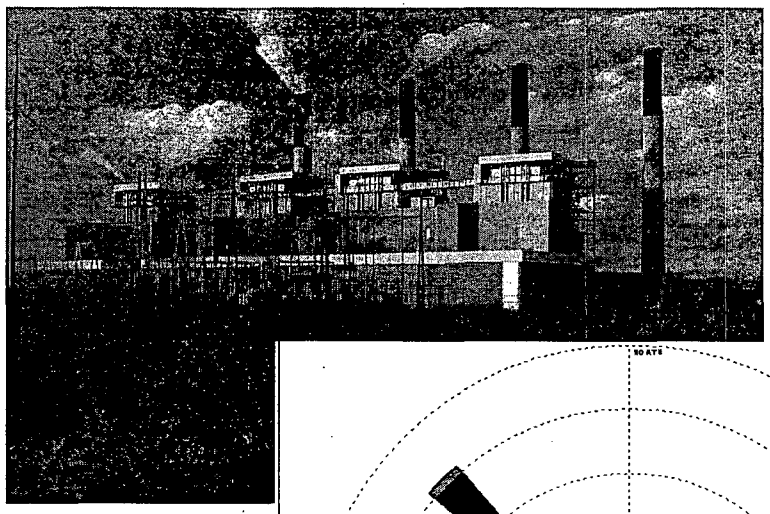


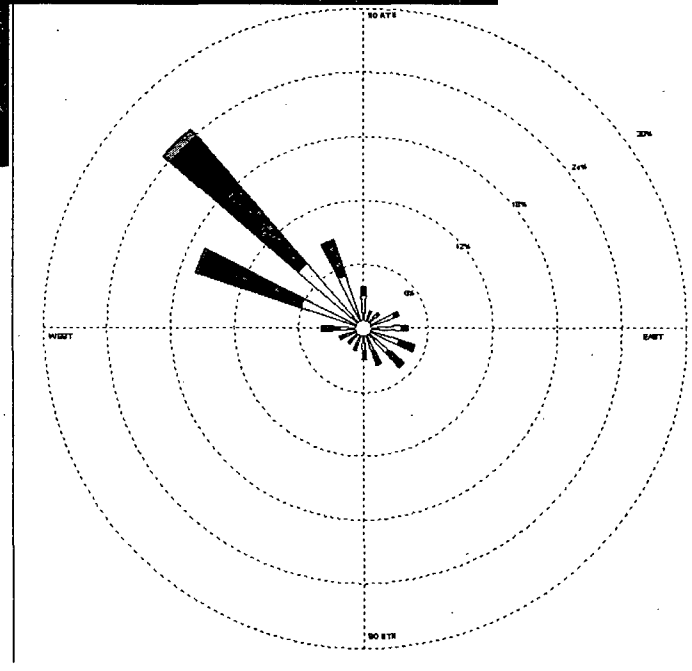
Look for the unexpected

- Hidden rooms
- Contaminated fire pits under parking lots
- Organic vapors stick to plastics

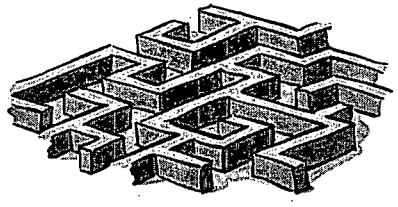


Exhaust systems



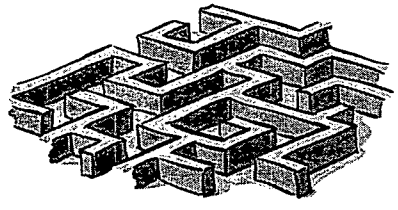


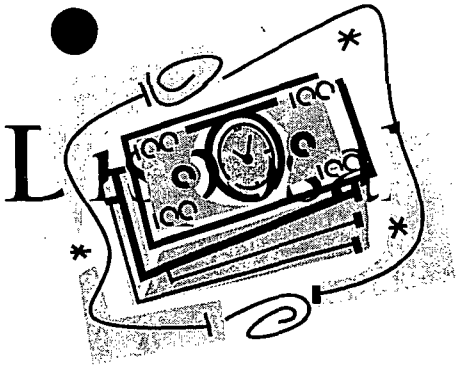
- Track long term plumes
  - Can exceed cleanup levels without exceeding effluent release limits
- Look at wind rose plots
- Effluents may not be as readily dispersible as you thought



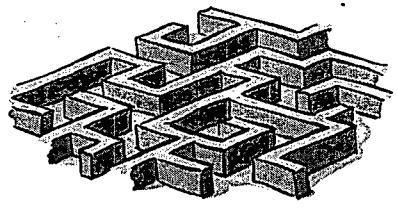
oundwater and Soil

- Groundwater Issues
  - Uranium tailings impoundments
  - Sites with history of solvent use
- Large sites contaminated with radioactive material
  - Need creative ways to decrease the concentration
  - Reduce amounts of waste
  - Avoid other reclamation issues.



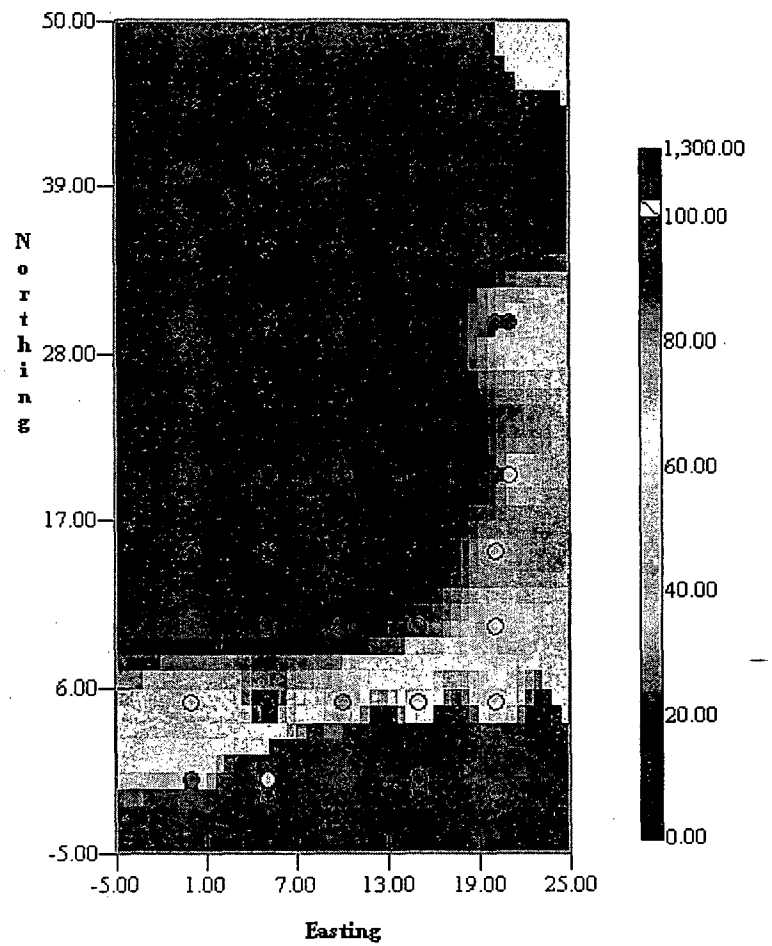


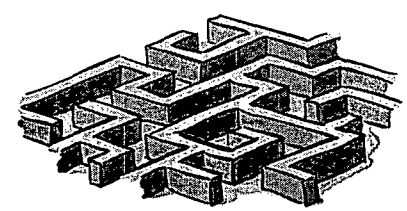
- Major contributor of cost
- Need competition for disposal options
- Minimize volume
- Better characterization equals better control of amount of waste
- Don't dispose of more than necessary



"Discrete" Sources Don't Stay Discrete

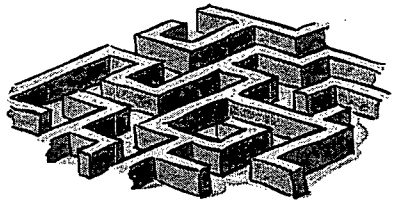
Contamination from Licensed Activities with Discrete Ra-226 Sources (uR/hr)





Decommissioning Summary

To achieve the most cost effective end result, decommissioning planning must begin before the first day of operation and include a hard look at preventative measures, regulatory issues and plans for site characterization and disposal



Questions?

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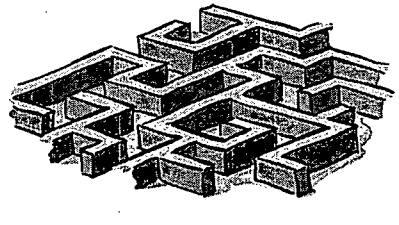


Update on Decommissioning Lessons Learned

Rafael L. Rodriguez, Project Manager
FSME/DWMEP/DURLD

Tuesday, November 14, 2006

Outline

- Accomplishments since the last meeting in summer 2005
- Current efforts to capture and preserve decommissioning lessons learned
- Incorporation of lessons into the design and construction of new facilities

Accomplishments since the last meeting – Summer 2005

- Publication of 23 lessons learned in the public website from ongoing decommissioning projects
- Publication of a preliminary bibliography with lessons-learned documents from EPRI, FCFF, OAS, and NRC
- Participation in a panel discussion during WM 2006
- Assist NRO/NRR and RES in developing documents for new reactor licensing

Current efforts to capture and preserve decommissioning lessons learned

- Lessons learned webpage has been updated

http://www.nrc.gov/what-we-do/regulatory/decommissioning/lessons-learned.html

- Working group focusing on other mechanisms to capture and preserve the information

- Interactions with DOE on lessons learned

Incorporation of lessons into the design and construction of new facilities

- Memo to NRO/NRR providing high level lessons learned (ML062620355)
- Input to be used by NRO for updated version of NUREG-0800
- Input to be used by RES to develop a RegGuide for new reactor licensing

Questions ?

Guidance Development for 10 CFR 20.1406

Presentation to ACNW Working Group on Lessons Learned in Decommissioning
November 14, 2006

William R. Ott, Chief, Waste Research Branch
Office of Nuclear Regulatory Research
US Nuclear Regulatory Commission

Provisions of 10 CFR 20.1406

- Applicants for licenses other than renewals
- Describe how facility design and procedures for operation will
  - Minimize, to the extent practicable, contamination of the facility and the environment
  - Facilitate eventual decommissioning
  - Minimize, to the extent practicable, the generation of radioactive waste

Status of Implementation

- No reactors licensed since August, 1997, when 20.1406 became effective.
- No effort to develop guidance since original publication.
- First standard design reviews did not address (specifcally addressed in Part 52 rulemaking)
- Multiple independent publications may provide relevant information (e.g. Electric Power Research Institute reports -access has been an issue)

Scope of Guidance Development Effort

- NRR - Revision of Standard Review Plan
- FSME - Compilation of lessons learned from decommissioning actions
- RES - Technical basis development for Regulatory Guide and Regulatory Guide
  - FSME Lessons learned
  - Review of regulatory guide system
  - Review of literature including available industry reports
  - Previous NRC publications (e.g. NUREG/CR-3587)

Milestones

- Consolidated lessons learned from decommissioning experience - December, 2006.
- Recommendations in January 2007 including
  - content of stand-alone guidance
  - existing regulatory guides which should be modified to reflect the provisions of 20.1406
- Draft Regulatory Guide for internal review - April, 2007
- Publication for public comment - July, 2007

UPDATE ON PROPOSED RULEMAKING

ADDITIONAL REQUIREMENTS FOR SUBSURFACE MONITORING

J.C. SHEPHERD, T.L. FREDRICHS, *et al*

NOVEMBER 14, 2006

OUTLINE

- BACKGROUND
- OPERATIONAL REQUIREMENTS FOR LEGACY SITE PREVENTION
- UPDATE TO PROPOSED ACTIONS

BACKGROUND

- SRM-SECY-03-0069 INCLUDED ACTIONS TO PREVENT FUTURE LEGACY SITES BY CHANGING OPERATIONS & FUNDING

- ACNW BRIEFINGS
  - JULY 2006: PROPOSED RULEMAKING
  - JUNE 2005: IDENTIFYING SITES WITH HIGH POTENTIAL FOR SUBSURFACE CONTAMINATION

OPERATIONAL CHANGES

- REVISE CONTAMINATION CONTROL
  - NEW FACILITY DESIGN
  - OPERATING FACILITY MONITORING
- ENHANCE NRC OVERSIGHT
- RISK INFORM SUBPARTS E, F TO PART 20

MONITOR FOR CONTAMINATION

- INSIDE FACILITY
- OUTSIDE FACILITY
  - SURFACE
  - SUBSURFACE (ALL MEDIA)
- RESPONSE(S) TO RELEASES

INITIAL PLAN: §20.1406

- CHANGES BEING CONSIDERED
  - INCLUDE EXISTING LICENSEES
  - REQUIRE CERTAIN CLASSES TO MONITOR SUBSURFACE MEDIA
- WORKING GROUP COMMENTS
  - SCOPE OF APPLICABILITY
  - EXISTING SURVEY REQUIREMENTS IN SUBPART F TO PART 20

SUBPART F

- EXISTING §20.1501 REQUIRES LICENSEES TO MAKE SURVEYS THAT ARE NECESSARY AND REASONABLE TO DETERMINE MAGNITUDE AND EXTENT OF RADIATION AND POTENTIAL RADIOLOGICAL HAZARDS

CHANGES SINCE LAST BRIEF

- §20.1406: NRR/NRO HAS PROPOSED REVISED PARAGRAPHS (a) & (b) TO EXCLUDE SOME OF PART 52

- CONSIDERING ADDING NEW SUB: (c) LICENSEES MUST IDENTIFY AND MINIMIZE CONTAMINATION IN THE FACILITY AND THE ENVIRONMENT, INCLUDING THE SUBSURFACE

SUBPART F CONSIDERATION

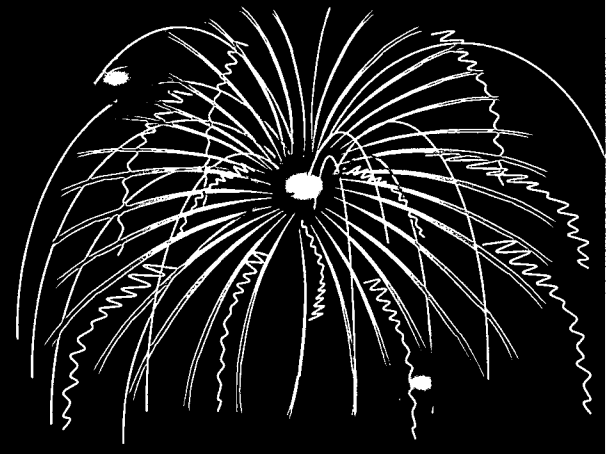
- **CONSIDERING NEW** §20.1503: SURVEYS AND MONITORING OF SUBSURFACE
  - COULD APPLY TO LICENSEES THAT HAVE
    - POSSESSION LIMITS REQUIRING FINANCIAL ASSURANCE FOR DECOMMISSIONING
    - ISOTOPES WITH HALF-LIVES GREATER THAN FIVE YEARS FROM LICENSED OPERATIONS
    - POTENTIAL FOR UNMONITORED RELEASES

§20.1503 CHANGE CONSIDERED (2)

- COULD REQUIRE, IN ADDITION TO §20.1501:
  - ESTABLISHING A ROUTINE MONITORING PROGRAM BASED ON SITE HYDROGEOLOGY
  - DEVELOPING A SUBSURFACE MONITORING <u>PLAN</u> THAT SPECIFIES INCREMENTAL INCREASES TO ROUTINE MONITORING WHEN INDICATED

RELATED TASKS

- NRC INSPECTION OVERSIGHT
- FINANCIAL ASSURANCE
- SUPPORTING GUIDANCE



THE INTERMEDIATE STOPPING POINT