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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON NUCLEAR WASTE (ACNW)

174th MEETING

SECOND DAY

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TUESDAY,

NOVEMBER 14, 2006

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The meeting was convened in Room T-2B3 of Two White Flint North, 11545 Rockville Pike, Rockville, Maryland, at 8:30 a.m., Dr. Michael T. Ryan, Chairman, presiding.

MEMBERS PRESENT:

MICHAEL T. RYAN	Chair
ALLEN G. CROFF	Vice Chair
JAMES H. CLARKE	Member
WILLIAM J. HINZE	Member
RUTH F. WEINER	Member

ACNW STAFF PRESENT:

JOHN T. LARKINS Executive Director, ACRS/ACNW
LATIF HAMDAN
ANTONIO DIAS
DEREK WIDMAYER
JIM SHEPHERD
MIKE SNODDERLY
RAFAEL RODRIGUEZ
WILLIAM OTT
STEVEN KOENIG
JOHN FLACK

MEMBERS OF THE SUBJECT MATTER EXPERT PANEL PRESENT:
RALPH ANDERSEN
HANS HONERLAH
TRACY IKENBERRY
ERIC L. DAROIS
LARRY BOING
JEFF LUX
THOMAS L. NAUMAN
DAVID KOCHER

ALSO PRESENT:

TOM CONLEY

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

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

(8:39 a.m.)

OPENING REMARKS AND INTRODUCTIONS

CHAIR RYAN: The meeting will come to order please.

This is the second day of the 174th meeting of the Advisory Committee on Nuclear Waste.

During today's meeting the committee will conduct a working group meeting on decommissioning lessons learned.

This meeting is being conducted in accordance with the provision of the Federal Advisory Committee Act. Derek Widmayer is the designated federal official for today's session.

We have received no written comments or requests for time to make oral statements from members of the public regarding today's sessions. Should anyone wish to address the committee, please make your wishes known to one of the committee staff.

It is requested that speakers use one of the microphones, identify themselves and speak with sufficient clarity and volume so that they can be readily heard.

It is also requested that if you have cell

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

So without further ado I will turn the meeting over to our cognizant member for this working group meeting, Dr. Jim Clarke.

Jim.

MEMBER CLARKE: Thank you, Dr. Ryan.

Welcome, all of you, to this working group meeting on decommissioning lessons learned.

In our first session this morning we will hear from representatives of industry groups, licensees and practitioners, providing information to us on decommissioning lessons learned, focusing of course on those lessons that can lead to reduced environmental impact and decommissioning costs.

We have an invited panel of experts, and let me quickly introduce them to you and thank them all for coming. They've been with them on several occasions, all of them, and we really appreciate their willingness to participate in these meetings.

Eric Darois to my right is the owner of Radiation Safety and Control Services in New Hampshire. He's presently supporting Connecticut Yankee and Yankee Road decommissioning projects.

And Eric holds a master's of science

degree in radiological science and protection from the University of Lowell.

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

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

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

Welcome, all of you, and we thank you for

coming back yet again.

Our first speaker is Ralph Anderson, chief health physicist for the Nuclear Energy Institute. Ralph's been working with the NRC decommissioning staff in their lessons learned efforts, and as we heard yesterday, supported efforts of the liquid radioactive relief lessons learned task force.

Ralph, thank you.

SESSION I: DECOMMISSIONING LESSONS LEARNED

DR. ANDERSEN: Thank you.

Well, as always it's a pleasure to be able to address the ACNW. I'm beginning to think of this as my home away from home, because it's generally an enjoyable experience.

What I want to talk about this morning is the integrated program between NEI and EPRI. Hence the coauthorship. My colleague, Sean Bushart, from EPRI wasn't able to make it out this week. However, I strongly encourage that at some future time Sean might be very appropriate to provide you must more details about the robust program, international program especially, that EPRI has been conducting for some almost 10 years now in the area of decommissioning.

In short our complementary roles, EPRI as

our industry's research and development organization has the lead responsibility for documenting or experiencing lessons learned for decommissioning, for technology development and transfer, and also provides a considerable amount of on site support for licensees, reactor licensees undergoing decommissioning.

The other part of our coin is Nuclear Energy Institute. Basically we have an executive oversight group which meets less frequently now as we complete our decommissionings, but it's made up of chief nuclear offices from those facilities undergoing decommissioning to provide both policy oversight and policy development.

We also maintain the interface with the Nuclear Regulatory Commission, the Environmental Protection Agency and Congress.

I want to note at this point my colleague who preceded me, Paul Genoa, who I believe members of the committee have met in the past, really has done an outstanding job over the years. We actually had a handoff at the beginning of this year. Paul is alive and well and working in other arenas at NEI.

Then finally our real mission is resolving economic and regulatory issues associated with

decommissioning. Some of that occurs in legislation, some fo that occurs in regulation, but some of it occurs also at the state level, at the PUC level.

The status currently for commercial nuclear power plants in the U.S. is that two have terminated their licenses - actually three if we count Shoreham. Shoreham always stands somewhat as an outlier. And we're entering the home stretch at the other plants.

What this is going to do is create a very, very extensive gap in our view from the time of decommissioning of current plants that are actually doing dismantling and decontamination, potentially for as much as 25 or 30 years or more before we enter into decommissioning again.

And then at that time we will potentially enter into it with a vengeance as the extended licenses of the current fleet expire.

In some cases it will not only involve decommissioning of plants that operate up until that time, but also some plants that are simply sitting in a status - safe-store status effectively right now for decommissioning concurrently with the other units.

One other element I should mention when we look out into the future is the impact of new plants.

A number of the new plants - in fact all but a few that are going to be in the first wave, and that's some 21 sites that would be involved, and potentially up to 30 plus units at this point in the head count - many of them will be colocated will operating units.

The likelihood is that when those operating units shut down, if there is a nuclear power plant continuing in operation, that those plants will not go into immediate decommissioning.

So there is a large lesson unlearned that we don't really have much experience with. Ironically this was envisioned in the original regulations as the standard, but in fact it has not been the standard, it is the exception.

And that is the whole issue of the impacts of safe-store, and particularly enhanced permanent storage type of situations. They've been called intumen (phonetic) and other names, assured isolation and so forth.

But there are a number of options out there that could come into play in the far future that we've really not exercised to any significant degree.

So I stress that in general the experience that we've gained have been plants that have shut down, and most of these with one or two exceptions

shut down earlier in their lifetime than expected, and pretty much immediate went into decommissioning.

So the effects of long term decay and other things really haven't come into play much with these units.

The issues that we are focusing on as we complete our whole series of technical reports associated with decommissioning are listed under the remaining issues.

The third one isn't really intended to be a hot button, but it recognizes some of the experience that we gained, certainly with one unit in particular, and our continued quest to find some reasonable approach to disposition a very low level radioactive materials.

And of course yesterday we learned from a lessons learned task force, and they are really responding, although they're operating plants, to the long term issue of groundwater contamination and soil remediation.

These are the plants that are in progress. I'm going to briefly touch on each of these, highlight a few things where we've gained particular lessons learned out of them.

And then what I would like to do is

provide you with a brief summary of lessons learned for decommissioning, but most importantly, picking up a theme I heard yesterday, I really want to spend a little bit of time on how we see our lessons learned from decommissioning applying to new plants.

We think that given the time frames that we are dealing with for license applications, given the discovery of a regulatory requirement that many of us had overlooked for applying such lessons learned to new plant design and operations, this has really become a critical factor for renaissance in nuclear energy.

Big Rock Point is certainly a fantastic success story. It's a plant that virtually operated its full expected lifetime, went into its decommissioning, has now reached Greenfield status. In fact it is intended that it will be turned over as a recreational area.

And also it engaged on a particular issue that I want to take a moment on only because it's a story worth telling that I hope we might be able to tell in the future at a number of sites.

Big Rock Point actually pursued an option where they had intended to basically crumple down all the building debris and then spread it out over the

site. They came up with a plan for that, how that would mitigate potential dose to future publics, and actually gained approval for that approach from the NRC.

But in their interactions with stakeholders, what they recognized was the value of being able to actually remove that material. It's just that the cost of shipping it halfway across the country when it had such radioactive content bordered on ludicrous, and certainly wasn't cost effective.

A number of those external stakeholders, NRC included, but particularly the state and the local municipality and so forth, worked with Big Rock to come up with an alternative, which was to dispose of that debris, again, extremely low activity, essentially in a landfill.

And what paved the way for was, rather than disposing of that material on site, and leaving it there permanently, albeit the dose consequence would have been small, the public concern issue would not.

They were able to take advantage of this alternative disposal process and arrive at a true Greenfield.

So there is a moral to the story, and I

think it's important that this organization in particular continue to remind the NRC that they are the keepers of the keys on that kind of an issue.

Doing that on a case-specific basis, as you know, makes it a very, very political process. I'm from Michigan. I worked at the Fermi II nuclear power plant for a number of years. And I'd just like to think that a lot of people up there have good common sense and that's why it was successful.

I can't say that about all states in the country, but I won't name names.

Maine Yankee, really the lesson learned there is that Maine Yankee discovered the United States Environmental Protection Agency. And that actually is where was born the jurisdictional issues between the NRC and the EPA that occupied the trade press for a considerable amount of time. A lot of missiles were fired back and forth between the two agencies. Fortunately no permanent damage was done, and it finally took Congress to help them work towards the memorandum of understanding, which we somewhat take for granted today, but believe me, as somebody who was very directly engaged in that, it wasn't easy.

What we don't have is a true test of jurisdictional lines and what constitutes adequate

protection of health and safety beyond that MOU, which is primarily just geared to information exchange.

But that really came to fruition at the Maine Yankee plant. That's very much it's claim to fame.

I should mention that under the corner in key EPRI interactions, I am not touching on those particulars, and I apologize. I think I better go back one just to clarify what those are. Sorry to have gotten so low for you.

We took each plant and tried to capture particular lessons learned from the specifics of that plant decommissioning, and then held a series of technical workshops.

And by the way NRC participated heavily in these workshops along with industry, so there was a lot of information exchanged back and forth.

And then also we were able to test out other technology, so that's what's denoted in the corner of each of these slides. So I apologize for not mentioning that at the outset.

The next plan I'd like to mention si the Trojan Nuclear Power Plant, which of course is now decommissioned. An interesting comment there is that the plant actually sits waiting for a repowering at a

future date. That is the intent. And it was interesting not too long ago when I was talking with people who should know something about it, I happened to mention, I said, oh, okay, talked about combined gas or coal plant or what are you thinking would be there, obviously I'm sure you've ruled out nuclear. And the surprised expression I got was kind of exciting for me, because they said, well, not necessarily. We'll just have to see how things stand when that time comes. So just an interesting thought. I wouldn't take that as an announcement of any kind, but just a case in point that there is no reason why decommissioned nuclear power plants can't be replaced by new nuclear power plants.

The Yankee Row (phonetic) plant, we certainly gained a lot of experience with groundwater at the Yankee Row plant, how to bound that, how to deal with uncertainties, how to factor that into decommissioning.

My understanding is that now I believe they are in the final status survey and verification process for license termination.

Connecticut Yankee intends to go Greenfield. A couple of things came out of Connecticut Yankee. This was another case of really

understanding stakeholder expectations in terms of endpoints that need to be achieved.

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

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

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

The key here is that for Connecticut Yankee, and because of that situation and some other

leakage that had occurred in a radway (phonetic) storage tank area, the real driver to decommissioning in Connecticut Yankee is the MCLs for groundwater.

So it's recognition that beyond license termination you still ultimately are going to fall under state and federal statutes, and fall under regulatory regimes that are derived out of the EPA where that real emphasis of achieving the MCLs becomes the ruling factor.

I think strontium-90 is actually one of the radionuclides at Connecticut Yankee.

So among other things it's given NRC and EPA an opportunity to exercise their memorandum of understanding.

Rancho Seco, Rancho Seco has several unique aspects to it. It's not engaged in a rapid decommissioning. It's engaged in a very deliberate decommissioning process over time. It's intent is to go to a Brownfield, not a Greenfield, for potential industrial reuse in the future.

But what probably is most intriguing is it is owned by SMUD, which is the Sacramento Municipal Utility District. And the district itself made a conscious decision that they weren't going to ship Class B, Class C or greater, obviously greater than

Class C waste, but Class B or C waste, all the way across the country to Barnwell.

So they actually are pursuing a process where all of that waste will be stored in site. So it's not intended that license termination is going to arrive any time real soon. But again that's kind of a unique factor, and what's important about it is that we all recognize the specter that even most of the operating plants may be in a similar circumstance as earlier as two years from now.

I mentioned that EPRI's program is international. It truly is. The U.S. industry, because of our lead experience gained with decommissioning has really become the global leader not only on having first of a kind experience which hopefully others will embellish on and improve our lessons learned, but also the fact that we already had a very robust R&D based program in place that could easily be expanded to other countries, and easily allow engagement by other companies in other countries to utilize that experience and then carry it forward.

It's obvious, the experience that we bring to bear is invaluable to them. But what is exciting about it is that with different approaches, different regulatory regimes, different cultures, they are

bringing to bear on common problems really different approaches that are associated with the way that they do things. And that might include waste disposal, it might include deconstruction, it might include the whole gamut.

So the key is, what we look at is that now we're engaged in the evolution of what I will call U.S. best practices into international best practices, and I personally find that very exciting.

EPRI conducts a number of international workshops. I had the opportunity to attend one of those, and found it very, very productive, very enlightening. So I commend that as the new thing in decommissioning.

The simple overview then of all of this is that EPRI continues its collaboration with plants who are decommissioning. Its focus is on reducing both the risks and the cost. And they really have a tremendous rich library of technical reports, software and so forth.

But now I need to make the comment, all of this material was really developed at considerable cost to the companies that participated in the process, and also by its own venue, EPRI isn't a nonprofit organization per se. It's not profit

driven, but it certainly needs to raise its funds to be able to continue its very robust research.

So these are in fact intellectual property. They are copyrighted products. They are available for public sale. You will find a single report is somewhat expensive. It can range anywhere from 25- to $100,000. But again that is reflective of the types of costs that go into putting these things together.

However what EPRI has done continually throughout, because we confronted this problem right in the very beginning is that they have held a number of technical workshops, which anyone can attend who cares to register and pay the registration fee, and also which has involved considerable participation by the Nuclear Regulatory Commission.

So there has in fact been a lot of information transfer. It's not like this is all molding away in a library somewhere.

Additionally EPRI and NEI are working very closely with NRC staff on the specific subject of capturing decommissioning lessons learned. We are working with Rafael Rodriguez.

And what EPRI is engaged in now is writing a fairly decent summary of lessons learned derived out

of these reports that at least would help people understand the types of information that's available in these reports, and where to find it.

Also, they are able to cross-reference somewhat to where it came from as an alternative means of gaining information.

But I will stress again that when it comes to the how-to level, the reports themselves are means of retaining this knowledge for this very, very extended time frame, until we get back into the decommissioning game again.

Okay. I want to touch briefly on some lessons learned. These have been many told tales, so I wouldn't expect a lot of burning bushes in this particular slide. But again, it's always good to reemphasize the obvious.

Probably the most obvious one, it kind of gets overlooked every time, is that moving from the process of operating an electricity generating machine to ultimately releasing a site, you go through several paradigm shifts that really require that you think quite differently about issues like workforce, organization, culture, safety issues. And that, we've seen over and over again that that isn't necessarily well understood at the outset.

Let me give you a simple example. A person who was a highly effective plant manager, highly effective at operating the plant safely, making sure that outages were conducted efficiently and safely, maximizing generating of electricity, in other words an outstanding production manager, isn't necessarily the best person for what is essentially a deconstruction project. That might call for quite different management skills.

And if you just reflect that thought process all the way through it leads you to understand how you need to plan this gradual transition into ultimately what is a waste disposal project. Because at the end of the day that's what decommissioning is, and when you are done with disposing of the waste then you are really done.

Of course you have to cap it off with one last challenging state of the art final status survey.

But that paradigm shift is the one that I hope we always capture on the front end of our lessons learned.

I'm only going to highlight a few others on here. Another front end issue I think often we overlook is the internal and external stakeholders, getting them engaged, getting expectations set and

understood, and getting endpoints agreed to up front.

A simple story: what about your plant employees? Do you really want them to all race out the door when they hear that you are going to be shutting down soon for decommissioning because they want to go to a plant that is going to operate at least through their remaining career? Or do you want to have some well conceived transition plan?

And given external stakeholders, at the end of the day the local community are the ones that are going to have to say that they are entirely satisfied with the end state that you've achieved. So you might as well get them involved up front rather than finding yourself in some debate down the road on what constitutes a safe standard.

The outcome of the property - you know, is it going to be a park, is it going to be another power generating station, or is it going to be another source of employment, is it going to impact employment in the area?

So there are a tremendous number of considerations that go on there, and sometimes I think all facilities have certainly involved stakeholders, but sometimes they've overlooked some key groups at the outset.

Figuring out which agencies really need to be involved, and what the real standards you need to meet, I've already touched on that.

The historical site review is an important one. What the lesson learned is, you better be doing that from the day you start the plant up. I'll say that again, it really should start - well I'll go0 back before that - it should start with plant construction. Because rom that time on, things are happening that you knew about when you did your ultimate decommissioning plan.

So one of the things that we've certainly captured, lessons learned, is that people have been going back now trying to do their historical site reviews while folks are still there to remember things. Five or 10 years from now 40 percent of those people will be gone. And of course a number of them already are gone that were there in the early days during startup.

But that's an issue that really is a lifecycle, lifetime of facility type of process. And again it really should start with construction. Where did we put that tight piping again? What did we do with that debris when we did backfill on the construction site? Very nice things to know when you

are trying to figure stuff out at decommissioning time, but since that was 40 or 50 years ago it's kind of hard to find people that are still around that can tell you about it.

I think we hit on some of the issues. Many times on site characterization and groundwater modeling, for soil and groundwater remediation, that is certainly an area where NRC recognizes as well, we need to give a lot more thought to criteria and approaches, the right thing to do. And we also need to understand again the stakeholder input that is necessary, because again the license termination criteria may not necessarily be the correct endpoint.

Thinking about groundwater for example as a resource that you're going to make unrestricted release of the property might cause you to make different decisions than if it's purely a dose-based type of approach.

The final site survey I want to touch on just to mention that it's important that it be extremely well coordinated with NRC, and with the ORISE as the organization that primarily does the verification surveys.

There have been emergent issues more recently of some lack of coordination and the impact

that it has is that any delays in verifying the final status survey can be really really highly impacting if the people who performed the final status survey left. If you are sitting around for months it's kind of hard to rationalize telling people to go sit in the trailer until ORISE is done.

It used to be, at least from the last time I was involved in this issue, that that was somewhat of a parallel activity. You survey it, I survey it, you survey it. My understanding is it has evolved somewhat to being more sequential. If that is the case, that is something that needs to be corrected.

And then finally on low-level waste management options, I'll just mention that we went into that issue in great detail in a workshop held by ACNW earlier this year, a very outstanding workshop, and the whole issue here is we need to continue to work for flexibility and options.

It won't bode well for ultimate decommissioning of a large number of plants if it's expected that everything is going to go to our standard Part 61 land waste disposal site.

Okay, now we're where I really wanted to be, which is to talk about new plants. And that is what's really been exciting is that in looking at

decommissioning we're learning a lot about doing things better, all the way from our design and construction through our operation.

So I'm going to touch on several issues, refer to my notes on this.

What I'll mention again is we're actually working on a very detailed report, and it's in progress, and expect that we'll probably have a workshop on that at some future time.

But in the meantime there will be a series of meetings that kick off on November 21st with NRC staff to talk about regulatory guidance and standard review plan for 10 CFR 20.1406 which is the regulatory requirement for all applications submitted after 1997 to reflect this kind of experience, specifically to facilitate decommissioning and to minimize radioactive waste generation.

So we already have the obligation. What we've got now is a body of knowledge to apply to that obligation. And that's the report that is in progress, and actually the notes I'm referring to are taken from our draft outline for that report.

But I do want to just highlight a few issues quickly, but I need to do a time check. I neglected to look closely at the schedule. What are

we working to?

MEMBER CLARKE: Ralph, you're fine. You're scheduled to 9:30.

DR. ANDERSEN: Okay, very good. So I'll roll this up enough so that we've got ample time for questions.

You know first and foremost, and that's why I say historic -

MEMBER CLARKE: It's been our practice, and I neglected to say so in the introduction, it's been our practice in working group meetings with invited panels to hold the questions until the end of the sessions.

DR. ANDERSEN: Oh, very good, so that's our panel session at the end? Okay, thank you, I appreciate that Jim.

In that case I will take a little time with this, and I appreciate the opportunity to do so.

Looking at design and construction it's issues like taking detailed photos and videos during construction at different stages to have things to refer back to. It's nice to know how things were put together when you go to take them apart again. We all learned that as children when we played with our Tinker Toys and our erector sets. We've kind of

forgot it a little bit in large structure construction.

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

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

Any of the temporary underground systems

that were used during construction, I will say that my general recollection having been through some of the construction projects, they're usually abandoned in place, covered up. So that's troublesome when you're decommissioning when you discover a pipe, and you have no idea what it's for or what it came from. You spend an awful lot of time figuring out that it really isn't important.

But removing all of that important instruction, also it's a helpful tip.

And then additionally, and this is the issue that we really learned big time with the recent issue with groundwater. The time to update your geohydrological evaluation and characterization is really when you completed your construction. I mean you've taken an environment that you characterize for the purpose of siting and licensing, you changed it around, we talked about that, that's really the time when you put in place your baseline geohydrology characterization. And then work from that over time, keep it current, not to try and go back and do it 20 years later, which is where most of us are right now.

So those are some of the types of items that came out of the considerations for the architect engineer and for the construction stage.

Now I'll briefly go through some of the actual design considerations for the NSSS suppliers. And this of course is an issue that they're grappling with now with their design certification process.

In regard to sumps, obviously you want to have a controlled collection of sump overflow and you want to route it places that you can deal with easily. If it's expected it's going to be contaminated, you're really want to route it to what's going to be ultimately a monitored discharged path.

Alternatively, if you expect it not to be, you don't want it routed in ways where it can become contaminated.

Welding all the subpipe penetrations, other types of fixtures have been used and they haven't done well. And certainly requiring a liner for all sumps. You know the technologies are there now especially with certain types of poly materials, to really enable that in a way that can change a sump from a major decommissioning issue to a somewhat straightforward decommissioning issue.

Structures and outside areas, simple things like berms and moats for all outside doors. Guess what happens sometimes when big systems leak lots of water? Sometimes it actually goes out the

door.

It would kind of be nice to capture that instead of just having it disappear into the ground.

Additionally a big need that we see, and I think this is an area that is very fertile, and I think we have a lot to learn from our Canadian colleagues, is to structure your site with - they're using - their term of art - it's establishing a grid system to create zones of influence. But it's essentially designing your site so that groundwater flow is directed the way you want it to go.

For instance, preferentially running away from structures toward structures, and again, what we're looking into with the Canadians now is exactly how they've been applying some of these concepts. They deal with tritium on a much larger scale than we do, and they've gained a lot of interesting experience about it. They tell me that it's really done on a building by building basis. Additionally they build in capabilities for ready and easy monitoring at the outset.

It makes sense to me. To be honest I'm not sure I fully appreciate how challenging it might be, but that's certainly an area we want to investigate a lot more.

Additionally we see the need to make sure that all of our structures that we would expect to have a potential for contamination are either lined or coated, lining being preferable. Again it's strange to think of a building having all of these poly walls until you think about it for a minute and you go, boy, I'd love to work in one of those.

It took us awhile to learn about coatings. We generally use them quite well across our industry now, but I do remember once upon a time that the average plant was bare concrete, and we dealt with the problems associated with that.

Concrete characterization in itself in terms of depth of contamination, and particularly with issues like tritium, makes contamination - or excuse me, decommissioning, much more complex than it needs to be.

So we think we ought to go to massive overkill with liners and coatings throughout structures.

A particular area of interest, and one that's under a lot of review right now to figure out how we can deal with it properly are seismic gaps within the buildings between structures.

Looking again at potentially useful

advanced poly or metallic seals for those applications. And certainly we want to create better access for inspection and maintenance. But in decommissioning that is always learned as an issue.

One of my favorites, this is one of those commonsense people participating in this effort, you need to think hard about snow removal. Snow removal actually has turned out to be a common mechanism for redistributing contamination on the site.

The primary reason for that is because, guess what, we legally and intentionally discharge gaseous radioactive effluents from the site, and they don't just magically vanish when they come out the end of the stack.

Particularly in snow situations, they become captured in the snow and basically deposited, and you come along and you relocate the snow hither and yon, the snow melts, and what happened to that contamination?

Although it was legally discharged from the plant, although it had potential impacts at very low doses, the fact is that if you just keep continually redistributing the contamination around on the site and again create problems for yourself at the point of decommissioning.

So the key is, that what we look at is probably much more extensive paving needs to be done in those areas that you truly believe that you are going to need to keep clear under snow conditions.

So like with the interior of the plant where you are thinking about really excessive lining and coating, outside this paving issue really comes into play the more you think about it, and the types of surfaces that you would use, and the way you would maintain those.

But again, it's something that could have a very useful impact, positive impact, on the decommissioning.

The spent fuel pool and transfer canal, spent fuel pool of course is one of the primary issues associated with groundwater contamination from undetected leakage in the past. There is a very good I&E notice on that subject.

But the key here is, beside some of the obvious welded seams, clearly you want to look more at a single continuous pour for the spent fuel pool and the fuel transfer canal, and also we really need to improve our technologies for leak detection, especially the ability to flush and hydrotest and inspect those.

And then finally making sure that in terms of liners that are used is to make sure that they are set up to be tested easily and frequently, to make sure that we understand what we're dealing with.

The piping, some key points that have been identified through there is, if you are going to have piping between buildings and underground why not think about tunnels, tunnels that people can walk in. If there are good reasons not to have the piping up on the surface, then for this very very large amount of money that is going to be spent to construct this facility it incrementally not looking at that significant changes in cost to consider issues of tunnels between buildings.

It's nice to be able to see things. It's the easiest way to identify leakage.

In essence you really try to prevent altogether buried or trenched piping. That would be the ideal you want to pursue. You also want to do away with underground conduit. I had our own experience at Fermi I'll recount briefly. We actually 365 days apart twice ruptured our condensate storage tank. It was within two hours of each other. We tended to think at the time maybe it was an intentional celebration of the previous event.

But most of the water - we had put in a rubber ladder to capture everything. It worked very well, but some of the water nevertheless did get away, and it all vanished into our underground conduit system. And we spent months working on recovery to get as much of that water out as we could.

But it certainly remains an issue that will need to be dealt with at recommissioning.

So those are something else that it would be nice to prevent altogether.

Cathodic protection of course is well known and is used, should be used more extensively. And then some obvious things like looking at pipes that are used and determining interior lining for pipes that would make them much easier to clean. That could be one of the answers to the well understood issue of embedded piping. The issue is well understood; the solution is not.

They are a tremendous challenge during decommissioning to deal with piping that we've embedded in concrete. So finding solutions to that is important, but one that is being looked at are these interior poly type linings that are reasonably impermeable.

As far as tanks go, shoot anyone who

designs underground tanks. That's a good start. But follow that up with folks that envision flat bottom large storage tanks, and send them down the road as well.

We've had some pretty significant experience. I remember years ago working at a plant on the Eastern seaboard, had a very, very large outside storage tank with a flat bottom where the material had essentially caked up and finally left us with the only real way of getting it out there was sending people in and shoveling it out. This predated robotics. That dates me a little bit.

But the point being that flat bottom tanks just aren't a good idea in the first place if you are going to be dealing with radioactive liquids.

And then overflows should certainly be hard-piped back to that location in which you intend to disposition that water, either recirculated back to where it came from or routed to an area where you can discharge it in a reasonable way.

Then I touch on the issue of site water management. Things to consider there is the storm drain system. You should minimize the number of storm drains, really be a lot more thoughtful about site design. You know now, sort of the other way around,

design the site and then figure out where all the storm drains go. It should be more of an interactive process.

It wouldn't hurt to have effluent smart people involved in that process. Those are great collectors for runoff that again is contaminated with legal discharges from plants, but redeposited it becomes an issue for decommissioning.

Having a composite sampler for all storm drains, and then isolating the potentially contaminated systems from storm drain systems that, you know, again, it's a thought process. If this system leaks, if this tank for some reason leaks, where is it going to go? I'd like it not to go to the storm drains.

So this kind of thought process in advance offers a lot of opportunity.

The other simple thing, and this is something that emerged in some of the recommendations in the lessons learned report is the use of onsite water.

There are a number of plants who by design discharge into a lake or a cooling source that is located on the site, then through a weir or some other process that water eventually is discharged off into

the open environment, and again, carefully controlled, carefully monitored, with a small fraction of the Appendix I criteria.

But the point is that plants are also designed in many cases to reuse that water in a number of applications. And as we figured out recently, what you need to be thinking about is, although you may legally have put radioactivity o8ut into those sources, you are still going to have to deal with the issue that if you pull it back in and circulate it in some fashion, that you need to know what you are doing with it.

One way to know is to simply analyze those things in the license and make sure they're called out.

Another way to know is to recirculate it back to where it came from. I will say that we've got an issue with staff over whether this represents unlicensed material after discharge somehow becoming relicensed by virtue of the fact that it's been recaptured.

But just as a practical matter for decommissioning, it requires some thought and design.

And then finally, discharge lines, probably two good lessons there. Design them so that

you can inspect them. And most importantly don't run a discharge line across someone else's property. That's something that in hindsight strikes us all as obvious now, but at the time it seemed like a good idea.

So thank you all very much. And I appreciate this, I look forward to our panel discussion later then for your questions.

MEMBER CLARKE: Thank you, Ralph.

Our next speaker is Jeff Lux. Jeff is project manager for Tronox, Incorporated. And he is the project manager on an NRC complex decommissioning sites.

Recently the project manager of the Cushing, Oklahoma refinery site, when its NRC license was terminated earlier this year.

Jeff is also representing the fuel cycle facilities forum. Jeff thank you.

MR. LUX: Thank you very much.

I do appreciate the opportunity to present. I'm actually presenting on behalf of Dave Culberson who is the chairman of the Fuel Cycle Facilities Forum who is not able to be here due to extenuating circumstances.

The topics I'd like to present today will

first of all introduce the Fuel Cycle Facilities Forum to those who aren't already familiar with it.

I'd like to recognize a few of the successes that have already been or are being achieved by NRC, and improving the regulatory process as it pertains to decommissioning fuel cycle facilities.

I'll also identify those aspects of decommissioning that represent the major cost components of decommissioning fuel cycle facilities, and then I'm going to try to present lessons learned by environmental design and construction and technical issues.

The Fuel Cycle Facilities Forum is a voluntary industry organization that was established in 1987. It represents both source and special nuclear material licensees, including fuel processors and specialty metal refiners.

We focus on decommissioning issues. We meet to discuss primarily complex sites which require special NRC consideration. And our membership represents most of the licensees that are responsible for those sites.

The Forum provides the vehicle for licensees to address both technical and regulatory decommissioning issues. And in the past the forum has

provided feedback and recommendations to NRC staff regarding decommissioning experience, as well as lessons learned at fuel cycle facilities.

The Fuel Cycle Facilities Forum is developing a philosophy that the term, decommissioning, should really be applied as an end of plant life process, and NRC should recognize a source term removal concept, or an interim remediation concept to be applied to remedial activities that are performed during a plant's operating years, and we'll explain a little more about why later on.

Successes that have already been achieved, or are being achieved by the Nuclear Regulatory Commission, related to decommissioning, that are already being incorporated into the consolidated decommissioning guidance, which is published as NUREG-1757, include the use of intentional mixing under certain conditions; the use of reasonable exposure scenarios; and the layering of institutional controls to achieve a level of confidence or a level of durability not formerly considered sufficient through those types of vehicles.

In addition the NRC has established the integrated decommissioning improvement program which continues to identify issues of interest and provide

guidance to staff and licenses.

Management from the decommissioning directorate has met with the Fuel Cycle Facilities Forum on a consistent basis to discuss technical and regulatory issues that are being encountered during decommissioning. And they've participated in the development of resolutions to several of those issues.

Those aspects of site decommissioning which represent the most significant cost impacts include the following. First, the transportation and disposal of contaminated material. This is usually the single most costly component of decommissioning.

NRC and states really need to cooperate in the siting and licensing of additional disposal facilities to promote both availability and competition. I'll translate that, cost competitive.

Next in process identification and subsequent removal of unanticipated material. That would be identified as material not identified during characterization that was created through the migration of licensed material through preferential pathways. This is far more common that was anticipated, and the excavation, shipping and disposal of this material represents significant unanticipated costs to licensees.

Another significant cost component is the decontamination and/or removal of inaccessible components. It's often necessary to dismantle or demolish clean materials under license controls just to be able to access contaminated or potentially contaminated material.

This is done at significant expense while possibly finding no material at all that requires decommissioning.

Next, site characterization and final status surveys can represent substantial costs if there is inadequate information concerning the historic disposal of license material once considered clear.

Finally, the implementation of health physics programs covering decommissioning activities may cost more than the decommissioning activity itself. Licensees should be able to categorize decommissioning activities based on the potential for exposure, and modify health physics monitoring as appropriate.

Environmental impacts can expand the scope of decommissioning significantly. Aspects of licensing or operation that may affect the scope of decommissioning include, Ralph mentioned the effluents

that may concentrate downwind, downstream, or downhill through repeated discharges, all of which may have been far below the limits, but due to various reactions or physical phenomena can concentrate downstream.

Several licensees, fuel cycle licensees, have had to excavate and ship sediment containing elevated concentrations of licensed material that had accumulated downstream from effluent release points, even though their effluents all have been far below effluent limits.

Environmental monitoring programs could identify such concentrations in advance of decommissioning so that licensees can modify their effluent controls program and prevent that.

Derive concentration goal levels, or DCGLs, are often derived with limited consideration of intermediate impacts. I'm aware of a number of licensees that have gone to great extents to derive as generous a DCGL as possible for soil only to find that a few years down the road that the clean soils they did not have to excavate are now causing groundwater contamination above the groundwater DCGL.

This is definitely not cost effective, because it's usually far more expensive to remediate

groundwater than to excavate source material.

Penetration of contaminated liquids into porous media can increase the volume of material exceeding DCGLs, and that impacted media is often more difficult or expensive to remove than the liquid source material that initially caused the impact.

Finally, fuel cycle licensees often note that the soil at their sites was contaminated beneath every penetration, conduit, piping, drains, that penetrated their concrete slabs.

This can result not only in an increased volume of contaminated soil, but in contamination of groundwater beneath the site.

The design and construction of facilities can have a significant impact on future decommissioning. I feel like I'm just going to be repeating a number of the comments that have already been made here. But fuel cycle licensees have learned that the following considerations can yield significant savings if provided for during design and construction.

First, embedded piping should be minimized. When impractical to avoid embedded piping, some provision for future access or at least survey should be made if at all possible to enable access for

survey decontamination or removal.

Corroded materials have proven very difficult to survey and are also susceptible to leaching. The use of higher grades of steel or plastic, whenever possible, to minimize the impact of corrosion, would be a tremendous benefit when it comes time to decommission.

Provision of secondary containment for any process equipment containing liquids could minimize the potential for leaks to penetrate building materials or migrate into soil would be a great benefit.

This concept of secondary containment could apply to underground piping as well as to above ground or implant piping in containers.

Also avoid floor penetrations in wet areas as much as possible. When penetrations are required, there should be provision for removable seals and preventive maintenance programs to minimize the potential for the migration of license material into underlying soil or groundwater.

Additional design and construction issues include the application of scrubbable, impermeable coatings to surfaces in wet process areas, or the incorporation of permeability reducing materials into

concrete to reduce the potential for liquids to penetrate building materials.

Minimize the physical extent of wet processing as much as is reasonable. Liquids are so mobile that it is advisable to convert to dry processes as quickly as possible.

And finally the cost of waste packaging and transportation can exceed the cost of disposal for low level rad waste.

Licensees should consider the construction of a rail line to the site. Even of a rail line is marginally justifiable, based on facility operating cost, it may prove to be well worth the investment during decommissioning.

Second category of issues affecting decommissioning are regulatory issues. Variability in the implementation of regulations related to decommissioning tends to cause delays as licensees strive to understand how regulations are going to be implemented by their licensing agency.

Inconsistency between NRC regions and states stems from differing degrees of emphasis on risk, cost, and degree if strictness in interpretation of regulations.

For example some agencies take the

position, you license does not address NORM, neither will we. And other agencies take the position NORM contributes to total residual dose, so you need to address NORM in order to address your residual dose.

When multiple agencies share jurisdiction over different aspects of decommissioning, lack of coordination between agencies can cause delays and commensurate cost increases.

NRC could proactively engage other agencies to expedite the approvals needed for decommissioning.

Most licensees have experience that indicates that a state agency and NRC tend to follow their separate path, and licensees struggle to gain consensus between regulatory agencies.

10 CFR 70.38 addresses the decommissioning of buildings or areas that are not used for licensed activities anymore. Some agencies have required licensees to decommission such areas to unrestricted release criteria, creating an island of purity in the middle of radiologically restricted areas. This is not a reasonably risk-informed policy.

Decommissioning directorate staff have proposed the use of alternative schedule provisions than 70.38 to enable licensees to perform source

control in the near future, and leave decommissioning for unrestricted release to some point in the future, but this is not consistently applied.

Fuel Cycle Facility Forum believes that as part of the IDIP NRC should generate position papers that explain the intent of regulations and provide assistance to regulatory agencies in achieving consistent implementation.

The multiagency radiation site survey and investigation manual provides for the subdivision of licensee owned property into categories based on their potential for contamination.

For instance unimpacted areas have essentially no impact from licensed materials. A problem for licensees who own long operated sites is the lack of information from former disposal sites or burial facilities, permissible under former regulations but no longer acceptable under either release criteria or current regulatory requirements.

Many of these burial areas which were not well documented contain material that now exceeds DCGLs. Licensees should minimize the footprint of any storage and disposal facilities, and thoroughly measure and document all disposition of material.

This will minimize the uncertainty related

to categorizing areas for decommissioning.

Alternately, licensees should make it clear in the license application which portions of the property they own will be subject to license conditions and restrict the placement of material outside of those areas to material which has been released for unrestricted use.

NRC has begun performing in process surveys and inspections during decommissioning. These surveys and inspections provide NRC assurance that licensees survey methodology, instrumentation, analyses, data evaluation and quality program all meet the requirements for decommissioning and potentially for final status survey.

This reduces the need for and the scope of extensive and expensive post decommissioning confirmatory surveys. This streamlines the decommissioning process and reduces the time between completion of decommissioning and license termination.

One example would be the elimination of confirmatory surveys for each and every excavation would allow backfill sooner, eliminating both a safety hazard and a potential environmental impact due to creating a bathtub that can form a driving force for groundwater.

The last category of issues are technical issues. For new licenses, control of the spread of license material, and surveys documenting the extent of migration of licensed material can provide a basis for modifying health physics monitoring during decommissioning based on the potential for exposure to licensed material.

This can save significant cost and time when decommissioning.

Unnecessarily rigorous health physics procedures are often implemented today in areas because our current philosophy is, we may find something here, so we must be fully protected just in case.

Characterization data that meets the data quality requirements for final status surveys can be used for final status surveys if licensees ensure that areas in which characterization data will be used for final status survey isn't disturbed during the decommissioning process. This reduces the time and cost for final status surveys.

Significant costs are incurred when licensees have to go through file boxes or file cabinets full of survey documentation and input that data long after the records had been created.

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 these may be the most critical presented in this presentation.

NRC needs to allow licensees maximum flexibility to decommission under their operating license and safety programs. This enables licensees to utilize their people cost effectively, and to benefit from the experience of their staff rather than rely on a separate contractor new to the site and new to the license requirements to perform their decommissioning.

Schedule, cost and quality can all benefit.

Agencies typically require a substantial amount of characterization data prior to the development of DCGLs. The information that is required for licensing provides sufficient data for the development of DCGLs during the licensing process, rather than waiting until initiating decommissioning.

These DCGLs may need to be preliminary DCGLs to enable modification over time.

Knowing their approved DCGLs during operating years would enable licensees to plan their operations more effectively, and to plan for decommissioning long in advance of performing it.

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 lot of good project management skills that have to be used in really making the project be able to be completed, and that's really I think probably the secret, if we take anything away from decommissioning and lessons learned, that is one of the key things to take away from it all.

And a lot of what I'm going to present here are things that Jeff and Ralph have already touched on as kind of what I think are the trend in the industry of what the key lessons are from the decommissioning area.

So we'll take a look at an historical perspective of some of the Department of Energy's activities. We'll look at cost issues, environmental issues, design and construction issues, and other improvements that we can make.

Many of the Department of Energy sites or facilities are in closure. These include sites that were formerly used in the defense program activities, things like the Rocky Flats sites, the Fernald site, the Mound site.

It also includes a number of other sites that have a limited number of closure activities, or decommissioning projects underway at those sites. And

these are sites like our site, the Oak Ridge National Lab site, Brookhaven National Lab site, other sites and facilities which are still active and have ongoing research programs, but do have a limited number of facilities that need to be decommissioned.

Some of those will be demolished in the end and turned into Greenfield or made available for other development or other research programs or infrastructure programs at those sites, and others will be - will have the decommissioning process completed, and then the facilities will be available for reuse in some way, shape or form, possibly just as new laboratory space, possibly a space that will then be modified in some way, shape or form to be converted into new research space, or whatever other needs are present.

Some facilities also are privately owned, but have been contaminated with government radioactivity. These are sites like the Battel (phonetic), Columbus laboratory site; sites like General Atomics down in La Jolla, California; and those different sites, as part of the contract closure of the Department of Energy's activities at those sites, requires that decommissioning occur at those sites.

So it's really a combination of different sorts of decommissioning activities underway at DOE sites.

Many of these facilities are one of a kind facilities, that were designed and operated and have their own unique history, their own unique set of problems, each one being a new egg to crack so to speak unto itself. And that applies to both the defense facilities and to a lot of the research facilities as well.

Many of these facilities, especially the defense facilities, were quickly constructed and operated and brought on line with really not a whole lot of concern, and rightfully so in a lot of ways, about closure. That would come later, and we would deal with that as it comes along.

So really there was no design with any decommissioning or site closure in mind at many of these facilities.

Record keeping issues, as several of the speakers have talked about already, things like asphalt records, documentation of construction activities as construction was occurring, different operating history of these sites.

There's a few cases where you will find

some good records in those areas, but in many cases you won't. It just doesn't exist, wasn't retained, or for whatever reason it's just not there.

Many of the facilities that are in the decommissioning program and at our site as well, did not really go through any sort of formal or detailed planning for deactivation of those sites. So what we have inherited at these sites and at these facilities are a number of conditions that under really optimal planning and analysis we really shouldn't have inherited. Things like operational waste that are left behind, or other issues that really should have been handled as a part of the deactivation or the safe shutdown of these facilities that really just didn't happen because the programs weren't in place.

Starting in the mid to late 1990s a lot of that emphasis was placed on those kinds of activities, sites like the Fernald site, sites like Rocky Flats, some of these other sites, did go through the deactivation process. And that has really helped I think a lot in eliminating a lot of those problems that we inherited in some of these various facilities that we decommissioned.

There also was a lot of poor past communication and past operational limitations on

openness with what was going on at the site, a different kind of dialogue with the public, as a part of dialoguing with the public and keeping the public informed. It just did not happen as well as it in some cases needed to, or in other cases, as it could have.

The labor forces that are being used to do the different decommissioning activities, also in many cases it's really a mixed bag of things. We have some sites that are using in house forces, in many cases, this is laboratory staff or other support staff are available to do this work. In other cases there's project specific contractors that are used. These are dedicated contractors that are brought on for a specific project or a specific activity, and in other cases contractors are brought on board where they are really an integrating contractor; they are doing a minimal amount of the work themselves at a site, and are subcontracting as a part of their work scope a large portion of the work to be done at that site.

And what I've done in the next several slides here is include a few photos of some of the different kinds of facilities. The photo on the left is a photo of a fuel fabrication facility. The photo on the right in this slide, it's a picture of the

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.

The next slide shows a little bit different situation. This was at the Argonne site. The photo on the left shows one of the old support facilities that was adjacent to the CP-5 research reactor, and in this case, the area was cleaned out. There was really a minimal amount of contamination if anything in that facility.

And what we did here is, we modified that structure and turned it over to the onsite grounds and facility maintenance staff who made use of it in their operation.

And the photo on the right shows, the upper photo shows a Glovebox Laboratory before decommissioning activities were commenced at that facility, and the photo in the lower right shows that same area after the area has been cleared out.

Just to give you a little flavor for what some of the different facilities look like. And we'll touch a little bit more on Rocky Flats and some of the other sites a little bit later here.

Moving on to the cost issues, the major cost elements in decommissioning at our site, and a lot of the DOE sites as well, is really two major cost elements: the cost to manage the waste that is

generated in doing the work, decommissioning work that's occurring at those sites; and the labor that is actually involved in performing that work, the hands-on workers out there doing the size reduction, the decon, the packaging of the waste, and the preparation of moving that material off site.

One thing I don't think we've done as good a job at, I know at our site, is doing as much cost benefit analysis and really forward planning really as much as we should on how we're going to deal with the large volumes of waste that some of the projects that we have undertaken, we just really haven't done as good of a job in forward looking and forward planning for that work.

It takes an awful lot of cost benefit analysis and careful consideration of what the best path forward is. And an awful lot of the effort that goes into that, once you've even made the decision as to how you are going to do that, is managing the interfaces that are associated with keeping those paths open and keeping that material moving, because once you start going down that path, you don't want to have any kind of obstacle or problems come up that are going to create difficulties, and kind of cause the system to start backing up in and of itself, and on

itself.

So the management of those interfaces is very important. And as I think Jeff and Ralph have already touched on as well, not to be forgotten is the fact that site characterization and things like the storage site assessment activities that you can undertake early on and really understand what the scope of the problem is, at the same time, not wading into it to a point where you're doing it for academic reasons or just for general interest reasons, but to really understand what the magnitude of the problems are, and what the history of the site is, is also very important, and is really money well spent, and yet something you have to be aware of and have to track it.

Clearance, materials, is an issue that if we could come up with a way that would streamline clearance for large volumes of material, or even smaller volumes of material, would not require that we have to then pursue management of those same materials as waste, and costs that are associated with those activities.

One of the things that I know the commercial nuclear industry has done a lot of is this intact large component removal, and that's been

something that recently has been undertaken at a number of Department fo Energy sites. This includes removal of some of the large Glovebox and other equipment items from the Rocky Flat site, as well as a number of those that we have also done in research reactor projects, where large heat exchangers were able to be removed intact as opposed to taking the time, the dose, and all the effort that goes with size reducing those components.

So we've done an awful lot, I think we've made some strides forward in that area as far as minimizing costs to the extent we can.

Finding ways to optimize the decommissioning process, again through these optioneering studies, cost-benefit analyses, things like that, the value engineering studies that can be done and help look at ways of eliminating problem areas in the past.

The last item on this slide is the item of industrial safety, and this is one that really as much as we think we've addressed it, we always seem to keep finding it coming up again and again. And these I think really go back to the operational records, the as built records, and things like that, the as built drawings.

We just don't have as good a set of documentation of that, or as complete a record of that, as we really could use. So things like electrical safety issues, a lot of different activities that are going on, rip out activities that are occurring such as lifting, rigging, moving heavy loads, things like that, all can have major impacts on the project, if something happens or some incident occurs, there is an opportunity then for a delay, and lots of staff that are sitting around and trying to find work around plants to keep them busy as well as how to handle the problem.

So industrial safety issues are a major issue, and really need close monitoring, and trying to control them to the greatest extent you can.

Technologies, really there is nothing here that is really like I mentioned earlier that is really rocket science. The technologies to do decommissioning work with are out there, they are commercially available. Go down to your local McMaster Carr supplier and pick up what you need to do to do a job. Not a major cost issue.

One thing that can be a major cost issue if you don't have agreement right up front from the start of the project is what the final endstate is

going to be, and having buy-ins from everyone as to what that is going to be, as opposed to let's say we start off doing a project, and we think we are going to clean up the facility, or we have some application up to a certain level, we're going to have to perform cleanup, and then we have a change in that cleanup level that we're going to work to. Then we have to go back and see where we now need to go back and address still cleaning up more additional residual contamination or materials from different areas. And it really can become very costly and very - a very involved process. So we try to really avoid that at any cost.

This next slide is just a little pie chart that shows one of the research reactors we did at the site, the JANUS reactor. And the point I'll make here is that a lot of the Department of Energy sites, and I know our site at least, the percentage of the waste, and you see the one bloc here, the eight percent bloc on the slide, the pink color, this is the budget breakout for this particular project. We ended up spending only eight percent of our budget really for waste disposal.

Now the one thing that kind of skews that data a little bit is the fact that we have access to

the Hanford site and other Department of Energy sites which have much lower disposal rates than a lot of the commercial sites do have, and the NRC licensed sites, would be shipping their wastes to. So that number is a little bit lower, an artificially low number, I'll call it, really, compared to the commercial nuclear power decommissioning industry might have. But still it gives you a little feel for how in some ways the waste disposal issue for some kinds of projects, and this is a smaller project, this isn't really a larger project, several millions of dollars in costs in this particular case, but in this case, the waste disposal cost was not as bad as it might have been.

Forty one percent of the overall cost for the project, though, went to the actual labor to do the dismantling. So we had roughly 50 percent of the costs that went into the actual disposal, packaging and transport and disposal of the waste, and about 40 percent went into the labor. So a total of about 50 percent went into the labor cost and the waste disposal costs.

Okay, really moving on to the next issue, environmental issues, really the environmental issues on our site, and again what I put on this slide, really, a lot of this comes from our site and our

experience, is highly site specific and site dependent concerns.

If you are working at a site like ours where we have I'll call it a little bit more maybe streamlined environmental process that some other sites may have, maybe a whole lot easier issue for our site as opposed to another site that might be undergoing closure.

NEPA environmental documents, to comply with the NEPA requirements, are prepared for each of the decommissioning projects and activities, typically in the form of an EA, and Environmental Assessment document.

The guideline there I guess I can give you is a careful consideration needs to be given to the lead times for everyone to do their reviews; get the necessary approvals on those sorts of documents, in order to keep things on track.

And generally speaking it's been in our case really where we go through a process of evaluating and documenting what the issues are, and how we are going to address those or mitigate those.

Okay, waste management issues, we've actually already touched on a fair number of these, and kind of reemphasize some of these, though, because

the waste management issue is really a critical one for a lot of these kinds of projects. And the easier and quicker that you can get the material that you have on your site processed, have it packaged or prepared to be shipped and moved off site, the better.

Some of the larger waste generators, sites that have larger volumes of material they're generating, have gone out and negotiated and have worked out some commercial disposal site arrangements to dispose of those materials, and it has proved to be kind of a lesson learned there I guess for larger waste volume generators at these kinds of sites.

Easier and more cost effective actions have been taken at a lot of the project sites, which is simply to not spend a whole lot of time and effort going into doing decontamination or different materials, but to simply package the material into a waste package and send it off site.

It comes down to a dollars and cents kind of decision needs to be made. It's difficult to justify implementing any sort of a large scale decontamination process or decontamination activity.

Many of the sites have also undertaken the development of onsite disposal cells, which will kind of optimize and quicken the pace of the processing of

materials, to get material out of the facility and into a disposal cell to move on to the next activity.

Another one that we probably have heard in the past, or all have dealt with, is use of previous unregulated materials in a currently regulated space, from where they were originally installed, and how they were originally considered, things like asbestos, PCBs, other heavy metal materials that are now - have been used in these different operations and now have to be handled as waste products and waste streams.

Management of mixed waste on some projects can be an issue. It hasn't - isn't so much of a problem as it had been in the past maybe.

Disposal of low levels of radioactively contaminated soils, we're sending an awful lot of material out from one part of the country and putting it into another part of the country in a disposal cell wherever it may be disposed of at, and it seems like there should be some way - I think the industry as a whole would like to see some way - maybe we deal with some of those types of waste streams in the future maybe a little bit differently, looking at things like disposing of some of those materials in different RCRA landfills, and maybe some of those sites.

The last item on this slide, meet the

Waste Acceptance Criteria for the disposal site. Don't make the process any more complicated than it needs to be to try to keep it simple as long as we can and wherever you can.

And this next slide is one that's from an EM slide that the office of EM and DOE really came up with. But really what it's really intending to show here is that really it depends on where your particular facility and your particular site is located at and this whole waste management issue.

You may have yourself or your site like at a site like ours is in the Midwest where we have to transport that material from that location to either Hanford for disposal or to other sites across the complex, maybe a Nevada test site, and it really has a major impact on the whole project flow, and the whole process of how to plan and optimize and implement the decommissioning process.

Again some photos here of just different decommissioning activities. This was at the CP-5 research reactor, it shows a Brokk piece of equipment in here removing some material in the foundation of the CP-5 pedestal.

And then the next slide is some demolition debris. This I believe is at Frenald showing staged

rubble that's come from some of the building; demolition activities as it's being readied to be sent to the on site disposal cell.

And this is kind of a different sort of a waste package here than you might have seen. This is some waste boxes coming out of one of the facilities at our site that have been packaged and are being shipped off site to Hanford for disposal.

Again, a little bit of a difference there, if you look back at that first one. It shows a little bit how easy it is, depending on what kind of a disposal option you are pursuing, if you have this kind of material, placing it into an on site cell, or if you have this kind of box material where material has been placed into the waste boxes and then shipped cross country to the disposal site, as I showed the map earlier.

This is the dedicated site at the DOE Hanford site, the environmental restoration disposal facility. This is where all of the debris generated at the Hanford site and the cleanup activities there will be disposed of in this cell. This is actually I think an earlier photo of the cell. The cell is actually expandable, can be expanded to accommodate all the waste they'll have at that site.

I think this is an early version of that site.

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

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

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

So really they went out, and like we

already mentioned, took a lot of off the shelf things, borrowed a number of different simple techniques or enhanced already existing techniques, and optimized the performance of those techniques, just in a small way or a small margin just to increase their efficiency.

They also in the way this contract was structured tried to avoid micromanaging the contractor; told the contractor what they needed to have done, not how to do it, but just what they wanted done, and when they wanted it done by, and that seemed to be very effective and very efficient in how they approached that.

They also held the contractor accountable for compliance with the environment safety and health requirements, as well as other quality impacting requirements, and other requirements that DOE had put in place in the contract, but yet they properly incentivized the contractor to do the job they were being paid to do.

Also there was on the other side of the coin there was concern with the way this contract had been structured, was it proper for us to really be incentivizing the contractor to the extent we really were, and is that really the best way to be doing what

we're doing? Are we really paying them too much to do the job too well?

And lastly it was a compromise on the soil action level, so I think this was an activity where they involved the stakeholders and helped the stakeholders understand that really, as much as they wanted to have maybe a much more refined clean up of the site done, that we had to compromise on the soil action clean up levels, that it simply wasn't going to be able to be accomplished in the - to the level they might have really wanted under optimal conditions to achieve.

So those are what I'll call the secrets of the Rocky Flats closure project success.

Okay, a lot of these - the next several slides are items that, again, Ralph and Jeff have touched on already. But some of these are really reinforced by some of the lessons we've had in doing work we've done at our site, so I'll run over them rather quickly here.

Stay away from embedded piping. Again we showed the Brokk in the earlier slide. We had to use a Brokk to do the excavating of some embedded piping in the concrete foundations of a couple of our facilities, and if we wouldn't have had that embedded

piping there, if it hadn't been designed that way and implemented that way, in the facility when it was constructed, we wouldn't have had to spend a lot of time and effort in tearing down those materials, or tearing those materials out.

Stay away from large massive concrete structures, things like large massive bioshield concrete. If you could come up with some type of modular type configuration where you could arrange those material so that you could simply remove different modularized pieces as opposed to sending a Brokk or taking a demolition hammer in and demolishing and removing the concrete using that technique.

Use of a secondary containment to contain leakages, if you have - use a pipe and pipe type of design rather than having just a single run of pipe going out to remove materials for an area.

Any sort of - or many of what's now I think touted as operations and maintenance features on a lot of the newly designed facilities. Many of these features would help - could be used as decommissioning friendly features, things like reduced impurities in different fabrication materials, operating the plant as cleanly as the plant can be operated, within different plant operating condition requirements and

needs. Try to reduce the contamination levels to the extent that's possible.

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

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

And one thing I'd point out here is that there was an IAEA technical report that was done on design and construction features, which optimizes

implementation of decommissioning. That's TRS-382. That was done some, maybe five to ten years ago now, but also a number of other design and construction features in it that would be maybe useful.

Okay, other possible improvements is the next slide we're looking at here, and these are some other ideas that just popped up that we might consider. And this is to really go back to some things we've done, I think probably a little better job of in the past, and that is sharing lessons learned. We're not doing as good a job I don't think in this area as we had in the past.

We are doing a better job of gathering those in some ways in some places, in some times, but we're not doing maybe quite as good of a job in sharing some of those as we have in the past.

The IAEA has a number of different documents they've prepared, which gather - some of this information to gather in one place.

DOE has a number of different lessons learned, and operating experience reports that are on the web, and you can get web access to those.

The NRC also has their regulatory information summaries, which are very good summaries of information based on experiences in

decommissioning.

The next bullet I think we need to do a little better job of preparing for decommissioning in advance by having almost I'll call it a living decommissioning plan that goes with the facility, maybe a skeleton of a plan or an outline that is fleshed out and further developed as the facility goes along its operating life. A minimal effort would be required to undertake something like that, and it might be a good way to stay current in the planning and lend a lot to a good public relations effort as far as showing that we are ready to deal with the facility when time comes to shut down the facility as well.

Okay. So this is just kind of - I labeled this the top 10 lessons learned. And a lot of these are ones that a lot of us speakers today already have touched on a number of these. Touching on a couple of the ones that we might not have addressed as much on, communications is an important lesson learned I believe, and that is dealing with facility personnel as facilities are getting ready to shut down, communicating with those personnel and working with those personnel to understand how the process is going to occur, what the process is going to consist of, and

when the need for different skillsets are going to go away, and when the opportunities are going to come along to joint - be looking for operations staff to join the decommissioning team, or when the jobs are going to go away and be gone permanently.

The second one is specialist support. There is an awful lot of specialist contractors that are out there in the industry, and you need to take advantage of that, and tap into those resources and use those where the opportunity presents itself.

The third item I think we've already touched on, a little bit about the need for final status surveys, a good definition of endpoints.

Planning and cost estimating, an expression I use here is failing to plan is planning to fail. We need to do a good job on planning, on laying out, optioneering and cost benefit analysis, and finding out what the best methods to move forward are on the different projects.

Deactivation process is one that I think we've lived with some of the problems that improper deactivation of facilities in the past have caused, and we need to make sure that we implement deactivation and bring facilities to a safe shutdown condition in the future, before we lose the personnel

and the operating knowledge at those facilities.

The six one we've touched on already, the waste management aspect. The seventh item is a hazards assessment, again, just a good standard operating practice to find ways of - and understand what the hazards are at the site, and assess what those hazards are, mitigate and control those, or eliminate those if possible, as the work progresses.

Site and facility history, we've actually touched on that a little bit already.

Off-the-shelf technologies, OTS stands for off the shelf technologies. There are a lot of technologies out there already that you can use to do decommissioning with.

And the last one there is facilitating information exchange, and building effective teamwork to make the work be able to happen.

Okay, next slide just kind of a summary again of some lessons learned, websites we've touched on that really already. This is something I lifted out of a different presentation that I wanted to share. But it gives some information there you can access on other websites.

And then in closing or in summary, as I think I've mentioned probably several times already,

decommissioning is not rocket science. Don't try to make it that. There's a lot of simple things that occur in decommissioning, and there's a couple of real important complex things that need to occur, that having a couple of good technical staff working with a good project manager and some good project staff to make things be able to happen.

And the other couple of bullets on that slide are self-explanatory. I'm not going to beat up on them too much.

Okay, and that's it. I turn it back to you.

MEMBER CLARKE: Larry, thank you very much.

We're a little ahead of schedule, but let's take a break and come back at 20 to 11:00. We will resume then.

(Whereupon at 10:26 a.m. the proceeding in the above-entitled matter went off the record to return on the record at 10:46 a.m.)

MEMBER CLARKE: On the record. Our next speaker is Hans Honerlah. He represents the Army Corps of Engineers and has experience with the Formerly Utilized Sites Remedial Action Program

(FUSRAP) and the Base Realignment Enclosure efforts. These represent the Corps' several NRC-sponsored decommissioning activities to provide the perspective from the compensative decontamination and decommissioning efforts that they undertake. Hans, thank you.

MR. HONERLAH: Thank you. I just wanted to start off for some of the folks in the room who may not be aware of what the Corps does for our mission work we'll go through a quick slide or two on what we do as an organization and who we work for and support. Some of our more predominant missions in the radiological or hazardous toxic waste arena are associated with the FUSRAP which is the Formerly Utilized Sites Remedial Action Program, also FUDS which Formerly Used Defense Sites, very similar programs. The FUDS program is associated with former military bases where FUSRAP is mainly associated with former complexes or former facilities associated with weapons development in the Manhattan engineering district.

BRC which is a Base Realignment Closure, we do a significant amount of support for EPA in their Superfund Program and actually implementing a lot of their remedial actions and removal actions. We also

control and oversee the environmental monitoring associated with the Army's deactivated nuclear power plants.

We typically generate large volumes of waste annually and most of the common radionuclides that we deal with in our remedial actions are uranium, thorium and radium. However, almost I'd say 99 percent of our sites and our facilities have multiple hazards. None of them are just contaminated with radiological materials or radiological constituents. So there's always a little twist in there with some chemical material or debris or asbestos or TSCA-regulated stuff. The physical form that we deal with is typically in soil. We have some building remedial actions that take place and a majority of the radionuclides that we deal with are very low-specific activity.

Most of the work that we perform as an agency we perform under CERCLA and its implementing regulation, the National Contingency Plan. As a lead Federal agency, we handle releases at many DoD FUSRAP installations and/or facilities. As a support agency, we do work with EPA. We've done with NASA, other Federal agencies, even with the Department of Energy when they seek some additional support.

There's typically a close correlation between CERCLA and the way we implement CERCLA and the MARSSIM remedial action process. However, I think everyone in the room is aware that MARSSIM has some significant limitations that are currently trying to be addressed. Some of the most probably important are the assumption of homogeneity as well as the assumption of surface contamination which I don't think we can say that about any of the sites that we've gone out and started working on.

The four significant issues associated with D&D and the Corps' experiences that we're going to talk about, that I'm going to talk about today are what we call ARARs as defined in CERCLA, the Applicable Relevant and Appropriate Regulations, waste classification and disposal, transportation and release of material from radiological D&D project and typically what I'm discussing there is release of material that is either within an impacted or just adjacent to an impacted area. However, it's in the confines of the project site and therefore has the stigma of coming from a radioactive remediation site and those are posing significant concerns.

The challenge that we have as an agency is that we support the Army and the DoD as well as our

additional customers nationwide, whereas some of the facilities that are located within one state, they're known their regulators. They know the specifics requirements as set forth and they've established those relationships. However, as an agency some things that we bump into are regulations that apply to a D&D project that we may be implementing in a specific state. Specifically, if the material is a source material, for an example we would call 10 CFR 20 Subpart E the 25 millirem per year criteria that we would try to meet and we would identify that as an ARAR under CERCLA.

However, when we go into a different state and depending on the state that we were in, the State of New Jersey has promulgated 15 millirem per year. Now they don't authority as an agreement state that's granted by the NRC, however, regardless of the material is they're going to try to call it T_{NORM} or something of that nature. Therefore, we must implement their 15 millirem per year that they've promulgated within their regulation.

The State of Massachusetts promulgated 10 millirem per year and again if the facility is a Federal facility under control of the NRC we would identify the NRC as the ARAR. If it's a commercial

facility under CERCLA if it's promulgated, we need to consider the more stringent of the two which in Massachusetts 10 millirem per year for the Bureau of Radiological Control and then for the environmental group they also want to see you comply with $1E^{-5}$ risk.

The State of Connecticut, they're in the process of trying to promulgate 19 millirem per year. How some of these numbers comes up are quite interesting. They're proposing it, yet it's not been promulgated.

The State of New York, while they would enjoy that we go to 10 millirem per year and they've issued it in what they call TGAM which is guidance. However, as a Federal agency implementing a program and spending Federal dollars unless it's promulgated, we don't have the authority to take that extra step.

Then we go into the U.S. EPA realm where we have multiple regions that we cross and each region has their own interpretation of CERCLA and the guidance that's put in by the EPA which are the OSWER Directives from $1E^{-5}$ to $1E^{-6}$. Also some of the other interesting things that the EPA threw out that aren't necessarily risk based are the 40 CFR 192, the Five and Fifteen Radium Rules which per the regulation states five at surface, 15 at subsurface. Per OSWER

Guidance what they really meant was five at all depths across the entire site. So the changes that we come across throughout our different programs make the decommissioning very challenging because it's not the same at any specific site.

Let's see. What are some of the other things that are out there right now within the ARARs? We may meet the criteria associated with the release of an NRC license or satisfy the Bureau of Radiation Control or the environmental areas within the states or Federal agencies and then other rules may be imposed on us by property transfer groups. If we aren't going to make the effort to get down to their 10 millrem per year or to their 15 millirem per year, then that property won't be transferred under different rules and requirements that the legal staff within the state will pull out since they didn't have their radiological criteria promulgated.

Those are many of the issues that we tried to bring up front. However, we request this information and these requirements from the state when we get into our projects if they seem to sneak out continually as we go deeper and deeper into our project and have spent significant time, energy and effort into getting to a point of finality.

I think the next one is implementing the dose and/or risk assessment guidance to determine the concentrations that we're going to require removal or remedial actions. 10 CFR 20 uses the average member of the critical group which is what we typically try to go to. However, other state and Federal agencies may see an industrial scenario as a restricted release which would require then at that point some form of deed restriction onto the property to ensure that that industrial scenario is really truly the only thing that that property is going to be used for.

Other states may suggest that while the property may be only industrial, what happens if materia leaves the property after the cleanup and goes to a non-industrial property and is there potential for that? So with those types of arguments which are all valid statements, they try to impose that we clean up to a residential or a residential farmer with all of our modeling throughout our different programs.

The other thing that's come up in recent past and it gets answered differently across the country is how to implement the radiological carcinogen risk into a CERCLA risk assessment when your CERCLA site also has chemical carcinogen risks and the additive versus non-additive, that can have a

significant impact on your cleanup costs associated with your site.

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

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

Waste disposal and classification and I think we as an agency have discussed multiple times these specific issues and we'll go ahead and bring them back on the table one more time. For characterization classification prior to disposal, we must review both the historical information from the

site as well as the analytical data developed from our site characterization activities. Based on information from both of those inputs, we can then make a determination on what the material is classified as a waste. However, the current system is a source based system and it doesn't necessarily allow for you to look at the specific risk. Materials within a single waste classification don't represent a similar risk. So it's kind of a false hope of saying that we have this material and it's classified as A. We want to deal with it as A. However, you could have significantly different risks from those materials.

One of the other shortcomings of the source based system, it's complex due to the multiple levels and/or I guess definitions of specific waste streams. We have not found it to be an efficient use of our resources to go through and try to define and explain the multiple potential classifications. It is difficult to defend on the grounds of health protection. It has significant impact on the competition for specific disposal facilities for each specific waste classification system and essentially it unnecessary uses up portions of our Part 61 facilities which could be better utilized for material

of much more significant risk.

A quick example, we had a facility that has special nuclear material, highly enriched uranium contamination that's very, very heterogenous across the site. However, it's contaminated with a very homogenous mix of very low levels of radium. The cleanup criteria for the radium was a couple picocuries per gram. For the uranium it was several hundred. However, since it was commingled with the enriched uranium, all that material needed to go to Part 61 facility as low-level radioactive waste at a significantly higher cost transportation. So those are the things that the complexity of each specific project makes it a challenge dealing within the system.

Some other things -- disposable facilities have a isotopic waste acceptance criteria which provide a maximum concentration in picocuries per gram for the entire cell. I'm not completely sure on the licensing requirements, the risk assessments that take place within these facilities. However, I feel that a majority of the material that we send to these Part 61 facilities represent only a fraction of their waste acceptance criteria as identified either within their license or within their EPA permits. I'm not sure how

within the current system or if it at all would be possible to take consideration into the given volume of the entire disposal facility to where you would have a volume weighted average of the specific radionuclide within your disposal cell versus just a set limit. If 90 percent of your material in that cell is only ten percent of what you're licensed to accept why couldn't that last ten percent be a little bit higher than that and is there a way to better track that risk within the entire disposal cell versus to have a set limit?

There's a facility within Oak Ridge the EPA and the DOE put in for their disposal facility where they are doing such a very similar system where they're using some of the fractions and volume weighted some of the fractions for disposal. It's a very unique concept. I do believe they have some papers coming up on it at the Health Physics Society meeting in Knoxville this January which will be interesting for maybe you folks to try to look at and share and see if that has any impact.

The utilization of RCRA facilities for disposal of low activity radioactive waste has really stabilized the disposal costs that we typically deal with to the point where we have some very long-term

contracts associated with it, very fixed costs and disposal is no longer a significant cost in a lot of our projects and I'll get to that a little later down into the transportation discussion.

The acceptance of RCRA facility disposal is typically on a state-by-state basis. It's not a national system and currently there are really only two facilities that we're willing to work with their state regulators to step up to the plate and bid on some of our large scale contracts. Both those facilities are out west while a significant portion of our cleanup sites are in the east and northeastern part of the U.S.

Currently, we still feel that there are certain limitations with the disposal of LLRW and those I think need to be addressed and I think they're currently trying to be addressed and I think we're all kind of hopeful within the industry, but I don't think we're all necessarily sure that it's going to happen.

Transportation, as I just spoke of, the disposal is no longer the primary cause factor in a lot of our D&D efforts. A large portion of the efforts typically focused in the eastern U.S., waste disposal sites in the western area. We've kind of seen this trend for over the last five or six years.

Since we've put in our disposal contract with the large volumes our disposal costs have really just kind of crept over time. However, due to energy any small change in the energy costs and within the railroad industry has a significant impact on our transportation costs because typically we're transporting this material several thousand miles. So we've gotten to a point now where our transportation cost can be 300 percent higher than our disposal cost.

Release of non-impacting material from D&D projects and this involves anything from over burden to get to the contaminated material. Can we place it back in the ground with concurrence from the state and localities to debris that may be commingled in and can be washed and released and the level of effort associated with it or even to debris and, I guess, foliage and whatnot on the surface of the contaminated property, how do you get rid of that, release it and then allow you to get down into your actual remedial actions?

And I think Larry and Jeff kind of spoke of it a little bit in their slides. Sometimes it's easier just to dispose of it. Is that the smartest thing to do? Is that the best thing to do for our environment to dispose of non-contaminated material

into a Part 61 facility, probably not but on a project specific basis, it's a cost factor that we need to look at and typically the level of effort associated with conducting the surveys to release these volumes as well as to gain concurrence with both state, municipality and the Feds can be a significant cost that the decision is made to place non-impacted or non-contaminated material within to a disposal facility.

I guess establishing a release for disposal versus a release for returning into commerce would be I think something that could potentially significantly assist this issue. Whereas if we're taking the level of risk that a project and/or a regulator may be willing to take to place material into a local D&D facility or a Subtitle B or a Subtitle C facility versus releasing material to be placed back in the commerce, I think they are two significantly different risks for the industry and the project regulators and everyone and I think if we could try to define that, make that separation, that would assist the C&D efforts.

Real quick in summary, providing harmony between Federal and state agencies on acceptable dose and/or risk would be a beautiful thing especially for

those of us who have to work across the country within many different regions, states, different authorities.

Developing a waste classification system based on risk that could arise from waste disposal. Currently the source based system, the pedigree where it came from, is a challenge. There are avenues within the NRC to seek specific exemptions and those avenues do tend to work. However, they can be costly, timely and have significant impacts in your schedule.

If you go down the road with an assumption that you're going to get that and then you don't get that, that's a significant roadblock.

Support regional dispose facilities, both existing and new for numerous waste classifications to reduce the cost associated with transportation.

I think that the RCRA facilities and utilizing the capacity nationwide with RCRA facilities would require some national type guidance. I'm not sure every state that's out there that has RCRA facilities would be willing to step up to the plate to accept some of these low activity wastes but I think it's something that would significantly assist us with conducting our D&D operations.

Then finally, I guess, to identify a general class of exempt waste that are exempt for the

purpose of disposal versus exempt for the purpose of release back in the commerce where you're doing your green tagging in the DOE world, where you're doing 100 percent surveys, nothing above background before it can be released back in the commerce. That concludes.

MEMBER CLARKE: Hans, thank you. Thank you very much. At this point, I'd like to turn to questions and discussions beginning with the panel and let me allocate a half hour for the panel at this point. So you may wish to ask questions. You may wish to give us comments, but let's just approach it that way. Tracy, would you like to start?

MR. IKENBERRY: Sure. I had a question regarding some of the actual costs of decommissioning and I was wondering -- I guess this would apply to all of the presenters. The costs of the decommissioning, do they get back to the costs estimators at some point so that the basis for cost estimating can take into account the actual data? My understanding is that the cost estimating process is actually quite difficult and a lot of uncertainty with that. Does that information actually get back to be able to improve that estimating process?

MR. ANDERSON: I'll start off. One of the things I kind of glossed over is that EPRI has

developed a lot of software tools that are continually refined and updated and among those are cost estimating and resource estimating tools for planning and scheduling and budgeting purposes. So the answer is yes in our business that that type of information is captured and fed back into the process for further use.

I'll make a comment. Because of the waste graph we looked at versus transportation, actually transportation waste disposal costs comprise somewhat more than one-third of the overall decommissioning costs for nuclear power plants. So maintaining that current and projecting that is a real important part of that cost estimating and changes that can be made that impact where that waste has to go have a significant impact on the overall costs.

MR. IKENBERRY: In your experience, Ralph, how do the costs compare to the pie chart that Larry presented?

MR. ANDERSON: Substantially different and I think Larry made the point that their disposal options are considerably different than ours and if you think about it when you recognize that ultimately you're creating a waste disposal project in many cases that helps determine selected alternatives for how you

even approach the deconstruction and the decommissioning because you're ultimately creating waste products. So you try to do it preferentially in ways that save you the ultimate waste disposal costs. So it's kind of driven by those backend costs, your whole planning process.

MR. LUX: I think the ability to estimate costs is probably more significantly impacted by our inability to quantify the amount of material that will require excavation and transportation and disposal such that I think we have fairly good information regarding unit costs. Our cost estimators were very effective at estimating the costs of exporting a given volume of material for disposal and disposing of that material. But when several million dollars worth of characterization didn't enable us to estimate the volume of material to be shipped within 50 percent it made the accuracy or the ability to estimate unit cost precisely somewhat irrelevant.

MR. BOING: Yes, most of the cost estimating work that we do is contracted out to subcontractors to support us in that effort and one of the things we do try to do is to after we implement the project get that result back to them so they can do a comparison between what we estimated and what

actualities turned out to be. So in that case, we do try to work with them and give them that feedback.

The other thing I'd mentioned is I believe there is a group that the Department of Energy has, a group that looks at cost and collecting cost and trying to make those kind of comparisons between planned and actuals and methodologies that explain the differences or to understand at least how people are implementing and using different processes to do that work with. But I'm not sure how active that group is or if they're still very active or if they're still out there or not.

MR. IKENBERRY: One more quick question. Larry, you had spoken specifically about some cost/benefit analyses as well and I'm interested in if you've done any cost/benefit analyses on the cost of the decontamination first disposal and make it just kid of broad categories. Can you speak generally about that? I realize that's kind of a tough topic.

MR. BOING: We've looked at that and we've done probably several years ago now, if not longer ago now, some studies of how long it takes, like for example, how much per hour does it cost to survey things for release let's say. How many dollars an hour does it really cost if I had a skid of material

that I want to release? How much does it really cost to survey that material and say, yes, it's ready to go or, yes, it's ready to go to our lead bank, let's say maybe, to where it can be stockpiled? We had done some calculations like that, but nothing real recent really. But we do go through that process of again evaluating what the options are because a lot more now than it was in the past 10 or 20 years ago it's about dollars and cents.

MR. IKENBERRY: Yes, I was kind of wondering what some of the new techniques, if there was any way to look at the cost of decontamination for example with a metric like cost per square meter readily and compare that to demolition?

MR. BOING: I think one of the things that happens in the states at least is we're very spoiled by the fact that we have so much open spaces and one of the things that works really to advantage of the Europeans and the Asians is the fact that they don't have and they have to find a way to optimize the process. So they are driven more by their regulators probably and their space limitations too. That they have to really focus on that is really a major focus. If you go and talk to them about technologies, you'll find that they're doing a lot of work because of that

in those areas, in those technology areas, decon and trying to find different ways, better ways to do things than what we have. We've been a little bit spoiled by the fact that we have all this available real estate.

MEMBER CLARKE: Eric.

MR. DAROIS: Yes, I had I guess more comments than questions and part of it is on the discussions we've just had. So I have just four topical areas that I'll throw out some comments again. One is I think Jeff mentioned in his presentation it would be nice to have DCGLs up front during the operating cycle of a facility and I think that's a great idea. However, as we all know, I mean in order to do that we need to define the endstate and that can certainly change over time whether you're doing DCGLs for industrial use, residential use, etc. So I think there are some challenges to doing that and in some cases, it may be quite obvious what the endstate is but my guess in most cases it's not. But I like the idea nonetheless.

I've toyed with the idea on another note here of wondering if it would be beneficial to have facilities at their design phase, maybe building by building, develop a demolition plan along with the

design and I've almost talked myself in through some circular logic on this thinking it would be a real good idea in the beginning. The case in point is I've seen three different ways of taking containment buildings down in operating plants, one with explosions, the other with a big machine that knocks it down really slowly from the bottom and have the thing come down on itself and the other surgical removal.

All of those three decisions were not driven by the mechanics of being able to do it. I think they were in large part driven by waste disposal costs. So that's where the circular logic comes in thinking that it would be nice to have the plan up front, but if you're going to change your mind later because the costs are going to be one way or another down the road 20 or 30 or 40 years from now it may not do you any benefit to come up with that in advance.

It kind of speaks to the fact that those that are operating plants or thinking of building plants today have no idea what we're going to be doing for disposal decades from now and I think as a nation we lack that vision of where we're going and where is the stuff going to go when we're done. That restricts us in terms of how creative we can get up front in

making this process go well.

And one other thought that came to mind I think in Hans' presentation was that we are putting a lot of low-level radioactive waste into facilities that were designed for much higher level wastes and even though we have plenty of space in the country it's really not the right thing to do. I mean these places have a lot of money and time licensing these facilities and I don't even know how you do this as well but is there any way we could put some sort of a penalty for disposing of too low a level waste in a place that's been designed for higher level waste because we're limited as to how many places we can put the lower level waste too and that needs to be solved. Those were my four commentaries anyway. Thanks.

MEMBER CLARKE: Thank you. Let's go to Tom Nauman.

MR. NAUMAN: Thanks, Jim. Interesting comments there, Eric. Food for thought.

MR. DAROIS: Yes.

MR. NAUMAN: Looking to the future -- First, I would like to comment on a historical perspective. Twelve years ago, give or take, D&D was not a concern. The waste issues, everything associated with D&D, was not a concern until

deregulation hit. Economics changed and nuclear wave was crested and we ended up moving into D&D due to economy forces basically.

Fifty years ago, well, 45 years ago when the plants were first coming online, no one envisioned some of the waste issues that we're dealing with today. No one, they didn't factor in the design of the buildings for D&D. They factored in making them super strong and build them and we'll relicense them and continue on making power with these plants. So for us to sit here today and project ahead into the future is pretty difficult for us to do.

When it comes to design of new plants and the amount of effort we've put into capturing lessons learned, I question a little bit as to the value of those lessons learned. At least 20 years into the future, the next wave is not going to hit until the relicensing era is over. So that's really more like 30 years in the future and the lessons that we've learned today while they're important the key drivers on how to tear the plants apart are pretty fundamental construction practices that will continue to learn as we go and equipment will evolve and methodologies will evolve, but what will apply to nuclear plants 30 years from now it's pretty hard to predict.

The question is for you, Ralph. What money do we spend today in the design of new plants that would be cost effective for planning ahead for D&D? When you factor in a nuclear plant right now, it costs approximately $500 million to D&D including waste disposal and everything else, a total of $500 million. What dollars do we spend today that would be effective 30 -- Actually the new wave of new plants will be 50 or 60 years into the future. Where can we apply the reasonability check? I like some of the things that I heard about sealants and containment and modularization, but I can't imagine it would be too cost effective to take it to too far an extreme. What's your views on that?

MR. ANDERSON: I think probably the way to capture it and it goes to some of the comments that you made on the front end about predicting the future because I tend to agree with you on those is to look at the issues associated with operations that would be partially addressed by some of the things that would also facilitate decommissioning and take into account both tangible and intangible benefits of those things that would really benefit you from initial operation all the way through decommissioning.

I suspect that to do a straight line cost

evaluation of if I do this now, I would expect that to have this benefit arguably 60 to 80 years from now if I'm just starting. Actually if you count the design, licensing and all that, you're probably talking about an 80 year period at a minimum.

MR. NAUMAN: Probably.

MR. ANDERSON: And I agree with you. It's kind of ridiculous to imply that you know where you're going to be at that period of time. But I think prioritizing some of the -- It's almost like doing ALARA in my mind. Prioritizing some of the things that are not terribly difficult to do and not terribly expensive and also offer benefit and operations could at least give one kind of priority list of things to approach partially as much to see how well they work and to begin technology development over that period of time as to put something in place with the expectation that you get this tangible benefit 80 years from now and it's interesting to me that in the creation of a lot of these items although we are capturing them under decommissioning lessons learned, though a lot of them came out of people who thought about how they're impacted during operations.

In summary, I don't really think you can do that cost. I think you're correct that to do that

cost evaluation dollars for dollars probably fantasy.

MR. NAUMAN: Yeah. One of the points I'd like to make is we've changed the way we regulate and manage the business as the pre-Three Mile Island era and the post-Three Mile Island era when the industry changed and the way we regulate and manage risk now and manage the operation of the plant is completely different than the way it used to be and a lot of the D&D legacy is from that pre-`79 era that predated the controls that are in place. So a lot of the mess that we're cleaning up is from that and a lot of the design flaws were things that were not -- People didn't predict that you'd overflow tanks and store water on the floor of rad waste rooms in the past, but that's happened prior to the current ways that we manage plants and I think some of the lessons learned from that and where we're going in the future will help us in the design.

Another question on new plants is when you factor in the licensing of the new plants there are designs that are out there in review. There are designs that have been reviewed, designs that are in review. I wouldn't recommend that we in the licensing of those plants put too much weight into controls. We all looked ahead into the design of the plants for

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 calculation but applying a certain amount of common sense. I think that applies to the certified designs and I think it applies to the future licensing process.

MR. NAUMAN: I agree.

MEMBER CLARKE: Thank you, Tom. Dave.

MR. KOCHER: Now, Hans, I had a couple of specific questions and a comment for you before I make some general comments. You made some comments about the problems of waste classification systems for you and I'm guessing that this mainly has to do with this pre-1978 and post-1978 stuff that contains NORM. Is that your major issue whether or not something is included in 11E2 byproduct material?

MR. HONERLAH: That's one of the issues but we also go into the unimportant quantity of source material which is specifically exempt as well as there is no lower level or no exempt quantity necessarily of some of your other contaminants, enriched uranium, 11E1 and things like that.

MR. KOCHER: Okay. You raised an issue about basically combining risks from radionuclides and hazardous chemicals and I didn't see the problem there. Yes, we've kind of turned a blind eye to

combining radionuclides and noncarcinogenic hazardous chemicals, but I don't see any problem with combining radiation risk with risk from chemical carcinogens. So maybe you need to explain to me what your problem is.

MR. HONERLAH: I just think it's implemented differently across the country.

MR. KOCHER: It could be. I mean EPA has their heat stables which supposedly cover the waterfront. One specific comment for you. You pointed out what's probably a real problem about having concentration limits in disposal facilities. I don't want to push Mike's button on this. At least in the DOE system the sites I'm familiar with, they have basically inventory limits. Unless you have an unusual really hot package of something that requires special considerations, they don't much pay attention to package by package concentration limits per se and so this may be more an issue in the commercial sector where the disposal facility doesn't really know where the waste is coming from necessarily. I don't know, but I don't think this is a problem in the DOE system.

MR. HONERLAH: I actually think it's something that they're doing well in the DOE system as opposed to the commercial system.

MR. KOCHER: In regard to general comments, gosh, it's just, you know, obvious stuff. I mean we have a problem here today because it was not possible to plan for the future 40 years ago. That seems pretty obvious to me and it's clear from Ralph's talk and all these others that we're doing our best to plan for the future and I think several of you have expressed cautions about whether we can really do this or not and I think those cautions are appropriate but it's certainly worth trying.

My guess is that at least the legal environment for the near term is fairly stable. We went through a period of 20 years or so where we had a new environmental haul every week and that seems to have slowed down. We're now sort of arguing about the nuances of what the Clear Air Act requires and all of that kind of stuff. But major new environmental legislation is probably not coming.

Ralph, you said something that triggered a thought when you were talking about how snow removal and snow melt move stuff around and it ends up concentrating somewhere. So we create a problem and I wonder whether we still have somewhat of a disconnect between acceptable releases to the environment during operations and what will be

acceptable environmental levels of contamination when you're through.

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

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

One of the things I want to quick comment about, sort of directed at yesterday's talk about the

tritium releases and it was fairly apparent that the problem there was that there were releases that we didn't know about rather than the releases were large because you might put out a curie or two of tritium that you didn't know about and there are large numbers of curies every year going out a pipe under a permitted release. Where am I going with this? I'm not sure.

The key is to somehow have a way to monitor the unforeseen or the unexpected or maybe in some perverse way make these off-normal occurrences part of an expected condition that you plan for and somehow try to monitor. The problem is that we had surprises, not that the surprises caused a problem.

MR. ANDERSON: I'd just like to make a comment to your comment. In my own view, the fact that there was no health and safety impact or at least that conclusion was drawn in itself is not surprising. That's how we design the plants. In fact, we assume total loss of contents from virtually every system that interfaces and show that the ultimate impact would be small fraction of Part 20. That was part of the licensing basis and somehow that got overlooked.

But I think your point is sort on target and that is the issue of we designed our monitoring

programs to monitor those things that we expected. We didn't really design our monitoring programs to check for other things and I think that's what set us up. First leaks aren't good things and second leaks you don't know about are particularly not good things. So I'm with you on that. But again, I want to stress the fact of no health and safety impacts shouldn't have surprised the staff or anybody else. That's what they required us to design to.

MR. KOCHER: And to somehow take into account in evaluating normal performance if you can. I would also say in response to something, some things I heard yesterday, that the onsite groundwater monitoring is nice but that's a problem that's hard to correct if it gets out of hand and it would be nice to know what's going on before stuff gets in the groundwater because the NRC may not care about onsite groundwater, but I guarantee that the states do for the most part. Enough said about that. Thank you.

MEMBER CLARKE: Thank you, Dave. I would like to turn to the Committee now with a couple of comments of my own first. I guess, one, I think the National Environmental Policy Act, the guidance developed by the Council on Environmental Quality, does provide for looking at cumulated impacts and for

what it's worth, I thought that was an interesting comment that you had there, Dave. And, Hans, I thought you did a great job with ARARs which is a particularly troublesome component of CERCLA. I wonder. Have you had any success with ARARs waivers for some of the sites you've been working on?

MR. HONERLAH: No.

MEMBER CLARKE: Okay. Well, I'm not surprised to hear that either. Let me start with our Chairman. Dr. Ryan.

CHAIR RYAN: Thank you. It's been a fascinating morning. I appreciate everybody's insights. I've been sitting and listening carefully and integrating. A number of thoughts strike me. First of all, I wonder what people around the table like this would have said in 1960 when they started designing the first reactors and that's Tom's comment. Waste disposal costs back then was 19 cents a cubic foot, not $350 a cubic foot. So it was a whole different world.

The restricted area of a power plant was the fence around it and now we have restricted areas that are very tiny fractions of spaces inside plants. So the world has changed. Outages were six months long. Now they're 16 days long in some cases. So the

world really has changed a lot and I think that's part of the lesson learned. The lesson learned is what we think is going to happen today probably won't happen down the line whether it's the power uprated plants that are looking at decommissioning or even new generations of reactors.

That being said, I think, Tom, you also touched on the points that Ralph talked about that some aspect of modularization, ease of disassembly, maybe a little better and creative engineering in putting a plant together might be a way to optimize, at least, the aspect of deconstruction, just that part of it. Just making it easier to take apart is a good goal. Maybe not the real driver which I found, Larry, your information fascinating that in your world the disposal cost is in essence not an eye-catching part of your total budget.

Whereas in the commercial world, it is the driver from many points of view. First of all, Eric and his folks and Tracy and others are making decisions, do I scaffold it three more times and spend that money to meet a contamination or a dose criteria and how much waste do I generate and where are the dollars going on that. Is it an optimization or it more expensive? You know, that's a tough equation to

balance, but you don't have that kind of real intense cost pressure that I think exists in the commercial sector, four to six to eight dollars a pound or $350 a cubic foot is a lot of money to spend on waste. And the waste acceptance criteria, at least in my own experience and I think I've heard several say this, are the driver of the bus. I have to meet the waste acceptance criteria and it's from that that I design my decommissioning plan because if I don't meet the waste acceptance criteria, I have a mound of stuff I can do nothing with. So that's a real key issue.

I'm also sensitive to the idea of concentration versus quantity. I don't think we've wrestled that to the ground yet. Concentration is very effective for transportation. It's very effective as a characterization parameter because when we measure a sample we're measuring a concentration in essence and we've used as a metric, but we have not done a complete job of translating concentrations into risk.

This Committee just finished a NUREG document from the history of low-level waste, very exciting bedtime reading, but also produced a letter that addressed some of these issues and recognized, I think, what is another theme on taking away which is

flexibility in that there are many parts of the existing regulations 61.58, 20.2002, I may have these backwards, 30.11 and 40.15 or is it 40.11 and 30.15? I forget, but there are two other parts in the other material sections that give the Commission the authority to consider alternatives and I think in general our letter indicates that it would be helpful if the Commission developed more detail than perhaps more applicable guidance in using those provisions of the regulations to recognize the circumstances that we're in today and maybe even builds in flexibility as circumstances evolve that things could change to meet whatever that evolution dictates.

I think we also recognize this fundamental problem of definitions. My favorite reference is the Atomic Energy Act of `46, not `54, but `46. Safety is mentioned four times as a word in the document, three with regard to dynamic and one with regard to sewer treatment facilities. Those definitions that we deal with of special nuclear material, source material and byproduct material clearly are based on security and safeguards for weapons-related parts and pieces and components and materials from the `46 Act. When we went to kind of the health and safety view in `54, we left the definitions there. So we're wrestling with

those and I think our view is manage the radionuclides based on their inherent risk in the material and forget about source, special nuclear and byproduct material for that purpose of risk assessment. Certainly it has value in other context. So I think we're thinking of that.

I guess I would ask a question. Maybe we answer it now or maybe in our second session, but if you were kings of the world, what would you advise this committee as the top five things we ought to tell the Commission to do or to fix with regard to these issues? And again, I'm not necessarily putting anybody on the spot now, but I think as we discuss all these issues it would be nice to hear some views on what the priorities are. Each of you have different experiences and views and it would be nice to hear if I had one thing I could fix I would take care of this issue or this problem and that would be a helpful thing for this panel to help us think through.

MEMBER CLARKE: Excuse me, Mike. If I could interrupt. Are all of you staying for the full day?

(No verbal responses.)

MEMBER CLARKE: You are? I would suggest you think about that and we close with that.

CHAIR RYAN: Yes, that would be really helpful because I mean it's a fabulous transcript. We've got lots of good information and ideas, but the one thing I think would be great from everybody's arena and you all have different backgrounds and experiences is what should we fix first and there are lots of things to address. But if it could be one thing, what would it be? I think that would really help us advise the Commission from really quite an expert panel of practitioners what's on the horizon that you would like to address. So I leave that with you to think about and I'll turn it back to you, Jim. Thanks very much.

MEMBER CLARKE: Thank you, Mike. Alan.

VICE CHAIR CROFF: Very interesting, but I have no questions. It's like drinking from a fire hose.

MEMBER CLARKE: Ruth.

MEMBER WEINER: Thank you, Jim. I have a question that has been bothering me since Ralph's presentation and I recognize that we are focused on technical issues. But I really do want to ask especially Ralph and the rest of you how do you address the workforce issue? How do you address the question that when you are in a decommissioning phase

you are telling people in X months or Y years your job is going to be gone? And what happens over and over again is that the very people who are the best technically are the ones who find something else. As soon as somebody knows they're not going to have a job, they go looking for another one. How is that address?

MR. ANDERSON: Although this will sound a little bit tongue-in-cheek, it's real and it actually formed our strategy when as Tom mentioned we entered a period when we thought we would be decommissioning most or all the plants. What you do is right next door to the decommissioning site, you start constructing a new nuclear power plant.

(Laughter.)

MEMBER WEINER: There you go.

MR. ANDERSON: Now I will tell you as a policy matter in the mid to late `90s, we really took a look at exactly that and we said even if we accepted that the idea here is to as efficiently and safely as we can continue to operate the existing fleet potentially through license renewal. How do we solve that problem? How does the whole infrastructure not collapse before you get to the end of the trail and the simple answer that everyone came to is we have to

build new plants. And I think that's the most simple answer.

MR. NAUMAN: I'd like to expand a little bit too. It depends on where your point of view is. If you're an operator at a nuclear plant, if you're an engineer, if you're a maintenance guy at a nuclear plant, your job is tied to that plant and its long-term future. But you have to recognize that in a refuel outage, take for example, two-thirds of everybody working in the plant is a supplemental worker, is a construction worker, rad tech, a transient workforce, who do that type of transition for a living. They recognize when they go build a new building that when that building's done if they did a good job, they're on a crew to build the next new building and whether it's to build a new nuclear plant after you finish the decommissioning or whether it's to go from outage to outage, that's the natural transition.

The real concern like you pointed out is the availability of those resources. The average carpenter, for example, the age of the average carpenter is exceeding 45 years old right now and there's not an influx of new people into the trades an that is going to have a major impact on the cost of

building new plants and even be able to do multiple projects at the same time and I agree with you. That`s probably the key problem for the future is managing people and we're going to have to get workforces from other places.

MEMBER WEINER: Thank you. To get more back to the technical, on-the-ground issues, what about reuse of facilities and, Ralph, you touched on it a little bit. But the notion that you have this massive facility and I'm thinking of the vitrification facility that we saw at Hanford which is the this gigantic, monestrous facility that they intend to simply once they're through, it's no more use. It's going to be entombed or whatever. What is being done about reuse of facilities and to tie this a little bit to something Dr. Kocher said, do we need a relook at the sort of exposure standards that we have in order to reuse some of these facilities? And anybody on the panel.

MR. LUX: Right now, it's a little bit difficult to justify decontaminating and bringing a building to the status that it can be reused for nearly any use as long as the cost of demolition and disposal is substantially cheaper than the cost of decontamination and final status survey that would be

required to justify its use.

Having said that, I think -- I don't know how to say this without sounding hokey, but it's a shame that when in the environmental field, the brown fields concept has at times been so successful that there isn't a similar provision for something similar within the nuclear material community. I don't know how to say that.

MEMBER WEINER: Are you saying that you think that the brown field concept is something that should be expanded?

MR. LUX: I think the site program within EPA for evaluating innovative technologies, I think, there are several programs like that that there isn't a parallel for within NRC or within radioactive materials regulatory communities that could be effective. But I don't know if it's that we're behind a learning curve or if it's that we're a little more reluctant to step out because of public perception about exposures.

MR. BOING: I'm sorry. I think there's just a lot of factors and you really need to decide where you're going to base your decision upon facility reuse. Are you going to base it upon a policy that exists? Are you going to look at costs? Should we

say we should reuse whatever it takes to reuse it? That would be a policy statement you would make or do you say based on cost/benefit? Are we going to make our decision based on cost/benefit or policy or which is it going to be?

Another example would be if we're looking at -- I just read an article a couple weeks ago about recycling programs in the country for household and it costs more to recycle and a lot of cities are doing away with it because they say it doesn't make sense for us to do it. It costs us more than it's worth. But what the ones that are being successful are doing is they are charging people more to dispose of the waste they dispose of and in some cases that's how they're funding their recycling programs is with some of those kinds of things.

So it all depends on what kind of an approach do you want to take because I know I feel the same way. I look at a lot of the decommissioning waste we throw away and I think, boy, there's a lot of valuable resources in there. If you could find a way to recycle a lot of that and save dollars doing it, it would be great. But the dollars and cents of it is you really just can't justify it.

CHAIR RYAN: Follow-up question.

MEMBER WEINER: Yes.

CHAIR RYAN: I want to follow up with you, Larry, because I think a lot about that. I struggle with recycle. I've read for years that DOE has all this fabulous metal that they want to recycle. I learned in going to a recycle steel mill near Pittsburgh that their radius from which they collect steel, scrap steel, is 15 or 20 miles because transporting it any more distance than that isn't cost effective and DOE's entire inventory of scrap steel is drop in the national bucket of what is recycled annually. So the idea that it's a valuable commodity is something that you have to think about.

You know recycle companies typically provide service for a fee, but they're out of the commodity business with the exception of aluminum and copper and maybe a couple of the precious or semi-precious kind of metals. So I think in the cost/benefit equation you really have to be careful of defining a benefit and we're on a particular benefit of recycle and I think sometimes you have to be careful.

The one that struck me which is a non-nuclear example is Vermont collects all kinds of switches from automobiles that have mercury in them,

old cars. They sell it on the commodity market. It goes to Bolivia where it's resmelted and put into the atmosphere and ends up guess where? Back in Vermont. And it's not my idea. It was in a news magazine, *Newsweek*, or one of those and it was one of the ironies of what's the benefit.

So I think you really have to scratch real hard on what you're really trying to accomplish when you start thinking of recycle as part of the equation. Now recycle as a disposal cost avoidance mechanism is fabulous, but it's not because we're putting valuable materials back into the world for us. It's disposal cost avoidance is the secret.

And I just want to kind of generalize that thought in that you used the word "cost/benefit." I've heard other folks say "optimization." Cost/benefit, I think, doesn't really capture the full range of issues on the whole area of decommissioning. A couple of folks have tried, for example, to recycle steam generators. It failed miserably because the minute they get the can open the doses go right through the ceiling and they find out the steam tubes are really contaminated. But if you ground them all in place in a foot and a half thick vessel it's a great disposal container. But does it use volume?

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 in there and there's going to be a resuspended component and all that goes with that.

We don't often get more creative than that with this and we were down the path when we were doing the Connecticut Yankee DCGLs. When we were going to be disposing the material onsite, we went through several iterations and we sat with some of the NRC staff people discussing the possibility of somebody living inside of a pipe and therefore the building -- Did we specifically model the pipe for a cave dweller and do the building surface DCGLs apply? I mean it gets to the point of a ridiculous assessment.

CHAIR RYAN: That's the day the plan changed, right?

MEMBER WEINER: Yes. Right.

MR. DAROIS: That's the day the plan changed. So you get into this scabbling thing. We're scabbling for three inches deep in concrete. If anybody is going to use the building for something, they're not going to go that deep and we shouldn't have to consider that material resuspended. So it seems there's more realistic applications we can have.

CHAIR RYAN: And there are examples there. We heard, I don't know, a year or so ago we heard

about the Flannery Bank Building in Pennsylvania where they actually have a reuse. It's now store space and actually some residential space and they had to do some very creative thinking along the lines that you're talking about because if they went strictly by DCGLs they would have removed so much of the structural foundation that the building would have collapsed. So they had to actually deal with what's occupied and what's not and things like that. So that's one of those issues of flexibility, I think, that we've heard a little bit about.

MR. DAROIS: Right. We need to exercise that more.

CHAIR RYAN: Yes.

MEMBER CLARKE: Ruth has one more quick question. Then I really need to get to Professor Hinze.

MEMBER WEINER: Hans had a --

MR. HONERLAH: I just wanted -- Everyone is focusing on buildings. Buildings have a finite life span. One thing that Jeff brought up was the land. That never goes away. Where he talked and spoke of the brown field and maybe bringing in a new building on land that isn't necessarily cleaned up to a residential standard, that building as an industrial

type scenario, I think that's a bigger focus because long term the land doesn't go away but the life span of the buildings, they will go away.

MEMBER WEINER: I have one more question. Thank you by the way for those comments. One more question and this may be something like Chairman Ryan has said to think about until the end. Hans, your slide on the multiple standards that you have to meet in different states was very revealing and I think that is faced by everyone. It was also faced by several who said once the NRC goes away you're left with the state and local regulations.

What should we recommend about that? Should there be uniform standards? Should we put some pressure on -- I'm not saying how you get there, but what would be a way to mitigate the impact of having to meet different local standards and along with that, this is just a question. Are you grandfathered? In other words, suppose the state promulgates something after you've started a decommissioning action. Do you have to meet the new one?

MR. HONERLAH: We're grandfathered if we have a decision document under CERCLA, a record of decision.

MEMBER WEINER: Thank you.

MR. HONERLAH: Similar to an EA or an EIS.

MEMBER WEINER: So I'd like to leave that with everybody to think about until the end of the panel.

MEMBER CLARKE: Professor Hinze.

MEMBER HINZE: Thank you, James. A very useful discussion and comments. I'd like to ask Larry a question that would be of help to me. In one of your summary slides, you made a statement similar to we are doing as well in terms of lessons learned transmitting and sharing lessons learned as we had in the past. Could you expand upon that? Where is the problem here and what is this originating from and why have things changed?

MR. BOING: I think kind of what I was referring to when I made that comment is we're not doing as much outreach I guess or I don't see things, people being quite as willing to go and participate in lessons learned sharing venues, things like technical society meetings, conferences and things like this and some of that's based on different contracting arrangements out at a place where people aren't really advocated to go and do that. Maybe people don't feel as much of a need to go and do that because the industry as a whole is kind of "dying out" in the U.S.

At least in the past it's been looked at that way. And that's kind of where I was going with that was I don't see as much of us doing things because we should do things, because they're the right things to help the industry grow forward and to share and learn from what we've done as much as we had in the past where we seemed to have more involvement and more interaction in technical societies and other organizations and even some things like the RAPIC at DOD, had funded at Oak Ridge for a long time and that's now gone away and I just see opportunities like that are really lost opportunities to really even build upon what we've done in the past and shared and make them even better.

MEMBER HINZE: Do you have any ideas on how we can improve that?

MR. BOING: Not really any that are more obvious than people just saying that we need to as an industry, as a nuclear industry, as folks that work in the environmental industry, everything related to that. I think we have to go out, kind of think about and say what I want to share with people about what I've done, what have I learned from what I've done, as opposed to saying that job is done and I'm moving onto my next one. What can I share and help the industry grow, expand, continue to be vibrant and start to go

in the right direction and share what I've learned.

I think it's kind of a personal obligation you almost have to take onto yourself and try to make it build into one where -- And corporations need to do the same thing too, I think, and say we have to learn from this and learn from what we've done and at least share what we've done so that others can see what we've done and try to use it as they can best see fit to use it.

MEMBER HINZE: Also you referred to your association with IAEA and their work in decommissioning and we've also heard the problems of predicting into the future and perhaps there is something that we can do about looking at the situation in other countries that might help us to look into the future in a clearer manner. Can you share with us some of your interaction with IAEA in terms of lessons learned from other countries?

MR. BOING: The lessons learned probably coming from other countries is a lot of the same lessons learned. You know, things that we're experiencing they've experienced as well. I think the key, maybe a big difference between the two, several big differences, No. 1, there's a lot more emphasis there on avoiding generating waste and having to

dispose of this waste because it's a liability. It's a major liability. They don't have the space and the resources to really deal with it like we do. So in a lot of cases, they're putting a lot more emphasis on technologies, looking at ways of decon-ing, you know, optimization of the decon process, which is really the best method to recycle material, how can we recycle material and kind of reintroduce that material back into the nuclear cycle and reuse it, metals and different materials possibly and fabricating new materials for new plants. They're doing things in those areas.

CHAIR RYAN: Larry, just on that point.

MR. BOING: Yes.

CHAIR RYAN: If I may, Bill. I think one of the things that's very different in Europe we can't forget is they have the EU Safety Directive 6. They can dispose of slightly contaminated solid materials and I think my own view is that process of decon-ing and getting to those endpoints is critically dependent on the fact they have that outlet. We don't at this point.

MR. BOING: Agreed.

CHAIR RYAN: So just for reference, I think that's an important difference.

MR. BOING: Right, and that's an important point, Mike, like you made. Likewise, I think a lot of the lessons learned are really the same. If you look at that slide I had of the ten lessons learned, a lot of the very same lessons learned be it a project in the U.K. or Japan or wherever, a lot of the same lessons learned. We have to know where we're going. We have to communicate with people. We have to look at the waste management issue. What's the final endstate and how are we going to know when we reach that final endstate, that we're actually there?

A lot of the things from a technical standpoint that we've been talking about this morning, site facility reuse and site reuse, the agency has prepared several good technical reports which deal with what the international community is doing in that area. Same with design and construction features to facilitate decommissioning. They've prepared some documentation in these areas too and that's something I think that we should really look upon that our tax dollars have paid for in our contribution to the agency and the UN agencies and take advantage and go on download all those documents for free at the IAEA's website. I mean there's a lot of a good reading, a lot of good reference material in there. You can go

and read in more detail if you want about what difference countries are doing, different kinds of facilities are doing worldwide.

I just like to try to point people to that because sometimes I think we sometimes overlook that. It's out there. It's free. It's available. It's good summary information, things like we're talking about here this morning with an international perspective.

MEMBER HINZE: Thank you. That helps. Ralph, I'd like to follow up on something that you were talking about with your integrated program with EPRI and particularly concerning new facilities. Has your work -- Has your review of this situation identified issues which have led to something other than reports? Has this led to any research activities, for example, on decontamination or the implementation or the implanting of sensors into subsurface that might give some clue as to the migration of fluids? We've heard about this as a problem. Do we see any real research going on in how to improve our ability to do decommissioning of new facilities?

MR. ANDERSON: Yes. I touched lightly on that but actually there is a very strong technology

development and technology transfer program. Looking at an issue like better ways to monitor groundwater is more one of technology transfer just because it's not specifically nuclear/radiological focused. So there is an effort to understand better how to draw in, to use Larry's phrase from earlier, off-the-shelf technologies and reapply them to our needs.

From a technology development point of view, probably a good example I could give is a process that's actually been used several times now. It's called DFDX which stands simply for decontamination for decommissioning where existing processes that were being used for large system and component decommissioning were taken to the extreme with the understanding that you couldn't use it in an operating plant because you would destroy the systems in the way but very aggressive full-system decontamination to use at the start of a project just to knock down if nothing else the overall dose rates and so forth and it's had a very beneficial impact on worker efficiency and on dose reduction. Now it's something that needs to be applied with great thought to make sure which situations it works for.

But the answer is yes, there are actual projects aimed at technological development. I would

suggest that either at a future date or in follow-up something more specific from EPRI on that you'd probably find quite interesting and I can try to arrange that.

MEMBER HINZE: I'm sure we'd find it very useful. There's a lot of technological development in terms of sensors that could be inserted into the earth and you get tomographic visualization and in terms of fluid migration or determining the amount of material that needs to be excavated, these kind of things, this could be very useful in trying to solve some of those problems if you had a heads-up and you could put these into the earth at the new sites. There's a lot that could be done. Certainly the technology will change, but at least you would have a change using at least the present day technology. I'll pass.

MEMBER CLARKE: Mike, I think you have one more question. Excuse me. We are ahead of schedule, but I'd like to stay ahead of schedule.

CHAIR RYAN: Okay.

MEMBER CLARKE: And maybe break in about five minutes if we could do that.

CHAIR RYAN: Sure.

MEMBER CLARKE: And the reason is we've just given you an in situ homework assignment and

we're going to need that 15 minutes. So go ahead, Mike.

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

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

MR. ANDERSON: Yes, there are three that

come to mind. One is collective dose and the second one is rad waste volumes and the third one is contaminated square footage within the plants and each of those was brought into play specifically to cause things to go in the right direction. There was aggressive goal setting on a five year basis. The goal setting was a product of plants developing their own plans for improvement and then really just sticking the median of what people projected they were going to accomplish in the next five years and then this process over the last 15 years has had a dramatic effect in all three areas.

In the dose reduction area, you've seen those graphs and we continue to track that and continue to try to drive down. We are considering how we -- We brought the doses low enough. We're considering how to refocus that indicator to incorporate individual dose.

Volume reduction is an interesting one because we drove it down so far that we actually gave it up as a performance indicator. Economics have taken over certainly as well, but the point is that those graphs are even more dramatic than the graphs associated with dose reduction. So we actually stopped tracking it because the ability to further

reduce volume is such a minuscule increment that it was almost meaningless to be projecting out on a five year basis.

Contaminated square footage is one that we continue to work at. It's been de-escalated to being a high level indicator and again it's a victim of its own success. But all of those were created with a problem in mind that we wanted to address and really got very much at the word you mentioned earlier which was optimization. We've reached some level at which we thought we were probably beginning to see kind of a cyclic behavior with the exception of dose.

CHAIR RYAN: Some of the coolant water quality criteria have a very direct effect on contamination conditions in plants.

MR. ANDERSON: As well as source term in general.

CHAIR RYAN: Sure.

MR. ANDERSON: Yes.

CHAIR RYAN: Okay. Thanks. So I think there's a dimension here of just operational parameters that kind of directly relate to this issue of what I'm going to face if I face decommissioning at some point in the future. Thanks.

MEMBER CLARKE: Thank you. Thank you all.

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 into a great deal of detail on those because I'm not that familiar with those types of things.

Okay, what I'd like to do is, like I said, talk about some of the things some of the other states have fed me and talk about some of these specific things that we have learned in the State of Kansas with some of the issues that we have had. We have had some interesting decommissionings.

And so basically what we have learned is that the keys to control costs are prevention, regulation, characterization, and disposal. I'm going to go through -- try to go through each of these and discuss them in a little more detail.

Prevention is just what it sounds like. You heard a great deal about that this morning and most of what you have heard applies to not only the large nuclear facilities, the power plants, DOE facilities, but it can also apply to the smaller licensees such as the ones that we states deal with.

We typically deal with a lot smaller facilities. The biggest problem now is the cost. Getting a small facility to spend money up front to save them money in the long run is very difficult to do. But we do try.

Basically we try to look at the best available technologies. Some of the things you heard about this morning, surfaces, coatings, that sort of thing. Ventilation systems, that is one that we have had some issues with.

We have got some licensees that deal with radiolabelling organic compounds for research. Those can be quite interesting. We've got a couple of facilities that -- well one in particular that got away from them. What they didn't have was detection and monitoring systems.

Some of the things the other states were talking about to me was retention pond designs. The ones that I talked to, particularly Colorado and Texas who have uranium mills, tailing ponds, you know, that sort of thing, things they have learned is leachate detection, using liners, pond liners, that sort of thing. Like I said, that is out of my expertise. But you've heard a number of speakers this morning talk about similar things.

All right. Monitors, one thing that is important is finding the problem areas before they become major issues. Area monitors, exhaust monitors on your ventilation, those can help you identify problem areas before they become major decommissioning

issues.

When you've got, for example, one licensee we had -- we are still dealing with, their fume hoods, where they are dealing with organic vapors, to save money he liked to turn them off at night. The end result was every plastic surface in the building was contaminated. His computer, everything from the front door to the back. And that is one of the things that we are dealing with.

We've had issues with culture. The licensee's culture, the decommissioning is not in the forefront during startup, particularly with these small companies. It is kind of like retirement. You don't think about it when you are 20. You think about it when you are old like me. And then you start wondering well how are you going to feed yourself for the rest of your life.

But it is incumbent upon us as regulators to educate them and try to point these things out. Decommissioning also comes when the income goes away. They are trying to get it done as quickly and as cheaply as possible. And I'll give you an example of a site that we have got and we are working with right now.

It is two companies, both make

radiolabelled organic compounds. One wants to get out of the business and sell it to the other. The one that wants to get out of the business is in a real big hurry to sell it and sell the facility to the other company. They are in a big hurry to buy it but what they haven't thought about is the potential of what they are getting into.

The facility was in place for 20 years. We've had regulatory issues with them in the past. There is potential for contamination of the site outside of the laboratories. We expect contamination in the laboratories and we expect that to transfer over to the new company which they are willing to accept.

What they don't expect or don't expect to happen is to find the soil on the property to be contaminated. What we have done as the regulatory agency is we have required the seller to do a site characterization survey so that everyone knows what they are getting into and so that we can have the proper responsible party address any issues that are identified.

That is going on right now so I don't really have any detailed information of what may or may not have been found there.

Regulatory issues, again, you heard this this morning. Address decommissioning during the licensing process. We are not doing anyone any favors by accommodating a company who wants to take shortcuts up front and then end up spending a great deal of money down the road trying to decommission the site. It really is in their best interest for us, as regulators, to help them through that process.

One thing that is needed -- you heard Hans talk this morning about the differences in the regulatory limits across the country -- the licensees need clear clean-up standards. And that is something that at this point doesn't exist. That is one of the biggest frustrations I have had as a state regulator is trying to figure out what standard to hold people to.

And, you know, these standards really need to be consistent. And be able to be translated between different agencies. We deal with EPA. We deal with our own environmental remediation people, our own waste management people. We all need to basically speak the same language.

During the inspection process is another area that we found the one facility I talked about earlier that got away from them is carbon-14 organic

compounds. During inspections, the inspectors need to be looking at these issues.

We tend to look at the here and now. When you go in and you are doing a performance-based inspection, you observe the daily operation, what is going on right then. You need to be more imaginative and think about what could be going on.

At this particular facility, the soil outside, although there was never any indication of releases exceeding the release limits, the soil now does. It does exceed the unrestricted release limits.

It is because, we found out in this process, organic vapors are not readily dispersible in air so they go out the stack and settle out on the ground very nearby.

Inspectors need to be aware of those things. Think about the facility that they are in, you know, look around doors, get up on the roof, do surveys, look downwind, that sort of thing. Identify these things before they become issues that are going to be very difficult to clean up later on.

It is a lot easier to clean up and a lot cheaper to clean up a spill now than it is to let it sit, you know, for 30 years and become a larger problem. Identify these leaks, these pathways out of

the facility.

Another thing that is important is characterization. We had another facility, a thorium lantern mantel production facility. They shut down operation in the late `80s, started to do a decommissioning. They looked at it from a hear and now standpoint.

We were doing our production in this part of the facility. And we happened to know that over in this other area, the radiation safety officer's office was contaminated. So they cleaned up those areas. Then came to us with a final status survey and said we are ready to terminate our license.

We looked at it and said no, you need to look at the rest of the facility. So they went back and did some more surveys, identified some more areas. Again, tried to look at the site from a piecemeal standpoint. And ended up they -- I don't know the numbers but I suspect that they could have cleaned the place up for probably a fourth of what they ended up spending on it.

It turned out it is a site that covers about a square block almost -- two- to five-story buildings. And they went in and deconned specific areas. And what they ended up doing in the final

story was they ended up basically taking the entire facility back to the original surfaces and demolished a number of the buildings on site.

All the work that they had done up until then was wasted money because they simply went back and redid it because they didn't look hard enough. They need to look at everything, especially these older facilities. That facility had been in operation since 1909.

Had they done surveys looking everywhere, they would have found the lantern mantels material that they used for insulation around windows. They would have found the material they used as a filler in penetrations. They would have found the 50-some-odd penetrations into the main sewer line that not even the city knew about, the hidden rooms underneath basement floors.

Had they been keeping track of things all along like you've heard this morning, they would have known about a lot of those things. Like I said, hidden rooms, contaminated fire pits under the parking lot.

That was an interesting item. It was a parking lot they used for -- employees used for baseball games. At one point, they paved it over

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 through the soil. It is real good for killing weeds which is a problem.

With large sites, we need to come up with creative ways to deal with these large volumes of waste. Either creative ways to decrease the concentration or just reduce the volume of waste. You know like you have heard over and over, the disposal costs are a major part of the costs involved with decommissioning. Anything you can do to reduce that volume reduces your costs within reason. You can increase it if you are not careful.

And there are other reclamation issues. You can -- you know if you get into an area where you essentially make a strip mine, then you have got other reclamation issues you have to deal with just because you have removed all the topsoil. Then you have got to replace that.

Disposal, major contributor of the cost. You've heard it this morning and I'll say it again. We need competition for disposal options. We need to minimize the volumes and better characterize what we have got before you even start and as you are disposing of it. You've got to meet the disposal site criteria.

But you can -- a lot of times we are tempted to be conservative with how we do our analysis. We err on the side of conservatism. That can be carried too far. But that is a good thing. And it may sound strange to hear a state regulator say that but it can be carried too far.

You know I would rather err on the side of conservatism but also not so far that you put people completely into bankruptcy and you end up, as a state, having to take over the site yourself. And, like you have heard before, don't dispose of more than necessary.

Here is a picture of what happens or what can happen with discrete sources. The Energy Policy Act 2005, NRC now has authority over discrete sources of radium-226. Radium dials fall into that definition. This is a site -- the building itself is about 20 by 40 feet. It was a radium dial shop.

These numbers are in micro-r per hour. If you look in the red area, the soil concentration in that area is up to about 12,000 picocuries per gram radium.

These were licensed activities with discrete sources. So this is something to take back to the NRC. This is what they are getting into with

discrete sources of radium. And we are working with these people to clean this up.

Some of these are in very interesting locations. This particular site -- north is at the top. On the east is a residence. On the south is another residence. On the west is an alley. Across the alley is Birthright. You can imagine the stares we got when we were going out doing these surveys.

But in summary, basically to achieve the most cost-effect end result, you have got to plan from the beginning, from the first day of operation all the way through decommissioning until you are complete. We need to take a hard look at preventive measures, the regulatory issues, and plans for characterization and disposal.

I can't stress enough how important it is for the regulators to first of all speak the same language, give a clear direction to the licensees, and to work with the licensees to achieve our common goal, which is the protection of the health and safety of the public.

And with that, I'll defer the questions until later as I understand. So thank you for the opportunity to speak to you.

MEMBER CLARKE: Thank you, thank you, Tom.

Our next session is a panel from the NRC. And let me tell you who they are: Rafael Rodriguez from the Decommissioning Directorate of the Office of Federal and State Materials and Environmental Programs, William Ott, from the Waste Research Branch of the Office of Nuclear Regulatory Research, Steven Koenig, from the Division of New Reactor Licensing of the Office of New Reactors, and Jim Shepherd, also from the Decommissioning Directorate of the Office of Federal and State Materials and Environmental Programs.

We appreciate that your folks are very early in the regulatory guidance process. And what you share with us is very preliminary. We know that and we appreciate that.

The Committee has benefitted greatly from early involvement in decommissioning efforts and we appreciate your willingness to give us a feel for where you are now and how you are approaching your work. So thank you.

Rafael, it is all yours.

MR. RODRIGUEZ: Oh, thank you.

Good afternoon. My name is Rafael Rodriguez and I am a project manager in the Division of Waste Management and Environmental Protection. And

this afternoon I'm going to give you an update of the staff efforts on decommissioning lessons learned.

Basically the outline for my presentation is going to be as follows. I'm going to briefly talk about the accomplishments of the staff since the last meeting to the ACNW in summer of 2005.

Also I'm going to talk about the current efforts that the staff is pursuing to capture and preserve decommissioning lessons learned. And finally I'm going to briefly touch on the subject of incorporating the lessons learned into the design and construction of new facilities.

The last time we met with the ACNW back in 2005 we briefly discussed what the staff was going to do at that time. As of now, the staff has published roughly 23 lessons learned in the public website. These lessons learned have been obtained from ongoing decommissioning projects within the Directorate.

Just to give you a quick summary of these lessons, some of the lessons identified, which are included in the public website, include coordination between licensees and NRC staff as well as coordination between licensees and all regulatory agencies involved in the decommissioning process, not only the NRC, adequate characterization of the site

before starting decommission activities, and how important it is. And also the use of realistic scenario and some of its benefits.

We also -- the working group, so to speak, the NRC is working right now with members of the Electrical Power Research Institute, the Fuel Cycle Facilities Forum, the Organization of Agreement States and we have this working group assembled to develop ways to capture and preserve decommissioning lessons learned.

And the working group published a preliminary bibliography that contains documents that in some way touch the subject of decommissioning lessons learned. And this bibliography was published in early 2006. And this bibliography, it is intended to serve as guidance for licensees and stakeholders rather than an all-inclusive source of information.

Also, the NRC staff participated in a panel discussion on the decommissioning lessons learned during the Waste Management Conference 2006, this past February.

And finally, the staff is assisting the Office of New Reactors and the Office of Nuclear Reactor Regulation as well as the Office of Nuclear Regulatory Research in developing documents for new

reactor licensing.

And this item basically addresses the idea of using the lessons learned that are being captured from current decommissioning projects and incorporating those lessons into the design and operation of new facilities, thus leading to the concept of less environmental impact and more efficient decommissioning.

There are current efforts that the staff is pursuing to capture and preserve decommissioning lessons learned. The staff recently updated the decommissioning lessons learned web page and I'm providing the weblink so people can take a look at some of the new lessons that are being published.

In addition to that, the working group is also focusing on other mechanisms to capture and preserve decommissioning lessons learned. Right now, the staff -- the working group is using the NRC's public website as the repository. But the working group is also working on other mechanisms to develop a more aggressive approach so to speak instead of just relying on this public website.

And finally we are engaging in discussions with DOE on the subject of lessons learned. And DOE successfully interacted with the staff in a meeting

with the working group that was held this past August. And the working group expects to have more interactions with DOE staff in the future to facilitate the exchange of information and ideas.

So regarding the subject of incorporation of lessons learned into the design and construction of new facilities, as recent as last month, October 2006, the Division of Waste Management and Environmental Protection issued a memo to the Office of Nuclear Reactor Regulation and the Office of New Reactors.

And this memo provided a list of high-level lessons learned. And I'm providing the session number for those members of the industry and the public that would like to take a look at the document.

Obviously this document was based on a review of several references that discuss decommissioning lessons learned. And the staff selected those lessons learned that it felt were at a very high level. And the selection was based on decommissioning experience from the staff in the division.

This input will be used by the Office of Nuclear Reactor Regulation for an updated version of NUREG-0800, which is the standard review plan for reactor licensing. And also the input is going to be

used by the Office of Nuclear Regulatory Research to develop a RegGuide for new reactor licensing.

So basically this is a quick summary of where we are right now in terms of decommissioning lessons learned. So obviously, we are going to address any questions later in the meeting.

Thank you.

MEMBER CLARKE: Thank you, Rafael. I don't know your sequence. Bill Ott, are you next?

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

MEMBER CLARKE: Thank you.

MR. OTT: I am just going to start off with this because basically what I want to at least leave you with was the impression that there is a lot of things going on in the Commission right now. There is the Standard Review Plan development that Steve Koenig is going to talk to you about when he gets here.

But there is the work that Rafael is doing and the work that Jim Shepherd will describe later. And then there is the Regulatory Guide development.

They don't all necessarily have the same single objective. And they aren't necessarily all inclusive. In other words, Rafael is very much focused on what his staff has learned from

decommissioning. The scope of the activities in the Office of Research are directed at all phases of 20.1406, which I will get to in a second. And that goes far beyond decommissioning.

What I have tried to show here is that we have got a rulemaking going on, which is what Jim Shepherd will talk about in terms of modifications to 20.1406. We have got this guidance development work going on in the middle. And that includes both the Standard Review Plan and the development of a Regulatory Guide. And I will get into that in more detail in a minute.

And then at the bottom, we've got the parallel activities going on by NEI and the industry, which were discussed this morning.

We can keep this handy-dandy little chart. We tried to put ML numbers in there when documents are available. We are going to be trying to make this accessible in a way that anybody can get to it and see what the latest is.

Okay, 20.1406 was the modification to Part 20 that was issued in 1997, 1998. And the interesting things about it are that the language in the rule presently addresses licenses other than renewals. It didn't speak specifically to things like standard

design. It just said applicants for new licenses.

There are questions about how that applies to standard designs that are currently being addressed. There is a Part 52 rulemaking that is before the Commission right now which essentially says that it does apply to standard plant designs. There are also two sections of it. And I'm not going to go into that in detail.

This is the regulation as it stands right now. And it says that the objectives of the regulation are to minimize to the extent practical the contamination of the facility and the environment, facilitate eventual decommissioning, and minimize to the extent practical the generation of radioactive waste. Only one of these specifically refers to decommissioning.

The other two would of necessity lead you to think of the entire life cycle of the facility in applying developing guidance that would help you review at the design stage how well you have achieved each one of these goals.

Now if you will look at the history of 20.1406 since it was promulgated, we haven't reviewed any reactors since August 1997. We haven't had any new applications to review. There is no effort to

develop guidance.

And listening to Ralph Anderson this morning, he said that was one of his problems with the way the Commission does business sometimes. They put out rules and don't develop guidance to go with them.

In this particular case, the modification to Part 20 was a very small part of those modifications that were issued in 1998. The first standard design reviews did not address this issue. One of them came in and asked us how to do it. The others just went through the process and there was no consideration given to 20.1406.

Multiple independent publications may provide relevant information. And I think it was clear from this morning that there is a lot of information out there than can be gleaned from the decommissioning of old sites. Probably not the only place to look for information but it is certainly a very good place.

Another place to look is documentation of problems at existing facilities and existing sites that haven't yet gone into decommissioning. And this is one of the reasons why listed on that diagram is the report of the Lessons Learned Task Force on Contamination, quite often referred to as the Tritium

Task Force, which I understand you heard about yesterday.

We have passed those on to the contractor that is helping us with developing a technical basis for this RegGuide. And those are certainly issues that we think need to be addressed or at least considered in developing the guidance.

I was really interested this morning in the description of the IAEA information available and how readily available it was in terms of being out there and accessible to everybody.

I wish that were also true of EPRI documents. We are aware of a number of documents in EPRI that probably would be extremely valuable in developing the guidance. We have access to them at the staff level but we have difficulties in transferring the information. So we have an accessibility problem with regard to EPRI documentation which we are trying to solve -- have been trying to solve for the last three months with limited success.

The scope of the guidance development effort, I've already mentioned this. The Standard Review Plan and one of the things in our contract was for the contractor to review not just -- not the

Standard Review Plan but the Regulatory Guide structure.

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

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

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

The last slide is a slide on milestones. And this just discusses -- it says what our schedule is. NRR has committed to publish the Standard Review Plan final in March.

They have committed to publish the graphic Standard Review Plan in January. They would like us to get as much information to them as we can in terms of the technical basis development, which we are. We are providing weather reports and pre-decisional information to NRR as we get it for their consideration.

But the general process of putting together a Regulatory Guide is going to wind up with us providing them with an actual draft of the guide in April. We expect to go out for public comment in July.

If we are able to accelerate that schedule, we will. But at the present time, this looks to me like a complicated enough document that I am not certain that we will be able to do any acceleration.

And that's basically all that I wanted to discuss today. I just wanted to tell you where we are in the process we are following to try and develop guidance for 1406 and include in that guidance

development information that we are getting from FSME and other sources on lessons learned in decommissioning.

MR. KOENIG: Excuse me. This is Steve Koenig with NRR. And sorry I showed up at two o'clock when we started. So I apologize for being late but I can expand on what we are doing for the Standard Review Plan.

MEMBER CLARKE: Steve? I guess you are next, aren't you? I don't know.

MR. KOENIG: Am I next? It is really hard to take these two and separate them because they are really tied together.

MEMBER CLARKE: That's fine. We broke early for lunch and you didn't realize that, I'm sure. So please go ahead.

MR. KOENIG: Okay.

MR. OTT: Do you have any slides?

MR. KOENIG: I don't have slides.

MR. OTT: Okay.

MR. KOENIG: Good afternoon. I'm Steven Koenig. And I'm leading the Standard Review Plan update effort as Bill Ott had mentioned. We are on track to issue a revised SRP by March 31st.

This is to be in effect six months prior

to the docket date of an application as specified by right now it is 50.34(h) which is the regulation that says an application has to consider the Standard Review Plan in effect six months prior to the docket date of an application. That is how we backtrack from a combined license application submittal in September to have our SRP schedule to track to March 31st.

I presented to the ACRS a couple of times but this is the first time to the ACNW so I can go back and provide any additional information as to the approach with the Standard Review Plan.

But basically in order to meet that March 31st date, we are not issuing this revision for public comments. We are making preliminary SRP sections publicly available in advance of this March time frame. But we are not issuing them for public comment.

We did not have time to meet that schedule to go through an iteration of here it is for public comments, take all the public comments, incorporate, and then issue a revision. We opted for this route of publishing a revision.

As you know -- or may or may not know, we attempted to update the Standard Review Plan. We have been attempting to for a long time. But we tried in

earnest to do it in 1996 and we issued a draft document.

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

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

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

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

We looked through the applicable sections and what we are doing is we are articulating that 20.1406 is an applicable regulation. And we are providing high-level interim acceptance criteria in advance of the Regulatory Guide that Mr. Ott had discussed, okay?

So -- and this high-level acceptance criteria is really just a reference to this lessons learned report as something to consider. But as Mr. Ott described, this is a very complex issue.

We don't want to put something in that hasn't been well thought out, well conveyed. So we are going with interim acceptance criteria.

The applicant is supposed to demonstrate how they satisfy our regulations. And we are providing them that, like I said, interim criteria. Okay? So that is really it in a quick discussion of the Standard Review Plan.

I'd be happy to field specifics.

MEMBER CLARKE: Steven, thank you for that. And as I said in my introductory remarks that you may not have heard, we know you are early in this and this is preliminary. And we appreciate your willingness to share with us, you know, how you are approaching it.

So if you can stay, we will entertain questions after the next presentation.

MR. KOENIG: Okay.

MEMBER CLARKE: And you are certainly welcome to stay for that.

MR. KOENIG: Okay. Thanks.

MEMBER CLARKE: Thank you.

Jim Shepherd?

MR. WIDMAYER: It might be a good time for a break. I had to send an emissary to find Jim. I think he was waiting until a later time.

MEMBER CLARKE: Yes. Somehow they didn't get the word. Okay. Yes, how about ten minutes? Will that do it, Derek, do you think?

MR. WIDMAYER: I hope so, yes.

MEMBER CLARKE: Let's break until 25 after.

(Whereupon, the foregoing meeting went off the record at 2:12 p.m. and went back on the record at 2:30 p.m.)

MEMBER CLARKE: Okay. We have one more speaker on the NRC panel, Jim Shepherd. Thank you, it's all your's.

MR. SHEPHERD: Okay. Thank you, Dr.

Clarke. It's a pleasure to be here for a quarterly briefing on the status of the Rule Making. I'll begin with a little background for those of you who aren't completely familiar with where we are, some of the operational requirements, what we have in mind for legacy site prevention, and then an update on our proposed action.

We began about four years ago actually reviewing the license termination rule, and how to best implement it. One of the things we looked at in SECY-03-0069 was to identify actions that we, the staff, could take to reduce the likelihood of future legacy sites by changing operational requirements and some funding requirements for plants.

We previously discussed this with the committee a few months ago on a proposed rulemaking, and a little over a year ago, the results of our first study to identify the types of sites that were most likely to contribute to this legacy problem.

Okay. Here we are. We're looking at, first of all, revising contamination control both in the design of new facilities, and in the monitoring for existing facilities, enhancing the NRC oversight, primarily the inspection program, and for changes to risk-informed Subparts E and F to Part 20, as part of

the increased monitoring requirements.

Monitoring for the contamination can occur inside the facility through existing instrumentation, sumps, and so on, walkdowns, whatever. Outside the facility, there's case of surface deposition. Monitoring in the subsurface, by definition, would require some kind of subsurface wells that would take samples either of the soil, or of the groundwater. And we believe there should also be a plan to respond to identification of a release. If a facility identifies a problem, they should have a plan in place as to how to address that problem.

Initially, we begin changing, or considering changes to 10 CRF 20.1406. It currently applies only to new applicants. We would change that exclusion and apply it to everyone, but it would require a reply only to certain classes of licensees, those that, in fact, have the physical ability to cause contamination in subsurface. The reason is, what we found is that the subsurface contamination is essential to the dramatic increase in decommissioning costs that we've seen. If someone doesn't have this stuff migrating through the subsurface, it's not generally going to have a large impact on decommissioning. The problems have been small leaks

over long periods of time that have migrated 10, 20, 30 years, and now, rather than having a few tens of square meters contaminated with a few hundred or a couple of thousand gallons of fluid, we now have literally millions of cubic feet that need to be excavated, disposed, handled, and so on.

The working group looked at the initial proposal and said, number one, we need to ensure that the scope of the applicability of this rule is appropriate, that we do not include those sites that shouldn't really have to do this enhanced monitoring, that we do not exclude those that really should be doing it.

Secondly, it pointed out that there are, in fact, existing survey requirements in Subpart F of 20.1501, in addition to the very general requirements in 1406, and that we should consider addressing those, rather than limiting the changes to 1406.

Since our last briefing, NRR, or NRO, I'm not sure which, has proposed some revisions to the existing 20.1406 to accommodate Part 52, the approval of the new license applications. They have included or excluded certain parts of Part 52 from this. In particular, the early design, or the early site permit, there's nothing there to monitor, so they

would be excluded. The manufacturing licenses wouldn't need to do anything. Only when we get to the combined operating license would there be direct applicability.

In response to that, we would then consider adding what would now be Subparagraph C, that the licensees must identify and minimize contamination in the facility and the environment, including the subsurface, so we would specifically include a statement on subsurface monitoring.

20.1501 currently says "necessary and reasonable surveys to define the magnitude and extent of radiation." It does not specifically say that should include the subsurface, but it can be interpreted that way. What we are considering in order to clarify that is a new 1503. We would limit the applicability to those that have enough material to cause a problem, which we will use the existing requirements for financial assurances, possession limits, have relatively long-lived isotopes. We feel that for the shorter lived isotopes, there are provisions in the rule that we could simply delay license termination, or issue a control license that would allow those to decay, much as the material facilities are already authorized for decay in storage

for the medical applications, for example. And we feel that five years, 10-year half-life, or 10 half-lives for decay would be adequate to address that. And, also, the sites would have the potential for unmonitored releases.

In order to do this, what we would establish is a routine monitoring program beginning with a definition of the site hydrogeology, as a basis for the placement of the wells, then developing a plan that would identify specific increments in the routine monitoring in the case that radioisotopes generated by the facility were found in the subsurface in concentrations greater than background.

Along with that, we would have guidance to the inspectors on how to review these programs. Tom Fredrichs is working on some financial assurance issues, specifically for those material sites whose financial assurance is a function of a specific decommissioning cost estimate, would be required to include the results of this monitoring in that cost estimate, and then the supporting guidance.

So that is where we are right now. There is still considerable work to be done. I think, as you've heard beginning yesterday afternoon with Stu Richards talk through this morning, there is much

agreement, at least in principal on what should be done in terms of monitoring. The question now is how we do best implement that. I'm done.

MEMBER CLARKE: Okay, Jim. Thank you. What we'd like to do now is entertain questions from the committee and the panel to Tom Conley and to the NRC folks.

MR. WIDMAYER: Yes. Theron told me there is a limitation to the ability of the microphones to pick up everybody over there, so we can add a couple of folks.

(Off the record comments.)

MEMBER CLARKE: Yes. I think it's really better if we can all see each other. Okay. Let's start with Tom Nauman.

CHAIR RYAN: Tom, use the microphone, please.

MR. NAUMAN: Just passing to someone else. Please come back to me in a few minutes, Jim.

MEMBER CLARKE: Dave.

MR. KOCHER: I wanted to ask Tom Conley something. He made a point in his presentation that alluded to something that I speculated about before lunch; and that is, situations where effluent release limits are complied with, with no problem, but then

clean up levels are exceeded. And I understand that he really can't talk about the particulars of this, but I wonder if he would comment on, to the extent to which this is a real problem, and his experience.

MR. CONLEY: Well, our experience has been somewhat limited, in that we don't have too many licensees that routinely release - have effluent releases, but this particular licensee is one that deals with radio labeled organic compounds, and in the process of producing those compounds did have routine releases out his fume hoods. And during all the years of his operation and our inspections, we never identified any releases that exceeded the effluent release limits; yet, at this point, we've done soil sampling out behind his facility, and there is activity in soil that does exceed the unrestricted release levels.

MR. KOCHER: I've got sort of a general question for the NRC staff. Do you have some goal in mind in terms of how much cleanup and decontamination that you expect sites will have to do if they play by the rules, as you foresee them? I realize you can't get down to zero, but do you have some general idea of where you'd try to get to? Have you decided that the amount of cleanup activity that licensees are

undergoing today is just unacceptable, and we've got to do a lot better than that? Sort of what do you see as the grand vision of sort of the end state, if all this works out right?

MR. SHEPHERD: We do not envision ongoing cleanup during operations as a regulatory requirement at this point. The decommissioning requirements exist. Before a licensee can terminate its license, it must meet 25 millirem for whatever land use and pathways we agree to for an unrestricted release. I'm not aware, at this point, of any move to change those numbers.

Also, because of the wide variability in the sites, and the potential for adverse interactions between operations and decommissioning, we do not envision at this point requiring any active remedial activities during operation, as a result of a measurement.

Having said that, certainly, if we go back and look historically at large events that have occurred, ruptures of condensate lines at reactors, or major spills in materials facilities, that disrupts operations, and generally they will go in and clean things up to some level that is agreed to at that time. It need not be the unrestricted release level

until they apply for license termination.

MR. KOCHER: Well, then this is a really dumb question, and I apologize in advance for asking it, but what is the problem that you're trying to solve?

MR. SHEPHERD: The problem we're trying to solve is, we have facilities that have ongoing leaks that get into the ground water, generally, or disperse otherwise through the subsurface, that create very large volumes of decommissioning waste, that far exceed the financial ability of the licensees to clean up. We've had several materials sites that have actually entered bankruptcy because they've been unable to meet the requirements. A specific example, Sequoyah Fuels Facility in Gore, Oklahoma; by their estimate, they had between 10 and 11 million cubic feet of material to clean up, and their estimated cost is between $275-300 million, against a financial assurance system of about $10 million.

CHAIR RYAN: Jim, could I ask just a follow-up question that is related to the NRC and the agreement states' point of view. I mean, as Jim has pointed out, significant sites that kind of have the NRC license in-hand, but there are literally thousands of licensees in agreement states from very small to

significant, and I'm wondering how the hand-off is going to happen between the developing guidance and how the states use it, and interpret it. I guess the question I'm asking is, how can a state be sure that if they interpret one of the requirements in a way that seems to make good sense, and good health and safety practice, and meets those goals from a state's perspective, that that's going to stand as being satisfactory under an agreement state review. Who's first?

MR. CONLEY: Well, I can say that our experience has been that the -- what we have done has been found acceptable during our IMPEP reviews. If it were not, we would have had some discussions about it in great detail.

CHAIR RYAN: Tom, do you think your experience is reflective of agreement states, in general, would you say?

MR. CONLEY: I think so. I think, in general, it is. We're actually a very small state. My materials program consists of five people. We've got 300 licensees. We just finished probably - I think one of the larger decommissioning projects in the country quite successfully. So, yes, I think it's -- our experience has been typical.

CHAIR RYAN: And just a short follow-up. Do you think -- do you use the MARSSIM methodology?

MR. CONLEY: Yes.

CHAIR RYAN: I get fairly positive comments when I ask about it, as being a relatively uniform and relatively well-accepted, although there are some questions that come up on it from time to time, but somebody uses MARSSIM, I think a lot of folks know what they're doing and why. Is that your experience?

MR. CONLEY: I think so. Yes. I think so. Obviously, MARSSIM has its limitations, and quite frankly, I was -- at the beginning, I was not thrilled with MARSSIM, until I started using it, and saw that it does work. And I've become a believer.

CHAIR RYAN: Okay. So that connection seems to be --

MR. SHEPHERD: I think so. We're fortunate to have Tom on the working group for this particular rule. And the situation he described a few minutes ago has given us, again, pause to consider exactly what wording we put in there in order not to screen out. In fact, a related-type condition, Palo Verde with their tritium contamination, their initial explanation is that it is precipitation of tritiated

vapor going up the stack, rather than any releases from the subsurface. I'm not a meteorologist, I'm just skeptical, but we have had a number of other facilities that have had reconcentration events, but they are generally from some other physical process, such as sewerage treatment plant, so this has raised an interesting question. And, hopefully, with these kinds of interactions as we write the rule, it will be clear enough, both to the staff and to the agreement states that there won't be a concern over the implementation.

CHAIR RYAN: Thanks. I appreciate the interruption.

MR. SHEPHERD: I'd say one other thing on MARSSIM. Whatever its benefits may be, in Table 1.1 is a list of areas to which it does not apply. Two of them, in particular, are groundwater and subsurface, so we have to be a little more creative than just reading MARSSIM.

MEMBER CLARKE: Thanks, Jim, Mike. Tom.

MR. NAUMAN: Yes. I'd like to follow up a little bit deeper on what David was asking. Getting back -- and sticking strictly with commercial reactors and standard review plans for future reactors, and the effects of this new ruling, or this new interim

guidance - what's the real driver, is it the cost for future decommissioning 60 years out?

MR. SHEPHERD: The driver starting in 2003 was the fact that we had licensees that could not afford to clean up the site, and that it was in a highly contaminated condition; and, therefore, presented at least a future potential exposure path to public health and safety.

MR. NAUMAN: But that's not related to new or existing commercial reactors. Correct?

MR. SHEPHERD: The current rule, as written today, applies only to new applications.

MR. NAUMAN: Okay. Because in my experience on decommissioning at Connecticut Yankee, at Maine Yankee, at Yankee Row, interim decommissioning at Dresden and other facilities, the contamination that we're talking about due to leakage paths, and the meeting the cleanup criteria was not substantially affected, the total cost, as compared to the decommissioning effort that was taking place.

MR. SHEPHERD: What I heard from Yankee Row is that since they started decommissioning, they've drilled 55 wells, three of them to over 300 feet. And I've heard cost estimates everywhere from five to fifty million dollars. Well, maybe $50

million isn't substantial, but it still sounds big when you're talking to the general public. We have not had the problem that nobody's been able to afford it. I mean, they've come up with the money.

MR. NAUMAN: Exactly, that's my point. They have - if you look at the overall decommissioning cost, it does not amount to 1 percent increase in the overall cost. And Connecticut Yankee was probably one of the worst cases with its leaking reactor water storage tanks, and they knew were leaking ahead of time, and they knew that they had the groundwater contamination issues early-on. So I can't imagine that predicting the effects of cost here is going to help the re-licensing effort or gain substantial benefit in the long run.

I'm somewhat concerned that we're throwing out interim guidance in the middle of the standard review plan process, without really doing a cost justification of that effort. We're using things from five to fifty million dollar estimates, as reasons for going forward with this; whereas, my perspective before was lessons learned for decommissioning was a valuable bit of information to capture at this point in time, because we're going to go into a period of 20 years, 30 years before we do any more decommissioning,

in reality, and we want to capture the things we've learned and set it down for posterity to be used in the future. But to hamstring new construction, new plants based upon this information seems overly ambitious here.

MR. SHEPHERD: Well, I think you're mixing a couple of things.

MR. NAUMAN: I could be.

MR. SHEPHERD: One Lessons Learned, as Rafael addressed, are Lessons Learned, and they're focused primarily on the physical aspects of decommissioning. The existing rule today that was passed in 1997, applies to reactors. NRR is seeking our assistance and the assistance of the Office of Research in developing interim guidance on how to apply the existing rule.

There is Change One to the rule, which parses out parts of Part 52, manufacturing licenses, for example. Then there is the proposal that we are considering. As part of a proposed rulemaking, there is a regulatory analysis that includes a cost benefit. Only after that is done, will the exact scope of the applicability of the rule be determined. That has not been finished yet. The rough schedule for this rule, as it stands today is, we would send forward to the

commission a proposed rule with the proposed guidance, and the preliminary regulatory analysis, cost-benefit analysis this spring, to determine what their response would be. Their response, to oversimplify it, can be go forward or stop. More likely, it may be go forward with, perhaps, some changes.

MR. NAUMAN: The other question I had was response to measurements, if you put in subsurface monitoring, area monitors and the likes, and you stated earlier that the response would not require immediate cleanup efforts under the operating scenario, would be just response for the future, so that it's documented, you knew where the leaks were, you knew how to control them, and you could take corrective actions to minimize the damage from those leaks early-on. Isn't that what 50.75(g) does now, documents spills?

MR. SHEPHERD: 50.75(g) says "document significant events". The question, and, in fact, it's one of the recommendations from the Tritium Task Force, is to define significant, because what we see is a fairly wide variation in how facilities interpret that, and what goes into the 50.75(g) file. So we hope to provide a consistent basis of what should be put in there.

MR. NAUMAN: Okay. I won't pursue it any further at this point.

MEMBER CLARKE: Okay, Tom. Thank you.

MR. SHEPHERD: And I'd just say, as a proposed rule, when it does go to the public, you will also have ample opportunity to comment on it, at that point.

MEMBER CLARKE: Eric.

MR. DAROIS: Yes. There's two issues, comments I want to make. I might as well stick with the theme with Tom's questions first. I guess I would put some caution in terms of the wording you're proposing here. And before I go into that, let me just reiterate something we heard earlier, that Ralph mentioned, that none of the groundwater issues that we saw from the power plant side represented any significant increases in doses to members of the public, so certainly they were low.

We do know that groundwater contaminations, and we'll go right to Tritium here, although it's more than just Tritium, but generally speaking, what we're seeing in groundwater is slight increases over background, up to, I don't know, several hundred thousand picocuries per liter, depending on the site and the source of the leakage,

so we're dealing with many orders of magnitude of possible scenarios. We've got varying background levels, and certainly, the question of redeposition of Tritium may or may not be an issue with regards to that, so in light of all of that, we've got proposed regulations that say we've got to minimize contamination, identify it in the subsurface, et cetera, et cetera. At what point, I guess, is what I'm wrestling with myself, 10 gallons of secondary coolant, versus 10 gallons of primary coolant, versus 100,000 gallons, you know, there's a whole range of possibilities in respect to activity and volume that could enter the subsurface. And where do we draw the line?

The industry has been, in the last year or two, dealing with fractions of an MCL, for instance, but those issues are more on the political side of it, I guess. From a dose point of view, it's all very small, and how does that fit into adequacy and minimization? Maybe you don't have an answer, but it needs to be considered.

MR. SHEPHERD: We certainly are considering those things. One of the considerations is, we heard several times that there is no off-site dose from anything that's been released, but if we

take Rightwood, just because I think it's the worst case where there's about 600,000 in the vicinity of one of the vacuum breakers, when we come to decommissioning, there is no on-site/off-site. If people are right there, 600,000 is a potential issue.

Now if we compare that, for example, to the effluent limits of Appendix B, it's still below that. So even at that, it's not a health issue, so your point is well-taken, that we do need to be very cautious that we're not creating problems that don't exist.

I think one of the problems that does exist is one of public perception. I think their major issue is, they're not really listening to dose numbers. They don't care about dose numbers. What they care about is somebody crapped up their groundwater, and either didn't know, or didn't tell, and it really irritates them.

MR. DAROIS: Yes. It's just hard to capture that in the regulatory framework.

MR. SHEPHERD: It is. It is, very much. But when we come to decommissioning, looking at it from that perspective, it's 25 millirem. Now many states have adopted either the EPA limit of 4 millirem, or some variation, which we do not

specifically enforce, but to which many licensees commit as part of their decommissioning plan, so we're really talking about, perhaps a difference in time, and when you find out how bad things are, or aren't, as the case may be.

At decommissioning, it's all got to be evaluated. How much of that should be done earlier on is part of the discussion we're having.

MR. DAROIS: It just gets a little interesting when a plant might sink some wells in the ground and find they've got, what might appear to be detectable Tritium leaving the site boundary through that pathway, somewhere between 500 and 1,000 picocuries, quite low in a dose sense, and almost a no-never-mind from a dose point of view, but it's licensed material, nonetheless, so it's just hard -- I just find it's going to be hard to capture that in the regulatory framework. That's all.

MR. SHEPHERD: Well, that's one of the issues, is okay, so an inspector goes out and he looks at the data that the licensee has collected, and there are some elevated numbers. And let's say 2,000, just to ensure that it's above background. Now what does he do with it? And that is an issue that we need to address.

MR. DAROIS: Okay. That's all. Thank you.

MEMBER CLARKE: Thank you, Eric. Tracy.

MR. IKENBERRY: I don't really have any questions, I guess. I did want to say to Rafael, I had a chance to look at the Lessons Learned website, and it looks pretty good. I was wondering where are you getting your information for the website that you're developing? Where does it come from?

MR. RODRIGUEZ: The current input that we put on the web was mostly based on experience from our own staff. I talked to each one of our staff. We did like a one-on-one interview, and I said, you have been working on several decommissioning projects, based on what you have seen in the last few years, what do you think is an item that should be shared with the rest of the decommissioning community? And I think I received a comment, I don't know if it was from Eric, or from somebody, last year that says when you talk about lessons, remember that this is something for industry, so you need to consider money. I mean, whatever you do that you define as a lesson, there has to be some money-savings to us. So, basically, that's another, let's say, criterion that I use when I talk to some of the PMs, but the long story short, based on

the experience from our own staff, which each one of the staff and our director.

MR. IKENBERRY: So is that primarily from reactors, also, from other licensees, as well?

MR. RODRIGUEZ: Reactors and materials facilities, as well.

MR. IKENBERRY: Okay.

MEMBER CLARKE: Okay. Rafael, I wanted to compliment you, as well. It looked like very good information, and I remember when we met with you the first time, we had some concerns about how you were going to do this; and, in particular, what you were going to do to, if you will, ensure the quality of the information. So far, it's all coming from NRC Staff. Is there an intent to capture information from others, as well? Is there a mechanism to do that?

MR. RODRIGUEZ: Oh, yes. What we are doing right now is, is part of the bibliography that we have in place, we're capturing documents from external sources, like EPRI has collaborated a lot, the Fuel Cycle Facilities Forum, NEI, and also, Thomas Conley gave me some help, so it's not going to be only NRC's Lessons Learned. There's going to be experience reports, so to speak, from different groups. We're going to make sure that the information that we make

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 line between what we put in the rule language, and what we put in the guidance. Certainly, I agree with your concept that each site is different. There are certainly changes occur at different rates during different times of the year. If there are specific events that can cause changes, be it a rainfall, a rain event, a drought, floods, tsunami, if that's appropriate to the site, that would cause the groundwater to change.

By "routine", I don't necessarily mean a fixed, regular schedule that at 3:00 every Thursday afternoon, if it falls on a full moon, I'm going to go out and measure groundwater levels. In my mind, the routine monitoring program should take those things into account, as known. The water levels, the chemistry should be measured at times appropriate to when it might be changing, but not -- it could be, if we take some of Tom Nicholson's favorite ideas from USDA over at Beltsville, where they have real-time monitoring that remotely logs things on a continual basis. That could fall within the definition of routine. Perhaps that's not the best word to use, but certainly, in the guidance, we will expand on the idea of doing sufficient characterization to identify

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 moment to something that came out this morning. And, Jeff, do you mind if I bring up your point? I have to give credit where credit is due. Jeff raised a point that when you go to decommissioning there is a paradigm shift. And there's also a paradigm shift in the community that surrounds the facility. And the paradigm shift, which occurred to me thinking about, was that all of a sudden, you're going from providing something to the community, power, whatever, to being just simply a polluter. And the community suddenly sees the facility in a completely different way, as providing no benefit, and nothing but a perceived detriment, no matter how minor that detriment may actually be. Is there any way that this can be addressed? Anybody on the panel.

MR. SHEPHERD: Well, in my opinion, being the regulator, I say it's the job of the licensee, and I would point to Consumer's Energy at Big Rock Point, who had an excellent public communications plan. They made their decision to shutdown somewhat before they actually did, although, not very long. They have an employee retention plan that was applauded internationally. When we went to the meetings, unlike a number that I've been to in the northeast, where

there was a great deal of opposition to anything the licensees were proposing, the only question we were asked was, couldn't we make them continue to operate, which, of course, we can't.

The fire department was very disappointed that they were actually going to take the standpipe out of the lake, because it was now more difficult to fill their fire trucks, and there has been - while there was some concern, they also began a two-point 2002 off-site disposal of their very low contaminated waste into a RCRA landfill. They worked very well through the community, they had a community oversight board. They hired a health physicist who represented the community to evaluate all of their shipments, and I think just their forethought in dealing with the community, not only at decommissioning, I think it probably started well before decommissioning. It was a relatively small facility, but they were still a major contributor to the economy of the area. I think the economics is one of the biggest impacts that we see, because I have been to a number of reactors in the northeast where during construction, of course, they're running several thousand people, during operation several hundred. When they come to decommission and shutdown, they're down to a few tens,

and just the visual impact driving down the street, seeing the closed businesses that no longer have a support base, those things I'm not sure that there is - well, other than Ralph's suggestion, is to replace the old reactors with new ones, I'm not sure there is an antidote, but I think that the public relation effort by the licensee before shutdown can contribute significantly to that.

MEMBER CLARKE: Ruth, if I could interject, the term "end use" has come up more than once today, and I'm thinking should we be thinking about end use sooner than - kind of in a position where we'll take any end use we could get on some of these sites. Clean them up, do whatever we can, but the end use might be that it might be beneficial, might be a recreation area, might be well received. If that were communicated somewhere closer to the decommissioning period, if that went, in fact, into the planning, I wonder if that might not be a good thing? So I just throw that out. I'm sorry, I didn't mean to interrupt you.

MR. LUX: I hate to sound too Oklahoman, but you all are generating some tremendous arguments for developing DCGLs in advance of beginning decommissioning. But I think, to borrow a term from

the EPA, when reactors shut down, they take on the appearance of an uncontrolled site. Very few people, perception of significant controls that were in place are no longer in place, and there's a guy named Dr. Peter Sandman from Rutger's University that developed a program called "Communicating Risk", concept is risk equals hazard, plus outrage. And, although, I agree with Jim's assertion, that it's really primarily the licensee's responsibility to communicate with the public and establish a program, such that the public can be reassured that things aren't becoming uncontrolled, but that, in fact, there can be, to some extent, a shift in the perception of control from entirely within the licensee's court, to the neighbors in the community feeling like they have some control, some level of influence over what is done, is not a panacea, but it can be very effective. But I also believe that it's very necessary for the regulatory agency to backup the licensee's assertions that there is still control, there is still protection, et cetera.

MEMBER WEINER: I have another question for Jim. You said that once a site is decommissioned, there is no more on-site and off-site, if I'm quoting you correctly. But decommissioning, itself, takes

quite a while. I haven't been involved with any plant decommission. I'm sure it took more than a few years to bring Big Rock Point down to greenfield status.

MR. SHEPHERD: About 10.

MEMBER WEINER: Well, and during that time, you've almost gone through a half-life of Tritium, and during that - the decommissioning period, there still is an on-site, and an off-site.

MR. SHEPHERD: That's correct.

MEMBER WEINER: So that it's only if you're looking at a release that is a significant amount on-site, when you start to decommission, you can also project what is that going to be? Is that correct?

MR. SHEPHERD: Right. And, in fact, Big Rock did that. In 1984, they had a condenser line break, by which they estimated one million curies of Tritium went under the turbine building. When they began decommissioning, they were 30-50,000 picocuries per liter, so two to three times the EPA limit. And, primarily through decay, it's now down into a few thousand, and they did not have to do any active remediation. So you're correct, but to bring up Jeff's point, when we're establishing the DCGLs, the assumption is that there is no fence line there, and

that's the level to which it must be remediated.

MEMBER WEINER: But some of the remediation will take place just because of decay.

MR. SHEPHERD: Natural attenuation, and decay can be a part of that, yes.

MEMBER WEINER: Thank you.

MEMBER CLARKE: Allen? Mike?

CHAIR RYAN: I'm kind of waiting for my homework questions to come around, so I'll hold a little bit for that.

MEMBER CLARKE: A few minutes. How's that?

CHAIR RYAN: That's fine. But there's two things I think, looking ahead to the guidance, that I think are important to address. One is, my favorite question is, when am I done? How can I assess whether I'm moving toward closure in my decommissioning, whether it's a relatively small, relatively straightforward site, like many agreement state circumstances, small buildings with a little bit of licensed material, and they had a liquid sump, and they've got to clean up a little bit around that. How do I decommission the soils and all that?

Clarity in closure and completion in the guidance, I think, is really something to try and

instill at every step of the way. My own view is that will help agreement state regulators, and agreement state licensees, assess whether they are taking actions that comport with what NRC would do, if it was an NRC-licensed facility.

In South Carolina, where I live, there's been a couple of big ones; Agnes, big in terms of size, small in terms of radioactive material, but the Naval Ship Yard, which was a fairly complicated site, and I think there was participation through IMPEP and agreement state program oversight, and lots of work done. Now that work is, my goodness, 20 years old, so I think there's a great value in trying to address that connectivity to the licensee, and to the agreement state, because that's where a lot of the action is going to be.

The other part of it is a general question. I recognize fully that sometimes criteria are negotiated not only on the basis of dose, but on the basis of community desires and negotiated approaches, and all the things we've heard today, but I think if the guidance addresses what is risk-informed, what is a good solid risk-informed approach as a basis, would be good, and to be specific about that. And then if there are other negotiated

settlements where we'll do this in addition to what's risk-informed, because of the community preference, or some other approach, I think it would be interesting to see how you could address those each in their own turn.

If one state does 25, while another will do 15, figuring it's 27 percent better, I'm not sure that's always the case, but that's sometimes what you do to get the job done. So addressing - that's part of the "When am I done" question, when am I finished, from a risk perspective. When have I managed the risk satisfactorily? I know that's a tough thing to address, but the more you --

MR. SHEPHERD: Especially when there's a difference between the state requirements and the federal requirements.

CHAIR RYAN: But I think explicitly recognizing --

MR. SHEPHERD: I'm not an agent of the state government.

CHAIR RYAN: Oh, no, I understand that.

MR. SHEPHERD: I can't go out and negotiate on behalf of the licensee.

CHAIR RYAN: Not saying you should, but I'm saying it should be clear to the licensee what the

agency is requiring, and then recognizing somehow in the guidance that there might be other drivers; for example, state requirements, or community negotiated requirements that might be more restrictive, perhaps, or comport with your guidance completely, and that you recognize that's a possibility, just so that that issue is on the table in the guidance is something that may be completely aligned, and may be somewhat different, but doesn't necessarily impact what --

MR. SHEPHERD: Right. Well, our risk basis is 25 millirems all pathways.

CHAIR RYAN: That's a risk basis. That does mean the approach is risk-informed.

MR. SHEPHERD: Volume II to NUREG-1757 goes to, to some extent, and, in fact, it was just revised two weeks ago it came out, I think.

CHAIR RYAN: I'm not up on that one.

MR. SHEPHERD: That there is an expanded discussion of realistic land use scenarios, pathways, and so on.

CHAIR RYAN: And that's the kind of stuff that I think is very, very helpful to really lay that out in as much detail as possible. I'll have to get that update and re-educate myself. That's good news, and things that go down that path even further I think

will really help do a couple of things; one is, inform licensees about realism and how to use it. And, also, help everybody understand how that works in the process, so thanks.

MEMBER CLARKE: This is probably a good time for your question, for those of you who weren't here this morning, our Chairman posed a question to the speakers, and to the panel, and gave them some time to think about it. So, Mike, do you want to ask it?

CHAIR RYAN: Jim, I'll be happy to have you lead the discussion, if you like, but the question was, if you were king of the world, what would the top five things be that you'd like to ask the commission to address in this arena of decommissioning, and decommissioning guidance? What would you want to see addressed, and what would you ask specifically that you would want to see from the commission, in terms of specifics. What problems do you want solved? I'll keep going, whatever way you want.

MEMBER CLARKE: Whoever wants to answer it, answer.

MR. DAROIS: I've only got three then.

CHAIR RYAN: That's all right.

MR. DAROIS: I'm not going to fail the

assignment.

CHAIR RYAN: No, no. That was kind of a collective top five.

MR. DAROIS: Okay. Yes, I have three, I think, that has risen to the top of my list. And one we were just talking about, really; that's alignment of the decommissioning criteria across all states. I mean, king of the world, stuff, Mike, so I'm not sure it's possible, but now one just commentary on that, if I may, and I think David alluded to it earlier this morning.

The criteria is really quite different. I mean, we're applying an annual dose-basis to releasing the sites, and when we get into state criteria, EPA criteria, it's 10 to the minus 4, to 10 to the minus 6 lifetime risk. And we're into that at Yankee Row, we have to comply with a 10 to the minus 5 standard total risk that's rad and non-rad. And it turns out that some of the values that we generate for radionuclides are quite, quite low, and the site has committed to the state to cover the majority of the industrial area, not 100 percent, close to it, with three feet of clean cover. It's a lot of soil. And that, basically, eliminates risk from some of the radionuclides; and, hence, they can easily pass the

standard, so I can't imagine every site in the country having to comply in that manner. It's a relatively small site, but it's very expensive to do, so I think it's very important if we could get some alignment there.

I think the other two are related more to waste disposal. If we can drive to completion more nationally, and more uniformly, the ability to dispose of low, low levels of radioactivity in local landfills, whether they be RCRA, or whatever they may be, I think that's going to be important for operating and decommissioning sites.

And, lastly, I think we need more options for the higher level waste disposal sites. And I think that's - we're in a situation today where competition has been limited, transportation costs are very high, especially if you're on the east coast, and I think that's going to weigh heavily into future costs for decommissioning, so I think those are my top three items.

CHAIR RYAN: Great. Thanks, Eric.

MR. DAROIS: Yes.

MEMBER CLARKE: Anyone else? Go ahead, Dave.

MR. KOCHER: Well, number one on my list,

which will never happen, is to have a comprehensive risk-based waste classification system. Now given that we can't do that, what can you do? And I think Eric was hinting at the idea that there are potential sort of ad hoc solutions, situation-by-situation solutions, but certainly, if you can open the door to sensible cheap dispositions of slightly contaminated materials, you've got to be doing a lot of good. How to do this, I don't know.

Number two, and this is not helpful to you, Mike, because it's more in the line of a question, and it's what I attempted to ask before, and I bungled it totally. Is it feasible to design, to have a system -- is it feasible to design, build, and operate facilities so that the cost of cleanup to meet NRC criteria is essentially zero? Is this a worthwhile goal? Do we have good information? Have we analyzed what it takes, what it would take to do that? And if it's not possible to do that, how good can we do? I mean, that was what I was trying to ask before.

The overall goal here, the pie-in-the-sky goal would be to have zero cost to clean up your land. You're always going to have something to do with buildings and equipment, I suppose. But when I asked

the question before, what's our real goal here, what's our overall global objective? The objective might be to, basically, have zero impact on the land when we're done. I don't know.

Related to that is, do we really have a seamless regulatory system that allows the licensees to follow the rules from construction permit, right on through everything to where, at the end of the day, you haven't created problems that are really troublesome? You somehow want to avoid causing problems just because you followed the rules. An example of this, this is not a problem for DOE, per se, but there's this compensation program for energy workers who get sick, and lot of these guys who are getting paid were exposed in accordance with regulatory limits. They were below the limits. Now that's not a problem that DOE is directly responsible for, but what happens -- is everything okay when you follow the rules? And if it isn't, can we do something to fix that?

Oh, gosh, the rest just seems pretty obvious, standardized designs, and design for monitoring the things that you don't expect to happen. And I think everybody talked about that.

MEMBER CLARKE: Thanks, David. Tom.

MR. NAUMAN: Well, it's good to go third, because a lot of the things have already been covered. Eric hit upon an issue that I had, and that was, basically, federalization of end-state criteria, have one criteria nationally that all states abide by, all licensees abide by, so it's simple, and it's clear. And we're now doing negotiations on a local, state, and federal basis.

My number one issue, though, I'm surprised it made it this far, was high-level waste and spent fuel. Spent fuel is a decommissioning problem. Each site that's already had its license terminated, each site that's going through D&D has to deal with its spent fuel. And until we nationally solve the spent fuel issue, we're all hamstrung going into the future. And if I was king, that would be number one on my hit list, is dealing with high-level waste and spent fuel.

Separating nice-to-do versus regulatory driven - back a little bit to the Big Rock Point issue, Big Rock Point did a great job. The public perception, community buy-in was wonderful. They had the pipes march out and put the unit to bed when they shut it down. It was wonderful. But the problem with that is, all that costs money. And back to it's the licensee's responsibility to deal with community

involvement, well, Big Rock costs as much as Maine Yankee, and the sites weren't comparable in size, and reactor, and contamination. It costs as much to decommission Big Rock as it did Maine Yankee, and it took two years longer, so the nice-to-dos need to be separated from the have-to-dos. And that's a regulatory - to be their marching orders.

And then stay the course, stay focused on risk-based guidance. I think it's important not to let political, and issues that come and go. The Tritium issue is not a new issue. Brookhaven issue came up 10 plus years ago with the Tritium, and it was a public outcry for a while, and then it kind of faded away, and it's been up and down through the commercial industry since then. So right now, there's focus, it's important attention to detail that we're focusing on, but I think we're somewhat being whiplashed by it, and I think we want to be careful about that going forward with new guidance. And we need to stay focused on risk-based and where is the best money spent for the highest return. Those are my wish list. Michael.

CHAIR RYAN: Thank you, Tom.

MEMBER CLARKE: Anyone else?

CHAIR RYAN: Jeff? Anybody else?

MR. LUX: I feel bad about coming with

such small issues after federalized everything, establish world peace and harmony between all states.

CHAIR RYAN: Different kings look at it in different ways.

MR. LUX: First of all, I think it would be important to improve the definition of reasonable exposure scenario. I just question, are we being a little bit over-protective when the exposure scenario that yields a 10 to the minus 4 risk, has a 10 to the minus 4 likelihood of ever occurring.

Second, I think we should expand MARSSIM to address volumetric averaging for subsurface contamination, both for soil and groundwater, as well as addressing heterogeneous distribution of contamination, which is currently difficult to do within MARSSIM.

I think we should integrate the monitoring of effluents or releases, both planned, and unplanned, with the monitoring of impact to the environment, and I know this sounds like a catch phrase, but harmonize the risk from the release with the risk due to environmental impact. Right now, licensees are able to either pull a limit out of 10 CFR 20, or model a release, and develop a limit, and then they can merrily sample at the end of the pipe to the end of th

stack for years without every saying where would this be going, and what impact could it be having? And that's where we have an effluent or a discharge limit that's based on short-term protection, causing problems when we get down the road with resident farmer unrestricted release scenario.

I think NRC really needs to provide guidance to regions and states regarding how to interpret and/or implement regulatory requirements, such as creating an island of purity in the midst of restricted area.

And, finally, I think that the consolidated decommissioning guidance should address the concept that the presentation of final status survey data should mimic the basis upon which the limits that are being measured against are developed. Right now, we develop a limit for a residential farmer scenario based on 10,000 square meters, or 2-1/2 acres, or whatever, and raising so much food, et cetera, et cetera. And then we apply that to a plot that's 10 meters by 10 meters, and you are not going to -- at that point, our survey violates the basis for the model that you rise the limits, and I think that should be reconciled. That's it.

CHAIR RYAN: That's a good list. I take

note of the one comment, where you talked about reconciled the release requirement with the environmental impact. I'm reminded of the sewer discharge change that occurred some years ago, which was probably that exact kind of issue, that what was showing up in sewer treatment plants seemed to be out of wack with what certain sewer releases were occurring, so maybe that's an example to build on.

MR. LUX: I didn't have any good examples, except for the release of a liquid effluent, and then I was delighted today to hear, I think it was Ralph, talk about snow, and Tom talked about air effluents, resulting in contamination on the ground, and there's a lot of ways you can have a release that complies with your limits, but still creates an undesirable impact.

CHAIR RYAN: Thanks. Tom?

MR. CONLEY: Well, to kind of keep along the theme that's been said, I'll stick my neck out a little bit and make a prediction, that if the federal agencies were ever to come to an agreement, the states would follow. I think the reason, one of the reasons, anyway, why you see states having different limits is because they don't have a standard to follow. That's probably at the top of my list.

The other thing that I would say to take back to the NRC is my second to the last slide, the picture of the facility with the impact from licensed activities from discrete sources, not necessarily just Radium, but discrete Radium sources is a new issue for NRC, and I think that's something that they need to look at very carefully as they get into it.

CHAIR RYAN: Okay. Thank you. Anything else?

MR. LUX: Everything else has been covered.

CHAIR RYAN: Okay, great. Ralph.

MR. ANDERSEN: I agree that just about everything has been covered. I'll second the motion on a few, nevertheless. I certainly would put at the top of the list the issue of waste for which we currently don't have a means for disposal. Used fuel and greater than Class C waste just reside in an indefinite limbo land, which means that virtually every nuclear power plant really won't have its license terminated. It will have a part of its license terminated.

Additionally, we need the continued emphasis on improving the flexibility in options for safe disposal of waste, based on risk. We've talked

about how that really drives the whole train, because you end up looking at what you will have to deal with at the end of the day, and then planning your decommissioning accordingly.

There's a lot of opportunities. I believe the staff got a lot of suggestions through the request for comment on the strategic assessment process, so there's a lot there to work through. And I think that that will have a profound impact, for a couple of reasons, the Big Rock Point story, being an example. The ability to remove the material, rather than to distribute the material on-site, in my mind, was profound. And if you think about it, it was done by an existing regulation, but in a sense, it was done by an exception to the normal pre-approved methods of disposal. So continuing to use existing flexibility within the regulation on the basis of risk, I think is very important.

Certainly, the alignment of criteria is vital, even though, perhaps unachievable. The other piece, and I think one of the speakers addressed that earlier. I believe you did, Hans, but it's equally important that methodology be standardized, ranging all the way from the assumptions that are used in scenarios, to the actual calculational methods, not to

mention that weird thing called which version of ICRP are you going to use to calculate the dose? Twenty thousand picocuries per liter categorically cannot produce 4 millirem of exposure, not unless you drink yourself to death. In fact, it's about 1 millirem of exposure, if that's your sole source of drinking water for the entire year.

The current concentration values in Part 20, I can't imagine anyone in the universe could actually achieve 50 millirem of exposure from those concentrations, because, again, it presumes that that's their sole and singular source of drinking water, 2.2 liters per day. I don't know about you, but I don't drink 2.2 liters of water a day. I might of fluid, some of it has a small alcohol content, and some of it has a little sugar and some flavor, but it's not water. So getting that straight, and that applies to the realistic scenarios, too, is helpful to what may main recommendation is.

The NRC-DOE task force that looked at radiological dispersion devices, had a series of recommendations. One of those, which I thought was applicable to decommissioning and a lot of other things we do that involve relatively small doses, was that, as a strategic measure, the government needs to

better communicate to people the real story about radiation and risk, so that we don't have what's essentially an hysterical response to a non-issue.

The government sees clearly that that's vital to convince terrorists that it's not worthwhile to set off dirty bombs, because in many cases, people might just clean up the immediate mess and say well, what's the issue? But it's based on really changing the public understanding. I would contend the same thing applies to decommissioning. We're talking about 25 millirem a year as a conservatively derived limit, but I think that most of your public, for instance, at least in the meetings that I went to, believes that 26 millirem will kill you, because 25 millirem, after all, is the limit, so we need to help with those issues. I'll just leave it at that.

CHAIR RYAN: Okay. I skipped passed you, Larry, because you were hiding behind Jeff when I went around, so why don't you pick up.

MR. BOING: That's okay, no problem.

CHAIR RYAN: All right.

MR. BOING: No, I actually kind of boiled it down to my top three, I guess, actually. And a couple of these, well, one of them, at least, we've already touched on, Eric did, and a couple of the

others did, too; and that's just finding some way to deal with these very low levels of soil and materials that we're shipping halfway across the country, or nearly all the way across the country to dispose of now, as opposed to doing things that make a little more sense, which is like sanitary landfill disposal, and other landfills to put them into.

CHAIR RYAN: Just to clarify, if I may, and the others that have endorsed that concept - there's three things that come to my mind in that regard. One is the Disposal of Solid Materials Rule Making that has been suspended. The EPA ANPR in its notice for proposed rule making on allowing some small concentrations to go into RCRA Subtitle C, and perhaps D landfills, and then vice versa, small trace quantities of RCRA materials that might end up in low-level waste on the other side of it, so are all three of those in play when you folks thing about solid materials of very low concentration? I'm getting nods on all that, so I just want to make sure you were integrating those three issues all as aspects of that one question. Thanks for the interruption, Larry.

MR. BOING: No problem. The second one would be, we've talked a lot here about Lessons Learned, and a lot of experiences, try to find some

way to help integrate all of those Lessons Learned into the way we're going to do operations, and find ways to apply those, to really take these Lessons Learned now, as opposed to them just being things we've said these are the lessons we've learned, and actually build upon those in how we design plants, operate plants, prepare for eventual decommissioning of sites yet to come down the pike.

And the third one I had was - kind of touches, I think, on maybe a little bit about what Jim was presenting here, but try to find some way to integrate a little bit more, if I want to call it kind of characterization on the run as we're going, and still operating sites, try to find ways to document and identify when we're having problems, and try to catch those as they're developing, as opposed to waiting until decommissioning, and find wow, we've got a tremendously big problem here that we're not able to solve. It's easier to solve it as it's going along, as opposed to waiting until you reach the end of the path, and say wow, we've really got a problem. So those are really what I kind of would top off as my top three out of that list, Mike.

CHAIR RYAN: Okay, thanks. I think, Hans, we're up to you.

MR. HONERLAH: I don't have anything left to say. I agree with what Ralph said, and I think that was something we really didn't talk about today, was communication to the public. I mean, we look at EPA, and Jeff brought up Brownfield, and how it's been a great success story for certain chemicals of concern; yet, if you were to consider it from a radiological site, just simply probably because the communication and lack of education within the community, it would never really fly, so I think that was a great point that you brought up, Ralph.

Again, nationwide standards for D&D, and how to implement those, specific guidance on the risk assessment, risk-based disposal everyone has discussed. But I think the one thing that we've kind of all said, but maybe tap danced around, that the Low-Level Radioactive Waste Policy Act and the Compact System that was established, was supposed to address the assistance for all these facilities across the country, and hopefully, get rid of the whole NIMBY issue, not in my backyard for this waste. And, essentially, it's stalemated. Nothing has ever taken place since it's been enacted. No facilities have been licensed for disposal. As a matter of fact, facilities have closed since it's been put in play.

CHAIR RYAN: Just a friendly amendment there. One license was granted in California, the land transfer was prohibited.

MR. HONERLAH: Correct. I guess the frustrating part is regionalization, and to address the transportation system. There are numerous RCRA facilities around the country, and there are numerous other sanitary landfills, and C&D landfills, but coming up with some national guidance that is readily implemented by the states, rather than I have a facility in one state that says no more than 10 picocuries per gram total activity from your facility, or your facility had discharges into the sanitary PTW, and there's 20 picocuries per gram Tritium in your sediments; therefore, it's got to be LLRW because it came from a licensed facility. Those things have to be overcome, as well as, I guess, just making some changes. I think it's going to be a hard point, and again, on the education thing to both the folks at our state level, not necessarily the Bureau of Radiation Control, because they're not the ones that monitor or permit those other facilities. It's the RCRA folks, it's the solid waste folks that do that.

CHAIR RYAN: Hans, would you let me call that risk-based or radionuclide risk-based disposal,

rather than origin or definition-based disposal?

MR. HONERLAH: Yes.

CHAIR RYAN: Okay. Fair enough.

MR. HONERLAH: But, again, regionalization.

CHAIR RYAN: Right.

MR. HONERLAH: Because we've currently got a system in place that allows for some 2002 exemptions, and for disposal at RCRA facilities, but the only states that have stepped up to the plate and sort of, I guess, allowed this to happen within their states are out west, again. So, again, we're still stuck traveling over 2,000 miles with this material.

CHAIR RYAN: Remember, just for a little history sake, and, again, I'm plugging the NUREG that you'll see soon on the newsstand. But you've got to remember the states asked for it, nobody forced it on them. Nobody forced compacts on the states, and so they got what they asked for. Now they don't want it, so there is an element of kind of an interesting history there, and compacts were kind of marching along until South Carolina with Governor Beasley made a decision, I'm now in the nationwide business again, compacts just stopped, just like that. So that's some very interesting history, and I keep thinking about

what lesson we take from that, but it's as much kind of a political history, as it is a technical history.

MR. HONERLAH: And I guess the concern of having one compact facility and every waste stream in that compact has to go to -- would, again, be price controls, and how do you afford competition to industry to help control prices?

CHAIR RYAN: And I would remind everybody to also recall that price had two components; one was cost, the other was tax. And in a case I'm familiar with, tax dwarfed the cost, so there is an issue there, as well. But thank you, I appreciate it. Anything else on your list? Tracy. Last and certainly not least.

MR. IKENBERRY: Yes. Well, I agree, there's probably much of anything new left to say. It's all been well covered. I think that of interest is this decommissioning block that Ralph mentioned that we're going to hit in 25 to 30 years, and I think it's pretty certain in 30 years that we won't do decommissioning then like we do today. It'll have to be much different. I don't think we'll have the same radioactive waste capacity in 30 years that we have today, so I think something is going to have to be really different. And Dave actually made me think

about this when he mentioned facilities that could be built to be completely cleaned up, or could be built with no impact. And that made me think, I think it's going to, in terms of some of the design, it seems like facilities are going to have to be made to be decontaminated, and then the buildings and much of the structure gotten rid of as completely clean, or certainly, as some low levels of contamination, because it's going to change.

We've talked about now, of course, that the choice is to demolish and dispose. I think at some point in the future, we're going to reach the point where decontamination is going to become cost-effective with demolition and disposal. And that will, I think, completely change our outlook that we have now on D&D. I don't know when that will come. I don't think I'll be around for it when it does, but I think it certainly is going to come.

CHAIR RYAN: The interesting thought, and I'm glad you came back to that, because I was thinking when Dave spoke, as well; I would be curious to know how many licensed facilities, other than reactors, are in buildings that were designed specifically for that activity, or they're in buildings that were designed for something else, and they're just in that facility

now. I think most of them are in that last category, where well, that looks like a good building, we'll do little renovations and they've got sewer lines, and water lines, and electrical and all that stuff, and we can figure out how to make that work. And I wonder if we took Dave's thinking and said well, let's start with a clean sheet of paper, and say we're going to use this particular process, and it's got these amounts of materials, and how do we keep it from being a decommissioning headache? That's an interesting prospect to think about, so thank you for that.

Yes, Eric.

MR. DAROIS: Let me just add, as you go out and change the state regulations, Mike, in the near future --

CHAIR RYAN: Yes, right.

MR. DAROIS: I wanted to just share one thing that I failed to mention about the Massachusetts situation. As we heard earlier, they do have regulations that impose a 10 millirem criteria. However, in addition to that, they've got another piece of legislation that's about two lines long, that basically says that they will not, the state will not allow any radioactive waste dumps in the State of Massachusetts. And it seems pretty innocuous when you

first read it. It basically says well, we're not going to have any large scale waste disposal sites here.

As we face that issue at Yankee Row, we got the interpretation, which I think they made up as we were discussing the issue with them, but the utility, at the time, wanted to bury some of the clean, very clean concrete on-site, crush it up, use it as part of the backfill to get the three foot elevation. But because there was a possibility there could be a few atoms of radioactivity in it, and they were going to survey it against the DCGL criteria, they said no, that will constitute a radioactive waste dump, and we won't let you put any of that concrete in the ground. So that's just a case in point where you're looking at the release criteria part of the regulations, thinking you're okay, but there's another gotcha on the other side. So as you go change the --

CHAIR RYAN: I'll keep that on my to-do list. Thank you. But it does bring up an interesting dimension. I've been involved in solidifying liquid radioactive waste, and the solidification agent had more radioactive material in it than the waste. Now lots of solidification agents have lots of naturally occurring radioactive material in it. I would be

curious to know if your concrete has a higher Radium and Uranium content than any Cobalt, or any other --

MR. DAROIS: And none of those arguments mattered in these negotiations.

CHAIR RYAN: That gets us back to the other main point, which I think you made, and others have made, which is, if we can get to a risk-informed approach, that's helpful. And I think some of those benchmarks, this is just one of my own to add to the list, that if you can somehow bring in background as a benchmark of some way to think about these things, other than 10 millirem. Ten millirem is very small. I mean, it's 1 percent or so, or 3 percent of background, maybe. And if you look at natural and hand-made, it's pretty small, a typical chest x-ray, maybe, your annual chest x-ray. And, by the way, you pay for that, so that's good radiation, so I think some of those things are worth exploring. How do we get that information across? How do we communicate the risk in the proper perspective and so forth? So it's one to wrestle with.

Anything else? John Flack, you have been patiently waiting.

MR. FLACK: Yes, John Flack, ACNW Staff. When you said I could be king, and not an ex-New York

City cab driver, I was ready to jump in.

CHAIR RYAN: All right, yes.

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

advance plants. And I think that kind of thinking, more probabilistic, more thinking of likelihoods and consequences, is needed.

And, of course, you could certainly capitalize on all the Lessons Learned that you heard here today, and build that into some principles and design criteria, but you're still left with likelihoods of things happening. And I think you have to also look at that piece, as well. And I think that's part of the equation that might be missing here, as well.

CHAIR RYAN: That's an interesting thought. I mean, I quickly jotted down some numbers yesterday. I forget what it was, it was 14 out of 104. Well, that's roughly 14 percent is the probability of the leak, all other things being equal, which I know is wrong, but it's not 10 to the minus 6, so that's something to think about, that if we could get away from deterministic absolutes as the way we communicate, but talk more in the risk language of probabilities, and communicate effectively in that arena, which is a challenge on its own, that's worthy of thinking about. Thank you. Professor Hinze.

MEMBER HINZE: Mike, this is probably a non-issue, because I haven't heard it in any of the

discussion here, but one of the things that we know looking into the future is that most of the new plants will be co-located with existing plants, which will be decommissioned during the operation of the other plant. Are there any implications, or problems, or concerns with this happening?

MR. DAROIS: Can I address that?

CHAIR RYAN: Please.

MR. DAROIS: I just work here. I think the problem - I think we may have more of a problem if we wait, rather than decommission early.

MEMBER HINZE: That's what I'm saying, what's going to happen later?

MR. DAROIS: When we wait 80 years to decommission a site, you've effectively lost all of the Cobalt-60, which is an easy way to detect the presence of anything that may be there, in some regards can be a surrogate radionuclide for those more difficult nuclides to detect. If there were fuel failures, there's plenty of transuranics, and possibly Strontium-90, and they just present a more expensive challenge to go in and clean up, decommissioning, monitoring and all that, so that is something we haven't heard much about, but I do - having been involved in a plant that's had significant transuranic

contamination, that can be very expensive.

Now let's hope the new plant designs don't have significant fuel failures, but there are sites with older plants that have life extensions.

MR. NAUMAN: And to expand on that a little bit, I'm not quite sure that they will. I think the premise that you will decommission while you're operating the other plant on the co-located site, today's experience doesn't reflect that out, except for San Onofre. And even San Onofre is not -- it's still going to decommission to a point, places like Dresden, Peach Bottom, Millstone, Zion, you name it, all the plants that have a decommissioned unit on site, they're going to stay that way until the plant that's operating reaches the end of its life, even Three Mile Island. It's going to stay in the state it's in until such time as the other unit reaches the end of its life, and then they'll decommission together. That's pretty much the plan with the ongoing plants, and it wouldn't surprise me if that will be the evolution for the new plants that are being built on co-located sites.

CHAIR RYAN: One of the things that's interesting to think about is, I'm going to assume that not operating doesn't mean not inspected by the

licensee. They still have pretty robust program of inspection and observation of a plant. Maybe it's not as routine as an operating plant, and for good reason, circumstances aren't changing as rapidly, but the other aspect is with power uprates, the life extension of plants, that's changed the dynamics, too.

I guess it's certainly a question to watch, I think, Bill, that are there groundwater issues developing in the old versus the new, and how do you separate monitoring issues, one from the other. How do you know it's the operating unit, or the closed unit? There's lots of interesting questions to think about.

MEMBER HINZE: It just seems to me that NRC in their regulations have to think about this.

MR. OTT: I think if you look at the provisions of 1406, you'll see that the requirements for minimization of contamination for the new plants are going to make them -- are going to require them to know what's there.

CHAIR RYAN: Yes.

MR. OTT: So you're going to wind up going through some kind of a survey of that existing site, and defining whatever contamination exists, so you're going to have to establish a baseline when you start.

MEMBER HINZE: And that should be done, anyway. Right.

MR. OTT: But it's going to be much more expensive than it was in the past, because in the past, we had no information, basically, in terms of radiological characterization of a new reactor site.

MEMBER CLARKE: We have a couple of other folks who want to ask questions. Dave.

MR. KOCHER: I wanted to make a comment on this holy grail of uniform regulations that everybody calls to. And I know I'm going to be raining on the parade, as we all go charging off, but it's not going to solve all your problems. It would be a good idea to have a benchmark like that for a minimally acceptable cleanup situation, but as far as I know, ALARA has not been repealed. And what that means in the real word is that virtually every site, especially one that has any kind of a significant contamination problem, you are going to have to go through a process of negotiating what the final outcome is going to be. And this doesn't matter, it doesn't matter whether you're doing this under the Atomic Energy Act, or CRCLA. The negotiating process is different in new cases, but you still have to do it, so the standard is some number out there, plus ALARA. The standard is

not the number.

MR. HONERLAH: I think on most large soil jobs in construction, I guess D&D facilities, it's never been ALARA to take more dirt and haul it 2,000 to 3,000 miles because of the risk associated with that. And that's just something that - we always consider it. It's never impacted anything that we've done.

MEMBER WEINER: This is just a challenge to NRC, I guess. One of the things that continues to haunt me is, are these numbers, 25 millirem, 19 millirem, 10 millirem. In the uncertainty bands that you have in getting to those numbers, they're all the same. And I don't know - perhaps this is something that NRC, as the federal regulator, could manage to communicate to the public, and this is something that goes right along with risk-informing any regulation. We need to inform people that, as Ralph so cogently put it, if the standard is 25 millirem, 26 isn't going to result in corpses all over the place. But we really do need to communicate the uncertainties in all of these numbers.

MR. SHEPHERD: Remember that the real limit is 100.

MEMBER WEINER: Yes, that's accurate. And

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MR. SHEPHERD: What we said is for decommissioning, we are going to rather arbitrarily allow for multiple site exposures, and for no firmly documented reason that I've been able to define is, we divide by 4. And you're quite right, which is why we, at the technical level, don't get particularly excited about the difference between 25 for the NRC standard, and the 15 for the EPA standard, because by the time you go through all the back calculations, what's actually measured is a concentration. And the difference in the measurements of the concentration is so small, it's totally overwhelmed by the uncertainty. That's not the same perception that occurs on the top floor next door and downtown.

MR. HONERLAH: I think just real quick to follow up with that; technically in the field to implement any concentration-based criteria with the excavator, with the scabbler, you're not drawing the line between 99 and 100 picocuries per gram. You're getting 90 percent of it, you might leave some small residual amounts there, so you're, by essence of the project, you're typically taking more, anyway. But I agree, it's typically, it's the legal folks that say we can't make that commitment to spend the extra

federal dollars. We can't set that precedent.

MEMBER CLARKE: Ruth, I think -- I'm sorry, Eric. Go ahead.

MR. DAROIS: One of the resulting impacts - well, we can't take that too far, because one of the resulting impacts is, if you throw another factor of 2 onto the 15 and bring it down to 7-1/2, you eventually run into a problem of detectability, survey design, and now the survey costs are exponentially increasing, so you can only use that multiple a few times before you reach that point.

MEMBER CLARKE: I think that's a very interesting area. And just to throw out another example - as you know, from the EPA side, the states can take primacy for certain acts, and they can set their own limits. As I recall, the primary drinking water standard for benzene is 5, and I think New Jersey adopted 2, so where does that leave us? I mean, somehow in the educational piece we have to find a way to get these things out to the people.

I think this would be a good place to wrap-up. We don't want to discourage --

CHAIR RYAN: I think everybody got an A on their homework. What do you think?

MEMBER CLARKE: Oh, yes, I think so. I

think so. And no good deed goes unpunished, so what we'd like you to do is write all this up, and --

(Laughter.)

MEMBER CLARKE: Let me take this opportunity. I think this has been a very interesting day. And I want to take this opportunity to thank all of you, our speakers, and our panel, very much, for your help.

MEMBER HINZE: And thanks to Derek and you.

MEMBER CLARKE: Well, yes, I was coming to Derek. I think he's - there he is. Derek, as you know, had a great deal to do in organizing this. Thanks, Derek, and thank all of you for coming, and back to you.

CHAIR RYAN: Let me add my thanks to a real expert panel. I know all of you have been here many times, some of you, I guess, at least, most of you, and we really appreciate the time you take to share your experiences from practice. It is, at least for the committee, I know for sure, and I'm sure for the staff, of hearing the real world experiences in a forum where we're looking ahead, rather than trying to fix a particular problem, really gives them insights that I hope are very helpful to them, as they are to

us. So we're going to try and capture all of this, I think Jim will clearly write a letter to the commission, try to capture particularly some of these key issues that you see, and you've identified, with some explanation, to give them some sense of what the practitioner community and the broader regulatory community see as key issues in this area. So I want to add my thanks to Jim's, and we'll, I think, conclude the working group at this point.

MEMBER CLARKE: Yes, Mike, if I could just make one comment.

CHAIR RYAN: Sure.

MEMBER CLARKE: Really several things struck me in the discussions and the presentations. When we were talking about the dynamics and the ability to predict the future, I was thinking back to a site in Lawrence, Massachusetts that you might know, you may have run into at some point. It had 22 buildings, some seriously, others not so seriously contaminated with PCBs. The decommissioning went on, I think it started in 1983, and I think it's a Brownfields project now. Those buildings were decontaminated so that they could be torn down and taken to a disposal facility. And those dynamics are

just - when you look at the time horizons that we're trying to think ahead, those dynamics are going to be hard to predict. Thank you.

CHAIR RYAN: Okay. Thank you. Let's see. I think on our agenda, that is the conclusion of our working group. We finished a little bit ahead of schedule, so if there's no other business for the committee this afternoon, we will adjourn our record, and adjourn the meeting for the day. We'll reconvene at 8:30 tomorrow morning.

I might just as a little teaser, we're very fortunate to have scientists from the French Academy of Sciences here tomorrow to discuss their study of low dose effects, and it's a very interesting view that they have, and where they're going to share that with us face-to-face, so we'll be happy to have that tomorrow, and you're all more than welcome to stay. Thank you.

(Whereupon, the proceedings went off the record at 4:14 p.m.)

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