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NUCLEAR REGULATORY COMMISSION

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WORKSHOP ON DEVELOPMENT OF REGULATIONS FOR

SPENT NUCLEAR FUEL REPROCESSING FACILITIES

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Tuesday, October 19, 2010

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Sheraton Albuquerque, Uptown Hotel

2600 Louisiana Blvd., NE

Albuquerque, New Mexico

9:00 a.m.

BEFORE: CHIP CAMERON, Facilitator

NRC STAFF:

MARISSA BAILEY

JOSE CUADRADO

JACK GUTTMAN

TOM HILTZ

MIRIAM JUCKETT

LAWRENCE KOKAJKO

JACK DAVIS

JACK PARROTT

PHIL REED

WENDY REED

PIERRE SAVEROT

OTHER ATTENDEES:

JANICE ARNOLD-J0NES

SVEN BADER

BEATRICE BRAILSFORD

JIM BRESEE

ANNE CLARK

BISWAGIT DASGUPTA

MIKE EHINGER

AMY GLOVA

DON HANCOCK

GEORGE HELLSTROM

ROBERT HOGG

SIMON HSIUNG

JIM LIEBERMAN

ROD McCULLUM

TOM PHAM

JAMES ROSS

DAN STOUT

REX STRONG

A G E N D A

P R O C E E D I N G S

(9:00 a.m.)

MR. CAMERON: Good morning, everybody. Welcome to the Nuclear Regulatory Commission workshop on a reprocessing rulemaking that the NRC has embarked on. And around the table I would just ask if we could keep the acronyms down, there's a lot involved in this area, but one that we will use will be NRC.

My name is Chip Cameron and it's a pleasure to serve as your facilitator for this meeting over the next two days, and I'm going to be assisted by Miriam Juckett, who is back there, and she's from the Southwest Research Center in San Antonio, Texas.

And I just want to address some meeting process issues before we get into the substantive discussions today, and what I'd like to do is tell you about the format that we're going to be using, tell you about some simple ground rules to just help us have a productive meeting, go around the table for some introductions, and then I'd like to walk through the agenda with you to make sure that we all understand the agenda and answer any questions about the agenda.

In terms of the format, we're using a roundtable format and usually the roundtable is in the

shape of a U. Well, we have a V today, but it is a roundtable concept as opposed to a big town hall meeting and the idea behind having a roundtable is for all of you to be able to talk to one another about the issues rather that people just talking to the NRC staff. And we have representatives of the interests who might be affected by a reprocessing rulemaking or concern about a reprocessing rulemaking and reprocessing issues.

And the NRC staff also is here at the table to serve as a resource for you, to answer any questions that you have, perhaps to share a little bit about their thinking about what directions they might go with this particular rulemaking. So we want to hear not only each of your opinions and perspectives on the issues but we'd like to get your reaction to what you hear from others around the table.

And this is a modest attempt to develop a richer type of data for the NRC to use in developing its rulemaking, and it's also an attempt to provide all of you with some more information about the issues. The NRC is also taking written comments on the issues, and I believe that the date, Jose, is November 4 for the submission of written comments. So you may hear things around the table that will help

you to formulate your comments.

And the focus is with you folks at the table for the discussion but we're also going to be going out to anybody in the public periodically to hear what questions or comments you might have about what you hear at the table and on the issues.

In terms of ground rules, they're very, very simple. If you want to speak, could you please just put your name tent up like that and then I'll know that you want to talk and you won't have to worry about jumping into the conversation or continually having your hand up. And I would ask that only one person speak at a time, not only so we can give that person our full attention, but also so that our court reporter, our stenographer, who is Carol Dawley back here, so that she can get what I call a clean transcript of the meeting, she'll know who's talking if we only have one person at a time talking.

And I should tell you this now, when you do speak you have to not only push the button on the microphone but you have to hold it down which I guess is some sort of devious way to keep comments short.

(General laughter.)

MR. CAMERON: But at any rate, you have to keep holding that button down.

And I just would encourage all of you to participate fully. There are going to be a lot of different views around the table, but this should be a learning experience for all of us. And we have two full days, I think we have a lot of time, so whatever questions, whatever discussion you want to have, let's take advantage of the opportunity.

And I'm going to be here to help you form discussion threads, so I may not take the cards and name tents in the order they're turned up so that we can follow a discussion rather than having a lot of unrelated monologues. I am going to keep the famous parking lot for issues that might come up that don't fit squarely into the agenda item that we're addressing and we'll come back and get those.

And let's go around the table for introductions, and if you could introduce yourself and give us your affiliation and perhaps one or two sentences on any concerns that you have about this issue or what you'd like to see accomplished over these next two days of the meeting. And then after that we'll go to agenda check and questions on that.

Anne, do you mind if I start with you, and we can test that button theory.

MS. CLARK: Well, it's kind of nice that

we're sitting down because otherwise I'd be too short for the microphone. But anyway, my name is Anne deLain Clark. I am the coordinator of the New Mexico Radioactive Waste Consultation Task Force which is a task force made up of the heads of seven different state agencies, so I work for the State of New Mexico. I'm headquartered in the Energy, Minerals and Natural Resources Department because my cabinet secretary, currently Jim Noel, is the chair of the task force.

My role is mostly as a policy analyst and advisor to my cabinet secretary and to the governor, and we do most of our broader work through the Western Governors Association, and I'm the co-chair of the Western Governors Association Technical Advisory Group on Waste Isolation Pilot Plant Transportation. And I may have gotten that in the wrong order, but it's something like that.

Anyway, I have great concerns about -- well, transportation is my primary expertise in terms of policy issues, and the WGA, the Western Governors Association, put together a comprehensive manual on transportation protocols for transporting waste to WIPP. So that's where my program mostly focuses but I do also cover other areas as well as they come up.

And one of the big concerns I have in

terms of reprocessing is what are we going to do with not just the radioactive waste that comes out of reprocessing but the chemical waste that will come out of reprocessing. And I'm not sure that NRC has the purview over all of that, but I certainly think it needs to be discussed and included in consideration. Thank you.

MR. CAMERON: Thank you very much, Anne. Robert.

MR. HOGG: Thanks, Chip. I also would be standing behind somebody or not visible, so I feel for you, Anne.

I'm Robert Hogg. I'm with Babcock Wilcox, been there for 12 years, prior to that on the staff at NRC. I've been working for the last couple of years with the NEW Task Force back in the fuel cycle trying to help them bring some experience and semblance of what can be done and should be done in the areas of risk assessment for the back end of the fuel cycle. Experience working with criticality, safety, risk analysis, PRA as well as waste issues and performance assessment for waste.

MR. LIEBERMAN: I'm Jim Lieberman with Talisman International. I'm here today as a consultant to Energy Solutions. I'm also a former NRC

staffer. I've worked with the Nuclear Energy Institute in developing their white paper proposing a framework for reprocessing, and my goal today is to help NRC get the information they need to make whatever decision they think is appropriate.

MR. HILTZ: Good morning, everyone. My name is Tom Hiltz. I'm branch chief at the Nuclear Regulatory Commission in the Office of Nuclear Material Safety and Safeguards. My branch has been responsible for about the last two years in working towards developing a framework, a revised framework to license a potential commercial reprocessing facility.

I'd like to continue to build on our dialogue in Rockville that we had to help inform the staff thinking with regard to the regulatory basis that might support a potential rulemaking. I think that the questions that we've outlined in the meeting notice might be helpful for us, and it's also my hope and goal that the staff here will be more open in some of our thinking and share some of our thinking too to help stimulate additional discussion that may be helpful for us as we move down the road. Thanks.

MR. CAMERON: Thank you, Tom. Phil.

MR. REED: My name is Phil Reed. I'm a radio-chemist within the Division of Risk Analysis

within the Office of Nuclear Regulatory Research. I've worked with reprocessing issues for several years, and I'm also a member of the working group that's developing the technical basis document for regulation.

And my purpose here this morning and the next two days is to make sure that we discuss most of the issues for which we're writing this regulation. We want to make sure that there are no holes left and we want to make sure that we have adequate discussion on at least the major issues to be included in the regulation.

MS. REED: Good morning. My name is Wendy Reed. I'm a radio-chemist in the Office of Nuclear Regulatory Research at the NRC. I'm also a member of the working group that's been tasked with developing the regulatory basis document for reprocessing regulations.

I'm looking forward to hearing people's views and concerns, with the hope that that will help inform the work that we are doing. Thank you.

MR. BRESEE: Good morning. I'm Jim Bresee. I'm with the Office of Nuclear Energy, Department of Energy. My background is chemical engineering. My office is responsible for the

development of alternative fuel cycles for possible future application in the U.S. and elsewhere. Our responsibilities extend over all aspects of these advanced cycles with a special emphasis on the wastes that result, the waste characteristics and their long-term issues associated with management.

MR. STOUT: I'm Dan Stout with the Tennessee Valley Authority. TVA is very committed to nuclear energy; we have six operating reactors; we have one under construction that's expected to go operational in 2012; we're making progress on development of a site for another reactor. And TVA is also supportive of closing the fuel cycle and supports the efforts that are ongoing by the NRC and by NEI on recycling regulatory framework development.

Prior to that I have personal experience at the Department of Energy where I was director of Nuclear Fuel Recycling. Thanks.

MR. McCULLUM: Hello. I'm Rod McCullum, Nuclear Energy Institute. About a year ago I took on leadership of the Recycling Task Force at NEI and inherited the good work of a lot of the experts you see sitting around the room today, trying to keep the effort moving forward. As my member company representative just said, there is a lot of support

for these technologies in the industry. There are a lot of decisions that lay ahead of us in terms of when, how, what, where. We're going to pursue these technologies.

One of the critical elements that `need to be in place before those decisions can be made is the regulatory framework, and we really appreciate NRC having these workshops. This is the second workshop. We did one of these in Maryland a couple of weeks ago and had a lot of really good discussions, we had a lot of good participation from stakeholders, and it's good to see that we're getting some new stakeholder faces involved here as well.

I know before I got involved in this at NEI, I was leading the industry efforts with respect to the entire Yucca Mountain regulatory framework, all the way up to the licensing process, and I won't digress into why that got interrupted, but I will say working with NRC to develop a regulatory framework, I've been there and I've done that. I think in the Yucca Mountain case you got a lot of public stakeholder input very early in that process, and then put in place a really strong framework. Again, I won't digress into what's happened to Yucca Mountain, but I don't think I'd put the blame on the regulatory

framework.

So looking forward to continuing down an equally as productive path here.

MR. CAMERON: Thanks, Rod, and I think you have some company in terms of Yucca Mountain refugees here today -- if I can use that term.

(General laughter.)

MR. CAMERON: At any rate, Jose.

MR. CUADRADO: Good morning, everyone. My name is Jose Cuadrado. I'm a project manager and part of Tom's staff at the Office of Nuclear Material Safety and Safeguards. I'd like to welcome everybody today to this workshop. I'm part of the group staff that put together this set of workshops and all the logistical arrangements and all the technical issues that are going to be discussed here today.

I'd like to take this opportunity to welcome members of the public and the panelists and thank them for participating, and I invite you to be as open and up front as possible in discussing these issues. The NRC certainly looks forward to all your input. Our commitment to openness, I think, shows by putting this format, so hopefully you'll take this opportunity to let us know what you think.

MR. STRONG: Rex Strong, United Kingdom.

I've spent 30 years working at a site which includes reprocessing of spent nuclear fuel waste management, nuclear fuel manufacturing and a variety of activities. So I've spent that time in and around environment of safety, security and quality, and I'm very happy to be invited to come along today and tomorrow, so I look forward to see how this pans out.

MR. CAMERON: And thank you very much, Rex, for joining us.

MS. BAILEY: I'm Marissa Bailey. I'm deputy director in the Division of Fuel Cycle Safety and Safeguards in the Office of Nuclear Material Safety and Safeguards. My division has had lead responsibility as far as developing the regulatory framework for reprocessing over the last three years, and since I'll be giving the overview, I guess I'll just stop right here for now.

MR. CAMERON: Okay. Thanks, Marissa. Sven.

MR. BADER: I'm Sven Bader from AREVA Federal Services. I'm in Charlotte. My prior experience has been primarily on the Mocked Fuel Fabrication Facility -- which will be called the M-Triple-F probably henceforth -- as a safety engineer. Obviously, AREVA also has operating facilities around

the world in France and in Japan -- well, the Japanese facility is not AREVA's but AREVA helped build it -- and I hope to provide some insights into some of the problems or issues we have here. And my focus here is to get some regulatory stability so that we can design some facility for the United States.

MR. CAMERON: Thanks, Sven. Don.

MR. HANCOCK: Good morning. I'm Don Hancock from Southwest Research and Information Center here in Albuquerque, so I want to welcome everybody to Albuquerque. All the businesses that you patronize will especially appreciate your being here, so I encourage you to do that and enjoy our beautiful city.

I was going to say, but since it's already been pointed out, there is another Southwest Research in the room. People at my organization called Southwest Research Institute in San Antonio the other Southwest Research. We're Southwest Research and Information Center in Albuquerque. We're a private nonprofit that work on a variety of issues, primarily providing technical assistance to communities about issues of concern to them.

And in New Mexico one of the major issues of concern to communities is the fact that over 40 percent of the uranium that has ever been mined in the

United States has come from this state, so we continue to have a lot of concern and issues with uranium issues in the state, and my organization has been heavily involved in that. A couple of people in the room that work on the waste isolation pilot plant, also are where I've been involved in that issue for the last 35 years.

So I have lots of concerns about reprocessing, about the continuing legacy of reprocessing in this country, and in my view, we need to address the past problems of reprocessing as we're talking about any new reprocessing facilities.

MR. CAMERON: Thanks, Don.

MS. BRAILSFORD: Thank you. My name is Beatrice Brailsford. I'm with the Snake River Alliance, Idaho's nuclear watchdog and advocate for clean energy since 1979. The alliance was founded by a small group of people who met on a park bench in Boise, Idaho after they read in their local newspaper that the Idaho National Laboratory routinely injected hazardous and radioactive waste into the Snake River Aquifer which is a sole source aquifer for nearly 300,000 people.

The injection well at the Idaho National Laboratory came right out of the chemical reprocessing

plant at INL. That plant has since closed, though the cleanup of its waste will extend for decades more. In the meantime, the Idaho National Laboratory also has a pyroprocessing program, the proliferable portion of the integral fast reactor program that is still going on.

My concerns about reprocessing focus very strongly about the waste that it produces and the contamination that it has caused not only in my home state but around the world. I think it is undeniably the most proliferable technology in the nuclear endeavor, and particularly as we are looking for reasonable responses to climate change. Looking at technologies that are so incredibly expensive that they slow any response down to zero I think has to be looked at with a good deal of skepticism. Thank you.

MR. CAMERON: Thank you, Beatrice. Thank you, all. I think we have a sterling group around the table, and again, I just encourage discussion on all of the issues.

I just want to go over the agenda with you, and let me first address an overarching issue. I know there are lots of policy issues on reprocessing and some of the issues that we've already heard about in terms of the cost of reprocessing, and these are

important issues. They are perhaps beyond the NRC's ken, so to speak, and what we're doing here today is focusing on what the NRC's regulatory and licensing framework should be if there is an application for a reprocessing facility. But given that, many of the larger policy issues of economics proliferation have implications for the NRC regulatory framework, so if there are concerns related to that, let's get them out on the table too.

Secondly, there's many complicated issues involved in building the reprocessing framework and in trying to keep straight what the many components of a regulatory framework might be, and we'll be talking about those today in terms of basic design criteria, sometimes called general design criteria, the integrated safety analysis that might inform the process. Then there's the famous IROFS, items relied on for safety, and then there's tech specs.

And there's a relationship among all of these and we're going to be talking about all of that but we're going to try to simplify it a little bit by having not only Marissa's opening presentation and then we'll have some questions afer that or time for questions, but also for each agenda item we're going to have a tee up by the NRC staff to give you an idea

of what the context is for that particular discussion.

And I'm hoping that most of you are familiar with the original Federal Register notice that the NRC published on all the issues, many of them called gaps in the regulations, and there are many issues there. We're trying to focus on the major issues during these two days, and a lot of the important but perhaps more mundane or straightforward issues can be addressed in written comments.

We're going to start out with looking at the regulatory framework, what are the alternatives for establishing a regulatory framework for reprocessing, and you're going to see that there are three choices that are laid out by the staff using 10 CFR Part 50, Part 70 or a new regulation. Should it be technology-neutral and I know we're going to have lots of discussion about that, and we want to, I think, get some discussion of what is technology-neutral, does it make sense. And then there's also one-step licensing, a potential one-step licensing process.

And I just want to draw your attention to the third dash under possible questions under the 9:45 a.m. discussion, and that should be what should be the minimum level of facility design information necessary

for the licensing of reprocessing.

You'll set that later on today at 3:15 there's a discussion for alternatives for establishing design and operational requirements for reprocessing facilities. I guess my caution with that dash is that we don't want to weigh down the first topic with getting off on design considerations, and it may be better to wait until we get to the design and operational. But it's just a caution. I mean, there may be relevant things that we would say on that in our first discussion.

And after that discussion we'll go out and see if there's any comments from the public, and then we're going to head to the second topic, and that's going to be at one o'clock and that's alternatives for safety and risk assessment requirements. And we're going to have a tee up by the NRC, but also -- there's a reason we usually don't have presentations by people around the table other than the NRC staff, but the Nuclear Energy Institute, NEI, has just completed a paper, actually, on the whole subject of the use of integrated safety assessment and the use of probabilistic risk assessments, and that's going to be a major part of the discussion we want to have at one o'clock today -- Rod McCullum from NEI is going to do

a very short presentation for us this afternoon on their paper to sort of also tee up that particular discussion.

And you're going to see the lead question there is should the NRC have a safety risk goal or limit, and I think that from sitting around and listening to all of you before and reading about this, one of the critical questions in my mind is that is a safety goal needed as opposed to a safety envelope.

And I'm hoping that this NEI white paper on reprocessing was on the website. This is the so-called Part 7X that NEI developed. Well, in there they have what they call a safety envelope. So we're going to start with that threshold question of safety goal, and I don't want it to derail the rest of the discussion unless it's really relevant to that. And then we're going to go into the integrated safety assessment issues, probabilistic risk assessment. And then we're going to move to opportunities for questions from the public.

And then we're going to go to design and operational requirements for reprocessing and those are laid out in a couple of different categories for you. The first two dashes talk about general design criteria. You might hear people around the table

talking about basic design criteria. Correct, Robert? Or BDC. And one of the things that we need to get straight right off the bat is that are these the same things just under two different names, or is there some fundamental conceptual difference between GDC and BDC, because I think that can be confusing.

Then there's the whole issue of tech specs, operator licensing requirements, emergency planning cyber security, but I think the main focus of our discussion there is going to be on the general or basic design criteria and the tech specs. And that's where you really need to start thinking about what the relationship is between design criteria, what comes out of the integrated safety assessment and/or the probabilistic risk assessment, how these items relied on for safety, IROFS, are generated out of an integrated safety assessment process, and then where do the tech specs come into play.

So one of the things that we have to make sure that we understand is how all of those relate to one another. And then we go to the public again.

And we do have a break this afternoon and we don't have one built in this morning, but when we get to 10:30 or so, we might want to just take a break. There's a coffee shop right out here where you

can get some coffee because I think we have enough time in two days to take a break this morning, to allow ourselves a break.

And then tomorrow, and I'll go over tomorrow's topics at the beginning of the day tomorrow, but we have security and safeguards issues and there are proliferation issues there, and there's also issues around material MC&A, material control and accounting. So we just want to make sure that we keep those straight. Waste has been mentioned a couple of times, Anne and Beatrice, important issues. Jim talked about his experience with that. So we'll go into all of those issues.

And then we're going to close up with environmental issues, and I just would say that environmental issues are not going to be directly covered by this particular NRC rulemaking, as I understand. Is that correct, Tom?

MR. HILTZ: That is essentially correct. There are certain environmental emission regulations that we'll look at, but a separate effort which will be a companion effort if we move on to rulemaking, will be to develop an environmental impact statement, and although that's not the topic of this workshop, if we have an opportunity to gain any insights on that,

we do have some folks in the room that would probably appreciate that.

MR. CAMERON: And that's an important aspect of this. As many of you know, the environmental review requirements of the National Environmental Policy Act, either an environmental assessment or an environmental impact statement, also apply to rulemaking if it would be considered a major federal action significantly affecting the human environment. There's a whole set of environmental issues, not just effluent emissions, and that's very relevant to this rulemaking.

The two related efforts, the NRC is starting to develop potential revisions to its radiation protection requirements in 10 CFR Part 20. That's on a separate track, but whatever comes out of there, just like existing Part 20, is going to apply to these facilities. If there's no change, the revisions to Part 20 would also apply. So that's one thing to keep in mind.

And then importantly enough, there's the EPA regulations on radiation in the environment in 40 Code of Federal Regulations Part 190. They are also contemplating a rulemaking at some point. They're not with us at the table today, although we would have

liked them to be here, but we understand that they're very early in their process and there's not much they can say about this upcoming rulemaking, and it's very relevant to reprocessing. And we might want to talk about how those issues might affect reprocessing facilities for the edification of EPA and the NRC Part 20 staff.

But I just wanted to emphasize that those are important rulemakings, they're related rulemakings, but they're off the table at this point. I mean, we can discuss them but they're not going to be addressed in this rulemaking.

So that's a long-winded overview of the agenda. Are there any questions about the agenda at this point?

(No response.)

MR. CAMERON: Okay. Well, Marissa, are you ready to talk with us? Okay. Marissa Bailey is going to give you a context on this rulemaking.

MS. BAILEY: Normally I'd like to stay seated down also because I'm short also, but I couldn't push the button the entire time.

First of all, I'd like to welcome you to our workshop on reprocessing, and it's been mentioned a couple of times already, but this is the second

workshop that we are having on this issue, the first one being in Rockville.

And it's been mentioned a couple of times already that the NRC is in the process of establishing a regulatory framework for reprocessing, and where we are in that process is that we are developing a regulatory basis for rulemaking. The purpose of this workshop is to get stakeholder input on the gaps that we've identified and how we should be addressing those gaps in our regulatory basis document.

This is an important part, this workshop and the public process is an important part of the regulatory framework development of the rulemaking process, so I'm looking forward to a good discussion on the issues that we're bringing up today. I would like to encourage robust discussion among all the participants, and like Tom, I'd like to encourage the staff to be open in sharing their thinking so that we can fuel the discussion.

What I'll be doing basically is giving a fairly quick overview on the effort of developing a regulatory framework for reprocessing. I'd like to talk about basically where this effort lies in the NRC organization, talk about where the regulatory framework is now for reprocessing and the public

process, and also talk about the schedule for this whole effort.

So first let me talk about where this effort belongs organizationally, and this is an abbreviated org chart of the NRC, as you can see, it doesn't really have all of the offices in the NRC but it does identify some of the major offices that are involved in reprocessing. And NMSS has the lead for developing the regulatory framework for reprocessing, but I'd like to point out that this is a multi-organizational effort, as you can see by the staff that's sitting at the table and will be sitting at the table in the next couple of days.

The Office of Federal and State Materials and Environmental programs, or FSME -- and from now on I'm going to use that acronym even though we're trying to avoid acronyms -- is a key player to this effort. They are responsible for the environmental piece, the environmental impact statement. They also are playing a key role in helping us to address the waste gaps.

The Office of Research is also a key contributor to the tech basis document and they are helping us to address some of the issues related to risk and also to the structure of the regulatory framework.

NSIR is also a key player and they're helping us to address some of the security and safeguards issues.

And within NMSS the lead division for this effort has been in the Fuel Cycle Safety and Safeguards Division, but over the next few weeks we do plan on transitioning the management responsibility for that effort to the Division of High Level Waste Repository Safety.

And I'd just like to take a couple of minutes to give you the reasoning for why we are going to be transitioning the management of this effort to the Division of High Level Waste Repository Safety, and it really has a lot to do with an integrated approach to spent fuel management.

Reprocessing is going to be or could be a very important component in the national strategy for managing spent fuel, and we recognized that when we developed the integrated spent fuel management strategies, and in the Integrated Spent Fuel Management Program, reprocessing is a key component along with disposal of high level waste and extended storage and transportation. And if you review the regulatory gaps for reprocessing, you can see that it's got kind of tentacles those two issues, to those

components, and it's also got tentacles to low level waste management and security.

So the object of the Integrated Spent Fuel Management Program is basically to enhance the effectiveness and efficiency of regulating the back end of the fuel cycle, and we want to make sure that as we move forward in addressing reprocessing and addressing ultimate disposal and in addressing extended storage and transportation that we're working closely in addressing those three components that we're integrating and that we're not promulgating rules and policy and guidance that could have an adverse impact on one of the three components, so we want to make sure what we are truly integrating.

And it's in the spirit of integration and in facilitating that integration that we are putting the responsibility for reprocessing under the one management umbrella and that's going to be Division of High Level Waste Repository Safety which is why you see today Lawrence Kokajko here and Jack Davis and Jack Guttmann. I think most of you know Lawrence is the director for the Division of High Level Waste Repository Safety, Jack Davis is the deputy director there, and Jack Guttmann is one of branch chiefs. So that's why you see some Yucca Mountain refugees, as

Chip put it here, in this meeting, because we are preparing for this transition.

Let me just talk about reprocessing specifically now. There is actually an existing framework for regulating reprocessing or for licensing reprocessing facilities, and that currently exists in 10 CFR Part 50. In fact, in the 1960s and 1970s, we did license a reprocessing facility and we did issue a couple of construction authorizations for reprocessing facilities.

But over the years, Part 50 has evolved and it's evolved to have a greater focus on power reactors and has really left reprocessing or production facilities behind, and that is why we have initiated the effort, first of all, to do the gap analysis, and then to start developing the regulatory basis for reprocessing.

The process for developing the regulatory framework will involve the gap analysis which we completed a couple of weeks ago, the development of the regulatory framework which we're in the process of doing now, drafting the rule, and conducting the environmental impact statement. This is a process where public involvement is very important. We do want to and we need to make sure we consider and

factor in the input of stakeholders because the issues are broad, and technically and policy-wise they're very complex.

The rulemaking we envision is going to be a considerable effort that's going to affect many parts of the NRC regulations, and so the input from our stakeholders we believe is very important. And as we continue to move forward in developing this framework for reprocessing, we are going to continue to reach out to our stakeholders to get your input.

And I think Chip already talked about the approach for the workshop and so I won't spend any time on that.

And I'd just like to talk about the schedule. Right now we are writing the regulatory basis for rulemaking. We expect to complete the draft regulatory basis in September 2011, and then somewhere in the 2012 time frame complete the final regulatory basis, and if approved, initiate rulemaking. At that time we would also initiate the initial environmental responsibilities. Our goal is to have a draft rule published in the 2013-2014 time frame and the final rule in the 2015 time frame. Of course, the schedule depends on resources and in 2011 I think we're fairly well resourced to at least complete the draft

technical basis in September.

And these are just a list of websites where information on reprocessing and on this effort is available, so it's there for your convenience.

And that concludes the overview that I wanted to provide.

MR. CAMERON: Okay. We're going to go around the table, and we'll start with Don. I just wanted to ask you to emphasize one thing that you already had up on the slide is that after you complete this stage of the process in September 2011, then it has to go to the commission for the commission to approve proceeding further.

MS. BAILEY: Right. The commission has to approve proceeding with rulemaking.

MR. CAMERON: Okay. And Marissa, do you want to relax and sit, and we'll go to questions. Don.

MR. HANCOCK: Thank you. I had a couple of questions that I wanted to get some clarification on and also relating to part of this comes from the SECY 09-0082 document. Can you be a little bit clearer with me about what the resources are that the NRC is putting into it? And I guess it may be more of a question for some of the industry folks around the

table than for you, but there's been reference to industry saying they want to come, having said they were going to come in with a license application in 2012, and so I'm trying to get some understanding from the industry folks about what their schedules for licensing applications might be.

MS. BAILEY: Yes. The resources that we've estimated, at least for 2011 to develop the regulatory basis, is about 12 FTE and about $1.5-1.6 million. And I'll let the industry answer the question about their plans for submitting an application.

MR. CAMERON: Rod McCullum.

MR. McCULLUM: I think the simple answer to industry's plans is we're still developing our plans. You know, you have a lot in play right now. You have a Blue Ribbon Commission out there that is visiting the whole fuel cycle question. After the Blue Ribbon Commission makes its recommendations, I think we should see some draft recommendations from them early next year. There will have to be some sort of a legislative initiative in Congress. There will be a different Congress coming up next, maybe the same administration, maybe a different administration.

As I think you've already heard from Dan

here, and as you see the representatives of the companies out there, there's a lot of interest in doing this but there really isn't a specific schedule. And I think one of the most important points that I can make here on behalf of industry here is the time in which a group of companies and industry have decided okay, we're going to build a facility and we're going to submit an application on date X, that is not the time to start developing the regulatory framework. If you wait until that time, it's too late.

Rulemaking is a very deliberative process, it should be a very deliberative process. NRC has laid out a schedule and most of industry appreciates the schedule leading up to a rule in 2015, some would like it to go faster. But we hope NRC will go through that deliberative process, develop a robust, a strong, a defensible rule -- that's very important to us that we have a defensible regulatory framework -- and then seeing that framework in place.

You know, I talk about the Blue Ribbon Commission, the politics, the economics, what's going to happen to the price of gas and all that sort of stuff, what's going to happen to the price of uranium, looking at what long-term projections are out there,

but having the regulatory framework in place is a key decision-making input.

So where there may be interest in industry in submitting an application in 2012, 2013, whatever the date might be, the more we know about what the regulations are going to be, that drives our decision-making. You can't make sound business decisions without knowing what the impact of the regulations are going to be. So this is an input for us.

MR. CAMERON: Okay, Don.

MR. HANCOCK: Can I just do a follow-up? And this is back to Marissa or whoever else from the NRC can answer it. What I just heard Rod say is very similar to what I hear other parts of the nuclear industry say. One of the parts of the nuclear industry that is, in fact, active, is working in New Mexico and other parts of the nation is the uranium development industry, and particularly with what they like to call the new in situ leach technology. There is no in situ leach regulation that the NRC has, rather they're bootstrapping the old regulation for, quote, old uranium mining.

And so I guess my question is how was the decision made to prioritize the reprocessing part of the nuclear industry over a rulemaking on in situ

leach which if we were doing such a rulemaking roundtable in New Mexico, we would have lots of people in the audience for that rulemaking as opposed to the reprocessing rulemaking which seems, frankly, less relevant to a lot of us in New Mexico.

MR. CAMERON: Marissa.

MS. BAILEY: I really can't speak to the part of the in situ leach and what the decision for that is, but for developing the framework for reprocessing, I guess I'd have to go back about three years or so with the Global Nuclear Energy Partnership, and at that time the commission had instructed the staff to look at the regulatory gaps for reprocessing with GNEP in mind.

Ultimately, GNEP sort of got dropped, the administration lost interest in that, but around the same time frame we received two letters of interest from the nuclear industry for at least their interest in pursuing licensing of a reprocessing facility. And so it was with that in mind that the commission directed the staff to continue with conducting the gap analysis and completing the gap analysis and initiating the development of a technical basis for reprocessing.

That's the direction that we are working

with, and until the commission directs us otherwise -- well, that's the direction we're working with, that's how we've been resourced, and I guess until the commission directs otherwise, that's kind of where we're moving forward.

MR. CAMERON: Go ahead, Don.

MR. HANCOCK: To maybe not belabor the point, but to make the point clear, in New Mexico a major issue has been, is and will continue to be the uranium part of the nuclear industry, and some of the companies here at the table are also involved in that.

But from an NRC standpoint, it's frankly disappointing for people in New Mexico to have a meeting like this -- which we're not opposed to having a meeting like this, we certainly support a roundtable kind of discussion and the people in the room who've have dealt with know on the stakeholder side we've put in a lot of time and energy into having EPA and DOE and the state do roundtable kinds of things, so I want to be clear what I'm going to say is not misunderstood -- but the NRC has a lot of role in New Mexico now in terms of cleanup of licensed facilities that are affecting people's health today.

The NRC isn't putting enough resources into the Homestake Superfund tailings cleanup in New

Mexico, isn't putting the resources needed into the cleanup of the Northeast Church Rock Mine -- and I'll be interested in talking to the GE people about that as well -- so when it comes to resources, we have a really strong interest in how NRC uses its resources, and frankly, the reprocessing rule doesn't look to me and to other people in New Mexico as the right place for the NRC to be putting because there are other things -- and I've already mentioned two: one, another rulemaking, and another, actually on-the-ground work that needs to be done now to protect people's health.

Just to make the point clear, one of the staff people from my organization has been relocated twice in the last three years from his home by the Northeast Church Rock Mine because it's too dangerous for he and his family and other people to live there because it hasn't been adequately cleaned up, and the NRC has part of the responsibility for that, as well as EPA and other groups.

So it's a direct health and safety issue to people in this state. The NRC has responsibilities that they're not fulfilling.

And so I want to make it clear I'm clearly willing to talk about the reprocessing rule but the

record needs to be clear, and frankly, the NRC people in this room need to go back to Rockville and to make sure that all of the various agencies, and frankly, the commissioners, because you don't come out and have these kinds of meetings on the kind of cleanup that we're talking about in this state.

So from a New Mexico standpoint, we want to make it clear that we'll talk about reprocessing but we fully expect to have the NRC, and frankly, industry people, be a lot more responsive on the problems we're facing today, the industry proposals that we're facing today and tomorrow and next year and not just the industry desires to have a reprocessing rule in 2012 or 2015 or whenever. That's not the only issue.

And frankly, in terms of health and safety and livelihood of people in this state and some other states that are affected by uranium development, this one is not the top priority. NRC needs to hear that, that needs to go back and there needs to be some clear rethinking about it. And if I'm wrong and other people in New Mexico are wrong, there needs to be a more formal discussion with the industry and with the NRC people about this resource question, and it needs to happen soon because this is going to keep coming.

MR. CAMERON: And I think that New Mexico is our host for this meeting and at this beginning stage of this workshop it's appropriate for that issue to be brought up. And for Marissa is it going to be will we be able to, will we take a message back to the executive director of operations and the commission on the concerns expressed by Don and sort of an intriguing idea also to do public meeting, public outreach not just on a particular facility or issue but on a group of issues that are facing a particular state, like New Mexico. Marissa.

MS. BAILEY: Yes. I appreciate that feedback. Actually in the meetings that we've had on reprocessing, this is the first time that that issue has been raised, and really the overall issue of resources and where does reprocessing fit in terms of resourcing and prioritizing when you consider all of the other things that the NRC is responsible for. So yes, we'll take that back.

MR. CAMERON: Okay, thank you.

And before we go to Rod, let's hear from Beatrice. There may be some issues for Rod to respond to, too. Beatrice.

MS. BRAILSFORD: I actually had a specific question for Rod. But I did want to, not just from a

New Mexico perspective though, obviously, I have wondered why we're meeting in New Mexico rather than Washington state or Idaho which are the two western states that actually have experience with reprocessing. And I, too, from a broader perspective am puzzled by how exactly this rulemaking is occurring, who is initiating it.

I think, Marissa, you were in a meeting with me when I asked what specific corporations were interested in pursuing reprocessing, and the answer at that point was that that information was proprietary but that I could probably guess. Well, you know, now I look around the room and I have a better guess than I did before.

It does seem to me that there is a possibility that the industry's interest in reprocessing is somewhat speculative which is fine from a business perspective, but from an expenditure of public funds, that does raise some questions. You know, I think GNEP was an entirely speculative thing. So I would just flag that.

And then, Rod, my question was in the sort of list of outcomes from the BRC you had a sentence in there that it might lead to legislative action, and if you could be specific about what legislative action

you, if not anticipate, at least contemplate coming out of the Blue Ribbon Commission that would have anything to do with reprocessing.

MR. CAMERON: And can I just clarify one thing for the record before you go? Beatrice's reference to BRC is to the Blue Ribbon Commission. I wasn't talking about the acronym, I just wanted to be sure that everybody knows we're talking about the Blue Ribbon Commission rather than the four-letter three-letter acronym that we had some exposure to back in the '90s, Below Regulatory Concern. Rod.

MR. McCULLUM: Yes. I want to first start out by responding to Don and I want to be very simple there. My area here is reprocessing and I'm not well versed on the topics with uranium mining, however, I know the folks in industry who are, and I received your message and I will take your message back.

The second thing for Beatrice, I really wish I could answer that question: What will the legislative proposal look like? In order to answer that question, I have to be able to predict the outcome of several Senate races, House races, leadership in Congress, and a lot of things. I simply am not that smart, I wish I was, but I'm not.

However, I do know the Blue Ribbon

Commission is going to tender recommendations early next year. I do know there is an expectation that those recommendations will take the form of legislation. I know that that will kick off a debate. There are a lot of perspectives as to how you get from those recommendations to a piece of legislation.

And you raise a very good point, Beatrice, about the use of public funds here for speculative interests, and I would certainly say that I think on industry's behalf it's far more than speculative. And you had GNEP which was a very aggressive program for reprocessing, then you had an election and now you have a different strategy, and then you'll have another election.

And one of the things we like about our regulator in the industry is they're not a political agency. NRC can't change its policies; it can't rewrite its rules every time there's an election. And one of the things we hope we'll get out of the Blue Ribbon Commission, by the way, is a recommendation for a durable policy on waste that doesn't change with every election and some way to implement that.

But for NRC's part, and this is why I think the public funds are appropriate here -- not that they should be distracted from other priorities

NRC has -- but the public funds are important here because NRC needs to be able to inform that policy debate that we all know is coming, and if we know what the regulatory framework is, the chance that we'll get a reasonable conclusion to that policy debate is far better. And I think from the interest in industry and I think from a lot of others out there that would like to see the best possible energy portfolio deployed in this country, that's important.

MR. CAMERON: Marissa.

MS. BAILEY: I guess I'd just like to repeat that I really do appreciate you folks bringing up the issue of resources and whether we're committing our resources to the right things, and that's something that we will look at.

But I also want to make sure that everyone here understands that when it comes to the NRC committing our resources that what's most important to us is ensuring the safety and security of operating facilities, fuel cycle facilities and reactor facilities and so on. So I just want to make sure that everyone understands that, that when we are committing our resources, that is our primary focus, that's our foremost priority.

With respect to your comment about the

companies that have expressed interest in reprocessing and whether those are proprietary, I don't think they are but I would have to turn to Tom to kind of refresh my memory as far as who those companies are.

MR. CAMERON: And maybe after we hear from Tom, if Sven or Dan or Jim, anybody wants to say anything about that, we'll be glad to hear it. Tom.

MR. HILTZ: We actually received, in about 2008, two letters of intent/interest in submitting for a commercial application and one letter in support of revising the framework. AREVA has indicated its interest publicly. The other organization submitted its letter to us under a proprietary considered business and commercial proprietary, and while my understanding is that they didn't have any concerns with releasing their name, they never actually followed up with us with a letter which told us that that information was no longer considered business proprietary.

MR. CAMERON: Okay. Anybody from around the table want to add anything more on this? Sven.

MR. BADER: I'll just give you the AREVA perspective. AREVA did, during the GNEP studies, come up with a time line, and unfortunately the NRC time line doesn't adhere to our time line. And we'd like

to think we're part of the public too, so from a business interest, yes, we're definitely looking for some regulatory guidance to make a business argument on why reprocessing is feasible in the United States. Right now it's very difficult to do. As Marissa pointed out, it's in Part 50 which is not cohesive, I guess, it's kind of split up a little bit, and so we're looking for some clear guidance on how to design our facility to meet the regulatory limits in the United States, whatever they might be.

MR. CAMERON: Okay. Thank you, Sven, and thank you, Dan, Beatrice, Marissa, Rod.

I think we're ready to move to the first discussion item. I guess we already had the first discussion item but we're ready to move to the first agenda discussion item, and Jose Cuadrado is going to tee that up for us, and this is what type of regulatory framework should there be, should the NRC establish for licensing and regulating reprocessing facilities.

MR. CUADRADO: Thank you very much for teeing up my introduction. My name is Jose Cuadrado. Alex Murray, unfortunately, could not join us -- so I'm pinch hitting for him -- due to medical reasons, so we wish Alex a speedy recovery.

Let's go to the first slide. Essentially what we're trying to do with this first presentation is to try to provide some context and some explanation of some of the terms and issues and gaps that NRC will be taking public input on as part of this ongoing effort to revise the regulatory framework for reprocessing facilities. This first slide provides sort of the context for which we'll be referring to some of the terms.

As you can see here, we're going to talk extensively about reprocessing and recycling. The context in which we're going to talk about this is the one that's provided by NUREG-1909. NUREG-1909 is a white paper that the Advisory Committee for Reactor Safeguards prepared, and essentially in this white paper they express their views concerning establishing such a regulatory framework.

In this paper the ACRS and the NRC refers to reprocessing as the first part of the separation processes that are going to happen in separating spent nuclear fuel from its useful constituents and separating the waste streams and conditioning all these wastes and removing all the high level radioactive materials. And for the purposes of recycling, the reference refers to the subsequent

stages which may include some additional treatment or additional conditioning of these materials, it may also include the conversion of some of these materials to MOX fuel assemblies and other types of waste treatments.

This slide is important because the Atomic Energy Act which is the legislation that essentially lays out a lot of the requirements for the establishment of NRC and for NRC regulations. It provides definitions for production facilities and reprocessing facilities would be classified as production facilities. And it is important because it is a law passed by Congress and goes above any regulation, and NRC codifies a lot of these requirements from law in NRC regulations.

Right now the NRC regulations in 10 CFR Part 50 which are applicable to production and utilization facilities, production facilities would be classified as reprocessing facilities and utilization facilities would be essentially nuclear power reactor facilities. These regulations identify essentially the minimum requirements for the safe operation of these types of facilities.

Also a bullet that we have in there is special nuclear material is regulated under a separate

provision which is 10 CFR Part 70.

This slide we have sort of two columns that lays out sort of the main differences between 10 CFR Part 50 and 10 CFR Part 70. This is important because as part of our deliberations we're determining what kind of regulatory framework are we going to lay out, is it going to be a Part 50 revision or a Part 70 revision or a new part that's going to incorporate aspects of both. That's some of the issues that NRC is considering.

In the left column we have Part 50 which applies to, like I said, reprocessing facilities. Part 50 has a regulatory philosophy that's based on very specific prescriptive requirements, very deterministic. It establishes a set of design basis accidents that the facilities that are licensed under this regulation must meet, and it also lays out a set of general design criteria, technical specifications, particular source terms, quality assurance requirements and requirements to maintain those as low as reasonably achievable.

And as we have already spoken here, one of the issues that we have right now is that the focus of this regulation over the years and over its revisions has solely focused on power reactors and these

revisions have not been applicable to production facilities or reprocessing facilities.

On the right side we have a column talking about special nuclear material licensing which is 10 CFR Part 70. This is a regulation that applies to domestic licensing of special nuclear materials which includes facilities that for the most part deal with uranium processing, enriched uranium processing. This essentially includes uranium enrichment facilities, fuel fabrication facilities, and the MOX facilities.

The requirements of this regulation are slightly different because it does include a risk-informed requirement which essentially the regulation states that licensees perform an integrated safety assessment. ISA is essentially like a risk-informed requirement which licensees evaluate the operations of the plant to determine the probabilities and the consequence of possible accidents, and based on those results, they determine what are the appropriate design aspects that need to be implemented to protect public health and safety.

This slide is very interesting because we also included it in the last reprocessing workshop and it created quite a bit of discussion. This table over here lists some of the -- let me just rephrase it this

way, I think our intent with the table is to sort of provide a context of the relative hazards that we're dealing with the facilities that are licensed under the separate parts. If you go towards the top, low enriched uranium, uranium 235, these are facilities and the hazards that these facilities provide are regulated for the most part under 10 CFR Part 70. These are relatively lower risk.

And as you go down on the table, you start getting into the types of facilities that are regulated under 10 CFR Part 50 which you could say are relative higher hazard and higher consequence facilities.

Another one of the issues at NRC is also debating as part of this reprocessing regulatory framework development is what kind of licensing process are we going to implement, is it going to be a one-step or a two-step licensing. As many of you are aware, all the current operating fleet of reactors are licensed under 10 CFR Part 70 and they follow a two-step licensing process under which we first issue the construction permit and then follow by an operating license.

Current revised regulations for reactors now contain a requirement that allows one-step licensing during which the NRC can issue a combined

construction and operating license. In addition to these requirements, there's also requirements for early site permits or separate design certifications, and many other licensing requirements to verify compliance with the licensing basis of the plants.

10 CFR Part 70 also allows for a one- or a two-step licensing process. Essentially most of the facilities that we have operating, fuel fabrication facilities and fuel enrichment facilities, are following the one-step licensing process that is ongoing. However, the MOX fuel fabrication facility is following a two-step process under which we first issued a construction permit and they have essentially requested a position and use license which the NRC is currently considering.

The next slide provides a bit of context concerning this issue regarding technology-neutral regulations and I think we're going to talk at length about this, and I just wanted to briefly talk about what this is all about.

Right now existing commercial reprocessing facilities, most of them which operate -- actually all of them operate overseas -- use a separation process called aqueous separation process. This process is commonly known as PUREX, which is an acronym that

stands for plutonium and uranium extractions. Essentially this process is a solvent extraction process under which you dissolve the spent fuel and separate its components and waste.

However, there are actually other types of technologies, non-aqueous, which are under different bearing levels of lab or pilot scale research which also include pyrochemical or also called electrorefining processes.

So as part of the ongoing deliberation, we're debating what kind of separate requirements or what kind of consistent requirements could we implement so that we don't necessarily discriminate against one technology or the other. As the NRC is aware up to these days, we believe that any potential domestic commercial reprocessing facilities are going to be using some type of aqueous process, maybe PUREX or some other variation of that; however, there's also discussions from members of the nuclear industry to consider other separation techniques such as pyroprocessing.

And I think that pretty much summarizes all the issues that I wanted to talk about. In this slide we have a whole bunch of questions that, although they may or may not align identically with

the ones that you have in your agenda, we just included them to promote discussion, and if you see something out there that piques your interest and you want to talk about it, you're more than welcome to do so.

So Chip, I'm done.

MR. CAMERON: Okay. Thanks a lot, Jose. And I'm going to find out if there's any questions for Jose before we begin the discussion, but I think it might be useful to start with the question, re-framing it to see if we can see if there's any consensus here as to are there any advantages to the NRC using a Part 50 approach or a Part 70 approach as opposed to writing a new regulation. So that's where I'd like to start with this, but let's see if there's some questions first. Don.

MR. HANCOCK: I'm not going to do what you just said because you earlier had said are there questions for Jose.

MR. CAMERON: That's what I meant, questions for Jose.

MR. HANCOCK: Well, it's for Jose but I'd also like to hear from industry folks. I guess I was struck by the comment that you made toward the end about you want the rule to not discriminate among

technologies, and I guess I want to understand that a little bit more.

From my standpoint, the PUREX reprocessing technologies that we've used in the United States have had pretty disastrous results and I would argue we want to discriminate against that technology continuing to be used with the kind of disastrous economic environmental health results at the DOE reprocessing sites and at West Valley in New York. So I guess I need to understand better why you don't want to discriminate against failed facilities.

MR. CAMERON: And Jose, just a couple other things on that. Besides answering Don's question about what you meant about not discriminating, do you also mean that this is the technology, what industry refers to or people refer to as technology-neutral.

MR. CUADRADO: Yes. I guess the concept of discrimination can be sort of misunderstood. Ultimately it is NRC's goal that regardless of the technology that we propose requirements for, that those requirements are consistent with the resident hazards and that we lay out requirements that indeed will ensure that the public and the environment will be protected.

This will likely mean that we're going to have to understand a lot more about one technology over the other. I think for the PUREX and aqueous process, there is experience out there for which we can draw on to understand what has worked, what has not worked, what are the things that we need to ensure that we do it correctly if we decide to do it. And for the other technologies such as pyroprocessing and others, we need to ensure that we also understand a lot more about the nature of the processes that these are, so that we can lay out requirements.

But what we want to make sure is that the NRC doesn't want to make judgments as to what is the most adequate and what is less adequate. We need to make sure that regardless of the technology that is used that we have the proper requirements consistent with that technology so that it can be safely used without drawing any preference to each one of these.

MR. CAMERON: Thank you, Jose.

Rod, could you also, in addition to whatever you're going to say, how do you address concerns such as Don expressed with one particular technology, or other people might have concerns with other technologies. How can that be handled in the regulatory process, the fact that one might have more

deleterious consequences, perhaps, than another.

MR. McCULLUM: Well, I'll try to tie everything together here, and if I don't, maybe that means it's time for a break. But I did have a question. I'll start with a question for Jose that I think will get into this, and Jose, if you could, could you go back to the slide that had the chart of the different hazards, that slide right there.

I think this gets into the essence of -- it gets a little bit of technology-neutrality but it gets into the essence of why we in industry feel a new regulation is needed. You've got the things that are deemed to be lower hazard up there, and you say more like Part 70 and the things at the bottom and you say more like Part 50. We looked at this question in developing Part 7X, it's just not that simple because it's not a question of what is the inhalation of a given population of radioactive materials, it's what energy sources exist that could potentially release those materials, how complex are the systems that must interact to potentially mitigate that release which is why you can't go up the arrow and you can't go down the arrow, strictly speaking. You need a new regulatory approach.

Now, to tie that back to technology-

neutrality which is our big principle here in industry, and the first way you do that is, of course -- and Chip got tired of me saying this at the last workshop but I'm going to start it again -- you've got to be risk-informed, you've got to be performance-based to be technology-neutral. And in saying that, we need a regulation that will assure that the right mitigative features are put in between the hazards and the things that can release the hazards and the people. And if you look at the nuclear industry's record, we've gotten very good at doing that.

So you need a regulation that won't prescribe analytical tools and methodologies -- and I'll talk about this a little bit more with integrated safety analysis -- that will assure that you have appropriate barriers between those radioisotopes and people, both the workers and the public.

So when I say risk-informed, performance-based, I mean not specifying you have to have the following seven items that you rely on for safety because in order to say that you'd have to know whether you're an aqueous or pyroprocessing facility, but here I show you determine what are your items relied on for safety. And that really is the essence

of what we're doing here in nuclear safety. Is you've got to put the right barriers in between those hazards and the people.

I'll just say a little bit about the different technologies, and I would agree we don't want NRC to produce a regulation that would simply lead us to where we are at West Valley, but I'll also say that that was a long, long time ago. We have a great base of experience. You look over in France -- and Sven can chip in here if he wants -- but one of the most powerful things I'm struck with whenever I hear the French present on their technology how even today it's evolving as they've processed thousands of metric tons of spent nuclear fuel.

There's been a lot of evolution in how you ensure safety since West Valley, and the representative from GE will be here later today, I understand, but he's in the pyroprocessing side, so on his behalf, a lot of experience with pyroprocessing technologies out at Idaho National Laboratory, EBR-2 and some of the other facilities that have operated out there.

So I think you need to capture the base of experience. And my finger is wearing out anyway. But where you can't be completely risk informed,

performance-based, you can provide what we like to call off-ramps or reserved sections where you can put in the regulation okay, here's how you go about determining the right items relied on for safety, but there's a specific 7X.YZ that would recognize some unique concerns to pyroprocessing, a specific 7X.QW that would recognize some specific concerns relative to aqueous, and you can develop those at different times as the knowledge becomes available.

MR. CAMERON: And we'll go to Robert, and then to Dan and we'll check back in with Don, but in terms of concerns about particular technologies, the process that the industry would envision putting into place, and maybe it's more appropriate to talk about a particular proposed facility rather than process, but if that facility or process couldn't make it through the process, then that's how those facilities or processes would fall by the wayside.

MR. McCULLUM: Correct. We'd expect NRC to lay out a very rigorous path for this risk-informed, performance-based demonstration of safety, and if a facility couldn't get to the end of that path, they wouldn't get licensed.

MR. CAMERON: Okay. Let's go to Robert, and then we'll go to Dan and Beatrice. Robert.

MR. HOGG: I just want to tie what Rod said back to the regulatory framework and how we considered many of these things when we were first developing Part 7X and thinking about what the structure was, and Part 50, it was pretty clear that there was an intent at one time to put reprocessing in that regulation. And after the last workshop, Alex provided us the appendices that would have applied to those regulations, and they're great ideas and great bases, but put in a prescriptive regulation like Part 50, that's what would be there.

And knowing what we know today, those were written in 1974 and they're great things and we do a lot of those things at a lot of facilities, but we do more today too, and we wouldn't have to if that was the regulation because that's the prescriptive nature of Part 50.

A part that is driven by performance and that has a performance basis would demand that the licensee continually think about how one meets those performance requirements and would continue to update and develop the bases and the considerations for the facility, and that was why industry was leaned towards a performance-based approach.

MR. CAMERON: Okay. Thanks, Robert. And

Dan, and then we'll go to Beatrice and Jose.

MR. STOUT: I just have one small point. As industry we have boiling water reactors and pressurized water reactors, both licensed under Part 50 or new facilities under Part 52. The experience has experienced or the industry has experienced that there's no reason why a similar model wouldn't apply to recycling technology where you would have one rule and then different technologies would require different designs to meet those requirements.

MR. CAMERON: Okay. Beatrice.

MS. BRAILSFORD: Well, I guess I was going to ask if I could have a real brief statement from both industry and the regulators what they saw as the advantages and disadvantages of technology-neutral, but I think we're going to spend a lot of time hearing about the industry's perspective in the next two days, and that does seem odd to me. I do know that industry is a stakeholder in this process, but it does seem to me that this particular discussion is driven to a notable extent by industry's desires.

So I do, at some point in the next two days, want to know what's in it for you, the technology-neutral versus not, but in the meantime, I would like to hear from the Nuclear Regulatory

Commission what are some of the advantages and disadvantages from a regulatory perspective in technology-neutral versus not.

MR. CAMERON: Okay. Thanks, Beatrice. I think technology-neutral is a major issue that fits within this particular agenda item, and we need to get to it sooner or later. We still have the Part 50, Part 70, new regulation, and I would imagine that if we wanted something to be technology-neutral, you could fold that into whatever one of those approaches. I'm not sure if you could or not. We still need to get to that, are there any advantages of using existing Part 50, 70.

But we had a couple of cards up, Jose and Phil, and I just want to make sure we get those out before we start to answer Beatrice's question about technology-neutral. And someone needs to define that for us, and we also want to hear from Rod and his colleagues about what are the advantages, and from the NRC what are the advantages of doing technology-neutral.

But perhaps another question is what are the disadvantages of doing it. In other words, Beatrice, I get from the implication of your question is that you don't think that technology-neutral may

necessarily be a good idea from a public health and safety standpoint, so we'd like to explore that a little bit. But let me hear, Jose, what did you want to say, and Phil, what did you want to say?

MR. CUADRADO: I guess the first thing I wanted to say is a brief clarification on the slide. The fact that the arrows point towards Part 50 and Part 70, that must not be misunderstood as an indication that the staff is leaning towards a certain way. I mean, we clearly have commission policy towards making regulations more risk-informed and performance-based, and that's definitely a part of the considerations as we go forward.

So I just wanted to clarify the fact that these arrows are out there, that doesn't necessarily mean that this is the only piece of information that the staff is using for developing its regulatory framework.

MR. CAMERON: And Phil.

MR. REED: Well, with regard to this slide, it's only related to inhalation does and mostly to workers.

The comment I was going to make was the broad comment about technical neutrality and also with the various separation processes. First of all, we

don't expect to a PUREX type reprocessing type of separation. I think what we're looking at mostly now is either the COEX extraction or the NEWEX extraction and also the pyrochemical.

In the commission paper that we wrote, I think it was either the first commission paper or the second commission paper, we identified the strategies for the particular separations and we identified a very simple extraction process where we would extract the plutonium and neptunium and make mixed oxide fuel. But we also identified the complete separation process, separating all the fission products the TRUs and all the other materials. And in a technical-neutrality type regulation, what we would like to aim at is simplicity for the aqueous separations.

At this point it doesn't appear as if there's going to be a broad differences, and we hope that's not the case, we hope that we don't have the complexities that we can handle the aqueous separation. The problem has come in with the pyrochemical, of course, and the pyrochemical is a molten chloride solution process, there's nothing aqueous about it. And that's, I think what the staff is struggling with now, to try to come up with some kind of regulations that would apply to all three of

these kinds, recognizing that we do.

The other thing that the staff is sort of struggling with is a lot of these separation processes work fine in a laboratory on a tabletop, we're not sure whether they actually work on an engineering scale or a full scale yet. Now, the PUREX process, of course, has worked in France and also Russia and also, I think, Japan, and they have tons of experience on that, but the experience that we have here is very limited on some of these scaling processes.

MR. CAMERON: Okay. Thanks, Phil. And let's put that on ice for a little bit and really try to dive into the technology-neutral issue because it comes up as a big issue and let's have a discussion as to what are the alternatives to the technology-neutral approach.

And Beatrice, at some point we want to ask you what your problems are, if you have problems -- I don't know if you do -- with the technology-neutral approach.

And Rod, were you going to start the topic?

MR. McCULLUM: Yes. I was going to speak about technology-neutral

MR. CAMERON: Can you give us a context on

that, and then we'll go to Robert, and then Tom and continue with the discussion.

MR. McCULLUM: Obviously, from where I sit, technology-neutral is the only way to go, so it's not surprising I'm going to see more advantages in technology neutrality than disadvantages. I will highlight what I think are each.

And I'm coming at this from a perspective of a representative of a trade association that represents a very diverse industry. Dan has already mentioned we have BWRs and PWRs out there. We have companies that sell boiling water reactors and we have companies that sell pressurized water reactors.

We also have in the dry cask storage, to get a little bit closer. This is when the reactor pools are filled up and we have to come up with an alternate storage means for the spent fuel. We have three major vendors in the United States that split the market, I don't know what the percentages are, and some of them have technologies of vertical casks, some of them have horizontal casks, they're different.

I guess I can sum all the advantages up of technology neutrality in that competition is good. And we have out there, and you saw it in the GNEP expression of interest, we have a competition, we have

multiple purveyors of multiple technologies seeking to bring reprocessing to the United States. You're going to get to a better answer if you have competition as you go down that process. So being technology-neutral allows all of those purveyors to play into the national debate without having NRC -- which is not a political agency, which does itself have to be neutral -- influencing that decision one way or the other.

If you look, again, in dry casks, we've loaded 2,000 of these things safely. There's a confidence and the commission recently expressed its confidence in that technology. It works, in part, because of the competition that exists between the vendors. So allowing the national debate on reprocessing to progress to get us to the best possible technology means not killing the competition at the very initial stage, which you would do if you tried to prescribe a regulation that was not technology-neutral.

As far as the disadvantage, and I'll say this to the folks at NRC, it does make the challenge of writing the regulation a little bit harder. An easy regulation is when you know exactly what the widget is going to look like, and so NRC has to

stretch its thought processes a little bit further to do this. We think they can do it and we think in the end the risk-informed, performance-based regulation will be a better regulation.

Sometimes an easy regulation isn't necessarily the best regulation. I won't name any other industries out there that don't have the safety record of nuclear, but those regulators probably should have stretched their minds a little bit more in the past too. So basically the advantage is competition, the disadvantage is it's a more challenging thought experiment for NRC.

MR. CAMERON: And let me just clarify or just ask you to affirm a clarification on what you just said that may be instructive for people, and it's a point that Robert brought up earlier, is that you mentioned risk-informed, performance-based. In other words, a technology-neutral regulation would need to be risk-informed, performance-based, as opposed to prescriptive regulations that were tied to a particular technology?

MR. McCULLUM: Yes, I see those two concepts as going hand in hand. Risk-informed, performance-based is what you are trying to accomplish without specifically prescribing how that gets

accomplished in a given facility. And in the end it's a better regulation. It's a challenging regulation to write.

MR. CAMERON: Okay. Let's go to Robert and Tom Hiltz, Jim Lieberman, and then jump back over to Jim Bresee, and then hear from our colleague from the UK, Rex.

MR. HOGG: So I really empathize with the discussion because when we were considering the framework as we wrote it, there are some things that are not -- what's the word that I'm looking for -- that are not dependent on the technology. The performance of the facility is going to be set at an expectation level, the ability to be non-proliferant is going to be set at an expectation level, there are certain things that are going to be dictated.

But we don't know what the design today is, and so the thing that we shouldn't dictate is what the design is. There are good designs and there are bad designs, and we don't want to fall into the trap of directing the design effort down a bad path, we want to go in the direction of directing the performance effort down a good path, and that's where we can be prescriptive in performance goals, or as what we ended up with in the white paper that NEI

wrote was more of a set of performance goals.

We saw a slide that was directed at dose consequence to the worker, and that's one goal, and then there's other goals, there's boundary goals, there's projected goals for local populations. Those things are the right things to think about and to prescribe, but not how to get there. And that's one of the things that I think Bob Pierson says it best, when the general design criteria were established, it was an expectation of how to design things.

The baseline design criteria, as we've proposed in our regulations, are the right things to consider, and the baseline design criteria in Part 70 are the right things to consider for a facility that could be designed to do a plethora of things, not necessarily one specific task every day every step of the way.

So that was the conceptual paradigm that we built that piece of the proposal under, and so it really is focused on the performance requirements and that's the first thing that we establish. And then from that, knowing all the good things that we've learned as engineers over the years, and we've learned them the hard way, put those things into the considerations of the design criteria.

MR. CAMERON: Thank you, Robert. Tom, and then we'll go to Jim.

MR. HILTZ: Thank you, Chip.

In partial response to Beatrice's question, I'd like to provide a little bit of context. In SECY 09-0082 which was our last commission paper that we wrote regarding reprocessing, and I think we also said it in a subsequent follow-up memorandum earlier this year, we intend to make, to the extent practical, any new rule in reprocessing risk-informed, performance-based, and to the extent practical, technology-neutral.

There, I think, is continuing discussion around the NRC about what technology-neutral means and how it is implemented, and I think it will be challenging to develop a technology-neutral rule. Rulemaking in itself is a very deliberative, thoughtful process that we enter that also has to abide by certain rules and a certain framework. So it's impractical and not reasonable for us to develop a regulation, a one-liner that says any reprocessing facility shall ensure the public health and safety is protected. We have to go to a sufficient level of detail in our rulemaking to provide that regulatory framework, and that stability, that efficiency and

that effectiveness.

We made a presentation to the Blue Ribbon Commission, I think it was in September or August, and one of the topics that we talked about was technology-neutral, and those slides are available publicly if you are so inclined to go look at those.

I think from an agency perspective, there is a tradeoff in technology-neutral, and a tradeoff in regulatory stability and effectiveness and efficiency. A technology-neutral framework that has high level performance requirements will likely require more detailed regulatory guidance in order to implement. You get to the same point, I think, whether you strive for a technology-neutral or for a more prescriptive regulation, because in the end, ultimately to provide that regulatory stability, you need sufficient guidance that a potential applicant or a licensee can use, and that the NRC staff can use in reviewing an application or a submittal.

So I think it's a challenge for us, I think it is a goal to the extent that we can to make our reprocessing regulation technology-neutral, but to the extent that we're able to make it technology-neutral, I think that the downside -- not the downside, but the other side is that we will have to

develop more detailed regulatory guidance in order to make sure that that framework is stable and predictable.

MR. CAMERON: And just let me clarify one other thing with you, Tom, and it seemed like this is what Rod was saying, is that are you equating technology-neutral with performance-based? And I'm just asking that from a point of understanding because that will make it easier to understand.

MR. HILTZ: And I'll offer my opinion. I think to the extent that there are performance requirements that are applicable to an array of technology, then you have developed a technology-neutral framework. The challenge is can you get performance requirements that cover the whole span of potential technologies that may be submitted, and I think that's a daunting and very challenging and maybe not a reasonable task.

MR. CAMERON: And you established one end of the spectrum for us on performance-based which would be any reprocessing facility must protect the public health and safety, one-line rule. That's the end of the spectrum and I'm not sure what the other end is.

Beatrice, can you hold for a minute? I

want to come back to you, ultimately, after this discussion to see what your take is on all this. Let's go to Jim Lieberman, and then Jim Bresee, and then let's go to Rex Strong, and then Marissa.

MR. LIEBERMAN: I was going to basically make the point that Tom said, in response to your question, Chip, that to some degree technology-neutral is almost a red herring. If you have a risk-informed, performance-based approach meaning you focus on what the outcome is, you want to meet a certain standard, you want to keep the risk to a certain level, you want the doses kept to a certain level, you want the releases kept to a certain level, you want the chemical impact kept to a certain rule, and then the rule focuses on the practices and methodologies, what issues do you consider, how do you consider them.

And it really goes to the Part 50/Part 70 question. Part 70 is a regulation that addresses a whole variety of regulatory activities. It doesn't prescribe in general the specific items each facility has to have. Compare that with Part 50, Part 50 is very prescriptive as to what each facility generally has to have.

In developing the NEI white paper on Proposed 7X, we looked at Part 70 and we said that

concept was good, the performance requirements were good, but the detail on methodology and the processes needed supplementation, and we took some things from Part 50, we took some things from Part 70 too, various parts of the regulations, to build so that when the particular design comes in, whatever that design might be, the applicant will be able to demonstrate the safety objectives and performance requirements to be met, and that way it will be technology-neutral.

MR. CAMERON: Thank you, Jim. I think that was helpful.

And Beatrice, we're going to end up back with you to give us your opinion on everything that you heard here.

MS. BRAILSFORD: I'd like to ask the regulators some follow-up questions.

MR. CAMERON: Do you want to do that now?

MS. BRAILSFORD: Yes, please.

MR. CAMERON: Okay. Then we'll go to Jim Bresee.

MS. BRAILSFORD: So Tom, could you delineate some of the challenges that you see with this technology-neutral approach, and as important, tell me what you think you get out of it.

MR. CAMERON: And Beatrice, we're going to

let that sit there and simmer and let Tom and the other regulators think about that, as well as all of the rest of you. But let's go to Jim Bresee, and then we'll go to Rex. Jim.

MR. BRESEE: Let me just make a few background comments on separations technology or reprocessing, or whatever term you want to use. Incidentally, the favorite term among my colleagues in Europe is partitioning. To people involved in that same technology in Europe, that seems to be a less threatening term than separations or recycling or reprocessing.

The whole purpose of recycling/reprocessing is going to be driven in the future in the U.S. by the products, and these requirements for the products can be reached by a lot of different pathways which is why it may turn out to be technologically useful to try to stay as much as possible in a technology-neutral regulatory framework.

I don't believe any serious thought is going into a separations process purely for the purpose of producing materials which will then be thrown away or disposed of through some type of combination of storage and disposal. In other words, the separations process will only take place if there

is a particular product in mind that has value sufficient to support the decision to do that separation.

That product most often will be fuel. It will be fuel for a variety of reasons, producing energy, transmuting materials which are hazardous, whatever. It will be a fuel issue that we will need to address in the development of the separations process. That is why within our current Advanced Fuel Cycle Program at the Department of Energy, the separations and fuels technologists work side by side.

We have an understanding that depending upon the specifics for a fuel design, there will be specifics ultimately dictated on the separations process. You can get to almost any fuel design by a variety of processes and these processes, each one of them has its own technical economic challenges, but they are not ruled out per se simply because of the product requirements.

So to the extent that our discussions today and tomorrow reflect the fact that separations are simply pathways to a product and that the specifications of the product itself determines the kind of separations that will be required, that may help in our discussions then of the regulations that

will be associated with those processes.

MR. CAMERON: Okay. Thanks, Jim. And keep the eye on the products and there may be several types of designs or processes that can get you to the product and each of those designs and/or processes will have their own technical economic challenges. All right. Rex.

MR. STRONG: Thank you. A few comments. I'm not sure whether you'll necessarily find these helpful, but you can judge that for yourselves really.

My experience is in the UK regulatory framework which is actually quite different from yours, and I just wanted to point out some of what I think are differences because that might help inform your future discussion.

Our regulations around nuclear safety are goal-based regulations, not target-based, and the goal, the fundamental goal is around reducing risks to a level as low as reasonable practicable. Now, as low as reasonable practicable ultimately is a judgment, it's a matter of opinion. Of course it takes into account the state of technology at the time the decisions are made, but it's not absolute. So a decision this year may well be different from one in ten years time or twenty years time.

And from an operator's point of view, the search for improved performance does not stop so there's no such thing as met the target, on to the next issue.

Now, specifically in terms of nuclear plant or new nuclear developments, there's a fundamental requirement that they shall be justified which means, very simply, that the societal benefits of the facility shall quite clearly outweigh the society dis-benefits. Now, all sorts of things, of course, can be taken into account in benefits and dis-benefits, but fundamentally there has to be justification.

In the UK the issue around whether UK has a nuclear power plant, for example, or whether the UK reprocesses spent nuclear fuel, for example, those are fundamentally political decisions made by our parliament, of course, taking into account stakeholders' views through various sorts of consultation processes, but they're fundamentally political decisions. They're not fundamentally decisions for a regulator.

The regulator has a role in respect of deciding whether a specific proposal should or should not be licensed, and when a developer wants to, say, build a new nuclear plant or an operator wants to do

that, the safety case for that facility has to be made by the operator. It's not made by the regulator, it's judged by the regulator, but the safety case is owned by the operator. So the accountability in our regime at all times, under the law, rests with the operator because it's the operator's case.

Now, if I just loop that back to a discussion about technology-neutral, what I've just said is independent of particular choices of technology. The operator has to make the case. If these are really, really big decisions, like whether we want a new nuclear power plant in the UK -- which, incidentally, we do -- that's a political decision. Choices of reactors and licensing of reactors comes along, as it were, separately, and similarly with reprocessing technologies.

I hope those comments maybe help.

MR. CAMERON: Thank you, Rex. That's instructive. I think that what you said about the policy choices made by the party is similar to what happens here, and also what you said about the applicant's responsibility and the regulators. So thank you for that comparison, and at some point, if you want to comment specifically on what types of regulations you have in place, that would be very

helpful to hear too.

Marissa you had your tent up and you were going to say something. If you want to begin to take a crack at Beatrice's question about what the challenges are of trying to establish a performance-based.

MS. BRAILSFORD: But I also need to know what the benefits are.

MR. CAMERON: Yes, the challenges and the benefits of performance-based, in parens, I guess, and technology-neutral, in parens. And then we'll go to Tom with that. And then after that, Beatrice, I would like to ask you if you have reached a conclusion, or not a conclusion, but what are your concerns with a performance-based, technology-neutral approach so that we can see if there's some way to talk about those concerns. Marissa.

MS. BAILEY: I guess I'll try to answer that question by maybe giving a practical example. If you want to take a look at a regulation that comes close to being technology-neutral or is technology-neutral, you can take a look at 10 CFR Part 70 which is a risk-informed, performance-based regulation. And what it does is it gives performance requirements such as the dose to the worker and to the public,

prevention of criticality. So it gives the performance requirements but it doesn't dictate the how to meet those performance requirements, it doesn't give design criteria, it doesn't give design specifications.

So under Part 70 we've been able to regulate a variety of fuel cycle facilities, all the way from a fuel fabrication facility to an enrichment facility and now the MOX fuel fabrication facility, and also facilities that are for special nuclear material licensees. So that is an example of a technology-neutral regulation.

The advantage to that, of course, is that we are able to regulate a variety of facilities and ensure that they are safely operating without having to go to rulemaking each time something new comes along. The disadvantage, I guess, is that there is a level of uncertainty in the licensing process because it is looking at a variety of different facilities, different processes.

And so we've had to deal with those uncertainties in some cases by developing guidance. For example, most fuel facilities are reviewed under the standard review plan for fuel cycle facilities that's in 1520, whereas, for the MOX facility we had

to develop a new standard review plan for that. So that's one of the disadvantages, I think, maybe the uncertainty that you end up with in the licensing process.

I guess another disadvantage is when you are establishing performance requirements, as Tom said, you have to establish the performance requirements that's applicable to the range of facilities that you're anticipating, and so when that fuel cycle facility is a reprocessing facility, that's when you see Part 70 falling short because it doesn't begin to address the risks that are associated with a reprocessing facility that is dealing with spent fuel and highly radioactive material.

So the challenge then for establishing, to me, a technology-neutral set of regulations for reprocessing is figuring out what those performance standards are that can capture the range of technology that you're anticipating with reprocessing.

MR. CAMERON: Okay. Thanks, Marissa. And I'm surprised that it's quarter after 11:00 already. I guess that there's the old saying about when you're having fun like this, the time passes fast. But I think this really gets to the crux of the issue on this first agenda item, and so we should continue this

discussion, but it's not just a discussion for the regulators, it's a discussion for all of you about what are the benefits of performance-based, technology-neutral, what are the challenges.

But also, don't you need to also look at what are the challenges of whatever that alternative is, the prescriptive, I guess, alternative, what are the benefits of that, what are the challenges of that because you need to figure out what's the best thing to do here.

So with that in mind, let's go to Tom, and then let's hear from Beatrice and anybody else on what their concerns are with this performance-based approach and let's talk about maybe some of the ways that those concerns can be addressed. Tom.

MR. HILTZ: Thanks, Chip.

I was essentially going to say, although probably not as eloquently as Marissa did, the benefits and challenges of technology-neutral. So if Beatrice can provide some context.

MS. BRAILSFORD: If you could be clearer.

MR. HILTZ: I think the benefits are that you develop one regulatory framework that's applicable to multiple processes or facilities, and it provides some efficiency and effectiveness, at least in one

part of the regulatory process, that you don't have to engage in rulemaking every time a new process or a new facility is proposed.

MR. CAMERON: And let me open it up just very quickly on benefits, benefits that people see from using the performance-based approach. You heard Marissa, you heard Tom, efficiency, effectiveness. Anybody else want to chime in on benefits of the performance-based, which I'm making the equivalent of technology-neutral. Dan.

MR. STOUT: I think one additional benefit is it encourages innovation and competition. You have a broader framework within which you can develop technologies, design facilities, build them and deliver products to market that have value. If the regulations were too prescriptive, it stifles that innovation and creativity because facilities have to be designed very narrowly.

MR. CAMERON: Okay. That's good. And I'm not forgetting what Rod said originally about everybody can play -- I think is the way you put it. And while we're talking about all this, we might want to think are there benefits in terms of protecting health and safety from such an approach too.

Robert.

MR. HOGG: I would imagine that some of the benefits are reaped in what doesn't happen too. We don't end up in a situation where things are lost over time, such as Appendix B, Appendix Q, which fortunately weren't lost. We reap the benefits of being able to develop new smart technologies, small modular reactors, develop all kinds of potential advances in a technology that is really born to be advanced and to use the intuitive and technological capability of the country to move things in a direction where people do things more smartly engineering-wise and more smartly safety-wise.

We have developed over time a much more well-defined understanding of dose to the body and our regulations have not really followed the direction of the knowledge there. They're very prescriptive in how they were developed and so we really need to think about how we say things in our regulations such that we don't close things out in the future. So it's not just the question of what things do happen, it's what we avoid as well.

MR. CAMERON: So you would have the ability to take into account advances in technology and you wouldn't have to scrap your whole regulatory framework or develop a whole new regulatory framework

if a new technology came along.

MR. HOGG: Right. Rex was indicating that there's a societal benefit expectation. Societal benefit could be ICRP-3, ICRP-30.

MR. CAMERON: You're just doing that to provoke Beatrice.

(General laughter.)

MR. HOGG: I'm sorry. The answer, though, isn't in stating what we're limited by, we should state what we expect and what we want.

MR. CAMERON: And Beatrice, I think you've heard some benefits, you've heard some challenges. What are your concerns, or what are anybody's concerns about using a performance-based approach and what would make you, perhaps, more comfortable?

MS. BRAILSFORD: And I will say that some of it is just that I'm an old battleaxe, so sometimes when I ask a question, I actually just want to hear the answer, it's not a throwing down of the gauntlet.

But I guess I am still -- and I understand what Marissa and Tom said about, you know, it makes it a little easier, though you go back and you have to write special guidance for something that even though it's technology-neutral, it still falls outside of it, and that perhaps that guidance process is not as

rigorous and as to the point accessible to the public as the more cumbersome rulemaking process.

I think competition is a very fine thing but I don't see in the coming decades a wildly competitive reprocessing market, and that's partly because in the preceding decades that's not what we've seen. We've seen reprocessing done by the governments of countries. So you know, encouraging innovation I think is, by and large, a good thing, but I don't know that that's a goal that is particularly important in a regulatory framework.

And particularly, Tom, if the United States builds a single reprocessor in the next quarter century -- right -- and I know that DOE is looking at a range of reprocessing technologies, but the range is not all the way from a dry cask to a PUREX plant, so I think that it's an odd goal to set up, particularly in the reprocessing arena. I mean, I can see some competition, very valuable and very doable in dry cask innovation, but I don't see however many billions of dollars it's going to take to build one of these, I don't see that easing or streamlining the regulatory process is going to mean that three of them are built versus one.

And I would just like to note that Chip

highlighted, kind of going back to NRC's mission, Chip gave you folks to say and what are the health and safety benefits, and nobody said anything about it.

MR. CAMERON: And two comments on that, just from the facilitator's perspective, is that I don't think we really gave people a chance yet to really address the public health and safety issue. And also, you responded to one of the benefits that was proposed in terms of competition, but some of the benefits, I would take it from this approach, could apply even if there was no competition.

But Beatrice, I really thank you for putting this out on the table because I think this is really the meat of this agenda item. Let's go to that public health and safety issue specifically and let's go to Jim, and then let's go to Anne, for whatever, Anne, you want to say, even if it doesn't fall in that. Jim.

MR. LIEBERMAN: Well, that's good team because that's was just what I was going to address.

I think my point on benefit is what Rex said. Safety is what it's all about, and the Part 70 type approach puts the burden on the applicant to demonstrate to NRC's satisfaction, and if there's a hearing, to the judge's satisfaction, that why the

particular facility meets the safety standards. And whether it's one facility or multiple facilities, whatever that facility is, the design has to be demonstrated why it works to achieve the safety standards.

I have 30 years at NRC and a lot of my time was in enforcement, and I'm familiar with lots of requirements in the reactor area which had a very good purpose at a particular time when the requirement was adopted, but over time things changed, technology changed, and their value and importance changed over time too.

And NRC is a very smart agency, they have very good people, but there's no way they ever have the degree of expertise -- I don't want to say never, but it's rare that they have the degree of expertise that the industry might have, given the hundreds, the multiplier number of employees the industry has in a given field. And to put the burden on NRC and to make sure they have the right prescriptive requirements up front, I think, does a disservice to the protection of the public. Putting the burden on the applicant and NRC being the judge and the questioner results in a better safety outcome, in my view.

MR. CAMERON: And are you also saying that

a prescriptive regulation could put the NRC in a box, so to speak, so that they might want to do something different that would protect public health and safety but they're sort of stuck with whatever the prescriptive regulations?

MR. LIEBERMAN: Well, that's a possibility if NRC prescribes that a given system is two widgets or three widgets and it turns out that like four or five widgets is a better way to go in a particular situation.

MR. CAMERON: Okay. Thanks.

Let's go to Anne, and then we'll come back to Tom, and then go over to Rod.

MS. CLARK: It appears to me -- and I believe that I may represent closest to the lay perspective here because I'm probably the least technically adept person at the table -- is that from an outsider, a regular everyday person's point of view that I think the balance between the details that have to be provided in a regulation that is specific to certain technologies versus the broader direction that you provide in a technology-neutral regulation, is what's at hand right here. And if you have the risk, in my perspective, of having a regulation that is technology-neutral is that we cannot anticipate every

issue that's going to come up.

Now, so what I'm saying is that even though the benefits are stating that we won't have to do new rulemaking every time a new technology comes on to the stage, in order to protect health and safety, we are likely to have to do new rulemaking every time a new technology comes on the stage because there will be new issues that come up that nobody guessed at.

And just to use an example from my own area of expertise in transportation safety, there was the Type B container, double containment issue that came up a few years back that the NRC reversed its rule on that. It used to require double containment for all Type B containers and it was transporting plutonium and plutonium dotter products type of waste. Now they said they don't need that double containment. What changed in the interim? Well, it was changing of technology, changing of understanding of the materials that are being evolved.

The same kind of thing is going to change, and so regardless of whether it means loosening certain regulations or adding more regulations, it is sort of a red herring to say that we can do technology-neutral regulation.

MR. CAMERON: Okay. Thank you for that

perspective. And again, I think you need to look at what happens under an alternative regime, too, in cases like the NRC example.

But I think it might be -- and I know I'm cutting into your lunchtime and we have Tom and Rod, but if anybody wants to comment on what Anne's very common sense looking at this from a person who is not involved in this particular technology but knows process, if anybody wants to respond to that, let's do that now, and then I have just one question for all of you to maybe close.

So let's go to Tom, and then Rod, and anybody else who wants to respond to what Anne just said.

MR. HILTZ: I wanted to actually go back to Beatrice's comments and just provide some context or some comments.

First, I think in listening to her comments, I may be inclined to think about technology-neutral in a different way, and Anne's comments also. When Beatrice asked the question is there any public health and safety benefit from doing technology-neutral, what the difference is, I haven't, quite honestly, thought about it in that context because my context is whatever regulation we publish, whether

it's technology-neutral, deterministic, risk-informed, performance-based, an underlying assumption of every regulation is that it will adequately protect the public health and safety.

So listening to your comments, and Jim's and others about maybe there is a followed discussion that we need to have about is there an approach that better protects public health and safety. But I did want to emphasize that any regulation that we publish as its core has it will adequately protect public health and safety and the environment and the common defense.

I think you've also captured, and I mentioned in my first comment and I want to reemphasize, that while there is certainly some perceived benefits to doing technology-neutral, there are also some perceive deterrents or detractors from technology-neutral. It's not all roses. If it were easy, I think every regulation we would do would be technology-neutral.

The tradeoff is while there may be less effort -- I'm sorry -- not less effort, but you do one rulemaking and it encompasses a broad range of processes or facilities, I think you articulated it and I think you captured it, there's going to be a

tradeoff, because depending on the level of specificity in that regulation, in order to provide stability further down the road, you're going to have to develop detailed guidance.

I think one of the reasons why the industry doesn't want to proceed with licensing a reprocessing facility under Part 50 is because we don't know what the rules are. The staff doesn't know how to review a reprocessing facility under Part 50. So there is benefit to having a look at the framework and guidance and the balance between regulation and guidance.

And the third point I wanted to mention is that you mentioned -- and I'm not sure how much of a concern it is to you about the public process for rulemaking about regulatory guidance -- but we have made efforts at the agency to engage extensively in involving stakeholders in the development of regulatory guidance, having workshops, public meetings. It's a goal that when we publish a proposed rule that the available guidance that would implement that rule was also made available at the same time.

MR. CAMERON: Okay. That last point was something that Marissa had mentioned, and I think it's relevant to Anne's concerns and Beatrice's concerns is

that when you have a performance-based, technology-neutral rule -- I don't know if always is the right term -- but often there's going to be a need to develop regulatory guidance to fill in the spaces, perhaps.

Let's hear from Rod and Jose, and go back to Anne.

MR. McCULLUM: I want to address, both Beatrice and Anne raised some very excellent points, I'm going to try to address both of those in the context of why I believe that technology neutrality benefits public health and safety. And if I can't do that, it's because you didn't give us a break and it's lunchtime.

MR. CAMERON: I was having too much fun and I missed it.

(General laughter.)

MR. McCULLUM: I will agree with Beatrice that it is unlikely we're going to be developing a whole lot of reprocessing facilities here in the country. If we did have three or four of these things and they become competitors, I think my member companies would all be very happy, but that's not where we start.

What we're really talking about in terms

of competition here is competition to bring technologies to market, and if the government prescribes the technology, either advertently through GNEP making a choice, or inadvertently through NRC putting out a technology-specific regulation, the government will get what the government asks for, won't necessarily be the most innovative, the best or safest technology. Indeed, having a competition to bring technologies to market inspires the safest technology to win, and if they all have the same bar they have to meet in terms of the regulation, that goes.

Now, Anne raised a very similar point along the same lines is that the technology will always be changing. To me, that again is another reason to be technology-neutral, risk-informed, performance-based because you do not want the regulation to discourage the innovation of technology. I drove an AMC Pacer in the '70s; it wasn't as safe as the car I drive today. So if you have a very technology-specific regulation, you have to update it every time there's a change in technology, or alternately, you just don't update the technology because it's too much trouble to change the regulation.

We call that in the industry regulatory stability. Regulatory stability benefits the industry because we know what our regulation is. It benefits the public because you know the bar for safety isn't moving. If I'm going to bring on a new technology, I'm going to have to use the same rigor and the performance-based tools to demonstrate the safety of that technology. You don't have to wait for a new rulemaking to do it.

MR. CAMERON: Thank you, Rod. Jose, and then we'll go to Anne.

MR. CUADRADO: I just wanted to make a quick comment based on what Beatrice said, and partly on what Tom said. A lot of the role of the regulator is to promote regulations that protect public health and safety, however, I see that what you're trying to communicate is that in order for us to accomplish that better there has to be trust in the regulator, there has to be confidence or sort of like an operating experience, if you could think about it, in that we've done that role in the past appropriately and that we will continue to do it.

One of the things you were bringing up is as we develop a technology-neutral or a performance-based regulation, we're going to rely a lot more on

issue below the rulemaking part, issues like developing regulation and all those issues. So my question to you would be what things do you feel would do a better job on enhancing confidence, because ultimately, enhancing public health and safety is going to rely a lot more on the public having the confidence that we can do that job better.

So if you can throw some ideas out there, and maybe now is not the right time, maybe we can do it later, that could be a great help.

MR. CAMERON: That probably wasn't the right time.

(General laughter.)

MR. CAMERON: Let's go to Anne and then we'll go to Don.

MS. CLARK: That is opening a big door.

I just wanted to clarify or just rearrange a little bit what I stated before is that I think one of the things that we make the assumption, and all of us -- and I'm a government employee as well, so I understand the perspective of government agencies -- is that we assume that regulations are purely procedural or process-oriented as opposed to being policy-oriented. And what I'm hearing from Rod, actually, most recently -- and I'm sure everybody said

it at some point or another -- is that really regulations do create policy. And that is my more closer area of expertise and I completely agree that regulations do create policy.

And so here is what I was really saying is how do we find that balance of creating enough specificity so that people are confident in the health and safety issues and still have a policy that allows diversity and broad competition, as you said, and a broader offering of technology.

And we are not the ones that are going to end up making that decision in the end, really. It will be determined at an administrative level and we will really end up having to carry out whatever our state representatives push, our Congress people push within the Congress and whatever our president supports from the executive side, unfortunately.

MR. CAMERON: Thank you, Anne.

MR. McCULLUM: Chip, can I make a motion that no matter what Don says, it will be the last thing that gets said before lunch?

(General laughter.)

MR. CAMERON: Go ahead, Don.

MR. HANCOCK: Were you going to have a public comment period, as is in the agenda?

MR. CAMERON: Yes.

MR. HANCOCK: Well, let me be real quick because I tried to make the point early but maybe I didn't make the point, so let me try again.

In New Mexico what would give the public more confidence in the regulator was for it to be a regulator. NRC regulation of nuclear facilities in New Mexico equals Superfund sites that years after they've closed we still haven't cleaned up and are still endangering public health, safety, water supply, et cetera. So NRC has got to do a better job, frankly.

For the industry, what would give the public more confidence in reprocessing is if the existing reprocessing messes in the United States were cleaned up which they're not, and not just the government ones, the DOE facilities, like in Beatrice's backyard and in Savannah River and Hanford, but West Valley isn't cleaned up yet either. So it would really be helpful if we saw a demonstration of health and safety as opposed to discussion about health and safety when it comes to reprocessing.

MR. CAMERON: Okay. Thank you, Don.

We're going to go see if there are any comments out there in the public. I think this was a

very good discussion, an informative discussion for the NRC. I guess the issue about 50, 70 or a new approach, this issue is going to have to be addressed, and I'm not sure that that issue is a real big issue.

But Anne's point about balance and all these things we're talking about, I think that when we get to our next session when we actually look at what the building blocks possibly are of a performance-based approach, I think we're going to be able to make judgments about whether there's a balance there or not. So I think that's going to be instructive for us.

I know it's often when we hear the industry put forward a particular proposal, or even the NRC, and maybe picking up some on Don's point, is that it might be met with suspicion, perhaps, or skepticism about motivation, et cetera, et cetera. And that's why I think this discussion has been a good discussion because I think it gets us away from any of that. So that was good.

Public? I'm not going to task Miriam with this which she has done, because she's ailing a little bit, but any public comments, questions at all from what you heard?

(No response.)

MR. CAMERON: Well, we're going to give an hour and a half for lunch, and I think we do have time, not that we want to waste time, Dan, but why don't we come back at quarter after 1:00 and we'll start with the next topic.

(Whereupon, at 11:50 a.m., the workshop was recessed, to reconvene this same day, Tuesday, October 19, 2010, at 1:15 p.m.)

A F T E R N O O N S E S S I O N

MR. CAMERON: Welcome back, everybody, and good afternoon. And we're going to go to the second agenda item which is safety and risk information. Correct, Jose? Since I seem to have lost my agenda -- oh, I just found it. Not a good sign for the facilitator to lose the agenda.

But we're going to talk about a number of issues here connected with safety and risk, and one of the most important issues that the NRC is dealing with is what methodology, so to speak, what process to use to determine safety measures, and that's usually framed in the context of something called an integrated safety assessment. The competing methodology -- and competing may be the wrong word -- is probabilistic risk assessment.

Who is going to tee this one up, Jose? Are you going to do it? Okay, Phil is going to tee this one up for us, and then after Phil is done, I'm going to ask Rod McCullum to just talk about some of the information that's in a recent paper that the nuclear energy industry, and as part of that, I want them to also give us a context of where this ISA or PRA fits into this total safety framework. And I think that will help us for this discussion but also

for the last discussion on design information, and it's going to tie us back in on a real level to some of the concerns that we talked about this morning in terms of performance-based.

And Phil, with that, can you just tee it up for us and then we'll go for discussion.

MR. REED: The first slide talks about two main aspects of the risk assessment. The first is the total safety and risk, and this is a summation of all the impacts from all credible accidents, a safety and risk goal. We also added ALARA here, and ALARA is not really normally considered for accidents but it is a method by which you can control the exposure to workers through effluent limitations and other things like that.

The other issue is the safety and risk assessment approach, which approach should we use and what should the methodology be. And finally in the last bullet there is a website that you can find a lot of information with regards to risk PRA approaches, and before I turn the slide, if you want to copy it down, feel free to do so.

The NRC approach to risk is basically through five fundamental documents. The first document is the Policy Statement on Safety Goals that

was published in 1986. The second is the Policy Statement on the use of Probabilistic Risk Assessment, PRA; this was published in 1995, 14 years ago. The third is a white paper on Risk-Informed and Performance-Based regulation that was published in 1998. Finally, in 2000 we published the revised Part 40, Domestic Licensing of Special Nuclear Material. And finally, the last bullet is our latest document and that's the Risk-Informed Decision-Making for Nuclear Material and Waste Applications; this was published in 2008.

In the next couple of slides we'll go into these approaches and provide a little bit more detail. The first is a safety goal that was published in 1986. This was a qualitative approach. This was an approach designed to find risk to the public, to the individuals with no significant additional risk to life and health. There was also a society risk involved from nuclear power plant risk compatible or less than other viable electrical generation risk. The third was quantitative, this was quantitative to an individual. And finally in the last bullet, on the average, all three of these generally translate to a risk of less than one to ten to minus six, and this is cancer fatalities that we're talking about.

The commission PRA statement came out in 1995 and this sort of dramatically changed the way we looked at things. This was designed to be used in all policy matters to the extent practical, and that includes reprocessing facilities. The idea here was to reduce unnecessary conservatism and support proposals for additional regulatory requirements. In other words, you had to be as realistic as possible. The PRA evaluations would be as realistic as practical and then the safety goals and subsidiary objectives to be used with appropriate consideration with uncertainties. Before, when we did any type of assessment, uncertainties was not a major consideration. This policy statement provided us with that opportunity to deal with this.

The PRA usage. The current PRA standards and guidance are developed principally for operating white water cooled reactors. There are different amounts of detail, there are different intended results, probabilistic failures, types and quantities of releases, and consequences. The current PRA standards do not fully address all facility aspects. For example, within the scopes there are some plant design considerations, particularly with construction. There are also some passive systems that are being

built into the new advanced reactor systems which raise some questions about the applicability of the PRA.

Some additional standards will be needed to support new designs and fully risk-informed regulatory structures. And finally, PRA is significantly more quantitative than the ISA approach. The ISA is the acronym for Integrated Safety Analysis. This is the type of approach you'll see with a Part 70 approach.

The next item is the 1998 document and this is the risk-informed, performance-based approach. This approach uses risk insights, engineering analysis and judgments in performance history for five different reasons: to focus attention on the important activities, to establish objective criteria based upon risk insights, to develop measurable or calculated parameters for monitoring performance, and finally, we want to focus on the results as the primary basis for regulation.

We talked a little bit about this this morning. Now finally we're going to go to Part 70. What I talked to you about previously has been mainly implemented through Part 50. Now I'm going to go to Part 70, and Part 70 is the fuel cycle regulation

which was published in 2000. This includes a subpart which was added for SNM, special nuclear material processing facilities. It incorporates risk via binding process similar to chemical approaches.

There are three consequence levels, high, medium and low; three likelihood levels, high unlikely, unlikely and not unlikely; there's a qualitative semi-quantitative methodology; and it also includes the chemical risk and baseline design criteria. I have a slide in the background that shows you exactly how this fits together and what the dose limits are for each one.

This requires the ISA and safety controls, IROFS, items relied on for safety analysis. This is in the regulation, this is in Part 70. Finally, we have a sequence, these are not aggregated risks, generally corresponds to facility risk less than one in a million.

Now, before we were talking principally about Part 50. Now, Part 50 is fine when you have fission products, when you have transuranics, when you have activated metals, and particularly when they're separated, when they're in solutions, when they're in aqueous solutions, or when they're in organic solutions. What Part 70 brings to the game is the

intent to look at chemical risk, and you will notice that in Part 70 there's specific requirements for chemical hazards. This is specified in the regulation, and this will help in reprocessing because, like I said, we have a lot of solutions, chemical solutions where we need to quantify risk in a manner in which we have not done previously.

The risk-informed decision-making is mentioned in 2008 and I also put the atoms number up there. This describes general concepts of risk and total quantitative health guidance, it provides three levels of regions of risk, unacceptable, tolerable, and negligible, and it suggests some other QHGs. These are total risk values summed up over all scenarios, and generally for the U.S. worker fatality risk is generally around 3.9 times ten to minus five. Again, this is cancer risk.

The next slide discusses a little bit about the points of discussion we'd like to talk about:

Should NRC have a safety risk goal for reprocessing?

What type of safety analysis assessment methodology should NRC processes require?

What type of methodologies, PRA, ISA,

LOPA? LOPA is an acronym for layers of protection analysis. This is a system that's used in the chemical industry.

Can semi-quantitative or qualitative risk assessment methodologies, such as those that we use for Part 7, be used?

How can NRC apply a PRA policy statement to reprocessing facilities?

Based on current practice with PRA, are there limits or obstacles on using the PRA approach for evaluating reprocessing facility risk?

What should be the balance between risk-informed and performance-based requirements such as ISA and PRA?

And finally, are there any specific hazards and accident categories that should be quantitatively assessed in reprocessing facility safety analysis? This latter means are there data available out there now that we can use, or is it such a system that we have to develop a lot of data on exactly what can we use from existing facilities both here and also international facilities.

I wanted to show that backup slide. This is the backup slide for Part 70 that shows you the high consequences, intermediate and low receptors.

And for the workers, I know you can't see it but there are dose limits associated with this. And you will notice in the second one I think there's also chemical hazards associated with this. And finally, for the individual outside the control area there's also dose requirements.

And that completes my presentation. I'll go back to the questions that we would like the audience to address.

MR. CAMERON: Okay. Thank you, Phil. And I just want to point out about the questions, there really is four questions because I think a lot of them really relate to the methodology that's this overall goal, then there's the methodology which is integrated safety assessment, probabilistic risk assessment, and then there was a question on there that we talked about this morning about the balance between performance-based and prescriptive. I think that's always going to be sort of the question that's going to hang in the background that we're going to be talking about in more specific terms. And then there's the question about specific hazards.

One of the major questions is the whole idea of the methodology integrated safety assessment, or PRA. Rod McCullum is going to do a presentation on

that for us, and I'm going to ask Robert Hogg to just put some context for us there. But I want to make sure, are there any questions? I don't want to go down the discussion trail yet, but are there any questions raised by Phil's presentation that we should answer before we go to Rod? And obviously we'll have plenty of time for questions. I just wanted to make sure that we were clear there.

And Rod, are you ready?

MR. McCULLUM: Perfect timing, just coming up there.

MR. CAMERON: Hold on one second, Rod.

MS. BAILEY: I think I just wanted to add another point of reference. Phil had a slide about the different documents that are out there that articulated NRC's position in terms of risk assessment and PRAs and ISAs. I do want to point out that we recently issued a draft ISA/PRA comparison, I think it was issued last week, and this is a paper that the commission has directed the staff to write and it compares the use of ISAs versus the use of PRAs for the purpose of the fuel cycle oversight process. I think that might also shed some light.

MR. CAMERON: Okay. And do you think that we might be able to put that paper up on the

reprocessing rulemaking website?

MS. BAILEY: Yes, we should be able to do that. And we are having a public meeting on that paper on November 5.

MR. CAMERON: So the paper was done for another purpose but it is also relevant.

MS. BAILEY: It was written for another purpose, but I think it might be relevant to this discussion.

MR. CAMERON: Okay. Thanks, Marissa.

Now we're going to hear from Rod on this, and then finally, I'd like Robert to try to set a context for us, so this will be more understandable. So what Rod is going to address is the second category of questions up there which basically is methodology. Go ahead, Rod.

MR. McCULLUM: And I think the paper -- I was reading it in the airport when I was changing planes on the way out here -- it is relevant, and indeed you'll see here one of the examples we want to cite is the experience that has been had. When Marissa says fuel cycle facilities, she's talking about the front-end type of facilities, I would call them, now we're talking about a back-end type of fuel facility here, with some added hazards that I think

you saw earlier.

But anyway, I am going to follow Phil's example, I'm going to sit here and hold the button down as opposed to go up to the podium, not because I'm short but because that will keep me briefer, I think. I have to quit before my finger goes numb here.

And I am also sensitive to the concern that Beatrice expressed earlier about industry driving this, and I think that we don't want it to be that way. I think it is a very important principle of effective regulation that the folks doing the regulating reach an understanding of that thing that they are regulating to the maximum extent possible. Of course, the best way to do that is to interface with the folks that are the experts at designing and building and operating that thing, and of course, when we do that we need to do that in public, as we did in the last workshop and as we are doing here, and it is good that we are bringing in others as well.

To facilitate that, industry formed a Recycling Task Force back in 2006. Felix Kelar was the leader of it, he's retired from NEI since, and due to the Yucca situation, I just happened to be available around the time that he retired. A lot of

work -- and you see many of the experts, particularly Jim and Robert sitting here -- went into developing. Okay, if industry was going to write a regulation, what would it look like, and we went through the whole dichotomy of should we just do Part 50, should we do Part 70, do we need something else. For reasons that have already been discussed earlier, we concluded we would need something else. We called this Part 7X and we came up with a white paper describing a proposed Part 7X that we submitted to NRC.

We think NRC has done the right thing as opposed to starting from this input, they've started down the approach that would be expected for any new regulation, okay, what are the gaps, what are the needs. And we think as they go through this, an interesting basis for comparison can be Part 7X, and we look to continuing to compare back and forth. And as Chip mentioned, I'm going to go through this quickly, then I'll ask Robert to give some additional context.

Gap 5 on risk analysis is one of the things that we in industry consider to be high priority. A lot of talk about risk-informed, performance-based, technology-neutral, and when you say those things and you want to give them meaning and

make then doable in a way that ensures public health and safety, it is the tool, the analytical tool that really is where the rubber meets the road. You're not going to describe the shape and size of tanks, their vessel thickness, the number of valves you have to have on the outlet piping in regulation, but you do need to prescribe a tool that can provide an assurance of safety.

And in support of that, building on what we had done in Part 7X, we went a step further submitting this just recently. We alluded to it at the last workshop in Washington, and actually we were informed by the dialogue that happened at the workshop in Washington -- we thank you for that -- and that gave us the impetus to finish up the paper, we sent it to NRC, and we're looking forward to continuing dialogue on that which I'll briefly highlight here.

In that paper we compared integrated safety analysis to probabilistic risk analysis, as did the recently issued NRC paper that I was reading on the airplane. And from my airplane scan, airport scan, there's a lot of consistency between the two papers. I think there's a strong recognition of what has been accomplished through integrated safety analysis in the NRC paper. There is discussion about

the potential role of PRA, and I'll get into that in our perspectives in a little bit. I wouldn't say it's inconsistent at this point.

We've talked about something called the safety envelope and when you look at the bullets under systematic analysis here, it's really all about putting the right barriers, measures, things -- we call them IROFS, items relied on for safety -- in between the hazards and the people and the environment.

I like the term semi-quantitative I saw in Phil's slide. I think that's what you get with an ISA. You don't have a PRA that describes the detailed probabilities, but you don't get a sense of likelihood, and you want to drive that to the point where you can get an assurance that the likelihood is small enough and the consequences are small and/or mitigated enough that you have assured safety and that you have all these things in place and you've defined a safety envelope.

It is an outstanding tool for risk-informed, performance-based, technology-neutral as it is deployed in the fuel cycle facilities. I think chemical hazards were also mentioned earlier, and it was discussed earlier here that we need to be worried

about chemical hazards as well as radiological hazards at these type of facilities, and this is another area -- and again, I think Robert is going to elaborate in a minute -- where integrated safety analysis is a proven tool. We think that with the types of facilities you have that this can be effective in assuring safety.

Probabilistic risk assessment is a quantitative tool and I think the second bullet is probably the most important distinction, and I'm still thinking about the NRC paper from the context of how much both sides may need to explore this more. And I think the term was used in Phil's presentation: PRAs can be as realistic as practicable. And I think where as practicable comes into play is in the extent to which you have data to construct a PRA.

At a commercial nuclear power plant you've got 104 of these things that have operated for 20, 30, 40 years and they all have similar systems, and they fall into two major categories, PWR and BWR, you have an incredible database, so you've got good data on the probabilities of human failures operating certain systems and the probabilities of different kind of valves not functioning.

When you have unique facilities, as you do

on the front-end of the fuel cycle and as you would in the case of a reprocessing facility, you need to make sure that you have enough data to make the PRA realistic. Otherwise, it's garbage in, garbage out if you really don't have the data.

Another thing that happens at a reactor, and this we pointed out earlier this morning, it's not just the hazard in terms of what is the material, what is its radio toxicity, its inhalation hazard, what is the source of energy that could potential drive the hazard to affect people. If you have a reactor and you have the temperatures and the pressures and the nuclear chain reaction going on, you have a lot of safety systems that have to interact with each other and they have to function, they have to failsafe, they have to come on within seconds, valves have to close within fractions of seconds. You can see where a tool like a PRA in this instance is important in that it allows you to quantitatively look at how those interactions perform to meet your safety goal, as opposed to where in ISA space we're talking about a semi-quantitative definition of a safety envelope.

So certainly before applying a PRA to a reprocessing facility, we need to look at on the third bullet what is really the need here in terms of the

interdependencies and the complexities and the energy sources and what data are available. But as you can see in the fourth bullet, we recognize that there are instances where if you have enough information you can use the PRA to give quantitative insights.

It can help you demonstrate where you have margin of safety. It can be another confirmatory check on you've got the right items that you're relying on for safety and all of the right items you're relying on for safety and help figure out within those items where to focus your resources, perhaps. So there may be within an ISA framework a role for a PRA and we would certainly welcome exploring that.

So our recommendation is that ISA is the most appropriate tool, it's a proven tool. I think at this point I'll ask Robert to say a few words on the idea of context of how we view our experience with ISA.

MR. HOGG: Thanks, Rod.

I guess what we did back a couple of years ago was take a lot of the experience that we had at our different fuel cycle and related facilities and evaluate both the iterative design process, design analysis feedback, design analysis feedback process,

and see where that touched the existing regulations, and then evaluate whether those were the right pieces to incorporate within the regulatory framework that we were trying to identify.

So if I was to describe that iterative process in a little more detail, we identified the performance requirements, we didn't reinvent the entire box. We certainly understand the regulatory environment that we exist in, including both Part 50 and Part 70, so we didn't throw that out and maybe try and establish an entirely new paradigm of regulatory expectations. We identified performance requirements that we knew were tried and true by the NRC and by the industry and used those and used as many of those as we could possibly find within the relevant regulations.

We identified design criteria. An interesting piece that the existing facilities can bring to the table is that we understand that just simply writing that the facilities will protect the health and safety of the public is of limited value, it's a real need but as one moves to implementation, one wants to know what the specific things are that one has to do to create that protective feature of the facility.

So we looked for the design criteria and the framework that the design criteria would most effectively establish, along with the performance requirements, the appropriate envelope for the safety of such a facility. And so we described what we believed was a safety envelope in that proposal that covers both workers, the public, criticality, release of chemicals, environmental controls, so it was broad in its scope.

We understood that the expectation of the agency and the expectation of anybody investigating facilities would be to understand the design of the facility in order to demonstrate compliance with those criteria, and so we wrote in, as is fairly traditional, an expected design report or safety report that included the documentation of the relevant design details that would be applicable to the structures and components of the facility.

Equally consistent with previous experiences, then the content of the analysis that would go into evaluating whether that design met those performance criteria. And we listed all of those things that are there: criticality, safety analysis, seismic analysis, integrated safety analysis, chemical safety analysis. And I'm talking a little bit about

what all the next layer of those safety analyses are because no one of those is a unique analysis to itself, more they're a system of analyses that one will then use to evaluate where systems interact, systems are well described and not well described, systems are well designed and not well designed and need refinement, and those analyses are used to then progress that set of design statements that will then later be used as the basis of safety of the facility.

So we established the safety report that included these design statements and analysis results, included metrics and an evaluation of adequacy, some measure of adequacy, and then feedback into the design process, and then repeat. And so you would then take that back to your performance requirements and evaluate whether those are still valid performance requirements, are we barking up the right tree, the baseline design criteria, have we established the right approach to controlling some particular aspect of the facility, and then redefining and reclarifying what the safety envelope is for the facility.

So we talk a little bit about analyses and some of the analysis techniques and we really dove pretty deeply in some of the industry reports that we've written over the course of the last two years

into what the difference and values and shortcomings of some of the different analytical of some of the different analytical techniques are.

We pulled from the chemical industry where HAZ OPS is used, identified some of the more robust failure modes analysis type valuation techniques, looked at the scope of PRAs as they're done today, both at nuclear power plants, at existing reprocessing plants around the world, and as we envisioned doing analyses in support of the safety basis of this type of facility.

And then, of course, we looked at our ISA techniques which we're very familiar with as far as how they could be used, how they could be used to risk-inform decisions and to relate the relative risks of different accident sequences, and rolled all those together and tried to establish a framework within which one could use any of those tools in the appropriate fashion and within the appropriate bounds. And any analysis technique is going to identify your boundary conditions and identify where you have valid data and where you don't have valid data. And so we tried to establish, based on our experience, exactly which of those tools would be most appropriate to use and when.

MR. CAMERON: Okay. Thank you, Robert. That's very detailed on the approach, and this is prologue for our next agenda item as well as this one. I just wanted to make sure that these basic building blocks, at least as I understand them, that everybody would know where this ISA question is. And the way I looked at it was you talked about the baseline design criteria, you also mentioned performance requirements. This was your safety envelope. The ISA would then be performed to identify certain accident possibilities, things like that, and also identify these IROFS, and for certain types of IROFS, high consequence events, then it would be tech specs. Okay?

But the question now before us is, is the integrated safety assessment the best way to do the safety analysis for one of these facilities, and that's the big question facing the NRC. Before we go to that -- and I don't know how much controversy there is based on what Rod put out in terms of should be doing an ISA, should we be forced to do a PRA -- I want to ask you what's the controversy on that.

But the first question on the sheet is what role the existing safety goal plays. Maybe we should have some discussion of that. And I'm just wondering does everybody understand what that question

is? I'm asking that because I probably don't understand it. James.

MR. ROSS: I was going to ask are we talking about ALARA type requirements here?

MR. CAMERON: I don't think so. I think we're talking about the commission's safety goal which is ten to the minus whatever. The question is framed as do we need to use a specific safety risk goal for reprocessing or is the current approach sufficient. Now, there are some things that are in there that might need to be explained. When we talk about safety risk goal, are we talking about probabilities? And when you talk about the current approach, is the current approach sufficient? Well, what is the current approach?

And maybe someone from the NRC could just explain what that means, safety risk goal. In other words, how would that safety risk goal be expressed, and what is the current approach for a fuel cycle facility? And then perhaps people might have opinions on those two questions.

Phil, how about the first one?

MR. REED: Well, the first one, the safety goals is what came out in 1986, and basically it was just a goal, it was a statement that we should do

this, do that, it was not quantitative, it was not qualitative in a sense, it just said that you should keep your releases as low as practical, you should make sure that the person outside the fence should not get an exposure of such and such. It was basically a goal, it was very qualitative.

MR. CAMERON: So there was a ten to the minus six.

MR. REED: There was. But over the years, people wanted something more, better. It was a very general approach because it did not include almost the design, it did not include realism, it was just a fundamental belief that we ought to do something and we ought to do it, it didn't say how we'd go about doing it.

With regard to the fuel cycle approach, the item in the fuel cycle facilities there is the current 10 CFR Part 70. That's basically Appendix H, I think, of Part 70 and that talks about the ISA part.

MR. CAMERON: Okay. So that second part of that current approach basically is using the ISA, integrated safety assessment methodology.

Marissa, and then we'll go to Robert. Marissa.

MS. BAILEY: Yes. I guess this is

probably one area in the work that we're doing where there's a diversity of view among the staff as far as what is the right risk method for assessing reprocessing facilities. And I'm not a risk person so I don't really know a lot about risk and risk assessment methods.

But to me, the basic question for reprocessing -- and I don't have an answer and so I'm trying to get input from all stakeholders here -- the basic question is, is an ISA sufficient for a reprocessing facility, for licensing a reprocessing facility, understanding that an ISA is qualitative but it can be quantitative to the level that you need it to be quantitative or for certain aspects.

Also understanding that an ISA doesn't really give you the full picture of what the risk is for a facility. The purpose of an ISA is to identify the items relied on for safety. The purpose of an ISA is to do a systematic assessment of the hazards in your facilities, and what's the probability or likelihood of those hazards and then identify items relied on for safety to either prevent or mitigate those hazards.

And I guess the question is, is that good enough for every processing facility, or do you need

something more that gives you a better understanding of the total risk that's associated with that facility.

MR. CAMERON: Okay. So that really this first bullet there is basically the ISA versus or in addition to some quantitative analysis question.

And let's go to Robert and then to Tom, and then let's explore this ISA issue. Robert.

MR. HOGG: I guess I see it slightly differently if I read the first bullet. The first bullet is a question of a safety risk or goal, and that's the envelope, that's the question of whether the criteria are singular or multiple or worded in a very clear and distinct fashion or worded in a somewhat higher level not specific type of description. So the safety goal that Phil described relative to the policy statement is a kind of a high level overarching statement versus the safety goals and criteria of Part 70 are specific dose criteria that are identified to specific individuals with detail that can be measured pretty deeply.

The second question is what type of safety risk or assessment methodology should be required, and that's where I think we're going to get into the discussion of ISA versus PRA or combinations or some

of this and some of that, whatever.

MR. WILEY: Okay. I just want to make sure that people understand what the hierarchy is here, and is the answer to should NRC have a safety risk goal, for you is that what your baseline design criteria establish, or is there something outside of that?

MR. REED: No. That's the performance requirements.

MR. CAMERON: So that safety risk goal, those are what you call performance requirements.

MR. REED: That's correct.

MR. CAMERON: And can you give us an example of performance requirements?

MR. REED: So the examples that we wrote for a dose to the key worker of one CVRT or 100 REM or greater, acute does of .25 CVRTs or 25 REM, intake of soluble uranium of 30 milligrams or more. So those are the kinds, versus ten to the minus six, or as well as ten to the minus six, those are the questions that I think are involved in that first question of safety goal.

MR. CAMERON: Okay. Why don't we just do you Marissa, and let's go to Rex then.

MS. BAILEY: I guess just a clarifying

question, and I think I'm going to show my ignorance here when it comes to risk assessment, but if I were to draw an analogy with reactors, there are safety goals for reactors and then there's the surrogate for those safety goals which are incorporated into regulations and that's the CDF core, damage frequency and LERF, large early relief something. But I guess what I see here is that what you're suggesting is that there would be safety goals and then this would be the surrogate to those safety goals. That's what would be incorporated in the regulation.

MR. CAMERON: And I think this is an important discussion because where we really get off track in these discussions is that we really don't have a good idea of what the entire context is here.

MR. HOGG: And I think maybe we're saying the same thing only with slightly different words. These goals or surrogates are ones that are used in the analysis to determine whether the design is adequate or not, and be it the early release fraction or the other surrogates that are not described in dose terms, what we ended up using was dose terms because they were consistent with the performance of the facility relative to its impact to individuals, and that's essentially how we decided whether to use that

or a ten to the minus six for the effectiveness of the confinement or some criteria like that.

MR. CAMERON: Okay. I think maybe we're getting some focus here.

Rex, from your experience, what do you have to tell us on this, and then we'll go over to Tom.

MR. STRONG: A few comments. In the UK we, in effect, do have a risk goal, risk to the members of the public arising from accidents, and that was work done actually by the Royal Society in the late '80s, early '90s to try and answer the question or illuminate the answer to the question: What risks are acceptable and what are unacceptable to members of the public going about their normal lives? So woven into the way we do stuff are numbers like the ten to the minus six which has been appearing here.

Just as a matter of fact, we have carried out PRA on nuclear chemical plants since the 1980s. As a technique it has its limitations. One of them is to do with the basic data about reliability and human performance reliability which are built into the answers. It has other limitations in that it is possible for analysts to deceive themselves into believing that the methodology is giving answers

which, in some sense, are absolutely correct. As a way of illuminating risks that might arise from different parts of the process, it nevertheless is a useful tool because it can illuminate those differences.

And back to my earlier comment about reducing risks to a level as low as relatively practicable, knowing when these risks arise and in roughly order of magnitude is quite useful, but it certainly isn't adequate to create safety system in our situation. This is like back to basics, a design of a nuclear plant must be well founded which means, in our terms, it has to take into account national and international design codes, appropriate design codes, and then once designed, there has to be some independent means of verifying that the design of, let's say safety equipment system, is actually capable of delivering the duty expected of it.

Because we're a nuclear chemical plant, we have used techniques like HAZOPS borrowed from the chemical industry, again for the 30 years, another set of useful techniques for illuminating the kind of things which can go wrong. So there are then choices to be made about design if that reasonably practicable, or if not that, working out how to

mitigate the consequences.

So for me, it isn't a simple straight golden bullet that answers this question that you're posing to yourselves. There are parts of the answer. For us, a risk goal is part of the answer; for us, making use of techniques such as PRA is part of the answer, but has to be set against making use of good engineering practice with substantiation that systems as designed are capable of delivering the duty expected of them. But PRA has its limitations, not the least of which [inaudible].

MR. CAMERON: Is your microphone still on?

MR. STRONG: Sorry. PRA is extremely expensive and is not without its shortcomings.

MR. CAMERON: Thank you, Rex, for that description of how you do it over there, and it sounds possibly similar to what Rod was talking about also.

And we're going to go to Tom. And I'm just wondering what's the controversy here, what are the worries, what are the concerns about doing this? Is it how you piece it together or what? Tom.

MR. HILTZ: Thanks, Chip.

I'd might further contribute to some of the confusion.

MR. CAMERON: That's great, just what we

need.

(General laughter.)

MR. HILTZ: I understand this issue to be a bit different than what folks have articulated, and I actually break it down more like Robert did. I think there are two issues that we're faced with. Number one is do we want to have a policy, an overarching policy or goal related to safety or risk associated with the reprocessing facilities, recycling facilities. And then the second issue which is them more technical issue, I think, is what's the methodology by which we want to assess risk and make risk safety decisions.

The 1986 commission policy statement, as I understand it, was meant to be applied to classes of facilities, not to individual facilities. There were qualitative health goals and then the surrogate quantitative objectives, but they were never meant to be applied to a single facility, in my understanding, they were meant to be applied to classes of facilities.

And I heard some folks say that one times ten to the minus 6 are incorporated in regulation, and I'm hard pressed to recall where we've actually incorporated those numbers into regulation. We may

have with the new Part 52, there may be some things in citing that that we've updated. But in general, those numbers are used for regulatory decision-making in our guidance document about how we assess amendments to operating reactor facilities. It's not meant to be regulating by the numbers.

Now let me jump back to the first one. The first one, if we establish a safety goal or a safety policy, that is actually a policy decision which will likely go up to the commission, so I don't think, at least when I think of safety goals, that we're talking about performance criteria because performance criteria, I think, will ultimately be incorporated into the regulation.

So for me, there are two important questions. Do we need an overarching safety goal that is more or less a policy issue that will be resolved at levels above the staff, potentially, or don't we? And I think the other issue is then what is the right methodology that we need in order to reach a risk-informed safety decision regarding the facilities.

MR. CAMERON: So just to make it clear, before we go to Sven, your overarching goal is you're disagreeing -- and I'm putting a light tone on that disagreeing -- is that Robert and Marissa, at least

Robert was saying that these type of performance requirements are a surrogate safety goal. Okay? And what you're saying is that should there be an overarching safety goal, there would also be performance requirements -- you called them criteria but they'd be performance requirements, but the safety goal would be something in and of itself, a high level.

And I guess the question there is has a similar overarching safety goal been established for other categories of facilities and do you need that type of goal.

Let's go to Sven.

MR. BADER: I'm actually a little perplexed. An overall safety goal is sort of like a core damage frequency? Is that what you were suggesting?

MR. HILTZ: I'm suggesting that if you go back and you look at the commission PRA policy statement -- I'm sorry, not the PRA but the qualitative and quantitative health objectives, they were designed for a class of reactor, either a PWR or a BWR, they were never meant, it was my understanding, to be applied as this is the magic number that every facility needs to meet, and that the surrogate about

how you would meet those qualitative health objectives of the quantitative goals of one times ten to the minus six -- and I'm not even whether if one times ten to the minus seven as a large early release was ever in that, I'm not sure, and again, it's my understanding that somebody here who is smarter than me might be able to provide an example -- that we resisted incorporating those into regulation, that they were set as policy goals and objectives which, in turn, I think rolled down into some of our guidelines for how we make decisions but didn't carry the sort of regulatory footprint of incorporated into regulation.

MR. CAMERON: And Sven, why don't you keep going.

MR. BADER: I'm going to keep going. The ten to the minus six, as I understand it and the way applied it for the M-Triple-F -- we didn't use ten to the minus six -- but up here we have highly unlikely for events that have high consequences, we had to demonstrate those events where highly unlikely, and that would be considered ten to the minus six in some cases, depending on the guidance documents you look at.

So when we say performance criteria, I believe it's all actually wrapped up in this table up

here, actually, where you have your dose criteria, your chemical limits, your environmental limits, solubility limits, and so forth. And then you have the probability which the highly unlikely, the demonstration you have to make which would be ten minus six some could say, the intermediate which has to be demonstrated to be unlikely which I guess you can say ten to the minus third to ten to the minus six and so forth. So I think the performance criteria up here kind of incorporate those criteria.

What I'm worried about is that there's some add up all the events in your facility and come up with one criteria, one number, identify all these different consequences, look at the probability of each of those consequences and sum them all up and come up with one frequency for the whole facility. Is that what we're talking about?

MR. HILTZ: I'm not talking about that. I'm just trying to provide you the background and why there's so much confusion about this issue about how we proceed forward to resolve whether there should be an overarching safety goal for a reprocessing facility.

MR. CAMERON: I think from what Sven is saying, then we're going to go to Marissa and Don, is

that that overarching goal that's already there is already being considered in these performance requirements, and so that you don't need to try to grapple with the issue of should there some new overarching goal in terms of this rulemaking.

MR. BADER: And that's what I'm suggesting. And I guess the question Marissa posed is ISA a good process, and I would actually pose the opposite, is PRA a good process. I mean, Davis-Besse happened. I don't think there's any PRA that would identify the chemical degradation or rusting of a containment facility and its analysis. And we have lots of the chemicals in the process so there's lots of chemical reactions going on that I'm not sure are very quantifiable with a PRA.

MR. CAMERON: Can you hold that because I think that's where we need to get to, and that's a good example and perhaps would an ISA have revealed that. That's what we really need to get to discussing this ISA/PRA issue. I'm just always thrown by this safety goal issue that we started off the questions with, and I'm trying to see if there is some unanimity of opinion here that you rulemakers for reprocessing that you don't have to reinvent the wheel in terms of this overarching goal.

MR. HILTZ: Chip, if I can ask a question for the panel. Is there an impression that there already is a safety goal for reprocessing facilities?

MR. CAMERON: Or not specifically for reprocessing facilities but one that the commission set generally for all types of facilities that are applying that, and I thought that Sven was sort of referring to that when he was talking about the ten to the minus six. Go ahead.

MR. BADER: Since you asked the panel, I'll consider myself part of the panel. I think up here is what I think is the safety goals and the performance criteria, that you have to demonstrate highly unlikely events, high consequence events or highly unlikely, intermediate consequence or unlikely, that's part of the safety assessment.

MR. CAMERON: Okay. We need to get you all on the microphones. And let me go to Marissa and then to Don, and then we'll see if we can see what Beatrice's question is, and then Jim, I just want to get this cleared up about do you need to do this in your rulemaking. Marissa.

MS. BAILEY: I guess I just want to put on the record that I don't disagree with Tom. Tom just articulated my thinking and my questions a little bit

better than I did which is really do we need a policy statement on safety goals, and to me, actually the more important question is what is the right methodology for assessing the risk at reprocessing facilities. That's really what I would like to get to is what's the right methodology, what are the advantages and disadvantages of ISAs versus PRAs for a reprocessing facility.

And I guess if you want to pursue the question of safety goals a little bit more, I'm not the right person to talk about it but there might be a couple of people in the audience that could answer the safety goal question.

MR. CAMERON: But I guess that's the question: Do you need to include some sort of a safety goal policy in this rulemaking? That's the question.

And Don, let me go to Jim first and then come back to you. Jim.

MR. LIEBERMAN: Well, frankly, I'm getting a little confused too on this safety goal. I think a safety goal in the Part 50 sense, core damage frequency, I think the real issue the ISA or the PRA is the methodology to show that something has been met, and the question is what's that something.

What's on the slide here is the performance requirements that used in the fuel cycle industry by NRC and you can say we need to decide whether we use PRA or ISA to decide whether high consequence events are prevented such that they're highly unlikely or not.

If these are not the right standards for reprocessing, then the question is, are these the right standards for the rest of the fuel cycle industry. The goal wasn't to reinvent the standard but basically use the standard NRC has found acceptable in the fuel cycle industry, and then how do you design or demonstrate a recycling facility has met these standards. And I think that's what the issue is.

MR. CAMERON: Oh, okay. And I don't want to belabor this point about this overarching safety goal because it may exist, it may be a red herring, it's something that staff needs to be able to say we don't need to address that here.

Don, you've listened to the conversation and I hope all the individual pieces might still be at least not completely fuzzy at this point, but what do you think on this?

MR. HANCOCK: Well, I actually had some

questions. And one of the things that's always bothered me, and the slide is a good illustration of it, and I guess I want to specifically ask the industry folks at the table, and I'm not sure exactly how's the right way to phrase it is so that it gets the question engaged. I've always been disturbed by the, in my view, significantly differing standards for workers and the public, and I'd like to have a quick understanding. And obviously we're not litigating here and that's not what I'm asking.

When I'm in discussions with other folks in the public about this, the frequent question that comes is why are workers expendable -- is the word that sometimes is used -- why have such a different standard for workers and the public. So I guess maybe that relates to the whole safety goal envelope question, maybe it doesn't, but I guess I'm interested in an industry perspective on that, and then I may have a follow-up and then I have a different question in a different area.

MR. CAMERON: Okay. That may relate to this all. And that's an important question. You're asking it of the industry.

MR. McCULLUM: And if NRC prefers to respond, I'll put my card down.

MR. CAMERON: The NRC, the agency sets those limits based on international practice and other things, but can we give Don a quick answer about why doses for workers are different from doses to the public

MR. McCULLUM: I'll take a crack at it and at least inspire the regulator to tell me if I'm wrong here. But I think, first of all, I take exception, having been a worker at a nuclear power plant, to the notion that workers are expendable. I took my own personal protection very seriously, as everyone who works at a nuclear plant does, and you wouldn't be working at them if you didn't otherwise.

I think the difference is twofold. One, it comes into the notion of voluntary versus involuntary risk, and the second comes into the notion of training which is certainly one of the things that when I was taking my own personal risk seriously at a nuclear facility came into play. I had to be trained on all the radiation protection procedures and how to respond to things and what to do in different areas, and I accepted the risk, given that knowledge, to go into those areas.

Now, it doesn't mean I wasn't protected, and I think if you look at any health studies of

workers at commercial nuclear power plants, I know when I worked for a utility that had coal plants and nuclear plants, the union workers would take loss in seniority and cut in pay to go from the coal plants to the nuclear plants because having been educated on the risks of both, they considered the nuclear plants to be much safer.

So we do protect our workers, but again, you do have to say something about the level of understanding of the risk that comes with being a nuclear worker and the required training that makes sure they do understand the risks they're taking on, and second, the notion of voluntary versus involuntary. If you're living in a community near a nuclear plant, your perception of risk might be different than someone who chooses to work in it, and I think we recognize that. We're protecting the workers, I guess, and we're protecting the public even more.

MR. CAMERON: Okay. Thank you. And as important as that question is, I don't want to get us off this track that is already winding. So Don, can you take us back there?

MR. HANCOCK: Maybe not because I had another question and it came up in Robert's

discussion, if you can help me, it's at least part of the rest.

So when you talk about safety envelope, what's the time period that you're talking about safety envelope for?

MR. HOGG: Well, what we did was establish safety envelopes in the similar vein to the way, again, Part 70 essentially established such envelope. As you have already identified and we discussed, identified the envelope as it applies to individuals outside of the facility, the members of the public, the workers, we established for normal operations and accident conditions much as they're currently established for existing facilities.

From an environmental standpoint we established them for the time period of operation of the facility and during decommissioning after the facility is removed. So we tried to be comprehensive in doing it, not to say that we've captured all of it, but that would be the intent would be comprehensive and capture both all potential receptors in groups and all time periods.

MR. HANCOCK: So then a question for Sven. He appropriately, and I appreciate it, used the PRA example of Davis-Besse -- I'm skeptical about PRAs for

other reasons from my experience -- but I guess I didn't understand, and so my question is how would an ISA in that situation have captured chemical problem at Davis-Besse?

MR. CAMERON: Okay. And that's great because that takes us right to the heart of the question: ISA and PRA, and let's discuss that. And it's great that you gave us that example, and let's hear from Don and Beatrice and perhaps Anne and others on this issue. This safety goal question, I think seems surrounded by it may be questionable whether that has to be part of your rulemaking, but I think we're going to leave that there and let's spend the rest of our time talking ISA/PRA. And SVEN.

MR. BADER: The ISA process would go through and identify -- we call them IROFS from Part 70 but I think it's important to safety in Part 50 -- and then once you've done that, you have to demonstrate highly unlikely the ten to the minus six, or whatever number you want to assign that. And so the primary confinement would have been identified as an IROFS and the next step is to look at the different failure modes of that IROFS, and corrosion is clearly one of those issues in the chemical industry that you have to worry about so that would be something that

you would look at.

Specific to Davis-Besse, I don't know the details of what caused the corrosion, I believe it -- I'm not even sure, I can't tell you -- I know they had collected a lot of material in the filters and it should have been obvious that there was a corrosion issue going on.

An ISA process and you identify your safety features and then from there you have to identify why those safety features make an event highly unlikely and it's able to sustain through all the conditions all the environmental qualifications that are necessary to demonstrate the safety throughout the operating history.

MR. CAMERON: And Don, do you want to tell us about what some of your misgivings are about the use of PRAs.

MR. HANCOCK: Well, the specific example that I am most familiar with and have been most involved with is the PRA for WIPP, and part of the reason I asked the time period, you know, the WIPP time period is 10,000 years which is way short of the risk period, so that's a problem. Probabilities, I mean, we don't -- and again, I would argue in the Yucca Mountain case which I know less about and the

WIPP case which I know a lot more about, probabilities are basically hand weighed.

From my standpoint, we don't have good bases in history, in engineering and any other way, from my standpoint, to really assign the probabilities, but yet they were assigned and decisions were made that I think on the basis of both good science and just practical experience were clearly wrong. Well, when will we know? Well, we'll know in a few hundred years down the line and that could be a little late, or longer than that down the line. So those are fundamental problems.

And people have talked about limitations, et cetera. That's a severe limitation, in my standpoint, and again, I understand there may be differing time periods we're talking about with different kinds of facilities, but a reprocessing facility, from my standpoint, based on at least my understanding of the history of reprocessing facilities in the United States, is a very long time frame and it's a lot longer than the operational lifetime.

And I don't know and I'm interested in people talking about how the ISA addresses those kinds of issues as well because, from my standpoint, the

issues relate to risk and consequence and public health and some ways that I'm, frankly, skeptical that either PRA or ISA does what I think needs to be done. That's why I'm glad to hear more reasons why limitations and strengths from people's perspectives, industry and regulators' perspectives for either one.

MR. CAMERON: And I think that the industry might say that it's not just the ISA in and of itself that gives you that confidence, it's the performance requirements, the baseline design criteria, and then you have the ISA and IROFS. But the implication, perhaps, of what you're saying that I'm picking up is that if you rely too much on a PRA, it can give you false confidence, perhaps.

So let's go to Rod and then Phil.

MR. McCULLUM: And the word false confidence was exactly the word that I was sitting here with my card up wanting to bring up. And I think Sven hit it just right when he talked about if you had an ISA for Davis-Besse, the safety basis for Davis-Besse was established by deterministic means, and then, of course, you have PRAs within that deterministic framework.

Let's say it was integrated safety analysis, you have a situation there where it's items

relied on for safety, not just components, not just the vessel material itself, items or procedures and administrative controls. And you had a case there where all of those things were in place, the human beings simply didn't deploy them appropriately, the human beings simply kept cleaning corrosion out of the strainer and didn't ask the question where it was coming from.

Knowing the probability with some precision of that hole being punched in the vessel by that corrosion mechanism would have probably only given you a false sense of confidence. And with an ISA or with the deterministic approach they did have in place, you had all the right IROFS there already. So relying on an exclusively probabilistic where it becomes too much about the number and does lead you to a false sense of confidence.

And what I did want to do, Chip, since we have reached the point, on at least my watch, where we are owed another break, is I want to try to summarize and answer your question.

MR. CAMERON: We started late.

MR. McCULLUM: That's true. Well, then I have plenty of time to summarize.

You asked the question where's the

controversy here, and from my e-mail that came in when I was changing planes yesterday and I tried to read as much of that as I could, and from what I heard today, I'm not sure there is a controversy. I think everybody around here agrees that there is a safety goal, it's a question of how we articulate that safety goal and more importantly, how we assure that that safety goal is met in requirements.

And you see a framework up there. Within that framework, and that is a pretty good framework and it's worked, and I think the paper that NRC released yesterday recognizes that that framework has worked, you have an established tool of integrated safety analysis that can give you a very high level of confidence.

You have another tool called probabilistic risk assessment, and that tool, I think, again NRC's paper and industry's paper have recognized that there are limitations to PRA, however, it's all about defense in depth sometimes and we recognize that if you define your compliance with integrated safety analysis within that framework, there are instances where you do have enough data. Maybe you do have a complexity of interactions where a limited scope PRA can give you an additional layer of confidence where

you can say I've defined this event highly unlikely and I've put all these IROFS in place and I've put all these procedures to make sure people check those filters and ask the question where the corrosion is coming. But I also want to do a PRA because there are a set of equipment in here that I do have some data on and that might also support additional confidence in that safety basis.

So looking at what NRC has put on the table and looking at what we've put on the table and looking at the discussion here, I'm not sure that this is that controversial. NRC still has a big task in front of them to make it all work, but I think there's a basis to go forward here.

MR. CAMERON: Okay. Thank you very much.

Let's to go Phil, and then we'll go to Sven. And I don't know, Don, if you have your card up from before, or you have it up now. Okay. Let's go to Phil and then Sven and then Don.

MR. REED: I want to point out a comment that Bob made which is extremely important, and that is design, When we do PRAs for reactors, we have the complete design, not only do we have a design, we have an operating system. We know where every nut and bolt is, we know where every pump and valve filter is.

When we do a reprocessing facility, we're lucky if we get a circle in the ground or a square. We just don't have the detailed design right now of what we're working which you really need to do a PRA because if you do a good PRA, a PRA will eliminate a lot of the things that you really don't need so you can concentrate your resources on something more important. So I think that's an extremely important point to consider.

The second thing is with regards to Part 70 versus Part 50 PRA. In a part 70 analysis, you only have to worry about maybe three isotopes, three isotopes of uranium, maybe if you do a plutonium facility, there's a couple more isotopes, but when you deal with spent fuel of 60,000 megawatt days for metric tons, you have hundreds and hundreds and hundreds of isotopes, fission products, transuranics and activated metals, and they're not just sitting there, they're moving around, they're going from one aqueous phase maybe to a non-aqueous phase, they're going to an evaporator, they're going here, they're going there.

So as a result, it's pretty difficult sometimes to get an estimate of risk to the public and to the individual, so you need something, I think,

much more important than just a little qualitative survey like Part 70. On the other hand, Part 70, like I said before, does recognize the chemical exposures. That's something that we've wrestled with in our working group. So there are some good points and bad points about the Part 50 and the Part 70.

MR. CAMERON: Thanks, Phil. Sven.

MR. BADER: In my haste to answer Don's question about Davis-Besse, I gave that answer that he didn't appear to be too pleased with, so let me try to improve on that a little bit better.

From an ISA process, we probably would have performed the HAZOP on the activities that were going on in the reactor. You would have seen the deviation of the chemicals that they use in the reactor, and then you would have to establish what consequences would have come from that. Clearly whatever happened, I'm not sure, increased the corrosion, so you would have experts in the room that would be able to tell you, Yes, if I change this chemical content in the process, I could potentially increase the corrosion in the process. If it were an ISA process, you would evaluate the changes to the process, the deviations to the normal reactor operations and identify potential consequences.

With respect to Phil's point there on the fission products, those are going to put you way up high from a consequence standpoint, so I'm not sure we really have to distinguish events with fission products that might be in the intermediate consequence category. I mean, you have to demonstrate any event with these fission products is going to have to be highly unlikely because the consequences from those events are going to be high, I don't know how high but clearly to the point that you don't want to have any of those events, you're going to have to demonstrate that they're going to be highly unlikely.

MR. CAMERON: But you're taking that into account when you do your performance requirement.

MR. BADER: I can tell you for the M-Triple-F, working with plutonium, plutonium puts you really quickly up into these high consequence events as well, especially for facility workers. You end up having quite a few safety systems identified for any little bit of ventilation plutonium.

MR. CAMERON: And the safety systems are the IROFS?

MR. BADER: The IROFS, correct.

MR. CAMERON: Okay. Good. That puts it in context. Don.

MR. HANCOCK: Thank you for the further clarification. I guess the sort of obvious mindless question that I have on the one hand is I fully agree with the idea of whatever we want to call it, a false sense of confidence that can come out of PRAs. I guess the obvious question is why can that not happen with the ISAs, number one.

And number two, I guess I need some clarification from Rod in terms of your conclusion that there is no controversy because I guess I understood clearly your presentation as being an ISA, the industry recommendation is ISA, and while I'm not a fan of PRAs, quite the opposite, I guess I was sort of presuming something along more the lines that Phil was talking about that you're going to do both, going to be required to do both, and is that what you were saying or not?

MR. McCULLUM: The answer is yes. I mean, we recognize in our paper that there is a role for PRA as a complement to ISA. And I think in terms of false sense of confidence, I mean, again it comes down to the human beings involved in the system and how diligent a job they do and the requirements need to make sure they do as diligent a job as possible. Complacency is the enemy we fight every day in our

industry, and we work very hard to make sure we don't become complacent and don't get a false sense of confidence.

If you do a good enough ISA so that you're identifying all the things out there, meaning you're consulting all the right experts, and then you do a PRA here and there to check your confidence where you have the ability to do that, not just relying on the PRA to spit out a number where you may not have enough data.

MR. CAMERON: When you have the data.

MR. McCULLUM: Right. I think that's what I'm saying and I saw some of that in NRC's paper that there might not be a controversy, that we've got a tool here that works in ISA and we've got an opportunity which, given the high hazard of some of these things -- and I think Phil recognized that -- maybe we want that in a few areas, that additional measure of confidence.

So this is doable, and again, that's the heavy lifting our friends at the NRC have to do, but we look forward to additional discussions as you do that.

MR. CAMERON: Okay. Thank you. Jim.

MR. LIEBERMAN: Well, I was just going to

say what Rod said, that in the NIE 7X we specifically provide for supplementing the ISA with quantitative assessment when there's an accident with the potential for a high consequence event involving fission product. So for that type of situation, we would do more than just the ISA.

MR. CAMERON: And I think this illustrates for the people who are going to have to do the rulemaking, I think Don's question about what does the ISA do for you, statement of consideration, supplementary information on the use of an ISA is going to have to try to answer some of those questions, I think.

We're going to continue down this path in the next agenda item when we're talking about design, and baseline design criteria, IROFS, tech specs to get a complete picture of how all this fits together and how some of this flows from the ISA. I want to make sure we go out to the public, but we have time for Robert and Marissa. Robert, go ahead.

MR. HOGG: I was just going to add that, you know, what I think we've done is come somewhat full circle around to the description of the process. And back to what Rex said at the very beginning, it's very important not to rely on any parts of this

system, and the system includes all these components, and if we anticipate that any one of these is a silver bullet, that's where the complacency has stepped in and we've really made a fundamental mistake.

What we should do is we should maintain flexibility in the approach such that we can use these tools to their best advantage, and we've got experience doing that, so we should be able to do that smartly and not fall into those traps that Rex mentioned.

MR. CAMERON: Okay. Thanks, Robert. And in England they use a gold bullet, we're going to try to settle for silver bullet. Marissa.

MS. BAILEY: And I guess my question sort of follows the comment that Robert just made, and I think I heard this comment at the workshop in Rockville, so I'll ask everyone here as far as what the thinking is. In this debate between ISA versus PRA, are we just getting caught up in semantics here? Isn't an ISA and a PRA really just a spectrum of how you do the risk analysis where a PRA is quantitative and then as you go towards more qualitative, you're going towards an ISA type approach?

And so I guess that's the question, is this semantics? And whatever risk assessment

methodology we ultimately decide is the right one for reprocessing, really the question is what's the level of detail that we are looking for in terms of whether it's quantitative or qualitative.

MR. McCULLUM: I agree. I know I didn't put my card up. I do agree with that, and that's why I like the term semi-quantitative because there are degrees of quantitative analysis you can apply in an ISA, and you hit it right on the head, level of detail, and that has to be proportionate to the risk.

MR. CAMERON: And there may be a better way to express it than semi-quantitative, but a combination of both. Right?

MR. McCULLUM: Yes.

MR. CAMERON: So it may be that going back to the no controversy, it may be that there's no controversy.

MS. BAILEY: Well, there is a controversy as far as what is it that we need to know to be able to assess the risk with a reprocessing facility and ultimately come to a decision that this is acceptable, that it is an acceptable design, that it is acceptable to operate.

MR. CAMERON: And that takes into account more than just the ISA, I guess.

Robert, and then let's go and see if anybody in the audience has a comment on all of this.

MR. HOGG: I guess that last line of thinking does bring us right back to the goal because if we state the goal in terms that only PRA can measure, then we're going to box ourselves in with respect to what tools we use. So I'm not against having qualitative goals that are risk measures that are measured by the accumulation of events and the math involved in the PRA process, but we should also have the goals that we can evaluate as we do under our Part 70 approach.

MR. CAMERON: Thank you, Robert. Thank you all.

Janice, anything? And please introduce yourself to us.

MS. ARNOLD-JONES: Janice Arnold-Jones. I represent House District 24, and I guess I'm struggling since I sit through a lot of legislative committees. So I'm unclear as to why we're struggling between the ISA and the PRA when we clearly need the best parts of both, and so I'm not quite sure why the struggle.

MR. CAMERON: Well, I think that the conclusion reached here after this discussion is that

we don't need to be struggling with an either/or approach.

Is that correct, Marissa and Rod?

MS. BAILEY: It's a thought.

MR. McCULLUM: For the record, it's a thought that industry agrees with.

MR. CAMERON: Do you want to say some more on this? I think that the struggle may be over going into another arena perhaps. Anything else you'd like to say? And that's House District in New Mexico?

MS. ARNOLD-JONES: I'm sorry. Sure, it's House District 24 in New Mexico which is like right over there.

And so as we go forward, my purpose for being here is I am certainly interested in the recycling of fuel and I see that as the ultimate expression of technology as well as use of good resources, so the safety statement certainly needs to be there, but I feel like you're getting kind of bogged down in the minutiae when, in fact, there is a clear target here. And I'm not quite sure how to help you get there, but I know that we need to move expeditiously but safety has to be the primary concern, and so I'm trying to figure out why we're not moving forward. I guess that would be my last

question.

MR. CAMERON: Okay. Why we're not moving forward with efforts to have reprocessing facilities or have the rulemaking? I think probably all the industry people would say that's a good question, and the NRC would say well, we need to make sure that we have an effective regulatory framework for licensing and regulating these facilities, and that might take some time. And of course, the NRC is not promotional about this, you know, all of that sort of thing. But at any rate, I think you helped to at least confirm the fact that we may not need to struggle with this particular issue.

Rod, go ahead.

MR. McCULLUM: I just wanted to respond to that and echo something that Anne said earlier about the relationship between policy and regulation. As far as why we're not going forward, there are a lot of things policy-wise on the table there and economic-wise about reprocessing. However, one thing that the people in this room can do something about is the regulatory piece which needs to at least inform policymaking in as neutral a way as possible.

MR. CAMERON: And I think Rod pointed out earlier that one of the policy issues that's

developing is to see what comes out of the Blue Ribbon Commission also.

And Marissa.

MS. BAILEY: I guess I'd like to sort of answer that a little bit. When it comes to reprocessing, the NRC is agnostic. We don't take a position for or against reprocessing, that's not our role. We recognize that reprocessing can be an important component in the national strategy, but that's not our decision, that's a decision that's happening above us, beginning with the Blue Ribbon Commission.

Our role is to make sure that if we do receive an application for a reprocessing facility that we have a predictable and stable regulatory framework that can address the safety issues and the security issues and so that we can do our job and carry out our mission of protecting public health and safety and security, so that's our role.

And in anticipation of what might happen, what the nation might ultimately decide, we are moving forward at least with the process of developing the technical basis for rulemaking for reprocessing. And that's what this workshop is all about, it's to be able to get input from a variety of stakeholders on

what they think is important for that regulatory framework.

MR. CAMERON: Thank you, Marissa. Well said.

And let's go to Mike. Can you introduce yourself to us, and then we'll go back to Janice.

MR. EHINGER: Mike Ehinger from Oak Ridge.

Let me first say that it's very difficult to sit in the audience and come up with a question at the end that reflects the thoughts that you've had all through the discussions, but if I can try to do that.

Early on it was mentioned probability risk assessment is something that is well developed and well defined and has been applied for a long time in the reactor evaluation, something where you know the components, and I think it was said early on that there's history on performance of components. Reprocessing is different.

The other thing I'd like to say is reprocessing is very much different than a lot of these things because all of the processes take place within very, very heavy structures and most of the consequences, first of all, there's a limited amount of material in any one location, and generally it's in a well defined piece of equipment in one way or

another that considers criticality and a number of other reasons.

And all of that stuff takes place in a very, very heavy, massive structure and the consequences of most of the events that you might see that you could be concerned about are really contained within this structure, and there's very few things that can possibly mitigate to an outside major release kind of thing. So in that sense, in my opinion, it seems that you lean toward the ISA approach because you can define just a few things that can breach this -- I hate to use the word containment, but the structure. So it's very different.

The other part of it was brought up, the length of time, and it's not like Yucca Mountain where it's a million years or 100,000 years or anything, because there's a usable amount of lifetime of the facility and after that the materials are gone, and it's not the same kind of thing. You're shaking your head, the materials are gone, there's some legacies left over, but the consequences, the explosions, the things that you consider in the context of operating facilities are no longer there. It's a risk of a garbage pile or something else, it's the hazards that are in the garbage pile.

But like I say, it's very difficult to construct a question that transcends the entire discussion.

MR. CAMERON: You don't need to do that either. It's just good to hear your comments on this from your experience from Oak Ridge. And Janice.

MS. ARNOLD-JONES: If I might, and I appreciate your patience, but let me just take this down to Joe Q. Public. You know, we're in an election right now and here are the questions that I am being asked. So you promised to take waste and deal with it, and we have not. Most people understand that reprocessing is probably the ultimate in terms of recycling and we're not doing it. And so with all due respect, Marissa, we cannot allow regulation to move so slowly that we don't have answers, and it is the chicken and the egg, but there's a come point at which we have to get off the dime and move forward, and that's kind of where we are.

And so I guess I would ask you when do we intend to deal with the waste that is merely stored when we clearly have proven technologies to move it forward. It seems to me you've got processes in place, and if I'm asking the wrong questions, I simply am telling you what people are asking me.

MR. CAMERON: And it's good that you're adding that voice to the conversation and I think that it's not a rhetorical question, obviously, but it's a question that is good for everybody up here to hear but I don't think we're going to be able to answer it right now. But let's go to Beatrice and then Anne, and then we'll go for a break.

MS. BRAILSFORD: Promises, promises. Should a reprocessor be built in the United States of America, it will be built by a private corporation, so when you look at a government official and say why aren't we moving forward, you are asking the wrong person.

MR. CAMERON: Anne.

MS. CLARK: From a policy perspective, governments involved need to not just look at the fact that this is going to change the amount of high level waste that's out there, but it is also going to create a whole other stream of waste that has to be dealt with an entirely different way, and here are many people who believe that that's a much more noxious stream of waste than the original high level waste that it would be used to reprocess.

MR. CAMERON: Okay. And I think this is the type of conversation that will probably continue

offline at this point. Let's take a break and come back right around 3:30, maybe a little bit after, and we're going to continue to go down the road.

(Whereupon, a brief recess was taken.)

MR. CAMERON: Okay. We're going to get started and we will finish by the appointed time with this one. This I on the design requirements, and we've already started to go at least down the path of some of the major issues.

Jose, who is teeing up design? Phil, I'll just let you have at it and we'll get to discussion.

MS. BAILEY: I'm substituting again for Alex who was normally going to give the presentation but because, as you've heard, for his medical condition he will not be here.

We've already talked about the first bullet, we've talked about the first two items. The third item is the issue we're going to be discussing right now, that is the minimum requirement or areas for review. Now, the minimum requirement includes, among other things, design base criteria, and of course, I've listed acronyms. GDC is the general design criteria, this is a Part 50 requirement. And right beside that you see the BDC, that's the baseline design requirement and that comes from Part 70. But

for all practical purposes for our discussion this afternoon, we're going to assume that those are essentially the same.

We're also going to be talking about technical specifications which are part of the minimum criteria, and in addition to that, we also have training and qualifications of personnel. All of these together support redundancy, diversity, defense in depth and all the safety functions that we believe are needed for reprocessing facilities.

What are GDCs and BDCs? Well, the NRC has established minimum requirements for proposed facilities or applications of licensed radioactive materials that provide assurance that important structures, systems and components will have the ability and reliability to perform their intended safety factions, also assurances that there are uncertainties and that there are errors from designs, analysis and unknowns are adequately addressed, that we have adequate defense in depth, redundancy and diversity must be present, and we have assurance that the balance of plant and unanalyzed situations do not impact the safety. NRC's regulations frequently identify these minimum requirements by terminology. I've already mentioned GDCs and the BDCs as coming

from two separate parts of the regulations.

Currently reprocessing and recycling facilities are production facilities. As we've learned, they're licensed under 10 CFR Part 50, production facilities are authorized under the Atomic Energy Act. And GDCs are in 50.34 and Appendix A. The other sections of Part 50 imply additional GDCs, i.e., Appendix F. Now, Appendix F is the regulation for reprocessing, Appendix I is the regulation for ALARA, as low as reasonably achievable to meet design objectives. And Appendix S is the earthquake regulation, the engineering criteria for nuclear power plants.

The GDCs specific to recycling and reprocessing facilities are needed to address the large quantities and types of radionuclides in these facilities, and that includes fission products, transuranics and also activated metals. There is also an item in Part B of Part 50 which relates to quality assurance, and it turns out that the quality assurance is actually entitled Quality Assurance Criteria for Nuclear Power Plants and Reprocessing Facilities.

Part 50, as mentioned previously by Marissa, there was a previous regulation that addressed GDCs. This regulation was a regulation that

was published in 1974, it was Appendix P, it was essentially deferred when we had to essentially get out of the reprocessing business. It was deferred in 1984 and I think the actual Federal Register noted it was deferred until NRC's regulations were actually needed again.

We've identified in this analysis 27 GDCs in seven different categories. These are in the actual extra slides that have been added to the presentation. 50.34, we should note Section (a)(3)(I) has a footnote that the GDCs for chemical processing facilities were being developed. I think this has been in the regulation for at least 15 years, if not more. But as you see, the reason, like we commented earlier, that Part 50 cannot address the chemical impacts but Part 70 can.

The next slide is also a previously proposed regulation that deals with reprocessing issues but no longer exists. This is a design criteria for the protection of fuel reprocessing plants and licensed material. It was published in the Federal Register in 1974 and it was withdrawn in 1974 until needed by NRC.

The current NRC status on the review of the GDC is that we were reviewing the existing GDCs

and BDCs and relevant documents. The regulations have no thresholds for applying existing GDCs and BDCs at this point. We've identified ten potential categories of the general design criteria, and within these categories there are 77 potential areas within these ten categories. Many of these have found significant fraction of areas could become our draft GDCs.

The ten potential draft GDCs are listed on the slide. They are the overall and general categories, multiple confinement and containment barriers, process safety features, nuclear criticality, radiological protection, physical security, materials control and accountability, another acronym, fuel and radioactive waste sighting and decommissioning. And in the backup slides we've listed all of these categories, these general headings, and within these general headings we have actually the GDCs and BDCs for these particular ones. I don't know whether we're going to show all the slides but they are certainly in the backup.

These are some examples of some of the GDCs and BDCs: quality standards record, minimizing risk from R&R, firing protection, negative pressure differentials, flammable gas, monitoring habitability, seismic protection, emergency processes, control

rooms, criticality, ALARA, shielding, waste management, aircraft impact, and design for eventual decommissioning.

We also have identified technical specifications as a baseline design. Technical specifications are actually required for reprocessing facilities, they are required by law under the Atomic Energy Act, they are described in Part 50.36 of our regulations, and it turns out that 50.36 actually references the word reprocessing, it uses reprocessing plants.

There is an extensive documentation on tech specs, Part 50, for reactors. In the Federal Register notice there was a technical specification published in 1973 specifically for reprocessing plants. That regulation also has been rescinded.

There are no technical specifications as part of Part 70. Part 70 uses integrated safety analysis and the items relied on for safety. The GDP, the Part 76 does have a technical safety requirement which is similar to technical specifications, and Part 76 is a regulation for the gaseous diffusion plant.

Technical specifications are derived from safety analysis to protect people from uncontrolled releases. 50.36 to 50.36(a) for effluents. There are

five categories within these areas: there's safety limits, these are events, uncertainties, etcetera; there's limiting conditions of operations, minimal equipment; there's surveillance identified requirements; there are design features that we look at; and then there are alternative controls such as minimal staffing and calibration.

There is another area that's recently been added to the regulation, and this is operating training. The Atomic Energy Act requires NRC to establish minimum criteria for operators of production and utilization facilities. This is now codified in 10 CFR Part 55, and as with Part 50, the regulations and associated guidance now focuses more on power reactors than it does for reprocessing facilities, and there appears to be an appropriate level for R&R facilities, needs to be determined, and that's included in Part 55 revisions or either a new R&R regulation.

These are the potential questions that we hope to discuss this afternoon. I'm going to run by and run it into a background. These are the relevant sources that we've considered for the GDCs. We've considered Part 20, 50, 52, Part 70, 72, and also the regulations that have been rescinded, Appendix P and

Q. We also looked at the NEI white paper. This is the NEI white paper that was submitted to us back in 2008. NUREG 1909 is a publication of our Advisory Committee on Nuclear Waste and is the background studies that they did for reprocessing.

The next slides relate to the categories and also the potential areas within these categories. I'm not going to discuss it and I can go through and show you that we have them. This will be published on our website, but each one of these categories that we do discuss has individual criteria.

I'm going to go back now to the questions and then I'll turn the presentation over to Chip.

MR. CAMERON: Okay. Thanks a lot, Phil, very comprehensive.

You'll notice that these questions, the first two are on general design, the first three, general design criteria. Then I guess that maybe the agenda has different potential questions. Is that true?

MR. REED: It should be the same.

MR. CAMERON: So I'm working from the agenda, and the first two dashes on the agenda talk about GDC, then the next two talk about tech specs, and then we go into some specific areas, operator

licensing, emergency planning, and cyber security, and I want to use the cyber security example to kick off the discussion about what should be in the general design criteria.

And I guess I'm always flummoxed about whether we should use GDC or BDC here, baseline design criteria. And I guess this since this is more of a Part 70 and it may be a hybrid new regulation, you're probably going to be using baseline design criteria, I don't know. But is it okay if we use baseline design criteria for this discussion? I mean, is there a substantive difference? Okay. We'll use baseline design criteria.

And Phil, could you put slide 9 up again. This is the slide, I think that tells you what the NRC thinking is on potential areas for BDCs, and Phil showed you within each BDC what areas would be considered, and that may be too daunting a task to get down into that level of detail, but maybe the discussion we should have now is are there areas that you see that aren't covered there that should be in there. And that last dash on the agenda, the cyber security, that might be an example of something that you would want in there.

And I guess that I if I remember

correctly, the industry 7X had 28 -- weren't there 28 design criteria there? Could someone tell us? Robert, or could someone tell us what's in the industry design criteria, and this is not an example of how the NRC might do it, but to give people an idea of how a design criteria is stated. Can you not only tell us what you might have thought of in here but just tell us how that -- read one of them to us so people get an idea of how a design criteria is stated, and then let's have a discussion, more of a discussion on what other design criteria there should be.

MR. HANCOCK: So from the way that we developed the industry white paper, we really focused on the words around GDC and BDC, as opposed to whether you call them a general or baseline criteria, it's what's the expectation of how one uses that criteria and is it a priori expectation or is it to be considered. The baseline design criteria in Part 70, the words around it are considering the design, the following criteria, the general design criteria or the design criteria that are to be incorporated in the design, and any time you don't incorporate such criteria, you will use as much an engineering effort to demonstrate why that's not necessary.

MR. CAMERON: So there is an important

difference, I guess.

MR. HOGG: GDC and BDC, the word general versus baseline isn't the issue, it's what's the words around the design criteria.

MR. CAMERON: Okay.

MR. HOGG: And we went through a very similar process that Phil described with respect to how we identified. We didn't group them into areas any differently than the way the Part 50 criteria are currently grouped, so some of the areas that are from Appendix P and Appendix Q, I think, are really very relevant and we would endorse considering those types of criteria too.

And the way that we wrote the criteria were relatively consistent with the BDC from Part 70 also, that they introduced the concepts and they left them open with respect to how one would consider the design as opposed to being prescriptive in their nature.

MR. CAMERON: And can you talk a little bit about that because people might assume that it would be better for safety and design if they were more prescriptive which might not be a correct assumption. So can you tell us why you took the more BDC-like approach in terms of consider, this, that, et

cetera, et cetera?

MR. HOGG: I can give you my opinion and perspectives because we didn't know. Probably it would be helpful to a designer to be prescriptive because it leaves that that much further ahead. But a lot of the things, containment versus confinement, we didn't really know what the answer was to be prescriptive in stating the criteria.

MR. CAMERON: So in other words, there's a lot of areas here where you might not have enough information to tell an applicant here's what you have to do.

MR. HOGG: Some of them we could pull that from existing criteria, so some of the potentially would be more prescriptive. But the ones that were somewhat unique in their nature, we understood the need for gas management and explosion control that is descriptive in Part 50 elsewhere than in the general design criteria, but we incorporated that as a concept without being prescriptive about how one would go about it.

MR. CAMERON: Okay. And Jim, do you want to put a finer point on that?

MR. LIEBERMAN: Right. The way the draft is worded is: Each applicant shall address the

following baseline design criteria in the design of new facilities. The application of these criteria shall be maintained unless the ISA demonstrates that a given item is not relied on for safety but does not require adherence to the specified criteria.

So they are kind of prescriptive but it really turns on the ISA and the basic analysis whether in a given case there's a basis you can demonstrate to NRC's satisfaction that you don't need it because of your particular design. The wording of each individual criterion, the design must provide for adequate protection against natural phenomena, but a site's characteristics must comply with the provisions of whatever.

So they are specific but you have the escape if you can demonstrate for your particular design there's a basis that you don't need it in order to meet the performance requirements.

MR. CAMERON: And we're going to go to Beatrice in a second, but are there some obvious things that you have in the design criteria that may not be on this particular list because this particular list, I guess, Phil, has been drawn from a lot of things that were done in the past. In other words, I use this word loosely, but how modern is in terms of

that.

MR. REED: Many of these were taken from the current regulations of Part 50, Appendix P, Part 70, I think there are a couple of them up there -- well, even the aircraft impact is now codified. All of these we do have references back to a regulation or I believe an industry document, like the NEI report, that has been mentioned as being a part of the overall design basic criteria.

MR. CAMERON: Okay. Beatrice, do you have a question or a comment on this?

MS. BRAILSFORD: Well, I wanted to help us not talk about the first question for the entire hour or whatever, because I do think in the lat discussion there were some other questions that might have been more fruitfully discussed.

If somebody could just explain to me what habitability means. And you may have started to do this, Jim, should NRC consider different GDCs for the different types of separation technology used -- that goes back to the technology-neutral question. And then I guess I was seeing a couple of some of the, you know, an earthquake or a fire are sort of natural phenomena, and then you called out cyber security and aircraft impact which are a different kind of peril

thank acts of God, but I don't know that there's anyplace to go with that.

MR. CAMERON: Habitability.

MS. BRAILSFORD: Yes, so habitability and then I think we keep going back and forth between facilities that massive liquid waste streams and facilities that don't.

MR. CAMERON: Phil.

MR. REED: Habitability and control are related. The habitability is the design areas around the control room material, things like that. Human factors might be another way of saying that.

What was your other question?

MR. CAMERON: I think the other one was technology-neutral. In other words, should you have different GDCs for different types of separation technology, and Beatrice realized that Jim's explanation of the fact that if you a designer or applicant could show that a particular design criterion did not apply to that facility, then they didn't have to address it and it might not apply because of the specific reprocessing technology.

MS. BRAILSFORD: But I guess I thought that it was different. In our discussion this morning, it was almost as if this morning we were

almost proving a negative, and now you're saying if I can demonstrate that I don't have to do this because it's not in my technology, but you've written rules that capture all the technologies, which is different than technology-neutral, frankly.

Now, remember, I'd just as soon the NRC participate in this discussion as well.

MR. LIEBERMAN: Well, what we did we took from existing baseline material design criteria in Part 70 which, in theory, covered all the fuel cycle facilities. We looked at Part 50 to see where there GDCs that weren't covered in Part 70 that we thought were relevant to cover the universe. Then we went to part 72, and Part 72 is the regulation of storage of spent fuel and they also have baseline design criteria. We looked there to see if there was anything there that might be relevant because you're going to be storing spent fuel at a reprocessing facility.

And we tried to be comprehensive. And obviously we're interested to hear NRC's views and there may be different perspectives, but the goal is to be as comprehensive as we can to cover the areas where a person developing a design for a reprocessing facility will make sure they cover those points. If

your for some reason your design doesn't need it, then you have some flexibility, but the burden is on you to demonstrate to NRC that you don't need it.

MR. CAMERON: And Rod.

MR. McCULLUM: I was going to say along the lines of Jim, and I think we tried to 7X -- and you can correct me if I'm wrong -- we want to be as all-encompassing with these as possible, recognizing that any given applicant has the burden to show if my design is unique and this doesn't apply here, they can demonstrate that.

Now, that being said, we had some discussion of this in trying to prepare for this meeting, and really when you look at what industry has recommended, Appendix P, Appendix Q, Part 70, Part 50, the best way to address this -- and this is really not the right forum here -- is to just have detailed meetings on each of these things. I mean, on the surface, most of those looked pretty technology-neutral up there. I mean, an earthquake is going to affect any kind of facility, they all have control rooms, they could all have aircraft impact.

But I think really a set of detail and public interactions between NRC and other stakeholders on each of these -- maybe you don't want to have 28

meetings but you have one meeting where you have an agenda or have specific expertise brought to bear here, and at the end of that series of meetings we ask ourselves: Okay, did we get them all? And maybe there needs to be a provision in the process for an emergent GDC, who raises that, how does it get raised, how does it get dispositioned if we do learn something. Because technology does evolve, we're not going to be regulating the AMC Pacer in the future here.

And anyway, I think that's kind of why you're hearing what you're hearing here, or not hearing, is that I think this is a subject we really need to go criteria by criteria and get the experts and talk about the details a little bit here.

MR. CAMERON: And there is only one, cyber security was mentioned somewhere on the agenda. Let me ask about that, is cyber security something that should be on as a general or a baseline design? Is there anything else that seems obviously missing here?

MR. McCULLUM: I think, Chip, cyber certainly is something to be discussed, but again, I wouldn't want to have that discussion and I'm not sure NRC would want to have that discussion without our respective cyber security experts here.

MR. CAMERON: All right. Just looking for suggestions. Anything on baseline design criteria or general design criteria? Is there something that the rulemaking staff would like to specifically ask the people around the table, while we have them here, about this before we got to tech specs? Phil, anything, or Marissa or Tom, Jose, Wendy?

MR. REED: I think the question that was posed was whether or not some of the other reprocessing techniques may have specific GDCs, and the only thing I can think of is that I think GE's facilities, the pyrochemical may have some that are different. Now, we have not looked at that in detail, we've only been concentrating on the aqueous reprocessing. Maybe somebody else can address that.

And I think the only new one we've added since the last one has been cyber security. Again, we're looking for information on that. Whatever any individual wants to comment, we'd certainly be interested in what they have to say.

MR. CAMERON: Okay. And can we make sure that if you do have these meetings on the GDC that we may have to provide phone links for people to join us from Pocatello?

Anybody have anything on this at this

point? Jim, yes, I wanted to ask. Go ahead.

MR. BRESEE: I'd just make one introductory comment on electrochemical processing that should be followed up just exactly like Rod mentioned. It needs detailed discussion, there are experts available, we certainly would be quite happy to join some discussion.

But one of the most interesting differences at present between electrochemical processing and the more conventional processes involving solvent extraction is that it is a batch process, and as a batch process, it introduces a lot of additional issues, technical issues that need to be carefully considered. The concentration of all materials in all of the batches changes with time throughout the process, so the monitoring and all the other things that have to do with controllability are more difficult.

This trades off against other differences which may be on the plus side, but from the standpoint of regulatory design, that is a significant, fundamental difference between electrochem and what might be called conventional technology.

MR. CAMERON: So there might be, based on that difference, there might be a GDC that could be

fashioned for that particular technology. Okay.

MR. McCULLUM: Right, and Chip, an aqueous applicant would then just say that's not applicable to them.

MR. CAMERON: Okay. So that would be in the pantheon and then aqueous could come in and say that's not applicable to us.

MR. McCULLUM: Right.

MR. CAMERON: Marissa, do you don't want to say something?

MS. BAILEY: No, I don't.

MR. CAMERON: You don't want to say anything. Okay. Tom wants to say something. No. Okay.

So Beatrice, that goes to your point about there may be something in there that may be specific to a particular technology.

Marissa, you still want to say something. Go ahead.

MS. BAILEY: I guess when you are trying to write a regulation, you don't want to put yourself in a position where you would end up regulating by exception, and so one of the things that I would be concerned about when you do something like specifying general design criteria but then it may not be

applicable to something else, is that you get yourself into that realm of regulating by exemption.

MR. LIEBERMAN: So you'd feel sort of uncomfortable with perhaps the approach where someone could come in and say that doesn't apply to us. And would that mean then that you would have to pretty thoughtful about how all of these things apply to every type of technology. Maybe you'd have separate GDC for the batch processing?

MS. BAILEY: And this is just me, I have not discussed this with my staff so they can disagree with me, but I guess I would see general design criteria, that we would want to identify the minimum set of general design criteria that we think are really important, especially if you're looking at a technology-neutral regulation that would be applicable to the spectrum of technology that you might be seeing.

And I recognize that that could be a challenge, and so the challenge really is what's identifying the minimum set of general design criteria. I guess an example would be something that's based on standard practice. For example, for criticality the double contingency principle, that that might be something that we would want as part of

the design, regardless of what the technology is, that there's double contingency for criticality safety.

MR. CAMERON: So you might have design criteria that you know are going to apply to whatever technology, and then you might have for batch technologies -- and I'm bungling that all up -- but for this particular type of technology, in addition to the general, so they'd be like specific design criteria rather than general.

Let's hear from James and then Jim and think about this idea.

MR. ROSS: I guess my one comment would be that we would want a general BDC for everybody consistent with Part 50, and when I kind of look at this issue, I kind of think about some of the other areas like the fuel cycle area or the enrichment area, and even though there are different technologies out there that the GDCs are still -- we've been able to make them consistent for everybody. So I don't know why we would want to change that in this process. I mean, what would make us make that decision to change it here?

MR. CAMERON: Okay. Rather than following sort of the standard.

MR. ROSS: It should stay consistent.

MR. CAMERON: And Jim, what do you think about this?

MR. LIEBERMAN: I think this is the challenge of marrying a performance-based, risk-informed system which his based more on Part 70 with adding the prescription of having more baseline design criteria from Part 50. So I think that's why you need the escape valve for the particular case. You may never use this escape valve, but if you do need it, it's built into the process.

MR. CAMERON: And is there an existing analogy in an NRC regulatory program that takes the approach that you described to us?

MR. LIEBERMAN: Well, there is a change process. 50.59, for example, in Part 50, and Part 70 I think is 70.62, but I may be wrong. But there are change processes allowed in the regulations with fixed standards of what you have to meet if you want to make a change. And so that's basically what we did here, we had the built-in standards up front of what you would do to make a change.

MR. CAMERON: So you took that change process and you incorporated it into that. Okay.

Jim, do you have anything for us? Okay. Don't worry. Rod.

MR. McCULLUM: I just wanted to agree with Marissa that we don't like regulating by exemption either and that's not what I was proposing. I was proposing a regulation that's constructed such that you can demonstrate compliance when you apply for your license by demonstrating that certain parts are not applicable, and that's in your license to begin with.

Now, that's a matter of construction and that's certainly a challenge, but I think preserving the risk-informed, technology-neutral, performance-based approach is worth taking on that challenge. But I did not mean to imply at all that we would say regulate by exemption because that's not a good way to start a new regulation.

MR. CAMERON: Okay. Well, let's move on to tech specs because I know Beatrice is going to hold me to addressing every topic. Right, yes, exactly, by 5:00.

Tech specs, what issues or considerations should NRC evaluate for establishing tech specs and should there be thresholds for tech specs? Now, I hate to keep going back to this 7X but it's useful to use for an example of an approach, and the 7X approach to tech specs does have a threshold. Is that correct? I don't know who wants to address that, but can you

tell us how that works, Jim?

MR. LIEBERMAN: When we looked at tech specs, we looked at 50.36 in Part 50 but Part 50 doesn't have IROFS. In this approach we're using IROFS, the items relied on for safety, so we said the tech specs should be the more significant IROFS, and the standard that we propose is tech specs addressing IROFS to prevent or mitigate identified accident scenarios that could result in high consequence events involving fission product releases to an individual outside of the control area.

So the concept is the fission product releases, the high consequence events, those are the most significant problems at a reprocessing facility, those should be tech specs. IROFS are capable of preventing the others, IROFS are still requirements so you still have to meet these, but we put the label of tech specs on the higher ones.

MR. CAMERON: So just to go back to this taxonomy, so to speak, there's the basic design criteria, there's the performance requirements that were up on that chart, then an ISA is done in concert with any PRA where there's significant, there's data available to make meaningful conclusions. That ISA tells you what items relied on -- is it relied or

required? That ISA tells you these items relied on for safety. Certain of those items relied on for safety are going to result -- could result in high consequence events, and for those events you would have tech specs.

And can you give us an example of how a tech spec would address one of those high consequence issues? Because I just want to make sure that people understand how the tech specs are going to be used. Why do you need a tech spec for those? Robert.

MR. HOGG: So an example might be if we have a minimum or a maximum ventilation flow rate in a certain part of a facility that if exceeded may cause offsite consequences because of the transfer of contaminants from that part of the facility through the stack. We would establish IROFS under the ISA process that would identify those components, preferably engineer features, potentially management measures that would involve both human activities and equipment, and we would establish limiting conditions of operation for those IROFS that if they do, when they fail, cause an offsite consequence.

So the type Jim mentioned, we would establish in the license technical specifications to ensure that those limiting conditions of operations

are met.

MR. CAMERON: Okay. And I think that's maybe helpful for people to understand what does the tech spec get you, what is required by the tech spec that the IROFS doesn't get you, doesn't include it in the IROFS.

MR. HOGG: The tech spec could get you a set of conditions under which you could operate temporarily as you regained control of that particular limit or piece of equipment.

MR. CAMERON: So the tech specs are basically stated in limiting conditions of operation?

MR. HOGG: And typically have the potential for some limited operation for some period of performance while the equipment is recovered and reestablished. Whereas, IROFS -- and this, again, is kind of a construct of the fuel fabrication facilities -- IROFS are somewhat on off switches. If the IROFS fail, the system is down. Whereas, a technical specification will give you a limiting condition of operation during the period while the equipment is regained.

MR. CAMERON: Well, does the tech spec then really give you additional protection, or does it just allow the operator to operate for a while?

MR. HOGG: That would depend on how it was constructed. Typically, it's constructed much more conservatively to allow that continued operation.

MR. CAMERON: Okay. Because I think people might think, well, if the tech spec is an add-on that it's always going to be a more conservative type of situation. Tom.

MR. HILTZ: Thanks, Chip.

I think the concept of tech specs and mixing tech specs with IROFS is going to be a pretty interesting challenge for the NRC. And I think what Robert has tried to articulate is sort of some of the areas where he's trying to marry tech specs and IROFS where they really have two different purposes. And I would be interested in sort of broader discussion on how we might establish safety limits that are typically required for tech specs, limiting conditions for operation, and then actually the limiting -- not the LCOs but the safety limits, LCOs, and I'm missing another concept in tech specs which alludes me.

But at any rate, the LCOs, at least in 50.36, are meant to establish the minimum requirements for equipment operability, and they establish that time that equipment can be out of service where you don't have to take a particular action. And I think

that risk has been used to inform technical specifications to determine how long that time should be or even if there are systems that are determined to be non safety-significant, even to remove systems from tech specs.

But I'm interested in understanding a little bit more about the marrying of 50.36 and IROFS because it's not clear to me how that's going to happen.

MR. CAMERON: Any clarity we can provide on this for the rulemakers?

MR. McCULLUM: I do want to provide some clarity because I think there's a notion about tech specs getting lost here, and I agree with Tom 100 percent here, and I think that's why there needs to be more discussion. Tech specs do give you an additional layer of protection. When you put a system in the tech specs and you put surveillance requirements on there, we haven't discussed that that's how you're going to assure it's operable, you put limiting conditions of operation on it where these are things you're going to do if operability is questioned, and up to shutting down your plant if you can't demonstrate something is operable.

These things represent an agreement

between the licensee and the regulator on how they will operate the plant on those things that are most important to safety. And so if the IROFS describe those things that are most important to safety, those are the things that go in the tech specs.

You have things that aren't in the tech specs, the licensee has certain levels of control and the licensee will still want to do certain things and will describe certain programs in their safety analysis. But to be perfectly clear here, the tech specs are the most important to safety things, and the ISA tool, if we use that to define what those things are -- and I think we can -- that's an area where we need to be very clear as to how that applies.

MR. CAMERON: So does every IROFS need to have a tech spec?

MR. McCULLUM: I'm not prepared to answer that right now. I think that gets into how we prioritize the IROFS and I think that's why there's more discussion needed.

MR. CAMERON: And let's go back to Tom.

MR. HILTZ: I would actually be surprised if there was a conclusion that every IROFS required a tech spec because I think for the M-Triple-F facility, we heard that there are what, 10,000 to 15,000 IROFS.

So I suspect that we'll want to consider a more manageable set of technical specifications.

MR. CAMERON: Let's go to Sven. He's had experience with the 15,000 IROFS.

MR. BADER: The 15,000 IROFS are a bit of a misnomer. IROFS, the way we counted them, included passive equipment, included the building, things that we considered items relied on for safety, a difference between other Part 70 facilities. I think we were very conservative in our approach, plus that 15,000 includes every component of a train. I believe some of the other Part 70 facilities consider one train an IROFS, not every component of that train is a separate IROFS.

But to get back to the technical specifications, in Part 70 we have management measures, we don't have technical specifications, and that might be a little bit of the confusion here. They're similar in nature, there are, I believe, 15 management measures that are specified -- I can't even remember where it's coming from but I want to say it's from Appendix B, actually, of Part 50 -- so there might be some relationship there with tech specifications. But measurement measures were included in surveillance and the limiting conditions

of operation.

So we might be getting a little wrapped around the axle, but I think applying those to every single IROFS, we did not do that for the M-Triple-F. There is some grading that we did, facility worker grading because a lot of the IROFS were specified for protecting the worker.

I'll give you an example. Delta Ps and glove boxes, Ron mentioned ventilation flow rates, making sure you have differential pressure so that the flow is into the glove box because if it's out of the glove box, it's very important for facility worker protection. Then each one of these glove boxes has redundant pressure measurements.

I'm not going to say that we did a technical specification for each individual pressure measurement, we did one more globally for all those, but again, they're not as restrictive of those that were protecting the public. Those examples are ones preventing red oil explosion hazards or hydrogen nitrate explosion hazards. Those beget very tight surveillance requirements as part of the measures. So we kind of graded them depending on who the recipient was.

MR. CAMERON: But you called them

management measures rather than technical specifications?

MR. BADER: Part 70 says management measures.

MR. CAMERON: But management measures, like technical specifications are designed to provide additional protection, or maybe not in all cases.

MR. BADER: Well, their intent is to make sure your IROFS are available and reliable. So that your safety systems are available and reliable, you implement all those management measures.

MR. CAMERON: Okay. Available and reliable.

And Tom said it was going to be -- you used the word interesting -- to try to marry up IROFS with tech specs, and I guess maybe it would be interesting for people to know what your anxiety is about that because that might reveal what needs to be done in the rulemaking process. Marissa, do you have the same type of anxiety?

MS. BAILEY: Yes. I think I would have to agree that it's going to be interesting to marry up the concept of IROFS with technical specifications. And Sven is right that management measures could be surrogate for tech specs, but management measures are

there to ensure the availability and reliability of IROFS. And like IROFS, they can be changed through the 70.72 process, so they are subject to the 70.72 process, whereas, technical specifications cannot be changed by the licensee, they would require prior approval from the NRC.

IROFS, as long as they're not sole IROFS, licensees can make changes to them if they follow the criteria in 70.72.

MR. CAMERON: So is there anything that anybody around the table can help you with in terms of that anxiety, that interest, at this point in time, given this process as opposed to perhaps some more detailed discussions?

MS. BAILEY: Well, I mean, I guess it's trying to identify what are the minimum set of technical specifications that we would really need for a reprocessing facility. Because it is sort of interesting that you've got the IROFS and the IROFS are those items relied on for safety, and so there's a certain set of controls that a regulator would want imposed on those, hence, the management measures, and hence, it's got to go through the 70.72 process, and hence, sole IROFS have to have prior approval before you make any changes to them.

And then even more -- maybe important is not the right word but I'll use that -- maybe even more important than that then are the technical specifications where you want regulatory control over that, so what are those sets of technical specifications.

MR. CAMERON: So I think you've revealed something that's important about what you call these which is the level of NRC approval that's required to change these things. Jim.

MR. LIEBERMAN: I'm concerned if NRC is concerned with the relationship with tech specs and IROFS because the IROFS are the result of the safety analysis to make sure that the facility meets the performance requirements. So the IROFS, the items relied on for safety, that's important, so which ones of those IROFS are the ones that NRC wants to make sure you have in tech specs. So I can't imagine anything in a tech spec that isn't in an IROFS; otherwise, you have calculate your IROFS properly.

So the issue is which IROFS, and I would think it would be those IROFS which are associated with the potential events of higher consequence. So I think all those things have to be tied together when you develop your set of tech specs, and then of those,

when you lose enough IROFS that you lose a safety function, that's when NRC is going to want to be notified, and that kind of sets the limiting conditions for operations. So I think they have to be all tied together.

MR. CAMERON: Okay. Thank you, Jim. Rod, do you have something else?

MR. McCULLUM: Yes. I agree with what Jim said. I mean, it's a question of which IROFS are tech specs, and I think in a risk-informed, performance-based, technology-neutral manner, I don't think we would look for a regulation to prescribe the following IROFS should have tech specs and the following IROFS should not. Rather, we should expect that the regulation would describe how a licensee goes about determining whether or not an IROFS requires a tech spec, what level of protection, what significance of hazard or energy.

And that's one where I think some more detailed dialogue among the experts is probably appropriate because I think tech specs are an important aspect of this, whether they're called management controls, and I think making sure that we preserve a level playing field for all technologies, we need the regulations to be clear on how do you

determine whether or not an IROFS needs to be supported by tech specs meaning these are things you're going to make an agreement with your regulator that you will not change without their approval.

MR. CAMERON: Okay. And you have a criterion on doing that.

All right. How about operator qualifications and licensing, anything additional that's needed here? And I guess I would ask additional to what. Anything more than what's required now for reprocessing operators? Tom.

MR. HILTZ: I think there has to be something more because I think that some sub group of operators for a reprocessing facility need to be licensed by the NRC which is different from other fuel cycle facilities, and this is a requirement that's carried over from Part 50 for a production facility. So the NRC will need to license some operators for a reprocessing facility

So I think the discussion is what should those operators be, what role will industry play in doing the qualification, would they follow a similar role as reactor operators, and that would help define NRC's role in actually issuing a license certificate to the operators.

MR. CAMERON: And Jim, did you want to talk about perhaps one answer to Tom's question about which of those operators should be licensed?

MR. LIEBERMAN: The current regulatory framework, Part 55, only applies to reactors so that there is no existing process. Recognizing there's lots of individuals in a chemical facility that will operate a facility, and recognizing in the general fuel cycle facilities, enrichment, fuel fabrication, whatever, they don't have licensed operators, the question was which of the operators should be licensed.

And we tied it back again to the ISA in the analysis and those operators who could have the potential to create high consequence events with fission product releases to the outside, that was a standard that we use for tech specs, we use that standard for when you have the PRA quantitative analysis, the ISA, and that's a standard we use to decide which individuals should be licensed by NRC.

MR. CAMERON: Okay. Does anybody see any problem with that logic? Is there anything important that's left out by using that as a criterion for which operators need to be licensed?

(No response.)

MR. CAMERON: Okay. Emergency planning. There's two questions here. Go ahead, Tom.

MR. HILTZ: I'm sorry. Before you go on, is there any insight into the process for operator qualification? Part 50 has a model where the industry has a substantial role in the qualification process, and NRC -- well, they have NPO who goes and looks at their qualifications and we take some credit for their process. Is there any thought about how a qualification process might work for a reprocessing operator?

MR. CAMERON: Jim.

MR. LIEBERMAN: This is an area where clearly we're going to need a lot of a dialogue between the industry and the NRC. But what's proposed here is a certification process where the applicant developed the qualification standards for the operators as part of the application, NRC has to approve that qualification process, and the applicant develops a certification process how the applicant would certify that these individuals have been properly qualified, trained and tested, NRC has to approve the certification process. And then NRC would monitor the applicant's training, testing and certification process to be satisfied that the

individuals have properly gone through the training, been properly tested and certified.

So it's a little different from the existing Part 55 reactor operating license program, but because there's only going to be so few of these facilities, we thought this type process would make more sense to make sure the operators were properly certified and licensed.

MR. CAMERON: Okay. Mike.

MR. EHINGER: Just to add some historical perspective to this, there really was a licensing process in place for both West Valley and Barnwell. There were C, B and A operators and senior operator licenses. I happen to know of only two senior operators that are still in existence, and I'm not one of them, but there was a process.

And the C operator was just a guy that turned valves or went and did samples or something like that. Going up to the senior operator who was a control room operator and in charge essentially of a shift, and he had the responsibilities that you're talking about. As I recall, the qualification exams for C, B and A operators were pretty much developed and administered at the site. At the time, the only ones that really did have the actual issued senior

licenses was West Valley, and that test was administered by the AEC at the time.

I don't know how you're ever going to get away from the idea that the requirements and the training and everything else is the responsibility of the operator. That can't be the responsibility of the NRC, it has to be the responsibility of the operator.

And I come back to a lot of the things that I hear along here, the NRC really is an audit group that is there to be sure that everything is done as specified and defined and agreed upon. I don't know how much the NRC really gets involved in actually doing it as much as being the one that assures that it's done properly and in the proper sequence.

But there is a history -- and I don't know where the exams are or anything else -- but there is a history for physically qualifying operators in reprocessing plants.

MR. CAMERON: Thank you, Mike. That's very useful.

And Tom, can I move to emergency planning? Okay. A couple of issues on emergency planning. What emergency plan requirements should NRC establish for reprocessing facilities? And should a regulation be more like Part 50, Appendix E requiring licensees

to determine an emergency planning zone, or Part 70? And perhaps someone could tell us how does Part 70 address emergency planning. If you're juxtaposing do we need a Part 50 arrangement or a Part 70, what's the difference between those two? Does someone from the NRC want to talk to that particular issue?

MS. BAILEY: I don't know that I can speak to it specifically, but I can characterize the difference between an event in a reactor facility versus in a fuel cycle facility. A fuel cycle facility which is essentially a chemical facility, the event happens quickly, a chemical explosion, then it's over. Whereas, with a reactor facility it's an event that's slowly developing. So I think given that difference, that's maybe something that we would want to consider with regards to emergency planning.

MR. CAMERON: Thank you for that characterization of the difference. What would that say about what types of emergency plan you should have? What would that say about that?

MS. BAILEY: Well, I mean, I think -- and there may be other thoughts here -- that with a fuel cycle facility you're recovering and you're preventing any more exposures, I guess is the thing that you're looking at. I guess the other thing that I would

point out is that with fuel cycle facilities, the events impact workers more than it does the public -- at least that's my understanding. It's more of a threat to your workers versus a threat to the public.

MR. CAMERON: So there's not really all of these considerations of evacuating people, it's more trying to help people.

MS. BAILEY: Maybe more hunker down versus trying to help people.

MR. CAMERON: Any comments from anybody on emergency planning issues? Jim.

MR. LIEBERMAN: Well, we had a lot of debate whether we should take the Part 50 approach or Part 70 approach, and as Marissa said, we focus on what's the likelihood of having an offsite situation. So we concluded that you use the Part 70 approach unless there's the potential for what we call a general emergency classification type event which is defined as an offsite release that could be expected to exceed EPA's protection action guidelines for more than the immediate site area.

So if you design a facility that there's a likelihood that you could have an event that could have substantial offsite consequences, then you should have a more formal emergency plan being in Part 50;

otherwise, you can use the Part 70 approach.

MR. CAMERON: And can you just tell us what that Part 70 approach is?

MR. LIEBERMAN: I knew you'd ask but I just don't recall off the top of my head.

MR. CAMERON: What is the Part 70, do we know what the Part 70 emergency planning approach is? Marissa talked a little bit about the differences in the facilities, but is Part 70 that basically there's no emergency planning?

MS. BAILEY: Hopefully Robert can speak to this, but my understanding is that it depends on the licensee and they are required to develop their emergency plans.

MR. CAMERON: Okay. Robert.

MR. HOGG: So the approach, and I'm not sure how we wrote it up exactly in the proposal but it was pretty consistent with the approach that we used at our Part 70 facility, and the approach is graded and so I think the different Part 70 facilities with different potential events could say different things in their plans. But generally, they required to classify events, identify actions, notify the appropriate agencies and local resources. So there are no different activities, they're just a different

level of formality with respect to how one describes it.

MR. CAMERON: So that's the key difference, the level of formality required.

MR. HOGG: Again, as opposed to a relatively prescriptive description in Appendix E of Part 50.

MR. CAMERON: Okay. Let's go to Tom, and then let's go to Rex.

MR. HILTZ: I guess I was just going to echo my perhaps uninformed understanding of Part 70 and Part 50 because I'm not an expert. But Part 70 has certain requirements that if you determine that you're going to exceed these thresholds, you're required to have an emergency plan. That emergency plan has to deal with the hazards that you determine, prior require coordination, require notification, periodic testing.

Part 50 in Appendix E requires, I think regardless, requires establishment of an emergency planning zone certain distances out, requires much more extensive coordination, I think more frequent formal exercising of the emergency plan. And I think from my perspective, a reprocessing facility, I think we all recognize, is not going to be like any current

fuel fabrication facility or fuel cycle facility.

And I think that not only is there going to be a technical element associated with what the requirements are for an emergency plan, but there also may be a policy element of what's required for an emergency plan which I don't know that we can debate here. But I think there's a public confidence issue that is real and that's going to have to be addressed surrounding any potential licensing of a commercial reprocessing facility.

MR. CAMERON: And that's, I think, the second time we've heard the term public confidence is that requirements being put into place because that's going to give the public a lot more reassurance about the facility. Rex.

MR. STRONG: Emergency plans. In my world emergency plans are one of the very things which our nuclear safety regulator actually approves for every nuclear installation. Now, those plans can be different from one installation to another because the plan reflects what's come out of the safety analysis, particularly around the design basis for said emergency plan.

The requirement is that that plan is detailed but is capable of being extended, by which I

mean that irrespective of the design base of the plan, if something else happens which is out with the planning base, then the operator and the local agencies must be capable of adapting their plans to cope. And I just make that point because our plan doesn't stand in isolation, it has to be integrated with those of the local authorities and the national agencies. And in our case, those plans are demonstrated twice a year with a national emergency plan once every three years.

MR. CAMERON: And is there any distinction for the different type of facility? In other words, we're talking here should there be a plan for a program process for a Part 50 versus a Part 70. Do you make any distinctions like that?

MR. STRONG: The distinctions that we make have to do with the potential nature of the event on the site and the potential offsite impact. And then from there the plan is developed, I have to say, in consultation with those who may be affected by it.

MR. CAMERON: Okay. Thank you, Rex. Rod.

MR. McCULLUM: Yes. I think this is another example of something we hit on this morning where you had that chart that Jose put up, lists of hazards, and he was indicating in the figure that you

go up to Part 50, you go down. It's not that simple. And again, this is why I think the approach that Jim outlined, it really is triggered do you trigger protective action guidelines for action offsite.

Now the Part 50 approach is what it is because in Part 50 every reactor is required to analyze certain severe accidents deterministically, and those do, by nature, trigger offsite response. So to automatically say we're going to go to a Part 50 approach, that wouldn't be appropriate because you don't have those accident scenarios, you don't have a design basis loss of coolant with a reactor involved at these facilities.

But then by the same token, to say that they can be treated the same as Part 70 facilities when they have a fission product inventory, a lot more isotopes, that also is not appropriate. So you really have to start to look through your safety analysis and do you have potential accident scenarios that could trigger protective action guidelines where you would need to involve offsite responders and start to shelter or evacuate people.

And I think the British approach where you always want to go one level up and maybe be able to extend it in case something you didn't anticipate

happens, that might also be prudent. But this is why we always have to keep focused on not is it Part 70, is it Part 50, but why do we have an emergency plan, and I think if we keep focused on that question as we develop the regulation, we'll get to a sensible answer.

MR. CAMERON: And that goes across every issue that we've been talking about too.

MR. McCULLUM: Yes.

MR. CAMERON: So good point to close on before we go to the public. Anybody out here? We heard from the experience, Mike told us about that. Anybody have anything else to say about this general area of design and operational?

MR. EHINGER: I guess my first question involves the idea of technology-neutral regulations, and as I'm sitting here listening to discussion, does the NRC not have some experience in that area in the enrichment plant licensing? You've got a couple of plants that are completely different in technologies. Does that have any impact? I don't know if that's an appropriate question or not, but it's one thing that had dawned on me listening to the discussion.

MR. CAMERON: Do you have another one?

MR. EHINGER: Well, the other question

that I had was again a reaction that I hinted to with a lot of the discussion that I've heard: What is the real role of the NRC? A lot of times you get the impression that they are writing tech specs, for instance, but I'm not sure that's really the case. Reactors are a different thing than other facilities and it's the operator who really knows the facility, and I don't think you can expect the NRC to have the same level of expertise for the facility that they could be writing tech specs and writing certain things.

So it comes back to defining the role of the NRC as auditing that it's done and approving, as opposed to doing a lot of the stuff. And I'm taken by the commentary and the implications of some of the things that are said. And I don't know if anybody else feels strongly in that area or not, but that was a reaction from sitting out on this side listening to the discussion.

MR. CAMERON: Okay. Thank you for that reaction. I don't know if we'll have anything -- oh, we do.

MR. HILTZ: Yes. I just feel compelled to respond a little bit.

I think we talked about the technology-

neutral framework that's already embodied in Part 70 this morning, I think Marissa mentioned that, and we do recognize that we have some experience in licensing different processes, different facilities under a single regulation, so we're not blind to that as we move forward with what we're trying to do with reprocessing.

With regard to your discussion about the role of the NRC, I certainly have a fundamentally different view of what the regulator's process should be, and I think it goes back to a fundamental concept that a strong and independent regulator is ultimately going to mean that nuclear materials will be used safely. If you don't have a strong and independent regulator, you lose public confidence and I think you lose the focus on safety.

There's nothing here, I hope, that's been said that detracts from the operator's responsibility ultimately to maintain and operate that plant safely. They are principally responsible for doing that. But our role is not just an audit role, our role is to provide oversight, and in this case with regard to reprocessing, our role is to provide the regulatory framework by which we will license which means we will make a decision that that facility is safe to operate

and will operate and protect public health and safety.

So while no one on the NRC staff will be an expert in reprocessing, I suspect that we won't have a lot of experience on the NRC staff, it's important for us to be able to understand the processes and understand what the right requirements would be so that if those requirements are met, we feel confident that the facility will operate.

And I don't think anyone here was suggesting -- at least in my discussion in wasn't suggesting that the NRC be the one who writes the tech spec or that the NRC be the one who does the integrated safety analysis. I think we have an obligation to establish those requirements under which, those criteria under which tech specs will be established so that when a licensee comes in or an applicant comes in, they have confidence and stability that they know they understand what the regulatory requirements are and we have confidence that if they comply with those, it will operate safely.

Sorry for the long answer.

MR. CAMERON: I'll tell you what, we're going to close with Tom's statement. It was a good statement, a good ode to regulation which we needed and perhaps we did misunderstand a little bit what

Mike said, but I think that was a good close for the day. It's a little bit after 5:00.

And we're going to start at nine o'clock tomorrow with safety and safeguards, and we'll have a tee up by some staff from a mysterious organization at the NRC. And then we'll talk about waste and then finish up with environmental.

So thank you all. I thought it was a good day, good work. Thank you.

(Whereupon, at 5:05 p.m., the workshop session was concluded, to resume at 9:00 a.m., Wednesday, October 20, 2010.)