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**NUCLEAR REGULATORY COMMISSION**

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                              Spent Nuclear Fuel Reprocessing Facilities

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1 UNITED STATES OF AMERICA

2 NUCLEAR REGULATORY COMMISSION

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4 PUBLIC MEETING

5 + + + + +

6 WORKSHOP ON DEVELOPMENT OF REGULATIONS FOR SPENT

7 NUCLEAR FUEL REPROCESSING FACILITIES

8 + + + + +

9 TUESDAY

10 SEPTEMBER 7, 2010

11 + + + + +

12 The meeting convened at the Hilton  
13 Washington D.C./Rockville Executive Meeting Center,  
14 1750 Rockville Pike, Rockville, MD, at 12:30 p.m.,  
15 Francis Cameron, presiding.

16 PRESENT:

17 FRANCIS CAMERON, Facilitator

18 SVEN BADER, AREVA

19 MARISSA BAILEY, NRC

20 JIM BRESEE, DOE

21 JOSE CUADRADO, NRC

22 YAWAR FARAZ, NRC

23 JOHN FLACK, ACRS

24 CATHY HANEY, NRC

25 THOMAS HILTZ, NRC

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PRESENT: (CONT.)

MIRIAM JUCKETT, CNWRA

ED LYMAN, Union of Concerned Scientists

ARJUN MAKHIJANI, IEER

ROD McCULLUM, NEI

ALEX MURRAY, NRC

PHIL REED, NRC

STEVE SCHILTHELM, Babcock & Wilcox

DANIEL PAUL STOUT, TVA

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I-N-D-E-X

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

12:46 p.m.

1  
2  
3 MR. CAMERON: Good morning everyone, or I  
4 should say good afternoon everyone. Welcome to the  
5 NRC's workshop on the NRC reprocessing rulemaking and  
6 I would just thank you all for being here and Ed, I am  
7 sorry if I rushed your lunch but thank you for coming  
8 up to the table.

9 It is my pleasure to serve as your  
10 facilitator for this session and Miriam Juckett from  
11 the Southwest Research Institute is going to be  
12 assisting me and I just wanted to cover a couple of  
13 meeting process items before we get into the  
14 substantive discussions today.

15 And I would like to tell you about the  
16 format for the meeting, tell you about some simple  
17 ground rules to help us to have a constructive session  
18 over the next day and a half, do some introductions  
19 around the table and then go through the agenda for  
20 you to make sure that we are all fairly clear on what  
21 is going to happen, when, and to answer any questions  
22 that you might have about the agenda.

23 In terms of format for the meeting, we are  
24 using what we call a round table setting and obviously  
25 not literally, but a round table format as opposed to

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1 the sometimes traditional town hall format that the  
2 NRC uses, is meant to encourage dialogue among the  
3 people around the table and so the format is designed  
4 to allow all of you to talk to one another about the  
5 issues rather than just talking to the NRC.

6 And we have around the table  
7 representatives of interests who may be affected or  
8 concerned about reprocessing issues. The NRC staff is  
9 also with the table today to serve as a resource for  
10 all of you.

11 And so we not only want to hear each of  
12 your opinions on the issues, but we want to get your  
13 reaction to other participants' opinions and  
14 perspectives on the issues.

15 So it's a modest attempt to try to develop  
16 what I call a richer form of data than the NRC  
17 normally gets through written comments on the issues  
18 and the staff is also taking written comments on these  
19 issues and I believe the comment period closes no  
20 November 5 of this year.

21 And although the focus of the meeting is  
22 at the table, we are going to go out to those of you  
23 in the audience for any questions or comments that you  
24 might have on the issues that are being addressed up  
25 here.

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1           In terms of ground rules, if you want to  
2 speak I would just ask you to turn your name tent up.  
3 I think most of you are familiar with this method. If  
4 you could just put it up like that. And that allows me  
5 to know who wants to talk and you don't have to worry  
6 about jumping into the conversation.

7           I may not take the cards as they turn up  
8 in order because we may be following a particular  
9 discussion thread, which is what we want to try to do,  
10 is develop those discussion threads rather than the  
11 unrelated monologue type of thing that can happen at  
12 these workshops.

13           I would ask only that one person at a  
14 time, so that we can give our full attention to  
15 whomever has the floor at the moment, and also so that  
16 we can get a clean transcript.

17           We are taking a transcript. Our  
18 stenographer is Jim Cordes over here, and one person  
19 at a time, Jim will know who is speaking. At the  
20 beginning as we go around, beginning of the session, I  
21 am always going to be referring to your name so that  
22 Jim can know who is talking and eventually he will get  
23 used to who is at the table.

24           And I would just encourage you to  
25 participate fully in the discussion, talk to one

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1 another. You may have different views on the issues  
2 but let's try to understand what the concerns and  
3 interests are behind those views so we can consider  
4 that.

5 And we are going to have the typical  
6 parking lot over here, where if an issue comes up, a  
7 comment that doesn't fit into the discussion at the  
8 moment, we will put it over here in a parking lot and  
9 we will make sure that we come back to it before we  
10 are done at the end of the day tomorrow.

11 And let's go around the table and do  
12 introductions right now. And I think I'll start here  
13 with Tom Hiltz. And you press the button on these  
14 microphones to activate it.

15 MR. HILTZ: Thanks Chip. My name is Tom  
16 Hiltz. I am a branch chief of the Advanced Fuel Cycle  
17 branch and my branch is principally responsible for  
18 the work associated with the revised framework for  
19 licensing a potential commercial reprocessing  
20 facility.

21 MR. CAMERON: Steve.

22 MR. SCHILTHELM: Good afternoon. I am Steve  
23 Schilthelm with Babcock & Wilcox and Babcock & Wilcox  
24 is working jointly with AREVA on the reprocessing  
25 program.

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1 DR. FLACK: My name is John Flack. My  
2 affiliation is with the ACRS. I am primarily here to  
3 keep the committee informed of activities in  
4 reprocessing and also had worked previously with the  
5 ACNW on reprocessing so we are very much interested in  
6 hearing what goes on today. Thank you.

7 MR. McCULLUM: Hi, I'm Rod McCullum with  
8 the Nuclear Energy Institute. We are the trade  
9 association for just about everybody that does  
10 business in the nuclear industry here in the United  
11 States. There are certainly a lot of diverse interests  
12 in the recycling and reprocessing area in the  
13 industry.

14 And I really want to thank NRC for holding  
15 this workshop. I was at Blue Ribbon Commission  
16 meetings, the presidential commission looking for next  
17 steps including recycling last week, and a recurring  
18 theme was having a regulatory framework that engenders  
19 public trust and confidence.

20 And really the only way to get that is  
21 from the beginning, to continue to seek it out and so  
22 that is a very good first step. And as we make  
23 decisions in industry regarding our views on recycling  
24 and reprocessing, knowing that you have a regulatory  
25 framework that is capable of doing that is a very

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1 important input for us as well. So thank you.

2 MR. CAMERON: Okay, and thank you Rod and I  
3 was a little remiss in perhaps offering, when you do  
4 introduce yourself, if you have any -- one or two  
5 sentences such as Rod just added on concerns that you  
6 would like to see addressed or objectives for the  
7 workshop, please add that in and I will go back over  
8 to these three gentlemen to see if they have anything  
9 to say on that account. But let's go to Alex.

10 MR. MURRAY: Yes. Thank you. Good  
11 afternoon. My name is Alex Murray. I am with the  
12 USNRC. I am senior engineer, senior chemical process  
13 engineer. I have been in and out of reprocessing,  
14 waste management and MOX, it seems like for centuries.

15 But my first job out of college was  
16 actually a MOX plant. Thank you.

17 MR. STOUT: I am Dan Stout, Tennessee  
18 Valley Authority. I am working with Rod and others  
19 from industry on nuclear fuel recycling task force.  
20 Prior to that I was at the Department of Energy  
21 responsible for nuclear fuel recycling.

22 And like Rod, I appreciate the opportunity  
23 to be here, sharing in this dialogue and it's  
24 important from industry's perspective for the NRC to  
25 continue with regulatory framework development. It's

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1 an essential component of the decision making process  
2 going forward. Thanks.

3 DR. BADER: I'm Sven Bader from AREVA  
4 federal services. I also work on the NEI task force,  
5 Rod and Steve Schilthelm of B&W is one of our team  
6 partners. My experience base is really on the MOX fuel  
7 fabrication facility down at the Savannah River Site  
8 and I hope that we can move forward with the  
9 regulations here to produce a similar facility on a  
10 pure commercial field.

11 DR. MAKHIJANI: Hi, I'm Arjun Makhijani. I  
12 am with the Institute for Energy -- excuse me, I can't  
13 speak very well, I'm numb.

14 MR. CAMERON: Arjun just had surgery this  
15 morning so I thank him for being here.

16 DR. MAKHIJANI: I have long been interested  
17 in reprocessing from concerns regarding non-  
18 proliferation, waste and cost and have written  
19 extensively about it and it's part of the reason, I  
20 guess, Chip invited me to be here.

21 MR. REED: I'm Phil Reed. I am from the  
22 NRC's Office of Nuclear Regulatory Research. I am in  
23 the division of risk analysis and I am working on  
24 issues involving research for reprocessing facilities  
25 and I am also a member of the technical working group

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1 that is putting together the technical basis  
2 documents, composed of the gaps that you will be  
3 hearing about this morning and tomorrow.

4 MR. FARAZ: Hi. I'm Yawar Faraz. I am a  
5 senior project manager at the NRC. Tom Hiltz is my  
6 supervisor. And I am also on the technical working  
7 group that is working towards putting together a  
8 technical basis, a regulatory basis for processing.

9 DR. LYMAN: I'm Ed Lyman, the senior staff  
10 scientist at the Union of Concerned Scientists. We  
11 oppose reprocessing barring really compelling reason  
12 to go forward with it and we still have seen no such  
13 reason. Our main interest here is to ensure that if a  
14 reprocessing rule is developed, that it is not watered  
15 down, diluted, weakened to accommodate the licensing  
16 of reprocessing plants which are incredibly expensive,  
17 failure-prone and a threat to the entire world for  
18 their production of fissile material that can be used  
19 in nuclear weapons.

20 MR. CAMERON: Thank you Ed. Marissa?

21 MS. BAILEY: I'm Marissa Bailey. I am  
22 deputy director for the division of fuel cycle safety  
23 and safeguards in NMSS at the NRC and I would just  
24 like to take this opportunity to thank everyone at  
25 this table for coming to this meeting and giving us

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1 your perspective. As we move forward towards  
2 developing the framework for reprocessing, I think  
3 it's very important that we do get a wide range of  
4 comments, concerns, feedback from all stakeholders  
5 that are involved. So thank you.

6 MS. HANEY: I'm Cathy Haney. I am the  
7 office director in the Office of Nuclear Material  
8 Safety and Safeguards. This effort falls under my  
9 responsibilities and I'll get a chance to do opening  
10 remarks in a few minutes so I'll save them for then.

11 MR. CAMERON: Okay. Thanks Cathy. Jose?

12 MR. CUADRADO: My name is Jose Cuadrado. I  
13 am a project manager, also at NRC, division of --  
14 office of nuclear material safety and safeguards and I  
15 will be helping with any of your IT needs or any of  
16 the organizational aspects of the workshop.

17 MR. CAMERON: Okay. Thanks, Jose and Jose,  
18 as the project manager, has put a lot of effort into  
19 getting us to the table here today, as well as Miriam,  
20 so thank you for that.

21 We are going to have some people joining  
22 us throughout the day: Jim Bresee from the Department  
23 of Energy will be here; Michele Boyd from Physicians  
24 for Social Responsibility is going to be here, she  
25 just got back from Argentina yesterday so this may not

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1 be the first thing she wants to do today; and we have  
2 some other industry folks from GE that are going to be  
3 joining us tomorrow.

4 So in terms of agenda, I just wanted to  
5 say a few introductory remarks about it, and we have  
6 already heard one overarching issue, which is the  
7 issues that Ed Lyman brought up about should we even  
8 be doing reprocessing? Obviously an important national  
9 policy issue however our agenda is going to focus on  
10 the NRC responsibilities in terms of developing a  
11 regulatory framework that is the most effective  
12 possible on this.

13 And so all of the agenda issues focus on  
14 those aspects -- various aspects of the NRC  
15 responsibilities. Secondly, this is a complicated  
16 area, all you need to do is read any of the background  
17 documents on it to know that, and we are hoping that  
18 we help to simplify it a little bit through the  
19 development of the agenda.

20 We are also going to have NRC staff  
21 members do what I call a tee-up on each agenda item  
22 before we go into it, to hopefully clarify what the  
23 important issues are.

24 We haven't tried to address all of the so-  
25 called gaps that were identified in the federal

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1 register notice. We really wanted to focus on issues  
2 during the next day and a half that it might be  
3 productive to have dialogue on, as opposed to issues  
4 that can be very simply addressed by submitting  
5 written comment by October 5.

6 And fourth, we really are also keeping our  
7 eye on the workshop that is going to be held in  
8 Albuquerque on October 19 and 20. Some of the same  
9 people may be around that table. We may have different  
10 people.

11 But at the end of the day, tomorrow, if  
12 anybody has suggestions on issues that we might want  
13 to give more attention to in Albuquerque, less  
14 attention, whatever, we would really appreciate  
15 hearing that also.

16 We are going to start off, as Cathy Haney  
17 mentioned, we are going to start with a context piece  
18 on NRC responsibilities and on this rulemaking --  
19 Cathy is going to that for us.

20 The first discussion issue -- and we'll  
21 have time for questions to Cathy after she does her  
22 presentation -- the first discussion issue is the  
23 alternative regulatory framework issue and you will  
24 see some of the ideas listed there that we want to  
25 talk about.

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1           We will have a tee-up for that and I think  
2 Alex is -- you are going to be doing the tee-up on  
3 that one.

4           The next topic for this afternoon is  
5 safety and risk requirements and Yawar is going to do  
6 the tee-up on that for us.

7           We are going to finish at 5 today. We are  
8 coming back tomorrow morning at 8:30 and basically we  
9 are going to start right in on design and operational  
10 requirements for reprocessing facility and I think  
11 Alex, that's you, you are going to do the tee-up on  
12 that one.

13           And then we are going to go to waste  
14 management issues, have a discussion of that and we  
15 are going to have Mike Lee of the NRC staff here with  
16 us to tee that one up for us.

17           We are then going to look at security and  
18 safeguards issues and we will have either Tom Pham or  
19 Marshall Cohen to do that tee-up for us.

20           And then we have environmental issues  
21 slated for the last topic of the day and that is a  
22 discussion of effluent limits and one of the things  
23 that all of you know or will see is that there is a  
24 lot of rulemakings, a number of rulemakings going on  
25 at the NRC that may have important implications for

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1 not only reprocessing facilities, but all facilities.

2 For example the Part 20 rulemaking that  
3 eventually is going to happen that might change the  
4 NRC's radiation protection standards. One of the  
5 things we can talk about is the effluent limits. We  
6 can talk about -- I know that there are some concerns  
7 about 40 CFR 190, which is in the EPA's bailiwick.

8 We can focus on those issues or we can  
9 come back to discuss more fully something that you  
10 think has not been addressed. So we will be going out  
11 to you to find out whether that last agenda item is  
12 one that we should really do or whether we should go  
13 on to something else.

14 So that's sort of the agenda overview. Are  
15 there any questions about the agenda at this point,  
16 about where something should be covered, something  
17 that we left out at this point? And then, do that  
18 John, just for practice, with the name tent. Oh great.  
19 Good, it works. Okay. Yes, John?

20 DR. FLACK: Yes. I had commented earlier on  
21 this. One of the things is trying to understand what  
22 the risk really is from these facilities and what work  
23 had been done to assess that. I mean, going forward  
24 with the regulation, one needs to really understand,  
25 you know, what we are dealing with as far as the risk.

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1           And I am not so sure that all the work has  
2 been done. I know research is involved in some of that  
3 and that's very good, but I'm not so sure enough work  
4 has been done in that area to really understand what  
5 the risk is from a reprocessing facility.

6           And of course my background is in reactors  
7 and there, we use PRA all the time and of course that  
8 issue is now on the table as do we need to do a PRA  
9 versus an ISA. But we are not here to deliberate --  
10 well, that's on the agenda, but I am not here to  
11 deliberate that issue.

12           It is just really understanding what the  
13 risk really is and then from there, move forward to  
14 what needs to be done to protect the public health and  
15 safety. Without knowing what that is up front, I think  
16 it's going to be very difficult to get everybody  
17 aligned in the same direction on that issue.

18           Because everyone will have a different  
19 feeling, a different understanding, a different  
20 perspective and so that's just an opening comment, I  
21 thought, to put on the table early on.

22           MR. CAMERON: Okay. Thanks John. That's a  
23 very good point. As we are going through -- and we are  
24 going to go over to Rod in a second here -- but as we  
25 are going through these discussions, if there is data,

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1 more data needed on a particular issue, research that  
2 needs to be done, please emphasize that for us.

3 And the NUREG report that John and his  
4 colleagues did on this, NUREG-1909 I believe, had six  
5 or seven research needs that you thought were  
6 important.

7 So feel free to put those research needs  
8 in if you see them and let's go to Rod.

9 MR. McCULLUM: Yes I will be very quick. I  
10 just want to second what John said. I think, beginning  
11 with an understanding of what the risk of these  
12 facilities really is, is important. I am not going to  
13 pretend to be able to answer the question right now. I  
14 know we have a lot of expertise in the room and I look  
15 forward to engaging them in a discussion of it.

16 I will say one thing: they are not  
17 reactors and I think it's important to start with that  
18 realization from the very beginning and we are going  
19 to get into some topic about new and different  
20 regulatory framework here.

21 But I agree, starting with the notion of  
22 what the risk of these facilities is, is very  
23 important.

24 MR. CAMERON: Okay, and maybe we can do  
25 that when we get to Yawar -- we can do that this

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1 afternoon when we get to Yawar's risk safety, to talk  
2 a little bit about that. Alex, did you have something  
3 to add on this?

4 MR. MURRAY: Yes, if I could please. I just  
5 wanted to just make a very quick comment. It's  
6 important to differentiate between risk and hazards or  
7 consequences, okay? I think that sometimes when we use  
8 the term risk, we really are talking about hazards --  
9 potential hazards and consequences from these types of  
10 facilities.

11 Whereas, as regards risk, from the NRC  
12 perspective, the risk of any licensed facility,  
13 whether it's a reprocessing plant, a uranium facility  
14 or a reactor, the risks must meet our existing  
15 regulations and be comparable, acceptable and low to  
16 members of the public, because that's an important  
17 little differentiation there. Thank you.

18 MR. CAMERON: Okay, and Yawar, could we --  
19 when we get to your -- you were going to do your tee-  
20 up for your session. Is this a legitimate issue to  
21 start off with when we get to that?

22 MR. FARAZ: Yes, one of the items that we  
23 will be discussing --

24 MR. CAMERON: Okay.

25 MR. FARAZ: hopefully --

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1 MR. CAMERON: All right.

2 MR. FARAZ: in that session.

3 MR. CAMERON: And Ed?

4 MR. LYMAN: Chip, there's one overarching  
5 issue that I don't really see addressed and it covers  
6 a lot of different areas, but that's the excessive  
7 secrecy that currently surrounds the licensing and  
8 fuel cycle facilities, in particular the designation  
9 of the ISA summary for Part 70 facilities as security-  
10 related information and many of the related documents,  
11 in almost every instance, that is an excessive  
12 designation and it's been a huge obstacle to public  
13 confidence in the licensing facilities, like the MOX  
14 plant.

15 So for a reprocessing rulemaking, going  
16 forward I think that is going to have to be addressed  
17 explicitly in the rule.

18 MR. CAMERON: Okay. Let's put that on the  
19 agenda. It's in the parking lot. If there seems to be  
20 a natural place as we are talking through these issues  
21 to talk about that, then let's bring it in, but let's  
22 not leave the room tomorrow until we do talk about  
23 that.

24 And as I mentioned, we are going to  
25 periodically go out to all of you in the audience for

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1 comments and questions after we have had the  
2 discussion up here.

3 I am going to deviate that for Mike, so  
4 that I could remind everybody that we are going to do  
5 that periodically. But Mike, could you just introduce  
6 yourself and say what you need to say?

7 MR. EHINGER: Well, I'm Mike Ehinger from  
8 Oak Ridge and I was just asking the question of how  
9 you recognize us if we have some input. So you have  
10 answered the question.

11 MR. CAMERON: Well is this life imitates  
12 art or something like that? Okay. Good. Thanks Mike.  
13 We arranged that in advance. But, Arjun?

14 DR. MAKHIJANI: Yes. I would just like to  
15 support what Ed said and suggest that maybe we discuss  
16 the secrecy issue at least for 15 minutes in the  
17 context of risk discussion because I think it's  
18 assumed that secrecy will improve security whereas I  
19 am not actually in agreement with that.

20 I think there are pluses and minuses to  
21 secrecy in relation to security and I think we should  
22 discuss it at least a little bit today.

23 MR. CAMERON: Okay. Thanks Arjun. We will  
24 do that. Okay, good. That was a useful commentary on  
25 the agenda and what I do now is turn it over to Cathy

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1 Haney who is the director of the office of nuclear  
2 material safety and safeguards to give us some  
3 context.

4 And Cathy, you can -- wherever you feel  
5 more comfortable. You can -- maybe you are the office  
6 director. You can do it from the podium. No one else  
7 can use it. All right.

8 MS. HANEY: Well I am honored to be  
9 speaking from the podium. I think others can use it if  
10 you want it. I can override Chip. But sometimes it's  
11 easier speaking from down there at the table anyway.

12 Well, I would like to welcome everyone to  
13 today's presentation and workshop. I think it's very  
14 important that we do this planning for the rulemaking  
15 in a very open forum and get as many of our  
16 stakeholders' input as early in the process as we can.

17 We have been holding workshops along the  
18 process, so this is just another couple of workshops.  
19 But we do take all the input from these workshops and  
20 consider it as we move forward, whether we are  
21 developing issues papers or keeping the commission  
22 informed about what we are hearing.

23 But I just want to let you know it is very  
24 valuable to me and to us in this process.

25 What I would like to do is to just do an

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1 overview. Some of this information is probably not new  
2 to many of you here, but from a starting point, to  
3 give you an idea of where we are within the agency.

4 So if you can switch to the first slide.  
5 This is a very abbreviated organizational chart of  
6 NRC. As you can see I highlighted several of the  
7 offices that we work with most closely on this effort,  
8 but there are a few that you don't see represented  
9 here.

10 The one that comes to mind is our office  
11 of the general counsel as well as we will be working  
12 closely with ACRS. But at this point in our technical  
13 preparation for working on the future in this  
14 processing and recycling area, there are three other  
15 offices that we are primarily involved with, and that  
16 is what we refer to as FSME, which is our office of  
17 federal and state materials and environmental  
18 programs.

19 The low level waste work is one of the  
20 priorities in that office. I have high level waste but  
21 FSME has low level waste. They also support us on any  
22 environmental work that we are doing.

23 And then we have our two offices that deal  
24 with reactors: NRR, which is our office of nuclear  
25 reactor regulation and then NRO, which is the office

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1 of new reactors.

2 NRR deals with our operating fleet that is  
3 existing right now and NRO is exactly what it says, is  
4 our new reactors that are coming online.

5 What doesn't appear here is our office of  
6 nuclear reactor research, but again, they are a very  
7 important player in the role in helping us right now.

8 In my organization -- I have three major  
9 technical groups that are reporting to me. One is the  
10 Division of Spent Fuel Storage and Transportation.  
11 This group is -- really does focus on spent fuel  
12 storage and transportation. They do the licensing for  
13 the independent spent fuel storage containers.

14 But what's -- we need to be working with  
15 them closely with them on this effort, because  
16 whatever waste is generated or whatever material is  
17 moving to the plant, the transportation aspects of  
18 that material would fall under this particular group  
19 as well as storage area.

20 The other division that I have to the far  
21 right there is the Division of High level Waste  
22 Repository Safety. This group to date has been  
23 focusing on the Yucca Mountain application -- the  
24 Department of Energy's application for the repository  
25 at Yucca Mountain.

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1           We do continue to review the license  
2 application through this fiscal year. We will start  
3 transitioning to a closure mode, depending upon the  
4 resources that are given to us. But at least in this  
5 fiscal year, we are continuing to review our  
6 application. We recently issued Volume 1 of the Safety  
7 Evaluation Report. That was the week before last. We  
8 are working on Volume 3 to be issued in the November  
9 timeframe. Of course that is highly dependent upon the  
10 resources that we have for this effort.

11           But we are also recognizing that there is  
12 a changing environment, changing national policy with  
13 regards to waste. That group is starting to look at  
14 what's the future of high level waste without a Yucca  
15 Mountain. Hence again why they are very integral to  
16 looking at this recycling and reprocessing work that  
17 we are doing here today.

18           And then lastly but not least is my third  
19 technical division, which is the Division of Fuel  
20 Cycle Safety and Safeguards. And as you have heard we  
21 have several representatives from that group sitting  
22 at the table today. That group actually has the  
23 programmatic responsibility right now for this effort  
24 that we are here to discuss today and they have had it  
25 for a while.

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1           That group also, in addition to the  
2 reprocessing work, does the licensing and oversight  
3 work for our existing fuel cycle facility as well as  
4 very actively engaged in licensing new facilities.

5           We can switch to the next slide. I want to  
6 just, at a high level, we -- about almost a year ago,  
7 started talking about how can we make all of our  
8 efforts work together. We need some type of integrated  
9 approach to looking at transportation, at short-term  
10 storage, at long-term storage, at licensing, because  
11 no matter what happens with the future of high level  
12 waste, we need to make sure that we are working.  
13 Whatever framework is developed, everything will feed  
14 into it and we will be able to approach it from an  
15 integrated standpoint.

16           And we wanted to do this with efficiency  
17 and effectiveness. Regulation to change rules, to  
18 develop rules, are very -- it's a very important  
19 process. It takes a lot of time but it also uses a lot  
20 of resources.

21           So in doing any regulatory changes to one  
22 area of the regulations, we want to make sure it  
23 doesn't have an adverse impact on another part of the  
24 regulations and in fact we asked our question, how can  
25 we work closely, so that one area -- any efforts in

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1 one area can benefit another area.

2 So we develop an integrated spent nuclear  
3 fuel program. There is a paper that is publicly  
4 available. It is on our website if you'd like to  
5 review it. But it will go through much greater detail  
6 than what I will discuss today.

7 But it talks about the program does, what  
8 it was envisioned to do and how we plan to go forward  
9 with it. But just a real brief overview on our next  
10 slide, is there are three program areas and the reason  
11 I mention it here today is because of that second  
12 bullet.

13 But stepping through the three components  
14 of this program, the first one is the regulatory and  
15 analytical tools for high level waste disposal. This  
16 is really looking at something non-Yucca. Part 63 of  
17 our regulations was developed to support Yucca  
18 Mountain. We do, in the area of high level waste go  
19 back to Part 60 but we recognize Part 60 is old, does  
20 need to be updated, should we decide to go forward,  
21 should the nation decide to go forward with something  
22 and doing forward with a geological repository that is  
23 not Yucca Mountain.

24 The second aspect of this is the  
25 reprocessing recycling. We decided to bring this into

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1 the integrated strategy because, again, as I mentioned  
2 earlier, the material going towards a reprocessing  
3 facility, the high level waste or the waste coming out  
4 of the facility, we all need to consider this as part  
5 of the system, as part of the cycle and the best way  
6 to do that was to bring these things all together.

7 And then of course the third component is  
8 the extended storage and transportation of spent fuel.  
9 And when do you say what does extended mean, you know  
10 put a time line on it, I really can't put an exact  
11 number on it but we have heard anything from greater  
12 than 120 to 300 years to 500 years.

13 Right now we are not focusing on what is  
14 the number, just merely that without a geological  
15 repository, there probably will be a need to store  
16 fuel onsite for a longer time period so we are looking  
17 for the -- just making sure that material can be  
18 safely stored and safeguarded while it's on site.

19 Now trying to focus down into just the  
20 reprocessing area, if I can have the next slide. Good.  
21 NRC does have the licensing jurisdiction over  
22 commercial reprocessing facilities. As I said, that  
23 area right now falls under my office because -- and  
24 the reprocessing facilities are considered production  
25 facilities.

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1           From a historical perspective, back in  
2 1960 and 1970, NRC, or back in that time frame, if you  
3 look back with AEC, did license a reprocessing  
4 facility and issued construction authorizations under  
5 Part 50.

6           Part 50 still is the guiding regulation  
7 for a reprocessing facility but if you look back over  
8 time it really has evolved to focus primarily on  
9 reactors and that is to support our operating fleet.  
10 We of course have Part 52 for the new reactors.

11           It has not evolved for the production  
12 facilities over time, hence why it's necessary for us  
13 to look into developing a regulatory framework for any  
14 reprocessing facilities that would fall in this area.

15           Move on to our next slide. I touched on  
16 this a little bit in just my brief opening remarks,  
17 was the importance of public involvement. We do  
18 recognize that in order to have a better product, we  
19 do need members of the public, and our internal and  
20 external stakeholders to help inform our process.

21           We recognize the technical issues and  
22 policies are complex. We touched just briefly on the  
23 fact of what is the risk from these facilities, is  
24 there a risk from these facilities. They are not very  
25 easy answers to some of the questions that have been

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1 raised under technical issues and policies.

2 We do recognize that rulemaking will take  
3 a considerable effort and it could touch on multiple  
4 parts of our regulations, on the code of federal  
5 regulations, and we do plan on engaging the public  
6 throughout the process and this workshop is just one  
7 way that we can do that.

8 We do have a second workshop that has  
9 already been scheduled and that is October 19 and 20  
10 in Albuquerque, so I will put my plug in now for I  
11 hope to see many of you still be able to attend that  
12 second workshop because we will be building on some of  
13 the discussions from this workshop as well as bringing  
14 some new topics to the table.

15 We appreciate Chip's involvement in these  
16 lectures, because I think in these workshops, Chip  
17 does a great job of facilitating them and getting all  
18 thoughts on the table. It's important we hear from  
19 everyone in this particular area.

20 And we do plan to focus the workshops to  
21 the best as a starting point, but again we want to  
22 remain as flexible as we can, but to focus on those  
23 rulemaking issues that were mentioned in the federal  
24 register notice and also to discuss any other, to  
25 broaden to other topics that fall under NRC's purview,

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1 as you may see some of these items going up in our  
2 parking lot today from today's meeting.

3 Next slide please. Just to give you an  
4 idea of what are we planning for and I think I'll  
5 start with the bottom bullet first because that's  
6 probably the one that I worried about the most on a  
7 day to day basis.

8 We have great ideas. We want to move  
9 forward. But our effort in this area is really  
10 contingent upon the resources that we have available.  
11 Our resources are going to be growing in `11, so I  
12 have asked Marissa and her team to try to get as much  
13 done as we can in fiscal year `11 so that is why these  
14 workshops, the timing of them, as we move into fiscal  
15 year 2011 on October 1 are very important to us.

16 But looking at the resources that I have  
17 available in `11 and that I hope to have available in  
18 `12, because we do NRC programs out on a two-year  
19 basis, this is the schedule that we are working  
20 toward, which is now and moving in through 2010, the  
21 regulatory gap analysis developing our regulatory, our  
22 technical basis for a potential rulemaking and then  
23 the workshops.

24 In `11 to `12 time frame, we plan to  
25 complete the regulatory basis, initiate environmental

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1 activities and that would be the time when we would be  
2 going forward to the commission asking for approval to  
3 proceed with a rulemaking. Should we get that  
4 approval, a draft rule would be available in a 2013 to  
5 2014 time frame with a 2015 as a final rule.

6 So those are the dates that we are working  
7 towards. Again, I'll mention that last bullet again.  
8 The resources in `11, I am fairly comfortable with,  
9 `12 get a little iffy-er and then we'll start the  
10 beginning of next year planning for the fiscal year  
11 `13 budget so we will see how it goes.

12 But that's the schedule for your  
13 information that we are working towards right now. And  
14 if we could go to the last slide. This is just, so you  
15 are aware, there are some additional information  
16 available should you be interested in more information  
17 on reprocessing. What you have is the website there  
18 that is specific to reprocessing and there you will  
19 find meeting summaries and presentations as well as  
20 transcripts, if the meeting was transcribed, there  
21 would be references there and then of course there's  
22 always additional documents available in ADAMS, or  
23 Electronic Reading Room.

24 If there is something that you are not  
25 seeing, please feel free to ask me why you are not

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1 seeing it or staff. There could be a reason why  
2 something is not being shared. And we will be happy to  
3 give you that reason. If not, if it's something we can  
4 go back and look for to see if it's something we can  
5 put up there, but we have tried to get as much  
6 information as we can up on the website.

7 So with that, that concludes my formal  
8 remarks so Chip, I will take questions.

9 MR. CAMERON: Questions for Cathy. John?

10 DR. FLACK: Cathy, yes, I am just curious  
11 about the role of EPA in this and how NRC interfaces  
12 EPA. I know there is a number of things that didn't  
13 quite end some years ago with EPA and it looked like  
14 they needed to do some work and I was wondering what  
15 the interface with NRC and EPA at this point in time.

16 MS. HANEY: Well, we have, in fact, as  
17 recently as this morning I met with EPA talking about  
18 when the need to move forward in dialogues. At -- as  
19 we move forward in the public meetings we will -- EPA  
20 is invited to participate but we are making sure that  
21 we are not getting out in front of them just by  
22 dialogue, and my staff to their staff and making sure  
23 that we are coordinated in any efforts moving forward.

24 So I would say it's an ongoing basis and  
25 then formally, obviously there's the federal register

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1 notices that another agency can comment on, our  
2 federal registers notices or information that we put  
3 out there.

4 MR. CAMERON: And we do have environmental  
5 issues on the agenda for tomorrow, end of the day, and  
6 to the extent that there is a question about what  
7 EPA's plans are generally, we might be able to impose  
8 upon them to give us a brief on that.

9 DR. BADER: Cathy, how will the Blue Ribbon  
10 Commission influence any of the schedule?

11 MS. HANEY: It has the potential to have a  
12 big impact on the schedule. What we -- in developing  
13 this integrated strategy, what we have tried to do is  
14 not to get in front of the Blue Ribbon Commission, but  
15 to try to position ourselves so that no matter what  
16 the Blue Ribbon Commission comes out with, we would be  
17 able to rapidly respond to it.

18 Should the Blue Ribbon Commission come out  
19 and say the solution is reprocessing recycling, I  
20 would expect that the Commission would move resources  
21 into this area. Should the Blue Ribbon Commission go  
22 the 180 degrees from that and say it's not even on the  
23 table, I could see potentially the Commission taking  
24 resources away from this project and possibly slowing  
25 it down.

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1 I think if that latter thing would happen,  
2 staff would probably propose to the Commission a path  
3 forward for their consideration and make again a  
4 budgetary decision, and that really applies to any of  
5 the items under the integrated strategy we did.

6 The paper that I referenced lays out a  
7 plan for the `11 and `12 time frame as well as going  
8 out I think as far as 2015. But that all is based on  
9 the resources that we have right now and based on the  
10 Blue Ribbon Commission's suggestions, it could alter  
11 that.

12 So I guess the short answer is it could  
13 have a big impact but we are trying to position  
14 ourselves so that we would be very quickly able to  
15 adapt to whatever they come out with.

16 MR. CAMERON: Okay, thanks Cathy. Arjun?

17 DR. MAKHIJANI: I didn't understand the  
18 Blue Ribbon Commission has any direct authority on it.

19 MS. HANEY: No, they wouldn't have the  
20 direct authority but I would say if they come back  
21 with a recommendation, the Commission would take that  
22 into consideration and also obviously we work through  
23 -- our budget goes through OMB and the Congress.

24 So the Blue Ribbon would go back, it would  
25 be considered so you are right, it's not a direct, but

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1 it obviously has a strong indication on how I think  
2 our resources would get directed.

3 MR. CAMERON: Okay. Thank you. Anything  
4 else, any questions for Cathy? Thank you very much for  
5 kicking it off, Cathy, and you can't take that  
6 microphone. You had the podium, but no, you have to  
7 leave the microphone. All right.

8 Why don't we just move into the first  
9 agenda item, regulatory framework? And Alex, are you  
10 going to do that for us? Okay.

11 MR. MURRAY: Yes, I will, Chip and I will  
12 even put my card up and I will even quickly say,  
13 Cathy, I have my minivan, if you want that podium,  
14 it's yours.

15 I will be very quick since we are little  
16 behind schedule. Jose, it's in there somewhere. Ah,  
17 there we go.

18 Input 1 is always nice. I just want to  
19 give a very quick TR for presentation for discussions,  
20 a little bit of an overview about regulatory and  
21 licensing approaches, framework and so forth. Next  
22 slide please.

23 We use the terms of reprocessing and  
24 recycling in the context from the ACRS/ACNW&M,  
25 basically those are the advisory committees of the NRC

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1 and they put out this NUREG about two years ago.

2 I have listed there reprocessing.  
3 Basically reprocessing is dissolving spent nuclear  
4 fuel and separating it into various constituents and  
5 recovering those constituents.

6 We use the term recycling to mean making  
7 some or maybe even all of those recovered constituents  
8 and reusing them somehow. Next slide please.

9 In the Nuclear Regulatory Commission, many  
10 of our regulations actually go back to what we call  
11 the Atomic Energy Act or AEA, which has been amended  
12 many times. The AEA defines production facility and  
13 has some very specific requirements for them.

14 Reprocessing facilities meet the  
15 definition of a production facility, hence any of the  
16 AEA requirements apply to a production facility. I  
17 should add the Atomic Energy Act is a law, not a  
18 regulation. It is above, more important, more powerful  
19 than a regulation if you will.

20 In Part 50 some of those minimum  
21 requirements are codified. I have listed some there.  
22 Part 50 also applies to a nuclear power reactor and  
23 for comparison, you have heard Part 70 and fuels  
24 mentioned. Those are considered special nuclear  
25 materials and they are regulated by a different part

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1 of the NRC regulations, which we refer to as Part 70.  
2 Next slide please.

3 On this slide, I just listed the two main  
4 regulations that might apply or would apply to  
5 reprocessing and recycling. Part 50 in the left  
6 column, Part 70 in the right column. As you can see  
7 Part 50 has some very specific requirements,  
8 deterministic, DBA, that's Design Basic Accidents.

9 You can adjust some of the analyses by  
10 using PRA, which is Probabilistic Risk Assessment or  
11 Risk Analysis depending which school you go to, has  
12 some minimum requirements which we call GDC, so  
13 General Design Criteria.

14 Other aspects, technical specifications  
15 and so on and so forth. QA represents Quality  
16 Assurance.

17 Over the past three decades, as Cathy  
18 mentioned, the focus of Part 50 has become Light Water  
19 Reactors. Having said that, it still remains the  
20 current regulation for reprocessing and recycling.

21 Part 70 is a regulation which applies for  
22 special nuclear materials. It's actually called  
23 domestic licensing of special nuclear material.  
24 Special nuclear material means, in simple terms,  
25 enriched uranium. It also applies to plutonium. It

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1 also applies to an isotope of uranium called uranium  
2 233.

3 It basically applies to the processing of  
4 non-irradiated materials, non-spent fuel if you will.  
5 In its current version -- it was revised in 2000, it  
6 has a risk-informed process based upon an integrated  
7 safety analysis. Yawar will discuss that in a little  
8 more detail in about an hour-and-a-half.

9 Most applications of Part 70 involve low  
10 enriched uranium for power reactor fuel. Next slide  
11 please.

12 This is just a chart. This chart was  
13 actually put out at the May public meeting as well.  
14 And basically at the top of the chart it lists low  
15 enriched uranium. Towards the bottom of the chart it  
16 lists MOX using reactor grade plutonium. That means  
17 plutonium that is recovered and recycled from  
18 commercial spent nuclear fuel that has been in a  
19 commercial nuclear power plant.

20 And the right column there basically  
21 lists, if you will, the relative consequence of the  
22 material in terms of what we call a radiation dose,  
23 based on ingestion or inhalation I should say via the  
24 lung pathway.

25 And as you can see, as you start getting

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1 more and more of the plutonium and fission production  
2 materials in, the relative dose effects go up quite  
3 substantially.

4 As you go towards the bottom of the list,  
5 the material behavior, potential consequence if you  
6 will, are more like Part 50 facilities. As you go  
7 towards the top of the list, they are more like Part  
8 70 facilities. Next slide please.

9 Another aspect of our discussion involves  
10 how many steps are there in licensing. Part 50 is  
11 essentially based on two-step licensing: a  
12 construction permit followed by an operating license.

13 That is how all currently operating  
14 nuclear power plants in the United States were  
15 licensed. About a decade or so ago, Part 50 was, if  
16 you will, modified along with another part of the  
17 regulations called Part 52, to allow one-step  
18 licensing.

19 Part 70 allows either one-step or two-step  
20 licensing, and I have listed the options there. Next  
21 slide please.

22 One of the things, when we discuss  
23 regulatory framework, is there has to be some if you  
24 will context from the different reprocessing and  
25 recycling technologies.

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1           There are several existing processes.  
2           These were actually developed in the United States but  
3           they are currently applied on a commercial scale  
4           overseas. They involved aqueous processes and the  
5           process is generally termed PUREX -- it's a solvent  
6           extraction process.

7           The other processes which have been or are  
8           under development, they have shown some promise, some  
9           potential advantages in laboratory applications. These  
10          include some such as pyrochemical or electrorefining  
11          methods.

12          Potential domestic reprocessing plants  
13          might use some additional modifications of PUREX or  
14          they could go if you will and use one of these newer  
15          technologies. We do not know at this time. Next slide  
16          please.

17          Here I have just listed some points for  
18          discussion. I am not going to walk through them. We  
19          can just go straight from here, Chip. Thank you.

20          MR. CAMERON: Okay, let's leave that slide  
21          up Jose, thank you. Thank you Alex. Let's start with  
22          Arjun and we will try to do this semi-systematically.  
23          Arjun, go ahead.

24          DR. MAKHIJANI: Just a factual thing. Can  
25          you put up that slide with the relative dose? 1,5?

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1 Yes, that one. I don't think you mean you do 3500  
2 percent. This is by mass, right? So you do 3500  
3 percent by mass, would have less impact than LEU  
4 because the main impact from LEU comes from U-234.

5 I think you mean HEU, which contains one  
6 percent U-234, which is the main radiological impact.  
7 The main radiological impact of enriched uranium comes  
8 from U-234, not from 238 or 235 and I don't think that  
9 ratio slide is correct, from my back of the envelope  
10 calculation so I would check that.

11 MR. MURRAY: We will check it.

12 DR. MAKHIJANI: It looks more like 10 or 20  
13 to me.

14 MR. MURRAY: We will check it.

15 MR. CAMERON: Okay. Thank you. Ed, and we  
16 will go over to Steve.

17 DR. LYMAN: Alex, I had a couple of  
18 questions on some of the things you said. When you  
19 said Part 60 allows one- or two-step licensing, in the  
20 case of a plutonium processing facility, I mean that -  
21 - a two-step process is required, isn't that right?  
22 There has to be a construction authorization if  
23 there's plutonium.

24 MR. CAMERON: Yes, can we clarify that one  
25 point about Part 70 allows either a one-step or a two-

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1 step, particularly in light of what Ed is raising.  
2 Alex, do you have any clarification on that please?

3 MR. MURRAY: As currently written and used,  
4 Part 70 can allow either one-step or two-step  
5 licensing. It was originally, when the revision was  
6 being worked on, the intent was to go to a full, one-  
7 step licensing approach very similar to the Part 50,  
8 52 combination for reactors.

9 But there was some concern at the time  
10 that in the future, some facilities, some potential  
11 licensees might come in and still request a two-step  
12 approach, one example being the MOX facility.

13 DR. LYMAN: But it is true that there has  
14 to be a construction authorization if it's a plutonium  
15 processing facility.

16 MR. MURRAY: Yes.

17 DR. LYMAN: So that essentially forces a  
18 two-step.

19 MR. MURRAY: Yes, yes, yes. I should add,  
20 in Part 70, plutonium processing means plutonium  
21 processing and fuel fabrication. It's not a  
22 reprocessing facility.

23 DR. LYMAN: And my other question. You said  
24 that Part 50 is the main vehicle for licensing,  
25 reprocessing and recycling, but for the fuel

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1 fabrication component of recycling, that would still  
2 be Part 70, right? Unless -- or it -- and what if it  
3 were integrated with the reprocessing?

4 MR. MURRAY: Well, you just answered your  
5 own question. It depends how any potential licensees  
6 or applicants in the future approach the NRC. If they  
7 are separate, discreet facilities for reprocessing and  
8 fuel fabrication, they could be approached as two  
9 separate facilities being licensed under two separate  
10 parts of the CFR and conceivably the fabrication part  
11 could be under Part 70.

12 Now having said that the, if you will,  
13 thrust of -- and I will let some of the industry folks  
14 chime in -- but the thrust of the industry as we  
15 understand it is going towards an integrated facility,  
16 where special nuclear materials such as plutonium are  
17 not kept in a separate form and shipped separately  
18 outside of being in a fuel assembly, but I'll let  
19 others speak to that.

20 MR. CAMERON: Okay. And I am sure we are  
21 going to get to that issue. Steve?

22 MR. SCHILTHELM: Yes, while we are on this  
23 -- oops you have changed the slide. Can you go back to  
24 the consequence slide? Because -- Alex, I think you  
25 brought this up earlier about understanding the

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1 consequence and John, you have mentioned understanding  
2 the risk -- am I correct? These are effective doses or  
3 cumulative doses, they are not acute doses, is that  
4 correct?

5 MR. MURRAY: These are inhalation doses.  
6 They are basically 50-year doses.

7 MR. SCHILTHELM: Fifty year committed.

8 MR. MURRAY: Yes.

9 MR. SCHILTHELM: Right. And I think we  
10 should really consider whether that is the most useful  
11 metric. When you talk about accidents, acute doses  
12 from a reactor accident are really what dominate. So  
13 to -- I would offer that this table gets arranged.  
14 Excuse me.

15 I would offer this table gets a little bit  
16 rearranged on an acute dose standpoint.

17 MR. MURRAY: That is something we can  
18 consider, but let me just add, in NRC regulations, we  
19 usually look at what we call a TEDE, the T-E-D-E which  
20 is the Total Effective Dose Equivalent, which encloses  
21 both the, if you will, the acute external dose as well  
22 as 50 year committed doses from inhaled and ingested  
23 species and that's what this is based upon.

24 MR. SCHILTHELM: And I do understand that.  
25 That goes back to the old Part 20 debate --

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1 MR. MURRAY: Yes.

2 MR. SCHILTHELM: of acute doses versus  
3 TEDEs.

4 MR. MURRAY: Yes. Yes.

5 MR. SCHILTHELM: But, not to revisit that  
6 or reopen that, but I think conventional wisdom is a  
7 reactor with the source term that a reactor offers  
8 would be probably the most hazardous nuclear facility  
9 from a potential consequence standpoint.

10 And I don't think a MOX facility typically  
11 comes to that level of hazard classification. So as  
12 you draw the arrows more like Part 50 or more like  
13 Part 70, I think we could debate this table for a long  
14 time, I think is the point I am trying to make.

15 MR. CAMERON: Okay. This looks like it  
16 might be central to the risk agenda item. So we are  
17 going to be revising that but let's hear from Arjun  
18 and Ed before we go on, perhaps, to the question of  
19 how should the NRC arrange its regulatory framework  
20 for moving forward with this Part 50, Part 70, new  
21 part. But Arjun, do you want to comment on something  
22 Steve said?

23 DR. MAKHIJANI: We are discussing a  
24 reprocessing plant, not a materials facility, MOX fuel  
25 fabrication plant, right? We are discussing

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1 reprocessing regulations, right?

2 MR. MURRAY: That is correct, yes.

3 DR. MAKHIJANI: Okay. There are actually --  
4 I can expand on this in the risk framework, but if you  
5 are talking about more like Part 50 or more like Part  
6 70, there are actually specific, unique things to a  
7 reprocessing plant and there will be specific, unique  
8 things that will go according to the design of the  
9 reprocessing plant.

10 With aqueous processes, you have high  
11 level waste liquid -- liquid high level waste tanks on  
12 site, which would contain more long-lived  
13 radionuclides than any specific, single reactor site  
14 because you are reprocessing a lot of fuel.

15 It depends on how the plant is designed  
16 and how your vitrification facility is designed and  
17 whether it works or not, whether it's more like La  
18 Hague or more like Sellafield.

19 But I think -- I don't think you can  
20 summarize it in more like Part 50 and more like Part  
21 70 because some of the most important hazards are very  
22 specific to the reprocessing plant.

23 So you are going to have to have that, in  
24 any case in your regulation.

25 MR. CAMERON: Okay. And that seems

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1 consistent with what Steve was saying but from what  
2 you just offered, Arjun, the implication for you is  
3 that this should not be -- that the NRC should be  
4 developing a new part rather than trying to jury rig  
5 50 or trying to jury rig 70.

6 DR. MAKHIJANI: Yes, I think you can draw  
7 on 50 and 70 but you know, recognizing that there are  
8 parts of the reactor regulation that are in themselves  
9 quite obsolete. I mean the Table S-3, which is used  
10 for reactor licensing, is completely obsolete. It was  
11 done in its waste aspects because it was written prior  
12 to low level waste regulations.

13 It was written prior -- some of it may be  
14 brought back alive actually, because it assumed  
15 reprocessing and you have been licensing reactors  
16 assuming no reprocessing.

17 So I think you can draw on what you have,  
18 but you have to recognize that what you have, even for  
19 reactors, is largely obsolete. What you have for waste  
20 is severely deficient and incomplete and you have  
21 recognized that to some extent in your paper.

22 And you have got new elements that have  
23 not been really properly considered, at least afresh,  
24 and after 9/11 you have got still more new elements  
25 that you need to consider so. Yes. You need to develop

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1 a new regulation, I would say.

2 MR. CAMERON: Okay. Let me check in with --  
3 thank you Arjun -- with Ed on his comment and then  
4 perhaps others have some comments on what Arjun just  
5 suggested, which is one of the discussion points here,  
6 about how the NRC should structure its regulatory  
7 framework. Ed?

8 DR. LYMAN: Yes, just for my understanding  
9 of this table. The table doesn't take into account  
10 relative volatility. It is just strictly one per unit  
11 mass of the material without taking into account  
12 pathways?

13 MR. MURRAY: That is correct. Yes. How it  
14 gets airborne is a different matter.

15 MR. CAMERON: Okay. Go ahead John.

16 DR. FLACK: Yes, and I am thinking, you  
17 know, design basis accident Part 100 releases and so  
18 on, safety, you know and SSC versus IROFS, I didn't  
19 see that comparison made either about how that is  
20 begin dealt with in Part 70.

21 Of course that goes Part 50 Part 100 as  
22 two pieces of that equation, and I don't see that  
23 playing out in the comparison. Now did you have  
24 something in mind on that, could you do that  
25 comparison off site to public -- well, I guess you

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1 start with design basis accidents with reactors. All  
2 right?

3 Do we have design basis accidents for  
4 these facilities, where then you would have to meet  
5 certain criteria, like Part 100 release -- so I think  
6 it oversimplifies the comparison a little bit because  
7 we are not going all the way out to the end points on  
8 this and that's the public exposure, off site.

9 MR. CAMERON: And Alex, you have -- you are  
10 catching a lot of attention with this slide.

11 MR. MURRAY: This is excellent.

12 MR. CAMERON: Okay.

13 MR. MURRAY: This is excellent. It was put  
14 in there to enhance discussion.

15 MR. CAMERON: And it may not be -- we are  
16 going to revisit these issues -- hazards, consequence,  
17 risk -- when we get to our second agenda item. But you  
18 have stimulated a lot of discussion already and do you  
19 have anything more to say on this now or --?

20 MR. MURRAY: Let me just explain one more  
21 time. This is just strictly based upon inhalation  
22 does, okay? TEDE. Fifty-year committed dose for -- on  
23 a mass basis via the inhalation pathway. Okay?

24 How it gets there, whether we had design  
25 basis accidents or not, that's another part of the

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1 discussions of what should be in a revised regulation  
2 for reprocessing facilities. Some of that we will  
3 discuss in the risk and safety discussion in about an  
4 hour.

5 MR. CAMERON: Okay. Thank you. Rod?

6 MR. McCULLUM: Yes, I just wanted to note  
7 quickly for the record that this is a rare instance  
8 where industry and Arjun Makhijani are in agreement.  
9 What you wrote on up there is that here is a need for  
10 new regulation.

11 I think as we go down this dialogue and  
12 start to talk about what that regulation should be and  
13 what it should look like, maybe some of the academic  
14 debate on this table becomes irrelevant and what we  
15 really are is looking at the most appropriate way to  
16 develop a new regulation for these types of  
17 facilities.

18 MR. CAMERON: Okay. Well, we will test out  
19 -- perhaps the table is not necessarily the  
20 organizing vehicle for the discussion we are going to  
21 have about risk and safety but does anybody have a  
22 different view on the need for a new part of the  
23 regulation to specifically deal with reprocessing?

24 Okay. How about the issue of one-step  
25 licensing? I mean we have already had some discussion,

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1 question from Ed Lyman about the existing framework in  
2 terms of construction authorization, plutonium --  
3 anybody have a view about the one-step licensing?  
4 Steve?

5 MR. SCHILTHELM: Yes I will offer some  
6 comments. These are not my own comments. I think  
7 Dorothy Davidson made these comments at a fuel cycle  
8 information meeting probably in `09.

9 Confidence in the regulatory process is  
10 central to any commercial entity taking on  
11 reprocessing, or taking on a major nuclear project. So  
12 just like the reactors needed a one-step licensing  
13 process to make business decisions so that they didn't  
14 get into a two-step process that could go south on  
15 them after major capital commitments, a reprocessing  
16 facility, if it is going to be a commercial facility,  
17 really does need a one-step process in order to  
18 provide that regulatory certainty. And those were  
19 Dorothy's comments.

20 MR. CAMERON: Okay. Thanks Steve. That's  
21 one reason, one important reason why one step would be  
22 important. I know the staff has drawn the analogy with  
23 the Part 52 process for reactors. Are there things  
24 from the experience of the NRC with one-step licensing  
25 in reactors that the NRC should make sure that it

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1 avoids if they are going to do one-step licensing for  
2 reprocessing facilities? Arjun?

3 DR. MAKHIJANI: Actually, you are not  
4 actually following the original design of the one-step  
5 processing, because you were supposed to have settled  
6 reactor designs and not reopen the question of reactor  
7 designs while you are considering specific reactor  
8 applications.

9 As things stand currently, you don't have  
10 a single reactor design that is completely settled and  
11 I think the problem is going to be much worse with  
12 reprocessing, and let me give a different view, that  
13 one-step licensing actually is not appropriate to a  
14 technology where there has been essentially no  
15 experience in the United States and there is going to  
16 be a lot of things that are specific to here, whether  
17 you are considering waste or environment or terrorism  
18 hazards or safety requirements.

19 That's for a settled technology, like  
20 PUREX and you are also considering a new technology or  
21 host of new technologies that are not aqueous, that  
22 are radically different, that are in the pilot stage.

23 And I don't see you can actually begin to  
24 discuss licensing of these things and at least for new  
25 technologies you have to have a two-step process. You

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1 probably have to have a three-step process, because  
2 you don't even know how to assess the risk of these  
3 technologies yet.

4           You have no data, other than laboratory  
5 data. You have no idea of operational problems and the  
6 frequencies of failure. So you can't have a one-step  
7 process for new technologies. I don't even think you  
8 can have one rule for technologies that are not yet  
9 commercial, that is common with technologies that are  
10 already commercial, where you have some basis for  
11 information and evaluation.

12           MR. CAMERON: Okay. Thanks for putting that  
13 on the table Arjun. Arjun referred to the experience  
14 in the reactor field with the one-step in terms of the  
15 designs not begin finalized and changing.

16           But I think the important point is how do  
17 you deal with Arjun's concerns about these are new  
18 facilities, complex, lots of information needed. Rod,  
19 do you want to talk to any of that?

20           MR. McCULLUM: Yes, I think there's an  
21 important distinction here between the world of  
22 reactor licensing and what would become the world of  
23 recycling facility licensing, which is the idea of  
24 having a design certification from a standardized  
25 design came from the notion that we would be

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1 standardizing designs because you would want to  
2 replicate the same thing in a lot of places.

3 A recycling facility, you know, maybe we  
4 would have multiples of those. Certainly I think each  
5 of my vendors here would want to have at least one of  
6 their own.

7 But that would not be the intent. You  
8 know, in France you have 80 percent of the electricity  
9 comes from nuclear and they use MOX fuel and they only  
10 have one recycling or reprocessing facility.

11 So you can support a lot of the  
12 infrastructure without having to try to replicate a  
13 standard design in a lot of places. So in that  
14 context, I think there still is an opportunity,  
15 although I agree that there are a lot of questions  
16 that need to be answered when you license one of these  
17 facilities -- there still is an opportunity for a one-  
18 step licensing process.

19 I would view it more as not a design cert  
20 and then a facility-specific license or a COLA. I  
21 would view it as you are kind of melding those things  
22 into one. You are doing the types of evaluations that  
23 you would do in a design certification review and some  
24 of the types of evaluations you are doing in a COLA  
25 all in the same place, because you are looking at both

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1 the facility and its location in a holistic manner.

2 So it is probably an area where the  
3 reactor analogy doesn't quite serve you but there  
4 probably are some lessons to be learned there.

5 MR. CAMERON: And do you have anything else  
6 on Arjun's concerns about that one-step may be too  
7 ambitious for these types of facilities? He mentioned  
8 you may need two steps, you may need three steps. I am  
9 not sure what he meant by three steps but how do you  
10 react to that? And we will be getting some other  
11 comments and we are going to go to Ed -- do you have  
12 anything that you want to add on that part of it?

13 MR. McCULLUM: Yes, just one thing and then  
14 I might let others who are even more expert speak, but  
15 I think that's where -- and it's on your list of  
16 things to talk about here today -- the notion of  
17 having risk-informed and performance-based regulations  
18 is important.

19 Clearly you have to very thoroughly  
20 evaluate the facility and determine safety and you  
21 have to have a lot in there that can assure safety.  
22 But by being risk-informed and performance-based, you  
23 are focusing on what is the result? You know, what is  
24 the level of protection that you are trying to achieve  
25 here, and making sure that you have an applicant that

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1 can demonstrate that.

2 You know, the devil is obviously in the  
3 details but I think if the agency is committed to  
4 going down that path, it is possible. I mean we  
5 license a lot of very diverse fuel cycle facilities  
6 under Part 70.

7 It is possible to construct a regulation  
8 that can credibly support a one-step process. I would  
9 also point out, in the reactor world, I mean there are  
10 things like ITAAC, where yes you have a one-step  
11 process, but you define all these inspections, tests,  
12 analyses, acceptance criteria that you will double  
13 check back at the end there.

14 So there are ways to build in provisions  
15 to address those unique things you might not know at  
16 the one step. But I will go back to what Steve said,  
17 is that if recycling in this country is to be a  
18 commercial venture, regulatory certainty is absolutely  
19 a must.

20 And you know, there are things you can  
21 build into a one-step regulation and you know, we  
22 would encourage the staff to continue to look in that  
23 direction to support that. And being risk-informed and  
24 performance-based I think is really the key there.

25 MR. CAMERON: Okay. We are going to come

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1 back and explore those and I am going to go to Steve  
2 and John and Dan. I just want to make sure that we  
3 hear from Ed either on this point or you had another  
4 point, perhaps.

5 DR. LYMAN: On the issue of one-step  
6 licensing -- well, I will start with what we just  
7 heard. It seems to me it's the original belief that  
8 the process in Part 52 is actually going to provide  
9 more certainty and be more efficient than Part 50. I  
10 think there is some question about it, given that the  
11 implementation of the ITAAC provisions and the closure  
12 of ITAAC and all those issues are still unresolved and  
13 are leading to uncertainty.

14 So I think ultimately what you may end up  
15 with is the whole ITAAC certification process is going  
16 to be really a surrogate for the second step of the  
17 original two-step licensing process, and all you have  
18 done is cut the public out of the opportunity for a  
19 second hearing, or at least raised the bar  
20 significantly.

21 So that's really the main outcome of going  
22 to one-step, is really curtailing the public's  
23 opportunity to seek a hearing.

24 With regard to fuel cycle facilities in  
25 particular, I did look up the original genesis of the

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1 construction authorization requirement in Part 70 for  
2 plutonium processing facilities and it goes back to  
3 the Atomic Energy Commission.

4 And they determined that, as opposed to  
5 uranium processing facilities, because plutonium posed  
6 a significant additional radiological hazard, that  
7 they decided that they wanted an additional step of  
8 approval of the design bases for a plutonium  
9 processing facility before going forward, and that's  
10 why that requirement is in there now.

11 So certainly, in any new requirement for  
12 reprocessing licensing, that logic would equally or  
13 even apply to a greater extent for a reprocessing  
14 plant, and therefore that construction authorization,  
15 I think, would have to be an essential part of any new  
16 licensing strategy for reprocessing plants.

17 MR. CAMERON: Okay. Thank you Ed, and I  
18 think everyone should note the rationale that Ed put  
19 on the table for what the Commission thought  
20 originally. So let's keep going with this. Let's hear  
21 from Dan and then we'll go to John. Dan?

22 MR. STOUT: I would like to recognize that  
23 there could be different levels of maturity of any  
24 kind of reprocessing facility that were to go forward.  
25 You could range from a new technology that isn't

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1 proven, and that would likely require a demonstration,  
2 to something much more commercial, based on things  
3 that are in existence.

4 And I encourage the NRC to formulate the  
5 regulation to accommodate the variety of technologies  
6 that could be put forward. And it comes to what Steve  
7 was talking about. It's a risk, a predictability of  
8 the regulatory process that is important in the  
9 business decision.

10 And so let the licensee decide whether or  
11 not they are going to come forward with a mature  
12 design in a one-step process, or if they want to bear  
13 the risk of a two-step process and come forward with a  
14 less mature design and proceed with construction  
15 knowing that there is another step in the process.

16 MR. CAMERON: So, under that view, Dan, the  
17 option would be available to either do a two-step or  
18 take advantage of a one-step.

19 MR. STOUT: Correct. I am suggesting that  
20 the NRC consider formulating the rulemaking to allow  
21 either one-step or two-step and let the licensee  
22 decide and to go in with a mature design in one step  
23 or a less mature design and proceed with the two-step.

24 MR. CAMERON: Well, going back, let me ask  
25 another question about that, going back to Rod's point

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1 about that one-step would be appropriate given a risk-  
2 informed, performance-based rulemaking approach. And  
3 then Rod, if I am not articulating it correctly, tell  
4 me. But I am trying to connect up what Rod said about  
5 risk-informed, performance-based with your idea of the  
6 mature design.

7 Is there a relationship there? Or how  
8 would the NRC say that well, this is a mature design  
9 so therefore you can go one-step, or it's not a mature  
10 design and so -- how would the NRC give guidance or  
11 instruction to an applicant about what would be  
12 acceptable in that regard?

13 And I am not sure there is a connection  
14 with Rod's point on performance-based, risk-informed  
15 but if anybody can make that connection, please do so.

16 Do you want to say anything more at this  
17 point on that? Well, let's go to John and then Steve.  
18 John?

19 DR. FLACK: Well, I think from lessons to  
20 be learned from the Part 52 and the new reactor  
21 licensing process, there's a difference between an  
22 ITAAC and a DAC. I don't know how many people are  
23 aware of that.

24 And a Design Acceptance Criteria is not  
25 where you want to go. The ITAAC makes more sense

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1 because everybody agrees up front what needs to be  
2 done and at the back end you just check and make sure  
3 it was done based on what you agreed to in the front  
4 end.

5 And it depends on how well-defined that  
6 design is, makes a lot of sense because how do you  
7 decide what needs to be done on the front end if you  
8 don't -- if it's still a concept.

9 So nailing it down at the front end, I  
10 think, is important all the way around, whether you go  
11 one-step or two-step or most importantly for one-step  
12 and you avoid what's known as Design Acceptance  
13 Criteria, where you have just a concept with the  
14 acceptance criteria, not the actual design.

15 Having said that, again, it comes back to  
16 the risk. I mean, what's so important here that we  
17 need to know it up front and nail that down, that  
18 everybody can agree to, and that has to take some form  
19 of risk insight.

20 When we look at this MOX facility, which  
21 the ACRS is looking at now, and you have 15,000 IROFS,  
22 I mean one has to stand back and say, okay, well, what  
23 is really important here? I mean, where do you get  
24 that perspective?

25 That is I think key to the whole process,

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1 that and being in complete understanding and a buy-in,  
2 up front, as to what needs to be done.

3 ITAACs I don't think will be that much of  
4 a problem, but DACs are definitely a problem and I  
5 would avoid those at all costs at this point, getting  
6 back to your original question.

7 MR. CAMERON: Now, just, I -- when you  
8 said, you used a term, is definitely a problem, what  
9 term was that?

10 DR. FLACK: Well, the problem again comes  
11 to getting everybody aligned to what we mean by that,  
12 and what needs to be acceptable at the back end. So  
13 you are agreeing to something up front, but is  
14 everybody aligned, in total agreement up front about  
15 what that means.

16 We will take the I&C area, which is  
17 continuously evolving and not knowing exactly what  
18 this is going to play out at the back end, but you are  
19 agreeing to some concepts in the front end.

20 That presents a problem as to what  
21 everybody agreed to before, when you get to the final  
22 design. So it's ultimately important to nail the  
23 design down well in advance and not wait to the very  
24 end, a complete design or whatever you might be  
25 talking about here, I think is key to this whole

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1 process.

2 And so how well one can do that at this  
3 point, having not worked in this area for 30 years now  
4 and relying on international experience, I think takes  
5 a lot of work myself.

6 So it may be too early even to answer this  
7 question, because I mean what are we really talking  
8 about here, you know a concept, basically.

9 MR. CAMERON: So are you saying that -- one  
10 of the things you are saying is that the decision on  
11 one-step, two-step, whatever licensing really has to  
12 await an exploration of risk and design and things  
13 like that?

14 DR. FLACK: I think we are going to need to  
15 know much more about it before we can make any  
16 decision on that. I don't know, that's my own personal  
17 view. Believe me, I am not speaking for the Committee.  
18 I don't know. The Committee has  
19 their own views on these things. So I am not speaking  
20 for the ACRS. These are my own personal beliefs from  
21 working in these areas over the years.

22 MR. CAMERON: Okay. Thanks John. Steve? And  
23 then we are going to go to the NRC folks and then to  
24 Rod.

25 MR. SCHILTHELM: Yes, and I am not sure I

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1 can make a direct segue between what Rod was saying  
2 and what Dan was saying, but when we sat down as an  
3 industry and put the white paper together that we sent  
4 into NRC, we had days worth discussion on this very  
5 topic.

6 And where we landed was that the burden  
7 really falls -- as Dan was saying -- the burden is  
8 going to fall upon the industry and the licensee. If  
9 we have a mature design, then in the end, there's a  
10 facility already operating that looks like this  
11 facility, then it shouldn't be a stretch to put forth  
12 a mature design and put forth a set of ITAACs, not  
13 DACs, but ITAACs, that you can live with.

14 On the other hand, if you don't have a  
15 mature design, and you try to put forth a set of  
16 ITAACs and you try to do that as a licensee, the end  
17 result would be something, I think to what Ed was  
18 alluding to in that you wouldn't have a certainty, and  
19 you would come into the ITAAC process essentially with  
20 a new design, or an evolved design from what you put  
21 forth.

22 So I think the real burden comes upon the  
23 industry to understand where their technology is and  
24 what they do know and what they don't know about their  
25 technology, and what they do understand and they don't

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1 understand about the accident analysis, and the risk  
2 that those accident analyses put forth.

3 So that was the reason, when we put forth  
4 the white paper, we said we need to create the  
5 alternative. You can come with a one-part of you can  
6 come with a two-part. The one-part or the one-step  
7 process comes with a strong ITAAC process, and as a  
8 licensee, you have to be willing to live with that  
9 strong ITAAC process.

10 MR. CAMERON: And that would depend on the  
11 -- again, to use Dan's point, the maturity of the  
12 design, the experience with that particular processing  
13 technology. Okay, go ahead Arjun.

14 DR. MAKHIJANI: Just quickly to respond to  
15 that. I think, while the concept sounds wonderful,  
16 ultimately you can't leave it to the industry to  
17 decide whether the design is mature or not. This is  
18 something you raised earlier, Chip, when this first  
19 came up.

20 It's got to be -- they have got to be  
21 defined criteria that the government set forth for  
22 that and a judgment that needs to be made as to  
23 whether a one-step or two-step.

24 So you are going to -- you are going to  
25 wind up in a more of a regulatory uncertainty because

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1 you will have to have a process for deciding whether  
2 it's one-step or two-step.

3 You can't just say, well, you know I think  
4 it's one-step and bind the government to that. The  
5 government is going to have to make a decision. And so  
6 you are going to have two steps even in that case, in  
7 my opinion.

8 MR. CAMERON: Okay. Let's go to the points  
9 that people wanted to make but I think, keep in mind  
10 Arjun's point there about how does the NRC structure  
11 its regulatory framework to give criteria to the  
12 industry on what they would think would be a "mature  
13 design" that might be acceptable for ITAAC.

14 Let's -- and before we go back to Rod, let  
15 me get Alex and Yawar and Phil on the record here in  
16 terms of any thoughts they might have about this  
17 discussion. Alex, do you want to go ahead or should we  
18 -- go ahead.

19 MR. MURRAY: I was going to say, as I have  
20 already spoken a lot, I would like to give my  
21 colleagues some time and then I'll --

22 MR. CAMERON: Okay. Let's go to Yawar and  
23 then Phil.

24 MR. FARAZ: On this point I wanted to add  
25 that there is quite a bit that you could learn from

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1 the international community. We have had reprocessing  
2 facilities in France that were -- when they were  
3 introduced, they were new design.

4 Same thing for the UK. They have their own  
5 design, like Thorp. And there what they did was, they  
6 actually -- it wasn't really a pilot plan but it was -  
7 - it wasn't at the lab scale either. Bu they did  
8 develop a testing facility and they went through  
9 elaborate tests.

10 They would change the parameters and then  
11 see how the process would react. So there's a lot we  
12 can learn from their experiences and how they managed  
13 to establish unique and new designs and reprocessing  
14 and they have been by and large operating those plants  
15 fairly safely.

16 MR. CAMERON: Okay. Thanks Yawar. Phil?

17 MR. REED: Oh, I just wanted to make two  
18 points and both of them are questions for the audience  
19 and for the industry. The Part 52 has a very unique  
20 situation with regards to the early site permit and  
21 early siting.

22 They allow it to be either incorporated  
23 into the one-step process or they allow you to discuss  
24 and present it outside, in which you have a lot more  
25 time, you can look at different types of facilities or

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1 locations.

2 And I was curious as to how we should deal  
3 with that process and is there a particular emphasis  
4 that you would like, either with the one-step or would  
5 you prefer it with the outside?

6 MR. CAMERON: Okay, that's on the table for  
7 people to think about. In the meantime, while people  
8 are thinking about how to respond to Phil's question,  
9 Alex, anything to add and then we will see what Rod  
10 and then Ed.

11 MR. MURRAY: Yes, if I could Chip. I would  
12 just like to point out that a one-step licensing  
13 process is not trivial as many of my colleagues in the  
14 reactor -- both the reactor side at the NRC and in  
15 reactor vendors have found out. Some of this has gone  
16 back to the mid- to late-1980s. It's a very extensive,  
17 very detailed process.

18 I remember some of the design work which  
19 was developed, you know, would fill a small library  
20 just for one reactor design and I do ask, you know,  
21 for members at this table here to remember that if one  
22 is going to consider a one-step licensing process,  
23 there is a considerable amount of information that  
24 would have to be developed and created and what have  
25 you.

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1           And as Yawar was mentioning, what was done  
2 overseas relied a lot upon pilot plant and testing  
3 experience as well as experience with older  
4 facilities. At the present time, that does not exist  
5 in the United States at all.

6           If I go and look at the reactor analogue  
7 again, there were a lot of questions raised by my  
8 colleagues in the nuclear reactor regulation which  
9 required the vendors to go back and do testing to  
10 verify both the assumptions in the models and some of  
11 the results.

12           And I will add members of the staff, both  
13 on the reactor side and when I say staff, I mean NRC  
14 staff just for clarification, on both reactor side and  
15 the fuel cycle side, have raised concerns both  
16 formally to management, but also in various, how shall  
17 we say, means of communication to applicants and  
18 licensees and vendors, about the level or potentially  
19 inadequate level of design in the applications they  
20 have submitted.

21           So I encourage us all to think and discuss  
22 what is the level of design information that is needed  
23 for a one-step process? What is needed for a two-step  
24 process? Thank you.

25           MR. CAMERON: So that's a key question,

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1 right Alex? What is needed for a one-step process?

2 MR. MURRAY: Yes, and again, look at the  
3 reactor site, 20 plus years, some of the design  
4 certifications from reactors have multiple, multiple  
5 revisions to their SERs. Now they are more  
6 evolutionary rather than revolutionary, but still,  
7 many modifications. Thank you.

8 MR. CAMERON: Okay. Ron.

9 MR. McCULLUM: Thanks. I just wanted to get  
10 back to this nexus between risk-informed, performance-  
11 based and one-step versus two-step, and also clarify  
12 that Dan and I are on the same page on this. When I  
13 was arguing on behalf of a one-step process, the  
14 regulation should provide for it, because for many  
15 applicants that level of certainty will be needed to  
16 go forward. I wasn't saying, and I should have  
17 clarified, that we should not have the option as we  
18 have proposed, for a two-step process.

19 I think where risk-informed, performance-  
20 based comes in, and this may go a little bit to level  
21 of information, is that in fact becomes more important  
22 in a two-step process. The idea that you are focusing  
23 on the results and the outcomes you are trying to  
24 achieve and less on regulating to specific design  
25 details of specific types of facilities or

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1 prescriptive regulation, is even more important, I  
2 would think, for someone who wanted a two-step  
3 application.

4 I think that the -- as has been said here  
5 -- the burden does have to stay on industry and this  
6 has been a fascinating discussion and the common theme  
7 of this discussion is -- what we are talking about  
8 here is where regulation and business decision making  
9 come together.

10 And for something as complicated as this,  
11 it's very important to get that right. Certainly at  
12 the highest level, industry needs to know as much as  
13 it can about the regulatory framework to make  
14 decisions on -- you know, we broadly support recycling  
15 -- but to make decisions on what types of recycling  
16 facilities and when and all of that.

17 And indeed, an applicant going for a two-  
18 step process would be saying, well, I want to go -- if  
19 this level of information and maturity as Dan says, to  
20 get some more certainty, then let me invest -- and  
21 this is where the business decision making -- the  
22 reason you need the certainty at the various steps is  
23 because you are going to make decisions to invest  
24 resources.

25 An applicant with a mature design has

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1 already invested a certain amount of resources in that  
2 and therefore you know, needs the certainty -- they  
3 both need to know what the regulation looks like.

4 And that also comes up again with this,  
5 that I am glad that the ESP was mentioned. That's  
6 something that industry is seeing of increasing value  
7 in the reactor world. At first we thought we were  
8 going to skip over that process and just go straight  
9 to COLAs. We are now seeing more ESPs because I think  
10 in industry we are seeing a value to addressing siting  
11 issues before you, again, invest too many resources in  
12 a specific design.

13 So it's providing a regulation that gives  
14 the public assurances that things licensed to that  
15 regulation will be safe and at the same time gives up  
16 perspective applicants the certainty they need to make  
17 the business decisions and when are we going to make  
18 these large investments?

19 And yes, I think that can be done with a  
20 risk-informed and performance-based framework.

21 MR. CAMERON: Okay. So that's partly an  
22 answer to what Phil had asked before, at least that  
23 aspect of it.

24 MR. McCULLUM: Yes, I think, yes, his  
25 question falls right in with the thread of the

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1 discussion we are having because it's how do you build  
2 a regulation so an applicant can make the decisions  
3 with certainty going forward, at the point that the  
4 decisions need to be made and that's one way to build  
5 some additional certainty in.

6 MR. CAMERON: Okay. Before we go back to  
7 Phil, I want to go to Ed, who I think might have  
8 reacted to Yawar's point on international experience,  
9 but go ahead, Ed.

10 DR. LYMAN: Yes, I guess I would just like  
11 to caution whether or not a facility is based on a  
12 facility that is built elsewhere, if that really is an  
13 asset or would facilitate licensing. I think the staff  
14 needs to take a look at whether the fact that the MOX  
15 plant is substantially based on an operating facility.

16 MELOX has really assisted in the licensing  
17 of that plant. When the design was first submitted by  
18 the contractor, it was only that 40 percent complete  
19 anyway and there are still issues, I would say with  
20 the MOX plant here which date back to the design phase  
21 which was never -- was never adequately resolved and  
22 is causing issues with regard to granting the  
23 operating license.

24 With regard to a plant like Thorp, I would  
25 hope that if anyone tried to submit a reprocessing

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1 plant application based on the Thorp design, the NRC  
2 would tear it up, given that the plant has never  
3 operated at capacity, has been shut down for years,  
4 had a major leak that went undetected for more than a  
5 year. I think that kind of experience should tell us  
6 to run screaming from that kind of facility.

7 And with regard to Rokkasho-mura, the full  
8 operation has been pushed back another two years in  
9 case anyone hasn't heard that yet and I think there  
10 are significant questions whether it may ever operate.  
11 Thanks.

12 MR. CAMERON: Okay thank you. Thank you Ed.  
13 Phil did you have --

14 MR. REED: Well, I just had one other last  
15 comment, which I also would like to direct to the  
16 audience and the members of the industry, and that's  
17 just so we don't forget, one of the items on the  
18 agenda is the technology neutral requirements, and we  
19 are going to face the possibility of having at least  
20 two licensees with two different aqueous separation  
21 processes and possibly a third one with a pyrochemical  
22 process.

23 And I am just curious as to how we are  
24 going to deal with these two issues, particularly the  
25 aqueous versus non-aqueous and what kind of

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1 requirements should be putting into our regulations  
2 that would address these, or can we do that with no  
3 specific requirements and just go to a complete  
4 neutral. How would we handle these for the two  
5 different types of processes?

6 MR. CAMERON: Okay. That is one of the  
7 items, the technology neutral and I think you brought  
8 in the issue we have been discussing of, you know, the  
9 mature design I think. So how are those integrated?  
10 How are they related? Arjun, did you have a comment?

11 DR. MAKHIJANI: Yes. One just brief follow-  
12 up to what Ed said and then the other thing about the  
13 different technologies, technology neutral.

14 I think you need to step back from this  
15 idea that there is a mature reprocessing technology.  
16 The French have operated their plant at 100 percent  
17 capacity for a number of years. It works well. Their  
18 vitrification plant works well.

19 I have a number of issues with  
20 reprocessing but the British design is, in principle,  
21 the same. It's a PUREX process. I mean you have got  
22 the same kind of chemicals. You have basically the  
23 same flow sheets and it's operated miserably and has  
24 had huge numbers of problems.

25 The idea that there is a mature design, I

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1 think, just comparing the British and the French and  
2 the fact that they are both PUREX processes should be  
3 rejected.

4 So I think at least going to the -- if you  
5 are going to international experience, and look at the  
6 facts on the table, you would -- at least I would not  
7 agree that there is a -- it's like looking at the  
8 breeder reactors, you know? FFTF may have worked  
9 reasonably well and then Superphenix worked reasonably  
10 well and then Superphenix was a failure and Monju had  
11 a leak in 18 months and it's just not a mature  
12 technology. There's no learning curve there.

13 In regard to technology neutral, you can't  
14 really have technology neutral regulations. Certainly,  
15 parts of regulations can be technology neutral,  
16 because you know the kinds of materials you are  
17 dealing with, the kinds -- some of the waste that may  
18 come out. But I don't see how you can have technology  
19 neutral regulations when the waste products are  
20 dramatically different, the risks are different, the  
21 storage is going to be different, the chemical nature  
22 of the products is going to be different and in the  
23 case of pyroprocessing, the technology itself is not  
24 even defined.

25 So I would say you can't even calculate

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1 the risks. I am going to say more about this you know,  
2 after Yawar makes his presentation. But I don't think  
3 you can -- I think you should abandon this idea of  
4 technology neutral regulations as an overarching idea  
5 that you are going to do this without specific  
6 reference to even aqueous versus non-aqueous. There's  
7 at least got to be a minimal dividing line.

8 MR. CAMERON: Can we address Arjun's point  
9 and perhaps it would be helpful to -- then we are  
10 going to go to Rod for this -- helpful to hear what is  
11 the concept of technology neutral and how do you  
12 address Arjun's points about these differences in  
13 terms of saying well, the rules should be technology  
14 neutral. Can you talk a little bit about that and then  
15 we will hear from Steve.

16 MR. McCULLUM: Yes, I think Steve --

17 MR. CAMERON: And we are going to go to the  
18 audience. Okay?

19 MR. McCULLUM: Yes, Steve may be able to  
20 amplify this point even better so I will try to be  
21 brief. And I guess for the first time now we are now  
22 in an area where industry and Arjun do not agree. But  
23 I think that risk-informed, performance-based is the  
24 opposite side of the same coin as technology neutral.

25 We believe very strongly that the

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1 regulation should be technology neutral and the way to  
2 accomplish that is by being as risk-informed,  
3 performance-based as possible. The less specific, the  
4 less prescriptive the regulation is, the more it can  
5 accommodate different technologies.

6 Now that being said, you can't just have a  
7 regulation that is two words that says be safe. It  
8 would be nice if you could but you can't. So in areas  
9 where there is a need for specificity, the regulation  
10 and the regulatory structure and the reg guides and  
11 everything that is developed underneath that can  
12 provide off-ramps to different options.

13 You can have a regulation that would say  
14 you know, if pyroprocessing section umptee-squat  
15 applies and if an aqueous process, section this and  
16 that applies. And in fact, we have recommended in  
17 previous meetings with NRC that in areas where the  
18 technologies are just not that well know, you may just  
19 want to put a reserved section in the regulation to be  
20 developed.

21 If there is something about pyroprocessing  
22 that's not well known enough, you know where you refer  
23 to something that would be more applicable to an  
24 aqueous-type process, also reserve a section, you  
25 know, 7x.3y or whatever that would be developed at a

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1 later point.

2 So there are ways to do that and I would  
3 just point out that this is not something we don't  
4 have experience with. We have 104 reactors in this  
5 country and a certain, significant fraction of them  
6 are pressurized water reactors and a certain  
7 significant fraction of them are boiling water  
8 reactors and yet we manage to regulate both and there  
9 are some things specific.

10 I mean I know reactor sump issues are an  
11 issue at pressurized water reactors and there's a lot  
12 of regulatory infrastructure developed around that.

13 So I think by being as risk-informed,  
14 performance-based as possible, and by recognizing  
15 where we need to bifurcate and where we need to  
16 provide for differences in technology, you can indeed  
17 develop a technology neutral regulation.

18 And I will say on behalf of all of  
19 industry, and the various technologies out there, this  
20 is critically important because having a recycling  
21 regulation is an important input to decision-making  
22 and as long as that is something that is completely  
23 unknown, if you aren't going to try to endeavor to be  
24 technology neutral, it's kind of like you have a  
25 chicken and egg situation you can't move forward on.

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1           So for -- we simply believe it can be done  
2 and the key is on doing as much as you can with risk-  
3 informed, performance-based. Thank you.

4           MR. CAMERON: Okay Thanks Rod. And I am  
5 going to go to Steve now but I just want to put a  
6 question on the table for Arjun. If the phrase  
7 technology neutral wasn't used to describe what Rod  
8 just said about use performance-based, risk-informed  
9 as opposed to prescriptive, but that there would be  
10 the off-ramps, okay, for particular technologies where  
11 you would have to be more prescriptive perhaps.

12           I guess if it was described like that,  
13 would that make sense? How much sense does that make  
14 to you Arjun? I am just wondering whether the phrase  
15 technology neutral may in and of itself be a problem.  
16 So I want to come back and ask you about that, but go  
17 ahead Steve.

18           MR. SCHILTHELM: To the point of technology  
19 neutral, there are kind of two pieces to a regulation.  
20 One is the process. It tells you how you go about  
21 licensing. And then there's a technical piece that  
22 says these are the things you have to be concerned  
23 about.

24           So you have to marry those two. When you  
25 talked about, and we offered this white paper to NRC,

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1 we actually believe that an integrated safety process  
2 allows you to be more technology neutral than the way  
3 Part 50 is written with general design criteria.

4 If you look in Part 50, they never really  
5 completed the general design criteria. They thought of  
6 perhaps writing more general design criteria for  
7 reprocessing plants and never really got to it because  
8 the reprocessing went away.

9 But as a process, an ISA allows you to  
10 evaluate particularly chemical processes but  
11 mechanical processes as well against consequence  
12 thresholds. And Part 70 has clearly written  
13 consequence thresholds that you evaluate your  
14 processes against.

15 So regardless of the technology, as long  
16 as the evaluation of the consequences and the risks of  
17 those consequences is done well, you can put together  
18 an appropriate safety profile.

19 Now the other thing we did, we recognized  
20 that there was value in -- Part 70 calls it baseline  
21 design criteria, Part 50 calls it general design  
22 criteria -- we recognized that at least for aqueous  
23 reprocessing, we could make an educated assessment of  
24 what additional baseline design criteria were  
25 necessary, based on international experience and those

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1 plants that are operating, and we offered additional  
2 baseline design criteria that you could apply in  
3 concert with the ISA and come to an acceptable and  
4 robust safety profile.

5 What industry probably did not do as  
6 thoroughly as we may have liked to, when we presented  
7 the white paper, is assess what additional baseline  
8 design criteria might be appropriate for non-aqueous  
9 reprocessing.

10 So there is work to be done there, but  
11 again, Part 50 was not flawed in its notion that we  
12 would develop additional baseline design criteria for  
13 reprocessing. The need for it just went away and if  
14 the need for non-aqueous reprocessing never comes to  
15 pass, then maybe there is no need to have more design  
16 criteria there.

17 MR. CAMERON: So are the -- to connect up  
18 with Rod again, the ISA allows you to be more  
19 technology neutral and the ISA is really your  
20 performance-based, risk-informed tool and the BDC are  
21 perhaps the off-ramps?

22 MR. SCHILTHELM: The BDC help you inform  
23 the ISA but the ISA has to work in concert with  
24 performance criteria. The ISA is a process. It's a  
25 process for evaluating the hazards of a particular

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1 operation. You have to have performance criteria.

2 I am actually working on a Part 50 license  
3 right now and frankly there are no performance  
4 criteria in Part 50. With regards to worker  
5 protection, with regards to chemical safety, with  
6 regards to criticality safety, the performance  
7 criteria just aren't really there in Part 50 and in  
8 Part 70 they are very clearly articulated from a  
9 consequence standpoint.

10 MR. CAMERON: So you need the performance  
11 criteria and Part 70 provides a better model of the  
12 performance criteria?

13 MR. SCHILTHELM: The point is you have to  
14 have performance criteria and you have to have process  
15 for doing safety evaluation, which is the ISA process,  
16 or a PRA if you choose that process.

17 MR. CAMERON: Okay and we are going to talk  
18 about the PRA versus ISA in the next segment. Let me  
19 go back to Arjun in terms of what I asked originally  
20 and I may have been very inartful and perhaps it might  
21 be better to respond to Steve's description and see  
22 how much comfort or discomfort that gives you, and  
23 also I would like to check in with Ed on the same type  
24 of points plus whatever he has. Arjun, any thoughts?

25 DR. MAKHIJANI: I think actually -- this is

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1 a gut reaction -- technology neutral is a term that is  
2 interfering with my understanding and is misleading  
3 because you are going to have -- if you have the basic  
4 performance criteria, whether for workers or public  
5 already specified, you have got your dose limits, you  
6 have got 40 CFR 190, you know, you have got to keep  
7 your public organ dose limits and whole body does  
8 limits, so you don't need new performance criteria for  
9 that. You have already got performance criteria.

10 The question is how are you going to  
11 translate that to a specific facility that you are  
12 licensing and you can't do that unless you consider  
13 technology. Now if you are going to say we are going  
14 to have one rule with one 10 CFR Part 73 or whatever  
15 and then reserve certain sections because we don't  
16 know the technology, it's really the same as saying  
17 you are going to have certain parts of the regulation  
18 that can general and certain parts of the regulation  
19 that have to be technology specific.

20 So to my mind, actually, technology  
21 neutral interferes with the idea that Steve was  
22 putting forward, that there is a process, there's  
23 levels of performance. The basic level of performance  
24 I guess is a dose limit, which is the health and the  
25 consequence, whether it's an accident analysis or

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1 routine analysis.

2 But to translate that into technical  
3 terms, it's the NRC's job and you can't do that  
4 without reference to a technology so that's why I  
5 think this term is interfering with my understanding  
6 of what you are trying to do.

7 MR. CAMERON: Yes, I wondered if it was and  
8 I think from the industry's point of view, there is  
9 some concerns and interest behind the concept of  
10 technology neutral and I guess the issue is, is that  
11 if you didn't use that term, how would those concerns  
12 and interests -- how should they be met in whatever  
13 the rulemaking framework is?

14 But let's go to Ed and I think we have  
15 pretty much talked about a lot of the issues in this  
16 area and I want to make sure that we get the audience  
17 viewpoints and I am going to ask Miriam to go out for  
18 that, but Ed, what do you have to say?

19 DR. LYMAN: Yes, on the issue of technology  
20 neutral, I just wanted to second what Arjun said. I  
21 don't think it's useful. I think that in practice  
22 there would be so many exceptions, variations, reserve  
23 sections that you would essentially end up with a  
24 technology specific regulation at the end anyway and  
25 you are only kidding yourself if you think you don't.

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1           One of the keys is uncertainty and to the  
2 extent it's linked to so-called risk-informed  
3 regulation, if you are talking about technologies  
4 whose designs are not as well-established, as you  
5 heard about before, then obviously the ability to meet  
6 a performance-based rule when there is very high  
7 uncertainty in the calculations you are doing, once  
8 again, brings you back to the issue of the technology  
9 you are talking about.

10           So I don't think you can escape that  
11 anyway. And there is also the issue of apples and  
12 oranges. If you are comparing aqueous and non-aqueous,  
13 it's not just the separation part, but the fact that  
14 General Electric, the proposed design would be  
15 integral with the reactor part so it's hard to see how  
16 you would have one framework that would cover an  
17 aqueous reprocessing facility that was supplying light  
18 water reactors with MOX compared to an integral fast  
19 reactor type design.

20           MR. CAMERON: Okay. Thank you Ed. Miriam,  
21 do you want to see what the audience has to say and we  
22 can get a reaction perhaps if appropriate from any of  
23 the panel members.

24           MS. JUCKETT: If you could just raise your  
25 hand. Say your name and --

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1 MR. EHINGER: Mike Ehinger. I am from Oak  
2 Ridge but I don't speak for Oak Ridge. I speak to you  
3 today as probably the only walking, talking, living  
4 dinosaur of reprocessing and with respect to that,  
5 history and evolution are very important and going  
6 back to the idea of single step licensing, I 100  
7 percent support everything that Rod and others have  
8 said.

9 And I use an example, going back in our  
10 history to when we were first writing regulations in  
11 1974, and we didn't have them, and we were trying to  
12 license West Valley, go ahead, have your reactions,  
13 but there's a lot to be said that.

14 I will skip a lot of the stuff, but in the  
15 end, it was the lack of one-step licensing that killed  
16 that place and a lot of people blame it on other  
17 things, but the reality is they didn't even give them  
18 the design requirements.

19 And the thing that -- the one -- the straw  
20 that broke the camel's back was changing the  
21 earthquake requirement for the site. I lived through  
22 it. I can tell you the whole story. I won't bore you  
23 with it right here.

24 With respect to -- and then with respect  
25 to Barnwell, where it was a licensing situation where

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1 all of a sudden an executive order killed off their  
2 investment. And even though an executive order said we  
3 can continue, they said they don't give us the rules  
4 to play by, and that killed it there.

5 With respect to technology, it's not the  
6 job of the NRC to evaluate the plant and the facility  
7 for operability, and I use another example from our  
8 past: the GE Morris Plant that was designed with  
9 current, PUREX technology but at the time the  
10 conventional wisdom was to put out a UF6 product and  
11 they designed -- there was a design change, in  
12 innovation with the GE Morris Plant that instead of  
13 doing the final purification step on the uranium, they  
14 went to a direct fluorination process.

15 And in the end, their commissioning  
16 activity said the plant won't run because we can't  
17 keep the two ends of the plant operating at the same  
18 time. It was an issue of surge.

19 So it met all the criteria, it met all the  
20 licensing, it's an operability problem and it's not  
21 the problem of the NRC to say whether or not a plant  
22 is going to be commercially viable.

23 I will give another example of that that  
24 Ed likes to point out, but I will give it from a  
25 different perspective: the idea of Thorp versus COGEMA

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1 and it's not one of the technology, it's one of the  
2 way they have built the plant and it's totally having  
3 an intimate knowledge of those facilities, having been  
4 there, having stood on the top of the tank where the  
5 pipe ruptured and said boy, that's a bad idea.

6 The difference in the technology is one of  
7 surge capacity between cycles and that's one of the  
8 operator's design requirements. It's not the NRC. The  
9 NRC can look at that as a box. There are some  
10 technology things to be made. It's looking at it as a  
11 box in terms of what you want to regulate, in terms of  
12 effluents, and safety, but it's not the object to  
13 evaluate the design itself for operability.

14 So without -- I could probably stand here  
15 and talk for hours at a time on this history, like I  
16 say having lived it right from the beginning in West  
17 Valley right through to having spent a lot of time in  
18 the Rokkasho plant and seen it come out of the ground  
19 internally, there is a need for one-step licensing,  
20 there is a technology envelope you can look at from a  
21 regulatory perspective without having to get into the  
22 details of the facility design and the operation and  
23 the process, but one-step licensing is absolutely  
24 crucial and I support everything that has been said  
25 here.

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1 MS. JUCKETT: Thank you.

2 MR. GEDDES: I'm Rick Geddes from Savannah  
3 River, another dinosaur. Former operations manager of  
4 the largest reprocessing plant in this country at F-  
5 canyon.

6 Couple of things. One is, I keep the  
7 reference to overseas experience and that's great. But  
8 I would like to point out that in fact there is a  
9 large body of knowledge of reprocessing in this  
10 country.

11 DOE does process lots of fuel. In fact  
12 it's doing it today in both South Carolina and Idaho.  
13 It's out there. It's available. Some of that came into  
14 play in helping the AREVA and the MOX licensing  
15 effort.

16 Secondly, the business of one-step versus  
17 two-step, I would disagree with Mike to some extent  
18 there. I think it's important to have both options  
19 available.

20 I think one fundamental difference that I  
21 haven't really heard come out in any of this  
22 discussion in comparison to reactors and analogies to  
23 reactor licensing, is, in all deference to Mr.  
24 McCullum, there's 100 reactors out there. To me they  
25 are all the same. Reactors are a dime a dozen. Maybe

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1 200 of them in 20 years or 30 years.

2 But there's only going to be one  
3 reprocessing plant. A decade later, two decades later,  
4 there may be another one. There's not going to be 100  
5 of them. They are going to be unique things. They are  
6 going to be one of a kind. You know, there will be  
7 some evolution to the next one.

8 I don't think you are going to find --  
9 like, I've got mature technology, I've got this  
10 standardized design. They are all pretty much going to  
11 be unique. And that's why I think you are going to  
12 drive yourself to a two-step process and in fact I  
13 think there's another thing.

14 I don't think anybody is going to say I am  
15 going to go out and build one of these commercially  
16 and make a profit on it. I think the MOX model is much  
17 more likely. This is going to be maybe a privatized  
18 operation, NRC-licensed, but probably government-  
19 funded on a government reservation, at least for the  
20 next century, you know, who knows after that but  
21 there's not going to be very many of these things. So  
22 I think they are going to be fundamentally different  
23 in the licensing aspect than the reactors as we look  
24 forward.

25 MS. JUCKETT: Other audience comments?

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1 MR. CAMERON: Okay. Whoops. Could you just  
2 try to be brief?

3 MR. EHINGER: Very briefly. Very briefly.  
4 Just responding to what Rick said. One of the  
5 difficulties that we have is that the only experience  
6 we have is in the weapons program, with very low  
7 burnup fuel and that's another part that I could speak  
8 to on the evolution of design, West Valley to  
9 Barnwell, Barnwell to Thorp, Thorp to COGEMA, COGEMA  
10 to Rokkasho, the evolution of design.

11 We can't take -- we have to look at the  
12 evolution of design. One of the difficulties that we  
13 have is we stay in locked into the experiences of our  
14 weapons reprocessing, which is, again, very low burnup  
15 fuel with very characteristic processes. I will leave  
16 it at that. We do have to look to the evolution. We do  
17 have to take into account the evolution of design.

18 MR. CAMERON: Okay. Thank you both for  
19 those valuable perspectives on this and what if we  
20 take a break and is that what you were going to  
21 suggest, Alex?

22 MR. MURRAY: No.

23 MR. CAMERON: No. Okay.

24 MR. MURRAY: I just wanted to add one very  
25 quick comment.

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1 MR. CAMERON: Okay.

2 MR. MURRAY: And then we can take the  
3 break.

4 MR. CAMERON: Okay.

5 MR. MURRAY: If I could, please. I think  
6 both of you have made some very good comments. I think  
7 it's important, though, to understand the viewpoint of  
8 what I like to term your friendly nuclear safety  
9 regulator.

10 In terms of the old experience, okay, I  
11 would be very cautious about trying to say, hey,  
12 everything went wrong from the regulatory perspective  
13 there.

14 While to some degree the regulations were  
15 evolving, all -- I will say two of the three  
16 facilities had some -- I will use the term significant  
17 issues. I will phrase it politely like that. Like,  
18 portions of the process did not work behind shielded  
19 cell walls, things like 80 percent of the plant was  
20 contaminated. Things like doses which were not ALARA.

21 So I think we have to tread very softly.  
22 When we go forward, we are going to have to make sure  
23 that things like ALARA are appropriately considered  
24 and enacted. I think while yes, obviously the  
25 regulatory framework and path forward has to be

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1 defined, so too does the design and so too do the  
2 safety attributes of that design.

3 Much of the work which has been done on  
4 processes is process-related not safety-related, okay?  
5 What was brought up here had to do -- also included a  
6 discussion about high burnup fuel. Most DOE facilities  
7 -- I don't want to get too much into jargon for the  
8 majority of our audience, but most DOE facilities went  
9 with fuel that had maybe a 1,000, 2,000 megawatt day  
10 per ton burnup.

11 West Valley, the hottest fuel reprocess  
12 there was 20,000 and that was from Indian Point. In  
13 the case of La Hague and Thorp we are talking about  
14 45,000 or so megawatt days per ton.

15 We have commercial reactors in the United  
16 States which are discharging fuel with burnups  
17 approaching 60,000, 62,000 megawatt days per ton.  
18 Okay?

19 So yes, things have changed. Yes, we have  
20 to consider fully all the safety attributes, not just  
21 the process attributes. And we can discuss those more  
22 in upcoming sessions. Thank you.

23 MR. CAMERON: Okay. Thank you. Thank you  
24 Alex for that context. We are obviously behind time.  
25 We started late. But I think that was a productive

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1 discussion in a lot of ways and we are sort of testing  
2 out how much time we need for each of these, so I  
3 wouldn't be worried. I am not worried about it.

4 And so why don't we come back at 3:15 and  
5 we will have Yawar tee up the next item and that's the  
6 last item on the agenda for today. Thank you.

7 (Whereupon the above-entitled matter went off the  
8 record at 2:58 p.m. and back on  
9 the record at 3:24 p.m.)

10 MR. CAMERON: Okay everybody. If we could  
11 get started again. Okay we are going to the safety and  
12 risk agenda item and Yawar Faraz is going to tee that  
13 up for us and he is going to pose a couple of  
14 questions for you that we will discuss.

15 But we had the issue raised during the  
16 agenda check about secrecy and we were going to  
17 address it during this agenda item because obviously  
18 how is someone supposed to know if the facility is  
19 safe if they don't have access to the data.

20 So after Yawar is done with his tee-up and  
21 the two questions, let's take a little time to just  
22 talk about that secrecy issue and then we will go to  
23 Yawar's two questions. Yawar?

24 MR. FARAZ: Thanks. I have 10 slides so I  
25 will try to get done in about 10 minutes. Slide two.

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1 John Flack and Alex were correct in that we need to  
2 understand the hazards associated with reprocessing  
3 facilities.

4 And in fact the NRC is doing that. We are  
5 looking both domestically and internationally to try  
6 and learn to see what those hazards might be and we  
7 are improving in that regard day by day.

8 Over the following discussions, what I  
9 think would be most useful is if we can focus on two  
10 items. One is how NRC could meaningfully regulate risk  
11 and what the methodologies might be to do that. So  
12 those are two questions that I think we should try and  
13 focus in on.

14 The third bullet on this slide gives you a  
15 website where you can get some background information  
16 on risk, how NRC addresses that. Slide three.

17 This slide identifies five NRC documents  
18 that address risk and what I will do is I will try and  
19 summarize these in the following slides, one by one.  
20 Slide four.

21 In 1986, the NRC established the Safety  
22 Goals for nuclear power plants as follows:  
23 qualitatively speaking, there should be no significant  
24 additional risk to a member of the public; and the  
25 risk to society should be comparable or less than

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1 other electrical generation risks.

2 Quantitatively speaking, for a member of  
3 the public, the prompt or acute fatality risk should  
4 be less than one tenth of one percent from all other  
5 accidents that that individual might be exposed to.

6 And from the standpoint of cancer and  
7 latent fatality risk, that should be less than, again,  
8 one tenth of one percent of the total cancer risk to  
9 that individual.

10 This roughly translates to an annual  
11 fatality risk of one in a million for cancer fatality  
12 and a little less for acute fatality. Slide five.

13 In 1995, the Commission issued its PRA  
14 policy statement, encouraging the risk of PRA, which  
15 is probabilistic risk assessment, using state-of-the-  
16 art methods. PRA is a useful tool for determining with  
17 reasonable assurance that the safety goals would be  
18 met.

19 For this, clearly PRAs would need to be as  
20 realistic as practicable, is what they had recommended  
21 in the policy statement. Slide six.

22 PRA has been used for power reactors for  
23 the last 30 years or so and it is particularly useful  
24 for assessing complex systems with active components.  
25 When you come to passive systems, PRA clearly needs

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1 some additional development and that is ongoing.

2 When you compare PRA to ISA, clearly the  
3 way PRA has been used is it has been extremely  
4 quantitative. Slide seven.

5 This is the third document in the list and  
6 it's on the risk-informed, performance-based  
7 evaluations, which was issued in 1998. It provides  
8 guidance and insights on how to identify and focus on  
9 the most important activities, monitor performance and  
10 focus on the results. Slide eight.

11 In 2000, the integrated safety analysis or  
12 ISA requirements in Subpart H of 10 CFR Part 70 were  
13 issued. In an ISA, all credible accident sequences are  
14 identified and binned according to their consequences.

15 Items relied on for safety or IROFS are  
16 identified to make the high-consequence accidents  
17 highly unlikely and the immediate consequence accident  
18 sequences unlikely.

19 Now methodologies that can be used to  
20 assess the accident sequences can be quantitative,  
21 semi-quantitative or qualitative. So the ISA  
22 requirements do not specify that you shall be  
23 qualitative or semi-quantitative or quantitative. It's  
24 open.

25 But most ISAs conducted so far use the

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1 semi-quantitative approach, more of the order of  
2 magnitude type evaluations. For such ISA risks are  
3 estimated on a pure accident sequence basis and the  
4 total risk or the aggregate risk from all accident  
5 sequences to an individual cannot be estimated,  
6 especially if you're following the semi-quantitative  
7 or the qualitative route.

8 So how are we -- considering the  
9 uncertainties and the resulting conservativeness  
10 involved in assessing risks using the ISA process, one  
11 would expect the facility risk to a member of the  
12 public to be in the order of one in a million per year  
13 range. Slide nine.

14 This is the fifth document on the list.  
15 It's the Risk-Informed Decision-Making document that  
16 the NRC issued in 2008, or the RIDM document. It  
17 provides three regions of risk: unacceptable,  
18 tolerable and negligible.

19 It's very similar to how risk is regulated  
20 in the UK. The RIDM document identifies quantitative  
21 health guidelines, or QHGs and for an individual, it  
22 discusses unacceptable fatality risk, tolerable risk  
23 range and also discusses where the negligible risk  
24 would arise.

25 For a U.S. worker, a general worker, the

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1 fatality risk is four, 10 to the minus 5 per year.  
2 Slide 10. And I think these are the discussion topics  
3 that we would like to concentrate on. We could carry  
4 that on after the one on the secrecy item.

5 MR. CAMERON: Okay. Thank you very much  
6 Yawar. Before we go to those points, can we just spend  
7 a few minutes on the secrecy issue, access to data and  
8 does anybody need Ed to put a finer point on what his  
9 concern is there before we discuss it? I mean, Ed, do  
10 you want say, just say some more on it?

11 DR. LYMAN: The concern here is with regard  
12 to fuel cycle facility licensing, one of the basic  
13 components of the application, the ISA summary is now  
14 entirely considered as an official use only, security-  
15 related document, and is not available to the public.

16 And the rationale behind this is that it  
17 would provide -- could provide information that is  
18 useful to terrorists who want to sabotage the  
19 facility. But it is also the fundamental document  
20 describing the safety case for this facility, and as  
21 such, it's something that is really -- is really  
22 something that the public has a right to see.

23 And to use the argument that anything that  
24 is safety related could potentially be used by a  
25 terrorist is an absurd argument, and has been used in

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1 my judgment to conceal a great deal of safety  
2 information and is really of little use to adversaries  
3 at all.

4 And there are numerous instances. There's  
5 one instance where the NRC inadvertently distributed a  
6 document associated with MOX facility licensing that  
7 was marked official use only but was distributed  
8 publicly so I can talk about it and it just described  
9 deficiencies in the applicant's method of calculating  
10 a certain chemical safety -- doing a certain chemical  
11 safety assessment.

12 Now anyone who could say that that was  
13 security-related information the public shouldn't see  
14 is -- there's no case for that. So I think that the  
15 standards being used to conceal this information from  
16 the public are inappropriately broad and therefore  
17 there has to be a much more specific threshold for  
18 withholding information that should be built into this  
19 reprocessing rulemaking to ensure that important  
20 information related to the safety of the facility is  
21 not withheld from the public.

22 MR. CAMERON: Okay. Thank you. Thank you  
23 Ed. And I will just emphasize Ed's last point, which  
24 is that a new threshold for accessibility or  
25 inaccessibility as the case may be, needs to be built

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1 into this rulemaking for reprocessing facilities that  
2 right now, the criteria is inappropriately broad and I  
3 don't know if anybody around the table wants to start,  
4 but let's -- Arjun do you want to just amplify on what  
5 Ed said and then we'll see if anybody has anything to  
6 say on it.

7 DR. MAKHIJANI: I want to amplify on the  
8 comment that I made earlier, is there's an assumption  
9 that if you keep something secret, that it's therefore  
10 more -- that you are going to result in higher  
11 security and higher safety. I am going to give you  
12 three, quick examples of where the contrary is true  
13 and where information that was released in the past  
14 would likely not be released today, which would have  
15 been very detrimental to safety.

16 And essentially all three were linked in  
17 some way to reprocessing. The first was the release of  
18 the tank farm Fault Tree Databank from Savannah River  
19 F and H Canyons from the reprocessing plants relating  
20 to high-level waste.

21 And I did an analysis of that Fault Tree  
22 Databank in the '80s and found that Savannah River  
23 wasn't keeping very good track of the hydrogen  
24 evolution in the tanks and that twice, the hydrogen  
25 had reached close to or exceeded explosive levels.

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1 This is from memory, from 25 years ago.

2 But essentially, the availability of that  
3 information with the safety analysis report on the  
4 tanks led to -- and their appearance in the Washington  
5 Post and the Wall Street Journal and the New York  
6 Times of these, my findings with Bob Alvarez and  
7 others that resulted in improved safety for its  
8 procedures at Savannah River site, because they were  
9 not paying adequate attention to turning on the  
10 ventilation systems in the tanks after maintenance, as  
11 I understand. That was more informal.

12 The second example relates to criticality  
13 risks in high-level waste tanks. It was the same  
14 problem -- not keeping track of the amount of  
15 plutonium that was going in there, both Hanford and  
16 Savannah River site.

17 The third relates to inadequate accounting  
18 of plutonium within the weapons complex, and still an  
19 unresolved issue. Now today, the kind of information  
20 that Hazel O'Leary made public with plutonium and  
21 highly-enriched uranium may not be made public.

22 But I would argue that in all cases, this  
23 is not just a public right to know. It's much more  
24 than that. It's the systems become safer. Tanks were  
25 put on criticality watch in Hanford because we had the

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1 information in the public that the government's idea -  
2 - Hanford's idea of what was in those tanks was wrong,  
3 and I happened to be part of the technical advisory  
4 panel on tanks, and I said, your numbers can't  
5 possibly be right. You have to revisit that.

6 And then they put tanks on a criticality  
7 watch. Well, you cannot as a basis for this, you  
8 simply cannot assume that keeping something secret is  
9 going to make you safer and more secure. I think  
10 there's a very strong argument that information should  
11 be released to the public unless there's a very  
12 specific case that some terrorist couldn't find it in  
13 a simple Google search.

14 I think your rule has to be biased in the  
15 direction of disclosure for the sake of public safety.  
16 That's the point that I want to make.

17 MR. CAMERON: Okay. Thank you Arjun.  
18 Anybody -- yes Steve?

19 MR. SCHILTHELM: I'll speak as a licensee  
20 and I'll just speak in general terms. In a sense I  
21 agree with what you are saying Ed and in a sense NRC  
22 is in a very difficult position. The threat is  
23 dynamic. The post-9/11 pendulum, if you will, swung,  
24 and as pendulums swing, it may have swung too far.

25 But I can tell you as a licensee, NRC does

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1 create a high hurdle for us. When we say something is  
2 classified or when we say something is proprietary or  
3 when something becomes official use only, the hurdle  
4 is pretty substantial.

5 And from our perspective as a licensee,  
6 NRC's default position is that the information be  
7 public. I agree it may not appear that way to you. So  
8 we are seeing two different sides or coming at NRC  
9 from two different paradigms.

10 But I do agree with you that it would be  
11 helpful if there were clarity from both perspectives  
12 because it's difficult for the licensees, it's  
13 difficult for the public and I'm sure it's difficult  
14 for the NRC.

15 I'm not sure you can build it into this  
16 particular rulemaking. There are other areas in the  
17 regulation that deal with the public access to  
18 information but in a sense I agree with what you are  
19 saying, that certainty would be helpful across the  
20 board.

21 MR. CAMERON: Okay. I guess a question for  
22 the NRC. And I've been looking at you Marissa, but I  
23 don't need to be I guess. But how would this issue be  
24 addressed, or could this issue be addressed in this  
25 rulemaking or would it be you know, a companion

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1 rulemaking or whatever? But if you could just give  
2 people an idea of how the process might work.

3 MS. BAILEY: Actually I don't really know  
4 and maybe Cathy can chime in. I am not quite sure how  
5 this issue would be addressed in this particular  
6 rulemaking and it's something that we would need to  
7 take a look at.

8 It is a difficult struggle for us because  
9 we do strive to be open and so we want to make clear,  
10 we want to make clear, we want to put out into the  
11 public the basis for any of our conclusions.

12 But on the other hand, there is -- we also  
13 want to make sure that we preserve security and that  
14 we protect security. So, it's something that we will  
15 just have to continue to struggle with.

16 I don't know Cathy, if there's anything  
17 else you'd like to add, or Tom? But I guess this is  
18 you know, the issue of secrecy hasn't really come up  
19 in our working on reprocessing and so I would be the  
20 first to say that we haven't really given that much  
21 thought but it's -- I appreciate the issue coming up  
22 and it's something that we will have to think about.

23 MR. CAMERON: And thank you. Thank you,  
24 Marissa, and it's good that the issue is being put on  
25 the table now. Ed, you heard Steve's comment about the

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1 high hurdle and that he agrees that clarity would be  
2 useful for both the NRC and the license applicants.

3 Do you have any suggestions for how the --  
4 how NRC would go about looking at a new threshold?

5 DR. LYMAN: Well, I think one problem is  
6 that right now the definition of this SUNSI security-  
7 related information is not in the regulations at all.  
8 It's all -- it's regulatory guides and less formal  
9 directives, and as opposed to, for instance, the  
10 definition of safeguards information. So I think this  
11 is an overarching issue.

12 It's not -- it would be a companion, the  
13 right part wouldn't be Part 70x but it would be an  
14 accompanying rulemaking possibly to have a consistent  
15 definition of security-related -- non safeguards,  
16 security-related information that is more specific  
17 than just any information that could possibly help an  
18 adversary do something. That's just too broad.

19 I'll give another example. Shaw Areva MOX  
20 Services last year submitted a request for an  
21 exemption from certain material control and accounting  
22 requirements. Now there's a provision in NRC  
23 regulations that any information pertaining to  
24 material control and accounting should be treated as  
25 proprietary, OUO.

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1           That document, at least 95 percent of it,  
2 was -- contained information that was previously made  
3 public that was in the construction authorization  
4 request. We went through it and found out that there  
5 were about maybe five lines that were appropriate to  
6 withhold. Most of the document should have been made  
7 public, yet it isn't. So there's a lot of  
8 inconsistency going on.

9           MR. CAMERON: So there's not a whole lot of  
10 quality control in terms of -- even under the existing  
11 threshold, whatever that is, that there is some  
12 inconsistency involved here.

13           So there's two issues, really. I take it  
14 that if there was going to be a rulemaking on SUNSI  
15 that people could comment and that there might be a  
16 way to improve the implementation of the present  
17 system.

18           And is this something that the NMSS staff  
19 can bring to the attention of the people who, at the  
20 NRC, who are in charge of this particular area? I  
21 mean, will you take this message to them?

22           MS. BAILEY: Yes, we can take this message  
23 back but I do want to emphasize that when we look at a  
24 document, there are a set of criteria that we follow  
25 to make a determination as to whether or not a

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1 document is OOU and I think the staff tries very hard  
2 to follow those rules, because really our first  
3 reaction to a lot of these documents is that you know,  
4 we do want to make it public.

5           Again, openness is one of our values so we  
6 do try very hard to apply those criteria for  
7 determining whether a document should be released to  
8 the public or not. But it's -- we will bring it back  
9 and --

10           MR. CAMERON: Okay.

11           MS. BAILEY: Consider the comment.

12           MR. CAMERON: Thank you Marissa, let's --  
13 yes Arjun?

14           DR. MAKHIJANI: Could I make a specific  
15 suggestion. The comment that Ed made kind of reminds  
16 of me other things that I have been involved in which  
17 I won't go into, but the proprietary as well as the  
18 other security-related kind of withholding supposedly  
19 security-related withholding documents from the  
20 public, results normally in the withholding of the  
21 whole document.

22           I have been involved in situations there  
23 were whole documents that were completely public that  
24 were granted proprietary status as a blanket matter by  
25 the courts, just because the company asked for the

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1 documents to be.

2 I think in a proceeding before the NRC, if  
3 you are serious about your commitment to openness, you  
4 would not grant either proprietary or secret status or  
5 OOU status to any document as a whole.

6 There may be, in this case, five sentences  
7 or may be five paragraphs, or it could be five pages  
8 or half the document that could legitimately be  
9 withheld, but to grant a blanket request to a license  
10 applicant that something should be proprietary or the  
11 whole thing should be secret, when it is easily  
12 available -- so a minimal threshold could be, how much  
13 of this information is available to the public already  
14 that is in this document?

15 And as a minimal thing, the party asking  
16 for the secrecy should be able to show that none of  
17 that information is already public and whatever is  
18 public at least should be returned to the public in  
19 the context in which it belongs.

20 That should be a minimal practice. I am  
21 not suggesting that it should be the whole thing, but  
22 it should be a minimal -- the burden should be on the  
23 NRC and the applicant before holding it and so far as  
24 I can see, from Ed's example, you are not fulfilling  
25 that burden.

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1 MR. CAMERON: Okay, thanks Arjun, and we  
2 are going to go to the first of Yawar's questions. But  
3 we are going to hear from Alex. Go ahead.

4 MR. MURRAY: Thank you. I just wanted to  
5 add to that. I do think that as a member of the NRC  
6 staff, I do think that the majority of the staff and  
7 management of the NRC do want complete openness, or  
8 openness as much as possible.

9 DR. MAKHIJANI: I agree with that.

10 MR. MURRAY: And I do agree, over the past  
11 five years, there has definitely been a trend where  
12 instead of redacting small portions of a document that  
13 clearly have some proprietary or security-related  
14 link, the trend has been to, if you will, remove the  
15 whole document.

16 And that is something that we as an agency  
17 are going to have to look at in our policies and  
18 procedures and so forth.

19 As regards reprocessing specifically, let  
20 me just throw out something for people to think about  
21 and maybe comment on later on. We can -- we have a  
22 couple of approaches that can be followed.

23 We do things where we have regulatory  
24 guides or NUREGs which give, if you will format and  
25 content of applications, or recommended format and

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1 content of applications. It is possible, somewhere in  
2 there, we can outline if you will the guidance -- it's  
3 not a regulation -- but it's guidance to -- as to what  
4 would clearly be considered proprietary or non-  
5 proprietary with the intent that as much as possible  
6 would be in the public domain.

7 We could also put something in there for,  
8 to use a term, a summary of the ISA summary, where  
9 instead of being very specific to safety controls,  
10 IROFS, design safety requirements what have you, it's  
11 at a slightly higher conceptual level, where if you  
12 will the intent or the mechanism whereby the staff  
13 considers safety to be achieved, or the applicant  
14 considers safety to be achieved, is evident. That  
15 might -- but I throw that out for discussion.

16 MR. CAMERON: Oops, your mic has to be on.  
17 Did you catch any of that at all?

18 DR. MAKHIJANI: Just like the NRC's  
19 commitment to the value of openness, and I am here  
20 because of it.

21 MR. CAMERON: Thank you very much, Arjun.  
22 So, we had some suggestions on how to deal with the  
23 secrecy issue, including Alex's suggestion that  
24 perhaps would not require rulemaking. So good  
25 discussion, and let's go to Yawar's first question and

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1 I'm going to state it the way I think you did, Yawar,  
2 which is how can the NRC meaningfully regulate risk?  
3 Is that --?

4 MR. FARAZ: You said it right. It's how  
5 could the NRC meaningfully regulate risk to an  
6 individual.

7 MR. CAMERON: Okay. And this -- the follow-  
8 on question is about the methodology, the PRA,  
9 integrated safety system or some combination. So on  
10 the first issue, what can be said? Does anybody have  
11 something to say on how can the NRC meaningfully  
12 regulate risk, is the way Yawar is asking it. Anybody  
13 want to start us off on that?

14 And maybe, can you put a finer point  
15 perhaps, on that, Yawar, in terms of you know, you  
16 have total safety and risk, aggregation, summary,  
17 overall safety goal, how does that safety goal play  
18 into all this? We heard hazards and consequences from  
19 Alex a little while ago, clarifying what he was  
20 thinking about as risk. I am just trying to figure out  
21 where we should start with this discussion.

22 And Flack has an idea. So we will go to  
23 him.

24 DR. FLACK: Well, I think the first thing  
25 one needs to understand is what the risk is. I mean,

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1 without knowing what the risk is, how do you make any  
2 meaningful decisions about it? So I think knowing what  
3 it is, is -- now, you know, what do we mean by risk, I  
4 guess, you know, and the bottom line is we talk about  
5 different, what, different kinds of risk.

6 I mean if you use reactors as the way risk  
7 is defined, we are talking about risk to the public  
8 outside, around a facility, out so far from a facility  
9 and the risk that that imposes to those individuals  
10 living around that facility.

11 Now, you can also talk about worker risk  
12 and the risk they are exposed to during operations. We  
13 could talk about accident risk, likelihoods of  
14 accidents and their consequences, and then you can  
15 talk about the risk of working at a facility, which  
16 could involve long-term exposures.

17 So I mean it's -- I think we have to  
18 define what we are really trying to achieve and define  
19 risk. And then once defined, what is it, and then set  
20 the criteria about it, including defense in depth,  
21 uncertainty, defense in depth. All that comes after  
22 the fact, so it's a very broad general question, I  
23 think, when you just pose it as how do we regulate the  
24 risk, I mean, maybe we could be more specific on that,  
25 as it applies to say, a reprocessing facility.

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1 MR. FARAZ: What I would offer is, you said  
2 it right, you provided the entire gamut. I would  
3 narrow down to maybe risk to a member of the public  
4 from accidents.

5 DR. FLACK: Good. Okay, so that's the  
6 starting point. That's what we are trying to  
7 understand and -- okay, good.

8 MR. FARAZ: Maybe if you can have a  
9 discussion on that, that would be really helpful.

10 DR. FLACK: Yes, right. And how do you go  
11 about determining what that is. What tools do you need  
12 to do? Now, if you are talking about the integrated  
13 risk, the total risk of all accident sequences, or do  
14 we, like at an ISA divide them in by one by one, and  
15 define the threshold from which it's greater than, you  
16 know, there are different approaches to dealing with  
17 that.

18 But in reactor space, you do a Level 3  
19 PRA. If you want to do the whole assessment and go  
20 from there, and then you can compare those results  
21 with the safety goals and that would be the next step.

22 But first, being able to do that I guess  
23 is the question, or do we need to do that, I guess is  
24 the question, for these reprocessing facilities. Does  
25 that make sense, that question?

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1 MR. FARAZ: Yes, exactly, yes.

2 MR. CAMERON: So are we jumping right to --  
3 is everything wrapped up in doing the PRA or ISA or  
4 some combination of that? I mean, is there a larger  
5 issue here that we need to talk about, or are we --  
6 should we jump to the ISA PRA issue which Yawar  
7 referred to as a methodology. What methodology do you  
8 use to determine risk? I just want to make sure that  
9 we are not missing a larger point and go ahead Alex.

10 MR. MURRAY: I think we should take a step  
11 back and ask ourselves the question, okay, which is  
12 essentially the first question on there, and that is  
13 are there are should there be a total risk or risk and  
14 safety goals, be they to a member of the public, to a  
15 worker, what have you, in some manner analogous to the  
16 safety goals that exist to reactors? Maybe they would  
17 be different ones, maybe there would be an  
18 environmental version as well as there is in Part 70,  
19 I don't know.

20 But I think we have to first ask  
21 ourselves, is there some ultimate goal for  
22 safety/risk, some total risk that we are shooting for?

23 MR. CAMERON: Okay. Let's go to Ed and then  
24 Arjun and Mike, we know you are out there and we will  
25 get to you, so you don't even need to raise your hand.

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1 We won't ignore you. Right Miriam? Okay. Ed.

2 DR. LYMAN: Yes, well I wonder whether  
3 that, looking at individual risk is the only  
4 appropriate endpoint or if the field is wide open, why  
5 don't you start talking about other issues which may  
6 be relevant to accidents at reprocessing plants, for  
7 instance, long-term land contamination.

8 Right now there are no NRC regulations  
9 other than those pertaining to NEPA and SAMA, which  
10 even touch on long-term land contamination from  
11 fission products, yet in a reprocessing plant, a tank  
12 accident could well lead to significant economic  
13 consequences as well as long-term land denial and  
14 perhaps there should be an explicit endpoint in the  
15 reprocessing rulemaking having to do with restrictions  
16 on the aggregate release of fission products with  
17 regard to land contamination.

18 MR. CAMERON: And Ed, I'm sorry, I just  
19 couldn't hear that, in regard to, that one word you  
20 have been using.

21 DR. LYMAN: Land.

22 MR. CAMERON: Land.

23 DR. LYMAN: Contamination.

24 MR. CAMERON: L-A-N-D.

25 DR. LYMAN: L-A-N-D.

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1 MR. CAMERON: L-A-N-D. Okay.

2 DR. LYMAN: Right.

3 MR. CAMERON: And let's hear from Arjun and  
4 get some reaction to Ed's point from Yawar and then go  
5 down to Ron. Go ahead. Go ahead.

6 MR. FARAZ: It's a short point I wanted to  
7 make. In terms of part 70 we do have performance  
8 requirements for environmental contamination or the  
9 environmental performance requirements are there,  
10 which would, you know, address the land contamination  
11 issue.

12 MR. CAMERON: And let me ask Ed if  
13 something similar to what Yawar is talking about --

14 DR. LYMAN: Sorry, what provision is that?  
15 I mean I am familiar with 7023 but --

16 MR. FARAZ: Yes, it's 7061, those are the  
17 performance requirements, and it addresses both the --  
18 it addresses the worker, the member of the public as  
19 well as environment.

20 DR. LYMAN: Anyone have the regulations  
21 here?

22 MR. CAMERON: While we are doing this, let  
23 me hear what Rod has to say and then we are going to  
24 come back to Arjun, but we are sort of going from this  
25 overall safety goal and now we talk about land

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1 contamination. I just want to make sure that we get on  
2 the same page and welcome to Jim Bresee, who has  
3 joined us from the Department of Energy. Thank you  
4 Jim.

5 MR. McCULLUM: Jim, before I speak, do you  
6 want to introduce yourself, since the mic is on?

7 MR. CAMERON: Just tell us a little bit  
8 about what you are doing and --

9 DR. BRESEE: I am with the fuel cycle R&D  
10 program of the office of nuclear energy and our  
11 purpose in life is to develop advanced technologies  
12 for possible future recycle of used fuel and we have a  
13 variety of alternatives and developing criteria by  
14 which we could do a down selection of alternatives. I  
15 hope I can contribute in that area.

16 MR. CAMERON: Great, and you know anything  
17 that you want to suggest will be a useful  
18 contribution. Right now we are on the issue of risk,  
19 safety and risk from the facility.

20 MR. McCULLUM: And I think that -- am I  
21 getting stereo here? I heard an echo of myself. But I  
22 think a lot of it does go to the tool you use to  
23 evaluate risk and a lot of that is where our risk-  
24 conformed, performance-based regulation can talk about  
25 the use of the tool, the regular use of the tool.

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1           However I think that there's probably  
2 elements of all of the above in that first question in  
3 there, and I think it is important that we be  
4 consistent with established precedent. I mean, the  
5 tools you use to determine the risk may be unique for  
6 a recycling facility I think, even though in terms of  
7 whether you should ISA or PRA and things like that and  
8 we certainly would have a lot to say on that.

9           Clearly ALARA is going to apply and again,  
10 that's an area where you don't have to do a lot  
11 different for one of these types of facilities, you  
12 know, you don't have to specify in detail the  
13 technology, for example, to put ALARA in place. You  
14 know, we have methodologies for looking at ALARA that  
15 would translate.

16           I think a lot can be accomplished on risk  
17 to an individual and we saw that in Part 63, the  
18 repository safety regulation. You know, you have a  
19 complex, geologic system and you could attempt to  
20 regulate it at all sorts of different points in the  
21 system, and in Part 60 there was an attempt to do  
22 that, to specify what were called subsystem  
23 performance requirements.

24           But if you end up specifying the right  
25 tool, which in the case of the repository, was total

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1 systems performance assessment, case of recycling  
2 facility might be an integrated safety analysis, or of  
3 PRA in some instances, you can use -- you can get a  
4 lot in terms of what is the risk to the individual  
5 from an accident in normal operations.

6 And then being consistent with established  
7 precedent out there, I mean, we have 10 CFR Part 100,  
8 we have a lot of things out there where we kind of  
9 know what doses are appropriate and that shouldn't  
10 change a lot for recycling facility. A neighbor of a  
11 recycling facility should have the same expectation of  
12 safety that a neighbor of a reactor does.

13 So I think really the discussion on this  
14 does go to the tool, the methodology. Recognizing you  
15 are going to apply ALARA in any case and recognizing  
16 that a lot is already known about what levels of  
17 individual risk are acceptable and a lot can be done  
18 with accident analysis, acceptable risk.

19 What you are really trying to do -- and  
20 this gets back to the point Alex made at the very  
21 beginning -- you are trying to make sure you have  
22 adequately captured the hazards, and again, in the  
23 technology neutral, risk-informed regulation, you  
24 wouldn't specify please evaluate the following 16  
25 hazards because this would vary.

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1           But you need to specify a regulation that  
2 will drive confidence that the methodology will  
3 identify the hazards and will appropriately evaluate  
4 those things that stand between the hazards and the  
5 public and provide assurance that those things -- and  
6 in an integrated safety analysis they would be called  
7 IROFS -- that those things will function with the  
8 adequate defense in depth, adequate assurances.

9           So I think this is doable, again in a  
10 risk-informed, performance-based way and I think that  
11 and I think that a lot of that goes to the  
12 methodology, is providing a regulation that will  
13 specify a level of rigor that indeed the hazards will  
14 be -- the applicant will communicate an understanding  
15 of his hazards and will provide assurances that the  
16 things that come between those hazards and the public  
17 are adequate.

18           MR. CAMERON: So your approach is that  
19 there would be something in the rule that would  
20 require the ISA to identify hazards or perhaps there  
21 might be, I think, the word semi or the phrase semi-  
22 quantitative was used and that would be the way to  
23 approach the controlling the risk from the facility?

24           MR. McCULLUM: Yes, correct, given that the  
25 overall goals are also that you are going to use that

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1 tool to demonstrate that you are providing a level of  
2 protection that is also consistent with the level of  
3 protection you have provided other facilities, and so  
4 that should be articulated, but I don't think there's  
5 a need to reinvent the wheel there.

6 MR. CAMERON: Okay, because that wheel is  
7 already been invented. All right. Let's go to Arjun  
8 and then we will go over to Steve and come back to  
9 Yawar and Ed. Arjun?

10 DR. MAKHIJANI: Yes, a couple of concerns.  
11 The idea that you can do a risk assessment, especially  
12 an integrated one, has an underlying assumption we  
13 never talk about that you can add up all the risks,  
14 that when you have different types of accidents, let  
15 alone routine releases and risks, that you can add  
16 them all up, that you can multiply the probability of  
17 an accident with the consequences, assuming you know  
18 them both well enough and come up with a risk.

19 Whereas, you know, a lot of people don't  
20 trust risk assessments and don't want them done. I  
21 don't belong to that group, but I do have reservations  
22 with this idea that you can add up all the risks. It  
23 doesn't correspond to how we live and it doesn't  
24 correspond to common sense.

25 The small probability of getting AIDS from

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1 a transfusion that hasn't been screened for the virus  
2 multiplied by the probability of the consequences --  
3 multiplied by the probability, the consequence could  
4 give you the same number as the large probability of  
5 getting a cold by going to work in winter.

6 And the two -- we clearly protect  
7 ourselves very differently from those two risks and we  
8 don't add them up in practice and if a hospital told  
9 you they weren't going to screen blood to save money,  
10 you would be outraged, even though the probability  
11 were very small, and the average damage might be 10  
12 bucks or whatever.

13 I think the fact that risk assessment  
14 mixes up large consequences, like the Mayak Explosion.  
15 Let's talk about reprocessing and not AIDS: 6,000  
16 square miles contaminated for decades, 30 towns and  
17 villages which had to be evacuated, long-term land  
18 denial from a high-level waste tank explosion, and I  
19 think that can't be equated to the consequences of a  
20 leak.

21 The different kinds of accidents and the  
22 fact that we are adding all of these things up, I  
23 would say that for high-consequence accidents, the  
24 risks -- the consequences themselves have to be  
25 represented as a certain kind of societal risk, if it

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1 is credible that it can happen.

2 And the second problem is something I  
3 referred to earlier, is can you calculate the  
4 probabilities of these accidents? I think the  
5 Challenger accident showed that the prior calculations  
6 of these accidents did not correspond to the actual  
7 risks.

8 Now we have had one explosion in a high-  
9 level waste tank. We had a problem at La Hague with a  
10 failure of electrical power for several hours in April  
11 1980. Fortunately there was no accident that resulted  
12 from that. How are we going to take those events and  
13 actually calculate the probability of a high-level  
14 waste tank explosion at a commercial facility?

15 I am not quite clear. You don't have  
16 enough data points. You have some indication: two  
17 types of tanks were kind of different; their cooling  
18 arrangements were different; and the regulatory  
19 arrangements were different.

20 So I think these problems are -- when we  
21 say risk assessment, there are certain routine kinds  
22 of things that can be evaluated pretty easily and or  
23 without much difficulty and added up, and I would  
24 agree with that.

25 But when you mix up that with severe

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1 accidents and consequences as is routine, I think this  
2 specially needs to be revisited with reprocessing  
3 plants, and especially aqueous reprocessing plants.

4 MR. CAMERON: Okay, thanks Arjun and we are  
5 going to go to Steve and I guess I would just put out  
6 a general question for all of you, is how would the  
7 approach that Rod suggested, how would that take care  
8 of Arjun's concerns or do we need to worry about those  
9 concerns?

10 But go ahead Steve.

11 MR. SCHILTHELM: I think I agree with a lot  
12 of what Arjun said. We tried, when we presented this  
13 white paper to the NRC, we tried to deal with that --  
14 those concepts from the standpoint of thresholds,  
15 trying to recognize that maybe protecting workers  
16 against accidental things that might happen in the  
17 plant required a different set of tools than  
18 protecting the public against things -- large  
19 accidents that could actually affect the public.

20 We offered thresholds consistent with the  
21 performance objectives that are in Part 70 for high  
22 and intermediate consequences. But I think what you  
23 are offering is maybe there's an ultra-high sort of  
24 consequence concept that may be appropriate.

25 But we tried to deal with that thought

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1 process within the white paper, because if we look at  
2 the MOX facility and we look at the licensing in the  
3 MOX facility, although the standards for protection of  
4 the worker and protection of the public are written in  
5 the same construct -- there could be a high  
6 consequence to the worker or a high consequence to the  
7 public -- the practice seems to be that protection of  
8 the public needs to meet a higher standard than  
9 protection of the worker, even though the consequence  
10 bin is the same.

11 So we tried to deal with that in the white  
12 paper by creating some thresholds and offering that  
13 for events that could affect the public, there needed  
14 to be more thought given to a quantitative analysis,  
15 versus qualitative. Whether or not we hit the mark  
16 doing that, that was our attempt and that was what we  
17 were trying to recognize.

18 MR. CAMERON: And I am going to -- yes go  
19 ahead. Go ahead Arjun.

20 DR. MAKHIJANI: How do you deal with an  
21 issue where you don't have very much data to be able  
22 to calculate a probability? That is one of my big  
23 problems with this whole exercise.

24 MR. SCHILTHELM: I will take that on  
25 because I was the safety manager at an NRC-licensed

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1 facility and I was deeply involved in the conception  
2 of Part 70 and the ISA concepts.

3 There is a significant danger to giving  
4 engineers tools that result in a number and letting  
5 them run with the number. My number is good, therefore  
6 I am safe. That is not safety.

7 And there is a danger to believing that  
8 the input is good enough to justify the output. It's  
9 just what you said. So I am not a huge advocate of  
10 quantitative risk analysis, particularly when people  
11 are involved and it's not a machine, and particularly  
12 when the data to support the failure of the machine is  
13 not well-understood.

14 And I am just echoing what you said, so I  
15 am not a probabilistic advocate from that perspective.

16 MR. CAMERON: And just a follow-up on that  
17 Steve, so that you would think that an ISA -- let me  
18 put it, a non-quantitative assessment might be more  
19 effective. I don't know if I can do that but -- to  
20 you.

21 MR. SCHILTHELM: No, I think we did believe  
22 that an ISA is more effective, absent good data, and I  
23 think the MOX experience -- and Sven is over there  
24 nodding -- that the lack of data for some of these  
25 chemical processes really inhibits the ability to do a

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1 good PRA.

2 A PRA can be done well, don't get me  
3 wrong, but it has its limitations.

4 MR. CAMERON: But you said you talked about  
5 the danger of giving an engineer -- and maybe there's  
6 other people that they would be dangerous to, too --  
7 give them a number and then you are going to run with  
8 it and just assume that you are safe.

9 Before we go up to Yawar and Ed, I want to  
10 hear from Rod and John and then we'll go up to that  
11 end of the table.

12 MR. McCULLUM: Yes. Thank you, Chip. And I  
13 will say, without getting into detail at this point,  
14 that industry will be further weighing in on this  
15 topic of ISA and PRA and to what level can you  
16 quantify things and to what level you may not need to  
17 quantify things.

18 I think Arjun's example is an outstanding  
19 test of this very question, in that if a tank exploded  
20 and did the ruinous damage -- and I am not familiar  
21 with the Mayak incident, but you know -- obviously  
22 either one of two things did not happen.

23 Obviously the hazard was not understood or  
24 appropriate mitigative features were not put in place  
25 in between the hazard and the public, and an

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1 integrated safety analysis, and if the regulation  
2 required enough rigor, without specifying the details  
3 because you want to be technology neutral, you want to  
4 be risk-informed, performance-based and I am sorry for  
5 being a broken record on that, but I think it is  
6 possible to put in place a regulation which would  
7 require the applicant to assure that he had identified  
8 all the hazards and understood -- he or she had  
9 identified all the hazards and understood them, and  
10 placed in a defense in depth manner sufficient  
11 barriers in between those hazards and the workers and  
12 the public.

13 And one can look at the old Soviet Union  
14 as an example where maybe that kind of thinking just  
15 didn't happen as often as it used to or should have  
16 occurred, but given that example I do believe, again  
17 focusing on your idea you are going to protect an  
18 individual, be that individual the worker, or be that  
19 person who lives on your fence-line and will stay  
20 there for 30 days after an accident, whatever the case  
21 might be -- you can indeed put in place a regulation  
22 that will require that the hazard be understood and  
23 communicated publicly and that those measures are in  
24 place.

25 And this is a subject we do look forward

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1 to additional dialogue. I think you will hear from  
2 industry on this subject and we would like, with the  
3 same folks around the table perhaps in the future to  
4 discuss in more detail, but yes, again, if you put the  
5 right amount of rigor into it and you understand your  
6 hazards, this can be done and accidents like that can  
7 be prevented and certainly in that case, should not  
8 have happened.

9 MR. CAMERON: Okay. Thank you. Thank you  
10 very much, Rod. John and then we are going to check in  
11 with Ed and Yawar.

12 DR. FLACK: Yes, a few things. Just to  
13 clarify a few points, at least in my own mind to make.  
14 Well, one is completeness and being able to capture  
15 all the hazards. It goes without saying, I mean that's  
16 a very important part of the process.

17 But the part about not having the data and  
18 therefore not wanting to do a quantitative analysis,  
19 to me, I don't think it justifies it in a way that  
20 there is uncertainty with the data, and one needs to  
21 know what that uncertainty is.

22 Now we could say, well, it's very  
23 difficult to deal with that uncertainty. That's fine.  
24 But at least I know it's there. And I also know when  
25 somebody is trying to write down a quantitative value,

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1 I know what his thinking is and what he thinks he  
2 needs to achieve, and therefore I get that feedback  
3 from the analysis.

4 Without that information, I don't know how  
5 to deal with it. I mean, it's just a matter of  
6 opinion. It's very difficult to get people to agree on  
7 things. And John Garrick once made a comment. He said  
8 that well, I can get people to agree on a number, but  
9 it's very difficult to have them agree on the  
10 uncertainty.

11 And how true that is. And what we are  
12 dealing with is uncertainty, and I think by not  
13 recognizing that, I think there's a tendency to push  
14 it under the rug, and say well, okay, since we can't  
15 quantify, we don't have the data, we have got -- let's  
16 do it this way and let's get -- resolve the issue.

17 But I think that's a mistake and I think  
18 that by trying to quantify something, you not only  
19 write down what you know and what you don't know in  
20 that way, by looking at the values and the  
21 uncertainties about those values, but also it tells  
22 you what you need to achieve.

23 And the sensitivity of that to the end  
24 result, because now I have a model, now I have an  
25 understanding, now I can play with sensitivities and

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1 understand what effect that has on the system, which I  
2 couldn't do without this model.

3 So to me, I think resisting that and  
4 saying well, it's just too difficult to do or we don't  
5 have something, I don't think that justifies not doing  
6 it. Well anyhow, that's my opinion on the matter.  
7 Thank you.

8 MR. CAMERON: Okay. Thanks John. Ed, do you  
9 want to chime in on this and then we will see what  
10 Yawar has?

11 DR. LYMAN: Well I mean I think the  
12 question that you have to deal with is if you are  
13 going to be creating some hybrid of Part 50 and Part  
14 70, are you going to go with a deterministic set of  
15 design basis accidents? Or are you going to go with a  
16 semi-quantitative hand-waving approach with regard to  
17 likelihood?

18 And I would say that from what I have  
19 heard, at least, there seems to be some sentiment that  
20 we are not going to be in a position to estimate the  
21 likelihoods well enough that you can actually use that  
22 Part 70, at least until there's significantly more  
23 operating experience with some of these facilities.

24 So I would think to err on the side of  
25 caution, that a Part 50-like approach, you specify a

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1 set of events which could lead to high consequence for  
2 the public and that you have to demonstrate that there  
3 are controls in place so that the dose will be limited  
4 in a deterministic fashion and not try to play this  
5 game of highly unlikely, unlikely, likely, if you  
6 don't have the inputs to be able to make those  
7 determinations reasonably.

8 MR. CAMERON: So you would prefer seeing a  
9 deterministic approach used?

10 DR. LYMAN: I think that that should be the  
11 foundation of the new regulation for -- the  
12 fundamental safety basis should be a set of  
13 deterministic events.

14 MR. CAMERON: Okay. Thank you. Yawar?

15 MR. FARAZ: Yes. In terms of identifying  
16 the hazards and the accident sequences, clearly, in a  
17 chemical-like plant, or a chemical facility, clearly  
18 the approaches used for ISAs have been very effective.

19 They have been used in chemical  
20 facilities. They have been used for fuel-cycle  
21 facilities quite effectively in identifying the  
22 hazards and the accident sequences.

23 However, the methods that we have used  
24 have some very significant shortcomings. One is that  
25 the methods that are typically used are semi-

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1 quantitative. They only have two levels of criteria,  
2 performance criteria: high consequence and immediate  
3 consequence. They don't address, or they don't  
4 differentiate between a high consequence event that  
5 might impact one individual versus a high consequence  
6 event that might impact 10s or 100s of individuals.  
7 They are treated the same.

8           So that's clearly a shortcoming in the  
9 methods that are used. Now, for existing fuel cycle  
10 facilities, that's fine because they tend not to have  
11 a lot of off-site risk. But in a facility like a  
12 reprocessing plant, where the inventories are very  
13 large and off-site impacts can occur if they are not  
14 properly protected against, then we need to think  
15 about something much better than the existing approach  
16 that they use for fuel cycle facilities.

17           MR. CAMERON: Okay. Let's go to Alex and  
18 then Sven and then Arjun. Alex?

19           MR. MURRAY: Thank you very much Chip. I  
20 appreciate it. Just a couple of points. And first,  
21 just by way of clarification, I think the event at  
22 Mayak is better known to more people as the Kyshtym  
23 event if I am correct. Yes? Okay.

24           So, one can easily search on that and find  
25 out details about that in any one of a number of

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1 servers. Just also for clarification, it was for -- it  
2 was a high-level waste tank from a different type of  
3 process than is being considered by anybody that we  
4 know of today. It's basically a historical process.

5 What I am hearing, and I have heard  
6 several people mention it now, about uncertainties and  
7 so forth. And again I throw it out, we get back to  
8 Part 50-like space in some areas, this concept of a  
9 design basis accident, the high-level waste tank shall  
10 not explode. Okay? The chemical cloud cannot happen. A  
11 criticality event cannot occur.

12 And I ask the assembled group, are they --  
13 is the thought that there should be some accidents  
14 that should be design basis like, deterministic  
15 analyses, some others which should be ISA or PRA-like?  
16 I do not know. But I throw that out there.

17 I will also add, getting back to numbers  
18 and I have heard MOX mentioned a couple of times,  
19 having been intimately involved with MOX, being an  
20 observer with MOX, being involved with MOX going back  
21 30 plus years, I can tell you that when ISA analyses  
22 were done and presented without quantification for  
23 non-linear or more complicated event sequences, the  
24 staff, in order to support their safety determination,  
25 were asked, either by management or review committees,

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1 to do a quantitative analysis.

2 And again, I throw out to potential  
3 applicants to consider, in some situations, do you  
4 want to do your numerical analysis yourselves, or do  
5 you want to rely upon the staff? It takes time. It's  
6 uncertain, what have you. Staff should be reviewing.  
7 We should not be designing based upon numerical  
8 analyses. Okay? But I throw that out and I think  
9 basically --

10 Oh, last thing, I have heard a couple of  
11 people mention threshold, different products for  
12 members of the public. Is there a threshold? Should we  
13 consider a threshold for different types of analyses?  
14 I don't know. Thank you.

15 MR. CAMERON: Very helpful though, good  
16 food for thought. Sven?

17 DR. BADER: Thanks Alex for stealing a lot  
18 of my thunder there. Just from the MOX fuel  
19 fabrication experiences, yes, we are -- we definitely  
20 did an ISA summary and we had considered doing a PRA  
21 and it got to the point where we were, as Steve said,  
22 had an engineer sitting around manipulating numbers  
23 and it goes back to the uncertainty quote that I think  
24 you used, John, from Mr. Garrick.

25 Another problem we have is this is a

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1 chemical process and it's not a Boolean logic often.  
2 Often we didn't have a valve turning off or on. We had  
3 several different combinations of chemicals having to  
4 be mixed in a certain pattern that would cause an  
5 event.

6 And really, the only way we found a  
7 meaningful approach to it was through the ISA  
8 approach, where we did a detailed HAZOP on this,  
9 looking at all the sequences and then we had computer  
10 models that actually went and modeled the deviations  
11 that we assumed are in the HAZOPs.

12 So it was an integrated approach and yes,  
13 we did have some numbers because that's what our  
14 models were showing, but they were not probabilities.  
15 They were, you are not going to have a runaway, red  
16 oil or hydroxylamine nitrate type of event explosion  
17 hazard.

18 So from the MOX facility, our main  
19 emphasis or our main insight that we saw was that for  
20 mechanical devices, yes, we could do some sort of PRA,  
21 those are the good devices that we could do a  
22 mitigation on certain events, certain release events.

23 But on chemical processes, we really  
24 didn't see any alternative to the ISA process. And I  
25 will leave it at that.

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1 MR. CAMERON: Okay. Thanks Sven. Arjun?

2 DR. MAKHIJANI: Yes. I didn't want my  
3 remarks to be misunderstood, if they were, that if you  
4 don't have sufficient data that you shouldn't do a  
5 quantitative assessment. It might be you have a lot of  
6 other options. Maybe you should look for a different  
7 way of doing things. Maybe you should look for ways to  
8 generate data that are more reliable from similar  
9 facilities.

10 It's not an invitation for hand-waving.  
11 That's not my intent for raising the question, just in  
12 response to what John said there. I think ultimately  
13 some form of quantitative handle on the consequences  
14 of accident sequences is very important, and so I just  
15 wanted to clarify that, that I don't think industry or  
16 anybody else should misunderstand my position that if  
17 you don't have the data that you can just decide to do  
18 without it.

19 You have to have -- maybe just tell the  
20 licensee to go back and know more about their process  
21 before they make a license application.

22 The second thing is that if you have  
23 extremely high consequence accidents that are  
24 possible, and it's true that PUREX is different than  
25 what they had in the Soviet Union and -- but the high-

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1 level waste tanks still contain fission products that  
2 have some potential for explosion in an event of loss  
3 of cooling, and that's simply there.

4 And I think maybe a design requirement, if  
5 you have extremely high consequence accidents, should  
6 be that the consequences should be reduced, that the  
7 design should be such that you can't just rely on the  
8 multiplication of a -- calculate a low probability and  
9 say, oh it's 10 to the minus 7 or 10 to the minus 8  
10 and it's not design basis, or 10 to the minus 6  
11 multiplied by 10 to the 10 and your damage is \$10,000  
12 or whatever.

13 I think you have to go back to the drawing  
14 board and come up with a different design that doesn't  
15 have high consequence accidents, and maybe you need to  
16 put a containment dome around the tanks. I don't know.  
17 Something, a different process that doesn't generate  
18 the same kind of liquid waste, that if you lose the  
19 cooling it might explode.

20 MR. CAMERON: So that would be one bottom  
21 line for you, is that for high consequence, require  
22 mitigation? Okay. Rod, and then we will go to Sven and  
23 then we will go to John.

24 MR. McCULLUM: Yes, thanks for coming back  
25 to me and I just wanted to real quick note another

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1 instance of agreement here between industry and Arjun.  
2 What you just wrote down there, I think that's the  
3 same thing I was saying where you have got to  
4 understand the hazards and assure you have put  
5 appropriate measures in between the hazards and the  
6 public and the workers.

7 And again, that's probably what was not  
8 done in either case, or at least in one of those cases  
9 at this Mayak facility. But we believe that integrated  
10 safety analysis and a regulation that requires an  
11 appropriate amount of rigor in an integrated safety  
12 analysis, could in fact assure that that gets done.

13 And without having to specify a bunch of  
14 predetermined, design basis accidents for facilities  
15 you can't in a technology neutral know in advance what  
16 they will be.

17 But I would agree with that. You need to  
18 be able to demonstrate you understand the hazards and  
19 that you have mitigated them. And so I think that's  
20 notable.

21 MR. CAMERON: Okay. Thank you Rod. Sven?

22 DR. BADER: I just wanted to add, one of  
23 the things about mature technologies is that you don't  
24 solely rely on prevention. You have these defense in  
25 depth mitigated features available to you as well.

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1 Then NFFF is designed with many of those features that  
2 are found in the mature plants in France AREVA runs.

3 And another point was when we did these  
4 PRAs -- we have done some PRAs -- is that under Part  
5 70, where you have IROFS, it's very difficult to  
6 distinguish in an PRA, what you are crediting as IROF  
7 when you are trying to do a PRA and credit everything,  
8 that includes your defense in depth features.

9 So there's a fundamental issue that we  
10 had, what do you pick out of your long list of action  
11 items or long list of fault trees, what items do you  
12 pick out of that to be the actual IROF? It's not a  
13 simple task to perform.

14 MR. CAMERON: Okay. Thank you. And John?

15 DR. FLACK: No, I agree with that. I think  
16 it's more of a process and it's not risk-based. It's a  
17 risk-informed process. So you are using that  
18 information to make decisions on defense in depth. You  
19 are not saying it's just a low number, we are not  
20 going to do anything about it.

21 So I think that basically goes back to the  
22 Commission guidance, not to just base things on  
23 probability, but also just to be informed by that in  
24 making a decision and then from that, decide how much  
25 defense in depth you need.

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1           So high consequence events would get a  
2 certain level of defense in depth in any case,  
3 depending on how much it's the likelihood, whether  
4 it's credible and so on, but of course that you have  
5 that on the table to make those kinds of decisions,  
6 it's another piece of information to use that if you  
7 didn't go through that process, you wouldn't have.  
8 That's all I wanted to say.

9           MR. CAMERON: Okay. And let's go to Tom,  
10 Tom Hiltz.

11           MR. HILTZ: Thank you Chip. I just have  
12 sort of a question. I mean the discussion for me has  
13 been very interesting, but it sort of hasn't  
14 punctuated on any real solution. I have heard that ISA  
15 is very useful. I have heard talk about the  
16 limitations of PRA.

17           I guess my question is, if anybody has any  
18 insights, if we want to be faithful to the Commission  
19 policy statement that PRA should be used to the extent  
20 supported by the state of the art, what is the state  
21 of the art that we can use PRA for reprocessing, for a  
22 potential reprocessing facility?

23           And what is necessary for us in order to  
24 make a safety decision using PRA?

25           MR. CAMERON: Let's get opinions on that

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1 point, as Tom called it, a punctuation. Rod?

2 MR. McCULLUM: Yes. I think PRA can  
3 complement ISA and I think consistent with the  
4 Commission policy statement. I think there may be  
5 areas where, when you do have systems that are  
6 analogous to things that exist elsewhere in industry,  
7 that you do have data on, you can use it to get risk  
8 insights.

9 And again, I am getting a little ahead of  
10 some things that we are working on right now in  
11 industry, where we would want to get back to you on a  
12 greater level of detail.

13 But we would say that ISA should be the  
14 core of what you would call the safety case and then  
15 that you might also look for areas of opportunities to  
16 gain additional insights through PRA.

17 But again you have got 104 commercial  
18 reactors, and that policy statement was written  
19 against that backdrop: 104 commercial reactors that  
20 have between 20, 30, 40 years' experience each. They  
21 could fall into two flavors: BWRs and PWRs most of  
22 them, well, Fort St. Vrain shut down.

23 So you have this incredible population of  
24 data on very similar systems and we are not going to  
25 come at you with 104 applications for recycling

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1 facilities and we don't have 104 existing ones that  
2 you can compare them to.

3 So you have to start out recognizing the  
4 limitations, and what are the tools to again assure  
5 that you understand the hazards and you put the right  
6 measures in between the hazards and the people and to  
7 use PRA for insights.

8 But to expect that PRA can play the same  
9 role for a recycling facility that it plays for  
10 reactor, probably you can't get here from there.

11 MR. HILTZ: And I just want to be clear,  
12 that's not my suggestion and I think the policy  
13 statement says PRA shall be used to increase in all  
14 regulatory matters to the extent supported by the  
15 state of the art.

16 So I am not suggesting that we would want  
17 to use where we are in the reactor world to say well,  
18 we have to have something directly analogous to that  
19 as we consider how to license a reprocessing facility.

20 My question is, where are we with the  
21 state of the art and what is the level of application  
22 that we can reasonably apply for a commercial  
23 reprocessing facility that provides us meaningful  
24 safety insight, provides us meaningful safety benefit  
25 and helps us make informed decisions?

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1 MR. McCULLUM: Yes, I just wanted to  
2 clarify. I didn't mean to imply that's what you were  
3 saying. I was trying to draw an extreme contrast  
4 there. And I think that's an area, if we recognize  
5 that the heart and soul of the safety case is going to  
6 come from ISA, then you have the task of saying okay,  
7 where are the areas we can apply PRA? Where are -- how  
8 do we trigger, okay, the system is something that we  
9 have experience with and/or is associated with a  
10 hazard where we might want to know more, making it  
11 worth it as well, again, just generating a number for  
12 the sake of it.

13 And I think that that's something that  
14 both industry and NRC as well as the stakeholders need  
15 to continue to look at. But I think if you recognize  
16 that you are starting with this pretty good tool in  
17 integrated safety analysis, and you are looking at how  
18 do I complement it with a PRA, it's a lot more  
19 manageable of a task than oh my gosh, how am I going  
20 to quantify all this stuff to make a safety case.

21 And yes, I didn't mean to misapply what  
22 you were saying with an extreme example there.

23 MR. CAMERON: So Tom, is it you are looking  
24 for some more specifics on where PRAs could be used in  
25 this process than just well, we will use them where it

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1 is feasible to use them? Are you looking for areas of  
2 examples for where a PRA could be used?

3 MR. HILTZ: I think I am hearing that we  
4 should do quantitative analysis that we will  
5 potentially learn from it, that we can manage the  
6 uncertainties and maybe we can understand the  
7 sensitivities.

8 To me that's not the -- I mean, ultimately  
9 I think where the fine point that we need to point on  
10 this, we need to figure out, I think, what the right  
11 balance is between the quantitative and the  
12 qualitative, to what extent we can use the PRA by the  
13 state of the art consistent with the policy statement,  
14 and sort of reach some consensus about how to move  
15 forward with balancing that quantitative and  
16 qualitative. So I hope that helps.

17 MR. CAMERON: Okay, well that's good and I  
18 know that you have to leave a little early so let me  
19 get Sven and John on the table quickly with comments.

20 DR. BADER: I just have a real quick  
21 question. I know you guys went to Japan and Rokkasho,  
22 I know, does some selective PRA. Is there any lessons  
23 learned that you guys gained from that experience?

24 MR. HILTZ: Yes. What Sven is referring to  
25 is that last December, we went over and did a vertical

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1 slice at the Rokkasho facility on risk assessment and  
2 materials, controls and accountability, and yes, we  
3 did bring insights back that will help inform our  
4 ultimate decision.

5 But I think we are also looking at this  
6 forum, to help inform that decision and while it did  
7 bring back insights, there is still I think arguments  
8 on both sides of the scale here about to what level we  
9 should use quantitative and to what level we should  
10 use qualitative.

11 I mean I think if we had gotten all the  
12 answers, we probably would say hey, we don't need to  
13 have any more discussion on this. But we didn't. We  
14 just -- it just continued to help inform our process.

15 MR. CAMERON: Okay. And John?

16 DR. FLACK: Well, I think there's one thing  
17 at least I will speak for myself and my own views on  
18 this, and I think for reprocessing, ISA does not go  
19 far enough. I think -- I don't know if everybody  
20 agrees with that, but I just don't think it is going  
21 to work by itself. I think more has to be done, number  
22 one.

23 And I think it's more, not only for  
24 licensing the facility, but also how do you  
25 demonstrate how well it operates downstream in the

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1 FCOP? I mean they are running into trouble with that  
2 right now. I think you have to do some more analyses  
3 than just an ISA.

4 I understand there's a lot of information  
5 in ISA. You can build on that. I mean it's there. It's  
6 great. It's like the PRA notebooks, you have got tons  
7 of information there to build on. You are pretty far  
8 there.

9 Now the question is, is how much more  
10 value going the next step will provide you, right? So  
11 I think that when you start to look at what you  
12 already know and what you don't know from what you  
13 have done, and what you would like to know in order to  
14 give that extra bit that you are going to need, both  
15 in licensing and for operations later on, when you go  
16 inspect these facilities, and how do you know there's  
17 an issue there, you have got to do something about  
18 that.

19 I think you can't just look at just one  
20 piece and then say this is good enough for this and  
21 now you are going to have to deal with it later on. I  
22 think you have to make that determination now and I  
23 think it's a very important question that needs to be  
24 answered.

25 And it's not just quantifying everything

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1 in the plant, I mean the facility, but there has to be  
2 a way you go about providing some of that insight in  
3 order to understand it, understand what risk this  
4 facility presents and when it does, if it should get  
5 into trouble, how do you know it?

6 I mean, that's a very fundamental question  
7 that needs to be answered. And I think the technology  
8 is there to do it. People say you can't use it because  
9 I can't treat human error. But we have been dealing  
10 with human error within the nuclear facilities, power  
11 plants, from way back, you know that Tom, I mean, we  
12 started way back when we were talking about these  
13 PRAs.

14 So I think one has to go back and really  
15 do the work and look at it and see where the value  
16 could come from and how you would use it and then take  
17 it to the next step and then say okay, here's where  
18 the criteria should be.

19 So I think we are pretty close but I think  
20 there's more work that needs to be done on this.

21 MR. CAMERON: Okay. Let me ask Rod a quick  
22 question. Rod, since you mentioned it a couple of  
23 times, that the task force was trying to put more  
24 flesh on the bones so to speak on this particular  
25 issue --

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1 MR. McCULLUM: Yes.

2 MR. CAMERON: and that you would be  
3 submitting that to --?

4 MR. McCULLUM: Yes, we are envisioning  
5 another white paper on this topic and I think we are  
6 hearing some things here today that we want to be sure  
7 we reflect onto that.

8 FFC. When you submit the white paper, and  
9 I don't know whether it would be part of the November  
10 5 comment or whatever, but will there be a possibility  
11 that others around the table who aren't on the task  
12 force, that there will be some opportunity for people  
13 to respond to that?

14 Because you may be moving the ball forward  
15 in trying to answer Tom's question, and I'm just  
16 thinking that it would be, will others have an  
17 opportunity to comment on that?

18 MR. McCULLUM: Yes, I mean obviously we  
19 will send it in a letter that will be public, but  
20 rather than just say, you know, watch ADAMS, I think I  
21 could distribute it to some of the others who are on  
22 here. And I would further encourage NRC to set up a  
23 specific public meeting in reaction to it.

24 MR. CAMERON: Just to work on that one part  
25 --

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1 MR. McCULLUM: I mean this is one where --

2 MR. CAMERON: Okay.

3 MR. McCULLUM: I think we all recognize  
4 what tools what we have. We all recognize the  
5 limitations of those tools. We all kind of see a  
6 vision of where we want to go, and I think if we  
7 continue to put the right amount of experts in the  
8 room together as well as the stakeholders, we can get  
9 from where we are to where we need to be for the type  
10 of regulation that again, can be technology neutral,  
11 risk-informed, performance-based and provide  
12 assurances of safety.

13 MR. CAMERON: Okay. And that would be --  
14 that could be a focused discussion. We need to -- I am  
15 going to ask Miriam to see about the public, and while  
16 she is going to do that, Alex, wave your tent. Yes, go  
17 ahead.

18 MR. MURRAY: Thank you very much Chip. I  
19 just wanted to comment a little bit about state of the  
20 art, PRA, ISA and everything. In general, many of the  
21 methods which we are using for fuel cycle facilities  
22 started in the chemical industry. The chemical process  
23 industry basically has continued to develop and refine  
24 its techniques.

25 In general, when they do use an ISA, they

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1 don't just have the three by three matrix that we have  
2 in Part 70. They generally have at least a five by  
3 five matrix, much finer if you will binning or  
4 gradation or categorization of events and  
5 probabilities, consequences and probabilities.

6 Having said that, the chemical industry  
7 has also gone more towards what I would call a poor  
8 man's PRA. They use the term layer of protection  
9 analysis, or LOPA, where instead of doing if you will  
10 fault tree analysis or PRA analyses based upon  
11 components, they tend to do it more at a system or  
12 multi-component level.

13 And that is perhaps something that we  
14 should kick around here or consider as we move forward  
15 on this, but definitely it is done.

16 And the last thing I would say about the  
17 level of capability of PRA, I would say in both theory  
18 and practice, if one has the time, one can do it on  
19 anything. The Japanese in the '90s, for example, they  
20 went and did a very good PRA on red oil events. Okay  
21 it is out there. Very detailed at the component level.

22 One -- if you look at the chemical  
23 industry again, for some of the -- I will use the  
24 higher hazard operations -- they look to doing a PRA  
25 type analysis because it is very complicated, it's not

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1 if you will more of a linear logic, it's a very  
2 complex logic. They have to -- and it's potentially a  
3 high consequence event. You blow up the refinery. Or  
4 you blow up the phosgene production unit. Those are  
5 bad events. So they want to make sure they understand  
6 what is important and they go to a full quantitative  
7 analysis, PRA analysis, so they know what is important  
8 to safety ultimately. Thank you.

9 MR. CAMERON: Thank you again.

10 MR. PIERSON: This is Bob Pierson. I wanted  
11 to make one point, and that is that we are tending to  
12 use the term ISA and PRA interchangeably and really  
13 they are two different analyses.

14 An ISA is a valuation of a process. You  
15 are looking at whether a process will fail and you  
16 assign items relied on for safety to prevent that  
17 process from failing or causing a consequence.

18 A PRA looks at all the components of a  
19 facility, all the processes of a facility, and  
20 measures the overall risk of the facility. So from the  
21 start, you are not -- in a PRA and ISA -- you are not  
22 even looking really at the same thing. You are looking  
23 at a piece of the puzzle with an ISA, and assessing  
24 whether each piece of that puzzle will prevent you  
25 from having an accident, and that constitutes the

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1 integrated portion of your safety analysis.

2 In a PRA you are looking at all the  
3 intermediate pieces of the process, and evaluating a  
4 failure mode of them, and coming up with a total  
5 failure mode of the whole facility. But that is not  
6 what an ISA does.

7 So I think it's important to make the  
8 distinction there, because if you don't do that, you  
9 are really -- you are comparing apples and oranges.

10 The other thing is, an ISA or a PRA,  
11 there's always going to be uncertainty in both of  
12 them. There's always going to be some sort of analytic  
13 pools that you can use and I think what you need to  
14 avoid doing is thinking that somehow an ISA is  
15 inferior to a PRA which is somehow better.

16 I worked with PRAs many years ago. In  
17 fact, the gentleman talked about the space shuttle. We  
18 did PRAs on the space shuttle and at the time we were  
19 coming out ostensibly about one in 25 missions would  
20 end up with a failure.

21 Now those were probably more like an ISA  
22 not a PRA, because we couldn't assign failure indices  
23 to each of the components. But I think an ISA  
24 represents whatever the technique, if it's applied  
25 correctly, it's certainly as rigorous and as

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1 appropriate for a highly complex system as a PRA,  
2 because I think, going back to what someone said  
3 earlier, if you are not careful, you can be mesmerized  
4 by erroneous numbers which give you a false sense of  
5 security if you are applying simply a PRA.

6 But that doesn't mean that you want to  
7 throw all the quantitative analysis out. I think in  
8 some cases quantitative analysis helps significantly.

9 So what I would suggest is, be careful  
10 about trying to compare ISA and PRA. What you are  
11 really trying to determine is what the consequences of  
12 an accident are and how you are going to prevent that.

13 Whether you achieve that with an ISA or a  
14 PRA really isn't as important as doing that correctly  
15 and I think for most facilities, where you don't have  
16 as the gentleman said, Boolean processes, an ISA is  
17 probably a more usable process because it doesn't  
18 depend on a series of events that lend themselves to a  
19 Boolean process, which classically a PRA does and you  
20 are probably going to -- if you are not careful, you  
21 are going to be lost with -- you are going to be  
22 mesmerized by data which really isn't relevant to the  
23 overall safety judgment. So with that I will close.  
24 Thank you.

25 MS. JUCKETT: Is there anyone else on this

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1 side before I wander over?

2 MR. EHINGER: Mike Ehinger from Oak Ridge.  
3 Chip, I think I should have taken your invitation to  
4 be at the table, because I have written down a lot of  
5 notes here on what has been said.

6 I guess to start -- I guess I will start,  
7 I think I agree with what Rod said, I think. I don't  
8 know that this whole probability discussion is really  
9 generic to the reprocessing issue. I mean it's a  
10 bigger issue, and I think that we are seeing that  
11 there's a lot of uncertainty in the way things are  
12 done.

13 I am really surprised that you guys used  
14 the Mayak tank explosion even in this discussion. One  
15 little aside. I think it was the very first visit  
16 anybody made to the RT-1 plant at Mayak. We had -- we  
17 were sitting in the office with the director and he  
18 was recounting the history of Mayak and the RT-1 and  
19 RT-1 was the first reprocessing plant the Russians  
20 built.

21 And his comment was -- this was 1948 --  
22 and his comment was, "We were a little unhappy with  
23 the performance because the workers were receiving 150  
24 hour per year average exposure, so we shut it down two  
25 years later and built another one."

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1           But so, I don't even know why you even  
2 bring up the Mayak tank explosion and relate that to  
3 the issues. But I will come back to the whole.

4           You started out in the very beginning with  
5 some very hard criteria. About less than one tenth of  
6 one percent of a risk in this way. These seem to be  
7 something you can hang your hat on.

8           When we get into this whole idea of  
9 probability risk assessment and things that can  
10 happen, you know, our history over the years is that  
11 things happen that weren't being considered. You  
12 didn't analyze for it. Big accidents happen because  
13 it's something that we didn't even know was going to  
14 happen.

15           And so what is the real value of this? And  
16 I will come back as a last comment in this thing. I am  
17 kind of troubled by all these discussions of  
18 probability risk assessment or whatever we want to  
19 call it.

20           I have in my memory, after TMI, one of the  
21 NRC commissioners made a statement that he was the  
22 only victim of TMI because the stress caused a heart  
23 attack with him. And I bring that up in terms of this  
24 whole probability risk assessment and everything else.

25           I happened to be in Vienna two years after

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1 Chernobyl, and I won't bore you with that story, but I  
2 will bore you with the story that I read -- it's not  
3 my job, but I go back and look at some of these things  
4 every once in a while -- and I read a summary of  
5 Chernobyl and what happened. This was a meeting in  
6 1996.

7           And all of the things that went on, and  
8 all of the hype and everything about Chernobyl and all  
9 the things I heard about when I was in the plume in  
10 Vienna, and all that other thing, they essentially  
11 concluded 10 years later, that the only real hazard or  
12 only real risk was -- or only real event -- was an  
13 increase in childhood leukemias, which is essentially  
14 100 percent curable.

15           But their real concern was the additional  
16 health effects due to change in diet, stress and other  
17 things that were brought on by the event and the  
18 publicity of it. And this ties back I think to one of  
19 the first things I heard, was a discussion of secrecy  
20 versus press versus what people do with data when they  
21 are given it.

22           And one of the things that we continually  
23 see is that the stress and the press and the hype and  
24 everything else, far outweighs any of the consequences  
25 of the actual -- other than immediate deaths from

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1 something like crashing a plane into a building.

2 But it really comes down to the fact that  
3 we can't even put into these probability risk  
4 assessments the real factors which is the way we use  
5 them and the way we portray it to the general public.  
6 And I guess that's as many notes as I can remember  
7 from the long discussion.

8 MS. JUCKETT: Any other comments?

9 MR. CAMERON: Thank you. Thanks Miriam and  
10 thanks to all of you for today and your contribution  
11 and we are going to get started at 8:30 tomorrow and  
12 we will get out of here so that people who need to be  
13 in by sundown -- Rosh Hashana -- will be able to do  
14 that.

15 We have parking passes at the desk for  
16 anybody who parked in the facility.

17 MR. CUADRADO: Also an alternative  
18 arrangement, if you have your ticket, you can go to  
19 the executive meeting center right down the hall and  
20 get it validated or at the front desk. Alternatively  
21 you can take one of the already validated tickets to  
22 get parking free of charge.

23 MR. CAMERON: So if you didn't park here  
24 today, park tomorrow because it's free. Okay. Thank  
25 you all. We are adjourned. Miriam, another?

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1 MS. JUCKETT: There is going to be a lunch  
2 downstairs if you bring your own lunch or if you want  
3 to pay for lunch tomorrow.

4 MR. CAMERON: And will we have coffee  
5 service tomorrow?

6 MS. JUCKETT: -- tomorrow morning.

7 MR. CAMERON: Okay. Great, thanks Miriam.

8 (Whereupon, the above-entitled matter  
9 adjourned for the day at 5:00 p.m.)  
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