

Official Transcript of Proceedings

NUCLEAR REGULATORY COMMISSION

Title: Advisory Committee on Nuclear Waste
186th Meeting

Docket Number: (n/a)

Process Using ADAMS Template
ACRS/ACNW-005
SUNSI Review Complete YCDS

Location: Rockville, Maryland

Date: Wednesday, February 13, 2008

Work Order No.: NRC-2002

Pages 1-175

ORIGINAL

NEAL R. GROSS AND CO., INC.
Court Reporters and Transcribers
1323 Rhode Island Avenue, N.W.
Washington, D.C. 20005
(202) 234-4433

TR04

ACRS OFFICE COPY
DO NOT REMOVE FROM

DISCLAIMER

UNITED STATES NUCLEAR REGULATORY COMMISSION'S
ADVISORY COMMITTEE ON NUCLEAR WASTE & MATERIALS

February 13, 2008

The contents of this transcript of the proceeding of the United States Nuclear Regulatory Commission Advisory Committee on Nuclear Waste & Materials, taken on February 13, 2008, as reported herein, is a record of the discussions recorded at the meeting held on the above date.

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

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

+ + + + +

ADVISORY COMMITTEE ON NUCLEAR WASTE & MATERIALS
(ACNW&M)

186th MEETING

+ + + + +

VOLUME II

+ + + + +

WEDNESDAY,

FEBRUARY 13, 2007

+ + + + +

The Advisory Committee met at the Nuclear
Regulatory Commission, Two White Flint North, Room
T2B3, 11545 Rockville Pike, Rockville, Maryland, at
8:30 a.m., DR. MICHAEL T. RYAN, Chairman, presiding.

MEMBERS PRESENT:

- MICHAEL T. RYAN, Chairman
- ALLEN G. CROFF, Vice Chairman
- JAMES H. CLARKE, Member
- RUTH F. WEINER, Member

NRC COMMISSIONERS PRESENT:

- PETER B. LYONS
- GREGORY JACZKO

1 NRC STAFF PRESENT:

2 LARRY CAMPER

3 NEIL M. COLEMAN

4 ANTONIO F. DIAS

5 BOBBY EIDS

6 DAVID W. ESH

7 FRANK P. GILLESPIE

8 JAMES KENNEDY

9 DEREK A. WIDMAYER

10

11 ALSO PRESENT:

12 RALPH ANDERSEN

13 JOHN GREEVES

14 RUTH MCBURNEY

15 THOMAS TENFORDE

16

17

18

19

20

21

22

23

24

25

NEAL R. GROSS
COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

TABLE OF CONTENTS

1	AGENDA ITEM	PAGE
2		
3	6) Opening Remarks by the ACNW&M Chairman	4
4	7) ACNW&M Meeting with NRC Commissioner	5
5	Peter B. Lyons	
6	ACNW&M WORKING GROUP MEETING ON MANAGING	
7	LOW ACTIVITY RADIOACTIVE WASTE	31
8	9) Greetings and Introductions	
9	SESSION I: What is LAW?	
10	10) LAW/TENORM Overview	
11	11) Alternative Disposal Options for Low	
12	Activity Waste	39
13	12) Regulation: A National Perspective	57
14	SESSION II: Risk-Based Approaches to the	
15	Regulation of LAW	
16	13) Risk-Based Classification System for	
17	Radioactive and Chemically Hazardous Wastes &	
18	Recommendations from the National Council on	
19	Radiation Protection (NCRP), Report No. 139	73
20	14) Risk-Informed Analytical Approaches to	
21	Waste Classification	96
22	15) Enabling Risk-Informed Approaches to	
23	Management of LAW	128
24	16) A Risk-Informed Approach to Managing LAW:	
25	Adjourn	

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
 1323 RHODE ISLAND AVE., N.W.
 WASHINGTON, D.C. 20005-3701

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

(8:33 a.m.)

6) OPENING REMARKS BY THE ACNW&M CHAIRMAN

CHAIRMAN RYAN: Good morning. The meeting will come to order, please. This is the second day of the 186th meeting of the Advisory Committee on Nuclear Waste and Materials.

During today's session, the Committee will consider the following. We will have a discussion with Commissioner Peter B. Lyons, where we will discuss ACNW letter reports. And the ACNW working group meeting on managing low-activity radioactive waste will begin shortly after lunch.

The meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. Mike Lee is the designated federal official for today's session. He's not here. So Antonio Dias will step in as designated federal official.

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

It is requested that speakers use one of

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 the microphones, identify themselves, and speak with
2 sufficient clarity and volume so they can be readily
3 heard. It is also requested that if you have cell
4 phones or pagers, that you kindly turn them off or
5 place them on mute. Thank you very much.

6 Also, feedback forms are available at the
7 back of the room for anybody wishing to provide us
8 with his or her comments about this meeting. Thank
9 you very much.

10 And, without further ado, Commissioner
11 Lyons, let me welcome you to the Advisory Committee on
12 Nuclear Waste and Materials. We are pleased to have
13 you with us this morning. Thank you.

14 7) ACNW&M MEETING WITH

15 NRC COMMISSIONER PETER B. LYONS

16 COMMISSIONER LYONS: Thank you very much,
17 Mike. And good morning to all of you folks. When I
18 woke up this morning and heard that there was a
19 two-hour delay on federal government, I debated for
20 about two seconds as to whether that would delay your
21 Committee.

22 My guess was that it would not delay your
23 Committee, knowing both your dedication and that you
24 probably were already in the area and probably staying
25 very close by. So I went ahead and braved the roads.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 I am glad I did. I am glad to see you folks here.
2 And, actually, the roads weren't quite as bad as I had
3 feared.

4 I will also apologize, although I think
5 you are sitting far enough away from me. I have been
6 working on quite a cold or flu or whatever this week.
7 I think I'm almost over it. Again, I think you are at
8 a safe distance. I am prepared, throat lozenges,
9 water. And hopefully I can manage to talk for a few
10 minutes.

11 I don't plan to talk very long. I would
12 like to leave most of the time for questions and
13 thoughts that you folks may have. And I thought I
14 would focus my comments on the planned merger.

15 I am the one who proposed that merger to
16 my colleagues. It was certainly a decision or a
17 proposal that I pondered over. But I do think it's
18 the right thing to do. I would like to talk a little
19 bit more this morning about why I thought it was
20 appropriate to move in that direction.

21 But I don't want that proposal or the fact
22 that that proposal has been accepted by the full
23 Commission to in any way undercut the admiration and
24 respect and appreciation that I have for the work that
25 this Committee has done.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 I hope it has been obvious by my interest
2 in many of the topics and subjects that you have been
3 involved with that I truly believe that you have been
4 performing a very, very important function, a very
5 valued function for the NRC and for the American
6 people. Just to mention some of the areas that I have
7 been particularly impressed with your contributions
8 over the last year or so, the low-level waste study,
9 certainly very important. And there are likely, as
10 you know probably better than I, to be continuing
11 challenges in the low-level waste, in how the nation
12 handles low-level waste, as we look into the future.

13 You provided invaluable support as we have
14 moved ahead perhaps to get closer to a license
15 application for Yucca Mountain. The seismic work,
16 package design, the dose modeling, all of those have
17 been important areas on which you have contributed to
18 the Yucca Mountain issues.

19 I think all of you are well-aware of my
20 interest in the linear, no-threshold model for
21 low-dose radiation effects. I have been one of I
22 think many who has truly sought to place low-dose
23 radiation effects on a more solid scientific basis.
24 And the work that you did -- I am thinking
25 particularly of the work with the French Academy of

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 Science -- I think was very important.

2 I am very much looking forward to the
3 workshop that you have scheduled. And I will be
4 making some comments at that workshop, where you will
5 be exploring this subject in greater detail, also
6 looking, as you have in the past, at the DOE low-dose
7 program.

8 Again, my interest here is very much
9 focused on my belief that given the amount of
10 resources that this nation invests in protection of
11 our citizens from low doses of radiation, I think it's
12 simply vital that we have a much more solid scientific
13 basis on which to determine those health effects and
14 protection criteria. That work is certainly very
15 important.

16 You are also aware of my interest in the
17 moderator exclusion. The recent paper that you folks
18 did I think you'll note was reflected very directly in
19 my vote on moderator exclusion. I think you raised
20 very important perspective on moderator inclusion.
21 And I was persuaded by your arguments that before
22 moving ahead with moderator exclusion, we should do a
23 better job of understanding what can be done with
24 burnup credit. And hopefully that can lead to some
25 renewed emphasis on getting the data for burnup

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 credit. But I know that has been another source of
2 frustration for certainly the Commission and also the
3 Committee, I think, over a long period of time.

4 But getting to why I felt a merger was
5 appropriate, it is very likely that sometime -- we
6 certainly don't know when but sometime measured in
7 months probably -- the Department will submit an
8 application on Yucca Mountain.

9 That is going to change the role of this
10 Committee very dramatically. You will certainly still
11 be asked to provide advice to the Commission, but that
12 will greatly limit your interactions with staff
13 whenever that application is filed.

14 In addition, I see that several of the
15 areas of focus for this Committee, while they are not
16 going away, are also maturing a fair bit. I already
17 mentioned that the low-level waste issues are not
18 going away. Those are almost certainly going to
19 continue in some fashion. But I think the work that
20 you have already done provides a basis in that area.
21 Decommissioning would be another area where you have
22 done a lot of work. And I think we have a pretty
23 mature approach now to decommissioning.

24 Putting all of these together with my
25 additional feeling, I believe shared by the rest of

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 the Commission, that the challenges that ACRS is
2 facing are increasingly intertwined or intermixed --
3 I don't know what the best word is -- with the
4 specialties that you folks have, whether it's MOX,
5 whether it is different aspects of GNEP -- and I
6 certainly can't speculate what will happen to GNEP,
7 but as we look into some of these future areas, I can
8 see that ACRS is going to constantly be needing to
9 draw upon the expertise that you folks have, certainly
10 in the health physics area, certainly in the radiation
11 response, radiation dose effects area. And I think
12 there is going to need to be or there would have
13 needed if they weren't merged to be more and more
14 interchange between the Committee, between the two
15 committees.

16 For that reason, also recognizing the
17 ACNW, now ACNW&M, was envisioned, I guess is one word,
18 was fissioned out of ACRS, it seemed to me that it was
19 an appropriate time to ask the question about what are
20 the odds of fusing, of fusion back into ACRS. That is
21 the con that I put in. And the Commission has now
22 agreed to move ahead with that.

23 I think that I am very much hoping that
24 you folks view this as I intended it to be, as,
25 frankly, a recognition of the way events have been

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 moving over certainly the time I have been on the
2 Commission, maybe even longer, but I viewed it as a
3 logical progression, absolutely did not mean it as
4 anything negative towards the Commission or towards
5 any of you. The contributions you have made, as I have
6 already indicated, have been greatly valued. And your
7 contributions in varying ways through the ACRS are
8 going to continue to be very valued.

9 We are in a situation at the moment -- and
10 Frank may need to correct me if I am wrong, wherever
11 Frank is. I'm sure he's here someplace.

12 MR. GILLESPIE: I am over here.

13 COMMISSIONER LYONS: Frank. Okay. I knew
14 you were sitting someplace. Frank, you are in the
15 midst of developing a transition plan. And as that
16 comes together, I'm sure all of us will be getting a
17 chance to look at that and comment on it.

18 As part of the SRM that came out of this
19 proposal, it was clear that there were a number of
20 ongoing activities that we look forward to either your
21 completing or in some way merging in with ACRS. But
22 that remains for the transition plan.

23 That is really the extent of what I wanted
24 to say. I think it is obvious in my comments that I
25 really don't want there to be any doubt that the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 Commission is going to continue to need your expertise
2 and is going to continue to value that expertise. I
3 think that in the merged arrangement, we can probably
4 find greater efficiencies for everyone and continue to
5 address certainly areas in which you were working and
6 also increase your contributions in the areas of focus
7 at the ACRS.

8 With that, I said I wasn't going to talk
9 long. I meant it. As long as my voice holds out, I'm
10 happy to try to take questions or discussion on any of
11 these areas. And maybe I will advance your schedule
12 a little bit today.

13 With that, Mike, back to you.

14 CHAIRMAN RYAN: Commissioner, thank you
15 very much. We really appreciate your vote of
16 confidence and the work of the Committee past, present
17 and future.

18 We have faced this challenge a couple of
19 times in the history of the Committee. Just a couple
20 of years ago, Dr. Garrick and I, the previous
21 Chairman, went through the same exercise. And that's
22 kind of when we said, well, now that the license
23 application for Yucca Mountain seems more eminent, we
24 began to add to the agenda on the things that you
25 mentioned: low-level waste, GNEP, and some of the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 other issues that we have addressed in the last couple
2 of years.

3 I think we are all very pleased that, you
4 know, in the area of decommissioning, we have had an
5 impact. In fact, our advice led to a second rulemaking
6 on the subject of decommissioning on the instruction
7 to staff to consider a second rulemaking. So we are
8 pleased with that.

9 On some of the other areas that you
10 mentioned, like low-activity waste, which as a working
11 group we are going to have today and tomorrow, in
12 addition to the low-level waste, where we are trying
13 to explore that lower end, very low-concentration
14 waste, in fuel cycle, we now have what we hope is a
15 tool for knowledge management, which is a really
16 encyclopedic review of fuel cycle information from,
17 say, the last 50 years. So we are pleased that that
18 is in place now.

19 So I think the one change we can be sure
20 of is that change will come. And we are pleased that
21 we are going to move into a different role and our
22 advice will still be needed there.

23 Many of the issues, as you have mentioned,
24 are mature from the standpoint of our agenda. We have
25 got the half a dozen or so things we are going to

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 finish up. And I'm sure that the way things go, we
2 will evolve as we go back with ACRS. And there will
3 probably be an evolution somewhere down the line
4 beyond that.

5 So I think we have engaged with the staff.
6 And I want to really emphasize our work is successful,
7 really, because the staff and many parts of this
8 agency come in and offer their information and
9 thoughts in a free, open, and honest fashion. And
10 it's those insights that help us formulate the
11 independent advice we offer to the Commission.

12 So we're not here alone. We're here with
13 the staff providing us the information in an open and
14 honest forum and in a public forum, which is an
15 excellent way to do it, to give you the advice we give
16 you. So we feel that's really an important part of
17 our activity here, is to be in the public and to be
18 available for the public to offer their views as well.

19 So, with that, I would ask members to
20 offer any comments. Allen?

21 VICE CHAIRMAN CROFF: I don't know whether
22 to go with a comment or a question. I share Mike's
23 thoughts that he has expressed. I really appreciate
24 your coming down and sharing with us sort of how you
25 got to where we are, I guess, if that sentence makes

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 any sense. I have certainly enjoyed the experience
2 and look forward to whatever happens in the future
3 with the ACRS.

4 I guess by way of more of a question, I
5 have been and I think Mike has been interested for a
6 long time in this whole waste classification ball of
7 yarn, I guess, is about all I can call it. And that
8 ranges from the high-level issues that have come up
9 and the waste incidental to reprocessing associated
10 with it, low-level waste issues that have been
11 mentioned already, the greater-than-Class-C that we're
12 facing, and possible implications of an advanced fuel
13 cycle and what that would do to waste classification.

14 I was wondering at this point what your
15 thoughts were on the whole waste classification issue
16 and where you thought it might go or where it needs to
17 go.

18 COMMISSIONER LYONS: Well, I would start,
19 Allen, by I think agreeing with probably all of you
20 that we have a waste classification system in the
21 country based largely on origin or at least partly on
22 origin, which I don't think makes very good technical
23 sense.

24 Having said that, maybe because I spent
25 some time on Capitol Hill on the staff there, I have

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 some feeling for how difficult it will be to change
2 it. And a change probably requires that some members
3 of Congress take a very strong interest in this
4 particular area. And I think it will be very difficult
5 to generate that level of enthusiasm among members of
6 Congress for a subject that while it is certainly of
7 substantial importance around this table, to this
8 agency, to many other areas of the country, I don't
9 think it exactly commands the -- it's not likely to
10 command the front pages is I guess what I am trying to
11 politely say.

12 I do think there would be strong benefits
13 from a re-look at the waste classification approaches
14 in the country, but I am not optimistic that we would
15 see the impetus for that change.

16 You mentioned reprocessing. I think you
17 did or at least came close to it. If GNEP in some
18 form, if reprocessing in some form does become
19 national policy, a fort for commercial spent fuel,
20 that is clearly going to -- I mean, maybe that will be
21 what forces a re-look at some of the waste
22 classifications.

23 Some of the same issues that you are
24 already dealing with with waste incidental to
25 reprocessing in the defense community are then going

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 to come to the fore in the commercial sector as well
2 and will continue to present challenges.

3 I am not giving you a good answer, Allen.
4 I don't have a good answer. I have no doubt that a
5 reclassification would serve the country well. I am
6 not optimistic that we will see it. Maybe a move
7 toward reprocessing will help to push in that
8 direction.

9 VICE CHAIRMAN CROFF: Do you foresee, I
10 mean, say, the possibility perhaps of trying to fix
11 some of the problems? Let me call it at a lower
12 level; in other words, not in law but possibly in
13 regulation, in guidance -- the Committee has had a
14 considerable interest in 10 CFR 61.58 if memory
15 serves.

16 CHAIRMAN RYAN: Yes, it's the one.

17 VICE CHAIRMAN CROFF: -- as possibly
18 helping out and fixing some of the warts, if you will.
19 Is that in the doable stack?

20 COMMISSIONER LYONS: I think that is in
21 the doable category. It's always going to get weighed
22 by the senior staff and the Commission relative to
23 other priorities. And it's probably not at the level
24 of the squeakiest wheel today given the overall
25 challenges facing the agency. But, yes, I think it's

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 in the doable category, and I think it's something
2 that needs to at least stay on the horizon as
3 something that would be a positive step.

4 VICE CHAIRMAN CROFF: Thanks.

5 CHAIRMAN RYAN: Ruth?

6 MEMBER WEINER: Well, again, I want to
7 thank you for coming to talk to us and for explaining
8 your role and what you see as the future and past of
9 the Committee. And I wanted to ask about a topic you
10 didn't mention.

11 Transportation is the poster child for
12 micro doses to mega populations. I mean, you have a
13 tiny dose. And then you multiply by the number of
14 people on the road and the number of shipments and you
15 get some enormous person, amount of person, rem, which
16 translates to a completely unrealistic LCF. What can
17 we do to change the fact that there is an insistence
18 on assessing the environmental impact this way, which
19 is to my way of thinking completely wrong?

20 COMMISSIONER LYONS: Well, Ruth, the whole
21 issue of collective dose is one that I have found
22 extraordinarily frustrating, probably for decades.
23 I've greatly appreciated the very strong statements
24 that ACNW has made, recognizing that I would say there
25 is no technical scientific foundation for collective

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 dose and that it is grossly misused.

2 I have found it interesting that even --
3 I should be careful how I say that. Well, no. Even
4 some of the recent studies which I wouldn't say they
5 endorse LNT. They at least recognize it as a plausible
6 approach, such as ICRP and BIER VII. I believe I'm
7 correct that both of those studies emphasized the
8 dearth of scientific underpinnings for collective
9 dose.

10 And the question was, how do we stop
11 people from using collective dose? I don't have any
12 idea because at least for some groups, it may serve
13 their interests very well to use collective dose. I
14 think we simply have to continue to stay on the
15 highest possible road of pointing out that there is no
16 scientific validity to collective dose. And you can
17 truly get absolutely ludicrous results.

18 I may not be able to quote this
19 accurately, but I am remembering that the range of
20 fatalities attributed to Chernobyl depending on the
21 group that did the analysis as varied from the
22 observed -- I want to say less than 40 or so --
23 fatalities, various extrapolations in the perhaps few
24 thousand to numbers that I have seen published of
25 approaching -- I'm remember a 600,000 number, but you

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 can play amazing I'll say games because I think that
2 is what they are with micro doses to mega populations.

3 As a scientist, that bothers me, but all
4 I know to do, Ruth, is that we have to continue to say
5 that there is no scientific backing for collective
6 dose applied that way, applied as a measure of
7 fatalities. You have pointed out, others have pointed
8 out that there are valid ways of using collective dose
9 in terms of assessing alternative approaches to
10 perhaps a remediation strategy. But that's in my mind
11 the limit of the use of collective dose.

12 The whole issue of transportation is one
13 that I think is unfortunate from many standpoints,
14 transportation of waste. Certainly the collective
15 dose is one aspect, but I think, in addition, in some
16 of the debate that has gone on over the last few
17 years, the fact that high-level waste has been
18 transported around the world safely in -- you would
19 know the number -- thousands and thousands of
20 shipments, perhaps millions of miles, the fact that
21 that has all been done safely somehow doesn't get the
22 same publicity.

23 If someone asks me if transportation of
24 high-level waste is hazardous, I'll say, "Sure, it's
25 hazardous." Like a lot of things in life that are

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 hazardous, it needs to be done right. And if it's
2 done right, as has been demonstrated by the record, it
3 can be done very safely. It has been done very
4 safely.

5 So I am personally sorry to see some of
6 the rhetoric that has gone on surrounding
7 transportation. And, again, to me is it a risk? Yes.
8 Do we understand it? Yes. Can we manage it? Yes.
9 And that's to me where the important facts are.

10 MEMBER WEINER: Getting back to your
11 response to Allen's question, since a number of
12 members of Congress have given the opinion that this
13 is the most dangerous part of the whole spent fuel
14 complex, is there any point or would there be any
15 possibility in bringing this question to the Congress,
16 to some committee?

17 COMMISSIONER LYONS: I may not be
18 following what you're suggesting as to what we bring
19 to Congress.

20 MEMBER WEINER: Well, would there be any
21 point. You worked on Capitol Hill for a long time.
22 Would there be any point in trying to have some sort
23 of congressional hearings on this question, somebody?
24 I'm not suggesting that the Commission do it but
25 somebody generate this.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 COMMISSIONER LYONS: Well, there might be
2 some benefit to that. As you said, it's not going to
3 be the NRC that probably would propose that.

4 MEMBER WEINER: No.

5 COMMISSIONER LYONS: We would participate.
6 I'm smiling just because we don't really have a
7 mechanism of proposing that. If members of Congress
8 want such a hearing, we would, of course, support it.

9 I may be wrong, but I'm not aware of
10 suggestions of a hearing in that area. There are
11 certainly suggestions for hearings in various areas
12 right now, but that's not one of them.

13 MEMBER WEINER: Thanks.

14 CHAIRMAN RYAN: Jim?

15 MEMBER CLARKE: Commissioner, I, too,
16 appreciate your presence and your willingness to share
17 with us how we got to where we are. And I appreciate
18 the kind words and recognition very much.

19 Probably a couple of years ago, I think
20 shortly after I joined the Committee, I was struck
21 with the challenge of taking decommissioning, as you
22 mentioned, decommissioning lessons learned and
23 bringing them into the front end of the process and
24 taking that knowledge forward in the design of new
25 facilities.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 I do think we have made some progress. I
2 think as a Committee, we feel good about that. And I
3 am not convinced that we are totally there as far as
4 closing the loop, but I do feel good about what we
5 have been able to do. And I think the process has
6 matured, and I appreciate your comments.

7 Serving on this Committee is probably one
8 of the most rewarding things I've ever done. And I
9 look forward to continued service as appropriate.
10 Thank you very much.

11 COMMISSIONER LYONS: I appreciate your
12 comments, Jim. And you're very right about the
13 decommissioning and the suggestions from this
14 Committee to try to take a more forward-looking view
15 at decommissioning far earlier in the life history of
16 a project.

17 I think that the suggestions that you have
18 made trying to avoid what may eventually become legacy
19 sites, trying to avoid some of the challenges that we
20 currently face today, trying to make sure that those
21 are not recurring challenges decades in the future, I
22 think those are very important contributions. And I
23 very much appreciate the Committee's role in that.

24 MEMBER CLARKE: Thank you.

25 CHAIRMAN RYAN: Commissioner, I would be

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 remiss if I didn't mention Professor Bill Hinze, who
2 was here yesterday to finish up a letter on seismic
3 questions that came forward. As you know, Professor
4 Hinze formally retired from the Committee in December,
5 but he promised that that was contingent on getting
6 this letter finished. So he was here yesterday but
7 had other commitments today.

8 I'm sure he would want me to extend his
9 thanks to you for your support of all of the areas
10 that he has been working in over the years and the
11 Commission as a whole. So I would be remiss if I
12 didn't mention that.

13 COMMISSIONER LYONS: I appreciate that,
14 Mike. And please convey to Bill that I specifically
15 mentioned his work on seismic at Yucca Mountain.

16 CHAIRMAN RYAN: Yes.

17 COMMISSIONER LYONS: I am anything but a
18 seismic expert, but I found his alternative points of
19 view to be very, very useful and I believe the staff
20 has found it useful, too, to frame different
21 approaches to viewing the seismic issue.

22 CHAIRMAN RYAN: In looking ahead, I think
23 we see challenges as we go back as part of the ACRS.
24 I think clearly there will be seismic issues for
25 nuclear power plants. Every application will have

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 chapters on environmental issues and questions on
2 radiation protection issues and questions and other
3 elements where I think we have had some overlap
4 already. For example, we have worked with ACRS
5 already in the MOX facility at the Savannah River
6 site. And other interactions have occurred.

7 So I am sure as we go back and get more
8 engaged on their agenda and as we finish up our agenda
9 and remain available for those issues that were sort
10 of the ACNW agenda, I'm sure we will have lots of good
11 work to do. So we appreciate you coming today. We
12 appreciate the other commissioners' support of, you
13 know, having one unified voice in this plan. And
14 we're looking forward and hope that our good work
15 continues.

16 COMMISSIONER LYONS: Thank you very much.

17 CHAIRMAN RYAN: Thank you.

18 COMMISSIONER LYONS: Give you some extra
19 time in your agenda.

20 CHAIRMAN RYAN: Okay. With that, we will
21 pause the record here and take a short break and
22 reconvene in about 20 minutes. Thank you.

23 (Whereupon, the foregoing matter went off
24 the record at 9:05 a.m. and went back on the record at
25 9:23 a.m.)

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 CHAIRMAN RYAN: We will reopen the record.
2 I had a request from one of our visitors, from members
3 of the public. Dr. Thomas Tenforde from the National
4 Council on Radiation Protection and Measurements is
5 here. He wanted to hear Commissioner Lyons, but with
6 weather-related travel, it was not in the cards today.

7 So, Dr. Tenforde, if you would like to
8 come up and announce the annual NCRP meeting and
9 provide that information to the members and the
10 members of the public who might be here, we would
11 appreciate hearing from you. That microphone right
12 behind you will work.

13 MR. TENFORDE: Well, thank you, Dr. Ryan.

14 I think that the Advisory Committee will
15 be very interested in the topic of this year's NCRP
16 annual meeting on low-dose and low-dose rate radiation
17 effects and models.

18 The meeting has, really, three main
19 components. The first is a review of up-to-date
20 laboratory-based research on molecular, cellular, and
21 tissue responses to very low-radiation doses, where
22 we're defining that as less than ten rem. And in many
23 cases, the studies were done at even far lower levels
24 of radiation.

25 And then the second session is on what we

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 have learned from epidemiologic studies on individuals
2 who were either exposed occupationally or
3 accidentally.

4 And the third session will be, I think, of
5 great interest to many of you. It's on potential
6 future regulatory implications of findings on low-dose
7 radiation studies. As you know, there are many
8 different and diverse populations of people that have
9 been exposed over the years or are currently exposed
10 to low doses. And of great interest to us, which was
11 the topic of this year's annual meeting, is the use of
12 medical diagnostic techniques, like CT, that expose
13 people to relatively low doses. And that is an
14 ongoing study.

15 So I have some copies of our press
16 release. The meeting will be on the 14th and 15th of
17 April at the North Bethesda Marriott, very
18 conveniently located across the street for those of
19 you at NRC. And we would like to invite you to visit
20 the NCRP Web site. It's just ncrponline.org. And it's
21 got the full program now for the meeting, along with
22 the registration information. And for any of you who
23 are not local, it has information on hotel
24 accommodations.

25 If I may, I would also like to say that

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 the 2009 meeting will be on a subject of great
2 interest to all of you. It will be on the future of
3 nuclear power: Safety, health, and environment.

4 We are putting together a steering panel,
5 which will hopefully include Commissioner Lyons and
6 people of similar stature within government to help us
7 plan this meeting and put together a formal program
8 committee. That will be during the first week of March
9 next year. And it will be at the Hyatt in downtown
10 Bethesda. So look forward to that, please. I think
11 that will be a fascinating meeting.

12 We want to bring every aspect of the
13 nuclear renaissance into focus at that meeting with an
14 international group. We are inviting for the steering
15 panel people from IAEA, NEA, and from Japan. So we
16 hope to have a very international set of participants
17 and speakers.

18 So I would like to just mention that for
19 your thought. And I will leave these press releases
20 on the back table here. Thanks again for giving me an
21 opportunity to say a few words about this year's
22 meeting.

23 By the way, we have a lot of registrants
24 already. I think it's over 400 now. So I encourage
25 everyone who wants to attend and hasn't registered to

1 please do so. We always have to fight the fire
2 marshall, and it's not our auditorium. But,
3 fortunately, we have a nice facility at the North
4 Bethesda Marriott.

5 CHAIRMAN RYAN: Thank you, Dr. Tenforde.
6 I might also mention that registration is free.

7 MR. TENFORDE: Yes. Thank you very much.
8 That's one of the bonuses of the NCRP annual meeting.
9 We do support all costs out of various sources of
10 funds.

11 CHAIRMAN RYAN: I didn't want to leave
12 that unsaid.

13 MR. TENFORDE: Yes. That is very
14 important. A lot of people look for that.

15 CHAIRMAN RYAN: That's great. And, again,
16 I think it will be a real robust meeting. As you
17 know, we have coordinated a meeting on similar topics
18 related specifically to the NRC for this year's
19 meeting.

20 And we do not conflict. In fact, we are
21 going to have the benefit of your meeting as we begin
22 ours. So I think it will be a robust set of speakers
23 at both meetings. And we will look forward to seeing
24 what good information comes out of those efforts. So
25 we appreciate you being here.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 If I may, I will just have one copy of
2 that. And I will make sure that is part of our formal
3 record so that that will be distributed as our record
4 is distributed.

5 Thank you, Dr. Tenforde.

6 MR. TENFORDE: I'll leave some on the
7 table there.

8 CHAIRMAN RYAN: That would be fine. And
9 we appreciate you being with us. Thanks, sir. Thanks
10 for coming up.

11 MR. TENFORDE: Thank you again.

12 CHAIRMAN RYAN: All right. Thank you.

13 Okay. With that, I believe we can close
14 the record at this point. We're going to go to our
15 letter-writing session. So we will close the record
16 here. Thank you very much.

17 (Whereupon, the open session was concluded
18 at 9:28 a.m.)

19

20

21

22

23

24

25

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

1:05 p.m.

1
2
3 CHAIR RYAN: Good afternoon. I'd like to
4 call this meeting to order. This is the afternoon
5 session of ACNW&M. My name is Michael Ryan. I'm
6 Chairman of the ACNW and we're on Item 9 of our agenda
7 for this week.

8 I'd like to turn to that agenda and
9 identify that the ACNW undertook an evaluation of the
10 issues impacting on the National Program for the
11 Management of Commercial Low-Level Radioactive Waste
12 sometime ago. As part of that examination, the
13 Committee conducted a working group meeting in May
14 2006 and issued a letter report summarizing key
15 findings from that the working group meeting later
16 that August.

17 The Committee also issued a white paper as
18 part of that evaluation. That white paper was
19 published as NUREG-1853 in January of 2007. Both the
20 Committee's letter report and the 2007 white paper
21 have been distributed and copies are available here
22 today if you haven't received one.

23 In the white paper, the ACNW examined the
24 history of low activity waste albeit briefing. This
25 class of waste are recognized using several common

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 titles, LAW, NORM, NARM, TENORM and perhaps some
2 others. But regardless of how they are described they
3 are those radioactive wastes whose concentrations are
4 greater than background and yet occupy the very low
5 end of what is the 10 CFR Part 61 Class A
6 concentration table.

7 To start us off on this working group
8 session, I'm pleased that Commissioner Gregory Jaczko
9 is here to offer his introductory comments and
10 thoughts on this topic. I know it's an important
11 topic to him and, Commissioner Jaczko, without further
12 ado, I'll turn the meeting over to you. Welcome.

13 COMMISSIONER JACZKO: Thank you. I
14 appreciate that introduction and I want to thank the
15 Committee for inviting me to today's meeting as you
16 begin a dialogue on this important issue of low-level
17 waste management and disposal.

18 Over about the past 20 years or so, there
19 have been several reports and people have talked about
20 these issues and written reports dealing with low-
21 level waste disposal and recently the Commission has
22 issued, the Commission staff has issued, reports
23 including a strategic assessment of low-level waste
24 that was done back in October of 2007. And all of
25 these reports and assessments have really concluded

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 the same thing that we need solutions to better manage
2 and dispose of low-level waste. I think that's
3 something that everyone really can agree on.

4 The question then becomes how do we go
5 about doing that and right now, I think we're at a
6 very opportune moment because we don't have a crisis,
7 but we have an obvious need and a need into the future
8 and a need that will materialize with sufficient time
9 for us to make real progress on how we address some of
10 the challenges with this issue.

11 One of the things that I've seen as a
12 commissioner here is that so much of this low-level
13 waste disposal is tied intimately with decommissioning
14 activities and that in many ways these two issues go
15 hand-in-hand. Whenever we deal with decommissioning,
16 one of the big obstacles to decommissioning becomes
17 disposal options and costs for some of the low-level
18 waste materials that are generated through
19 decommissioning and it's perhaps an obvious fact that
20 all the facilities that the NRC licensed and even some
21 that we never licensed have to be decommissioned and
22 that is an important point.

23 At some point, we will be decommissioning
24 a large number of power reactors. We will be
25 decommissioning fuel cycle facilities. We will be

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 decommissioning materials facilities. So there is a
2 large number of facilities that will ultimately need
3 to be decommissioned and, with that, will be large
4 amounts of low activity and low-level radioactive
5 waste, in particular, large volumes of Class A waste.

6 And the Committee I know is familiar with
7 the potential closing of Barnwell in July of this year
8 and the coming need to dispose of large quantities of,
9 as I said, power plant and materials facilities
10 decommissioning waste and, even as I said, some of the
11 new enrichment facilities that we are currently
12 licensing today. They will be generating waste and
13 generating materials that will need to be
14 decommissioned.

15 So as I looked at this situation, I began
16 to look at some of the challenges that we currently
17 have with siting low-level waste facilities and as I
18 think is obvious to everyone probably in this room,
19 that has been a challenge and will continue to be a
20 challenge for a long time. So one of the things that
21 I think we have to do is take a look at sites that
22 exist currently that might be able to be licensed more
23 easily and more quickly than siting a brand new
24 facility. And the obvious potential for that would be
25 other types of hazardous waste disposal facilities.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 As I was looking into this issue, it was
2 brought to my attention that in the State of Colorado
3 which is an Agreement State there was a license issued
4 by the State of Colorado for a RCRA Subtitle C
5 facility and so they issued a license for radioactive
6 materials under their Agreement State Authority to a
7 site that was already permitted under RCRA and I think
8 is an intriguing option as we go forward. And one of
9 the reasons why I work with the Commission to
10 encourage them to begin examining this issue to see
11 whether there is a relationship from the technical
12 side between the requirements for a RCRA hazardous
13 materials facility and an NRC low-level waste facility
14 and the requirements for licensing and permitting and
15 to see where there are similarities, where there may
16 be differences and how we can address those
17 differences. So the Commission asked the Committee to
18 use their expertise and to look into this issue and I
19 think this meeting is really an important first step
20 in taking a look at alternative ways to get new low-
21 level waste facilities licensed and in operation for
22 the future.

23 One of the things that I really want to
24 stress, I think, as this meeting commences and as this
25 issue continues to be discussed is that I think the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 first and most important thing to do here is to look
2 at this from a technical perspective and to really
3 analyze what are the similarities for facilities that,
4 for instance, could be permitted under RCRA and
5 facilities that would be licensed under Part 61 or
6 under Agreement State equivalents and to see how those
7 technical requirements compare. I think if there is
8 a nice overlap or there's a nice interrelationship
9 between those that then we can begin the hard work of
10 looking at how we could go about in the licensing
11 process get some of those facilities licensed to
12 accept low-level radioactive waste or other subsets of
13 low activity waste.

14 I think throughout this the challenges I
15 think are obvious and that it is to ensure that we
16 maintain public confidence and public involvement in
17 the ultimate decisions because that is one of the big
18 challenges right now with siting any new low-level
19 waste facilities is ensuring that the communities in
20 which these facilities would be situated are accepting
21 and confident that these facilities would continue to
22 provide adequate protection for public health and
23 safety. And that's why I think it's so important to
24 look at this first from the technical side to see what
25 are the technical overlaps and see where are the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 differences and how do we address those differences
2 then that may exist in the technical permitting and
3 licensing requirements.

4 So I'm very excited to see the Committee
5 taking on this issue and very interested to see what
6 your meeting, what information you're able to gain and
7 learn from this meeting and how you see these issues
8 being related and what kind of technical information
9 we can get that we can then use to look in the
10 regulatory process.

11 I look forward to hearing how your
12 meetings go and see what conclusions you're able to
13 come to. And I'll be happy to answer any questions if
14 you have any. If not, I would look forward to hearing
15 your meeting.

16 CHAIR RYAN: Let me just give you a short
17 brief outline of the agenda.

18 COMMISSIONER JACZKO: Sure.

19 CHAIR RYAN: And tell you who we have
20 here. We're very fortunate that we have a broad
21 spectrum of regulators both here from the NRC, the
22 EPA, states, state organizations that have dealt with
23 the issues that you mentioned in your summary. We
24 also have, I think, a very good array of
25 practitioners, people who deal with this on a day-to-

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 day basis for real waste for real disposal at real
2 facilities. So it's that body of their experience
3 that we hope to bring to the record that we can then
4 do the analysis that you asked about, just exactly
5 that, what were the technical issues, how would you
6 address them, how would you find solutions.

7 I think one important feature about very
8 low activity or low activity waste disposal is it's
9 not new. It's been going on for some time in lots of
10 places around the country and one of our goals is to
11 assemble all that evidence in one place, do the
12 analysis and do the thinking, the critical thinking,
13 to say where there are good technical synergies and
14 where are the technical issues where further work
15 needs to be done. So that's in a nutshell the exact
16 goal that we're hoping to achieve for this working
17 group meeting.

18 With that, I'd ask my colleagues if they
19 have any other comments or questions and, if not, it's
20 time to go to work.

21 COMMISSIONER JACZKO: Well, good. I look
22 forward to seeing what you're able to learn and
23 produce.

24 CHAIR RYAN: Thank you very much.

25 COMMISSIONER JACZKO: Thank you for the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 opportunity to introduce it.

2 (Off the record comments.)

3 CHAIR RYAN: Without further ado, I'd like
4 to invite James Kennedy up to give us the alternative
5 disposal options for low activity waste, an NRC
6 regulatory perspective. Welcome, Jim.

7 MR. KENNEDY: Okay. Thank you, Mike, and
8 the rest of the Committee for inviting me to speak
9 today on low activity waste disposal and to give our
10 regulatory perspective on them.

11 (Off the record comments.)

12 MR. KENNEDY: Okay. Once again, thanks
13 for having me today.

14 CHAIR RYAN: Jim, excuse me. We just want
15 to go into the display.

16 MR. KENNEDY: I see.

17 CHAIR RYAN: There we are.

18 MR. KENNEDY: Good. Today, I'm going to
19 cover the two main provisions in our regulations under
20 which these types of disposals for low activity waste
21 occur. They are 10 CFR 20.2002 which allows us to
22 approve disposals not otherwise authorized in the
23 regulations and 10 CFR 40.13(a) which exempts
24 unimportant quantities of source material, that's
25 source material that's less than 0.05 weight percent

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 from Atomic Energy Act regulations and which enables
2 our licensees to dispose of these types of materials
3 in unlicensed sites. In addition to addressing
4 current practice in authorizing these disposals, I'll
5 discuss our plans for the future to better inform
6 stakeholders about the criteria that we use and the
7 processes that we have in place to review these
8 requests for disposals, low activity waste disposals.

9 I know your task is focused on RCRA
10 hazardous waste sites and so while I'll be addressing
11 all kinds of alternate disposals including landfills,
12 regular municipal landfills, I'll highlight the use of
13 RCRA Subtitle C facilities as I go through the
14 presentation.

15 This is a chart showing our NRC regulatory
16 framework associated with the disposition of solid
17 materials, all types of solid materials, except high-
18 level waste. It starts on the lower left with the no-
19 detect policy for releasing materials from an NRC
20 license that NRR has in effect for nuclear power
21 reactor licensees and as you go around the circle, the
22 hazard of the waste increases and the type of disposal
23 facility and the measures that they have to control
24 the hazards increase as well.

25 But beginning on the lower left, NRR has

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 a no-detect policy for releasing materials with slight
2 contamination or no contamination at all from their
3 licensed controls. No-detect, if radioactivity cannot
4 be detected by a licensee using certain instruments
5 with certain sensitivities, it may be transferred by
6 the licensees to unlicensed persons for any use.

7 Now above that on the chart, the next
8 circle is Reg. Guide 1.86. Our office, FSME and NMSS
9 endorse Reg. Guide 1.86 which contains in its surface
10 contamination limits for releases of solid materials.
11 Again, these materials can be released for
12 unrestricted use and generally, they aren't considered
13 to be low-level waste not when they're released for
14 unrestricted use.

15 Now for volumetrically contaminated
16 materials, licensees can request any kind of disposal
17 under 10 CFR 20.2002 that's not already authorized and
18 specified in the regulations. 10 CFR 20(k) identifies
19 specific types of disposals that are authorized.
20 Obviously, those include 10 CFR Part 61 disposals in
21 a licensed disposal facility. They also include such
22 things as incineration and release of materials into
23 the sanitary sewer.

24 10 CFR 20.2002, we can authorize these
25 disposals providing a safety case can be made and I'll

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 talk more about that later. Licensees can also
2 transfer unimportant quantities of source material as
3 waste to unlicensed persons and disposal sites and
4 I'll describe more about that later.

5 Moving around the circle, we have Part 61
6 low-level waste disposal sites. Most low-level waste
7 is sent to a conventional Part 61 facility. All of
8 them, of course, are licensed by Agreement States at
9 this time. Most of the volume is sent to Part 61
10 facilities and also the vast, vast majority of
11 radioactivity as well.

12 And finally, at the bottom of the circle
13 is the highest hazard of waste, greater than Class C,
14 which is presumed to go to a geologic repository,
15 although DOE who is responsible for disposing of it
16 could also request other disposal alternatives as well
17 such as bore holes.

18 Just real quick, these are current
19 regulations that I mentioned as I was explaining that
20 chart in the front, 10 CFR 20.2002 and I'll describe
21 that in more detail in a bit and the two provisions in
22 Part 40 that enable licensees to dispose of
23 unimportant quantities of sources material, 40.13(a)
24 which contains the exemption for unimportant
25 quantities of source material, meaning that it doesn't

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 have to have a license, and 10 CFR 40.51(b)(3) which
2 says that the licensee can transfer license material
3 to any person exempt from the licensing requirements
4 of the Act to the extent permitted under such an
5 exemption. In any case, the licensee can use both of
6 those provisions there to transfer unimportant
7 quantities of source material waste to RCRA hazard
8 waste site.

9 And, Mike, I know you appreciate this.
10 I've heard you mention it before. The unimportant
11 quantity basis stems from the regulations that were
12 adopted nearly 40 years ago. The 0.05 percent weight
13 limit for the source material in that exemption was
14 chosen on the basis of concentrations that are
15 necessary to be a useful sources of fissionable
16 material, not health and safety. And that has
17 implications for our process and I'll describe those
18 a bit later.

19 Here is a brief summary of what 10 CFR²
20 20.2002 says. It says that the staff, NRC, can
21 authorize alternative disposals of licensed material
22 not otherwise authorized in the regulations like Part
23 61. It's been around since 1959. It can only be used
24 by a licensee or a license applicant. That's come up
25 a number of times in the past because we have some of

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 these legacy sites where the license has been
2 terminated and organizations, companies, are cleaning
3 up the sites without a license just for efficiency
4 reasons, but with NRC oversight. The material has to
5 be generated in the licensee's activities. The
6 application must include, among other things, a
7 description of the waste and how it's going to be
8 disposed of and dose analyses and finally the staff as
9 a matter of practice for many years has used a dose
10 standard in approving these of less-than-a-few-
11 millirem-per-year exposures to members of the public.
12 We could actually go up to 100 millirem of year, the
13 public dose limit in Part 20, but staff for reasons of
14 conservatism has used that dose standard for many
15 years.

16 As far as past implementation of low
17 activity waste disposals under 20.2002, we've had more
18 than 100 requests in the last 30 years. Two-thirds of
19 them have been for on-site disposals. The trend
20 recently has been towards off-site disposals and I
21 think the reason for that is our decommissioning
22 program has tightened up the guidance on on-site
23 disposals and we're paying a lot more attention now
24 than we used to, say, more than ten years ago or 15
25 years ago to what's been disposed of on a site in

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 terms of what needs to be cleaned up at the time of
2 discommissioning and we've put out some guidance in
3 NUREG 17.57 on that. I think it's become clear to
4 licensees that on-site disposals are probably much
5 less desirable and useful than they used to be and so
6 they're just not asked for as often as they used to
7 be.

8 Typically, 20.2002s occur in solid waste
9 landfills, that is, not hazardous waste landfills.
10 Most are below clearance levels. Some are right at
11 clearance levels. Some appear to go a little bit
12 above, but the concentrations are extremely low. And,
13 in fact, clearance levels, and when I say that I mean
14 the standards that have been defined by IAEA in its
15 safety guide, at those levels, of course, materials
16 could be released for unrestricted use, but licensees
17 are conservative and are using them to dispose of
18 material in landfills.

19 And you can see a listing of all the
20 requests from 2000 to 2006 as an enclosure to a SECY
21 that we wrote a couple of years ago. That enclosure
22 has the licensee, where it went to, a description of
23 the waste, the amount of the waste and so forth.

24 As far as RCRA hazardous waste landfills,
25 I was unable to find any in the recent past, that is,

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 the last eight years anyway that have actually gone to
2 a RCRA hazardous waste site. Now back in 2005, we did
3 approve a couple of 20.2002 requests for large amounts
4 of decommissioning waste to go from a reactor in the
5 northeast. I think it was Connecticut Yankee, Adam
6 Neck. We approved those requests. They were to go to
7 two different hazardous waste sites. I think Waste
8 Controls Specialists was one and U.S. Ecology, Idaho
9 was the other. And even though we made that approval
10 for a variety of reasons, I'm sure I don't know all of
11 them, but economics I think was a factor, the licensee
12 chose not to send the waste to either of those
13 facilities.

14 And so my example here of a 20.2002
15 request, if I had an example for a RCRA hazardous
16 waste site, I would give you that. But I don't. So
17 I'm giving you this alternative which was an important
18 one and one that you may have heard about already. It
19 has to do with the Big Rock Point Nuclear Power Plant
20 in Michigan. That license was terminated about a year
21 ago, but they requested approval to dispose of 42
22 million pounds of concrete debris from their nuclear
23 power plant which they were decommissioning over the
24 last few years.

25 They added about three million pounds of

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 low activity, PCB-contaminated waste a year or two
2 later. We approved that 20.2002 request. Part of
3 review looked at the radiation doses to a truck
4 driver, a landfill worker and a post closure resident
5 farmer. The doses were very low ranging from 0.002
6 millirem per year to 0.4 millirem per year.

7 Let me talk about unimportant quantity
8 transfers for disposals which occur under a different
9 set of regulations. We also do these like 20.2002
10 under case-by-case approvals using as I said earlier
11 10 CFR 40.13(a) and 10 CFR 40.51(b)(3), the latter
12 which enables licensees to transfer to exempt persons.

13 As I mentioned earlier, again 40.13(a),
14 the exemption for unimportant quantities of source
15 material is based on the amount of fissionable
16 material that's in an unimportant quantity and it
17 wasn't developed based on health and safety. And for
18 that reason, in 1999, the Commission when it was faced
19 with a couple of requests to transfer unimportant
20 quantities of source material to unlicensed disposal
21 sites, they addressed the issue. The staff wrote a
22 Commission paper, 98-284. At that time, we had
23 proposals from Shieldalloy Metallurgical Corporation
24 to dispose of large amounts of waste, unimportant
25 quantities, from their Cambridge, Ohio site and their

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 Newfield, New Jersey site. So the staff wrote a
2 Commission paper. It analyzed or described the
3 proposed disposals and the potential doses that might
4 occur.

5 The Commission in responding to the
6 Commission paper gave us some criteria by which we
7 could evaluate in the future any other proposed
8 disposals of unimportant quantities of source material
9 and what they said basically ended up in a proposed
10 rule in August 28, 2002 *Federal Register* and what it
11 says is we can approve these or the staff can approve
12 these if it can be shown that a dose to a member of
13 the public is unlikely to exceed 25 millirem per year.
14 They also said the dose could go up to 100 millirem
15 per year. If it's between 25 and 100 millirem per
16 year, they ask that the Commission be informed. They
17 also said they were even open to higher doses under
18 particular cases based on unique circumstances, but
19 that there would be a Commission review if we received
20 a request like that and the staff recommended
21 approving it. And, finally, the Commission said until
22 the rule was promulgated, the Commission would
23 continue to approve on a case-by-case basis.

24 Now we proposed that rule six years ago,
25 five and a half years ago, and since that time it's

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 been put on hold. It's been a low-priority rulemaking
2 and there's been no action on it since. What that
3 means in effect is that we continue to use the
4 criteria that the Commission defined and we do it on
5 a case-by-case basis.

6 Now here's an example of an unimportant
7 quantity approval. Actually, it just happened a few
8 weeks ago. It's the Homer Laughlin China Company.
9 I'm sure a lot of you know that they used to
10 manufacture Fiestaware. I think they actually still
11 manufacture it. But back in the old days when they
12 manufactured the Fiestaware, the red glaze had uranium
13 in it as well as the ivory glaze, too. So they had
14 uranium compounds at their facility up in West
15 Virginia.

16 The waste involved here included things
17 that they were using to handle the uranium glaze, wood
18 block, concrete blocks, and so forth. It was less
19 than 0.05 percent source material and therefore
20 exempt. There was about 30 tons of it. They provided
21 a performance assessment to use which included
22 analyzing doses to a transport truck driver, a
23 disposal facility worker, an off-site resident during
24 operations and an on-site resident after site closure
25 as well as an intruder. They proposed to send it to

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 the Waste Control Specialists facility down in Texas.
2 We analyzed it on the staff. The doses we came up
3 with and they came up with were around three millirem
4 per year to a truck driver and worker and 4×10^{-5}
5 millirem per year to a future on-site resident and an
6 intruder. And, like I said, we approved that on
7 February 1, 2008. I give the ADAMS numbers there in
8 case anybody is interested.

9 I just thought I briefly summarize a few
10 rulemakings that have addressed disposal of low
11 activity wastes. I know Dan Schultheisz is going to
12 be discussing the EPA rulemaking or advanced notice of
13 proposed rulemaking in 2003. I just thought I'd
14 summarize it real quick. You all know or many of you
15 know that it was published as an advanced notice of
16 proposed rulemaking in November 2003. They were sort
17 of laying out conceptually what the proposed rule
18 might look like. They asked a lot of questions, but
19 generally the idea was that concentration limits would
20 be specified for disposal of low activity waste in a
21 RCRA hazardous waste facility.

22 They discussed, too, some potential NRC
23 regulatory approaches as a companion to the EPA rule.
24 They could have ranged or could range in the future if
25 we go ahead with it from a specific license for a RCRA

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 Subtitle C facility to a general license to even
2 something like the current practice where when
3 something is sent to a RCRA hazardous waste cell now
4 as licensed material it becomes exempt and no longer
5 subject to NRC regulation. But generally, their idea
6 for some simpler NRC process, regulatory process, than
7 what's contained in Part 61.

8 They also mention, too, that there was
9 some possibility of certain radionuclides, anyway,
10 going all the way up to Class A limits based on the
11 dose, groundwater movement and worker in public
12 exposures. So it appears conceptually anyway that
13 their idea was to expand the range of low activity
14 waste that could be disposed of at these types of
15 facilities because right now, you know, we're having
16 alternate disposals at clearance levels and for exempt
17 quantities of source materials that 0.05 percent which
18 is at the very low end and it appears that they were
19 thinking potentially much higher concentrations of low
20 activity waste.

21 Two other proposed rules, I mentioned the
22 one that the Commission asked us to do back in 2002 to
23 promulgate a rule that would codify the dose criteria
24 that they specified for us in 1999. That also
25 envisioned transferred disposal in RCRA Subtitle C

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 facilities. The rulemaking is on hold because of
2 other higher priority rulemakings.

3 Sort of a related rulemaking, it doesn't
4 have to do with hazardous waste sites, but the
5 disposition of solid materials rulemaking or the so-
6 called "clearance rule," the proposed rule was sent to
7 the Commission in March of 2005 and in June or July of
8 2005, the Commission also put that rule on hold
9 because of other higher priority work.

10 I didn't want to go without mentioning the
11 strategic assessments and where this falls in it. Low
12 activity waste disposal was a topic of great interest
13 when we got public comments on the strategic
14 assessment. About half of the commentators had a view
15 on it. A number of them felt we needed to be better
16 specify what our internal procedures were. A number
17 of them thought we ought to be working with EPA to go
18 ahead with the rulemaking and do what we could to
19 encourage EPA to go ahead with their rulemaking on low
20 activity waste. There were also a large number of
21 stakeholders who were opposed to any additional work
22 or any additional disposals of low activity waste in
23 landfills, RCRA hazardous waste sites and so forth.
24 So it was quite controversial.

25 In any case, using the criteria that we

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 had for the strategic assessment and the NRC's
2 strategic goals, we ranked the development of an
3 internal procedure and the Standard Review Plan as
4 high and that's something that we're just beginning to
5 work on. We have practices for reviewing these
6 requests that have come in to us. Our documentation
7 of it needs to be better, both for the staff, the
8 understaff in particular, and our documentation also
9 needs to be better for licensees so that they
10 understand well what the expectations are and can
11 submit something to us that we can review efficiently.

12 Well, just to conclude, we respond to
13 licensees' requests for disposals in hazardous waste
14 sites or landfills using those two regulatory
15 provisions that I mentioned earlier. The requests
16 that we've received in the past have involved very low
17 concentrations of radionuclides typically at or below
18 clearance levels or exempt levels in the case of
19 source material. There have been a number of
20 rulemakings that have been initiated to address low
21 activity waste disposal. All are on hold at this
22 time. And we're in the process of making our
23 procedures and our standards and our expectations more
24 transparent than they have been in the past.

25 At the end here, I have a couple of

1 citations that have a lot of good information in them.
2 There's the 19 -- Let's see. I think it was the 2005
3 NCRP meeting slides which are available online. You
4 have to pay \$10 for them, but there's a lot of good
5 information in those. As far as staff's approval of
6 20.2002, we did a Commission paper a couple of years
7 ago and that has a lot of information on the criteria
8 and past approvals and so forth.

9 And then on July 25, 2000, Carl Papierella
10 of NRC testified at a hearing on FUSRAP program. At
11 that time, there was a lot of controversy about
12 disposal of FUSRAP waste in landfills including the
13 Button Willow landfill out in California, most
14 importantly, the Button Willow landfill, and there
15 are, gosh, probably 500 pages of testimony and
16 information on low activity waste disposal of all
17 kinds all over the country including oil field waste
18 in Louisiana and some of the hazardous waste sites and
19 so forth. In any case, it's a good source of
20 information.

21 I thank you for your time and be happy to
22 take questions.

23 CHAIR RYAN: Jim, thanks very much.
24 You've gotten us off to a great start with an overview
25 of the NRC regulatory perspective. We'll hear from

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 states, I think, in a little while, but any questions
2 for Jim? Jim Clarke.

3 MEMBER CLARKE: Yes, thank you. Could you
4 put up slide six, Jim, the Big Rock Point slide? I'm
5 wondering if you could help me. I'm trying to recall.
6 I think Big Rock point is a good example of a site
7 where everything was eventually taken off-site.

8 MR. KENNEDY: Yes.

9 MEMBER CLARKE: The initial plan was to
10 contain it on-site, I think, or some of it on-site.
11 Did the off-site disposal not go to a RCRA facility?

12 MR. KENNEDY: It went to two local
13 landfills in the State of Michigan about 100 or 200
14 miles away.

15 MEMBER CLARKE: So Title D?

16 MR. KENNEDY: Yes. Not Subtitle C.

17 MEMBER CLARKE: And the PCBs probably went
18 to Utah. Is that right?

19 MR. KENNEDY: No. They also went to a
20 local landfill that was permanent. I don't think it
21 was under Subtitle C. Ralph is back there. Maybe he
22 knows.

23 MR. ANDERSEN: Yes. It was also under
24 Subtitle --

25 CHAIR RYAN: Ralph, if you could just come

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 to the microphone and tell us who you are for the
2 record. Thank you, sir.

3 MR. ANDERSEN: Ralph Andersen with NEI.
4 Yes, I believe it was not a Subtitle C site.

5 MR. KENNEDY: Right. That's my
6 understanding as well.

7 MR. ANDERSEN: But it was specifically
8 permitted for PCBs waste disposal. Yes. So it's just
9 simply been evaluated for that type of disposal.

10 MR. KENNEDY: And actually they had to
11 send it to a separate facility for the PCB waste. The
12 first facility which took the majority of the waste
13 and was a Subtitle D facility, that is, a landfill,
14 solid waste landfill, was not authorized to take the
15 PCB waste but the second was.

16 MEMBER CLARKE: The second was. Okay.

17 MR. KENNEDY: Yes.

18 MEMBER CLARKE: Okay. Thank you.

19 CHAIR RYAN: Ruth.

20 MEMBER WEINER: I'm fine.

21 CHAIR RYAN: Okay. Allen.

22 VICE CHAIR CROFF: No.

23 CHAIR RYAN: Again, Jim, thanks for a
24 great start. It's a great overview.

25 MR. KENNEDY: Thank you.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 CHAIR RYAN: And stick around. We might
2 have some questions later on. Thank you.

3 Next on the agenda is Ruth McBurney from
4 the Conference of Radiation Control Program Directors
5 who will give us the perspective of Agreement States.

6 While Mike is getting the slides set up,
7 I will announce an administrative matter. With such
8 a large group of folks I know checking in is sometimes
9 problematic if you have to wait in a line. If you
10 would let Mike Lee know your name, he'll make sure
11 that you're logged in so that your log-in will be a
12 little bit more efficient and easier tomorrow. Just
13 if you weren't logged into the system today, make sure
14 you see Mike Lee and he'll make sure that's a little
15 easier tomorrow. Thank you all.

16 MS. MCBURNEY: Good afternoon and thank
17 you for inviting me to come and give the national
18 perspective on what's going on in the states with
19 regard to low activity waste regulation.

20 I'm really going to give an overview of
21 the perspective of state regulation of exempt material
22 and other releaseable material, what criteria are used
23 in state programs, some waste that's been allowed to
24 be disposed of other than in a licensed low-level
25 waste site. By rule both AEA material and

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 technologically-enhanced, naturally-occurring
2 radioactive material or TENORM, also some perspectives
3 on alternate means of disposal and some of those types
4 of allowances that have been given and also to touch
5 briefly on some of the license low activity waste
6 sites throughout the country. I'm sure you'll be
7 hearing from the people representing those sites more
8 in-depth later in the session.

9 Just to give you a perspective on the
10 regulatory framework, there are currently 34 Agreement
11 States and 16 non-Agreement States, meaning that 34
12 have entered agreements with the Nuclear Regulatory
13 Commission and have for the AEA material, their
14 regulations are compatible with those of NRC.

15 All the states also have jurisdiction over
16 NORM or TENORM. Right now, there are specific
17 regulations for TENORM in about 12 of the states. All
18 of those states are Agreement States that mostly are
19 in the states where there are TENORM issues such as
20 for phospho-gypsum, pipe scale in the oil and gas
21 industry and some of the mining tailing that are not
22 considered AEA material. So there are regulations
23 regarding those in about 12 of the states.

24 The Conference of Radiation Control
25 Program Directors provides suggested state regulations

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 for all radioactive material. We have working groups
2 working on those that are also similar to those of the
3 Nuclear Regulatory Commission for AEA material and we
4 make sure that the suggested or model state
5 regulations do meet the compatibility standards of
6 those of NRC. But also we have developed suggested
7 state regulations for TENORM and, as I'll mention
8 later, we address some ways of disposing of that
9 material as well.

10 For exempt material for disposal, I think
11 Jim Kennedy mentioned that the source material less
12 than 0.05 percent by weight. Some of the states have
13 regulations that would allow that to be disposed of
14 without regard to its radioactivity under certain
15 conditions and some do it on a case-by-case basis.
16 But all have the same regulations on the unimportant
17 quantity of source material and the transfer of
18 unimportant quantities as NRC's. And then, of course,
19 all the exempt items and materials that are in 10 CFR
20 Part 30 are in the equivalent Agreement State rules
21 and those types of things can be disposed of as non-
22 radioactive if they are an exempt item.

23 Waste that's generated after meeting site
24 decommissioning standards are considered, I guess, if
25 something goes on on those sites and that material is

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 disposed of, it can be disposed of without regard to
2 its radioactivity. This particular standard varies
3 from state to state and I'll get into a comparison in
4 just a minute.

5 For exemption of TENORM, the exempt
6 concentrations for disposal of that varies from state
7 to state as well. Currently, some states that have
8 TENORM rules exempted at the 5 picocurie per gram
9 radium level and some go as high as 30 picocurie per
10 gram. The suggested state regulations or model state
11 regulations have a 5 picocurie per gram radium as an
12 exempt level for radium in theirs.

13 Several years ago -- Well, about a year
14 ago, a survey was done of the Agreement States and the
15 State of New Jersey which also had an active program
16 in this area to see what criteria they used for
17 release of equipment and surface-contaminated areas,
18 also if they placed any conditions on those releases
19 such as release for disposal only rather than for
20 recycling or reuse. They were also asked if they have
21 adopted some sort of dose criteria for decommissioning
22 and, if so, what is it? If not, what is the basis for
23 the unrestricted release of facilities in those
24 states?

25 On the equipment and facility release

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 limits, 18 of the states surveyed stated that they
2 used the Reg. Guide 1.86 or the NUREG-1556 criteria
3 and two of the states used 10 percent of that limit
4 that was in Reg. Guide 1.86 and those two states
5 actually had that limit in their regulations rather
6 than as guidance. Some other used a 200 dpm per 100
7 square centimeter and this question was not addressed
8 from some of the respondents. We got 27 respondents
9 out of the 35 that were surveyed.

10 We also asked if there were additional
11 restrictions on that equipment of facility release.
12 Twenty of the states said no. Once they met those
13 limits, that was it that could be released for
14 disposal or in any manner or for reuse or whatever.
15 In five of the states there were additional
16 restrictions. Some of those restrictions would be
17 it's not releaseable to an unclassified or a Class 3
18 landfill. One respondent said that. Disposal or
19 reuse only was expected of those facilities that had
20 been released under the limits and one state said that
21 it was addressed on a case-by-case basis.

22 Regarding the decommissioning standards,
23 most of the states had adopted the 25 millirem and it
24 was in their regulations. One state -- No. Three of
25 the states still used a 10 millirem decommissioning

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 standard and one non-Agreement State used a 15
2 millirem standard. One state had not adopted, said
3 that they had not adopted, a decommissioning standard
4 in rule, but it was done on a case-by-case basis not
5 to exceed 25 millirems.

6 What we learned from that survey was that
7 the states and NRC do have some sort of de facto de
8 minimus level below which waste is disposed of as non-
9 radioactive in accordance with these release limits.
10 Most of the states are consistent with NRC with
11 release of equipment and facilities and standards for
12 decommissioning, although there is some variation
13 still among the states on that.

14 Some of the states or most of them have
15 some sort of rules that would allow other disposal of
16 certain radioactive material by other than to a low-
17 level waste site. For AEA material, of course, you
18 have the liquid scintillation and animal carcasses
19 rule for tritium and carbon-14 in certain
20 concentrations and that's in 10 CFR 20.2005. Some
21 states have added the iodine-125 which is also used in
22 laboratory use and medical use and in liquid
23 scintillation and also in animals and so have added
24 that isotope to that list of that that's able to go to
25 landfill or in the case of liquid scintillation if

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 it's hazardous to a hazardous landfill.

2 The State of Texas has adopted, has had in
3 place, since the mid 80s a rule that would allow
4 certain concentrations of short half-life material
5 that's less than 300 days in Class 1 municipal
6 landfills or if the material also contains hazardous
7 material, it could go to a Subtitle C hazardous waste
8 landfill.

9 Some states allow emission controlled dust
10 from arc furnace smelting of gauges, the inadvertent
11 cesium-137, the ash from that, to be disposed of in
12 Subtitle C hazardous waste landfills that allow the
13 KO-61 flue dust to be disposed of there. Once again,
14 the State of Texas had included that in rule. I think
15 some states do it under the or NRC would allow it
16 under the branch technical position under the
17 Alternate Disposal Rule and use the branch technical
18 position as guidance. The State of Texas used that
19 guidance and actually implemented it into a
20 rulemaking.

21 Tennessee, and I'm sure you'll hear more
22 about this later, allows certain bulk waste in
23 municipal landfills under the Bulk Survey for Release
24 criteria. Pennsylvania, and I don't have this on the
25 slide, also has through rulemaking legitimized some of

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 the inadvertent disposal of contaminated material at
2 local landfills as well.

3 With regard to TENORM, technologically-
4 enhances, naturally-occurring radioactive material,
5 the suggested state regulations that have been
6 developed by CRCPD membership and have gone through
7 the approval process from the Federal agencies as well
8 allows the disposal of that, of TENORM, at a permitted
9 solid or hazardous waste disposal facility, that's
10 supposed to solid, not sold, provided that it's not
11 prohibited from disposal at those facilities. So
12 those facilities would have to be permitted to take it
13 or allowed to take it, could be disposed of through an
14 injection well approved for such disposal or, in
15 certain concentrations, a land application might be
16 allowed, some sort of dilution or dispersion as a land
17 application if there was a small amount on, say, a
18 large land lease for oil exploration.

19 Some of the -- Right now, the TENORM
20 regulations vary from state to state and we haven't
21 had the suggested state regs. in place long enough for
22 all the states to actually adopt the new SSRs in that
23 area. So right now, there's quite a bit of variation
24 in how states are regulating TENORM and the disposal
25 aspects of that.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 CHAIR RYAN: Ruth, just a clarification
2 there. The states aren't required to adopt that SSR,
3 are they?

4 MS. McBURNEY: No.

5 CHAIR RYAN: Okay.

6 MS. McBURNEY: Because this is not a
7 Federal standard and the states that have TENORM
8 issues they usually tailor their regulations to that
9 specific issue. Like in Florida, it might be toward
10 the phospho-gypsum in industry.

11 CHAIR RYAN: As opposed to oil and gas in
12 other states.

13 MS. McBURNEY: Oil and gas states.

14 CHAIR RYAN: Yes. Okay. Thank you.

15 MS. McBURNEY: Also I wanted to make
16 mention that the suggested state regulation for TENORM
17 does prohibit dissolution to make the waste exempt.

18 Regarding alternate means of disposal, as
19 you heard earlier, the 10 CFR 20.2002 does allow
20 application for alternate means of disposal for low
21 activity waste. Some states do have this regulation
22 and some do not for various reasons. Some have
23 legislation that only allows waste to be exempted by
24 rule or other types of disposal to only be done by
25 rule.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 It is a compatibility level D meaning it
2 does not have to be adopted by the Agreement States
3 since it is a procedural rule for obtaining an
4 exemption from other rules and not a standard in
5 itself which some compatibility levels such as for
6 your basic dose standards must be adopted. But this
7 particular rule is at a much lower level and does not
8 have to be adopted by Agreement States.

9 For TENORM, the suggested state
10 regulations do provide for alternative means of
11 disposal, those that are authorized by the permitting
12 agency for the disposal site upon application or upon
13 the agency's initiative and consistent with public
14 dose standards. Those alternate methods must also be
15 consistent with the Safe Drinking Water Act standards
16 and other EPA requirements for disposal of such waste.

17 Several of the states do have licensed or
18 permitted low activity waste facilities. Of course,
19 the U.S. Ecology facility in Idaho is a hazardous
20 waste permit that's been amended to allow certain
21 concentrations of radioactive material. You heard
22 earlier from Commissioner Jaczko about the Colorado
23 facility that was a hazardous waste facility that's
24 now been licensed under the Colorado rules for low-
25 level waste. It's limited to NORM or TENORM, uranium

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 or thorium decay chain material less than 2,000
2 picocuries per gram and radium at less than 400
3 picocuries per gram, the Energy Solutions facility in
4 Utah which is licensed for low activity waste and
5 TENORM and Waste Control Specialists facility. The
6 current facility is a hazardous waste facility that is
7 permitted to accept exempt material including exempt
8 TENORM and the unimportant quantities of source
9 material. They do have an application pending for
10 (11)(e)(2) material as well, but that's not been
11 licensed yet. And I haven't even mentioned (11)(e)(2)
12 or pre-1978 (11)(e)(2) material which the states are
13 treating like they would TENORM for that material that
14 was pre-1978 uranium tailings.

15 In summary, the states and the Nuclear
16 Regulatory Commission do have a sort of de facto de
17 minimus level below which waste is disposed of as non-
18 radioactive in accordance with release limits.

19 Most states are consistent with NRC for
20 the release of equipment and facilities and standards
21 for decommissioning, although they do vary somewhat.

22 States vary in their regulation of TENORM
23 waste, but CRCPD has provided model regulations for
24 the exemption of certain concentrations of that
25 material for licensing material while it's in

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 possession and then giving some disposal options for
2 TENORM.

3 Some states have provided for ultimate
4 disposal options for low activity waste, that's
5 specific rules, or through implementation of rules
6 similar to 10 CFR 20.2002 and are providing by rule
7 and by licensing some actual or other permits, some
8 way of disposing of some of this waste.

9 With that, I'll close and be able to
10 answer any questions that you might have.

11 CHAIR RYAN: Ruth, thanks. That's a great
12 overview of the states' perspective. I'm pleased to
13 note that all the facilities you mentioned in your
14 list are here on the agenda.

15 MS. McBURNEY: Yes.

16 CHAIR RYAN: And we'll hear some of the
17 details from them. So that's worked out very, very
18 well. Any questions, Jim?

19 MEMBER CLARKE: No. No, thank you.

20 CHAIR RYAN: Ruth.

21 MEMBER WEINER: Yes. I had a couple of
22 questions. Given the variety of regulations and
23 implementations that the states have, would you see
24 from your perspective would there be a benefit to
25 standardizing everything? Would there be a detriment

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 to standardizing everything? How would you see that?

2 MS. McBURNEY: I think it would be a
3 benefit to have a national standard for how to handle
4 low activity waste and for setting some initial
5 minimal level for doing that because it would give
6 better guidance and better standardization for that.
7 I think back as far as in the background document,
8 back as far as the 1970s, the states were asking for
9 some sort of national standard on this.

10 MEMBER WEINER: Well, if that were to
11 happen, would you see that as happens with other
12 Federal regulations that the states could get more
13 restrictive but not less restrictive and that then
14 some states would do that and we have the same
15 situation we have now?

16 MS. McBURNEY: That could happen. That
17 very well could happen because in some states the
18 politics is such that they want even tighter standards
19 than the Federal standards and then it puts the states
20 that do accept the Federal standards in the position
21 of those people in the states with the tighter
22 regulations sending their waste there to the other
23 states. So there are several issues that would have
24 to be addressed on that.

25 MEMBER WEINER: Thank you.

1 CHAIR RYAN: One of the things you
2 covered, Ruth, was the kind of array of bases and
3 histories of what formed a regulation or a
4 requirement. The short version of the question is if
5 you were a king or queen of the world or a king of the
6 world or creator of the world, would you pick dose as
7 the basis for regulating or concentration.

8 MS. McBURNEY: I think dose because --
9 Well, then the concentration could be implemented as
10 an implementation.

11 CHAIR RYAN: Derived from the dose.

12 MS. McBURNEY: Right. Derived from the
13 dose.

14 CHAIR RYAN: By performance, assessment,
15 that kind of thing.

16 MS. McBURNEY: Yes. Having been involved
17 in the rulemaking for the short-lived material in
18 Texas, the rule lays out concentrations, but the risk
19 assessment on the basis on which we did the rulemaking
20 was a 1 millirem criteria, but then we actually put
21 the concentrations of the various isotopes --

22 CHAIR RYAN: Still based on a specific
23 criteria.

24 MS. McBURNEY: Still based on the other.

25 CHAIR RYAN: I think that was interesting

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 note from Jim Kennedy's talk is that if you look
2 across his circle of regulation, some were instrument-
3 based, I mean, based on specific instruments. I
4 guess, somewhere there might be a dose criteria, but
5 the transparency of those isn't as clear whether
6 that's just the concentration. Because in a
7 different, say, geo-hydrologic setting the same dose
8 could end up with a different concentration.

9 MS. McBURNEY: But, yes. But it would be
10 for a typical -- I think that dose basis was based on
11 atypical municipal landfill.

12 CHAIR RYAN: Yes.

13 MS. McBURNEY: And the dose criterion of
14 the 1 millirem and then from that all these
15 concentrations.

16 CHAIR RYAN: Again, I think one of the
17 things we're trying to learn in these couple of days
18 is if you do pick a dose it's fairly clear and uniform
19 to everybody, but then the burden of performance
20 assessment goes with that.

21 MS. McBURNEY: Right.

22 CHAIR RYAN: But if you do that for them,
23 you may end up with something that's more restrictive
24 in one case than in another.

25 MS. McBURNEY: Right.

1 CHAIR RYAN: So we're trying to learn as
2 much as we can about that and you've given us a great
3 start.

4 Allen, do you have any questions at this
5 point?

6 VICE CHAIR CROFF: I had one. You talked
7 a lot about TENORM and NORM. What about accelerator-
8 produced materials?

9 MS. McBURNEY: Of course, that is now AEA
10 material. So it's regulated now like lab product
11 material is.

12 VICE CHAIR CROFF: But in the past, was it
13 -- Before that relatively recent change, was it
14 treated the same as, I mean, what you describe for
15 NORM and TENORM basically in terms of exemptions and
16 the rest?

17 MS. McBURNEY: Most states regulated it
18 like they did byproduct material. It was licensed
19 like byproduct material. The difference in ARM and
20 ORM is that the NARM in ARM, accelerator-produced
21 material, was actually possessed for its radiological
22 properties, just like byproduct material is used
23 medicine and industry for its radiological properties;
24 whereas, TENORM is used in -- I mean, it just happens
25 in industries that they're not really wanting it

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 there. It just occurs. It's naturally-occurring
2 material that is a byproduct of oil exploration or of
3 the phosphate industry or whatever.

4 VICE CHAIR CROFF: Okay. Thanks.

5 CHAIR RYAN: Ruth, thanks very much.
6 You've gotten us off to another great start, so we
7 appreciate that.

8 Our agenda shows that we are due for a
9 break. However I think I'll split up the afternoon
10 floor sessions and ask Allen Croff to provide us with
11 his summary and a risk-based classification system for
12 radioactive and chemical hazardous wastes, coming as
13 recommendations to the National Council on Radiation
14 Protection and Measurements, in Report Number 139.

15 I may be incorrect but I think this is one
16 of the first really comprehensive assessments of
17 radioactive material and chemical waste analysis with
18 regard to risk assessment and ultimate disposal of
19 these kinds of material.

20 Allen, thank you for giving us this
21 briefing?

22 RISK-BASED CLASSIFICATION SYSTEM FOR RADIOACTIVE AND
23 CHEMICALLY HAZARDOUS WASTES - RECOMMENDATION FROM
24 THE NATIONAL COUNCIL ON RADIATION PROTECTION

25 VICE CHAIR CROFF: I think you are right,

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 Mike. We certainly couldn't find another one to help
2 us along.

3 I'm going to come at the waste
4 classification and waste disposal issue from I guess
5 a very different perspective than the two talks you
6 just heard.

7 What you just heard is talks about - at
8 the level of regulation, and how the system is working
9 from a pragmatic standpoint I guess to put it in a few
10 words.

11 I am going to more focus on a history and
12 the status of hte waste classification system at the
13 higher levels, which means I'm going to primarily be
14 talking about things that are codified in law, not in
15 regulation or guidance and this kind of thing.

16 First, the title says a brief history, and
17 it's going to be like that movie title, Part One of a
18 Brief History of the World.

19 These were initially classified based on
20 operational and design considerations. If you go back
21 to World War II and shortly after it, great demand for
22 the product, in particular of plutonium from
23 production reactors, which was meant for processing;
24 and then various secondary wastes.

25 And the people running those plants needed

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 practical solutions today on how to handle them today.
2 So whether they had penetrating radiation or not,
3 whether they generated a lot of heat or not, those
4 were the most important considerations, and the wastes
5 were segregated on that basis and managed on that
6 basis, not for the most part disposed of on that
7 basis, certainly for the higher activity waste.

8 As a practical matter this translated from
9 how much heat is it generating to the process that
10 generated the waste. There were only certain
11 processes and certain places in these facilities that
12 could generate a high-heat waste or a waste with
13 penetrating radiation or high alpha. So it became
14 attached to the source or the origin of the waste if
15 you prefer.

16 And as time went on this what I'll call an
17 idealized source basis was adopted, and codified into
18 the waste definitions which are the boundary of the
19 waste classes. And basically that's what persists
20 today. That's sort of how we got to where we are.

21 And you will note the word, idealized,
22 here. I use that deliberately. If the process was
23 running right and as intended, they knew where the
24 waste would go. And I'll get back to this a little
25 bit later.

1 And as I said the primary waste
2 definitions come from law. This is from the NCRP,
3 Report #139, and it was our attempt to sort of
4 summarize the hierarchy of waste classification in the
5 United States, first splitting it into fuel cycle
6 waste, or Atomic Energy Act waste, and then non-fuel
7 cycle waste.

8 And I should say, the report goes back a
9 few years, and it precedes the change in law which
10 brought some of the non-material back in as AEA
11 materials. So this diagram is a little bit off in
12 particular as it concerns some accelerated produced,
13 and some of the more concentrated norm sources.

14 But focusing on the left you see the four
15 major waste classes. All of these are defined in law.
16 I'll spare you the torture of reading the definitions
17 here, because some of them are indeed tortuous.

18 But basically high level waste is the
19 lynchpin. It is defined on its source as the waste
20 from nuclear fuel reprocessing, which has been
21 somewhat refined to be the waste from the first cycle
22 of nuclear fuel reprocessing or equivalent.

23 Transuranic waste and low-level waste are
24 defined by exclusion. Transuranic waste is waste
25 that's not high level waste and has more than 100

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 nanocuries per gram, and low level waste is waste that
2 excludes high level waste, spent fuel, uranium and
3 thorium mill tailings.

4 There is essentially a definition for
5 uranium and thorium mill tailing in the law.

6 Beneath this you start to get, from these
7 basic waste classifications and go into waste sub-
8 classifications, transuranic waste has the contact and
9 remotely handled; and that's applicable to the DOE
10 system, not the civilian system.

11 And of course under low level waste we
12 have hte A, B and C that come from Part 61, and then
13 by difference I guess I'd call it the greater than
14 class C.

15 At this point I think I'll make one other
16 comment. Let me go on for just a little bit; I'll do
17 that a little bit later.

18 Given some of hte frailties of this system
19 that have been well described, and some of the
20 challenges it creates, and I'll get to these a little
21 bit later, there have been some alternatives proposed,
22 and I'll describe them for the U.S. and then talk a
23 little bit about the international situaiton.

24 In the U.S. over decades literally a
25 number of authors have tried to propose systems with

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 a goal of making waste classification more related to
2 risk as opposed to the source of the waste.

3 A very typical approach is usually a two-
4 dimensional approach where the waste is categorized on
5 one hand by its activities - that's activities,
6 something like curies or power density - and on the
7 other hand by longevity, in particular, the
8 concentration of long-lived isotopes, and whether it
9 makes it unacceptable for near-surface disposal or
10 not.

11 To my opinion these have had very little
12 impact in the U.S. They have just barely been
13 considered for adoption. There have been a couple fo
14 attempts that didn't last very long. And they just
15 simply haven't gone very far.

16 I guess I should at this point comment on
17 the NCRP Report #139. What it attempted to do was to
18 set forth a risk-based waste classification system,
19 one that was essentially literally based on risk, and
20 to do so and have a unified classification system for
21 chemical waste and radioactive waste.

22 The essence of it if you bore down into
23 the middle of it is to compare the radionuclide
24 concentrations to acceptable - quote, acceptable limit
25 - for various disposal facilities for the waste,

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 either a near-surface facility or have an exempt class
2 of waste.

3 And there are numerous challenges in doing
4 this. In the chemical system and the way they
5 approach risk, and the RAD system and the way it is
6 approached on a risk basis, are not the same. The
7 same words mean different things in the two systems.

8 In the radiation world, threshold effects
9 are essentially unimportant to us in most cases,
10 certainly concerning waste disposal. But they are of
11 significant importance in the chemical worlds, so that
12 added to the account. So it got to be a rather
13 complicated exercise. The proposal came forth for a
14 three-tiered system: exempt, low hazard, and high
15 hazard. But again to my reckoning I don't think it's
16 going any place in the near future.

17 Internationally, I'm certain not going to
18 try to address every country in the world, but
19 concerning the International Atomic Energy Agency,
20 this summarizes their presently recommended, I'll
21 guess I'll say, waste classification. It has an
22 exempt waste class based on dose; a low and
23 intermediate waste level class, which is sort of a
24 collage of what we would call low-level waste in this
25 country and the transuranic waste, the long-lived - of

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 the low and intermediate level long-lived waste is
2 something that we would probably call a transuranic
3 waste.

4 And you will see in that middle block,
5 especially for the non-long-lived, a number of
6 disposal destinations are impossible. It's sort of -
7 it's up to you, country, is basically what they are
8 saying.

9 And then high level waste. And in this
10 case it's - it is based on the power density in the
11 waste. So you bring in that factor as well as the
12 concentration of long-lived radionuclides, in
13 particular the alpha emitters.

14 So I can't make a direct connection but
15 possibly some of the early work in the U.S. might have
16 influenced the IAEA, since there are similarities
17 between some of the proposed systems.

18 And then as a separate matter, the
19 basically norm waste that they recognize because of
20 the volume need to be considered separately.

21 This is what's on the books now and
22 official.

23 Going beyond it, they are working on a
24 revision to this, and this is the diagram if you will
25 that shows how it lays out.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 And I should say, fortuitously or not,
2 just last night I got emailed to me an updated version
3 of this which I have not had a chance to digest yet.
4 Based on a cursory scan it does not appear to differ
5 much, but I haven't had a chance to read the words.

6 What you see in this diagram is an
7 elaboration of their system. The VSLW waste on the
8 left is very short-lived, and it's basically decay to
9 innocuous levels. It's that short lived.

10 At the bottom you see the exempt waste
11 category which has been retained at clearance levels.
12 Very low level waste would correspond to the kinds of
13 things we have been talking about here today. This is
14 waste that might be disposed of in a landfill, but not
15 a near-surface disposal necessarily designed for low
16 level waste, the higher activity low level waste,
17 which is the LLW block or band above it.

18 Intermediate level waste has been
19 retained, and this is something probably more akin to
20 the transuranic waste. So they have taken their
21 previously block in the middle, and separated it with
22 the target destination there. They have mentioned
23 things like deep bore holes. But something
24 significantly below the surface.

25 And finally high level waste destined for

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 repository disposal.

2 A couple of other features you see here.
3 These little red dots scattered around. They went and
4 looked at typical isotopic sources raising from some
5 very short-lived ones, yttrium-90 and irridium-192,
6 which are the As on the left, to cobalt-60 and tritium
7 are the B's, and then to cesium-137 and strontium-90,
8 the Cs, and finally plutonium and americium and radium
9 sources, which are the D sources on the right.

10 I just wanted to show where they would fit
11 into these things, and of course some of them become
12 intermediate waste and far more stringent disposal.

13 You also see a very broad band of where
14 the norm might lie, and thus it's challenge and why
15 they chose to put it in a separate classification.

16 Talking about the risk basis of the
17 systems, I don't know that htey have been described.
18 The U.S. classification system believe it or not is
19 qualitatively or indirectly related to risk in ways
20 that are similar to the ideal.

21 To pick an example high level waste, if
22 you've got high level waste coming out of a potential
23 commercial reprocessing plant, maybe something like
24 one of the LaHague plants or THORP, it's very active,
25 radioactive. They are running the plant and producing

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 material that meets up to the ideal of high level
2 waste. And it should be treated as such.

3 On the other hand, if you look at the
4 Department of Energy situation where they have taken
5 waste from that same source many years ago, diluted it
6 with neutralizing chemicals, processed it, removed
7 things, blended things, it moves away quite a bit from
8 the ideal depending on exactly what little piece of
9 that waste you might be looking at on any particular
10 day.

11 So in a qualitative sense it does relate,
12 but. There are a lot of ways differing from the
13 ideal. High level waste, I just mentioned, at what
14 point should it not be mentioned as high level waste?
15 The Congress has come up with this waste incidental to
16 reprocessing construct based on a lot of earlier work
17 here in the Nuclear Regulatory Commission for deciding
18 that.

19 But the nature of the definition raises
20 this question, and the need for I'll call it
21 exceptions in some cases.

22 Low level waste, the very dilute and very
23 concentrated edges of the spectrum of low level waste.
24 In this meeting today you've already talked and will
25 talk a lot more about the more dilute and whether that

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 should be acceptable.

2 At the very concentrated end you get into
3 isotopic sources where if you start to take very
4 literally the concentration even though it may be a
5 millicurie or some very small amount of radioactivity,
6 its concentration can be very high.

7 And so it just doesn't fit into the tables
8 of concentration, and the concept of low level waste
9 will help special consideration, and often that
10 consideration has gotten into the concentration
11 averaging business which has been interesting for many
12 years, and I think we are going to hear more about
13 that right after the break.

14 And then there is non-fuel-cycle wastes,
15 which are separate and have been and are sometimes
16 treated separately, and not necessarily same way as
17 the fuel cycle waste, but even though they may be
18 similar to fuel cycle waste.

19 The IAEA waste classification system would
20 seem to be mostly risk-informed, and I'm referring to
21 the existing one. And I can't really make heads or
22 tails at this early juncture out of the new IAEA
23 system because it hasn't been quantified to a very
24 great extent in terms of exactly where the boundaries
25 would be. But it looks to have some promise,

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 although it is very complicated.

2 The proposed U.S. waste classifications
3 have generally been mostly if not entirely risk
4 informed. As I said before, similar to the IAEA waste
5 classification system.

6 Finally some of the central problems that
7 these definitions involve have caused as I mentioned
8 high level waste and the need for this WIR process
9 that is costly and distractive I think, I would say,
10 at a minimum; contentious at worst.

11 There is no lower boundary for low level
12 waste. You have heard quite a bit in the previous two
13 talks about regulations and otehr provisions in
14 guidance that are - and including state regulations -
15 that are allowing it to occur. But in the
16 classification per se, in the U.S. there is not an
17 exempt waste class.

18 That has led us to things like mixed waste
19 and no clearance or case-by-case clearance of
20 materials, depending on where you are.

21 At this point we have no system for I'll
22 call the intermediate level non-defense waste, or
23 greater than class C wastes. As Jim Kennedy noted,
24 the DOE is working through some kind of a process with
25 I guess the expectation of an EIS that will propose

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 some path forward on this.

2 But at this point there is a lot of
3 greater than Class C and equivalent DOE waste that is
4 awaiting some destination.

5 Finally the concentration based boundaries
6 as I said get you into difficulty at the ends of the
7 spectrum and have led to our discussions here today as
8 well as those that preceded it, as well as at the
9 other end the concentration averaging protocols and
10 the need for those to make sense out of the system.

11 I believe with that I'm done. I include
12 a few references here to the two IAEA documents and
13 the NCRP report for anybody that is interested.

14 Questions?

15 CHAIR RYAN: Jim?

16 MEMBER CLARKE: No thanks. Nice job.

17 CHAIR RYAN: Ruth?

18 MEMBER WEINER: That was a very good job.

19 One of the - this is just to add to your
20 very excellent presentation - one of the very
21 confusing things was the notion of transuranic waste,
22 at least a quarter of which is the same sort of stuff
23 as low level waste. And the remote handled
24 transuranic waste is physically indistinguishable from
25 high level waste. So it's a completely artificial

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 distinction.

2 VICE CHAIR CROFF: Yes.

3 CHAIR RYAN: There's an aspect of waste
4 classification that we have talked a little bit about,
5 I think Ruth talked on it, and you did, Allen, and
6 that is that many wastes were defined not only by
7 their origin but also by how they were handled
8 operationally.

9 Ruth gave an example: contact and non-
10 contact handled waste has absolutely nothing to do
11 with its disposal risks; everything to do with its
12 operational risks.

13 If you look at the DOT requirements for
14 moving waste or radioactive materials around the
15 country, you've got dose rates on contact with the
16 shipping container, and dose rates at distances away,
17 and all that stuff; the driver's position. And those
18 are all radiation protection for worker kind of
19 criteria.

20 Again, you know, the risk for an accident
21 is handled through the accident requirements and
22 design requirements so that material is controlled in
23 the accident situation.

24 But again it's about waste. You know some
25 folks have tried in the past to say that if you don't

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 have to placard it, it's not radioactive waste. We
2 all know that's wrong. We have this confusion out
3 there.

4 Again, I wonder what, from your past work,
5 your insights are, how do we at least pick a couple of
6 things? I mean concentration I think people can
7 understand in the middle range. And over a fairly
8 broad range is a useful metric.

9 The very dilute, the very concentrated,
10 you have explained very well how that sort of becomes
11 not representative of the risk.

12 In disposal concentration doesn't really
13 relate to risk. Quantity disposed in the system is
14 what determines the risk. So for example that leads
15 me to think about averaging. We now have guidance on
16 averaging for irradiated hardware; it's a times 10
17 rule.

18 I just throw out a number: what about a
19 times 30 rule? Would that change the risks once
20 disposed?

21 Could you offer any insights? I mean if
22 you had to pick, I kind of ask you the same question
23 I asked Ruth McBurney, if you have to pick a couple of
24 metrics to try and work with as the criteria to deal
25 with low activity waste in a way that was consistent

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 with low level and some of the other categories you
2 mentioned, what would you pick?

3 VICE CHAIR CROFF: Let me first go back to
4 where you started. You're right, the definitions even
5 current ones come from operational things, and in the
6 old days high level waste was something that boiled.
7 It was just about that simple.

8 I think ideally first a waste
9 classification system should be tied to a disposal
10 destination at its most fundamental level. And then
11 below that you can get into subclasses of, is it
12 radioactive? Does it have handling problems? Get
13 into the engineering stuff.

14 But if it's waste your ultimate objective
15 is to get rid of it so you should be focusing on
16 disposal destinations.

17 In my view having seen everything from
18 concentration base, which we have a lot of, having
19 tried a risk-based, and what we tried to do in the
20 NCIP report was very close to risk based, I think the
21 right answer - and Allen would agree with Ruth
22 McBurney - is dose.

23 Because from dose you can get
24 concentration limits. If it's at the fringes, then
25 you can become case specific, and you've still got

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 your dose criteria that you are supposed to meet.

2 And that would seem to solve an awful lot
3 of problems if we could get it headed in that
4 direction.

5 CHAIR RYAN: Thanks. With that we will
6 take - I'm sorry? Bobby, did you have a question?

7 MR. EIDS: If you allow me.

8 CHAIR RYAN: I'm sorry?

9 MR. EIDS: If you allow me.

10 CHAIR RYAN: Sure, yes, please, I'm sorry
11 I didn't see your hand up.

12 MR. EIDS: This is Bobby Eids, deputy
13 general, waste management.

14 Just two things, just to update, because
15 you mentioned the DS-390. It was posted, you are
16 correct, it was posted on the 11th which was two days
17 ago. And I looked quickly.

18 And if you look at slide #6 of your
19 slides, so there is some correction. So if you see
20 that figure was changed. So the norm was removed as
21 an example of the waste.

22 So and this is one of the comments that we
23 made about the norm. And IAEA did respond to our
24 comments and the norm now was removed from that
25 figure.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 So if you look on the current verison on
2 page six, figure one, actually the norm is not
3 included, and the example is given, they are not
4 included.

5 So if you update that slide, which is what
6 I would do.

7 VICE CHAIR CROFF: Let me if I could ask
8 you a question back then. What does the IAEA proposal
9 say about norm or how is it to be classified or
10 handled?

11 MR. EIDS: That is a very good question.

12 In response to that, if you look at Annex
13 3 of the new version, so it may be - you do not have
14 the benefit of looking into detail into this, so I
15 apologize for that.

16 However, they did consider this, and they
17 gave this as an example in Annex 3, and they showed
18 this exact figure as shown in Annex 3. And in
19 accordance with IAEA, the annex is not part of the
20 document.

21 I will read for you their standard. They
22 say: the appendix is an integral part of the main text
23 and has the same regulatory status under the agency
24 status in the main text.

25 However, the annex is not an integral part

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 of the text. So therefore since it is an annex, it is
2 not an integral part of DS-390. It is given as an
3 example, and it's left up to the states to deal with
4 the norm, depending on the current regulations.

5 VICE CHAIR CROFF: I think that is too much
6 for an engineer to figure out. (Laughter.) Leave
7 that to the lawyers.

8 MR. CAMPER: This is Larry Camper. But as
9 a practical matter what happened during the last
10 committee meeting was, the graphic depiction of the
11 norm, the concern the committee raised, it wasn't easy
12 to capture norm on that graphic depiction because of
13 the half-life involved.

14 It's a bit misleading as depicted there.
15 Now it's a crude representation, that is true. But a
16 lot of the discussion evolved around that, and I
17 suspect that's why they removed it as an example.

18 MR. EIDS: Sorry, the other comment I would
19 like to make when talking about risk is, the devil in
20 the details.

21 So I think then it comes to the issue of
22 the performance period. It makes a big difference for
23 a performance period of 30 years, versus a performance
24 period of 1,000 years or 10,000 years. You will have
25 different values for risk because of the contaminant

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 transport.

2 So the issue of risk should be linked also
3 to the issue of hte performance assessment as well.
4 So in this regard we may end with some kind of size-
5 specific analysis. And example of DU for example
6 disposal in terms of the volume of radioactivity it
7 could be different. It is a class A waste by default.
8 However when you do consider you know the risk and the
9 volume it may be easier to have some kind of size-
10 specific analysis.

11 VICE CHAIR CROFF: You remind of something
12 I'd forgotten just a little bit before concerning
13 waste classification.

14 When you stand back from all of it and you
15 sort of recognize how few waste disposal facilities we
16 have and are likely to have for quite awhile to come,
17 you have to ask yourself just how helpful is waste
18 classification as opposed to just saying, here is my
19 site. Here is a dose limit. Let's go in and see
20 whether it meets it or not, and forget whether the
21 waste is blue or purple or yellow.

22 And I think that is what Richard is sort
23 of suggesting there, and you maybe have to start
24 asking yourself, I mean waste classification is useful
25 if you got a lot of facilities; you want consistency.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 But maybe one depository, you know, struggling with
2 low level waste sites. I don't know.

3 CHAIR RYAN: Those are great insights. And
4 Bobby, thank you again for bringing us up to the
5 minute with IAEA; we really appreciate that. It's
6 within 48 hours of it being out in the press. That's
7 great information. Thank you.

8 I think you also raised an interesting
9 question that I think we'll begin to address with our
10 next presenter after the break, Dr. Esh, that will
11 talk about risk-informed analysis. Because I think
12 that's where, Fred, you and Anne were discussing, kind
13 of come together. What is your risk assessment? How
14 do you do performance assessment to address all the
15 variables that we have heard about so far this
16 afternoon.

17 So thanks for being with us as always.
18 And again with that we will take a 15-minute break and
19 reconvene at 3:00 o'clock for the next two
20 presentations.

21 Thank you.

22 (Whereupon at 2:43 p.m. the
23 proceeding in the above-
24 entitled matter went off the
25 record to return on the record

1 at 3:00 p.m.)

2 CHAIR RYAN: I would like to ask everybody
3 to please take their seats.

4 Thank you. Just one administrative note.
5 Several folks have expressed interest in obtaining
6 copies of slides.

7 What we will do is, Mike Lee is the staff
8 person helping with this meeting. If you would give
9 him your business card. When we assemble the packet
10 for this meeting, which is the slide sets, the
11 transcript and so forth, we will sure to make
12 distribution based on your turning in your business
13 card to Mike Lee.

14 So if you would do that, we would be happy
15 to provide them. And we can't provide them kind of as
16 we go. That's just not a real efficient or effective
17 way to do it.

18 So we will be happy to distribute it when
19 we make that packet available. So thank you for your
20 interest.

21 Without further ado, David Esh, Dr. Esh,
22 is going to speak about risk informed analytical
23 approaches to waste classification in the NRC staff
24 review.

25 Welcome, David, nice to see you.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 RISK-INFORMED ANALYTICAL APPROACHES TO WASTE
2 CLASSIFICATION: NRC STAFF REVIEW OF U.S. DEPARTMENT
3 OF ENERGY (DOE) WASTE INCIDENTAL TO REPROCESSING
4 (WIR) DETERMINATION

5 MR. ESH: Nice to see you.

6 Do I need a microphone here?

7 CHAIR RYAN: I think you are okay. The
8 microphone is on the table.

9 MR. ESH: I'm happy to be here and talk to
10 you about what we've done in risk-informed analytical
11 approaches to waste classification.

12 This is in the context of incidental
13 waste, so we haven't applied it to any other waste
14 management area or scheme. It's only for incidental
15 waste.

16 But I guess the committee, we've talked to
17 them in the past, felt that there may be some
18 applications to other problems. So I'm here talking
19 to you today not trying to give my ideas about how it
20 may apply to your waste management areas but just to
21 describe what we have done, and hopefully there will
22 be some translations done by the committee and the
23 stakeholders as to the applicability to their systems.

24 I'd like to acknowledge Karen Pinkston
25 here who was one of my co-contributors on this

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 problem.

2 I'm going to give you some background.
3 We'll talk about waste classification. And then just
4 the approach I'm going to show you is for
5 concentration averaging for incidental waste.

6 We have developed three categories.
7 Categories don't mean anything more than that's a
8 descriptive term within our reviews for incidental
9 waste that tells what approach is being used.

10 We developed some averaging discussions
11 for the staff to use. I'll talk about how we went
12 about that, and give you some conclusions.

13 Some background for those of you who might
14 not be familiar, waste incidental to reprocessing, or
15 WIR, is waste originating from the reprocessing of
16 spent nuclear fuel that does not need to be sent to a
17 geologic repository in order to safely manage the risk
18 that it poses.

19 So it's basically the residual material
20 that you cannot get out of a tank, for instance, high
21 level waste tank, or material that you separate out
22 from the reprocessing or the management of high level
23 waste, the low activity portion.

24 Those sorts of materials are falling in
25 this gray area that Allen Croff talked about. It's

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 not the same as the high level waste, but it's
2 certainly not meeting the language definition of low
3 level waste. So exactly what is it and what do you do
4 with it?

5 In this process NRC has worked with DOE in
6 the past on a case-by-case basis, but then more
7 recently in October of 2004 we had this Defense
8 Authorization Act of 2005, which we refer to as the
9 NDAA, which required DOE to consult with NRC on waste
10 determination. So we are essentially an independent
11 technical reviewer of their waste determination.

12 And the waste determination includes the
13 performance assessment of the material to demonstrate
14 the safety of its management and disposal, and some
15 other things, removal of key radionuclides, or highly
16 radioactive radionuclides to the maximum extent
17 practicable. And we basically do an independent
18 review of DOE's work.

19 And then also in this act we were assigned
20 the responsibility to monitor DOE's disposal actions,
21 and that is a more independent look at what they have
22 done to see if they are continuing to meet the
23 performance objectives, where in this context the
24 performance objectives at 10 CFR Part 61.

25 It's basically that we assess whether the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 waste can be managed safely as if it was low level
2 waste. But it's only the performance objectives in
3 Subpart C, it's not all of regulation.

4 The NDAA, where the waste classification
5 comes in, is that hte NDAA requires additional
6 consultation if hte waste does not meet the Part 61
7 Class B concentration limits.

8 So we got into some issues about, well,
9 how do you define that? On one hand the Department of
10 Energy who we are consulting for say those Part 61
11 classification limits, how they were derived, that
12 doesn't really work for our problem. Our problem is
13 different.

14 And then we also had other stakeholders
15 say the same thing but they were coming at it from a
16 different direction. They felt, whereas the DOE felt
17 that some of the things in Part 61, the derivation fo
18 the concentration limits, was overly conservative for
19 their types of problems, the other stakeholders felt
20 that some of those assumptions and things that were
21 done were nonconservative.

22 And so we took a hard look at this and
23 said, okay, can we do this better if we just use the
24 numbers that are in 6155, that's an easy approach, but
25 is there a better approach that is more risk-informed

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 than that.

2 And 61.55(a)(8) provides for the use of
3 concentration averaging in waste classification. So
4 the basis is all there to do this; it's a matter of
5 interpretation and implementation.

6 So what we did is, we looked at our
7 guidance. We have a concentration averaging branch
8 technical position, and that's for commercial low-
9 level waste disposal. Looked at what it was saying,
10 and we looked at the regulation, and we decided well,
11 what can we do to look at the real aspects of these
12 incidental waste problems while still staying in line
13 and honest with the main elements that are in that
14 branch technical position in the regulation.

15 We came up with these three categories,
16 categories one, two and three. One is based on
17 physical homogeneity of the waste, so it's basically
18 if your material that you are worried about, what the
19 concentration is and therefore what the classification
20 of it is can be well mixed in your system, and you are
21 not mixing it to dilute the classification, but you
22 are mixing it to manage the waste, or to stabilize it.

23 You can calculate the concentration based
24 on the average of the waste, and the averaging - or
25 the material you put in to stabilize it.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 That's category one, a straightforward, do
2 you have physical mixing basically.

3 Category two, stabilization to satisfy
4 61.56, is basically that 61.56 says that the waste has
5 to be in a stable physical form for disposal. And
6 within 61.56 it says you can determine the stability.
7 Stability is kind of defined with respect to the
8 potential intruder exposures.

9 So category two, the averaging is defined
10 based on your potential intruder scenario. So if you
11 are talking about deeply buried waste where you are
12 worried about somebody drilling into it, what is the
13 average concentration that somebody is going to hit
14 with a drill if they drill for water or some other
15 resources and exhume some waste.

16 If the waste is more shallow and they put
17 in a basement, what is the average concentration you
18 get whenever they put a basement in? Those
19 approaches, we think, are well within the branch
20 technical position and the regulation.

21 But we felt like that didn't capture all
22 of what we needed to capture, and we came up with the
23 site-specific averaging. The other participants in
24 your meeting here have talked about aspects of this,
25 and I think this hopefully in a few slides here I'll

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 show you how it all fits together, how we think it
2 could fit together.

3 Granted, this was for our specific
4 application, but there may be applicability to some of
5 your other problems.

6 So category three is a risk-informed
7 approach we believe that allows for consideration of
8 the factors listed below: depth to waste, quantity of
9 waste, concentration of waste, and maybe in the
10 presence or absence of an intruder barriers.

11 If you think about it, what are you trying
12 to do with classification? You are trying to ensure
13 that material is safely managed and disposed of in a
14 configuration that is appropriate for the material.

15 So what you are implicitly saying is that
16 if something is less than class A it can be disposed
17 of with less controls and less stringency than
18 something that is a higher classification.

19 In this case, the classification though,
20 our opinion is, it's impacted by the quantity, the
21 concentration and the accessibility, so where you put
22 it and how you've managed it.

23 Concentration can be a measurement an
24 influence to risk, but it's only one of the elements
25 to the influence of risk, and I think Dr. Ryan talked

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 to this. It's concentration times quantity times some
2 factor that is related to its accessibility that is
3 influencing the risk in the case that we talk about.

4 So that's what our approach is, it's
5 trying to factor in all of those for our specific
6 problem.

7 Then I have to say that when I first came
8 up with this, it was fairly complicated. I think it
9 involved sacrifice of a chicken, and there was a
10 chipmunk involved. Karen and Cynthia from our staff
11 reviewed it, and I think we got it a lot more clean
12 now. It should make sense to all of you, and if it
13 doesn't I'm always happy to talk about it; feel free
14 to contact me.

15 On this slide here we have on the left the
16 part 61 intruder construction scenario. That scenario
17 is one where it is assumed that sometime after site
18 closure and the institutional control period ends that
19 a potential excavation would be made at the site,
20 exhuming some quantity of waste. And those
21 calculations that were done were deterministic
22 calculations using dosimetry consistent with ICRP-2
23 and generic parameter sets.

24 As it needed to be for commercial low-
25 level waste disposal, the waste classification that

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 they were trying to develop had to apply to any site
2 across the country that was going to be licensed. So
3 that was the right approach at the time.

4 What you need to understand, though, is
5 that the scenario - the excavation and quantity and
6 even say concentration of material - was kind of
7 constrained by the commercial low-level waste
8 application.

9 So it had some vision of, what was the
10 type of material that was going to go into these
11 facilities? What was the quantity of it? What was
12 the type of disposal technology that was likely to be
13 used for those facilities?

14 Ranges were looked at on all those things,
15 but it was still within a box of commercial low-level
16 waste disposal.

17 For our problem, this incidental waste
18 problem, as Allen Croff talked about, work more on the
19 edge of, certainly we have in some cases higher
20 concentration material; but then we also have material
21 that may be smaller in quantity, and also, much more
22 inaccessible than the commercial problem.

23 So the figure on the right shows our types
24 of problems that we are concerned with. We can have
25 piping that might be fairly close to the surface that

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 would still be impacted by this excavation-type
2 scenario; or our well driller we consider.

3 But a lot of the material is pretty deeply
4 buried, more than 10 meters for instance, that could
5 be intersected by a well that somebody puts in to try
6 to extract groundwater or other natural resources.

7 So in our approach we looked at these
8 different scenarios. We looked at probabilistic and
9 deterministic calculations. We used more updated, or
10 more recent dosimetry, and we tried to consider site-
11 specific parameter values or distributions.

12 So the translation between what was done
13 for Part 61, and then our problem, is what's shown on
14 these figures, and we needed a way to convert between
15 one and the other. So that's what I'm going to show
16 you here.

17 Our approach was - sorry, let me step back
18 a second. In this process we developed a guidance
19 document to use to perform our reviews. So the
20 Department of Energy would know what we were looking
21 for, the types of information we were looking for,
22 what our expectations were.

23 That guidance document is NUREG- 1854. So
24 in this work is part of that guidance document.
25 Everything I'm talking about today is found in that

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 guidance document. There is more documentation about
2 the approach in the context and everything. If you
3 want further information, please take a look at that;
4 and then if you need more beyond that feel free to
5 contact me.

6 What we needed, though, because that was
7 a guidance document, was some way for our staff to
8 look at DOE's arguments about waste classification and
9 concentration averaging without needing to do a full
10 blown analysis necessarily at the first stab, but to
11 see, okay, is this in the ballpark where I think is
12 reasonable, or is this some extreme case where the
13 limits are being pushed, as how much averaging you can
14 assume.

15 So we developed these concentration
16 averaging expressions, of which - we constrained it to
17 certain scenarios. And the reason why we did that is
18 because in NRC space and in low-level waste space
19 these were the types of scenarios that were considered
20 for commercial low level waste.

21 So if we are talking about incidental
22 waste, and we are saying, can this material be managed
23 as if it were low level waste, then we should look at
24 similar scenarios to commercial low level waste
25 disposal.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 You can expand this and look at a broader
2 range of scenarios. What we find is that between the
3 NRC and other regulatory agencies there can be some
4 difference as to how people look at disposal. NRC
5 looks at disposal as that; it is disposal, it's not de
6 facto long term storage where you are continuing - you
7 can assume that somebody is going to be there in
8 perpetuity, maintaining your systems, monitoring, et
9 cetera.

10 But our approach is one where you dispose
11 of the material; at some time it becomes a disposal
12 facility where you don't have that continual control
13 and maintenance; and then you could potentially have
14 some scenarios where people contact the material.

15 And so these scenarios are what are
16 addressed here.

17 What we looked at, what we wanted to
18 consider, is that some of the material may be shallow
19 or deep. Those are generic terms, but it's related to
20 the processes that you may contact them.

21 They may be protected by an intruder
22 barrier, or not be protected by an intruder barrier.

23 And therefore, based on these constraints,
24 what would be the potential disruption process that
25 you could have that would expose material?

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 Because if you are using a dose-based
2 approach to say what's appropriate for concentration
3 averaging and therefore classification, it's related
4 to how much material you are exhuming or exposing, and
5 how long it's protected, and how it has been managed.

6 So this construct of these scenarios are
7 what we use to develop our averaging expressions, and
8 basically the staff is directed, if the waste is
9 shallow and there is no intruder barrier then you use
10 a certain approach. If it's deep and there is an
11 intruder barrier then you use a different approach.

12 But it's a way to recognize this
13 accessibility of the material in addition to what was
14 done in the past with this quantity, or concentration
15 really.

16 The example averaging expressions are just
17 for the staff to use on this type of problem. And the
18 way we set it up is, that is kind of a red flag to
19 say, when do I need to have additional effort, when do
20 I need additional review effort.

21 It doesn't necessarily mean that if it
22 didn't pass our averaging expressions we would say
23 it's a certain class.

24 It's up to the - in this case - the
25 Department of Energy to make the classification

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 argument. This is just a review tool for our staff to
2 make the review process work more efficiently.

3 We used some conservative assumptions, or
4 what I would say are conservative assumptions, in
5 development of these expressions. That's one of the
6 reasons why we wouldn't think it would be appropriate
7 for somebody just to take them and use them in a
8 classification calculation. You wouldn't be doing
9 yourself justice from a risk perspective.

10 These equations, like I said, are not to
11 be used as a basis for waste classification.

12 So our goal was to develop some equations
13 that compare this new analysis for incidental waste to
14 the Part 61 analysis that was done in the past.

15 And what you see here, the equation to its
16 very basic term is one of concentration for a scenario
17 and a radionuclide times the volume of material that
18 you may exhume or be exposed to times a transfer
19 factor, this $X(i,j)$, where it gives you a dose for a
20 certain scenario and a certain radionuclide.

21 This transfer factor, $X(i,j)$, is really
22 what comes out of the performance assessment. That's
23 - the performance assessment is converting some
24 concentration and volume of material into a dose.

25 So what we did is, we, without wanting -

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 not wanting to duplicate the Part 61 calculations, we
2 made some assumptions that, given the concentration of
3 material in the tables in Part 61, and knowing the
4 volume of material that was assumed in the scenarios
5 for Part 61, those concentrations were set with some
6 other assumptions and a performance assessment
7 calculation, to give you an intruder dose of 500
8 millirem basically.

9 Knowing all that, then we can define these
10 things in the lower part of the equation. We will
11 have new ones that would apply for our particular
12 incidental waste problem. And we are basically doing
13 a normalization to calculate what the concentration is
14 for an appropriate - for these incidental waste
15 problems that takes into account the differences in
16 concentration quantity and accessibility of the
17 material.

18 So we developed these averaging
19 expressions. So the way we did that is, we made a
20 probabilistic Goldsim model to calculate the intruder
21 dose for each scenario for unit concentrations. Then
22 we calculated the mean dose used to determine the
23 value of the constant for each radionuclide.

24 Then we assume, like I said, the class D
25 concentrations correspond to 500 millirem for a low

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 level waste facility.

2 And you basically rearrange those
3 equations, and you get a constant equals the ratio
4 down here, the expression at the bottom.

5 Let's see. After we get that constant,
6 then, the averaging equations were created for each
7 scenario using the constant from the limiting
8 radionuclide. So that is a conservatism.

9 So say we had a source or a mixture of
10 something that had cesium and strontium and neptunium,
11 and we do this approach. Maybe neptunium is the
12 limiting value for our scenario that we are
13 calculating in terms of this $RC(j)$ factor, this
14 constant in the expression, or sorry, the constant in
15 the expression here is written out as constant.

16 We used the neptunium value for all
17 radionuclides instead of, what you could have is, this
18 constant is defined as a vector, and you multiply
19 that, the right element from that vector in this
20 expression to calculate a particular $RC(j)$.

21 We felt that was too much complexity, as
22 I said. It started out even a lot more complex than
23 this, and that was too much complexity for somebody to
24 implement easily. Because we wanted something that
25 can be implemented cleanly, and it's not fraught with

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 errors or mistakes for people to do.

2 What's done in the bottom line is, we do
3 the sum of fractions for all these RC(j)s and if it's
4 greater than one, then that means more review effort
5 is needed; if it's less than one, then that means the
6 review effort is probably appropriate, or less review
7 effort is needed.

8 The concentration averaging approach for
9 incidental waste we believe is risk informed. Like I
10 said this approach takes into account quantity,
11 concentration and accessibility of the material. It's
12 flexible, and you can probably apply it to many
13 different scenarios. It's not just applicable to this
14 problem, although we haven't applied it to any other
15 problems yet. We only developed this for our internal
16 use for this incidental waste problem, which we have
17 talked to the committee in the past, and they thought
18 maybe it had some applicability to this broader issue
19 here.

20 And I think it really does. I think one
21 of the issues, I know Dr. Croff talked about this in
22 his presentation, where we said, well, let's just -
23 maybe there is some validity to going to a site-
24 specific analysis for each facility, and you just look
25 at the material you are putting in there and see what

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 the result is.

2 In general I agree with that. But my one
3 caution is, these performance assessments are not
4 simple. In particular, if you start mixing a lot of
5 different materials, you are worried about how things
6 are mobilized out of the problem into the groundwater,
7 transported in the groundwater.

8 That can be a very technical complicated
9 problem, so if you went to a site-specific approach,
10 it puts more burden on us if we were the regulator, or
11 on the state regulators, to really look at that with
12 a fine-tooth comb and make sure there isn't something
13 being done that is funny.

14 The classification approach, if you do
15 that in a risk-informed way, it should allow you
16 flexibility but still put some constraints on the
17 problem. Like in this case we are putting some
18 constraints on the problem from the scenario
19 perspective. We say, if we are talking about disposal
20 from an NRC perspective, then that means we use
21 certain scenarios to look at disposal. We don't look
22 at scenarios of, well, we have a recreational exposure
23 that walks on the site five hours a year, and nobody
24 ever digs up anything and nobody uses groundwater.

25 Well, of course if you are looking at that

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 sort of scenario, that can buy you a lot more
2 concentration and quantity that will be appropriate
3 for disposal than if you are looking at one of these
4 scenarios where people disturb the material.

5 So that's kind of where we are. I'm happy
6 to take any questions.

7 CHAIR RYAN: David, thank you.

8 That's, again, it's exciting to hear about
9 this work, because I think you've really captured what
10 our thinking is in the last slide that your work for
11 WIR seemed very appropriate, and it's flexible and
12 applicable to different scenarios.

13 For example, if you think about it, you've
14 got everything from a dry yard environment to wet
15 eastern environments. You've got different streams
16 for the water. So that's the vector.

17 You've got different waste packaging and
18 waste form issues. You can certainly address those.
19 You've got arrangements of intruder technology and
20 other kinds of things. All those you dealt with in at
21 least some extent in some form or fashion in here, so
22 that is what sort of got us excited, the basic pieces
23 are the same, although they may look a little
24 different in one application or another, but we can
25 sure handle it.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 That's one I think great advantage of this
2 technique.

3 The second is, it's probabilistic, which
4 means you can take two analysts with the GoldSim tool
5 and make the same kinds of analyses in two different
6 rooms and they will come back with similar answers.
7 It's not interpretative; it's the analytical
8 calculations relating to the analysis, rather than the
9 analysts experience being the driver which is often
10 the case. So that makes it extremely powerful.

11 And I think there is a lot more
12 transparency at the end of the day with these kind of
13 results, and the more arcane, very complex transport
14 kinds of models that people tend to look at to do
15 these calculations.

16 So with that - and again, I fully
17 recognize the caveat, you haven't applied it yet, so
18 you are not going to declare victory in anything other
19 than what you've done, which is appropriate too.

20 But it really integrates to me that the
21 key things you have to look at in any performance
22 assessment for disposal, whether it's very low
23 activity dilute stuff, right on up to irradiated
24 hardware.

25 I posed the question earlier about, well,

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 you know, we have a factor of 10 rule know for
2 hardware. Why couldn't we have a factor of 30? Well,
3 this is a really simple straightforward way to say,
4 okay, is that within reason based on all the other
5 forms and features of that problem?

6 And if you get at those kind of questions,
7 I think, in a real risk-informed way pretty clear.

8 That's more of a comment than a question.

9 MR. ESH: People like - I have a comment
10 that people like concentrations, because they feel
11 they are easy to evaluate against, whether it's in
12 groundwater, in the material you are putting in,
13 somebody can quantify the material and say, how does
14 it compare to the concentration.

15 But the concentration, to be frank, it's
16 very unfair to some people in some scenarios or some
17 systems, and it might be unfair in the other direction
18 to others, if you are not careful about how that
19 analysis is done, et cetera. Yet whenever say
20 regulators try to set those concentrations, we try to
21 be conservative.

22 But if you tried to pick the most
23 conservative scenario, and most conservative
24 parameter, for everything that went into the
25 calculation, you would be setting an extremely low

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 limit that would be very expensive financially and
2 otherwise for people to be trying to meet that
3 criteria, and in our - in this approach and in our
4 opinion that is not risk. That, if you can do
5 something like this you can be more fair to everyone.
6 You can be more fair to the people that may have a
7 situation that their material is less accessible, and
8 has been stabilized more than somebody where their
9 material is more accessible and has not been
10 stabilized. And that has to be recognized in the
11 classification system, because ultimately you are
12 trying to protect health and safety, and that is the
13 bottom line.

14 CHAIR RYAN: One last comment, and then
15 I'll ask other members if they have questions or
16 comments.

17 We are on record with the commission as
18 saying, recognizing this in our WIR letter that this
19 is very very creative and powerful work that has in
20 our view a lot of capability, and I'm sure we will
21 continue to encourage that they recognize the fact
22 that this is a tool that might unlock a lot of the
23 doors that we are talking about today that are very
24 complicated circumstances.

25 So congratulations to you and your

1 colleagues, and Karen and Anna and the others that
2 have worked on it. It's really very, very excellent
3 work.

4 MR. ESH: Thank you.

5 CHAIR RYAN: We are happy to move that
6 forward.

7 MEMBER CLARKE: Yes, I think it worked out
8 really well, that Allen's talk and David's talk came
9 when they did, back to back. And this is more of a
10 comment. You answered my question already, so I don't
11 need to ask it.

12 But it seems we have traditionally not
13 only for radioactive waste but for chemical waste
14 started with deciding what classification it is and
15 then asking the question, what can we do with it.

16 This approach, if you turn it around, and
17 we have a particular menu fo engineering designs for
18 certain site-specific environments, okay, let's look
19 at that and see what we can put in. I think that -
20 you know, there is a lot of value to turning the
21 scenario around and thinking about it that way.

22 MR. ESH: Yes, I agree. And especially
23 because the types of systems that are in play, or what
24 people do to manage their waste is very - has a lot of
25 variability. And the performance that you can get

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 out of a system, as you are well aware and have
2 commented on, is very dependent on the service
3 environment in particular.

4 So something that works well in a human
5 environment might not work well in an arid environment
6 and vice versa. So if you aren't acknowledging that
7 in your approach, and you say, everybody use this
8 facility and everybody do this, it can work, but it
9 also - it can be overly burdensome to some and maybe
10 not burdensome enough to others.

11 So you are ultimately trying to strike a
12 balance there. But if you take an approach like you
13 said, coming at it in the other direction, then it
14 allows people the flexibility to make hte decisions to
15 meet the safety criteria, and they can come at that in
16 a number of different directions, managing their
17 quantities, their concentrations, or how htey are
18 disposing of the material.

19 MEMBER CLARKE: The other thing I'd like to
20 see, the probability, after the use, of being risk-
21 informed strikes me as more available if you come at
22 it from this angle than if you come at it from the
23 other.

24 MR. ESH: Yes, we like to use risk-
25 informed, because it's a buzzword, but when you get

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 down to it sometimes things aren't very risk informed.
2 But that's where it's applied.

3 MEMBER CLARKE: We have put descriptive
4 designs in the wrong environment, so we can do as well
5 - would have if we did something else.

6 The question I was going to ask is, given
7 all the caveats you gave us about not wanting to use
8 this for waste classification, and I totally
9 understand that, but it does seem that this approach
10 would have merit for looking at low activity waste in
11 the kinds of facilities that would be suitable for
12 those kinds of decisions.

13 Do you agree with that?

14 MEMBER CLARKE: I agree with that. My main
15 reservation in particular with the low activity
16 material is that I think you could do this especially
17 if you have a dedicated facility for a certain type of
18 material. You could do that well.

19 When you start mixing these materials, and
20 you put say some radioactive materials where in the
21 assessment maybe somebody is assuming that the
22 material has very low solubility, and it sorbs pretty
23 strongly to the natural materials, and it doesn't go
24 anywhere basically, and you calculate a low dose
25 impact, you put that in a facility that has a bunch of

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 organic solvents an chelating agents and everything
2 else, and all of a sudden that analysis goes out the
3 door.

4 That I think is the challenge if you make
5 it open to taking these types of materials and trying
6 to do a dose assessment where you can just put them in
7 any type of material of a certain quality, a certain
8 quality in terms of its performance to isolate that
9 material.

10 But the uncertainty in how well that
11 facility can perform I think is impacted by the types
12 of materials that you put together.

13 MEMBER CLARKE: I would just add that the
14 good news is that we don't put solvents in landfills
15 anymore.

16 CHAIR RYAN: On the other hand, though,
17 that's the advantage, that you can take care of those
18 actual site characteristics, where there are solvents
19 or not solvents, and that kind of thing, as opposed to
20 have a fixed assessment that now drives you to a very
21 conservative answer.

22 So on the one hand it's a challenge.
23 There's lots of things to take care of. But once you
24 take care of them, you get kind of more into the
25 realism sort of picture than a fixed arbitrary

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 picture.

2 So it's kind of a two-edged sword, isn't
3 it?

4 MR. ESH: I have to say that I was stunned
5 by the complexity of the waste classification system,
6 especially on the low end of the spectrum.

7 CHAIR RYAN: That's why we are here.

8 MEMBER CLARKE: Thank you for an excellent
9 presentation.

10 CHAIR RYAN: Ruth?

11 MEMBER WEINER: I want to commend you, too,
12 for a really excellent presentation.

13 And if you could put slide six up again
14 for a moment. There, yes.

15 What you are proposing with the site
16 specific, as I understand what you are proposing with
17 the site specific disposal facility is, based on the
18 WIR considerations, and with WIR you are already
19 there. The facility exists, and you are talking about
20 how to best stabilize it or dispose of it or what to
21 do with it.

22 Can you see any problem with your category
23 three where you are creating a site, or using an
24 existing site which meets your category three
25 standards to bring in the waste from others?

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 And the reason I ask this question is,
2 having lived in the West with a number of sites that
3 were sited there because of the environmental
4 characteristics of the place - I mean Hanford really
5 is a pretty good place if you get away from the river
6 a little bit - can you see any problems with that?

7 MR. ESH: It's a good question. I see that
8 for - where you have the ability to select a site, or
9 to choose a site, the site selection criteria and the
10 robustness of the site characteristics would certainly
11 play a role in this.

12 And the way that we've handled it as you
13 commented, most of these sites are - the sites and
14 facilities for potential disposition of material that
15 is removed, because we do have that situation too. It
16 isn't just material, residual material that may be
17 remaining in a storage tank, but there are waste
18 streams that are removed and purposefully disposed of
19 in another facility. So you would have some options
20 as to where you put that material in theory. In
21 practice we don't really have many options.

22 But the site selection part of it I think
23 would have to be factored in, too, and it's not here.

24 MEMBER WEINER: Well, carrying that one
25 step further, what you get into in site selection is

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 somewhat related to what Hanford faced, oh, 20 - 25
2 years ago. Everybody said, you are bringing all the
3 world's low level waste to Hanford. And as a matter
4 of fact, that probably is an okay idea, given the
5 characteristics of the site.

6 But it becomes sociologically difficult to
7 handle.

8 MR. ESH: It does, yes. And this, on slide
9 10 here, this $X(i,j)$, this factor, the transfer factor
10 from your quantity and concentration, due to the
11 result. By implementing site selection, hopefully you
12 are making a better $X(i,j)$, for a site that you have
13 done a good job selecting than one that you have done
14 a poor job selecting.

15 So that is where, in this construct right
16 now, site selection will come in under this generic
17 guy that is going to do a performance assessment.

18 But you could certainly take it separately
19 that, by choosing sites that have certain
20 characteristics for certain types of material, that
21 you are improving the ability of that facility to
22 retain that material.

23 MEMBER WEINER: Finally, I know that right
24 now the Department of Energy is wrestling with this
25 question of greater than Class C waste, and I realize

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 this - we wanted to focus on the low end, but if we
2 can consider that for a minute, would you see this as
3 an approach to the disposition of greater than Class
4 C waste?

5 MR. ESH: I think determining what to do
6 with greater than Class C waste should certainly
7 factor in the characteristics of the material, the
8 potential places you could put it, how you could
9 isolate it, yes. I think you could certainly factor
10 it in. But in that case you are always saying what
11 the material is. You are saying it's greater than
12 Class C and it's more of a technical problem of how do
13 I isolate it.

14 Whereas in these cases you are trying to
15 use something like this to say, what class am I? And
16 therefore, how should it be managed.

17 And I think the classification system, as
18 I said before, has value, because it gives people an
19 idea of how much effort you need to put into trying to
20 isolate it in general.

21 I mean if it worked right, Class A waste,
22 you would know, I need - me as a regulator, I can give
23 less attention to the technical aspects of what I'm
24 doing with Class A waste than Class C waste. It
25 should work that way. Whether it does work that way

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 or not is a different question - so.

2 CHAIR RYAN: There's some element of a
3 fallacy with greater than Class C from my perspective
4 in that the very small sources which calculate to be
5 greater than Class C can in fact, be trivial in terms
6 of risk. So again, I'm kind of bringing it back to
7 that point that the centerline, the middle of the
8 range of concentrations, it works great.

9 MR. ESH: I mean, if you put a Cobalt 60
10 source or a Cesium 137 source in an engineered
11 facility deep in the ground and you had high
12 confidence that you keep it there for 200 years or 300
13 years you're not talking about a high-risk source any
14 more. So, I mean, that's the -- the idea behind this
15 is you can try to represent those sorts of things.

16 CHAIR RYAN: Whereas, maybe some small
17 percentage of that activity, you know, in a chemical
18 or a physical form that gave it mobility, creates a
19 much different higher risk situation. So again, I
20 like -- I mean, the thing that's fabulous about this
21 is it's concentration and quantity and all those
22 elements of the system in which you put it that gets
23 evaluated, you know, all on an equal footing.

24 So if you change one you see the result.
25 If you change three you see the collective or the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 integrated result of those three changes. That, to
2 me, is the real benefit here. Allen?

3 VICE CHAIR CROFF: You know, one question;
4 the Category 3 approach has been on the street now for
5 some number of months. In your dialogue with DOE have
6 you come up with any unintended consequences or
7 problems or, you know, does it seem to be going well
8 or what?

9 MR. ESH: We have not had any further
10 waste determinations that we've reviewed where they've
11 applied it yet. We did have a generic technical issue
12 meeting it's called, with a series of meetings with
13 them on various topics to try to talk about some
14 differences or similarities and they asked a number of
15 questions about specific applications. So if I had a
16 layer of high activity on the wall of a tank, how
17 would I consider that in this approach, in particular
18 because in our averaging expressions that are in our
19 NUREG-1854, there's things in there like the user
20 specifies the depth of the well that somebody is
21 trying to get resources for or there are some things
22 that are specified in the equation and so they wanted
23 to know for that specific circumstance, how would you
24 apply that in the averaging -- in the averaging
25 approach. And we described that to them. I mean, you

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 basically -- you sum up the quantity of the material
2 in the wall that you could intersect and the bore hole
3 and shrink that down and that gives you an equivalent
4 thickness of a layer that you'd hit. So the wall
5 circumstance can be converted into the layer
6 circumstance, which is the main one that we were
7 looking at.

8 So there is some -- there were some
9 questions like that regarding the application of it
10 but we haven't had any further waste determinations
11 yet to really iron it out. And that's where you find
12 whether you've done well with your guidance
13 development or not is when it gets applied, the law of
14 unintended consequences occur.

15 VICE CHAIR CROFF: Yes, agreed, thanks.

16 CHAIR RYAN: Okay, well, David, again,
17 thanks very much. We really appreciate your
18 presentation. It was interesting and informative.

19 Next, we have Ralph Andersen, from the
20 Nuclear Energy Institute who's going to talk about
21 enabling informed analytical approaches to waste
22 classification.

23 MR. ANDERSEN: Thank you for the chance to
24 come up and talk with you on the topic of
25 radioactivity waste management. The title is a little

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 bit of a misnomer. Probably enabling alternate
2 approaches to management of low activity waste would
3 be a little more correct. The idea is it is reliant
4 on what we at least call was conformed approaches.

5 What I'd like to focus on and it was
6 fortuitous that Commissioner Jaczko kicked off this
7 portion of the ACNW meeting, is one particular
8 alternative to perhaps serve as a model for how we
9 might make other alternative approaches enabled on a
10 more generic basis and that is the use of RCRA
11 facilities for disposal of low activity waste. You
12 know, obviously, we had the ANPR, Advanced Notice of
13 Proposed Rulemaking issued by EPA in 2004 and in fact,
14 one of the things that I'll provide the Committee were
15 comments that we provided on that in 2004. I look
16 forward to hearing EPA's presentation tomorrow to hear
17 once again what the status of that effort is.

18 But I suggest that the important thing
19 that I heard from Commissioner Jaczko today, and I
20 agree, is that we have the visibility and thus, the
21 importance of an issue like this without the urgency
22 and that's rare in our business. If we, for instance,
23 are gearing this at major facility decommissioning,
24 primarily nuclear power plants, we have the luxury of
25 15 or 20 years to work our way through what probably

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 would be a complex process certainly from a political
2 point of view.

3 But his simple concept that was actually
4 illustrated in his comments that I call your attention
5 to dated June 26th, 2007 on this topic and you can
6 find it on the NRC website under Commissioner's
7 speeches, was just isn't it possible to do a
8 comparative evaluation between what is required by NRC
9 for Part 61 disposal facilities and what is required
10 by EPA for RCRA Subtitle C and Subtitle D facilities
11 and draw some conclusions about equivalency and
12 protection of public health and safety. And his
13 primary focus was ways in which to be transparent,
14 open and to carry along public confidence and
15 credibility about the technical conclusions that we
16 draw.

17 The premises, therefore, that are in this
18 kind of approach is that you can make such a
19 comparison in the first place. There are differences.
20 The simple one that I always like to point to is the
21 basic subject of the millirem that we're talking about
22 the Part 61 millirem which dates from the time of
23 dinosaurs or are we talking about contemporary
24 millirems which, in fact, are used in EPA risk
25 assessment space. And secondly, like all good things,

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 is it worth doing from a sense of could we implement
2 the results of it if we reached the conclusion that
3 new alternatives could be pursued.

4 And finally, you know, there would need to
5 be some impetus across the board for stakeholders to
6 both participate and support the effort. The
7 principles that we've put forward over and over again
8 in any of these alternative approaches is, first of
9 all, I shouldn't represent deregulation and I know
10 that's usually the number one argument that is made
11 against doing anything but, oh, gee, you want to
12 deregulate it. In this particular case, not true.
13 We have a very stringent regulatory system within the
14 NRC. You have a very stringent regulatory system
15 within the EPA.

16 Secondly, there's always the additional
17 issue of increasing risk somehow which I always find
18 intriguing but the key here is, is that we certainly
19 think as a principle that we should be maintaining
20 comparable levels of protection of public health and
21 safety. I'll touch on some of these issues a little
22 more as we go on.

23 And finally, with processes like this,
24 assuming that you clear the technical obstacles, all
25 too often we find that that after the technical work

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 is done, that we can never really get going on the --
2 in the true public policy-making process. A great
3 example is the very, very large volume of work that
4 was done to support the idea of criteria for the
5 disposition of low activity material and I believe it
6 was generally describing clearance criteria but after
7 all that fine technical work of the NRC staff, nothing
8 really has come of it.

9 Our suggestion then and our suggestion now
10 is to actually begin by determining what you want to
11 accomplish, begin with thinking about the endpoint,
12 you know, what is the level of dose that you want to
13 assure protection below and what might that imply in
14 terms of criteria for the type of waste you're talking
15 about. I believe it's important to set the goal first
16 rather than to go backwards and determine what can I
17 do and then decide whether what can I do is good
18 enough. That always kind of sounds like deriving
19 safety standards based on economics and capability
20 rather than some other basis.

21 A second step would be to actually
22 characterize what waste we would be talking about. As
23 I'll mention in a minute, we're actually hard at work
24 doing that. And then thirdly, is using that
25 information, then is to actually go through

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 performance assessments in the context of both NRC
2 requirements, namely Part 61 and also EPA requirements
3 and see how those match up. It may be possible to do
4 that generically and have discussions with EPA and
5 potentially one could do it from the generic criteria
6 that exist in regulations and guidance.

7 However, it would probably be beneficial
8 to do a few case studies also with real sites. I
9 mentioned that we've been doing some of our own
10 evaluations. Among others we actually took the
11 criteria that IAEA has on the basic safety standards
12 for clearance which are attended by their calculation
13 to imply one millirem per year maximum exposure and
14 I'll mention that's a contemporary millirem and so
15 what we did is an analysis of the waste that we
16 generate both in operation and during decommissioning
17 and try to determine waste streams that on a practical
18 basis could be redirected. So we didn't just take all
19 the waste and then overlay these concentration values.

20 Rather we looked at where would it
21 actually be practical to apply them. What we came up
22 with is really the -- during operation, the practical
23 waste stream is the dry active waste, namely plastic
24 and paper trash, used protective clothing and the
25 like, so our garden variety trash type waste. For the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 entire industry, it looks to us like you would be
2 talking about 400,000 cubic feet of dry waste
3 generated, which actually equates to somewhere on the
4 order of about 20 to 40,000 cubic feet once it's been
5 compacted, put into containers and all that.

6 It's really not a very large volume and
7 among 100 plants, you divide those numbers by 100,
8 it's not particularly remarkable. So I would make the
9 comment that if that's all we were looking at, it
10 really wouldn't be worth the effort. That would be a
11 simple answer to the operating regime. And again
12 since power reactors represent the most significant
13 portion of low level waste as well as low activity
14 waste being generated that could go into this. I just
15 suggested the cost of effective equation for
16 application of NRC resources wouldn't yield a very
17 interesting result. But when we looked at
18 decommissioning, we did a couple of case studies.
19 What we actually came up with there on a per reactor
20 unit basis is in round numbers, probably talking about
21 100 million pounds of decommissioning debris and soil.

22 That's a lot of pounds. I did try to do
23 some back-of-the-envelope conversions as to what that
24 might mean in volumes and things that I came up with
25 were probably on the order of maybe 200,000 cubic feet

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 but in this analysis, it's kind of a meaningless
2 quantity because, in fact, the RCRA sites dispose of
3 things by weight, generally, not by volume. That
4 always has fascinated me the difference between NRC
5 disposal, regulated disposal sites and RCRA disposal
6 sites and that's primary because they're bringing
7 things in, in truckloads and not necessarily neatly
8 done one way or another.

9 To throw some dollars on that and these
10 are rough numbers and it's why I didn't specifically
11 put them on the slide, but one can never resist doing
12 the economic analysis. What we sort of came up with
13 is that probably the net impact for operating units if
14 we were able to go to say RCRA Class C facilities with
15 low activity waste, it's probably on the order of
16 about a \$50,000.00 a year savings per reactor. And
17 again, that's pretty rough numbers.

18 On the other hand, if you assume that
19 decommissioning degree in soil connote decommissioning
20 at that magnitude would go to RCRA Class C, Subtitle
21 C facilities, you're actually talking about something
22 on the order of 10 to \$20 million. If you assume that
23 it went to a Subtitle D type facility, it's about five
24 times per unit and that's how we get up into these
25 numbers that you saw in the NAS report and others that

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 are on the order of several billions of dollars
2 difference. The perspective that we've gained from
3 our initial review is that it can be done and it can
4 be done safely and cost-effectively and then it does
5 have some very tangible benefits that we think might
6 be of value to a wide range of stakeholders.

7 For one, if you really look at the
8 available disposal capacity today for Class A, B, C
9 waste, there's not enough there to accommodate
10 decommissioning of the existing fleet much less new
11 plants and that's a fact. Now, it's the job of the
12 vendors to tell you that, of course, approvals will be
13 made and expansions will be made and politics will
14 remain constant and all things would be good and so
15 that actually that capacity would be forthcoming when
16 it's needed and that might be the case, but I will
17 tell you that when you go by current capacities,
18 "Sorry folks, we can't dispose of all this waste and
19 the existing available capacity." So there is a great
20 value in applying risk informed principles to send
21 waste to the right place. I will tell you that when
22 you look at the capacities available to even a limited
23 number of the RCRA sites it dwarfs what's needed. You
24 might imagine when you step away from radioactive
25 waste into hazardous waste, the volumes and magnitudes

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 increase substantially. So our infrastructure in this
2 country actually has quite a lot of room in those
3 areas.

4 The other huge benefit is the one that was
5 exemplified at the Big Rock Point site for the outcome
6 of being able to dispose of material cost effectively
7 in the municipal landfills which are EPA regulated
8 sites through state regulations. They are not holes
9 in the ground in somebody's back 40. It actually
10 allowed them to take the site to a Greenfield type
11 status such that the site can be used as a public
12 park. Had the economics not prevailed that way and
13 had they dutifully disposed of everything in low level
14 waste disposal sites, it would have greatly effected
15 the ALARA equation under 25 millirem total effective
16 dose equivalent which is the limit for decommissioning
17 and license termination, such that much of that
18 material would have been left on the site in a realm
19 titled "Acceptable Risk" but the bottom line is it
20 would be a public park that would produce predictably
21 a certain amount of radiation dose from playing at the
22 park.

23 So it was -- that's by the way, why it was
24 so well supported by the local community. So it opens
25 up options like that, that are much more attractive

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 than just saving a dollar here and there.

2 Come closing thoughts, I guess I would
3 like to leave with this is that -- and I've talked
4 with Commissioner Jaczko about this before, and we
5 don't actually differ. Although he emphasizes that we
6 ought to get the technical work moving and get it done
7 and at least reach the technical solution. I think
8 what we've seen and particularly at some of the DOE
9 facilities that have had to regroup for their cleanup
10 and kind of start over again. There's a tremendous
11 value in getting the stakeholders involved at the very
12 front end of the technical analysis so that they
13 understand the assumptions that are going into it,
14 that they have some ability to offer input into those
15 assumptions and can follow the process through so that
16 when the results come out at the end of the trail,
17 instead of them suddenly being produced, you know,
18 here's NUREG 1,000,552 and it's got all the answers in
19 it and if you turn to the back page, there's a number
20 there and believe me, the number is correct, and
21 everybody looks at the 500-page NUREG and says, "I'm
22 not going to be able to read this and go through and
23 see if I believe it's correct, so I either trust you
24 or I don't", that's our current process.

25 And typically speaking, one community

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 tends to say, "Okay, I believe it", and another
2 community that weighs in equally tends to say, "I
3 automatically don't believe it". So I think what DOE
4 among others have learned through that process, when
5 you bring stakeholders through that, at the end of the
6 day you've got to resolve it's both acceptable and
7 credible.

8 So you know, I would comment that
9 identifying the stakeholder issues up front and
10 responding to them, is important. And even if there
11 are issues that are non-technical, sometimes you see
12 things you can do in technical space that will help
13 address those at a future time.

14 Secondly, I think a great recognition that
15 came out from some of Ruth's comments and some of the
16 -- in the NAS report as well. The burden of
17 implementing this regulation isn't going to rest with
18 the NRC. The NRC isn't going to be out implementing
19 anything. They just, at best, would be creating a
20 regulatory framework to enable this, nor would EPA
21 here in Washington DC or ever in the regional offices
22 be out implementing anything. We just sit there, for
23 a state to say, "Gee, if I want to dump a lot of
24 resources into this that I've not been budgeted for,
25 I could probably implement a state framework and

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 actually allow the local vendor to do this if they
2 wanted to do it". That's not provided for.

3 In fact, in our original comments, we even
4 suggested if EPA was going to go forward, then part
5 and parcel really needs to be thinking about the
6 appropriations that would be necessary to provide
7 grants or other types of opportunities for the states
8 to take this, once developed, and actually carry it
9 out into practice. Otherwise, I can guarantee you
10 after all the fine work is done, it will go nowhere.

11 And then finally, we need to recognize
12 that both the compacts and the site operators have
13 gate-keeping roles. Compacts actually have an
14 authority about import and export of waste. So it's
15 all nice and good if you enable all this, but the
16 compact either could say, "Frankly, I don't want you
17 shipping your waste there, or alternatively, I don't
18 want you shipping it into my geographical boundaries",
19 and additionally, they could simply say, "Well, since
20 you're going to save x amount of money it would be
21 awful nice if we got that".

22 So they could certainly wipe out any
23 economic benefit for doing that if they chose. Having
24 them involved in the front end is the point.
25 Likewise, site operators it might be useful to involve

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 them on the front end to see if they're even
2 interested in the notion of having radioactive
3 material come their way.

4 My final comment that I wanted to conclude
5 with on the risk issue because like I said, it always
6 does come up, when we looked at the types of waste
7 we're talking about, looked at the concentration
8 values that are in the IAEA Basic Safety Standards,
9 what we always like to do as an exercise is compare
10 those values to common soil and compare those values
11 to foods we eat and they're typically much below that.
12 And unless we've changed the laws of physics, it's not
13 impossible for a matter to occupy the same space,
14 whether it be waste or soil or fruit that went to the
15 dump or anything else, or at least when it tries
16 usually have a very interesting event that occurs. So
17 the fact is, is I would argue that by introducing
18 materials that are essentially less radioactive than
19 either the existing geological terrain in which the
20 site is located or less in many cases than the
21 quantities of radioactivity that are going there as
22 just part of the normal garbage disposal process, that
23 you are not reducing risk.

24 You're probably diluting it in a very
25 technical sense, but again, that's why it's useful to

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 get stakeholders involved up front and go through the
2 technical exercises. Those are the comments that I
3 wanted to make. Appreciate the opportunity and be
4 happy to entertain any questions.

5 CHAIR RYAN: Thank you, Ralph. I'm
6 pleased that we have representatives from all the
7 constituencies you listed who should be at that table.
8 Hopefully, this is an early and opening discussion on
9 this issue.

10 MR. ANDERSEN: I hope I got all of them to
11 get engaged.

12 CHAIR RYAN: Yeah, Jim?

13 MEMBER CLARKE: Just a quick question,
14 Ralph. I'm sure you do this but I just wanted to ask
15 anyway. It seems to be the appeal of being able to
16 use these sites is two-fold. One is the capacity that
17 you mentioned and the other is their geographical
18 distribution. RCRA sites tend to be near industrial
19 areas which tend to be where the reactors are. So did
20 your cost savings factor that in, in some way?

21 MR. ANDERSEN: Yeah, actually, distance
22 does play a role. If you assume that there might only
23 be one or two -- we really started by focusing on the
24 Subtitle C hazardous waste facilities because we knew
25 there would probably be a wide margin of

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 protectiveness provided by that. So again, if you
2 made some assumptions about which ones might be likely
3 to go forward with something even if it became
4 possible, the transportation is an aspect in terms of
5 both cost and also the hypothetical risk assessment
6 associated with doing that kind of transport.

7 So the more limited you are without that
8 distribution referred to, the larger impact that has.
9 It doesn't cancel out the benefits but it does cut
10 into them significantly if, for instance, you're going
11 all the way from Florida to Idaho, just by way of
12 example.

13 MEMBER CLARKE: Assuming all things being
14 equal that all of these facilities would be available,
15 it strikes me as a real advantage.

16 MR. ANDERSEN: I would argue a two-tier
17 system that enables disposal at municipal landfills
18 which, obviously, would be much more restrictive
19 criteria than others that enabled disposal
20 specifically of hazardous waste facilities.

21 MEMBER CLARKE: RCRA has a good precedent.

22 MR. ANDERSEN: Yeah, and you know, there
23 the PCV drove them to have to select an additional
24 site. Absent the PCV actually everything would have
25 simply gone to the initial municipal authority.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MEMBER CLARKE: It sounds like fortunately
2 they had a PCV site not that far away, too.

3 MR. ANDERSEN: That was fortuitous, yeah.

4 MEMBER CLARKE: Thank you.

5 CHAIR RYAN: Right?

6 MEMBER WEINER: Could you put up your last
7 slide, please, Ralph?

8 MR. ANDERSEN: Sure. Let's see.

9 MEMBER WEINER: It was such a nice summary
10 and I have to ask a question. There. Your first
11 bullet, I would say this depends very much -- since
12 stakeholders are frequently self-identified, this
13 depends very much on who is identifying himself or
14 herself and to implement this plan, I would encourage
15 you to look at some of the DOE experiences that you
16 might not readily look at and I'm thinking of the
17 Sandia Mixed Waste Landfill. That is located --
18 there's nobody around, there's no groundwater leak,
19 site-wise, it's very good and even radiologically,
20 it's a very good site because relatively short half-
21 life material that is stored there and in 40 years the
22 activity will be pretty much gone.

23 That has been a bone of contention now for
24 close to 10 years and the major contenders don't even
25 live anywhere downstream or in the same watershed.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MR. ANDERSEN: Right.

2 MEMBER WEINER: So you really -- the
3 stakeholder issue problem is one that is very
4 difficult and while I appreciate the optimism of your
5 first bullet, our experience has been that it doesn't
6 always work.

7 MR. ANDERSEN: Yeah, it doesn't always
8 work and I'm sure it's how you configure it. I
9 remember some years ago working with the International
10 versions of Green Peace and Friends of the Earth. We
11 were in a context in which we recognized that we
12 needed to solve a problem and that the problem was
13 independent of our religious beliefs about nuclear
14 energy and in my mind setting up context really has a
15 lot to do with it. The political arguments -- what I
16 liked about Commissioner Jaczko's approach is you
17 start with a focus on the technical analysis.

18 My simple comment is, engage the
19 stakeholders at that point. I mean, if somebody -- if
20 a particular stakeholder is in a just say no mode and
21 you're simply able to communicate to them, well, then
22 you're not really going to add much value to this
23 process. We'll see you when we get to the decision
24 making process then. But you're welcome to
25 participate and observe if you want. Meanwhile we are

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 going to do a technical analysis.

2 So optimism, yeah, that's a new spirit
3 that's kind of sweeping across the country, I hope but
4 what I do recognize is the failure to do that, is to
5 guarantee failure at the end of the process.

6 MEMBER WEINER: Yeah, and I would agree
7 with that. What has happened with the mixed waste
8 landfill, of course, is that it has provided -- in a
9 sort of perverse way, it's provided employment for a
10 large number of people for many years and that's only
11 because people keep raising these objections. But I
12 think the point of using a RCRA site really is a very
13 good one. I don't mean to detract from that.

14 But your second bullet is also very well-
15 taken. The states must be -- in any decision
16 involving this, the states must be a major stakeholder
17 right from the beginning, right to participate in the
18 technical aspects. That's all.

19 MR. ANDERSEN: I think the reciprocal
20 opportunities are that the -- you know, the monies
21 that you're talking about solving -- saving,
22 particularly when you're talking about decommissioning
23 space, is money paid by electricity consumers to
24 create decommissioning funds. And depending on
25 whether you're regulated or unregulated environment,

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 you know, it's either directly regulated by the state
2 or indirectly. But the key there is -- and that's why
3 I think it's important to really lay out on the front
4 end, why would you even go to do this, lay the
5 benefits out, the states have a much broader role than
6 just the regulatory aspect. It has to do with
7 economic development. It has to do with, you know,
8 availability of less expensive electricity, and it
9 also has to do on the receiving end with, "So what's
10 in it for me if the stuff is coming in to my state".

11 So, you know, if you look out to the
12 decommissioning era and I've made this comment to you
13 all previously, that it's a night and day difference
14 between looking at low level waste in an operating
15 context, you recall the graph that I always show
16 that's got the huge bulge when you go to
17 decommissioning, and when you look at it in a
18 decommissioning context, you know, from a lot of
19 points of view. But the states really need to have --
20 I agree with you, it's not just a regulatory point of
21 view. They're also stakeholders in their own right.

22 MEMBER WEINER: Thank you.

23 CHAIR RYAN: Allen?

24 VICE CHAIR CROFF: One question, at a
25 couple of places in your presentation and I think

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 verbally you noted that there hadn't been a comparison
2 or a valuation of Part 61 disposal and you know, RCRA
3 disposal and --

4 MR. ANDERSEN: What I suggested was, is
5 that there's not been a comparison of performance
6 assessments done within each context.

7 VICE CHAIR CROFF: I accept your word, I
8 guess. I'm surprised or puzzled but I mean, this idea
9 has been around for a long time as been evidenced by
10 the EPA rulemaking and nobody has gotten that far yet.

11 MR. ANDERSEN: Yeah.

12 VICE CHAIR CROFF: It would seem
13 fundamental.

14 MR. ANDERSEN: Yeah, I would suggest to
15 you that -- sorry Dan, but Dan Schultheisz from EPA
16 will be up tomorrow morning, so, you know, please ask
17 him that question but when I've asked them that
18 question, the answer has been no. When I've asked
19 NRC, the answer has been on.

20 VICE CHAIR CROFF: Okay, well, maybe some
21 of the site specific people, the experiences out
22 there, maybe they can share what they learned. They
23 must have done some kind of assessment, as they go
24 through tomorrow. Thanks.

25 CHAIR RYAN: And again, Ralph, thank you

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 very much for your insights and being with us today
2 and hopefully tomorrow and we will move to our final
3 presentation of the day. Are you both speaking or is
4 one speaking? John Greeves is speaking, all right,
5 for a risk informed approach to low activity waste
6 disposal. Welcome, John.

7 MR. GREEVES: Thank you. It's good to be
8 here. Thank you, it's good to be here. And I'd
9 really like to thank whoever put me last.

10 (Laughter)

11 CHAIR RYAN: You don't get to critique
12 everybody else, John. You just get to do your
13 presentation.

14 MR. GREEVES: No, not critique, it's a
15 roll-up.

16 CHAIR RYAN: Just kidding.

17 MR. GREEVES: I've spent a lot of time in
18 this room and I've really found this afternoon to be
19 rewarding. I think most of us are saying the same
20 thing. So what I hope you get out of this
21 presentation is a concrete proposal. Jim Lieberman,
22 my colleague in the back, who most of you know, and I
23 have been toying with this idea for three years.
24 We've put together some concepts I want to share with
25 you and as I said, it feels good to be at this point

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 in the presentation.

2 We've had a lot of talk about getting the
3 technical work going, moving. We're at that juncture
4 were we see the need but not the urgency. There is
5 this hump coming on the current reactors going into
6 decommissioning and now is the time to take action on
7 that. I was requested to identify if we were
8 representing anybody today and the answer to that is,
9 no, we're representing ourselves. Talisman has
10 afforded me the opportunity to travel internationally,
11 done work for the IAEA internationally, so these
12 thoughts are a compilation of things that have
13 occurred over a large number of years.

14 We speak internationally frequently and I
15 usually like to start with, you know, what's the
16 genesis of the thought process and safety in terms of
17 what we do in the waste area. I borrowed these slides
18 actually from an IAEA colleague and you normally start
19 with the basic safety or the science, the UNSCEAR data
20 that feeds into the ICRP recommendations. Principles,
21 I always found that that was a good hook to hang your
22 hat on in terms of explaining yourself to people and
23 it flows down into setting up these standards. The
24 IAEA, as people have discussed before me, and the
25 European Union are in a position to set these

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 standards.

2 And then the States earn their own right
3 to do that as they see fit for their particular state.
4 All of this actually comes together in the Waste
5 Convention. I had the opportunity to go to one of the
6 meetings they had a few years ago and a lot of the
7 things we're talking about actually get implemented
8 there and that's why it's critically important to have
9 a way to be able to communicate with each other
10 internationally. So that's a bit of a theme in terms
11 of what I wanted to present.

12 I see what I call progress
13 internationally, establishing disposal facilities.
14 I've seen a number of facilities that actually aren't
15 here in the United States that do this low activity
16 waste disposal approach; principally France, Spain,
17 Sweden. I've seen evidence of it in Japan and UK.
18 The IAEA, as other speakers have identified, has
19 established standards for low level waste, high level
20 waste and have decommissioning guidance and they've
21 got a clearance piece of guidance that's used in part
22 internationally.

23 Other speakers have identified that the
24 fourth bullet, disposal capacity, remains a challenge
25 worldwide, especially this high volume, low activity

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 waste and I think some of the international examples
2 are ahead of us in that area and I'll give you some of
3 those examples. The last item, Dr. Croff mentioned
4 this, Draft Guide 390, I actually worked on this a
5 number of years ago. I've kept close with it. It's -
6 - I don't know, maybe I'm too close to it. It's not
7 that complicated but maybe I've been too close to it.

8 I too would show this chart and my
9 understanding what the IAEA is trying to do is get a
10 set of language, a tool, a classification system that
11 leads to a disposal route. And this is a chart with
12 less content on it that you saw earlier and what I'm
13 talking about today is this area right in here, the
14 very low level waste disposal piece. That's the piece
15 that I'd like to focus on in my comments and my
16 summary. I think internationally people have done a
17 good job with clearance. We now have a clearance
18 standard in the United States. Other countries are
19 using this very effectively. The IAEA put together a
20 criteria with quantitative numbers that defines what
21 this is.

22 Very short life material, this is also
23 working very well internationally, this country,
24 elsewhere. The rest of this isn't working as well as
25 it should be and what the IAEA is looking for is a

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 comprehensive system to be able to communicate and
2 what I would give you is the example of they like to
3 do performance assessment, peer reviews. They like
4 to go around from country to country and this supports
5 the Waste Convention. In order to be able to do that,
6 you've got to have a similar language. If you're
7 talking about clearance or exempt waste and how you're
8 handling it in your country, you do a peer review.
9 It's very nice to be able to have an agreement on what
10 that is and how you do that.

11 And this particular box in here, the very
12 low level waste disposal facility, I'll give you a
13 couple of examples of where that's done. It would be
14 nice to have that terminology and use those types of
15 things in those peer reviews. So I find it very
16 rewarding in the travels that I have.

17 There are over 100 near-surface disposal
18 facilities internationally in the world and I've
19 visited many of them. The one on the right here
20 actually is in France. This is the one where you can
21 find a very good example of a typical low-level waste
22 disposal facility with engineered barriers like we
23 design addressed back in the '80s but never built, the
24 French built those facilities. And also very nearby
25 within a number of kilometers is this very low-level

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 waste disposal facility right here. I'll have some
2 pictures of this also later, where they have
3 implemented this approach that I'm describing today.

4 A couple of others are on this chart. The
5 US program, we'll all familiar with the regulations
6 over the past number of years are a patchwork. This
7 is a term that the committee that Dr. Ryan worked on
8 used. It truly is. It's a patchwork of regulations.
9 Some of the wastes are currently over-regulated based
10 on the risk involved. I think a number of us have
11 seen examples of that and there is a demand for a
12 simpler approach, more cost effective disposal of what
13 I call very low level waste, consistent with these
14 definitions that the IAEA is putting forward.

15 Whatever approach we use, as other
16 speakers have mentioned, needs to be protective of the
17 public health, safety and the environment. That's got
18 to be built in. And part of the way you do that is
19 through the rulemaking process. You get full
20 ventilation, people have a chance to talk. So that's
21 what I would point to as a way to look for public
22 acceptance over time.

23 We agree collectively disposal in Part 61
24 facility is protective. However, it can be quite
25 expensive for the high volume low activity waste.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 This is what's in the room with us now and we just
2 really don't have an effective way to deal with that
3 issue that's going to be out there when the current
4 list of reactors go towards decommissioning. We do
5 have this 20.2002, used to be 20.302. You look at
6 those 100 some examples in that SECY paper and they go
7 back through time under various pieces of Part 20.
8 They've led the use in landfills and there are some
9 inconsistencies in how you do that type of work.

10 I do a lot of consulting in that area and
11 there's more questions than answers. It takes a fair
12 amount of time to run these to ground. It would be
13 useful to have something that would help level the
14 playing field in terms of how you dispose of this
15 particular low activity waste. The proposal that Jim
16 and I have worked on would be to put together a risk
17 informed approach to dispose of this low activity
18 waste under the IAEA regulatory format. We take on
19 the same terminology as the IAEA does, very low level
20 waste. It would be the low end of Class A waste and
21 you would not need all the requirements of Part 61.
22 There are some pretty expensive requirements in Part
23 61. There's control by the state or the Federal
24 Government. There's some monitoring requirements that
25 I'm sure the speakers tomorrow will tell you more

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 about and so we would see using a licensing program
2 subject to oversight by the agreement states.

3 A number of the speakers today identified
4 that the rubber meets the road with the states. And
5 what we would do would model a regulation on the CRCPD
6 Subpart M. For those of you who are not familiar with
7 that, Subpart M is one of those suggested state
8 regulations that addressed a Part 61 facility. You
9 could attach a 25 millirem standard to that for this
10 type of waste. You could pick another number. As I
11 said, waste would be a subset of Class A and you could
12 consider unrestricted released after a post-closure
13 period.

14 The performance objective, call it 25
15 millirem following post-closure period, so you could
16 have 100 years of control but effectively it would end
17 up looking like a site that's released under the
18 license termination plan. It's no worse than that.
19 During the post-closure period, a dose could be
20 limited to 100 millirem. If you've got fences up, et
21 cetera, but somebody gets on site as an intruder, you
22 could have that type of a criteria. It would simplify
23 design requirements different from Part 61 and you
24 would essentially come up with a waste acceptance
25 criteria set to comply with that particular

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 performance objective.

2 It's -- it really looks a lot like what
3 Dave Esh was talking about earlier. Decide what your
4 performance objective is. That's what the WIR
5 criteria does, it tells the staff, "Look at the
6 performance objectives and then see whether this
7 circumstance, the DOE site meets that".

8 CHAIR RYAN: While you're on that slide,
9 you don't meet 25 mr, you mean 25 millirem per year.

10 MR. GREEVES: Correct.

11 CHAIR RYAN: Thank you.

12 MR. GREEVES: Twenty-five millirem per
13 year.

14 CHAIR RYAN: Per year, yeah.

15 MR. GREEVES: Right, correct.

16 CHAIR RYAN: Yeah, thanks.

17 MR. GREEVES: Segregation isn't needed.
18 Packaging wouldn't be prescriptive. Government
19 ownership might not be required in this case. That is
20 an expensive operation, to require government
21 ownership for a disposal facility. Long-term control
22 issues could be used. The State of Ohio is taking a
23 long-term control approach at one of the
24 decommissioning sites. NRC has approaches for long-
25 term control. There's concepts that could be build

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 into this.

2 Conditions could be build in, in terms of
3 financial assurance, maintenance, monitoring for
4 radiation, et cetera. They just wouldn't be an
5 onerous or as costly as they are for a Part 61 site.
6 Could consider an independent party to take long term
7 custody. These are concepts that we've talked about
8 for other reasons that could be built into a
9 regulation.

10 The benefits of going in this direction is
11 it addresses what essentially are limited disposal
12 options. At this time, these options exist
13 internationally. It would maintain public protection
14 at a lower cost. It could accelerate cleanup of some
15 contaminated sites. I've seen this happen
16 internationally and it seems to work well there. It
17 would avoid worker exposure at unlicensed sites in
18 monitored facilities that you would require some
19 amount of radiation protection for the workers and
20 radiation monitoring. It's consistent with the
21 Amendments Act of '85 and it would be regulated by the
22 states who have extensive low level waste disposal
23 experience.

24 It also provides a flexible approach that
25 should reduce the cost of disposal of low-level waste

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 considerable. Consistent with the plans of the
2 international community on waste, it would be part of
3 the process that this country could explain in its
4 presentation to the convention on waste management.
5 It avoid inconsistencies in the exemption approach.
6 We've talked about a number of those today. I think
7 this would help level that out.

8 Standardized or regulatory approach for
9 low activity waste provides a consistent regulation
10 for all states. This could be done anywhere. It's
11 just -- at this point it doesn't exist in terms of a
12 regulation, so a developer can't step up and say, "I
13 would build that type of facility". I think it would
14 diffuse some public concerns about unregulated
15 radioactive disposal activities. I'm sure EPA
16 tomorrow is going to tell you about the concerns that
17 they're getting about going to RCRA facilities and
18 depending on how you put it together, it could
19 generate public acceptance over time.

20 Here's just a little bit more detail of
21 the facility in France, the Morvielle site, which I'm
22 not good at French, but this is the site they use for
23 very low-level waste disposal activities. Here's a
24 disposal site. I'm not going to go through all these.
25 Here's an up close shot. It is a landfill and

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 obviously, bringing in bulk weights. It's more
2 control than I think RCRA facilities is. It has a
3 radiation overlay on it in terms of the controls.

4 Fast forward, I started with I wanted to
5 make a concrete proposal. I think all the speakers,
6 including the Commissioner, we're looking for how do
7 we move this forward. It is a state responsibility
8 under the Amendments Act. The states have the
9 experience to implement low-level waste disposal and
10 the bottom line is what about developing a suggested
11 state regulation proposed for this category of very
12 low-level waste disposal. It's consistent with what's
13 done internationally. There are examples you can go
14 visit that are up and running and very effectively
15 dealing with waste disposal issues, large volume, low
16 activity, internationally.

17 So I am thankful to be able to summarize
18 these points. I really have made many of the same
19 points that the other speakers have and I'd be pleased
20 to address any questions today or tomorrow.

21 CHAIR RYAN: Great, thank you, John. I
22 guess I'd just offer you a friendly amendment to our
23 middle bullet on this slide. Seven states have
24 experience but the others don't.

25 MR. GREEVES: Well --

1 CHAIR RYAN: A lot have tried by only
2 seven have done it.

3 MR. GREEVES: We can debate that. The
4 states have a lot of low-level waste experience, more
5 than the seven, but this is a concept.

6 CHAIR RYAN: I'm with you. And again, I
7 appreciate your --

8 MR. GREEVES: If I have to keep slides on
9 the slides, I'll take ownership of those.

10 CHAIR RYAN: I just don't think you want
11 to say states have -- all states do, some do and some
12 have been observers but --

13 MR. GREEVES: I'll stand by the bullet,
14 "States have experience with low-level waste".

15 CHAIR RYAN: Jim.

16 MEMBER CLARKE: Just one question. You
17 mentioned the French facility that I believe you said
18 employed the design that we looked at in the '80s but
19 didn't use. Could you tell us a little more about
20 that?

21 MR. GREEVES: Well, I've been there, I've
22 looked at it. It's an engineered facility. They do
23 a lot of concrete. The package the waste. ANDRA runs
24 the whole show over there. It's very consistent.
25 Everybody knows what they owe ANDRA. It comes

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 together. I can't ever get an answer what it costs.
2 I can't every do the conversion. Maybe somebody else
3 in the room has done this. But it's basically an
4 engineered facility.

5 MEMBER CLARKE: They have features that
6 ours do not? Is that --

7 MR. GREEVES: Well, we don't have an
8 engineered facility that I know of where you would
9 bring in concrete vaults and put them together.
10 You've got roofs over the top of them and they've got
11 under-drain systems. This is not Clive and this is
12 not -- see, Barnwell has evolved over the years and
13 Bill's back in the room, maybe he can tell us later,
14 but you know, having been to Barnwell like even longer
15 than I, it's evolved over the years from a trench to
16 concrete right circular containers and now my
17 understanding is everything goes in concrete but it's
18 fundamentally different from that.

19 MEMBER CLARKE: The confusion was, you're
20 used to the term engineered facility. Just want to
21 know a little more about what you meant by that.

22 MR. GREEVES: These were engineered from
23 the get-go. This thing was built after -- through
24 effort that we did with the Corps of Engineers in the
25 middle '80s and it looks like earth-mounded concrete

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 bunkers.

2 MEMBER CLARKE: So similar to Japan, I
3 think it was.

4 MR. GREEVES: Japan has a similar concept,
5 too.

6 CHAIR RYAN: I've visited as well as John
7 has. It's a vault system with under-drainment, not
8 only drainment but inspection capability so you can
9 look at the bottom of the concrete and all those kinds
10 of things. So there's quite a lot of detailed
11 features.

12 MR. GREEVES: It's a world class facility.

13 CHAIR RYAN: It is -- it has some
14 differences in how it's, you know, been developed and
15 run of course. It's a national site for the entire
16 national system. So it's got the authority of the
17 entire power company of France behind it.

18 MR. GREEVES: What I appreciated was being
19 able to see both of these facilities side by side.
20 This country, which is a major nuclear country, has
21 invested in both of these facilities as being needed
22 and they're a workhorse.

23 CHAIR RYAN: One of things that it does
24 take advantage of that I think is important tying back
25 to David Esh's presentation is they both considered

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 concentration in quantity in disposal and they
2 actually have a quantity limit in the low-level waste
3 site.

4 MEMBER CLARKE: Thank, John, that's
5 helpful.

6 MR. GREEVES: Okay, thank you.

7 CHAIR RYAN: Ruth?

8 MEMBER WEINER: Picking up on Jim's
9 question, how does the French facility just roughly
10 compare with Clive, because there is some engineering
11 at Clive?

12 MR. GREEVES: Well, I'm not an expert on
13 Clive, but I --

14 CHAIR RYAN: Why don't we leave that
15 question and we'll talk about the facilities tomorrow?

16 MR. GREEVES: Well, Clive is a Class A
17 facility.

18 MEMBER WEINER: Yeah, Clive is a Class A
19 facility.

20 MR. GREEVES: All you have to do is go to
21 each of them and I think you --

22 CHAIR RYAN: We're going to have folks
23 talking about their experiences at facilities
24 tomorrow, so why don't we table it till then.

25 MEMBER WEINER: Okay, sure.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 CHAIR RYAN: Good. Anything else?

2 MR. GREEVES: You could build that
3 facility at Clive.

4 MEMBER WEINER: Sure, that was -- I was --

5 CHAIR RYAN: That's getting into the
6 client interest, though, isn't it?

7 MEMBER WEINER: Yeah, I was kind of
8 concerned. I have one other thing and that is what is
9 the cost of this French facility? Is that something
10 that --

11 MR. GREEVES: I have many times asked and
12 I'm not good at converting the -- you know, the --

13 MEMBER WEINER: Converting francs to
14 dollars or Euros to dollars.

15 MR. GREEVES: It's Euros now. All I can
16 assure you is it's very expensive and, in part, that's
17 why they built the other facility.

18 MALE PARTICIPANT: Okay, so they built the
19 other -- so the other facility is --

20 MR. GREEVES: Well, the other facility is
21 for decommissioning waste.

22 MEMBER WEINER: Yeah, and so segregate
23 that because of the cost.

24 MR. GREEVES: That would be my assessment.

25 MEMBER WEINER: Okay, that's fine, thank

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 you.

2 CHAIR RYAN: Allen?

3 VICE CHAIR CROFF: No questions.

4 CHAIR RYAN: Okay, great. Well, with
5 that, we will -- oh, excuse me. You may.

6 MR. CAMPER: Thank you, Dr. Ryan. John,
7 in listening to your presentation and listening,
8 frankly, to all the presentations, and being involved
9 in the work on DS-390, I always come back to the
10 question of what is the definition of low-activity
11 waste? I mean, for example, if you look at the chart
12 that was earlier, the upper range of very low-level
13 waste is somewhere on the order of 400 becquerels per
14 gram alpha. It talks about it being approximately 100
15 times clearance level. You said the lower end of
16 Class A. There is no definition for low activity
17 waste internationally that I've been able to find and
18 so given the preciseness that we have today at our
19 classification scheme where if you go to the tables in
20 Part 61, you see radionuclides and concentrations. As
21 you know, it's a great degree of specificity.

22 I always come back to the point that if
23 we're really going to try to pursue an alternate
24 pathway for disposing of low-activity waste, we're
25 going to have to come up with a rather precise

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 definition because that's what people in the United
2 States have become accustomed to.

3 CHAIR RYAN: Larry, I'm going to take an
4 alternate view --

5 MR. CAMPER: So what is it?

6 CHAIR RYAN: -- just for the sake of the
7 discussion over today and tomorrow. I don't think you
8 need a precise definition. I think what you need is
9 precision in the tool used to make those assessments
10 and clarity and transparency in the tool. That's why
11 I think the committee is so supportive of the work of
12 David Esh and his colleagues on a transparent clear
13 tool to make that assessment for all the reasons Dr.
14 Esh stated. Every site's a little different, there
15 are different features, there are you know, different
16 environments, different engineering features, all
17 those kinds of things.

18 So trying to bin it and say very low-
19 activity waste is up to this concentration doesn't
20 measure the risk in a disposal setting. It gives you
21 a metric that's somehow related to risk in one
22 disposal setting. It's behind the assessment. So I
23 would take the alternate view, just again, for the
24 sake of the discussion. I don't think that's the best
25 way to go. That's why we've gotten into trouble.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 You know, then you end up with the least common
2 denominator for that number. So think about that.
3 What I think we need to do is not so much focus on
4 what's the right concentration, I think we need to
5 focus on what's the right tool to assess the given
6 waste being disposed here and doesn't meet the
7 objective.

8 Now, we've talked a couple of times today
9 about folks that said dose objectives. Sounds good to
10 me. But, you know, there may be other ways to think
11 about a risk metric that's more broadly applicable in
12 different settings for different technologies than
13 simply a concentration. So just as an alternative,
14 think about that.

15 MR. CAMPER: Well, I hear you and I agree
16 with you.

17 CHAIR RYAN: I've got one other short
18 point. The Commission is authorized under 6158 to
19 develop alternate systems of waste classification. It
20 doesn't say alternate classification tables or
21 concentration tables. It says alternate systems of
22 waste classifications, so as long as the principle
23 protection criteria are met or words to that effect.
24 So not only is the risk that are measured by that, the
25 Commission has the authority to do that now. We don't

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 need to change any regulations.

2 MR. CAMPER: Yeah, well, I agree with you
3 philosophically and you witness the work of John -- I
4 agree with you philosophically. The point I come back
5 to though, and it's a stakeholder issue that was
6 raised earlier, stakeholders have become accustomed to
7 a rather specific definition of waste.

8 CHAIR RYAN: And they don't like it much
9 because it's not clear --

10 MR. CAMPER: Well, it's not --

11 CHAIR RYAN: -- in the cases I've had that
12 experience.

13 MR. CAMPER: I agree but the level of
14 preciseness that is there is something they've become
15 accustomed to and when you move toward a system that
16 is fuzzier, if you will, and relies upon site specific
17 performance assessment, which I happen to think, by
18 the way, is a very good idea, I am getting at the
19 notion, though, that stakeholders will ask you
20 specifically what is this material. And in terms of
21 waste classification, the principal reasons why we
22 have it is operational handling of the waste, how do
23 we package it and so forth as you know.

24 CHAIR RYAN: Well, again, the operational
25 health physics aspects and the transportation aspects

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 are two different risks analyzed for two different
2 reasons. Once disposed is where the methodology that
3 David presented today comes in and to me can be a
4 whole lot more transparent than trying to explain a
5 concentration table in some abstracted scenario. You
6 can talk about this site and this location with these
7 features that the stakeholders know are the right
8 numbers for this area. So, you know, again, I'm just
9 trying to shake the tree a little bit here and think
10 about a different vision of how to go about it, you
11 know, for the purpose of getting this conversation
12 going.

13 MR. CAMPER: I understand that and I agree
14 with you philosophically. I'm just pointing out that
15 all the time when we get into discussions of low-
16 activity waste whether it be here or abroad, there is
17 not a clear definition.

18 CHAIR RYAN: And again, I'm not trying to
19 pre-suppose any stakeholder's view, but I think that's
20 where engaging on the Commissioner's point about let's
21 get the stakeholders into the process and think this
22 through, that's a good way to think about it. Bobby?

23 MR. GREEVES: Can I answer his question?

24 (Laughter)

25 CHAIR RYAN: Yes. Bobby, did you want to

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 make an additional point there or did you want to wait
2 for John?

3 MR. EIDS: That's all right, I have just
4 a question and comment to make.

5 CHAIR RYAN: Okay, go ahead, John, sorry.

6 MR. GREEVES: Larry asked me, you know, is
7 really a question about the lack of specificity and
8 Larry, you and I have traveled over there and worked
9 in that environment and I would just point out, it's
10 very well-defined what the international, at least the
11 IAEA, defines as this exempt clearance, and this is
12 quantitatively defined. It's very well done and people
13 still complain about it. So you're going to have
14 people on both sides of this issue and the definition
15 of this very low-level waste that you'll find in this
16 document is 10 to 100 times this clearance number.

17 So that gives you something to work with.
18 But my experience working with these people
19 internationally is they don't want to be roped in.
20 It's like Mike said, "Give me a little bit of room
21 here. I want to be able to work on a performance
22 based approach and if I come up, you know with a
23 construct like the French and the Spanish have for
24 this very low-level waste concept, I don't want
25 anybody dictating to me, Spain, France, what

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 parameters to select. But generally, they follow, I
2 think a very consistent approach. The French actually
3 use 25 millirem in their calculation for that facility
4 and I think that's good enough. They don't want to be
5 fenced in over there either. So you're not going to
6 find a lot more precision on what these lines are on
7 in whatever the final piece of the --

8 CHAIR RYAN: In fact, this squiggly tells
9 you a little something right here.

10 MR. GREEVES: On purpose, on purpose.

11 CHAIR RYAN: I know, I know, John.

12 MR. CAMPER: Yeah, I recognize the
13 squiggly.

14 MR. GREEVES: Thank you for the question.
15 Bobby?

16 MR. EIDS: Yes, I have just a comment
17 regarding the category under the exempt waste and the
18 question regarding the concept of BRC which the NRC
19 dealt with for some time, so people mixed this with
20 the concept of BRC and now we are talking about before
21 as you remember it was 10 millirem and now we are
22 talking about one millirem even. And the relationship
23 between that concept which was descended for a certain
24 time and the exempt category, that's the first
25 question.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 The other question regarding the proposal
2 on slide number 7.

3 MR. GREEVES: there was a question in
4 there?

5 MR. EIDS: Yeah, there's a question on
6 that, on your proposal on Slide Number 7. This
7 proposal does have --

8 CHAIR RYAN: Would you bring up your Slide
9 7, please?

10 MR. EIDS: Slide Number 7.

11 CHAIR RYAN: Thank you.

12 MR. GREEVES: Is that 7? I've got
13 pictures in mine.

14 CHAIR RYAN: Yes.

15 MR. GREEVES: Okay.

16 MR. EIDS: Which says that all risk
17 informed, I think, the numbering is different.

18 CHAIR RYAN: It might be 8.

19 MR. GREEVES: Yeah, see, I inserted
20 pictures in mine. I couldn't send them through an e-
21 mail, so is it 8?

22 MR. EIDS: It could be 8. Yeah, that's
23 the one, the first bullet. Does this -- has something
24 to do with EPA, they are doing regarding AMPR and who
25 you perceive that this can be done concerning what EPA

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 is doing and that AMPR.

2 MR. GREEVES: Well, I'm currently not
3 familiar with what EPA is doing. It's been a long
4 time. I think that's part of our problem is we've had
5 these rulemaking efforts going on for since 2000
6 whatever. I'm not familiar exactly. I look forward
7 to what Dan has to say tomorrow. My memory is that
8 they were going to pick some dose number and we had
9 these discussions about 25 versus 15, so I think
10 you'll get your answer from them tomorrow. I can't
11 speak for the EPA.

12 Internationally, people are using numbers
13 like 25 millirem for that French facility that I
14 showed on the diagram as the objective to do the back-
15 calculation to derive the concentrations which end up
16 being basically a WAC, a Waste Acceptance Criteria for
17 that facility.

18 MR. EIDS: So the proposal is under the
19 Atomic Energy Act and the question what is the EPA
20 role in this case concerning that doing the work under
21 the AMPR.

22 MR. GREEVES: A good question. That's
23 what this meeting is all about, throw things on the
24 table and we'll know better what EPA's thinking is
25 tomorrow.

1 CHAIR RYAN: Bobby, let's carry that
2 question tomorrow, maybe we'll integrate the answer.

3 MR. EIDS: Okay, what about the exempt and
4 the BRC issue?

5 MR. GREEVES: I don't want to talk about
6 BRC. I'm very comfortable with the -- I worked on
7 that exemption clearance standard. I believe in it.

8 CHAIR RYAN: If you don't want to talk
9 about it, stop talking about it. Okay, good.

10 MR. GREEVES: I'm not going there.

11 CHAIR RYAN: Okay, good. With that, I
12 think we are at a good place to stop our discussion.
13 I want to again thank everybody who participated
14 today. It's been a very informative and lively
15 discussion and I look forward to everybody's
16 participation tomorrow. Thank you all very much.

17 (Whereupon, at 4:42 p.m., the above-
18 entitled matter recessed, to reconvene on February 14,
19 2008.)

20

21

22

23

24

25

CERTIFICATE

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

Name of Proceeding: Advisory Committee on
Nuclear Waste & Materials
186th Meeting

Docket Number: n/a

Location: Rockville, MD

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


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

NEAL R. GROSS
COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

RISK-INFORMED APPROACH TO LAW DISPOSAL

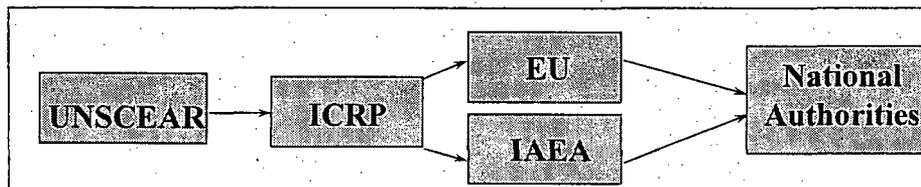
John Greeves
Jim Lieberman



TALISMAN
INTERNATIONAL, LLC.

Responsibilities International & National

- | | | |
|----------------|---|------------------------------|
| UNSCEAR | - | basic biological data |
| ICRP | - | protection principles |
| IAEA/EU | - | safety standards |
| States | - | regulations, guides |

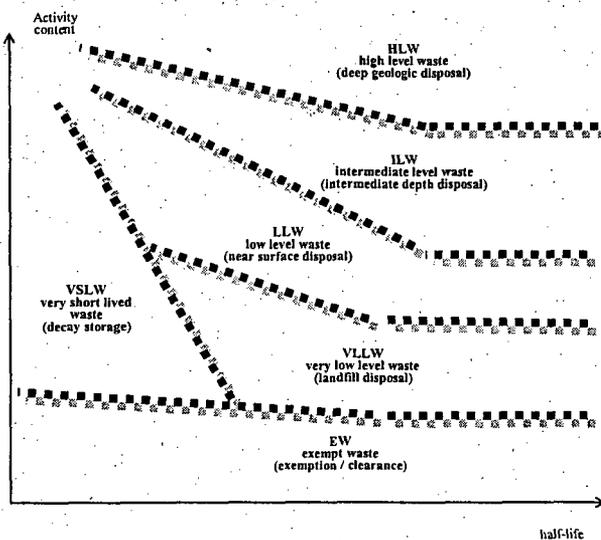


INTERNATIONAL STATUS

- Progress has been made in Europe establishing disposal facilities (e.g., Sweden, France and Spain)
- IAEA has established standards for LLW and HLW disposal, Decommissioning and guidance on Clearance.
- Disposal capacity remains a challenge, especially high volume low activity waste
- IAEA is addressing Classification of Radioactive Waste (DS 390)



3



4

UNITED STATES PROGRAM

- Regulations controlling radioactive waste have evolved as patchwork over 60 years.
- Some wastes are currently over-regulated based on the risk involved.
- Demand for simpler approach for cost effective disposal of very LLW
- Approach needs to be protective of public health, safety & environment
- Approach needs public acceptance



5

UNITED STATES PROGRAM (Continued)

- Disposal in a Part 61 facility is protective
- However can be expensive for high volume low activity waste
- Authorization under 10 CFR 20.2002 to utilize local landfills has led to some inconsistencies and can undermine disposal site development



6

PROPOSAL

- Develop risk-informed approach to dispose of low activity waste under AEA regulatory framework for VLLW
- Large volumes of low end Class A waste do not need all the current requirements of Part 61
- Use licensing program subject to oversight by Agreement States
- Model regulation after CRCPD Part M, 0.25 mSv/y
- Waste would be a subset of Class A
- Could consider unrestricted release after post closure period



7

PROPOSAL (Continued)

- Performance objectives (PO) could provide intruder dose of 25 mr following post-closure period, 100 years
- During post closure period intruder dose could be limited to 100 mr
- Simplify the design requirements
- Waste Acceptance Criteria (WAC) set to comply with PO
- Segregation not needed
- Packaging not prescriptive



8

PROPOSAL (Continued)

- **Government ownership may not be required**
- **Long-term control license (LTC) could be issued. Similar to approach Ohio and NRC use for restricted release sites**
- **Long-term control license would include conditions addressing site restrictions, financial assurance, maintenance, monitoring, and other post-closure activities**
- **Could consider independent party to be the long term custody licensee**



9

BENEFITS

- **Addresses limitation on disposal options**
- **Maintains public protection at lower cost**
- **Accelerates clean up of contaminated sites**
- **Avoids worker exposure at unlicensed and monitored facilities**
- **Consistent with the Low-Level Radioactive Waste Policy Amendment Act of 1985**
- **Regulated by States with extensive LLW experience**



10

BENEFITS (Continued)

- **Provides more flexible approach that should reduce the cost of disposal of LLW**
- **Consistent with plans in the International community for waste.**
- **Avoids inconsistent exemption approach**
- **Standardize regulatory approach to low activity waste provides consistent regulation for all states**
- **Defuse public concerns about unregulated radioactive disposal activities**
- **Could generate public acceptance**



11

PATH FORWARD

- **Under LLRWPA of 1985, LLW is a State responsibility**
- **States have extensive LLW experience, all LLW sites are in Agreement States**
- **Develop a Suggested State Regulation or NRC proposed rule for a VLLW Disposal Facility**



12

Enabling Risk-Informed Management of Low-Activity Waste

Ralph Andersen
Nuclear Energy Institute

NEI

NUCLEAR
ENERGY
INSTITUTE

Preface

“I believe that RCRA facilities could prove to be a viable disposal option for very low level radioactive waste ... if it can be demonstrated that the facilities meet standards comparable to current NRC regulations for disposal of such waste.”

-Commissioner Gregory B. Jaczko

Premises

- **NRC-EPA requirements and standards are comparable for Part 61 and RCRA waste sites**
- **It is practical and cost-effective to allow redirection of some waste streams from NRC to EPA-regulated disposal facilities**
- **Potential benefits to stakeholders justify the effort**

Principles

- **Regulatory oversight and control will be maintained**
- **Protection of public health and safety will be maintained**
- **Engaged stakeholders will drive the process**

Preliminary Steps - Technical

- **Establish a dose-based standard and criteria for defining “low-activity waste” (LAW)**
- **Characterize types, forms, and quantities of wastes that might fit within the LAW definition**
- **Compare and assess performance within NRC and EPA regulations, guidance, and standards, either generically or through case studies**

Preliminary Data

- ▣ **Assuming a dose-based criterion of 0.01 mSv (1 mrem) per year:**
 - **400,000 ft³ of operationally generated dry waste (unprocessed) per year overall**
 - **100,000,000 lbs of decommissioning debris and soil per reactor unit**
 - **Different outcomes based on RCRA Class C and D sites and distances**

Industry Perspective

- ▣ **Enabling disposal of very low activity waste at RCRA sites:**
 - **Can be done safely and cost-effectively for operating and decommissioning facilities**
 - **Can preserve limited Part 61 site capacities for other low-level waste disposal**
 - **Can enhance license termination outcomes toward “greenfield” sites**

Additional Thoughts

- **Identify and define stakeholder issues up front and respond to them**
- **Regulatory implementation burden will fall on the states**
- **Compacts and site-operators have gate-keeping roles**



U.S. NRC

United States Nuclear Regulatory Commission

Protecting People and the Environment

**Risk-Informed Analytical Approaches to
Waste Classification: NRC Staff Review
of DOE WIR Determinations**

**David Esh
Karen Pinkston**

February 13, 2008

Overview

- Background
- Waste Classification
- Concentration Averaging
- Category 3, What is it?
- Averaging Expressions
- Conclusions

Background

- Waste-incidental-to-reprocessing (WIR) is waste, originating from the reprocessing of nuclear fuel, that does not need to be sent to a geologic repository to safely manage the risks that it poses
- On October 28, 2004, the President signed the Defense Authorization Act for 2005 (NDAA) which requires:
 - DOE to consult with NRC on waste determinations
 - NRC to monitor DOE disposal actions

Waste Classification

- The NDAA requires additional consultation if the waste does not meet the Part 61 Class C concentration limits
- The Part 61 concentration limits were derived based on assumptions that may not apply to incidental waste
- 10 CFR 61.55(a)(8) provides for the use of concentration averaging in waste classification

Concentration Averaging

- Category 1 – Physical Homogeneity
- Category 2 – Stabilization to Satisfy § 61.56
- Category 3 – Site Specific Averaging (new)

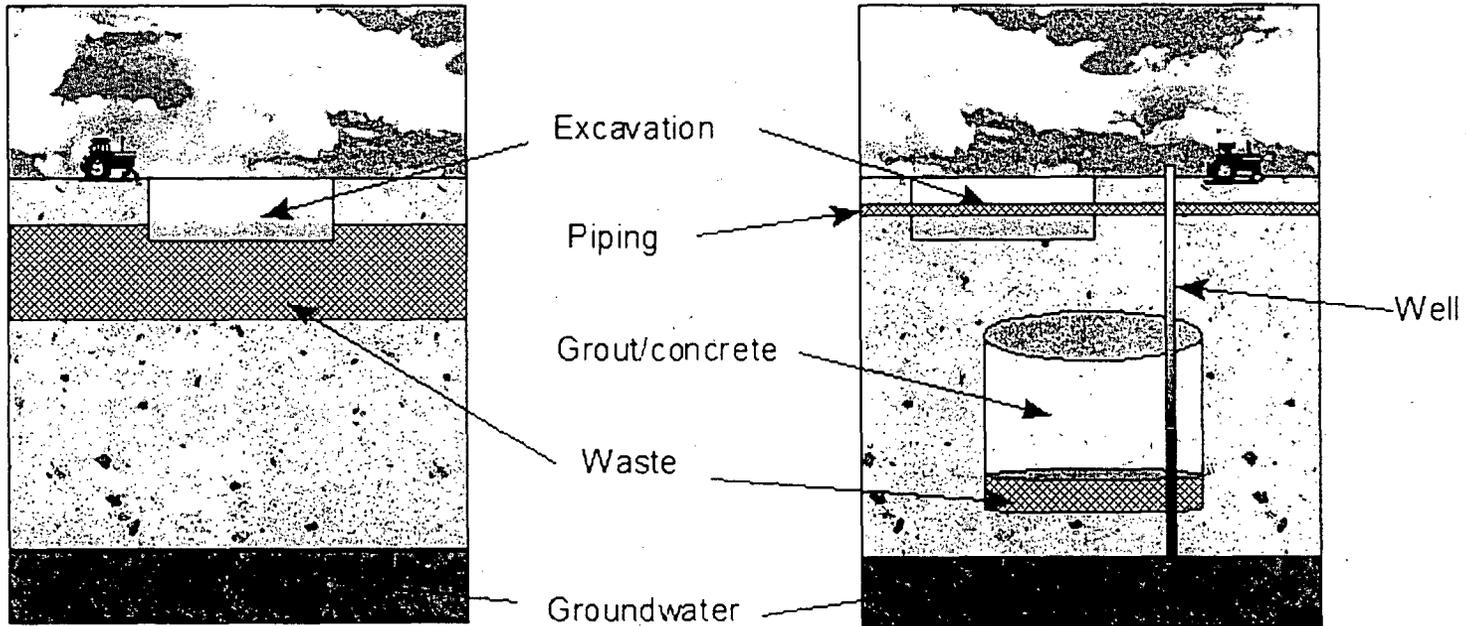
Concentration Averaging

- Category 1 and Category 2 are based on elements of previous guidance
- Category 3 is a risk-informed approach to allow for the consideration of factors such as:
 - Depth to waste
 - Quantity of waste
 - Concentration of waste
 - Intruder barriers

Category 3 – Site Specific Averaging

Part 61 Intruder Construction Scenario

Incidental Waste Intruder Scenario for Tank Residuals or Ancillary Equipment



Deterministic calculations
 Dosimetry - ICRP 2
 Generic parameter sets
 (a)

Probabilistic or deterministic calculations
 Dosimetry - ICRP 26 and 30
 Site-specific parameter values or distributions
 (b)

Averaging Expression Scenarios

Scenario	Typical Waste Access Time (yr)	Waste Disruption Process	Receptor Type
Shallow waste, no intruder barrier	100	Residential Construction	Construction worker–acute or Resident–chronic
Shallow waste, intruder barrier	500	Residential Construction	Construction worker–acute or Resident–chronic
Deep waste, no intruder barrier	100	Well Drilling	Well driller–acute or Resident–chronic
Deep waste, intruder barrier	500	Well Drilling	Well driller–acute or Resident–chronic

Example Averaging Equations

- Example averaging expressions were developed for use by NRC staff to determine when site specific calculations may require additional staff review effort
- Conservative assumptions were used in the development of these expressions
- The equations are not to be used as the basis for waste classification

Example Averaging Equations

Conceptual Approach

- Goal is to develop equations that compare a new analysis for incidental waste to the Part 61 analysis

$$C_{i,j} * V_i * X_{i,j} = D_{i,j}$$

Combining the equations for the Part 61 and new analyses and rearranging gives:

$$\frac{C_{N,j} * V_N * X_{N,j}}{C_{61,j} * V_{61} * X_{61,j}} = \frac{D_{N,j}}{D_{61,j}}$$

where:

- i = the analysis index (either 61 or N)
- j = radionuclide index
- D_{i,j} = intruder dose from radionuclide j
- C_{i,j} = concentration of radionuclide j
- V_i = volume of waste exhumed
- X_{i,j} = conversion factor to convert a source to an intruder dose (function of dosimetry, parameters, uncertainty, assumptions)

Development of Averaging Equations

- A probabilistic GoldSim model was used to calculate the intruder dose for each scenario for unit concentrations of radionuclides
- The mean dose calculated by GoldSim was used in determining the value of the constant for each radionuclide
- Class C concentration limits in Part 61 were assumed to correspond to a 500 mrem dose for the LLW facility considered in the Part 61 analysis (i.e., $D_{61,j} = 500$ mrem)

$$\frac{X_{N,j}}{V_{61} * X_{61,j}} = Constant = \frac{C_{61,j}}{D_{61,j}} * \frac{D_{GoldSim,j}}{C_{GoldSim,j}} * \frac{1}{V_{GoldSim}}$$

Development of Averaging Equations (cont.)

- The averaging equations were created for each scenario using the constant from the limiting radionuclide

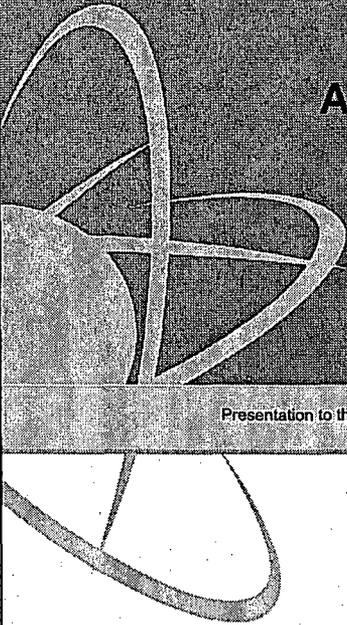
$$\frac{C_{waste, j} * V_{Waste_exhumed} * Constant}{C_{Part_61_tables, j}} = RC_j$$

- The sum of fractions approach is used for multiple radionuclides

$$\sum RC_j \leq 1$$

Conclusions

- The concentration averaging approach for WIR is risk informed
- The approach is flexible and applicable to different scenarios
- The staff is considering if the approach may be more broadly applicable



**A Brief History and Status of
Radioactive Waste
Classification**

Allen G. Croff
Advisory Committee on Nuclear Waste & Materials

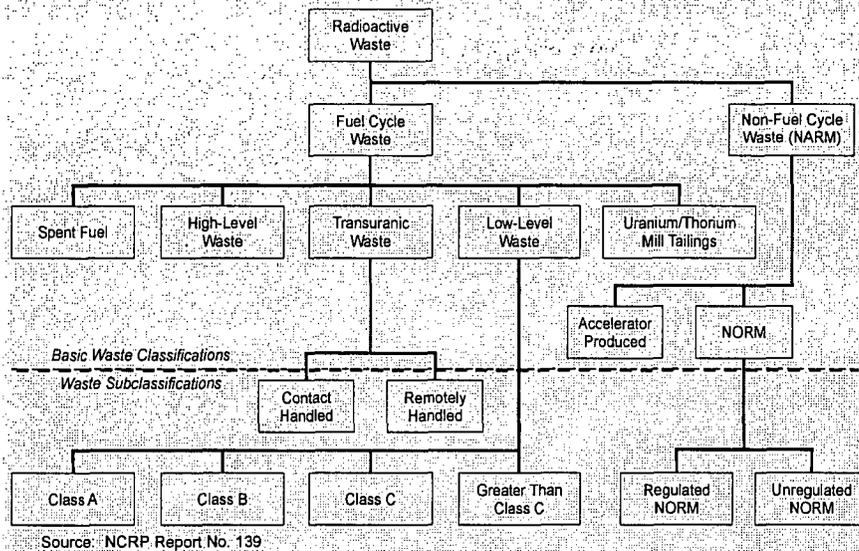
Presentation to the ACNW&M LAW Working Group Meeting
February 13, 2008

 **U.S. NRC**
United States Nuclear Regulatory Commission
Protecting People and the Environment

History in the U.S.

- Wastes were initially classified based on operational and design considerations
 - Heat generation, penetrating radiation, etc.
- This was quickly translated to the source of (process producing) the waste
- The idealized source basis was adopted into the waste definitions (boundaries of waste classes) and persists to this day
- Primary waste definitions come from law

U.S. Waste Classification System



3

Proposed U.S. Systems

- A number have been proposed with the goal of being more related to risk
- Typical approach is two-dimensional
 - Activity: Curies, power density
 - Longevity: Concentration of long-lived radionuclides unacceptable for near-surface disposal
- No impact in U.S., possible impact internationally

4

IAEA Waste Classification System

Class	Waste characteristics	Disposal options
Exempt waste	Concentrations of radionuclides at or below levels corresponding to annual dose to members of the public from waste disposal of 10 μ Sv	No radiological restrictions
Low- and intermediate-level waste	Concentrations of radionuclides above exempt levels and thermal power density less than about 2 kW m ⁻³	Near-surface disposal system or geologic repository ^b
Short-lived waste ^a	Concentrations of long-lived, alpha-emitting radionuclides restricted to 4 kBq g ⁻¹ in individual waste packages and average of 0.4 kBq g ⁻¹ over all waste packages	
Long-lived waste	Concentrations of long-lived, alpha-emitting radionuclides that exceed restrictions for short-lived waste	Geologic repository
High-level waste	Thermal power density greater than about 2 kW m ⁻³ and concentrations of long-lived, alpha-emitting radionuclides that exceed restrictions for short-lived waste	Geologic repository
Waste that contains long-lived, naturally occurring radionuclides ^c	Contains uranium, thorium, or radium; generated in mining and milling of ores or similar activities, or decommissioning of nuclear facilities ^d	No radiological restrictions or systems similar to those for short-lived waste ^e

^aDistinction between short-lived and long-lived radionuclides is half-life of about 30 y.

^bRange of disposal options may be acceptable, due to variety of radionuclides and wide range of concentrations that may be present.

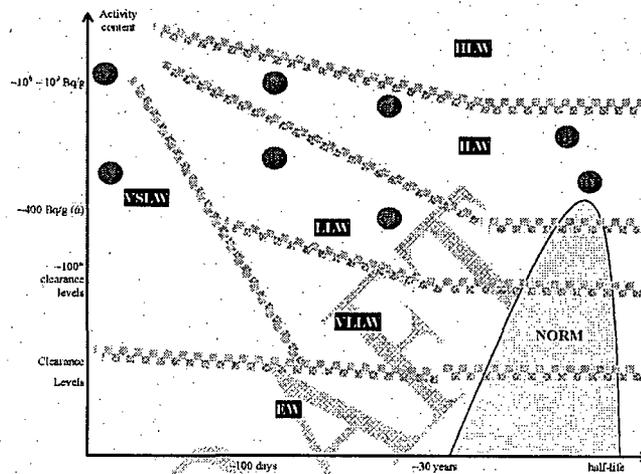
^cWaste is not part of basic waste classification system, but large volumes of waste that contains long-lived, naturally occurring radionuclides are given additional consideration.

^dWaste from decommissioning also may contain man-made radionuclides.

^eDisposal option would depend on results of safety assessments for particular wastes.

5

Proposed IAEA Classification System



6

Risk Basis of Systems

- U.S. waste classification system is qualitatively/indirectly risk informed for wastes generated and managed similar to the ideal
- U.S. has many wastes differing from the ideal
 - HLW: At what point can/should it not be managed as HLW (WIR)
 - LLW: Very dilute and very concentrated edges of the spectrum
 - Non-fuel cycle: Separate but often similar

7

Risk Basis of Systems (cont'd)

- Existing IAEA waste classification system is mostly risk informed
- Proposed U.S. waste classification systems: generally risk informed and similar to IAEA waste classification system

8

Central Problems

- No lower boundary for HLW
 - Symptom: WIR
- No lower boundary for LLW
 - Symptoms: Mixed waste, no clearance of materials or exemption levels
- No classification and system to manage intermediate-level non-defense wastes
 - Symptoms: Orphan GTCC
- Concentration-based boundaries
 - Symptom: Concentration averaging protocols

9

References

- "Risk-Based Classification of Radioactive and Hazardous Chemical Waste", NCRP Report No. 139 (2002)
- "Classification of Radioactive Waste," IAEA, Safety Series No. 111-G-1.1 (1994)
- "Classification of Radioactive Waste," IAEA, DS-390 (2006)

10

Backup Slides

Definition of HLW (NWPA)

- HLW is...
 - (A) highly radioactive material from fuel reprocessing, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and
 - (B) other highly radioactive material that NRC, consistent with existing law, determines by rule requires permanent isolation

Definition of TRU Waste (WIPPLWA)

- Transuranic waste is waste that contains more than 4 kBq/g of alpha-emitting transuranium isotopes, with half-lives greater than 20y, except for:
 - High-level radioactive waste
 - Waste that the Secretary of DOE has determined, with the concurrence of the Administrator of EPA, does not need the degree of isolation required by the disposal regulations in 40 CFR 191; or
 - Waste that NRC has approved for disposal on a case-by-case basis in accordance with 10 CFR 61

13

Definition of LLW (NWPA)

- LLW is defined as radioactive waste that:
 - (A) Is not high-level waste, spent fuel, transuranic waste, or byproduct material as defined in Section 11(e)(2) of the Atomic Energy Act; and
 - (B) NRC, consistent with existing law, classifies as low-level radioactive waste

14

Definition of Byproduct Material-1

- Section 11(e) of the AEA
- The term "byproduct material" means—
 - (1) any radioactive material (except special nuclear material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material;
 - (2) the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content;

15

Definition of Byproduct Material-2

- (3)(A) any discrete source of radium-226 that is produced, extracted, or converted after extraction, before, on, or after August 8, 2005, for use for a commercial, medical, or research activity; or
- (B) any material that—
 - (i) has been made radioactive by use of a particle accelerator; and
 - (ii) is produced, extracted, or converted after extraction, before, on, or after the date of enactment of this paragraph for use for a commercial, medical, or research activity; and

16

Definition of Byproduct Material-3

(4) any discrete source of naturally occurring radioactive material other than source material, that –

(A) the Commission, in consultation with the Administrator of the Environmental Protection Agency, the Secretary of Energy, the Secretary of Homeland Security, and the head of any other appropriate Federal agency, determines would pose a threat similar to the threat posed by a discrete source of radium-226 to the public health and safety or the common defense and security; and

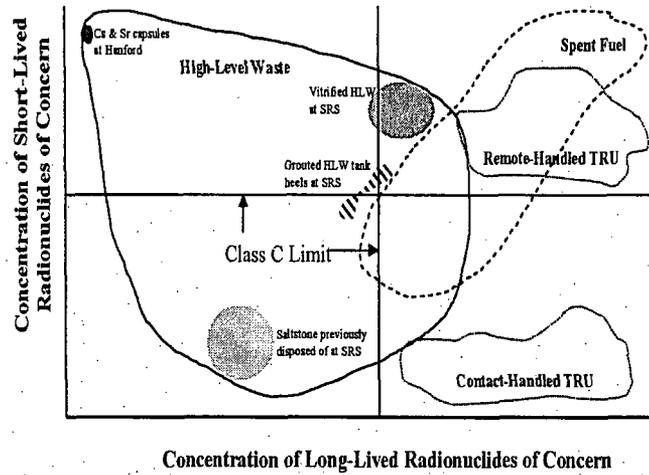
17

Definition of Byproduct Material-4

(4)(B) before, on, or after August 8, 2005 is extracted or converted after extraction for use in a commercial, medical, or research activity

18

Waste Radionuclide Concentrations vs 10 CFR 61 Class C Limits



Source: *Risk and Decisions about Disposal of TRU and High-Level Radioactive Waste*, National Research Council (2005)

Low Activity Waste Regulation: A National Perspective

Ruth E. McBurney, CHP
Conference of Radiation Control
Program Directors

Outline

- Exempt material and other releasable material
- Waste allowed to be disposed in other than a licensed LLW site (by rule)
 - AEA Material
 - TENORM
- Alternate means of disposal
 - AEA Material
 - TENORM
- Licensed LAW sites

Regulatory Framework

- 34 Agreement States
 - Compatible regulations for AEA material
 - TENORM regulations: in ~12 states
- 16 Non-Agreement States
 - AEA material under NRC jurisdiction
 - TENORM under state jurisdiction
- CRCPD provides Suggested State Regulations for all radioactive material

Exempt Material for Disposal

- Exempt items and material
 - Source material less than 0.05% by weight
 - Byproduct material as specified in 10 CFR Part 30 and equivalent state rules
- Waste generated after meeting site decommissioning standards or equipment and facility release standards (varies by state somewhat)
- TENORM: Exempt concentrations for disposal varies from state to state(5-30 pCi/g); 5 pCi/g Ra in SSR's

Agreement State Survey on Unrestricted Release Limits

- Agreement States and NJ surveyed in 2007 in conjunction with "Bulk Survey for Release" issue at OAS meeting
- Questions to States:
 - Are your licenses tied to some criteria for release of equipment and surface-contaminated areas?
 - Do you place any additional conditions on these releases, such as release for disposal only and not recycling or re-use?
 - Have you adopted a dose criteria for decommissioning? If so, what is it? If not, what is your basis for unrestricted release of facilities?

Equipment/Facility Release Limits/ Decommissioning Standards

(27 respondents)

Equipment and Facility Release Limits	Additional Restrictions?	Decommissioning Standard
RG 1.86 or NUREG 1556: 18 states 10% of RG 1.86 (in regulation): 2 states Others: 200 dpm/100 cm ² Some not addressed	No: 20 states Yes: 5 states -Not releasable to unclassified or Class III landfills (1) -Disposal or re-use only expected (2) -Case by case (1)	25 millirem in regulations: 22 10 millirem: 3 15 mrem: 1 (Non-Agreement State) Case-by-case NTE 25 mrem: 1

Confirmation from Survey

- States and NRC do have a de minimus level, below which waste is disposed as non-radioactive, in accordance with release limits.
- Most states are consistent with NRC for release of equipment and facilities and standards for decommissioning.

Rules Allowing Other Disposal of Certain Radioactive Material

- AEA Material
 - 10 CFR 20.2005 and equivalent (H-3 and C-14 in liquid scintillation and animal carcasses)
Some states have added I-125
 - TX: Short-half life material (concentrations in rule) in Class I municipal landfills, Subtitle C hazardous waste landfills for mixed material
 - Emission control dust from arc furnace inadvertent Cs-137 (or some Am-241) gauge smelting disposal in Subtitle C hazardous waste landfill
 - Limits on concentration and total activity/landfill
 - TX includes in rule
 - NRC and other states use NRC BTP and guidance
 - TN: Certain bulk waste in municipal landfills

Rules Allowing Other Disposal of Certain Radioactive Material

- Technologically Enhanced Naturally Occurring Radioactive Material (TENORM)
 - SSR's allows disposal:
 - At a permitted solid or hazardous waste disposal facility, provided it is not prohibited from TENORM disposal
 - In an injection well approved for such disposal
 - Land application in certain concentrations
 - Individual state regulations vary from SSR's
 - SSR for TENORM prohibits dilution to make waste exempt

Alternate Means of Disposal

- AEC Material
 - 10 CFR 20.2002 allows application for alternate means of disposal for low activity waste
 - Compatibility Level D, since it is a procedural rule for obtaining an exemption from other rules
 - Some Agreement States have a similar provisions; some may provide for exemptions of waste or alternate disposal pathways by rule only

Alternate Means of Disposal

- TENORM
 - SSR's provide for alternate methods
“authorized by the permitting agency for the disposal site upon application or upon the Agency's initiative,” consistent with public dose standards.
 - Alternate methods must also be consistent with Safe Drinking Water standards and other EPA requirements for disposal of such waste.

Licensed/Permitted LAW Facilities

- Idaho: U.S. Ecology—amended hazardous waste permit to allow certain concentrations of radioactive material
- Colorado: Clean Harbors—licensed under Part 14 of CO rules for low-level waste; limited to NORM, uranium or thorium decay chain material <2,000 pCi/g and Ra <400 pCi/g
- Utah: Energy Solutions facility—licensed for LAW and TENORM
- Texas: Waste Control Specialists—hazardous waste facility permitted to accept “exempt” material, including exempt TENORM

Summary

- States and NRC do have a de minimus level, below which waste is disposed as non-radioactive, in accordance with release limits.
- Most states are consistent with NRC for release of equipment and facilities and standards for decommissioning.
- States vary in their regulation of TENORM waste, but CRCPD has provided model regulations for exemptions, licensing, and disposal options.
- Some states have provided for alternate disposal options for LAW by specific rules or through implementation of rules similar to 10 CFR 20.2002.

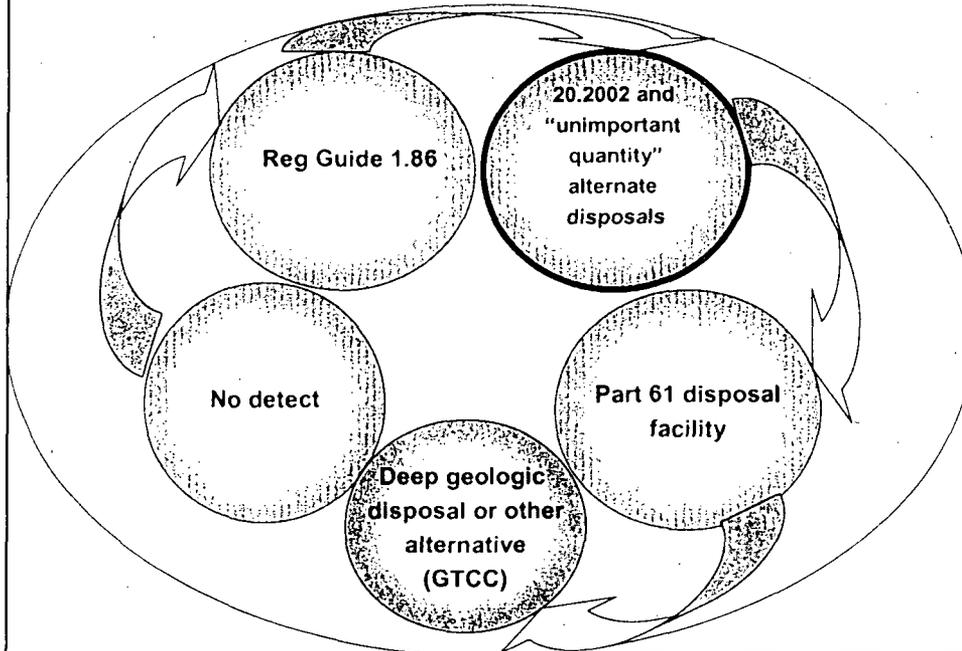


Alternative Disposal Options for Low-Activity Waste: An NRC Regulatory Perspective

*A Presentation for the ACNW&M Working Group Meeting on
Managing Low-Activity Waste*

James E. Kennedy
Sr. Project Manager
Low-Level Waste Branch
Division of Waste Management and Environmental Protection
Office of Federal and State Materials & Environmental Management Programs
E-mail: jek1@nrc.gov
(301) 415-6668
February 13, 2008

Regulatory Framework--Disposition of All Non-HLW AEA Solid Material



Current Regulations

- 10 CFR 20.2002, Method for obtaining approval of proposed disposal procedures.
- 10 CFR 40.13(a), "Unimportant quantities of source material." 10 CFR 40.51(b)(3), "Transfer of source material."

3

10 CFR 20.2002 Provisions

- Alternative disposals of licensed material, "not otherwise authorized"
- In use since 1959
- Licensee or license applicant
- Material generated in licensee's activities
- Application must include:
 - Description of waste, manner of disposal;
 - Dose analyses
- Dose "standard"—less than "a few mrem/yr."

4

Past Implementation

- More than 100 requests in last 30 years
- 2/3 for onsite disposals, trend towards offsite recently
- Typically, solid waste landfills
- Most below clearance levels
- Enclosure 4 to SECY-06-0056, March 9, 2006, has list of all 20.2002 authorizations from 2000 to 2006

5

Big Rock Point 20.2002 Request

- Requested approval for disposal of 42 million pounds of concrete debris from nuclear plant undergoing decommissioning
- Added 3 million pounds of low-activity PCB contaminated waste later
- Staff review—doses to truck driver, landfill worker, and post-closure resident farmer
- Doses ranged from 0.002 mrem/yr to 0.4 mrem/yr.

6



Protecting People and the Environment

“Unimportant Quantity” Transfers for Disposal

- Case-by-case approvals under 10 CFR 40.13(a) and 40.51(b)(3)
- SRM-SECY-98-284, Feb. 2, 1999
 - Addressed Shieldalloy sites in NJ and OH
- Proposed rule, August 28, 2002 Federal Register (Vol. 67, No 167, pp 55175-179)
 - Normally approve if dose to a member of the public is unlikely to exceed 25 mrem/yr
 - If dose between 25 mrem/yr and 100 mrem/yr, staff to inform Commission
 - Licensees may still request approval for transfers with doses of greater than 100 mrem/yr. Approval based on unique circumstances and not without full Commission review.
 - Until rule promulgated, Commission will continue to approve on a case-by-case basis.

7



Protecting People and the Environment

Example – “Unimportant Quantity” Approval

- Homer Laughlin China Co., Newell, WV
- Wastes resulted from use of uranium glaze
- Included wood blocks, concrete blocks and debris, steel components
- Less than 0.05% source material
- Approximately 30 tons
- Exposure scenarios examined
 - Transport truck driver
 - Disposal facility worker
 - Offsite resident during operations
 - Onsite resident after site closure
 - Intruder
- Doses – approximately 3.0 mrem/yr truck driver and worker, 4.0 X 10⁻⁵ mrem/yr to future onsite resident and intruder
- Approved February 1, 2008 (ML080320468 and ML073541298)

8



Protecting People and the Environment

Rulemakings for LAW Disposal

- EPA Rulemaking for low-activity waste—ANPR 2003
 - Concentration limits would be specified
 - Potential NRC regulatory approaches (as companion to an EPA rule)
 - Specific license
 - General license
 - Exemption
 - “Simpler NRC regulatory process” [than Part 61]
 - Possibility of some radionuclides at Class A limits, based on dose, ground water movement, worker and public exposures.

9



Protecting People and the Environment

Rulemakings, continued

- Proposed Rule, August 28, 2002, “Transfers of Certain Source Materials by Specific Licensees”
 - Envisioned transfer for disposal in RCRA Subtitle C facilities
 - Dose standards described earlier would apply
 - Rulemaking on hold
- Disposition of Solid Materials Rulemaking
 - Proposed rule sent to Commission in SECY-05-0054
 - Rulemaking on hold

10

LAW Disposal in LLW Strategic Assessment

- **Significant interest by stakeholders.**
- **Staff ranked development of internal procedure and standard review plan as “high” in priority.**

11

Conclusions

- NRC responds to licensee requests for disposals in hazardous waste sites or landfills.
- Requests have involved very low concentrations of radionuclides—typically at or below clearance levels, or exempt levels (for source material).
- Rulemakings have been initiated to address LAW disposal, but none active at this time.
- Staff making process more transparent.

12



Additional Information

- NCRP 2005 Annual Meeting Slides--Managing the Disposition of Low-Activity Radioactive Materials (available at <http://www.ncrp.com>)

- SECY-06-0056, "Improving Transparency in the 10 CFR 20.2002 Process," <http://www.nrc.gov/reading-rm/doc-collections/commission/secys/2006/secy2006-0056/2006-0056scy.html>

- July 25, 2000, Hearing of Environment and Public Works Committee, U.S. Senate. http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=106_senate_hearings&docid=f:71521.pdf

LOW ACTIVITY RADIOACTIVE WASTE: AN OVERVIEW

Michael T. Ryan Ph.D., CHP
Chairman
Advisory Committee on Nuclear Waste & Materials

Presentation to the ACNW&M LAW Working Group Meeting
February 13, 2008



Purpose of ACNW&M LAW Meeting



- **To explore relative merits of available LAW disposal options**
 - Listen and learn from current practitioners
- **Make observations and recommendations for the Commission's consideration**
 - Issue letter report
 - Summarize working group meeting findings in attachment

Current Situation



- **Potential disposal solutions/options are available**
 - Limited release (NRC-proposed)
 - In-situ disposal
 - Bulk disposal in municipal landfill (Tennessee)
 - NRC-exempted waste disposal facility (§ 20.2002)
 - Agreement State/NRC-licensed facility (Part 61)
 - RCRA-permitted disposal facility (Colorado, Idaho, Utah)

Example: RCRA-Permitted Disposal



- **EPA established RCRA regulations in 1976**
 - Regulations include provisions for disposal in landfills
 - About 20 landfills currently in operation
- **Electric Power Research Institute-sponsored study (ca. 1996) comparing RCRA and Part 61**

Example: RCRA (continued)



- In 2003, EPA published an Advanced Notice of Proposed Rulemaking
 - Proposed disposal alternative for very-low Class-A LLW
 - Acknowledged existing use of RCRA Subtitle-C disposal facilities
 - Recognized NRC approval of disposal practice
 - Recommended regulatory approach to make future disposal practice more uniform

**Low Dose and Low Dose-Rate Radiation Effects and Models:
NCRP 44th Annual Meeting, April 14-15, 2008, Bethesda, MD**

Potential human health effects of low doses of ionizing radiation such as those experienced in occupational and medical exposures are of great contemporary interest. Considerable debate exists over the applicability of a linear-nonthreshold model for characterizing the biological responses and health effects of exposure to low radiation doses, and alternative models have been proposed. A related subject of interest and debate is the effect of the rate of delivery of radiation doses on the biological and health outcomes of exposure. The primary goal of the 2008 NCRP Annual Meeting will be to bring these issues into the perspective of currently available data and models of the biological responses and human health impacts of exposure to low doses of radiation. The meeting will feature presentations by international experts on the topics of (1) molecular, cellular, tissue and laboratory animal studies on the effects of exposure to low-dose and low dose-rate radiation, (2) results of epidemiological studies on human health effects of low radiation doses in occupational, medical, and other exposure scenarios, (3) potential impacts of these findings on future regulatory guidance and public health policy. The perspectives of research scientists, public health officials, and regulatory agencies will be presented.

The meeting will be held at the North Bethesda Marriott Hotel. Information on the final program for the meeting, hotel accommodations and registration are available at <http://NCRPonline.org>.