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1 UNITED STATES OF AMERICA
2 NUCLEAR REGULATORY COMMISSION

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4 ADVISORY COMMITTEE ON NUCLEAR WASTE

5 (ACNW)

6 142nd MEETING

7 + + + + +

8 WEDNESDAY,

9 MAY 28, 2003

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11 ROCKVILLE, MARYLAND

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13
14 The Advisory Committee met at the Nuclear
15 Regulatory Commission, Two White Flint North,
16 Room T2B3, 11545 Rockville Pike, at 1:00 p.m.,
17 George M. Hornberger, Chairman, presiding.

18
19 COMMITTEE MEMBERS:

20 GEORGE M. HORNBERGER, Chairman

21 B. JOHN GARRICK, Vice Chairman

22 MILTON N. LEVENSON, Member

23 MICHAEL T. RYAN, Member
24
25

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1 ACNW STAFF PRESENT:

2 JOHN T. LARKINS, Executive Director, ACRS/ACNW

3 SHER BAHADUR, Associate Director, ACRS/ACNW

4 NEIL M. COLEMAN, ACNW Staff

5 TIMOTHY KOBETZ, ACRS Staff

6 HOWARD J. LARSON, Special Assistant, ACRS/ACNW

7 MICHAEL LEE, ACRS Staff

8 RICHARD K. MAJOR, ACNW Staff

9 RICHARD SAVIO, ACRS Staff

10
11 ALSO PRESENT:

12 FRANK CARDILE

13 CARL FELDMAN

14 ROBERT L. JOHNSON

15 CHRIS MCKENNEY

16 ROBERT A. MECK

17 GEORGE POWERS

18 CHERYL TROTTIER

		3
1	<u>AGENDA ITEM</u>	<u>PAGE</u>
2	Opening Statement	4
3	Control of Solid Materials	8
4	License Termination Rule (LTR)	35
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		

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

(1:03 p.m.)

CHAIRMAN HORNBERGER: The meeting will come to order. This is the first day of the 142nd meeting of the Advisory Committee on Nuclear Waste.

My name is George Hornberger, Chairman of the ACNW. The other members of the committee present are: John Garrick, Vice Chairman; Milton Levenson; and Michael Ryan.

During today's meeting the committee will:

- 1) hear presentations and hold discussions with representatives of the NRC staff on a potential regulation on the control of solid materials containing no or very small amounts of radioactivity;
- and 2) hear presentations and hold discussions with representatives of the NRC staff on its evaluation of issues related to making the restricted release/alternate criteria provisions of the LTR more available for licensee use; and 3) prepare ACNW reports on recent committee reviews.

John Larkins is the designed federal official for today's initial session.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. We have received no requests for time

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1 to make oral statements from members of the public
2 regarding today's sessions. Should anyone wish to
3 address the committee, please make your wishes known
4 to one of the committee staff.

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

9 Before proceeding, I would like to cover
10 some brief items of interest. Members and staff
11 regret to note that this is the last meeting during
12 which the committee will enjoy the services of Barbara
13 Whitaker and Tim Kobetz. Well, Barbara anyway.

14 (Laughter.)

15 No. Oh, rats. That's on the record now,
16 Tim.

17 (Laughter.)

18 Barbara reports Monday to her new position
19 in Research, while Tim reports to NMSS. Both will be
20 missed, and we wish them well.

21 Gibran Hamdan -- this is an unbelievable
22 note to me. Gibran Hamdan, Indiana University
23 quarterback, and son of Latif Hamdan, NMSS, who was on
24 rotation to the ACNW last year, was picked by the
25 Washington Redskins on the seventh round.

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1 (Laughter.)

2 And that's on the record, and I think
3 quarterbacks now are always at least 6'3" and 230.
4 Oh, well, I haven't met Latif's son. He is 6'3" and
5 230, huh? Okay.

6 (Laughter.)

7 Where am I? I better hurry up here.

8 (Laughter.)

9 Three, the Conference of Radiation Control
10 Program Directors held their annual meeting and
11 awarded Commissioner Dicus their highest award -- the
12 Gerald S. Parker Award, named after one of the
13 founders of CRCPD. Congratulations.

14 George Dials, former WIPP Manager and
15 President and CEO of LES, the Urenco-led uranium
16 enrichment consortium that hopes to build a plant in
17 Hartfield, Tennessee, resigned May 13th. LES's press
18 release cited Dials' interest in pursuing other
19 business interests and ventures now that the
20 enrichment project was up and running.

21 Five, DOE's nuclear waste program must
22 receive at least 460 million in fiscal 2004 in order
23 to have a chance of meeting its December 2004 target
24 for submitting a repository license application to
25 NRC, DOE Deputy Program Director John Arthur III said

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1 at the May NWTRB meeting

2 Six, DOE must be confident the repository
3 project meets nuclear QA before it submits a
4 repository license application to NRC, DOE Waste
5 Program Head Margaret Chu told the Nuclear Waste
6 Technical Review Board during this month's meeting.

7 John Arthur III, Chief Deputy at Yucca
8 Mountain, later told reporters that DOE plans to
9 submit a schedule to NRC in roughly two weeks that
10 outlines the Department's schedule for determining QA
11 compliance. Arthur indicated that the schedule would
12 include a date by which DOE must decide there is full
13 QA compliance in order to be able to meet its
14 December 2004 target of sending a license application
15 to NRC.

16 Seven, Australia has selected a repository
17 for low-level and short-lived intermediate radioactive
18 waste in the state of South Australia. The selection
19 process concluded May 9th when Federal Science
20 Minister Peter McGauran chose a site 20 kilometers
21 east of Woomera. Reason cited for the selection of
22 the site over two other candidates were that it
23 offered better security, less environmentally
24 sensitive access route, and is more saline.

25 The site selection process began in 1992

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1 and included both scientific assessments and community
2 consultations. McGauran said in a statement that he
3 hopes the repository will open next year. The waste
4 is now stored at more than 100 temporary sites around
5 the country.

6 Okay. And now back to our regularly-
7 scheduled programming. We have several presentations,
8 as I mentioned. The first discussion will be on
9 control of solid materials, and Mike Ryan is going to
10 chair the meeting for this portion.

11 MEMBER RYAN: Thank you, Mr. Chairman. I
12 guess our first presentation is Frank Cardile. Where
13 is Frank? Ah, there he is, hiding behind the pillar.
14 Do we have copies of your slides?

15 MR. CARDILE: Yes, I believe so.

16 MEMBER RYAN: All right. Thank you.

17 MR. CARDILE: I think we're just going to
18 go from the handout material rather than going to
19 overheads.

20 Okay. Thank you. I guess I'm going to --

21 MEMBER RYAN: Please proceed.

22 MR. CARDILE: -- walk through the overhead
23 material or the handout material, rather than go with
24 slides.

25 Thank you. We're here to discuss our

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1 rulemaking effort on controlling the disposition of
2 solid materials -- basically, jumping over to page 2.
3 The task lead for this rulemaking effort rests in
4 NMSS, specifically IMNS. We are supported by NMSS's
5 Division of Waste Management in preparation of a
6 Generic Environmental Impact Statement, and by the
7 Office of Research in the preparation of technical
8 information in a number of areas.

9 What we'd like to do today is give you a
10 status of our rulemaking effort and also, as I've
11 noted, how the technical information support is being
12 developed. You'll see as I go through my remarks some
13 of the questions that have come up in our rulemaking
14 effort, and, therefore, then how some of the technical
15 work will hopefully support that.

16 What I'm going to go through today is the
17 solid materials that we're dealing with, why we're
18 doing a rulemaking process, the information-gathering
19 efforts we've conducted, the workshop that we just
20 held last week, and what we're doing now.

21 The range of solid materials -- we're
22 basically covering solid materials that are no longer
23 needed at the facilities we license. This slide shows
24 the spectrum of the materials at our facilities, the
25 broad spectrum of facilities -- reactors,

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1 manufacturing facilities, laboratories, medical
2 facilities, etcetera.

3 Despite their presence at these
4 facilities, much of this material has no radioactivity
5 from license operations because it didn't come in
6 contact with radioactive materials. For example, some
7 of the furniture, some piping or electrical equipment,
8 some packaging, material like that.

9 Other materials have very small amounts of
10 radioactivity from license operations, because they
11 just have limited contact with radioactive materials.
12 This can be some of the tools or equipment, some
13 structural materials, that type of thing. All of this
14 is from the restricted or impacted area of a facility.

15 The levels we have discussed in our issues
16 paper that might be on these kinds of materials are --
17 and the doses that one might receive from them are at
18 levels that could be 1/100th of the dose that's in
19 natural background. Other materials have larger
20 amounts of radioactivity at a facility. As we well
21 know, these are kept separate from the ones I just
22 mentioned, and they are required to be sent to license
23 disposal.

24 These are not part of our rulemaking
25 effort. We are not changing our approach for these,

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1 and all our discussion in the following slides and
2 remarks don't apply to them.

3 On page 4, our current approach for
4 controlling the disposition of the solid materials
5 that have no or very small amounts of radioactivity
6 involves separating it from material with larger
7 amounts, conducting a radiation survey to see if
8 radiation is detected, and, if so, how much.

9 In making these detection determinations
10 we use existing guidelines based on survey instrument
11 capabilities. These are contained in Regulatory
12 Guide 1.86 and in other documents that the agency
13 uses.

14 Basically, if radiation is not detected,
15 or if the amount meets these existing guidelines,
16 material is allowed -- solid material is allowed to be
17 released. On page 5 --

18 VICE CHAIRMAN GARRICK: To what level are
19 you able to conduct these surveys, what radiation
20 level?

21 MR. CARDILE: Well, our current approach
22 is basically guided by the levels that are in
23 Regulatory Guide 1.86, which are 5,000 disintegrations
24 per minute per square centimeter for surface
25 contamination. That's been an issue that -- and

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1 you'll see as we talk some more perhaps that different
2 detectors can detect different levels, obviously, and
3 can detect below that.

4 And so while our methodology, while our
5 approach is based on a detection standard rather than
6 a risk-based standard, that's a whole, or that's an
7 issue.

8 MEMBER RYAN: I just want -- just for
9 clarification, you say "released," do you mean
10 released without regard to radioactivity for further
11 disposition or whatever --

12 MR. CARDILE: Yes. Once the material
13 either is -- passes because it's not detected or
14 because it meets the levels at -- in the 1.86 type
15 levels, they are released without regard for
16 radioactivity levels.

17 MEMBER RYAN: Okay. And I guess just to
18 further --

19 MR. CARDILE: In other words, there are no
20 more conditions or restrictions on it.

21 MEMBER RYAN: Right. I mean, as far as
22 you're concerned, it's not within regulatory control
23 at that point.

24 MR. CARDILE: Yes.

25 MEMBER RYAN: Is it fair to say that --

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1 when you say "licensees," do you mean both NRC and
2 agreement state licensees, or --

3 MR. CARDILE: Yes. Agreement state
4 licensees, to a large degree -- I don't know for every
5 state, but they to a large degree use 1.86 or --

6 MEMBER RYAN: Right.

7 MR. CARDILE: -- similar standards.

8 MEMBER RYAN: Okay. Thanks.

9 MR. CARDILE: I guess on page 5, kind of
10 getting into the remarks on page 5, is that we
11 generally do a rulemaking when we want to review an
12 existing approach. What's interesting is that a
13 recent study by the National Academies reviewed our
14 existing approach and indicated that it does protect
15 public health and is workable.

16 So one would ask, well, why are we doing
17 a rulemaking? Well, the National Academies report,
18 and as we've kind of just touched on now, we're
19 looking to make our approach more consistent as well
20 as more risk-based. The National -- we're looking to
21 that, and that's what the National Academies report
22 also did.

23 The National Academies report, while
24 saying our report does -- our approach does protect
25 public health noted that it could be improved to make

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1 it more consistent and to make it more dependent upon
2 risk or more risk-based.

3 So they all -- the National Academies
4 report also went on to say that NRC should, therefore,
5 proceed with a process to evaluate alternatives and
6 invite public input. That's our rulemaking process,
7 so that's where we're at now is in the rulemaking
8 process, with the goal of establishing a consistent
9 way to decide on what material needs continued
10 regulation to protect the public and that which does
11 not because it is clean or poses insignificant risk.

12 We've been engaged and involved, and
13 continue to be, in a number of information-gathering
14 efforts. This included publication of an issues paper
15 in June of 1999 and receipt of over 800 stakeholder
16 letters with a diverse set of views. We held six
17 meetings to hear from stakeholders in '99 and 2000.

18 The stakeholders, as you can see, listed
19 here represented a range of organizations and views.
20 What was interesting is we got a lot of strong input
21 from the metals and cement industries. We'll talk
22 about those in a minute. They are the recipients, to
23 a large degree, of the material we would release, so
24 their views are important.

25 We also heard from citizens groups and

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1 individuals, licensees, federal, state, and local
2 agencies, tribal governments, scientific
3 organizations, and the solid waste industry, by which
4 I mean the landfill operators and associations.

5 Going to page 7, following this public
6 comment period, the Commission requested a study by
7 the National Academies to obtain an independent review
8 of the issues and the alternatives involved with
9 disposition of solid material. As part of this
10 information-gathering, the National Academies held
11 three additional meetings open to the public in 2001
12 and submitted their recommendations to us in March of
13 2002.

14 We're also conducting a number of
15 technical studies -- you'll hear about them in a few
16 moments from our research staff -- on possible impacts
17 and practicalities associated with different
18 alternatives. And we've also gotten input from
19 various scientific organizations, including a recent
20 study or a recent technical report by -- on
21 alternatives by the NCRP. I have a copy of that here.
22 It's NCRP Report Number 141.

23 That's all been put together over the last
24 two, three years. Where we're at now is that we've
25 got a large bank of that information. I'm just going

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1 to jump ahead. Information, those comments, those
2 views can be viewed in a SECY paper that we prepared
3 a couple of years ago. It can be reviewed on our --
4 or viewed on our website and also reviewed in a NUREG
5 report which summarizes the various comments.

6 So we've tabulated and are continuing to
7 bring those comments forward, even though, as you can
8 -- I didn't really get into the timeline, but our
9 timeline was is that we held a number of the public
10 meetings in late '99 and 2000, and then we had the
11 National Academies conduct their study in basically
12 2001 and 2002.

13 But all of the comments that we received,
14 both in our process of gathering information, and in
15 the -- and from the National Academies' input and the
16 NCRP input, they're all in our data bank, so they're
17 all part of what we're working from as we move
18 forward.

19 From the information we gathered we get
20 now into some specifics as to where we are and what we
21 know and what we've heard from different views.
22 Preliminary alternatives can be divided into two broad
23 categories. One is those alternatives involving some
24 further use after radiation surveys verifies that the
25 health and safety is protected. This could either be

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1 for unrestricted use, either by continuing the current
2 practice or through -- by passing or by issuing a
3 dose-based regulation, or the further use could be
4 some conditional use.

5 The alternatives also involve the broad
6 category of no further use, either because the
7 material is sent to an EPA-regulated landfill disposal
8 or because it's disposed of in a licensed NRC or
9 agreement state low-level waste site.

10 Most of the comments, most of the
11 information gathered focused on unrestricted use, and
12 most of the comments we received, although not all,
13 and some of the important ones are not -- were in the
14 area of health and safety. What I've listed here is
15 just a few of the diverse information and comments we
16 have received. As I mentioned, they can be viewed in
17 much more detail in material that's on our website.

18 Some information gathered, most notably or
19 including from the National Academies and the NCRP
20 report, noted that the radiation levels in our issues
21 paper for possible release are in the range of other
22 health-based standards -- for example, similar or less
23 than the EPA drinking water standards. They pose
24 negligible risk, and they're a small fraction of
25 natural background.

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1 On the other hand, the commenters have
2 noted that the risks are uncertain, that they're not
3 accurately modeled, that they can't be accurately
4 measured, and that no dose above background is
5 justified.

6 On the next page you get to the --
7 page 10, we also got important comments on the
8 regulatory or economic burden that could result from
9 a rule in this area. In particular, as I mentioned
10 earlier, the metals and cement industries noted there
11 could be a very large impact on them because consumers
12 would not buy products made with material recycled
13 from licensed facilities.

14 Commenters also noted that there wouldn't
15 be any liability for material that was released into
16 the -- into consumer products in the public sector,
17 and the burden for this could fall on the public. On
18 the other hand, commenters also noted that disposal of
19 not allowing release and, rather, disposing of the
20 material and licensed low-level waste would use up
21 resources for material that is essentially clean, and
22 that, in particular, small licensees such as medical
23 facilities could face severe economic impact if all of
24 their materials and routine trash materials needed to
25 go to a licensed low-level waste.

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1 We also got -- received quite a bit of
2 information on alternatives that would restrict where
3 the material would go. These are in particular, as I
4 just noted, the conditional use option, which
5 restricts material to only certain uses. For example,
6 perhaps it could go to a bridge or a sewer line or
7 someplace where the public is not as intimately
8 associated with it perhaps as in a consumer product.

9 Another restricted alternative, or limited
10 alternative, is disposal at an EPA landfill. An
11 advantage of these alternatives, of course, is that
12 they can minimize potential radiation dose to the
13 public by restricting material to only certain
14 authorized destinations that have limited public
15 exposure.

16 There are some issues raised regarding the
17 safety of landfill disposals. Despite a potential
18 positive of limiting public exposure, there were
19 concerns expressed in all our public meetings, and,
20 again, at the meeting we held with the Commission in
21 2000, that it might not be viable economically to set
22 up a specific conditional recycle process for the
23 limited quantity of material from NRC licensees. And
24 it also wasn't clear that restrictions would work to
25 limit where the material goes.

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1 So where are we now? What are we doing
2 now? Well, that's a quick snapshot of a lot of the
3 information we gathered. We haven't made any
4 decisions about the alternatives. They're all part of
5 our consideration. In October of 2002, the Commission
6 directed us to conduct a rulemaking process to
7 evaluate alternatives, including one of which would be
8 a rulemaking process, retaining the current approach,
9 to give fair consideration to these alternatives and
10 ensure stakeholder input.

11 We are also directed to build on these
12 previous efforts and to focus on solutions, as I have
13 gone through this -- quite a bit of information that
14 we've got there. And, in particular, we were directed
15 to focus on the feasibility of these restricted
16 alternatives. We also were directed to increase web
17 use to interact with stakeholders.

18 If we go on to page 13, we've kept our
19 website up to date. It has information on our current
20 activities, what's going on now. You can link to a
21 variety of information, a variety of documents, and
22 all of the comments we have received. And also, it
23 provides information on when additional comment
24 opportunities exist.

25 We issued a Federal Register notice in

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1 February, which invited additional comment, invited
2 new comment in this area, and announced an EIS scoping
3 process for this rulemaking. And we held a workshop
4 on May 21 and 22, last week.

5 Going to page -- what I'd like to do over
6 the next couple of pages is give a very early summary
7 of that meeting, or of that two-day workshop. As I
8 mentioned on page 14, the agenda of the workshop, the
9 first three bullets, we -- allowed us to talk with --
10 a little bit with stakeholders about our rulemaking
11 process, about our information-gathering efforts, and
12 about our environmental review process.

13 Most of the next -- rest of the two days
14 was involved in stakeholder discussion on the
15 stakeholder's perspectives on all of the alternatives,
16 with a particular focus on conditional use and
17 landfill disposal.

18 The next few pages, as I mentioned, give
19 you a very quick and very brief summary of what we
20 heard. We got a lot of input. We're still digesting
21 the comments. There will be a more detailed summary
22 and a transcript on our website very shortly, but I
23 want to -- but these slides give you some idea of some
24 of the points made at the workshop.

25 The first page, page 15, talks about some

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1 of the views we received on unrestricted use and was
2 useful because it allowed us to give some updated
3 views and current views from the different
4 stakeholders.

5 With regard to economic issues, the metals
6 industry reiterated their concern that consumer
7 perceptions could cause product deselection, and they
8 also noticed that there could be business interruption
9 if an incoming load of solid material, particularly
10 metal, sets off alarms at their steel facilities,
11 because in that case it must be rejected because of
12 continuing concerns about orphan sources.

13 What we were told is that you can't -- you
14 must check for the orphan source if you see a
15 radiation alarm go off. You can't just assume it's
16 just cleared material at very low levels. So this is
17 a -- these are two continuing economic concerns to
18 them that we've heard before and that they restated.

19 We also heard radiation protection
20 concerns expressed in the meeting. Despite
21 information developed in the National Academies and
22 NCRP reports about the levels involved here and the
23 fact that they're in the range of other risk levels
24 that are used in -- by government agencies and their
25 comparison to background, we still hear -- concerns

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1 remain that there is no safe level of radiation that
2 can be released and that we don't know the health
3 effects of radiation at low doses.

4 Concerns were also expressed that --
5 continue to be expressed that we can't measure the
6 releases accurately. And also, basically, that we
7 can't do environmental monitoring of consumer
8 products. We don't go out and monitor a particular
9 chair or Ford Taurus, which is the example that the
10 steel industry always bring up, for radioactivity. So
11 those are a number of the concerns we heard there.

12 We did also hear from a representative of
13 the American National Standards Institute, who issued
14 ANSI N13.12. I don't know if you're familiar with
15 that. That was a document that the ANSI issued I
16 believe two years ago, which contains dose criteria
17 for control of solid materials and screening values
18 for those materials.

19 It contains a one millirem dose criteria.
20 And what the gentleman from ANSI, who was representing
21 ANSI I guess as well as the Health Physics Society,
22 indicated is that the NRC should adopt the levels in
23 the ANSI standard, which -- because they are levels
24 that can be used to set standards in a protective way
25 and are consistent with international standards being

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1 worked on.

2 We also heard a statement by the NEI that,
3 despite the fact that they still believe that safe
4 criteria for clearance and release can be set, they
5 had modified their position somewhat to note that
6 metals suitable for recycle should only be released on
7 a case-by-case basis to assure that they don't wind up
8 in consumer products. So those were some of the views
9 we heard last week on unrestricted use.

10 With regard to conditional use, we heard
11 a fairly consistent or similar discussion from a
12 number of the participants or stakeholders. The
13 metals industry continued to note that conditional use
14 may not be viable or economically feasible, noting
15 that a dedicated melter wouldn't -- would probably
16 likely not be feasible economically because of the
17 small amount of NRC material.

18 We heard from the states that a
19 conditional use option would be too much of a burden,
20 because it's hard to control where material goes. We
21 heard from ANSI that the ANSI N13.12 did not address
22 conditional use generically, because conditional use
23 possibilities and possible uses are unknown and
24 unlimited.

25 And basically, kind of what we heard --

1 and we heard this from a couple of people, including
2 an NEI representative -- was that a rule should,
3 therefore, not define specific requirements for
4 conditional use, but rather outline a process by which
5 someone could come in and propose for a particular set
6 of materials and a particular scenario and location to
7 which they might go, propose that to us and we could
8 review it on a case-by-case basis, and perhaps do an
9 environmental assessment.

10 Such a process would be -- they noted it
11 would be similar to the 20.2002 process. So that was
12 what we heard in that regard.

13 On page 17, we had more discussion on
14 landfill disposal than we had had three years ago, and
15 that was good, because it brought us a little more up
16 to speed. We had some discussion about -- that
17 reviewed the types and designs and post-closure uses
18 and liquid and gas testing in RCRA C and RCRA D
19 landfill sites.

20 We heard pros and cons of a number of
21 discussions on landfill sitings, the fact that it can
22 already be somewhat difficult to site landfills, in
23 particular RCRA D landfills, whether or not you have
24 -- you know, even without radiation, so this could
25 make that more difficult.

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1 We heard pros and cons on whether you can
2 model landfill disposal successfully. We heard that
3 you can, because it's been done in RESRAD modeling,
4 and we heard concerns that landfill scenarios are
5 pretty diffuse and may be hard to model.

6 We heard discussion about costs that
7 should be considered, who should have the authority
8 for the landfill disposal, and other issues, including
9 the potential that the material going to a landfill
10 could be diverted to other uses, and whether the
11 design for a landfill can accommodate this material.

12 And we also heard discussions about that
13 -- with regard to conditions on releases that this
14 shouldn't be considered a conditional release, in the
15 sense that any material in a RCRA D landfill should be
16 at clearance levels or whatever is defined as a clean
17 or safe level, and that additional conditions or extra
18 limits or conditions or constraints should not be
19 placed on RCRA D landfills at any rate because the
20 landfill should not -- the landfill should be seen as
21 an unconditional release rather than some kind of
22 thing that can have further design conditions have to
23 be placed on it.

24 So we heard a spectrum of views, and we
25 are working to digest them.

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1 On page 18, we also heard some other
2 views. We heard a call for a task force of industry
3 licensees and consumers, convened with NRC assistance,
4 that would focus on specific materials and what
5 industries might take what. And they were looking to
6 maybe get more involved in the specific materials and,
7 as I said, who -- where it might go in a particular
8 case.

9 We heard requests for extension of our
10 comment period from its current June 30th date, and
11 requests for additional public input in this process.
12 We heard a request that there be -- or comments that
13 there be more complete records needed to let an end
14 user know the source of the material. And we heard a
15 number of suggestions on what should be specifically
16 included in the scope of a GEIS.

17 On the last page, on page 19, are where we
18 are now. Our scoping comment period runs through
19 June 30th of this year, which is about a month away.
20 As I mentioned, we heard requests that that comment
21 period be extended. Our schedule for our rulemaking
22 process and our NEPA processes are on our website, and
23 it calls for providing a recommendation to the
24 Commission in mid-2004 on how to proceed, whether to
25 go to a rulemaking and what that rulemaking would be.

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1 So that's where we are on the schedule.

2 And I guess that pretty much completes my
3 remarks, and my research colleagues will now describe
4 the technical work that they're doing to support the
5 rule and this rulemaking process and answer, as you
6 can see, a number of these questions that have been
7 raised.

8 MEMBER RYAN: Thank you, Frank. That's a
9 great overview.

10 A couple of quick questions. One is with
11 regard to sources of radioactive material that -- as
12 within your scope. I assume this is just Atomic
13 Energy Act materials, correct? And not NORM or T-NORM
14 or --

15 MR. CARDILE: That's right.

16 MEMBER RYAN: Okay.

17 MR. CARDILE: We've been -- that was a
18 question in -- a scoping question asked in the public
19 meeting, but at the moment we're focusing on them,
20 although we have looked at the breadth of the
21 inventory of those types of material that might be at
22 DOE or that might be at -- controlled by the states.
23 But at the moment, our GEIS will -- is focusing on AEA
24 material. But, again, that's a scoping question that
25 was raised and we'll --

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1 MEMBER RYAN: It's still under
2 consideration, yes.

3 MR. CARDILE: -- work with you.

4 MEMBER RYAN: And the second, as you
5 mentioned, RCRA subtitles C and D landfills is a
6 disposal option. And it just raises a question in my
7 mind -- have you been coordinating at all with EPA who
8 has kind of principal regulatory authority over those
9 facilities?

10 MR. CARDILE: Yes. Well, as a matter of
11 -- in two ways. We talked -- we have -- we worked
12 with them, or are working with them, on the ANPR
13 effort that they have now on the mixed waste
14 facilities, which is the last draft I saw that was
15 discussing possibly extending questions of putting --
16 of having, you know, radioactive material in both RCRA
17 C and RCRA D landfills. I haven't seen a draft of
18 that in a month or two.

19 Also, the representative from the EPA's
20 Office of Solid Waste came to our workshop and gave an
21 overview at the beginning of, you know, what was a
22 RCRA C landfill, a hazardous waste landfill, and what
23 was a RCRA D landfill. Obviously, as we now go
24 forward, we'll work with them some more.

25 MEMBER RYAN: Thanks. Do members have

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1 other questions? Milt?

2 MEMBER LEVENSON: Two questions. One, I
3 know the steel and scrap industry has had a few
4 incidents. Have any of those resulted from released
5 material, or have all of the cases been from lost or
6 foreign sources?

7 MR. CARDILE: I believe that most of the
8 -- I believe that probably all of the problems that
9 have cost them a lot of money have been from lost
10 sources that got into the melt and contaminated
11 material. The material, the levels of material that
12 we're talking about in a clearance or released at a
13 millirem is already low and diffuse. And so it would
14 only tend to diffuse more. Yes, I think -- I don't
15 know that they've -- they've not identified to us that
16 they've had any problems with melted material.

17 MEMBER LEVENSON: Yes. I think that's
18 probably the case. That seems to be getting mixed up,
19 though.

20 MR. CARDILE: Well, the point that they
21 made to us at the workshop and at other places is that
22 -- and I'm not an expert, but when a load comes in,
23 when a rail car or whatever comes in and it's full of
24 metal, and it sets off an alarm on their detector --
25 I guess they have very sensitive detectors -- that

1 it's -- they don't know, of course, whether that's
2 because there's a buried -- there's an orphan source
3 or a lost source buried in amongst this big load, or
4 because the -- you know, just the general radiation
5 level.

6 So to some degree, they have to treat it
7 as if it's a -- and it's not economic for them to dig
8 through that rail car and find the lost source. So
9 sometimes they'll just reject the whole shipment,
10 which means that's a business interruption. That's
11 the word that they use. That means that while they
12 had some material coming in, and now they have to turn
13 it around. So we heard that they'd just as soon not
14 get any of this material. That way they don't have to
15 worry about the pedigree or any of that.

16 MEMBER RYAN: There's another category,
17 too, that's not just the orphan source coming in the
18 gate. There's also a few of those cases, Milt, where
19 it's been a level gauge that's been melted, you know,
20 within the plant.

21 MEMBER LEVENSON: But what I'm saying is
22 that I -- at least the cases I've heard of, none of
23 them have been because of release of low level of
24 material. They've all been because of a source
25 problem.

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1 MEMBER RYAN: Yes, I haven't heard of a
2 case of other than a source problem.

3 MEMBER LEVENSON: Yes, okay. The other
4 question I had -- and when people talk about not above
5 background, are we talking about the background in
6 Denver or in San Francisco, or, you know, in
7 Washington near a building that's out of granite?

8 Because if it's absolutely local
9 background, then you've got probably thousands of
10 standards, because at the level we're talking about --
11 one mr per year or something -- probably every city in
12 the country is different, and many different places
13 even within each city it would be different. So what
14 are people talking about when they say "not above
15 background"?

16 MR. CARDILE: Well, I think you're right.
17 As you mentioned, even in Chicago you can walk down
18 the street past I guess their post office, and, you
19 know, the granite buildings have a high -- higher
20 exposure level. And, of course, there's a large
21 variation in background between what's in Denver and
22 what's in the coast.

23 I think the comment -- so that's what, for
24 example, the National Academies report noted was that
25 there's a variation -- that if background is high or,

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1 you know, is a certain level, then it can vary. I
2 think the concern we've received, though, is that
3 while it's in the noise of -- what's noise between
4 different areas, or while it's less than what can be
5 between the coast and Denver, for example, it's an
6 addition which shouldn't be added. That's the comment
7 that we received.

8 VICE CHAIRMAN GARRICK: Just a simple
9 clarification. On slide 9, I've got a radiation
10 balance problem here. The third sub-bullet says small
11 fraction of natural background, and then the sixth one
12 says no dose above background justified. Is that --
13 are those compatible statements?

14 MR. CARDILE: Well, I think they're from
15 -- yes, I apologize. This is a slide that summarizes
16 the views from a range of commenters, and I guess the
17 first three I think I would characterize them as those
18 were comments from -- that were -- or statements that
19 were made in the National Academies and NCRP reports
20 that a level like one millirem is a small fraction of
21 natural background.

22 And then, the lower three ticks or
23 bullets, whatever, are concerns about even a level
24 like one millirem, that no dose above background is --

25 VICE CHAIRMAN GARRICK: These are just

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1 different sources.

2 MR. CARDILE: These are different sources
3 of comments.

4 VICE CHAIRMAN GARRICK: Okay. Thank you.

5 MR. CARDILE: Yes, I should separate them
6 so that it's a little clearer, but --

7 CHAIRMAN HORNBERGER: For the alternatives
8 involving no further use -- for example, your disposal
9 in licensed low-level waste disposal sites -- have
10 people calculated the cost of going to that kind of
11 option?

12 MR. CARDILE: The National Academies
13 report had a chapter comparing the cost of EPA
14 regulated landfill -- I think it was either RCRA C or
15 RCRA D, I forget which -- to disposal in licensed
16 landfill. And it was -- they noted one of their
17 findings was that it was substantially lower.

18 That will be one of the items in the
19 environmental impact statement or regulatory analysis
20 that we do will be compare those and tabulate those,
21 as well as the cost of a clearance option. So to
22 answer your question, specifically, yes, the National
23 Academies report did tabulate the cost of disposal and
24 licensed low-level waste burial.

25 CHAIRMAN HORNBERGER: And will the GEIS --

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1 again, we all commented on the comment "no dose above
2 background," which is not possible. But in the EIS,
3 will the dose be compared for unrestricted or
4 restricted release versus disposal in a landfill?
5 Disposal in a landfill is not zero dose. Zero --

6 MR. CARDILE: Right.

7 CHAIRMAN HORNBERGER: -- above --

8 MR. CARDILE: Right. There would have to
9 be -- I think our thoughts would be, well, there would
10 be a similar dose criteria placed on disposal in a
11 landfill.

12 MEMBER RYAN: No other questions or
13 comments from members? Thank you, Frank. I think
14 we'll move on to our other presentations, and Cheryl
15 Trottier is going to introduce those presentations.

16 MS. TROTTIER: Good afternoon. I'm Cheryl
17 Trottier in the Office of Research. What we're going
18 to try and do this afternoon is talk to you about all
19 of the work that we're doing to support the effort
20 that the agency is undertaking on this rulemaking.

21 Our main task is to develop a technical
22 basis that would support rulemaking. I have three
23 project managers who are working in this area. The
24 first one you'll hear from is Dr. Robert Meck. He is
25 working on a NUREG, which we have previously published

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1 as a draft. We are currently in the process of
2 finalizing it, which will provide individual dose
3 estimates for some materials. It doesn't include all
4 of the materials that we will eventually analyze. It
5 includes metals and concrete and reuse of equipment.

6 He will be followed by Dr. Carl Feldman,
7 who is doing some of this follow-on work, which will
8 include looking at some of this other material such as
9 just average trash that would be released during
10 normal operations. He is also working on the
11 collective dose analysis that will be used to support
12 the rulemaking.

13 And then the third person will be Dr.
14 George Powers, who is working on the survey
15 methodology. And he will actually be able to answer
16 your question about, you know, how low can you go. I
17 mean, today's technology does go very low. Thanks to
18 9/11 it's getting -- the capability is getting better
19 all the time.

20 Anyway, one thing I want to say about the
21 work that George Powers is doing, this work is broad
22 work in that it supports decommissioning
23 decisionmaking as well. If you are familiar with the
24 times we've come and talked to you about the MARSSIM
25 techniques for decommissioning, it doesn't deal with

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1 subsurface contamination. That still has to be
2 analyzed in a more cumbersome manner.

3 What this survey methodology will
4 eventually do is enable us to design surveys to have
5 high assurance that we have adequately characterized
6 subsurface situations. So it will be handy for this
7 situation where you may have large amounts of material
8 going out in huge canisters. You want to make sure
9 you've accurately characterized it, but it will also
10 be useful in the soil environment.

11 And with that, I'll shut up and let Bob
12 start.

13 DR. MECK: Thank you. Good afternoon.
14 I'd like to acknowledge my co-authors who are doing
15 technical assistance in parallel with us and assisting
16 staff on the assessments that this presentation is
17 about. And before we go to the next slide, I'd like
18 to make a distinction for you, a definition and
19 distinction, so that it might make the presentation a
20 little more understandable.

21 Clearance by international agreement
22 definition is the cessation of control from -- with
23 respect to radiological properties. And so if I speak
24 of something being cleared or clearance, we're not
25 talking about any conditions whatsoever with respect

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1 to the radiological properties of the material or the
2 equipment.

3 And in the previous presentation you heard
4 a broader consideration, which was the control of
5 solid materials, and a subset of that control is
6 clearance. Okay? So --

7 VICE CHAIRMAN GARRICK: Has that
8 definition been generally adopted? Is that --

9 DR. MECK: Both the European -- the EC,
10 European Council? Commission, thank you. The
11 European Commission and the International Atomic
12 Energy Agency use that definition and have defined it
13 in that way. And that's the way that we're using it
14 here this afternoon.

15 Let's see. Okay. Well, we'll go up here.

16 The report's official number is NUREG-
17 1640, and you saw the title on the title slide. This
18 report assesses doses to people potentially associated
19 with the processing and the use of materials and
20 equipment released from licensed facilities.

21 The doses are normalized to the amount of
22 radioactivity in a gram or a square centimeter of the
23 surface. Just as a reminder, NUREG-1640 is limited in
24 scope of materials that are assessed, and that
25 equipment for reuse is also assessed in this report.

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1 Over 80 scenarios were analyzed for this
2 report. In other projects, soils and ordinary trash
3 are being analyzed. With the addition of these other
4 materials, most of the material that realistically
5 would be candidate for release are covered. Dose
6 assessments were performed using Monte Carlo
7 techniques to take into account the variation of
8 parameters.

9 As you can imagine, in each of these 80
10 scenarios the amount of time, for example, that a
11 worker or a process would take could vary, and so this
12 is one of the advantages of taking into Monte Carlo
13 techniques.

14 Let's see, comments on the draft came from
15 the NRC staff, peer reviewers, including the National
16 Academies report, and public meetings, and also in
17 written submissions. They concerned improving the
18 accuracy and completeness of the models used in the
19 assessments. The final version will have a better
20 description of the basic oxygen furnace processes and
21 will add consideration of induction and cupula
22 furnaces.

23 The potential for mixing of cleared
24 materials with like materials in general commerce will
25 be treated in more detail and in a probabilistic

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1 sense. Considerably more research has gone into the
2 partitioning of elements in the various melt products.

3 The representations for the transportation
4 of materials and the copper and aluminum industries
5 have been almost entirely reworked. These responses
6 were aimed at improving the realism, and often lead to
7 less conservatism than in the draft assessments.
8 However, in some cases, more restricted concentrations
9 are the result.

10 The geometries for trucks hauling scrap
11 and other processing products was made much more
12 realistic. For example, the distance between the load
13 and the truck driver was increased to the actual
14 dimensions as compared to the draft. Disposal in a
15 landfill was added, and drinking water down-gradient
16 from a landfill was also added in the final document.

17 More radionuclides were added, and both
18 ICRP 26 and ICRP 60 based models were assessed to
19 provide more complete comparisons with international
20 assessments.

21 The results are complete. For steel, most
22 critical groups are workers or persons reusing large
23 equipment -- for example, processing scrap or melt
24 products. Use of consumer products does not rise to
25 the level of identifying any critical group.

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1 Criticals groups, for a very few radionuclides, result
2 from atmospheric or drinking water exposures.

3 For the volumetric or becquerel per gram
4 radionuclides, 63 percent are less restrictive than in
5 the draft. Most of these are a factor of one to 10
6 times less restrictive. Sixteen percent are less than
7 a factor of three more restrictive. For the surface
8 or surficial radioactivity, the becquerels per square
9 centimeter, 74 percent of the ICRP 26, which is also
10 the basis for Federal Guidance Report 11 from EPA,
11 74 percent from that model, and 78 percent from the
12 model of ICRP 60, results are less restrictive than
13 Regulatory Guide 1.86 levels.

14 So the bottom line is that defensible and
15 robust dose assessments are ready for use in
16 rulemaking. We've been turning the crank, as you can
17 see illustrated here, and a publication is expected in
18 June of this year. We're working hard to complete
19 that.

20 And that concludes my presentation. Thank
21 you.

22 MEMBER RYAN: Thank you very much. A
23 quick question. You mentioned surface contamination
24 and volumetric contamination. And how about in
25 between? Do you have a methodology to look at

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1 something that might have some volumetric
2 contamination but not uniform or --

3 DR. MECK: I think that would have to be
4 examined on a case-by-case basis, and it would be, in
5 my mind, analogous to a sum of the fractions sort of
6 approach. You know, how much -- what fraction of it
7 -- the activity, on a nuclide-by-nuclide basis, would
8 be involved volumetrically. And then the remainder
9 assumed --

10 MEMBER RYAN: As you bring that drafting
11 to closure, that might be something to think a little
12 bit about, because that's practically speaking, you
13 know, a common situation -- to have some material that
14 is surface contaminated and other that is volumetric.
15 And how to deal with a mixture might be a helpful
16 thing to think about.

17 DR. MECK: All right. Thank you.

18 MEMBER RYAN: Any other questions from
19 members? George?

20 CHAIRMAN HORNBERGER: Just a quick one.
21 So obviously all of this is done through calculation.
22 I mean, there are assumptions about the surface
23 contamination, but then the doses or potential doses
24 are all done through calculation. Is that right?

25 DR. MECK: Right, right. All of this is

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1 done through calculation. The assumption that we made
2 for modeling purposes is that the associated
3 radioactivity was normalized. It was uniformly
4 distributed either in the surface or throughout the
5 volume.

6 Now, we know that in the real world that
7 is not the case, and the idea in terms of
8 implementation is that this is a suggestion -- that if
9 a licensee wanted to verify, on a case-by-case basis,
10 that he had, say, 10 percent of the surface of the
11 material was -- had associated radioactivity, then,
12 you know, he would have to come in on this case-by-
13 case basis and say, "We would like to release this
14 based on an average," and allow, then, for this
15 10 percent, perhaps even at a higher level than if it
16 were uniformly -- than the same concentration if it
17 was uniform, just because the total surface would
18 average out to what we had calculated.

19 CHAIRMAN HORNBERGER: And the scenarios,
20 as you say, mostly job-related and reuse scenarios are
21 the key. And you mentioned things like, what, the
22 melters or the equipment?

23 DR. MECK: Well, actually --

24 CHAIRMAN HORNBERGER: Is the equipment
25 fabricated? Large equipment fabricated from recycled

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1 material?

2 DR. MECK: Not really. Not really. I
3 think the intuitive approach is probably revealing in
4 that, you know, where would the most radioactivity,
5 most concentrated radioactivity occur, and where would
6 it be in the greatest group? Well, it would be in the
7 initial load --

8 CHAIRMAN HORNBERGER: Right.

9 DR. MECK: -- that the truck driver would
10 take away from the licensed facility and also in the
11 scrap yard where it got dumped. And so that turned
12 out to be, maybe not too surprisingly, the higher
13 groups of exposures.

14 CHAIRMAN HORNBERGER: And so a lot of
15 those exposures would occur regardless of where the
16 trucker was delivering the material, whether it be to
17 a RCRA landfill or to a melter.

18 DR. MECK: That's correct.

19 MEMBER RYAN: Any other questions?
20 Cheryl, next up is Dr. Feldman?

21 DR. FELDMAN: Good afternoon. I'm
22 basically taking the 1640 material that Bob Meck spoke
23 of and going the next step. Anyway, what I'm going to
24 do is give you an overview and status of the follow-on
25 effort after 1640.

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1 And this effort is for purposes of
2 information for the -- for purposes of supporting the
3 GEIS to estimate the collective dose for the clearance
4 of solid materials, and for the possible rule option
5 considerations, things like what if it were
6 10 millirem release limits, one millirem, etcetera.

7 What we have so far is we haven't actually
8 done the collective doses. We're in the process of
9 concepts for calculational methodologies and
10 developing information bases. And we have something
11 called a draft blueprint letter report that we got
12 from our contractor, SCNA. And it was reviewed by our
13 staff for comments and adequacy.

14 In addition, we are also going to take
15 into consideration the recent workshop we just had as
16 to any comments they may have that we would also
17 incorporate into the collective dose reports. Based
18 on the review so far that we have looked at, we think
19 that the blueprint methodology concepts is -- can do
20 what we need to do to get the information for
21 collective dose for the GEIS development.

22 Okay. The collective dose evaluation
23 itself, the data that goes into it is obviously the
24 inventory of the materials that we have from the NRC
25 licensed facilities, things like metals, concrete,

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1 trash. We're also looking at soils. That's under
2 development; it's not as fully developed as these
3 other -- metals, concrete, and trash.

4 The other thing that's looked at are the
5 possible scenario pathways developed starting with the
6 release of the material from the facility, and follows
7 the path through all the various steps, through to the
8 consumer -- to development of products to consumer
9 use.

10 At each of these scenario pathways there's
11 a vast amount of this layered data that's been
12 developed by the contractor using something called
13 Geographic Information System, which is a coordinate-
14 type system, a map of, say, the United States. And it
15 has all of the reactors laid out and has all of the
16 distances to melters and all kinds of things of that
17 sort.

18 And we can simply, depending upon what --
19 how we choose to combine this material, select
20 enormous amounts of data and use various kinds of
21 Monte Carlo techniques to average the different -- for
22 different realizations of these different pathways
23 scenarios.

24 Okay. The collective dose methodology, as
25 you might expect, parallels, as appropriate, the

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1 methodology that was used in NUREG-1640, and it uses
2 the dose conversion factors which are normalized doses
3 per unit mass.

4 Again, we use a statistical approach, and
5 what we get for the collective dose are average values
6 and then a two sigma or 95 percent confidence
7 interval.

8 Oh, status of the effort is -- we think
9 the present effort can easily accommodate various
10 kinds of information requirements and format
11 presentations. We're at the stage now where we're
12 doing the programming. We have the information in --
13 say, in matrices-type structures, and we can format it
14 to whatever needs the GEIS development requirements
15 are. We can add different considerations. It's very
16 flexible at this point in time, so that's why we're
17 trying to get useful input right now.

18 The recommendations from the NRC staff who
19 reviewed the blueprint paper, as well as the workshop,
20 are coming in and we're going to input those to our
21 contractor. And the soils effort is, again, early but
22 proceeding. And I guess I'm done with that.

23 I also want to mention I'm going to give
24 out a draft Chapter 2 of this blueprint, because I
25 think it will give a better feel than I was able to

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1 give in this quick presentation.

2 I'm done.

3 MEMBER RYAN: Thanks very much. Just a
4 question. The collective dose at the kind of levels
5 that you generally talk about is a small fraction of
6 background, whether it's individual or collective.
7 So, you know, I guess it's a question -- is the real
8 use of collective dose in this modeling exercise to
9 identify critical groups? Or what's its goal?

10 DR. FELDMAN: No. Its goal -- we have to
11 do cost-benefit analysis, and the cost is the
12 collective dose and the way we do NEPA analysis.

13 MEMBER RYAN: Okay. That's fine. I
14 understand. Any other questions from members?

15 VICE CHAIRMAN GARRICK: In your cost-
16 benefit analysis, if you look at different clearance
17 levels, such as one, 10, something, did you also
18 attempt to compare the risk impact with the cost for
19 different clearance levels? Was that in NUREG-1640?
20 Is that --

21 DR. FELDMAN: Well, 1640 did the maximum
22 individual dose. We're not doing that. We're doing
23 the collective dose.

24 VICE CHAIRMAN GARRICK: Yes.

25 DR. FELDMAN: And this part of the

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1 contract doesn't do the cost. It just does collective
2 dose. ICF is another contractor that has come on
3 board -- is going to be doing the actual cost. But
4 what we intend to do is basically look at different
5 risk levels like, say, millirem, do the collective
6 dose for that particular inventory of materials --

7 VICE CHAIRMAN GARRICK: Right.

8 DR. FELDMAN: -- and the associated cost
9 will be a comparison a ratio of cost-benefit. And
10 then it'll be compared with, say, 100 -- just the way
11 we normally do impact analysis.

12 VICE CHAIRMAN GARRICK: Now, is the cost
13 -- what's the cost going to -- what's the scope of the
14 cost analysis going to be? It's the cost of what?

15 DR. FELDMAN: It's the cost of the dose
16 with some conversion. We usually convert it to money,
17 like \$2,000 per man-rem or \$3 million per fatality
18 averted to one of those kinds of numbers. And we
19 basically follow through on the risk part -- portion
20 of it converted to money, and then the cost that it
21 costs to transport things, and so on, all of those
22 things are balanced and we come out with a ratio of
23 cost-benefit greater than one, etcetera. We did that
24 in the license termination, same idea.

25 VICE CHAIRMAN GARRICK: Right. Okay.

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1 MS. TROTTIER: Can I just -- one
2 clarifying -- the Commission has come forward with a
3 reg analysis handbook, guideline handbook, that the
4 staff uses in rulemaking. And so that's really what
5 they're going to be using this for, to, you know, come
6 up with the alternatives and be able to compare one
7 alternative against another. So it's pretty
8 prescribed in that every rulemaking basically follows
9 the same approach.

10 VICE CHAIRMAN GARRICK: Okay.

11 DR. MECK: And just to add a little bit
12 more detail, in this reg analysis handbook there are
13 18 attributes. You're asking about the scope of cost-
14 benefit, and these 18 attributes are intended to cover
15 all reasonable attributes that one would consider for
16 a range, and certainly risk is underlying each of
17 these attributes.

18 However, the mechanism for normalizing
19 things that are qualitatively of a very different
20 nature is to monetize them. And so that's the
21 approach, but the scope is actually quite broad then.

22 VICE CHAIRMAN GARRICK: Thank you.

23 DR. FELDMAN: I just wanted to clarify
24 something. What we're also looking at in a collective
25 dose -- differs from the maximum individual doses --

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1 we are looking at what maximizes that type of thing.
2 And, of course, things like how long somebody is
3 exposed to something, aside from just -- and the
4 number of people exposed, and then looking at things
5 like bedsprings as an example of that, where people
6 sleep on beds for long periods of time, things of that
7 sort and iterative aspects of it, and how much of the
8 inventory we have taken into account when we make
9 these kinds of products, and how much is left over,
10 and just to try to get some kind of an estimate of
11 bounding.

12 VICE CHAIRMAN GARRICK: Yes, okay. Thank
13 you.

14 MEMBER RYAN: Milt, did you have a
15 question? George?

16 Okay. Thanks very much.

17 And our third presenter is Dr. Powers.

18 DR. POWERS: I'm George Powers. I'll be
19 talking to you about the performance-based radioactive
20 materials control. In essence, this is probably one
21 of the more fun parts of this entire rule process,
22 because we're trying to improve, or optimize if you
23 will, the process of determining the presence or
24 absence of radioactivity for the requirements or the
25 conditions present, requirements referring to

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1 regulations, what have you. Conditions present would
2 refer to pretty much everybody else -- spatial
3 geometry, the isotopes, the instrumentation.

4 I'll be looking at four aspects of it from
5 the perspective that we use it. It's necessary,
6 before one gets into any form of magnitude, to
7 actually understand the requirements of whatever the
8 pending decision is going to be. Is it going to be
9 recycled? Is there going to be reuse? Is there going
10 to be disposal? Is it going to be radioactive metal
11 turned into a waste container that's going to hold
12 higher levels of radioactivity?

13 And, finally, you're going to want to
14 identify explicitly the uncertainties that could lead
15 to the decision errors that you might run into. And
16 this turns out in some cases to be quite a process.
17 One person might think that there will be an error
18 associated with one form of measurement or technique.
19 Somebody else might be more concerned about whether
20 it's surface or subsurface.

21 The little discussion that's been going on
22 on whether to look at subsurface or surface material
23 -- Frank mentioned 1.86 and something like 5,000
24 d per m on a surface. Well, imagine a large piece of
25 tinfoil, and find it can pass the 5,000 d per m, but

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1 go ahead and roll it up into a 5,000-foot roll and put
2 a detector up against it. You've got a completely
3 different situation. So the configuration of what you
4 are going to be measuring is going to be quite
5 important.

6 What is accomplished? The last time that
7 I was in front of the ACRS we had just completed
8 NUREG-1505, which was the transformation from a
9 document called 5849 to MARSSIM. And the
10 transformation primarily led with the concept of
11 moving from parametric statistics toward non-
12 parametric statistics. And in the world of the non-
13 parametric statistics you do not need to know what the
14 distributions are that you're working with.

15 In the parametric world, you've got to
16 have a pretty good handle on that to get reasonable
17 results. But in any event, sampling uncertainties and
18 so forth were worked out in MARSSIM, and it came out
19 in around August 2000. Analytical uncertainties,
20 material sending to the laboratory, is due out this
21 December.

22 It's a document called MARLAP, which is
23 the Multi-Agency Radiological Laboratory Analytical
24 Protocol Manual, and it's being headed up by John
25 Griggs at EPA. And it turns out that's going to be a

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1 very, very good document. To date, the textbooks on
2 radiochemistry, radiation chemistry, are old, pretty
3 much out of date. This could very well become a
4 college textbook. It's headed that way. It's been
5 reviewed in that manner.

6 We have target for next year a materials-
7 specific document, which they are referring to as
8 MARSAME, just basically more pages, Multi-Agency
9 Radiation Survey Assessment of Material and Equipment.
10 This will probably be the heart of the regulatory
11 guide or whatever might come out of the NRC.

12 They have been working on this for a
13 couple of years now. It was initiated when we
14 published July last year a NUREG-1761. Some of you
15 may or may not have this. It's the Radiological
16 Surveys for Controlling the Release of Solid
17 Materials. It was issued to get the ball rolling in
18 that area.

19 And then, we're moving into the subsurface
20 area. This will be accomplished, we hope, within the
21 next couple of years. And to pull this all together,
22 one of the things that has happened as you move from
23 the two-dimensional world -- the surface surveys, the
24 land surveys, to getting into subsurface, subsurface
25 meaning below 15 centimeters, or inside waste

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1 containers, anything that gets volumetric, the
2 mathematics gets a little more complicated

3 So we've set up a program called SADA, and
4 I'll mention that a little bit later.

5 Finally, we get into the instrumentation
6 side of it. Selecting the proper instrumentation for
7 surveys was pretty well covered under NUREG-1507,
8 which came out some time ago. We later updated some
9 of that information with the advances that have
10 occurred in instrumentation, and part of it is in the
11 Appendix B of this thing here.

12 And we put these out as letter reports
13 internally, because of the changes that are occurring.
14 Since 9/11, in the area of instrumentation, there has
15 been quite a bit happening. Before everybody was
16 pretty much interested in handheld meters, you had
17 some NC-2 meters, projects like ISOX that Ken Berra
18 put together for monitoring, has advanced quite a bit
19 since then.

20 We've gotten into the capabilities of data
21 logging. Instruments make readings. You don't have
22 to write it down on a piece of paper. It'll take care
23 of it for you. We're getting into live-time analysis
24 where partial results are available at the site where
25 the measurements are being made.

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1 We're getting into GPS, location of where
2 samples are taken, and this has all happened within
3 the last couple of years. And probably one of the
4 more exciting ones as far as subsurface is concerned,
5 and related to things like partial contamination,
6 subsurface contamination, is the world of computer
7 tomography is starting to get involved now a little
8 bit. So they can actually generate 3-D diagrams of
9 what is in a container.

10 So these problems of facilities like
11 smelters, and so forth, they might be able to identify
12 and locate this material without having to completely
13 empty out a vehicle. But that does lead to a problem,
14 and I think it's worthy of bringing it up, making
15 aware of it.

16 A lot of the analysis is moving toward the
17 integration of the instrumentation to analytical
18 softwares coming together. That begins to open up all
19 sorts of areas in the area of quality. There's a lot
20 of software that's being generated to go into, let's
21 say, a little handheld instrument that's being used
22 onsite.

23 And they assume it works one way, but does
24 it? This is going to be I think something that's
25 going to have to be worked out. NIST is interested in

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1 this also.

2 We've gotten into the sampling designs.
3 As I mentioned earlier, the so-called 5849, which uses
4 a uniform grid, you take a sample at every square,
5 collect your samples, and go for it. Simple,
6 straightforward, everybody likes it. Doesn't require
7 any brains. You apply a little brains to it, move
8 into MARSSIM, you might be able to do the same thing
9 with only 10 percent of the samples and get better
10 results.

11 When we moved into MARSSIM we moved into
12 the non-parametric random-type sampling. And applying
13 things like the minimum detectable concentrations that
14 instruments can detect, the more sensitive an
15 instrument is to it, the fewer samples you're going to
16 need, if we're talking that type of material. So this
17 would be considered the active form of surveys that's
18 being done today.

19 A few other little things have come out.
20 We've set up double-sampling beyond MARSSIM. A lot of
21 utilities or situations come up where a site or
22 materials are being released. They expect, yes, we're
23 going to take a survey, but if it fails we want to
24 resurvey. Some of the criteria that's been set up is
25 a bit harsh on the licensee, but they can plan ahead

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1 for it.

2 One of the other items that has come up
3 dramatically in the materials side of it is, what is
4 a survey unit? Well, there's been quite a bit of time
5 spent on that. Once the answer kind of got worked
6 out, it turned out to be fairly simple. MARSSIM you
7 have surface area that you apply.

8 Well, it so happens when you get into
9 materials, a survey unit can range anywhere from a
10 hammer that a guy is carrying out of a powerplant,
11 just one hammer as a survey unit -- that's it, the
12 results -- you aren't going to sit and do 15 or 20
13 measurements on it, maybe one going through. Or it
14 may be an entire carload if you're able to make
15 sufficient statistical samples against it to allow
16 that to occur.

17 In the subsurface world, we're going
18 toward the Bayesian concepts. This I think is going
19 to have an impact also on the previous work that had
20 been done in the area of 2-D. We're doing all of this
21 to assure that what we are putting together is
22 defensible. A lot of these techniques have been used
23 helter-skelter. Depending upon the knowledge of the
24 people that are in the field doing the work, it varies
25 from place to place.

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1 But I think we're bringing enough of it
2 together to where we're -- by using things like
3 Bayesian sampling, there's another one called adaptive
4 sampling, and, in particular, co-sampling, especially
5 in materials where you're measuring more than one item
6 and you're going to compare to them and do things like
7 a covariance-type analysis on them.

8 VICE CHAIRMAN GARRICK: Now, why wouldn't
9 you use Bayesian sampling, for example, on surface?

10 DR. POWERS: You can. That's why I said
11 it's going to start beginning to impact the MARSSIM as
12 it was designed. Case in point -- MARSSIM was put
13 together for a regulator. He knows nothing about that
14 site. So he has to -- when he gets done -- let's say
15 he chooses his alpha at five percent, he wants five
16 percent of the -- you're willing to accept five
17 percent of the material getting past you as the
18 regulator.

19 So it's based on a national basis. You
20 don't know anything about any sites you go onto, so
21 you set up this type of sampling. And you set your
22 alpha five percent, and you'll be 95 percent sure that
23 you collected whatever you wanted to.

24 Now, you move toward Bayesian, now you're
25 starting to take credit for some site-specific

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1 information.

2 VICE CHAIRMAN GARRICK: Right.

3 DR. POWERS: Which is being done by the
4 people that take care of the so-called license
5 termination plans today. They know more about that
6 site than the MARSSIM gives them credit for. And so
7 where we're talking of an alpha of like five percent,
8 probably in reality we're looking at maybe one percent
9 or a half a percent. And we don't -- that doesn't
10 show up. It just -- it was done by a fraction of a
11 percent.

12 If you have a washout area, you would want
13 to sample primarily where that area is to find the
14 boundaries of it. That's adaptive sampling. There's
15 no sense in sampling the rest of that site.

16 The SADA program that's doing this is from
17 the University of Tennessee. It's a free program that
18 can be downloaded. And the DOE and the EPA have
19 already dumped over \$2-1/2 million into this program.
20 We're contributing to it now on its shirttails by
21 adding to it Bayesian sampling/resampling
22 capabilities.

23 It has built into it an excellent
24 visualization package. The areas up there that are
25 described that we're spending time in now are in the

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1 statistical analysis area. We're spending time in the
2 secondary sampling design. And we're spending time in
3 the geospatial uncertainty analysis.

4 We have other people in the research group
5 that are working on uncertainty analysis of the
6 modeling. We've got a pretty good handle, we think,
7 on the surveying and the sampling statistics. The
8 poor modelers, they've got it tough. We have also
9 utilized as many technologies as we can from other
10 fields. As I mentioned, computer tomography, from
11 astronomy, decon pollution analysis, all of these
12 techniques are turning out to be quite useful, and we
13 keep looking around.

14 Why? To support this rule. We want to be
15 sure that when we do go out with guidance for this
16 regulation, if it occurs, that it is going to be
17 totally defensible, as much as we can possibly make it
18 at this point.

19 If you're interested in it more, on
20 June 3rd to 5th we're going to have the University of
21 Tennessee -- and the Environmental Measurements Lab
22 will be here for three days, and the Professional
23 Development Center, discussing the -- and showing SADA
24 to the NRC personnel as a training issue.

25 And that concludes my presentation.

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1 MEMBER RYAN: Thanks very much. Just a
2 quick question. Will this SADA capability ultimately
3 be tied back to the dose performance requirements?
4 And how do you link those two together? Is that a
5 goal? I mean, for example, if I'm a user, and I want
6 to show that something complies with the requirement,
7 will that be kind of laid out in the implementation
8 guidance, how to get there?

9 DR. POWERS: Yes. One of the features
10 that SADA has is it has an incredible number of
11 sampling styles and capabilities, some of which we
12 have not approved as an agency.

13 MEMBER RYAN: Right.

14 DR. POWERS: But they are available, and
15 they are in there. We're bringing in a new one, which
16 is a MARSSIM-type sampling, and then going into three-
17 dimension --

18 MEMBER RYAN: I see.

19 DR. POWERS: -- with it. And as we go
20 through this development and through this workgroup
21 that we've got, we'll be getting to say, yes, this one
22 -- these are valid, acceptable survey situations that
23 can be used.

24 MEMBER RYAN: Great. Questions from
25 members? Milt?

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1 MEMBER LEVENSON: Yes. If I understand
2 what you've said, the radiation measurements in this
3 program have no discrimination in the sense that you
4 don't determine anything about either half-life or
5 energy of the source, is that correct?

6 DR. POWERS: Well, you would be using the
7 energy of a source to determine what it is, if you're
8 getting into -- if you need that capability. A lot of
9 the instruments that occur today are like multi-
10 channel analyzers that are portable, and they do
11 utilize the energy.

12 From the half-life, one should determine
13 what the thing is, and then you probably have a pretty
14 good idea of what the half-life is.

15 MEMBER LEVENSON: Okay. So in this
16 program you will be discriminating, or will not be?

17 DR. POWERS: I'm afraid I don't quite
18 follow the question.

19 MEMBER LEVENSON: Instrument -- you know,
20 spectrometers, there's incredible capability in
21 instrumentation. But in this program, when you're
22 monitoring materials for releases, etcetera, will you
23 be looking at -- numbers were quoted like so many
24 counts per square meter or something, whatever is --
25 are those kinds of things in the regs -- will they be

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1 independent of half-life or what the source of the
2 radiation is?

3 DR. POWERS: Well, given the source of the
4 radiation, most people are familiar with surface
5 measurements. When you start getting into subsurface
6 measurements, you start looking at other parts of the
7 spectrum. Like there's a Compton edge on the spectrum
8 that will begin to move, and that will give you some
9 idea of its depth, until you finally reach a point of
10 electronic equilibrium or something like that, where
11 you can't read the --

12 MEMBER LEVENSON: No, that's a slightly
13 different kind of thing. What I'm trying to get at is
14 that what's on a material -- it incredibly complicates
15 the issue and the problem -- of what you might be
16 willing to release. If the material had a half-life
17 of 20 hours, it might be quite different than if it
18 was 20 years. So --

19 DR. MECK: If I can clarify -- the
20 criteria from dose gets translated to the
21 concentrations that I spoke of earlier, and this is on
22 a nuclide-by-nuclide basis. And so the presumption is
23 that the nuclides present will have to be identified,
24 and then this translation to dose through
25 concentration can be accomplished.

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1 MEMBER LEVENSON: That makes the
2 monitoring instrumentation significantly more
3 complicated.

4 DR. MECK: Yes.

5 VICE CHAIRMAN GARRICK: With all the users
6 for SADA, I assume it's -- and maybe you said this,
7 that it has gone through some sort of a formal code
8 verification program.

9 DR. POWERS: That's the other beautiful
10 part of this. EPA has a pretty nasty QA program for
11 programmers, and this has gone through the EPA QA
12 program, which does exceed, I think, in this
13 particular case that of the NRC's as far as --

14 MS. TROTTIER: George means rigorous.

15 VICE CHAIRMAN GARRICK: Rigorous?

16 (Laughter.)

17 MS. TROTTIER: Nasty could mean
18 ineffective.

19 (Laughter.)

20 MEMBER RYAN: One other instrumentation
21 question I had is it really -- it sort of implies that
22 the bar is raised a bit, and I'm following up on
23 Milt's comment, that, you know, a simple GM
24 measurement of counts per minute or disintegrations
25 per minute without process knowledge probably isn't

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1 going to be enough.

2 That's not a bad thing. I'm not
3 criticizing that. I'm simply saying that
4 radionuclide-specific measurements will really be the
5 focus of how to demonstrate compliance rather than
6 what is kind of the 1.86 of -- you know, world of
7 disintegrations per minute, and so on. Is that a fair
8 statement on my part or --

9 DR. FELDMAN: I'm not sure.

10 DR. POWERS: Yes. I think --

11 (Laughter.)

12 MEMBER RYAN: We'll come back to the "I'm
13 not sure" in a minute.

14 (Laughter.)

15 DR. POWERS: On the very first slide I
16 mentioned that one would want to know the reason for
17 what the release is going to be and what the intent
18 is, what isotopes you're going to use. And that's
19 going to have a lot to do with whether or not you're
20 going to need to use the GM counter.

21 If you're working with something that's
22 going to have fairly high concentrations, but when
23 done it's going to be somewhat diffuse, you can use
24 simple equipment. It's going to depend upon your goal
25 for what you are going to release.

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1 MEMBER RYAN: Sure.

2 DR. POWERS: The comment was made earlier
3 about backgrounds differing on the east coast versus
4 the west coast, and my favorite comment to that is
5 usually take the waste from the east coast, take it to
6 Colorado, and reduce the background in both places.

7 MEMBER RYAN: Well, I guess my point is a
8 little different. If, for example, you've got a
9 single radioisotope licensee, and you have cobalt-60,
10 it's a very simple detection question.

11 But if I have a reactor facility and my
12 question is releasing material that's been in the
13 neutron-activation field of some kind 20 years ago,
14 that's a whole different matter, and, you know, what
15 steel and concrete may be there and what activation
16 parts are there and what concentrations, and all of
17 that. That's a whole different matter requiring a
18 much more complicated detection scheme to make
19 assessments of samples or represented samples and all
20 of that.

21 So I guess what I'm hearing is is that
22 you're aiming to address that broad range of detection
23 complexities in this effort. Is that correct?

24 DR. POWERS: Right.

25 MEMBER RYAN: Okay. Good.

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1 DR. POWERS: In the last 10 years or so,
2 I think I could probably safely say that you could
3 measure anything that you want. If you go to the
4 MARLAP manual, let's say you've got a background of
5 one count per week. You put a sample in, you have a
6 count in the second day. What is the probability that
7 that has radioactivity in it?

8 MEMBER RYAN: Sure.

9 DR. POWERS: That is the level that we
10 have been able to go to. You can go to mass spec, and
11 you can take stuff down to separate out the individual
12 atoms. It's a little expensive, but it's doable.

13 MEMBER RYAN: No, I understand.

14 DR. POWERS: If you want to go there,
15 I'm --

16 MEMBER RYAN: No, that's fine. Thanks for
17 the answer. That's great.

18 Any other questions or comments?

19 DR. MECK: Could I just --

20 MEMBER RYAN: Please.

21 DR. MECK: I'd like to point out that in
22 our current practice, the implementation of Reg
23 Guide 1.86 does require some process knowledge, and it
24 does categorize according to radionuclides of various
25 kinds. And so --

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1 MEMBER RYAN: It's not individual, though.
2 It's grouped.

3 DR. MECK: Yes, they are grouped. And so,
4 yes, this is going to be a sophistication of what --
5 compared to what we do now.

6 MEMBER RYAN: It may, in fact, be a good
7 one because it might clarify, you know, what applies
8 when, and so on perhaps, so that's great.

9 MR. CARDILE: Can I just remind everybody,
10 though, that we're at the stage again of developing a
11 technical basis, developing information to feed into
12 the process. When we get to a rulemaking, if we get
13 to a regulation that we would discuss with you, and
14 supporting guidance, we'll come back, and we'll say --
15 we'll talk about, you know, where we are -- how we're
16 taking all of this and implementing it.

17 This is -- we're not yet at -- this is
18 exactly what we're doing or we're going to be thinking
19 of doing.

20 MEMBER RYAN: Sounds like good questions.

21 MR. CARDILE: Well, yes, these are -- and
22 this is good discussion, and it's good -- and you're
23 seeing that this type of improvement is -- as a matter
24 of fact, some of the comments we heard the other day
25 at the workshop were, you know, you need to be able to

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1 measure it better, you need to be able to have better
2 records, etcetera, etcetera, and this is the type of
3 thing. But we're not at the finalized stage by any
4 means.

5 MEMBER RYAN: Thanks very much. Cheryl,
6 any other last comments? Are we --

7 MS. TROTTIER: No. I just want to thank
8 you. And as we move forward, we'll be back to brief
9 you on our status at that time.

10 MEMBER RYAN: Great. Thanks very much.

11 VICE CHAIRMAN GARRICK: I'm a little
12 curious as to what Dr. Feldman's differing view was.

13 (Laughter.)

14 DR. FELDMAN: I was basically -- when I
15 said I'm not sure, I was basically saying what Frank
16 Cardile was. I was thinking of saying what Frank was
17 saying. We haven't come to a criteria. Depending
18 upon how low you want to go, you know, conversion from
19 millirem to concentrations of dose, then the
20 methodologies change.

21 MEMBER RYAN: Sure.

22 DR. FELDMAN: And that's -- and we also
23 know, you know, some of the ways we've done other
24 things before is we have a pretty good idea of the
25 dose-contributing nuclides for a number of the

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1 materials we're dealing with. Most of them come from
2 reactors. It's cobalt predominantly, cesium comes
3 next. And depending upon -- so those are the major
4 dose dominant contributors, and then those would
5 probably be more of a concern than looking at each
6 specific nuclide in many cases.

7 MEMBER RYAN: Sure.

8 DR. FELDMAN: So --

9 VICE CHAIRMAN GARRICK: Thank you.

10 MEMBER RYAN: Mr. Chairman, I guess we're
11 through with our first group of presentations on
12 control of solid materials.

13 CHAIRMAN HORNBERGER: Thank you, Mike, for
14 not only keeping us on time but actually getting us
15 ahead. I think we'll maybe take a break now. Is that
16 all right with everyone? Let's return at 3:00. Okay?
17 We'll take a break until 3:00.

18 (Whereupon, the proceedings in the
19 foregoing matter went off the record at
20 2:37 p.m. and went back on the record at
21 3:01 p.m.)

22 CHAIRMAN HORNBERGER: Okay. We're going
23 to reconvene now. The second part of our afternoon
24 has to do with the License Termination Rule. And,
25 again, Mike Ryan is going to chair this portion of the

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1 meeting.

2 MEMBER RYAN: Thank you, Mr. Chairman.

3 Our speaker is Robert Johnson on the
4 results of License Termination Rule analysis. Good
5 afternoon. Welcome.

6 MR. JOHNSON: Good afternoon. It's nice
7 to be here. I haven't been here for a few years I
8 guess. So this will be a good reentry maybe.

9 I'll give a talk today, an overview of the
10 License Termination Rule analysis, and talk more about
11 restricted release, and Chris McKenney will talk more
12 about scenarios.

13 Let me try this little mouse out. Okay.

14 So the talk today will really focus on
15 kind of two parts. The first part that I'll give is
16 an overview of the analysis of the License Termination
17 Rule -- LTR I'll call it from now on -- and just kind
18 of give a real quick summary of the background,
19 evaluation process. And, in particular, there are
20 nine issues, and so I'll just summarize very briefly
21 each of those nine issues, just to give you a flavor.

22 You all have the papers, so you can read
23 -- you know, pick and choose, because it is a long
24 document, so pick and choose where you really want to
25 look at. In talking with your staff, we figured that

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1 the second part we would go into two issues in
2 particular that might be of more interest to you.

3 And, in particular, I'll talk about
4 restricted release, institutional controls, and then
5 Chris will talk about more realistic exposure
6 scenarios. So that's sort of the game plan. We can
7 proceed, then.

8 I am happy to say that -- well, let's see.
9 How should I start? I'm happy to say that many of the
10 team members that helped me on this analysis are in
11 the audience. I'm looking around for them.
12 Hopefully, they will be. So if there are questions,
13 you know, they might be able to help in that regard.

14 Let's start a little bit on the background
15 and start with the Commission direction. In June
16 2002, the Commission gave us an SRM that had directed
17 us to conduct an analysis of the LTR implementation
18 issues. In particular, they wanted us to focus on
19 restricted release and institutional controls, and
20 with the goal of making those provisions of the LTR
21 more available for licensee use.

22 And in part this SRM, you might say,
23 worded it -- what happened to it? Oh, okay. Sorry
24 about that. I think this is the only one that does
25 the fancy fade in. The rest are just right there.

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1 Where did this SRM come from? In part, it
2 probably came from the fact that we had been working
3 with DOE for a few years. As a matter of fact, I
4 briefed the committee a few years back on our attempt
5 to seek an MOU with DOE to take over ownership of some
6 of our restricted release sites under the Nuclear
7 Waste Policy Act.

8 And this had been sort of the path that
9 the LTR, when it was finalized, had envisioned. And
10 so we were working diligently, you know, with DOE on
11 that, but that did not -- that was not successful at
12 the time. And meanwhile a couple of sites like
13 Sequoyah Fuels were still trying to find a way to deal
14 with that provision, and they weren't successful. So
15 there was pretty good visibility that this provision
16 of the LTR wasn't working, and so the SRM in
17 particular wanted us to find some ways, make some
18 recommendations, to make it work.

19 In addition, you know, there were other
20 issues related to the LTR, and we thought it would be
21 good, because many of these issues sort of interact.
22 They should be looked at at one time by a team, but
23 try to look at the interactions possibly that might
24 exist between those issues.

25 In response to the SRM, the staff prepared

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1 a Commission paper in October, and this was an initial
2 analysis of these issues. It identified eight issues,
3 and it also laid out the plans for the issues. But it
4 was important because it scoped what the issues were.

5 Based on that plan, we worked through the
6 next many months and completed the results of our
7 analysis in SECY-03-0069 May 2nd, and the Commission
8 recently approved the release of this Commission paper
9 last week. And let's keep in mind, however, the
10 Commission will be obviously reviewing the paper and
11 the recommendations that we have made and giving us
12 direction some time in the future.

13 So today what I'll be going over are just
14 results and what our staff recommendations consist of.

15 Regarding the evaluation process, it was
16 pretty straightforward. We put an NMSS/OGC team
17 together to evaluate the eight issues that were
18 identified in that October paper. We also identified
19 a ninth issue, a new issue on intentional mixing. And
20 because that came late in the process, we're just in
21 this paper only putting together the plans for
22 evaluations of that new issue.

23 The team, as I mentioned, were made up of
24 a number of people. And we assigned people to each of
25 the issues, and the Commission paper has an attachment

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1 that gives the results of each of these issues. So I
2 just wanted to recognize the team members here for
3 their diligent, persistent work, and they'll be able
4 to maybe answer any questions that you might have.

5 I'll be going over these issues in a
6 minute, so we don't have to talk about them or read
7 them off here.

8 Going on to this next page, I just want to
9 go ahead and just talk about most of the issues were
10 evaluated in sort of a parallel fashion. We first
11 thought it was important to find out what experience
12 we may have had with other NRC regulations or just
13 implementing the regulations.

14 And then we also wanted to look beyond NRC
15 and look at what other experiences other agencies,
16 EPA, DOE, Corps of Engineers, other groups may have
17 had that would reflect on our issues. And, of course,
18 this was more or less important depending on the
19 issue. And I'll get into that in a little bit minute
20 -- in a little minute.

21 After we collected this information, we
22 identified a number of options, and then, as usual,
23 laid out pros and cons for them, and then made
24 recommendations. We also put together a matrix of all
25 of the current decommissioning sites and how they

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1 might be applicable to each of the issues, and that's
2 in the Commission paper.

3 So that gives you a little more tangible
4 feeling, you know, site by site rather than just, you
5 know, issues and not knowing exactly how relevant they
6 might be.

7 Now I'll start into a real brief summary
8 of the issues. On restricted release, just in brief,
9 since the issue itself was, like I mentioned,
10 difficulties in arranging institutional controls that
11 are required for both the restricted release and the
12 alternate criteria provisions of the LTR.

13 And the outcome was basically what the
14 Commission asked us to do -- make some recommendations
15 to make these provisions viable. And I'll talk --
16 when I get into more detail later, I'll talk more
17 about what those recommendations are.

18 Now, the next four issues are various
19 questions about the relationship of the LTR criteria
20 to other criteria that are out there. And the first
21 one here -- unimportant quantities -- is a good one to
22 start with. The issue can be viewed as there's an
23 unclear relationship between the LTR unrestricted
24 release criteria and the unimportant quantities in
25 40.13(a) -- that's the .05 weight percent criterion.

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1 And, really, what that criterion is for in
2 40.13(a), it's the level to exempt from regulation if
3 source material is less than .05 weight percent. So
4 you can see that the purpose of this criterion is more
5 of an entry into regulation, you know, rather than for
6 the purpose of license termination.

7 And the .05, from what I've been told, was
8 originated more from a safeguards purpose, you know,
9 rather than, you know, a decommissioning purpose.

10 The desired outcome -- and when we say
11 "desired outcome," what we did in the October paper
12 was put down our objectives, so people would know not
13 only what the issue is but what the objective of the
14 staff's evaluation would be. And in this particular
15 case, you know, we just wanted to describe the
16 relationship here for all of the sites, because this
17 originated from a formerly licensed site AAR that had
18 proposed the use of the unimportant quantities as a
19 decommissioning criteria for their site.

20 Both the staff and the Commission did not
21 approve that, and so this led to this paper looking at
22 the issue generically.

23 Okay. The next issue, again, is another
24 form of relationship. And it was observed that in
25 some cases the LTR unrestricted release criteria for

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1 uranium and thorium could result in a higher -- well,
2 there could be some other standards for uranium and
3 thorium that are higher than the unrestricted release
4 level.

5 Also, cleanup to the unrestricted release
6 level could, in some cases, result in below natural
7 where uranium and thorium occur in nature. So we
8 thought that it would be important to look at the
9 appropriateness of developing a separate unrestricted
10 release standard for uranium and thorium that's higher
11 than 1402.

12 And a number of regulations -- NRC
13 regulations were looked at. EPA's use of Part 40,
14 Appendix A, in their ARARs or applicable requirements
15 was looked at. And in general, what I'll focus on
16 here is particularly the Part 40, Appendix A, the
17 equivalency criterion, which you may -- it may be
18 called.

19 And this allows for the higher
20 unrestricted release standard for mill tailings sites,
21 but it was meant when it was put together, and the
22 guidance for implementing it, it was meant for a few
23 isolated sites with small areas. And more important,
24 as I understand it, it's for where the uranium and
25 thorium is a small component of the overall dose, and

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1 small concentrations.

2 And so this particular use at mill
3 tailings sites is in contrast to, you know, our
4 decommissioning sites, our uranium/thorium sites,
5 where uranium and thorium, you know, would be the
6 primary, if not the sole, you know, source of dose.

7 Similarly, this sort of ties into EPA's
8 use of a few ARARs that they have approved. They
9 reference back to Appendix A, and also their guidance
10 mentions Appendix A and exactly, you know, the same
11 constraints on using it. And so our conclusion was
12 that it really wasn't applicable for our kind of
13 sites.

14 While the desired outcome was to determine
15 or decide if a separate standard would be appropriate,
16 our recommendation in the paper is that it's not
17 appropriate. And there's a couple reasons, you know,
18 here. We felt that the LTR, when you look at all the
19 provisions, the unrestricted in 1402, the restricted
20 release in 1403, and then even the alternate criteria
21 in 1404, give a lot of flexibility.

22 It may not satisfy everybody, but if a
23 particular licensee has difficulties because of volume
24 and cost in meeting the unrestricted, then there is
25 the restricted release option, and even the alternate

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1 criteria option. So there's a degree of flexibility
2 provided in the existing LTR.

3 And the second point here is that to
4 implement -- obviously, to implement a separate
5 standard you'd need a rulemaking, and there really are
6 a few sites really that could benefit from this.
7 There is roughly 18 uranium-thorium sites, and 14 of
8 those are thinking of unrestricted release. And by
9 the time you think about four years for a rulemaking
10 to be finalized, the schedules for most of these
11 sites, you know, they will have been mostly
12 decommissioned by that time.

13 So the bottom line is it really isn't that
14 cost effective, we didn't think, for a rulemaking
15 which is a labor-intensive, you know, for so few
16 sites.

17 Moving on to another issue -- again, it's
18 sort of the relationship -- it's a question of the
19 relationship between the onsite disposal approval
20 standard and the LTR unrestricted release. The
21 20.2002 does not establish a clear standard for
22 approving onsite disposals, but it allows agency
23 discretion on a case-by-case basis and up to
24 100 millirem.

25 And so there is some flexibility there,

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1 but part of the problem is is that at the time of the
2 license termination all onsite disposals would need to
3 be evaluated, of course, from a dose standpoint and
4 meeting the unrestricted release criterion. So if one
5 were approving over 25 millirem disposals and you did
6 many of them, you know, you would -- a licensee may
7 have great difficulty meeting the 25 millirem standard
8 later on.

9 So we felt that what this was doing was --
10 well, our staff practice has been, therefore, to
11 approve onsite disposals at a few millirem level. And
12 so what this does is it helps confidence that, you
13 know, by the time a licensee gets to license
14 termination, you know, they will be more able to meet
15 the 25 millirem.

16 However, the regulations permit, like I
17 said, up to 100 millirem approvals. So we thought,
18 well, we could approve above a few millirem if the
19 licensee provided enough financial assurance to pay
20 for the cleanup. And the problem here is that we
21 don't want to create sites that might have more waste
22 than they are able to pay for later on during
23 decommissioning, particularly if they go bankrupt.

24 MEMBER RYAN: Sure. A quick question,
25 though. By having that financial assurance

1 requirement for eventual decommissioning, you're
2 really signaling that disposal other than at a few
3 millirem isn't really disposal.

4 MR. JOHNSON: That's right, yes.

5 MEMBER RYAN: I mean, it's not a
6 disposition of the material. It's just a temporary
7 fix until you want to terminate the license.

8 MR. JOHNSON: Yes, it is a temporary fix
9 at a few millirem. But if you're going to be doing it
10 much more, then you're at risk of being stuck with it
11 or not able to pay for it. And that's what we're
12 trying to avoid.

13 MEMBER RYAN: Sure. No, I understand that
14 part. I mean, it really signals the licensees that
15 this isn't, you know, a final disposition.

16 MR. JOHNSON: Yes, right. I understand.
17 You'll see this issue referred to in a few minutes on
18 the financial assurance side. It's an indicator of
19 increasing cost, so we're trying to link some of these
20 issues together.

21 Next one, controlling disposition of solid
22 materials. The issue here is that there's an unclear
23 relationship, for some anyhow, between LTR's 25
24 millirem for unrestricted release and the existing
25 guidance of a few millirem for controlling disposition

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1 of solid materials. And one of the questions is the
2 potential removal of residual contamination after
3 license termination from an unrestricted release site.

4 You know, when you're -- before license
5 termination, if you want to release materials, it's a
6 few millirem. After license termination for
7 unrestricted, you know, it's 25, so the question is,
8 what's the difference here?

9 So the evaluation and the desired outcome
10 described a relationship. So in this particular
11 attachment, a lot of things are described,
12 comparing/contrasting these two standards, and some of
13 the recommendations here that I listed. There's a
14 different purpose, obviously, for release of materials
15 before termination. It's releasing usable materials
16 for reuse, possibly reuse quite a lot, in contrast to
17 the LTR where, you know, you don't expect release of
18 material, because most of the valuable material has
19 already been taken away as part of decommissioning.

20 You may have contaminated soils or
21 building materials left, but the type of material is
22 different, and, of course, the scope and the timing is
23 different. Release of material is before license
24 termination, and, of course, after license termination
25 material is after decommissioning.

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1 Also, we felt that another important
2 factor was during decommissioning the ALARA part of
3 the LTR will, in actuality, for some sites reduce well
4 below 25 millirem for some sites. In addition, if
5 material is removed from a site after termination,
6 obviously, if it's like soil you're going to get a lot
7 of mixing, you know, in the activity of removing that
8 material, and then putting it elsewhere, wherever it's
9 being reused.

10 So the combination of ALARA and mixing,
11 you know, is going to really, in fact, close the gap
12 between 25 and a few millirem, and the difference may
13 not be that much. So the staff feels that the LTR is
14 protective if materials are removed from a site after
15 license termination.

16 In any event, as part of alternate
17 scenarios, if removing materials after termination for
18 reuse is considered important, then it can be analyzed
19 as one of the scenarios.

20 Speaking of scenarios, I won't go into it
21 here because Chris will tell you all about it.

22 The next one, we have two issues that
23 relate to preventing future legacy sites. The first
24 one here is changes to financial assurance. In
25 particular, the issue relates to a lot of staff

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1 experience with sites; some sites in bankruptcy, has
2 led us to be able to identify various financial risks
3 that could result in shortfalls in decommissioning
4 funding.

5 And I've listed a few here. The paper
6 goes into many more of these financial risks. It's
7 sort of a risk-informed approach. You want to -- it's
8 a little different, you know, than you might be
9 usually talking about, but what we are trying to focus
10 on here is areas of high financial risk from our
11 experience.

12 And the first one there, underestimation
13 of decommissioning costs, initial underestimation,
14 some licensees have assumed restricted release, which
15 is a lot cheaper than unrestricted release, with maybe
16 no way of knowing if they're going to be able to
17 achieve it.

18 Another example, operational indicators of
19 increasing costs, like spills, for instance, or like
20 the onsite, you know, disposals would be another
21 example. Things can happen during operations that
22 indicate there's going to be a higher cost of
23 decommissioning, and, therefore, the cost estimate and
24 the fund amount may need to be adjusted.

25 Also, there could be accidental releases

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1 that could increase cost. And then, something
2 entirely different, you could have inadequate
3 financial disclosure by the licensees that could lead
4 to not really knowing their financial well being well
5 enough.

6 So these are examples of some of the
7 financial risks, and in this particular attachment for
8 each of them options are evaluated for dealing with
9 them, and then recommendations are made for dealing
10 with them.

11 VICE CHAIRMAN GARRICK: What would the
12 incentive be for a licensee to go to anything more
13 than a restricted release? What would be the
14 incentive to pay the extra cost to go from restricted
15 to unrestricted?

16 MR. JOHNSON: Well, I don't think there is
17 an incentive for them to do it. There's an incentive
18 for us to do it, because it could be a difference
19 between, I'll say, ten and tens of millions of
20 dollars. Okay?

21 And so if they assume restricted release
22 in their cost estimate, and then five or 10 years from
23 now get to the point of trying to make those
24 arrangements and it doesn't work, and they are
25 financially in trouble or close to bankruptcy, then

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1 they won't have the funding to pay for the
2 decommissioning to unrestricted release.

3 Naturally, there's no incentive for them,
4 because they'll have to pay more for a higher amount
5 of financial assurance. So it's not an incentive.
6 And that's really one of the reasons why we're
7 recommending here rulemaking.

8 We're recommending changes to the
9 requirements and, in particular, this leads right into
10 the answer I think here is that -- two things. We
11 would require the decommissioning cost estimate to be
12 based on unrestricted release, unless the licensee can
13 demonstrate they can arrange for restricted release.

14 Secondly, we will require that the staff
15 review and approve the decommissioning funding plans,
16 which right now we don't. So these two things will
17 help deal with this initial underestimation problem.

18 MEMBER RYAN: How many sites have actually
19 been terminated, or licenses have been terminated with
20 restricted release?

21 MR. JOHNSON: None.

22 MEMBER RYAN: See, that's my experience
23 and point is that I don't think that's going to
24 happen, I guess practically speaking. You know, if
25 it's a restricted release, is it really released is my

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1 question.

2 MR. JOHNSON: That's --

3 MEMBER RYAN: You know, I mean, it's not
4 really released. It's still a site that has some
5 control to it.

6 MR. JOHNSON: I think the perspective was
7 in the license termination rule that originally the --
8 it was released from NRC involvement. The license was
9 terminated, so, therefore, the site was no longer
10 under license. Probably that was viewed as released,
11 and I'll talk a little bit --

12 MEMBER RYAN: Okay.

13 MR. JOHNSON: -- when I get to mine about,
14 you know, we have some different views now that may
15 help be able to achieve restricted release in a few
16 cases.

17 Also, just a couple of other
18 recommendations briefly here. We would require
19 reevaluation of cost estimates and fund amount when
20 certain indicators occur. We would also require
21 property damage insurance for major accidents, and
22 certification of financial statements. These are all
23 examples.

24 And there's a lot more detail in the
25 paper, if you're interested, that all kind of aim at

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1 trying to fix some of these problems and make the
2 funding more robust and have -- give us confidence
3 that there will be adequate funding.

4 Now, this next issue is similar, kind of
5 parallel to the financial assurance one, and it deals
6 with changes to licensee operations. And the issue
7 was that looking at our experience we looked at where
8 there were -- the problem sites today, why they
9 occurred.

10 And looking back historically we found
11 that often times there was chronic releases to
12 subsurface over time. None of these releases were
13 safety problems, but they may have been small, some of
14 the groundwater contaminated, but they were
15 environmental contamination problems, which in some
16 cases built up over years, and then your result is a
17 complex and costly decommissioning problem.

18 Kind of associated with it was, believe it
19 or not, late identification of contamination by
20 licensees, late recognition that there had been an
21 event, and the extent of the contamination.
22 Reporting, therefore, wasn't happening, you know, to
23 NRC, and so this was another major problem that we
24 found looking at our staff experience.

25 Also, looking at the regulations and

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1 guidance, it didn't really cover these things
2 specifically and explicitly enough. You know, we have
3 -- they are covered in general, but we feel that to be
4 stronger, to aim at this problem and focus better, the
5 requirements would need to explicitly call out some
6 things, which I'll mention here in a minute.

7 So we are thinking of rulemaking and
8 guidance to mitigate some of these high operational
9 risks, and we're also kind of taking another form of
10 risk-informed, you know, review here, in that we're
11 looking at trying to -- we will be identifying high-
12 risk sites, sites that would have high risk of
13 contamination, maybe have large volumes of liquids.

14 We also will look at their higher risk
15 activities, and this would allow the licensees and the
16 staff inspections to be focused on these areas of high
17 risk.

18 We're also looking at minimizing the --
19 requiring a minimization of contamination through
20 procedural changes. Right now, the LTR requires
21 minimizing contamination only for new licensees, and
22 what we want to add to it is existing licensees.

23 We would also be --

24 MEMBER RYAN: A quick question.

25 MR. JOHNSON: Yes.

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1 MEMBER RYAN: I'm sorry to interrupt.

2 MR. JOHNSON: No, that's fine.

3 MEMBER RYAN: It raises an interesting
4 speculation, I guess, on my part. You know, sometimes
5 licensees might have a tendency to keep material on
6 their facility in inventory as licensed material,
7 which all has -- you know, and let's say it's just not
8 in ready use today. It's in storage for all practical
9 purposes. Is there any way to incentivize licensees
10 to minimize the amount of material they actually have
11 on hand and encourage them to dispose as you go, so to
12 speak, through this financial assurance mechanism?

13 In other words, if I really need 10 curies
14 of something, but I have 100, just because I had it
15 for some other purpose, is there a way to incentivize
16 them to get rid of the 90 they don't need any more, so
17 that it doesn't become a potential problem or those
18 kind of things?

19 And I just throw that out as something to
20 think about, that very often they -- you know,
21 licensees might say, well, we have a health physics
22 program, so having 100 is no big deal. We can watch
23 that just as well as we watch 10. But that may not
24 always be right. You know, there may be other
25 problems like leakage and ubiquitous kinds of problems

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1 over 10 years or 20 years that ultimately become much
2 bigger issues at termination.

3 MR. JOHNSON: I guess reaction would be,
4 like you're saying, you have to look at the bigger
5 picture and maybe what risk that extra, you know,
6 amount of inventory might pose. And if it is a risk,
7 then maybe financial assurance would have to be
8 increased, and that would be --

9 MEMBER RYAN: And, conversely, if they
10 don't have the material onsite, they could potentially
11 reduce their financial obligations, because they have
12 a reduced inventory, that kind of thing.

13 MR. JOHNSON: Right.

14 MEMBER RYAN: So it's sort of a two-way
15 street on that.

16 MR. JOHNSON: That's right.

17 MEMBER RYAN: Yes.

18 MR. JOHNSON: But it would certainly be --
19 you'd probably have to look at a lot of factors to see
20 if that --

21 MEMBER RYAN: Oh, no question.

22 MR. JOHNSON: -- inventory was really at
23 risk or not.

24 MEMBER RYAN: Yes. Is it at risk, or is
25 it not? Or, you know, if it's liquids and

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1 dispersibles, obviously it's much more important than
2 if it's a solid and encapsulated, and so on and so
3 forth, but yes.

4 MR. JOHNSON: The next issue is the new
5 issue that we added. It deals with the
6 appropriateness of allowing intentional mixing of
7 contaminated soil to meet release criteria. This has
8 generally not been permitted by the staff. However,
9 I think everybody can understand there's potential
10 financial and exposure reduction advantages to
11 possibly doing this under certain circumstances.

12 So the idea here is, you know, there's no
13 results, you know, in this paper on this issue right
14 now. But there are some planned evaluations listed to
15 look at what NRC policy has been to look at our
16 experience, also to look at policy and experience of
17 others -- EPA, Corps of Engineers, and DOE, and
18 international -- and then make some recommendations
19 based on doing that homework.

20 Now, very quickly, kind of wrapping up
21 this overview, is what are the recommended actions and
22 the schedules that the staff have in this paper?
23 Well, the first one here is to prepare the Commission
24 paper on mixing, and that will be done this September.
25 And then the rest of the actions here, and the dates

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1 that you see, are really assuming -- we had to make an
2 assumption for planning purposes that we would hear
3 back from the Commission, get an SRM, maybe in
4 September, let's say.

5 And based on that assumption, we're saying
6 the first thing we want to do is prepare a regulatory
7 issue summary, and that's to get information out to
8 the broadest audience, to the stakeholders, licensees,
9 and others about what the issues are, what we
10 recommended, and what the Commission directed us to
11 do, so that people will understand what changes might
12 occur, and what the plans are for rulemaking or
13 guidance or whatever.

14 So it's really to quickly -- kind of
15 beyond this Commission paper, you know, beyond an SRM,
16 which not everybody is looking for all the time, is to
17 provide a simpler, easier, briefer document that's
18 more user-friendly to read than this paper and get it
19 out as quickly as we can.

20 Then, the other items there is the
21 rulemaking and its supporting guidance for -- again,
22 for preventing future legacy sites. That rulemaking
23 is a single rulemaking. It focuses on only those two
24 issues that I talked about -- financial assurance and
25 operational changes. And we're looking for a proposed

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1 rule in '06 and a final in '07.

2 Many issues that I'll talk about next,
3 like restricted release or the onsite disposal or the
4 scenarios that Chris will talk about, will eventually
5 come out in revised guidance. The decommissioning
6 consolidated guidance would be revised where it needs
7 to be done.

8 And then, lastly, revised inspection and
9 enforcement guidance. That's a companion to the
10 operational changes issue, so that we can focus our
11 inspection program appropriately and where there might
12 be enforcement actions that -- or tools that need to
13 be made available, then the guidance there can be
14 adjusted in the same way.

15 These dates are out in the future, '05,
16 '06, '07.

17 Lastly, for the overview, just a quick
18 idea on outcomes. What are we getting for all of
19 this? Okay. And I broke this up into two bins sort
20 of like. We're faced with existing decommissioning
21 sites. These are sort of our legacy sites. These are
22 the sites that have been problems, that are challenges
23 right now to make progress on in decommissioning.

24 And so we think by addressing some of
25 these issues that decommissioning will be facilitated

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1 for some maybe more than others. In some cases, more
2 economical decommissioning will result as a use of a
3 realistic scenarios.

4 Restricted release/alternate criteria
5 should help provide new options for some licensees
6 that they might be able to use where they haven't been
7 able to make arrangements so far. And, in general,
8 we'll clarify a number of these questions about
9 relationships that I just talked about, you know, for
10 those that might be very interested in some of those
11 questions.

12 And lastly, the matrix of sites and
13 issues, this gives you in the paper a more tangible
14 feeling for where we think there might be some
15 benefit, you know, to specific sites. And that can
16 vary a whole lot. We didn't do a real careful, in-
17 depth analysis here. But, you know, some sites might
18 benefit quite a bit from scenarios, and maybe others
19 not much at all, you know, so it's a range of outcomes
20 there.

21 The next is, of course, we're also looking
22 at the lessons we've learned today and to apply them
23 to future licensees, so we can prevent future legacy
24 sites basically, reduce the potential for them in any
25 event. And we think that some of the issues may

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1 actually reduce the need for using restricted release
2 or alternate criteria.

3 We may use these provisions for a few
4 sites that we have to deal with today, but we don't
5 want to encourage the use of this -- these particular
6 pathways.

7 And then, lastly, we think it contributes
8 to the Commission's preference for unrestricted
9 release, and that maximizes the opportunity for reuse
10 of some of these sites.

11 Any questions on this overview before I
12 get into the restricted release one in more detail?

13 MEMBER LEVENSON: I have one question.
14 The .05 for uranium and thorium is a number that came
15 into being, I think, as a strategic issue way back
16 when. If it arises here, I assume it's only relevant
17 to unirradiated material, is that correct? If it's
18 been irradiated, probably something else controls
19 rather than the uranium or thorium concentration. So
20 it's probably just unirradiated material.

21 MR. JOHNSON: Unirradiated, okay.

22 MEMBER LEVENSON: And the question is, if
23 it's only unirradiated material, and the way the law
24 is structured, doesn't this end up being NORM
25 material, and, therefore something that we don't worry

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1 about? I'm confused as to why it's sometimes NORM and
2 sometimes not NORM.

3 MR. JOHNSON: I can't answer that
4 question. Is there someone that may want to volunteer
5 from my team in the audience? I see a volunteer
6 coming to the microphone. Jim Lieberman.

7 MEMBER RYAN: Just give your name, please.

8 MR. LIEBERMAN: Hi. I'm Jim Lieberman
9 from the Office of General Counsel. This is a very
10 difficult question. We have the definition of source
11 material, which is ore, of less than a certain
12 concentration the Commission adopts, and they adopted
13 the .05. We have unreported quantities of source
14 material. That's source material which is less than
15 .05 percent uranium or thorium.

16 NORM is clearly ore which is less than
17 .05, but where the unreported quantities of source
18 material is NORM or material NRC regulates and exempt
19 is just not clear. In fact, the staff just prepared
20 a Commission paper to the Commission on joint
21 jurisdictional working group to address potential ways
22 we can clarify that very issue. So I don't have a
23 clear answer for you.

24 MEMBER RYAN: Milt, it's even a more
25 interesting question when you look at states handle

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1 it. States who are authorized under the agreement
2 state rule tend to just lump both together and
3 regulate them all under one umbrella within the state.

4 But you're right, if you go back to the
5 Atomic Energy Act of '46, the original definitions are
6 clearly strategically- and security-based. I mean,
7 control of the material was the focus not from a
8 health and safety perspective so much as a safeguards
9 and security question.

10 So, you know, and then when you kind of --

11 MEMBER LEVENSON: The question I'm sort of
12 asking is, I think the law -- it's still on the books,
13 I think -- differentiated the .05 into --

14 MEMBER RYAN: Well, the definitions have
15 survived through the Atomic Energy Act of '54 as
16 amended today.

17 MEMBER LEVENSON: Right.

18 MEMBER RYAN: With a few wording changes.

19 MEMBER LEVENSON: Right. And, therefore,
20 shouldn't the regulations conform to what's in the
21 law?

22 MR. LIEBERMAN: Well, the challenge is
23 that there's no way to read the Atomic Energy Act as
24 a whole and the Commission's regulations as a whole in
25 a logical way. The way they've been amended, both by

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1 Congress and by the agency over time, it just doesn't
2 hang together perfectly.

3 And the question is: is the cost to
4 change the regulations to make it into a more uniform
5 way -- what's the best way to do that? And that's the
6 purpose of that Commission paper I referred to.

7 MEMBER LEVENSON: I guess my point is that
8 leaving out the legal, the regulatory, and all the
9 rest of it, from a standpoint of risk, of the
10 uranium/thorium that's below .05, this must be a very
11 small fraction of the total involved. And should it
12 be treated separately, or shouldn't it be treated like
13 NORM, which is probably the biggest --

14 MEMBER RYAN: That's probably not a good
15 assumption, because it may be less than .05 percent by
16 weight, but it may be large in volume. So --

17 MEMBER LEVENSON: But it's still NORM.

18 MEMBER RYAN: Well, the secret is focus on
19 the radioactive material if you want to regulate the
20 risk or manage the risk, not the percentage by weight.

21 MEMBER LEVENSON: But we do --

22 MEMBER RYAN: If you have a concentration
23 of uranium or thorium, that's where the risk is
24 focused.

25 MEMBER LEVENSON: I agree with you

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1 completely. I have never understood the
2 differentiation between NORM and T-NORM and stuff from
3 accelerators. I mean, if it's radioactive, it's
4 potentially the same risk. But legally we
5 differentiate. I don't understand why, but --

6 MEMBER RYAN: Well, it's historical
7 origin.

8 MEMBER LEVENSON: I know. But the point
9 is it is differentiated.

10 MEMBER RYAN: Go ahead.

11 MR. JOHNSON: Shall I continue?

12 MEMBER RYAN: Yes.

13 MR. JOHNSON: Next part. Restricted
14 release/institutional controls. The issue -- we've
15 had a number of difficulties arranging institutional
16 controls required by restricted release and alternate
17 criteria. On this slide, I've just given a couple of
18 examples.

19 Governments and tribes have been unwilling
20 to accept ownership of our private sites and take
21 over, you know, a stewardship responsibility, and in
22 part due to the liability concerns. You know, what if
23 there's failure? You know, what if some repair or
24 major replacement has to occur? It's going to cost a
25 lot of money.

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1 And I mentioned our attempts with seeking
2 a DOE MOU. Another site in Michigan -- have talked to
3 the State of Michigan about taking over controls of
4 the particular site, and Michigan is undecided right
5 now. So that's a big question. We haven't had a lot
6 of success there.

7 Similarly, lack of independent third
8 parties to take on the role in the LTR. And also, you
9 might question about the long-term continuity of the
10 third parties. And then, long-term effectiveness of
11 more conventional institutional controls -- deed
12 restrictions, and so forth -- particularly when we
13 expect a change of ownership over the time period of
14 concern.

15 And I probably should have mentioned
16 earlier -- I mean, all of our sites are
17 uranium/thorium sites that are considering restricted,
18 release. So we're talking about long term.

19 And then, lastly here, unclear flexibility
20 of the existing LTR's risk-informed graded approach to
21 institutional controls. I'll talk more about that in
22 a minute, but sometimes there's a perception that
23 federal ownership of a site is the only solution. And
24 so part of clarifying the graded approach was to not
25 only show the structure for it, but, you know,

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1 examples other than just federal ownership.

2 CHAIRMAN HORNBERGER: What's the
3 incentive, or what -- is there an incentive for
4 governments or tribes to step forward and say, yes,
5 we'll do it?

6 MR. JOHNSON: I don't see the incentive
7 for that, other than good government, you know,
8 feeling like they have a responsibility or can
9 contribute to solving a problem. Or it's in their
10 state, and so, therefore, they should, you know, bear
11 some responsibility of protection for something in
12 their state.

13 CHAIRMAN HORNBERGER: Yes. But I mean,
14 still, even as a state -- somebody concerned about a
15 state, if your option is to hold, you know, the
16 responsible party's feet to the fire to get the
17 problem fixed, and let the liability with them or take
18 it over yourself, I just don't see what the incentive
19 would be.

20 MR. JOHNSON: No.

21 CHAIRMAN HORNBERGER: I don't see why it
22 would be a surprise that there has been difficulty in
23 getting institutional control of restricted release
24 sites.

25 MR. JOHNSON: The only observation I would

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1 make is that our discussions with Ohio on agreement
2 state that it does have a possession-only license.
3 They were more comfortable, you know, using their
4 licensing authority to control the site. They felt it
5 was more effective. They knew what licensing was
6 about, deed restrictions. They didn't know -- they
7 didn't have much confidence in that for the long term.

8 So the incentive was, I believe, from
9 hearing them talk that they could provide more
10 effective protection.

11 Well, looking at the evaluations, one of
12 the things I think the committee recommended a few
13 years back when I briefed you on stewardship was look
14 at what EPA is doing. In other words, look at what
15 others are doing.

16 And, of course, in the past couple of
17 years a lot really has occurred in this institutional
18 control and stewardship arena. So we did look at
19 EPA's guidance, talk to EPA, looked at some of DOE's
20 major reports, and followed the evolution of their
21 long-term stewardship program.

22 We also looked at agreement state
23 experience, in particular had discussions with Ohio,
24 as I mentioned. We looked at National Academy
25 reports, ASTM standard, you know, on site --

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1 restricting site use.

2 And then, most recently ECOS, the
3 Environmental Council of States, set up a subcommittee
4 on long-term stewardship, maybe a year or so ago, and
5 so we became involved with that committee about a year
6 ago. And that's a good mechanism, it looks like so
7 far, to exchange information and try to deal with
8 common problems that federal governments, states, and
9 tribes have in this area.

10 We also looked at other NRC regulations.
11 In particular, Part 40, Appendix A, the mill tailings
12 experiences is a good model in many respects. It has
13 a lot of good lessons learned there by what they
14 require and what they have worked out with DOE over
15 the past decade or so.

16 And also, the West Valley Policy Statement
17 has some nuggets in it that, you know, are useful
18 insights. So we looked at our regulations.

19 And then, we looked at the existing
20 decommissioning sites that are considering restricted
21 release, so we have a context. What problems actually
22 at what sites do we have to solve, in the near term at
23 least? And as a matter of fact, this list of
24 restricted release sites has diminished over the
25 years.

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1 You know, we started with 15 about two
2 years ago, and we're literally down to three right
3 now. And they all have long-lived radionuclides, as
4 I mentioned. They are all very specific and unique
5 situations.

6 We've been having ongoing interactions
7 with them. We have a phased report -- approach to the
8 decommissioning plan development, and that means talk
9 with the licensees prior to development of the
10 decommissioning plan, and focus on this particular
11 issue first in concept before you get too far
12 investing in a particular pathway that may not work.

13 So we did a lot of homework that way to
14 try to get some background and get some insights. And
15 I've just highlighted here -- there are so many
16 insights that are in the paper that are useful, but
17 I've just highlighted a few of these. Some of these
18 were kind of a repeating theme that you heard in
19 National Academy documents, DOE documents, you know.

20 Some major themes are you really need to
21 plan for failure of -- potential failure of
22 institutional controls, particularly in the long term.
23 You need to think about how they could fail and make
24 your plans accordingly, so that you can anticipate and
25 maybe help reduce or mitigate the possibility of

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1 failure.

2 So that the second bullet here is that you
3 need to select the right types of controls, implement
4 them rigorously. Then, you have to monitor them, and
5 you have to enforce in some cases. They aren't just
6 controls you put in that are self-perpetuating at all.
7 You need to work at them over the long term, and then
8 you may have greater success.

9 In some cases, you may need federal -- an
10 ongoing federal role. And then, lastly, it seems like
11 flexibility is one of the big words. You know, of
12 course, I think we all realize each site is a
13 particular story and a case, and so the solutions are
14 very particular, you know, to the site's situation or
15 the legal jurisdiction that the site is in. So
16 flexibility to tailor your controls is an important
17 theme that's repeated.

18 Let's look at our recommendations, our key
19 recommendations. This is a busy slide. Right in back
20 of this slide I've put a table right out of the
21 Commission paper that you can kind of look at if you
22 want side by side, and it might help a little bit.

23 But the first thing we recommend is to
24 clarify the LTR risk-informed graded approach for
25 restricting use. First, we wanted to define the risk

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1 framework I'm calling it, and it's really based on the
2 rule in 1403, the statement of considerations, and
3 guidance.

4 Putting all these things together --

5 VICE CHAIRMAN GARRICK: Who is going to do
6 this? Who is going to make that clarification?

7 MR. JOHNSON: We would clarify -- number
8 one, we would clarify this. What you read in the
9 Commission paper would be -- appear in the risk, the
10 regulatory issue summary.

11 And then, secondly, it would be clarified
12 in guidance space, revised guidance --

13 VICE CHAIRMAN GARRICK: So somebody is
14 working on how you're going to risk inform or adopt a
15 risk-informed graded approach. Somebody is working
16 that out.

17 MR. JOHNSON: Yes. The initial work is in
18 this paper. As you read it, it's the concept. It's
19 the approach that we see. It's based on -- you know,
20 it's based on what exists in the rule and the
21 statement of considerations, as they walk through it.
22 You know, it's not something really new. The problem
23 I think we had is that there were pieces scattered
24 about, you know, and nowhere was it just described in
25 one place, so people could try to understand it and

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1 see the various pieces.

2 So that's what we've attempted here in the
3 Commission paper, and welcome any suggestions. You
4 know, it's sort of an exercise in risk communication,
5 too. You know, did we explain it clear enough? Is it
6 a simple enough framework that the licensees can use?
7 And so, in any event, that's where we're at. Yes,
8 guidance would have to be -- further guidance would
9 have to be developed, but I think you see a bulk of
10 the approach explained in the paper.

11 But the framework here is twofold. It's
12 based on hazard level, the dose without institutional
13 controls, and that's what the LTR calls for in 1403.
14 You have to calculate dose, assuming -- they say
15 sometimes assuming failure of institutional controls.
16 So in other words, how bad can it be without any
17 restrictions? So that's the hazard level.

18 The second part is the likelihood of
19 hazard occurrence, and we're kind of looking at that
20 as the hazard duration. If you have long-lived
21 radionuclides, your duration of controls has to be
22 long, and the longer your duration of controls, the
23 greater your likelihood of failure of controls.

24 So that's kind of the logic of the
25 framework. Hazard level -- that's dose; likelihood of

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1 hazard occurrence -- that's duration, short-term
2 versus long-term radionuclides.

3 So we used that logic and came up with two
4 bins -- lower risk sites and higher risk sites. The
5 lower risk sites are at less than 100 millirem, and
6 that's public dose limit. And this is what's in 1403,
7 the LTR. So it's less than 100 millirem or -- I'll
8 emphasize "or" -- short term.

9 Similarly, higher risk sites are greater
10 than 100 millirem, greater than the public dose limit,
11 or long term -- over the long term.

12 Now, we recognize that, you know, this
13 structure isn't in concrete. The boundaries aren't
14 absolute. There could be flexibility, because some of
15 our sites could literally be long-lived radionuclides,
16 and you might have 30 millirem. You might have five
17 millirem above 25. And so there's going to have to be
18 consideration, you know, if there cases like that.

19 Okay. That's the framework, but now the
20 second part is look at the grades. There's two
21 general grades, and, again, this is based on the
22 existing LTR. The lower risk sites, legally
23 enforceable institutional controls, like deed
24 restrictions. That's right out of the existing LTR
25 right now.

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1 Higher risk sites -- again, out of the LTR
2 and out of the statement of considerations, it's
3 legally enforceable controls and more durable
4 controls. What does that mean?

5 It might mean government ownership. It
6 might mean government control in some way, government
7 having a part, a local or a state or the federal
8 government having a part of the responsibility for
9 control. Or it could mean DOE ownership under the
10 Nuclear Waste Policy Act, or in a minute, as I'll
11 mention, it could mean NRC possession-only license or
12 NRC monitoring. That provides the durability.

13 But in any event, you have these two
14 general grades. But the specific grades really amount
15 to flexibility. What are you really going to pick for
16 a particular site, given the particular site's legal
17 jurisdiction and circumstances?

18 Okay. Moving on to this one, some of the
19 new options The risk-informed graded approach was
20 sort of like based on the existing rule. Well, now
21 we're proposing some new options to involve NRC. The
22 first recommendation is that NRC monitor and enforce
23 after license termination. We have two ways of doing
24 this.

25 Number one, under the existing regulation,

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1 1401(c), allows NRC to come in after license
2 termination, if there's new information that leads to
3 a concern about a significant safety threat. Granted,
4 the LTR envisioned finality. It envisioned NRC not
5 involved after license termination.

6 This particular provision allows us to
7 come back in only if there's a significant safety
8 threat. So we are proposing that we use this
9 regulation for those sites that might pose a
10 significant safety threat if the institutional
11 controls fail, if the land use changed, and you would
12 have maybe an adverse land use like a residential --

13 MEMBER RYAN: How would you monitor for
14 those kind of developing safety threats?

15 MR. JOHNSON: We would monitor a couple of
16 different ways. We described in the paper you may
17 require, as part of the condition for license
18 termination, that the owner provides an annual letter
19 of certification explaining that the institutional
20 controls are still in place, that the land use is, you
21 know, as agreed to.

22 Or it could in this case, 1401(c), NRC may
23 on occasion go out and do an inspection of that
24 facility -- again, looking for new information to
25 check on it. Again, it would depend on the

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1 circumstance, probably the site, local --

2 MEMBER RYAN: There's another example
3 somewhere that it really isn't terminated, then, it's
4 just in a state of quiet.

5 MR. JOHNSON: It's a -- yes, a monitoring
6 role you might say.

7 The second way to monitor and enforce is
8 under a legal agreement and an institutional control,
9 where NRC would be written into an actual deed
10 restriction to have the authority to come in and
11 monitor, to have the authority to come in and possibly
12 enforce or put institutional controls back in place.

13 The Commission asked us in the SRM to look
14 at this monitoring role and use the formerly licensed
15 site AAR as a pilot, and we have been doing that.
16 Discussions with AAR, and in working on a settlement
17 agreement as well as a restrictive covenant that would
18 include NRC -- that's just work ongoing, and we've had
19 some meetings with them on this particular way of
20 doing it.

21 Another new option on this next slide is
22 NRC possession-only specific license after completing
23 remediation. So the key point here is that all the
24 requirements for 1403 must be met. The site dose
25 criteria must be met. Cleanup, in other words, needs

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1 to be completed. The possession-only license,
2 therefore, acts as an institutional control, similar
3 to how EPA looks at their permits and orders as a form
4 of institutional control. And that's how we would
5 view it also.

6 It provides the legal enforceability, and
7 it provides the durability of the controls, and it's
8 similar to Ohio's decommissioning and possession-only
9 license.

10 MEMBER RYAN: Well, that's clearly a case
11 where there wouldn't be a termination.

12 MR. JOHNSON: Right. It would not be a
13 termination; it would be an amendment to the license.
14 And the amendment then would contain the conditions
15 for restricting use.

16 It would also contain any conditions for
17 maintenance and monitoring, reporting. This is where
18 the annual letter of certification might be used, if
19 we felt that would work, and --

20 MEMBER RYAN: Those can involve a lot
21 more, though. I mean, they can be even as complicated
22 as entry and egress requirements, and monitoring,
23 and --

24 MR. JOHNSON: That's right.

25 MEMBER RYAN: It could include, you know,

1 entry and egress requirements, health physics
2 monitoring, and all that sort of stuff, too, so --

3 MR. JOHNSON: That's right.

4 MEMBER RYAN: -- I see this as
5 significantly different than termination. Possession-
6 only to me is a whole different --

7 MR. JOHNSON: That's right.

8 MEMBER RYAN: -- category.

9 MR. JOHNSON: And we're not saying it's
10 termination.

11 MEMBER RYAN: Right.

12 MR. JOHNSON: You know, I mean, we're just
13 saying it's an amendment to the license, and yet we
14 still want cleanup to the restricted release levels.
15 And we still would need the appropriate financial
16 assurance to be put in place, because that will pay
17 the bill for us and any other maintenance that goes on
18 in the future.

19 MEMBER RYAN: That's confusing, though.
20 Restricted release and possession-only are two
21 different things.

22 CHAIRMAN HORNBERGER: It's restricted
23 release without the release.

24 MR. JOHNSON: That's right.

25 (Laughter.)

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1 MEMBER RYAN: I just throw that out as a
2 caution because that could be very confusing to folks.
3 You know, there is now very clear provision about how
4 to have a possession-only license.

5 And whatever conditions you wanted to
6 impose to make it a possession-only license could
7 involve any kind of structure of contamination limits
8 or cleanup requirements to get there, and health
9 physics, or whatever all else you -- you know, you
10 want to put in environmental monitoring, air sampling,
11 water sampling, whatever it might be.

12 And that to me has a different flavor than
13 restricted release where there is some notion that,
14 ah, that stuff isn't going to happen.

15 MR. JOHNSON: Well, we clearly say in the
16 paper that this is different than what the LTR
17 envisioned for restricted release.

18 MEMBER RYAN: Yes, it sure is.

19 MR. JOHNSON: And which envisioned, of
20 course, being done, NRC out of the picture, and this
21 is a recognition that for some cases you may need to
22 do this.

23 MEMBER RYAN: Yes. I'm not disagreeing
24 with it. I'm just simply saying that communicating
25 that forward and outward might be something that might

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1 need a little bit of noodling to make sure you don't
2 confuse things.

3 MR. JOHNSON: That's right. The choice of
4 a word could throw thinking off and --

5 MEMBER RYAN: You bet.

6 MR. JOHNSON: Yes, that's a good point.

7 I was saying that the amount of
8 involvement that NRC would have would vary. It would
9 be flexible. It would be tailored to site-specific
10 factors. It could be based on risk. It could be as
11 simple as a letter each year certifying that the land
12 use is the same. You know, nothing has changed, you
13 know, it's industrial use, period. Or a letter coming
14 in saying ownership we expect to be changed, and then
15 you would have to reissue a license to the new owner.

16 So it can vary quite a bit. It could be
17 very much like some of the mill tailings sites that we
18 have, you know, where we just visit them on occasion.

19 In addition to these new options, we just
20 also noted and concluded to the Commission that we
21 wanted to continue monitoring and participating in
22 some of these cooperative interagency efforts. A lot
23 has been happening over the last year or two anyhow,
24 and it seems like when we were trying to finish this
25 paper it was like a moving target.

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1 The National Academy Phase 2 report came
2 out May 1st, and our paper is dated May 2nd. So we
3 couldn't get anything in there about that. And the
4 ECOS memorandum of understanding was signed. It was
5 draft when we were preparing the paper.

6 So a lot is happening here, and we see
7 some benefit from, you know, being involved and
8 exchanging views with some of the other agencies. We
9 share some of the issues, although our regulatory
10 schemes are different. You have to work within them,
11 of course.

12 To end here, we're envisioning
13 implementing these recommendations in guidance space.
14 And so like you mentioned, the possession-only license
15 guidance, you know, would be modified so that there
16 would be guidance for this kind of possession-only
17 license. Likewise, the decommissioning consolidated
18 guidance would be modified, you know, to mention this
19 -- these various options that are available, as well
20 as the risk-informed graded approach.

21 And also, the risk would be sent out, you
22 know, soon so that parties can have an understanding
23 of that approach.

24 Lastly, outcomes. We feel that these
25 recommendations provide more effective restrictions

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1 that will protect public health and safety over the
2 long term. The sites, like I said, we're thinking
3 about are all uranium/thorium sites. And so they are
4 likely, depending on dose and all that, going to need
5 more durable controls. And so these options, short of
6 some of the other ones that we've pursued, these
7 options we think can be more effective at protection
8 of public health and safety.

9 There are -- also, these options we feel
10 can be implemented quickly and not through a
11 rulemaking process, which would be another three or
12 four years. So they are available. These options
13 would make the provisions of restricted release and
14 alternate criteria more available and immediately
15 available. The approach is more consistent with EPA
16 and National Academy and ASTM suggestions in many
17 ways.

18 And lastly, it should increase public
19 confidence in restricted release. There is still
20 maybe lack of preference or objection to actually
21 doing it at a particular site, but the way of doing it
22 might -- there might be more confidence in the way of
23 doing it.

24 We have noted that from one site in New
25 Jersey where the local people said they would feel

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1 more comfortable with a possession-only license
2 approach, because they would prefer NRC stay in the
3 picture, and they would feel that the approach is
4 safer with us in the picture.

5 That's the end of my particular summary of
6 this issue. Before we move on to Chris and realistic
7 scenarios, if there are any further questions?

8 MEMBER LEVENSON: I have one. I want to
9 commend you for what I think you said, and that is
10 that you are addressing the method of failure of
11 institutional controls. This is an issue that I've
12 been doing a little work on recently, thinking about.
13 In the reactor safety field, you know, a number of
14 decades ago we talked about something failing or not
15 failing.

16 And there wasn't a lot of progress made
17 until we began to look into the details of how it
18 failed, and I think the same thing is true in
19 institutional controls. There is more than one way
20 that institutional controls can fail. The institution
21 can be intact, but it's short of money. There's a
22 whole series of things.

23 Do you intend to pursue this and identify
24 different methods or different ways that institutions
25 could fail? Because I think that can have an impact.

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1 MR. JOHNSON: I think that's important in
2 a particular site's case to understand the site you're
3 working with, the community that may be wanting to be
4 involved, or the whole circumstance of a site, I
5 think, would help focus on what the needs are at that
6 site.

7 And a lot of, well, our guidance, as well
8 as some of the suggestions from various studies have
9 said to do this type of planning up front, and
10 understand what the needs of the site are and what
11 things, you know, you need to protect and how things
12 can fail.

13 And then design your conditions or your
14 financial assurance, for instance, you know, to
15 provide the funding over the long term, or the
16 monitoring, the reporting. You know, what parties
17 need to be involved in that, you know, should be based
18 on how things can fail.

19 MEMBER LEVENSON: Well, not how the site
20 can fail, how the institutional controls can fail.

21 MR. JOHNSON: Yes, right.

22 MEMBER LEVENSON: For instance, yes, one
23 institution might be intact and might have enough of
24 a budget that it could continue its monitoring, but
25 not have money to do remedial work. And that would be

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1 quite a different kind of thing, if it is being
2 monitored, even though they can't correct it. So
3 there are a number of different ways institutional
4 controls can fail.

5 MR. JOHNSON: Right. Right.

6 Okay. Thank you. I will turn it over to
7 Chris to complete the last issue on realistic
8 scenarios. Do you want to take the chair?

9 MR. MCKENNEY: This issue was not actually
10 raised in SRM down from the Commission, but was self-
11 identified by the staff. Since we were doing the
12 analysis of the LTR anyways, that this was an issue
13 that could not only help restricted release sites but
14 also unrestricted release sites.

15 And mainly it's an issue of, how can we
16 provide clear direction for licensees to actually use
17 as realistic of scenarios as they need? And I think
18 that's the important thing is, how much do they need?
19 Obviously, the conception -- the perception is is that
20 the LTR requires licensees to use the resident farmer.
21 And it's the perception both in-house and outside.

22 For evaluation, we looked at the existing
23 guidance. It's flexible, it provides flexibilities,
24 it allows -- in large part it says, "This is a way to
25 do it. If you want to do something different, justify

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1 it."

2 It may be flexible, but the tone really
3 discourages licensees, because it doesn't tell them
4 what they have to do to justify it. It just tells
5 them to justify it. It's in some -- some forms of
6 bring another rock.

7 The analysis for the viable scenarios, the
8 discussion of those for long-term radionuclides, was
9 anything that could be -- any scenario that could be
10 viable over 1,000 years. Obviously, that tends to
11 drive you from the fact that you can't foretell the
12 future and you can't foretell land use reasonably over
13 a few decades to a lot of people reverting to resident
14 farmer, because you just couldn't justify anything
15 else.

16 We also looked at staff and licensee
17 experience. One of the issues in this is that there
18 -- this is -- scenarios are licensee-initiated and
19 justified. It does lead to a catch 22. Licensees
20 aren't likely to come in if they don't think the staff
21 is going to approve things. But if the staff doesn't
22 get anything, they can't approve anything. And so
23 there can become the perception that we wouldn't
24 approve anything, but we're not getting any requests
25 in the first place.

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1 We have had very few that have come in for
2 realistic scenarios, and we have worked with most of
3 those.

4 Because of the few number of sites, there
5 is not a broad vision of how flexible the guidance is
6 or how vision -- how flexible the LTR is within the
7 staff itself. And that may lead to licensee and
8 others to getting a false impression of the level of
9 flexibility allowed in the LTR. That's not as
10 flexible.

11 VICE CHAIRMAN GARRICK: Now, what is the
12 licensee -- what's the licensee's role in this?

13 MR. MCKENNEY: The licensee's role is to
14 look at their site and decide what scenarios they want
15 to use at their site. They've got to decide what
16 scenario is appropriate for their site.

17 VICE CHAIRMAN GARRICK: But do they do --
18 okay. Do they do that on the basis of very site-
19 specific considerations, or do they --

20 MR. MCKENNEY: They can.

21 VICE CHAIRMAN GARRICK: -- pick and choose
22 from a set of scenarios that you would provide?

23 MR. MCKENNEY: Usually, they pick from
24 what we have, because they don't want to have to
25 develop it all themselves. They can. The guidance

1 does allow you to make site-specific analyses. In a
2 few cases, we've had very site-specific analyses, such
3 as Watertown GSA in Massachusetts. That used a CERCLA
4 process.

5 But most licensees are falling back
6 because the work has already been done for like RESRAD
7 and others for the resident farmer. If they use
8 something like that, they don't have to provide any
9 justification. They don't have to do land use
10 planning and other things that may be required. And
11 they didn't know how successful they'd be in the first
12 place.

13 So because of the uncertainties, they
14 tended just to say, well, NRC has developed this
15 screening approach or this screening scenario, and you
16 know what? I'll just do that, because that's the easy
17 way out.

18 VICE CHAIRMAN GARRICK: Yes. The problem
19 with that is how -- is specificity.

20 MR. MCKENNEY: Well, the problem is is the
21 third bullet right there, which is that we only have
22 the resident farmer sitting out there. We don't have
23 well-developed examples. If there was well-developed
24 examples of alternate scenarios, I believe that there
25 would be more use of them, because if they had some

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1 sort of template to work off of, they would know where
2 to go.

3 You know, we're just showing them -- and
4 basically, in a lot of the guidance we're just showing
5 them the door, you know. Here's one way, but you can
6 take this door until it's closed and nobody knows
7 what's beyond. And you can go that way, though, and
8 you might get to the -- you might get decommissioning.

9 MEMBER RYAN: Isn't part of that question,
10 too, a practical matter that a licensee is trying to
11 get something accomplished?

12 MR. McKENNEY: Yes.

13 MEMBER RYAN: And I think that's really
14 the drivers. If they have a scenario that they know
15 is, within some degree, favorable for review --

16 MR. McKENNEY: Right.

17 MEMBER RYAN: -- then they're going to
18 look at that. And, you know, even though that may
19 cause them to say, "Dispose more material at a higher
20 cost than not," they're balancing that against, well,
21 you know, if we work for three years on a scenario of
22 our own and spend XYZ dollars, you know, we may end up
23 at the same or a worse place.

24 So I think -- I guess my own feeling is
25 sometimes it's very practically driven.

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1 MR. McKENNEY: Yes. That's what I mean,
2 that it's practically driven. That they don't want --
3 that there is too many -- there is a lot of
4 uncertainties on whether you can --

5 MEMBER RYAN: And often under a time
6 constraint.

7 MR. McKENNEY: Right. That's another
8 thing is is that -- for the licensee-initiated and
9 justified is is that the last thing a licensee wants
10 to become is a case study. They don't want to become
11 the test case for the staff. They want to find out
12 that somebody already -- somebody else has already
13 done what they want to do, and they want to take that
14 approach. And so you have a hard time finding that
15 first person to come in and become the test case,
16 because of the practicalities involved.

17 They have the timeliness rule. They have
18 a want just to get this over with. Decommissioning is
19 not a profitable section of their operations.

20 VICE CHAIRMAN GARRICK: The reason I raise
21 this question is you put quite a bit of emphasis on
22 the word "realistic" --

23 MR. McKENNEY: Yes.

24 VICE CHAIRMAN GARRICK: -- scenarios. And
25 one of the important lessons we learned in doing

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1 nuclear powerplant risk assessments was how site-
2 specific risk really is. And the underpin of that
3 whole specificity are the scenarios --

4 MR. MCKENNEY: Right.

5 VICE CHAIRMAN GARRICK: -- associated with
6 the risk. And this is quite a different situation in
7 many respects, but, nevertheless, it is something that
8 has to be looked at in terms of, well, can you really
9 deal with this in a generic sense? That's kind of
10 what you're doing and what the licensees are doing.

11 Given that risk in all other places where
12 we've gotten very quantitative, gotten very detailed,
13 have discovered how site-specific it really is, and
14 just trying to --

15 MR. MCKENNEY: Right.

16 VICE CHAIRMAN GARRICK: -- connect this
17 with the lessons learned.

18 MR. MCKENNEY: Yes. I mean, you know,
19 activities such as how much gardening is done in a
20 certain area is definitely site-specific.

21 VICE CHAIRMAN GARRICK: Right.

22 MR. MCKENNEY: But it's a standard form.
23 We also look to our case size in the CERCLA approach.
24 The CERCLA approach does bring in a lot more of site-
25 specific analysis as it's a -- you bring in the local

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1 planning boards, you bring in the local governments
2 and other ones to get aid, and you do some roundtable
3 discussion of what are the appropriate scenarios for
4 a site, rather than this generic approach of using a
5 resident farmer or just an industrial worker, or what
6 have you.

7 As part of the thing -- we looked at a
8 couple of options, and the -- one is to continue with
9 the current guidance but just emphasize current
10 flexibilities that are in the guidance. That would be
11 staying with the fact that scenarios have to be viable
12 over 1,000 years. That would be staying with -- well,
13 mainly that.

14 The other one was to bring us in line with
15 what -- partly in line with what CERCLA was doing,
16 which is that they're using more foreseeable future
17 scenarios. The scenarios are based on these
18 discussions with local planning boards, with really
19 site-specific issues, to try to make sure that you
20 aren't like having to always assume that civilization
21 is going to end, and then there's going to be
22 residential farmers here.

23 And in the end, that's our recommendation
24 is that licensees should be allowed to go that route.
25 They should be able to use local planning boards.

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1 They should be able to set up this process of
2 consensus-building on what are the viable scenarios
3 that should be used, even for long-lived
4 radionuclides.

5 But that's not -- but in cases of that,
6 while the compliance scenario may be based on this,
7 what is the reasonable future land use scenario, there
8 would be still done as a risk -- to risk-inform it,
9 you'd still do the analysis of what other -- what are
10 the possible doses from other land uses? Just so that
11 you have an understanding of, well, this is the
12 reasonable land use. This is what is likely, and this
13 is what compliance is for unrestricted release.

14 But are we really -- is there things that
15 could go really wrong at the site? It's within --
16 it's in the view of the robustness analysis by SERP
17 that they've suggested, and it's been -- it is
18 actually modeled on one of our sites, which is at
19 Watertown GSA, which the U.S. Army Corps of Engineers
20 went through a CERCLA building process of scenarios in
21 the state and -- the state environmental and radiation
22 departments got together and decided to use a park as
23 the scenario, as the land use for a site with uranium,
24 because that's pretty much the only thing this land
25 could be used for.

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1 So any questions?

2 MEMBER RYAN: Chris, is there any way to
3 look in all of the CERCLA approaches that involve the
4 CERCLA sites that have gone through this process and
5 get some assessment as to how many end up as parks or
6 farm land or housing or industrial sites, or that kind
7 of thing? I mean, it would just be interesting. I
8 mean, it struck me as you were talking that --

9 MR. MCKENNEY: Right.

10 MEMBER RYAN: -- how many ended up as
11 resident farmers, I'll bet you it's a small --

12 MR. MCKENNEY: No. The actual guidance on
13 land use for EPA actually acknowledges that they, too,
14 have been accused of being way too conservative in
15 that way. And in 1995, they put out guidance to do
16 this foreseeable future, because of that, that they've
17 been --

18 MEMBER RYAN: Is there any way to align
19 with that in a more complete way or --

20 MR. MCKENNEY: Well, I mean, that's what
21 we're suggesting is actually that alignment. But as
22 to a database of what the results are, we can only ask
23 EPA for that --

24 MEMBER RYAN: That might be a great
25 question to ask. I'd be curious to see how that

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1 washed out.

2 VICE CHAIRMAN GARRICK: In California,
3 this is an easy take. It's all going to be houses.

4 (Laughter.)

5 MR. MCKENNEY: Yes, again, site-specific.
6 Okay. The foreseeable land uses -- even without our
7 primary justification, which is in our rule right now,
8 is that based on the scenario's modifications, or the
9 scenario on the half-life of the material -- in other
10 words, you know, short-lived radionuclides we're
11 really only worried about -- like cobalt-60, we're
12 really only worried about what's going to happen in
13 the next five to 10 years at that site, because that's
14 when the peak dose is. And it's going to drop off
15 really fast.

16 The physical features of the site, which
17 also forbid land use, and that the -- I already
18 mentioned the robustness calculation.

19 On our outcomes, well, this all depends on
20 how much the licensees use it. But we feel that it
21 would lead to more economical safety, because you
22 would have higher allowable concentrations by having
23 less onerous scenarios. But you'd still have to
24 maintain the level of risk, because you are just not
25 being ultra-conservative.

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1 And there would be fewer restricted use
2 sites, because some of the -- some sites that are on
3 the edge of being restricted use, you know, in the 30
4 to 35 millirem range, if you use a residential farmer,
5 would be able to get below 25 by possibly doing a
6 site-specific realistic scenario.

7 Any questions? Thank you.

8 MEMBER RYAN: Any questions?

9 VICE CHAIRMAN GARRICK: Well, I sure like
10 the idea of trying to develop realistic scenarios. I
11 guess it's a matter of how realistic they are and how
12 they're done.

13 MR. MCKENNEY: Yes.

14 VICE CHAIRMAN GARRICK: But I think as far
15 as the general approach is concerned, this makes a lot
16 of sense.

17 MR. MCKENNEY: Yes, a lot of it is
18 bringing it more prominent -- I mean, as -- since the
19 Army Corps of Engineers did work within our regular
20 guidance right now, and was able to bring in the
21 Watertown GSA approach the way they did it, and that's
22 all we're basically suggesting. We're going to bring
23 it much more prominent, and bring it much more -- for
24 uranium especially -- that we're not -- we're saying
25 we need shorter timeframes.

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1 But that's true. It's all in actually how
2 it -- it's great now to see how it actually --

3 VICE CHAIRMAN GARRICK: Right.

4 CHAIRMAN HORNBERGER: Isn't there
5 something between the site-specific realism and the
6 resident farmer? Because the resident farmer, as you
7 said, is a pretty stylized calculation. Why can't
8 there be a more or less stylized calculation for an
9 industrial usage scenario?

10 MR. McKENNEY: Well, that's one of the
11 things is that it may be able -- a way to do some
12 stylized alternative use ones.

13 CHAIRMAN HORNBERGER: Right.

14 MR. McKENNEY: So that they don't have to
15 go fully site-specific, but they could go to like some
16 general land use. So you just have a general idea of
17 what the land use is. They don't have to do a real
18 specific thing of, "This is exactly what the land use
19 would be."

20 And maybe our guidance can get developed
21 so that we can have some well-developed examples that
22 they can say, "Well, we're just using this scenario,
23 scenario B from your developed stuff, as our" -- and
24 this is why we can use that, which would assist the
25 licensees a lot in using the alternate scenarios.

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1 MEMBER RYAN: Chris, what's the schedule
2 and forecast for this work and development? I'm just
3 curious.

4 MR. McKENNEY: It's with the rest of the
5 guidance, and it would --

6 MEMBER RYAN: You may have had it in your
7 slide, and I just --

8 MR. McKENNEY: Yes. '06 is -- September
9 of '06.

10 MEMBER RYAN: So it's out there on the
11 horizon a bit.

12 MR. McKENNEY: Yes. Well, a lot of it is
13 because of resources.

14 MEMBER RYAN: Say again?

15 MR. GREEVES: John Greeves, NRC. You saw
16 the guidance slide. We need to get an SRM back
17 deciding how much buy-in we have on this. But what's
18 also important is we're already doing this. The staff
19 is already doing realistic scenarios, and we might
20 like to, you know, visit with your staff and explain
21 -- there's a whole handful of cases where we're doing
22 this, and those are probably ones that would be
23 illustrative to the kinds of questions you're asking
24 here.

25 MEMBER RYAN: Right.

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1 MR. GREEVES: The guidance will be useful
2 for our external stakeholders. It's also useful for
3 our staff, because, as Chris said, the staff was
4 defaulting to these conservative scenarios. We've got
5 to kind of work that issue. But we're already getting
6 pay off just by thinking this thing through already.

7 So I want you to go away with an
8 understanding that a lot of these recommendations
9 we're actually doing in terms of realistic scenarios.
10 It isn't just Watertown Arsenal that we've looked at
11 this type of an approach. We've done some work at
12 NFS. We've got a couple of other cases where we're
13 looking at this.

14 It affects the people with large
15 inventories of soil, a little bit of groundwater, who,
16 you know, are faced with that Envirocare, \$10-, \$20-,
17 \$100 million ticket. Those are the people who are
18 getting affected by this. So --

19 MEMBER RYAN: Thanks. That's so much
20 help.

21 MR. JOHNSON: The other observation is
22 that when we meet with licensees prior to their
23 developing a decommissioning plan, we talk through a
24 lot of the major issues or questions that they have.
25 And, you know, whether it's institutional controls,

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1 for instance, or, you know, this is a prime
2 opportunity here to talk about what scenarios are
3 appropriate for their site.

4 MR. McKENNEY: I mean, between the risks
5 -- well, now we might not have the guidance until
6 September of '06, but the staff will definitely be
7 using most all of these issues except for the ones
8 that -- if these were approved to -- except for the
9 one that requires rulemaking, on a case-by-case basis
10 while the guidance is being developed. It would not
11 be we'll wait until the guidance is developed.

12 MR. EID: This is Bobby Eid. I would like
13 to add that something -- in between, that in the dose
14 impact analysis, the staff they do something between
15 -- what normally we do, we try to eliminate certain
16 pathways, like, for example, certain sites.

17 The drinking water is not viable for
18 drinking, so we do not need that pathway. In some
19 cases, the drinking water source, although it is good
20 aquifer, so we could eliminate that, because we know
21 the source is not directly from the aquifer, it could
22 be somewhere else. It could be municipal water
23 supplied, you know, on the site.

24 So there are different ways we do
25 eliminate the pathways, although specifically we may

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1 not call it different scenario. But we do, at the
2 end, when you eliminate the pathways, you end actually
3 with different scenarios. So we do something in
4 between because there was a question if there is
5 anything in between or not, yes, we do have something
6 in between.

7 MEMBER RYAN: Okay. Thanks.

8 Any other questions?

9 MEMBER LEVENSON: Yes, I have a question.
10 You mentioned that essentially the sites you are
11 currently involved with are pretty much uranium and
12 thorium type sites. But how does this work relate?
13 Some years down the road we're going to start having
14 license termination on reactor sites. How does that
15 relate to your current program?

16 MR. McKENNEY: Well, we are currently
17 having license termination plans coming in. We've had
18 three in the past six months that we've approved.

19 All of these things could be used by
20 reactors. There are -- in this review, a lot of the
21 more restricted release issues especially, which is
22 what the focus of the SRM was on uranium and thorium
23 sites. No reactor that I know of is thinking of
24 restricted release as an option.

25 The realistic scenarios, though, on the

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1 other hand, could definitely be used by them,
2 especially for the fact that they have short-term --
3 relatively short-term -- from a decommissioning point
4 of view, the half-lives are short, 30 years or less.
5 But they could take definite advantage of that.

6 MEMBER LEVENSON: There may be some
7 reevaluation of that that it costs so much money to
8 get a powerplant site environmentally approved as a
9 powerplant site, it seems to me that people start --
10 that are out decommissioning nuclear plants, even if
11 they don't build another nuclear plant, they're
12 probably going to find it only makes economic sense to
13 keep that site as a powerplant site, because it has an
14 incredible value for that. So you may find that, in
15 fact, restricted release is the thing that makes
16 sense.

17 MR. McKENNEY: There may not even be
18 restricted release under some of those conditions even
19 then. It depends on how, again, under a restricted
20 release -- in a realistic scenarios point of view --

21 MEMBER LEVENSON: Right.

22 MR. McKENNEY: -- do you really need a
23 deed restriction to have them control -- make that
24 industrial site for the next 10 years? Or how likely
25 is it to not still be a powerplant in 10 years? That

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1 may be an argument that a licensee could make.

2 MEMBER RYAN: Well, I mean, that would be
3 a case where a possession-only type approach might be
4 real workable.

5 MR. McKENNEY: Exactly.

6 MEMBER RYAN: Thanks. Any other
7 questions?

8 Mr. Chairman, I'll turn it back to you.
9 Are there any staff comments or questions at this
10 point?

11 CHAIRMAN HORNBERGER: Anything from the
12 audience?

13 MEMBER RYAN: Audience comments/questions?

14 CHAIRMAN HORNBERGER: Any comments or
15 questions? Okay. Thank you, Mike. Thank you,
16 Robert.

17 So we're not going to need the recorder
18 after this. So I think what we'll do is let's take a
19 10-minute break and reconvene and we'll finish up our
20 business for today. We're adjourned for 10 minutes.

21 (Whereupon, at 4:30 p.m., the proceedings
22 in the foregoing matter went off the
23 record.)

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

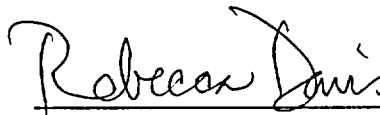
Nuclear Waste

142nd Meeting

Docket Number: n/a

Location: Rockville, MD

were held as herein appears, and that this is the
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Rebecca Davis
Official Reporter
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Controlling the Disposition of Solid Material

ACNW Meeting

May 28, 2003

Overview

- Solid materials
- Why do a rulemaking process
- Information gathering efforts
- May 21-22, 2003 workshop
- What we are doing now

Range of solid materials

- No radioactivity from licensed operations
 - No contact with radioactive materials
- Very small amount from licensed operations
 - Limited contact or material cleaned
- Appreciable amounts of radioactivity
 - Kept separate
 - Licensed disposal

What is done now

- Conduct radiation survey
- Existing guidelines based on survey instrument capabilities
- Allow material release if radioactivity:
 - Not detected, or
 - Meets existing guidelines

Why we are doing rulemaking process

- Review existing approach
 - Existing approach protects public health
 - Improve to make more consistent
- Evaluate alternatives and invite public input
- Establish consistent way to decide on disposition of solid material

Information gathering efforts

- Issues paper: >800 stakeholder letters
- Six stakeholder meetings in 1999-2000
- Stakeholders:
 - Metals and cement industries; citizen groups and individuals; licensees; Federal/State/local agencies; Tribal governments; scientific organizations; solid waste industry

Information gathering efforts

- National Academies Study
 - 3 information gathering meetings open to the public - 2001
- Technical studies
- Input from scientific organizations

Information gathered

- Preliminary Alternatives

- Alternatives involving further use
 - Unrestricted use (no action or dose-based)
 - Conditional use
- Alternatives involving no further use
 - EPA regulated landfill disposal
 - Disposal in licensed LLW disposal site

Information gathered

- Unrestricted use

- Impacts on health and safety
 - In range of other health-based standards
 - Poses negligible risk
 - Small fraction of natural background
 - Risks uncertain and not accurately modeled
 - Releases can't be accurately measured
 - No dose above background justified

Information gathered

- Unrestricted use

- Regulatory/economic burden
 - Consumers won't buy recycled products
 - No liability for released materials
 - Disposal in LLW uses resources w/o health benefit
 - Small licensees would face economic impact

Information gathered

- Restricted alternatives

- Advantages/disadvantages
 - Limited public exposure
 - Issues regarding landfill disposal
- Concerns about viability
 - Limited quantity of material from NRC licensees
 - Would restrictions work?

What we are doing now

- No decisions on alternatives
- Commission direction - Oct 2002
 - Rulemaking process – range of alternatives
 - Stakeholder involvement
 - Build on previous efforts; focus on solutions
 - Feasibility of restricted alternatives
 - Increase web use to interact w/stakeholders

What we are doing now

- Website: www.nrc.gov/materials.html
- Feb 28, 2003 FRN
 - Invited comment: secy@nrc.gov
 - Announced scoping
- May 21-22, 2003 workshop

May 21-22 Workshop Agenda

- Rulemaking process
- Information gathering efforts
- Environmental review process
- Stakeholder discussion on:
 - Perspectives on alternatives
 - Focus on conditional use and landfill disposal

May 21-22 Workshop Summary

- Unrestricted use

- Economic issues
- Radiation protection concerns
- ANSI N13.12
- Modified position

May 21-22 Workshop Summary

- Conditional use
 - May not be viable or economically feasible
 - Concerns about burden
 - Difficult to apply generically; should be case-by-case
 - A rule should outline process

May 21-22 Workshop Summary

- Landfill disposal
 - RCRA C and RCRA D sites
 - Landfill siting, modeling, costs, regulatory authority, other issues
 - Conditions on releases

May 21-22 Workshop Summary

- Other

- Public involvement

- Recordkeeping

- GEIS scoping

Current actions

- Comment period through 6/30/03
- Rulemaking and NEPA processes
- Supporting technical bases

FINALIZATION OF NUREG-1640

Radiological Assessments for
Clearance of Equipment and
Materials from Nuclear Facilities

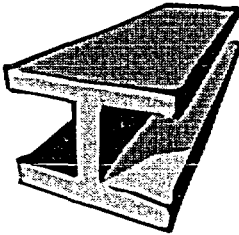
[Technical Support for Rulemaking]

Robert A. Meck, NRC
Robert Anigstein, John Mauro, William Thurber, SC&A

ACN/W MAY 28, 2003

1

MATERIALS AND EQUIPMENT



ASSESSMENT OF
POTENTIAL DOSES TO
PEOPLE FROM
CLEARANCE OF:

- STEEL
- ALUMINUM
- COPPER
- CONCRETE
- EQUIPMENT FOR
REUSE

ACN/W MAY 28, 2003

2

RESOLVE COMMENTS COMPARED TO DRAFT:



- Realism for industry
 - Basic Oxygen Furnace,
Induction Furnace
 - Mixing
 - Partitioning
 - Representations of
transportation, copper,
aluminum industries
- Less conservatism

ACN/W MAY 28, 2003

3

RESOLVE COMMENTS

COMPARED TO DRAFT:

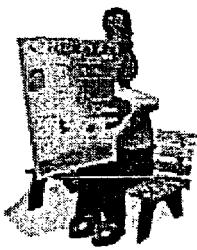


- More accurate geometries
- Landfill disposal
 - Well water down-gradient
- More radionuclides
- ICRP 26 and ICRP 60

ACNW MAY 28, 2003

4

RESULTS FOR RULEMAKING



- Mostly job-related and reuse scenarios are key for standard setting
- Realism often resulted in less dose per unit concentration of nuclides
- ICRP 60 gives generally lower exposures per Bq

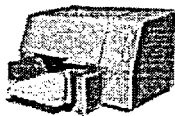
ACNW MAY 28, 2003

5

Defensible and robust dose assessments are ready for use in rulemaking.

Work is in progress!

JUNE 2003 IN PUBLICATION



ACNW MAY 28, 2003

6

PERFORMANCE BASED RADIOACTIVE MATERIALS CONTROL (MEASUREMENT)

Improve the process of determining the presence or absence of radioactive material for the requirements and conditions present.

- *Planning*
- *Instrumentation*
- *Sampling*
- *Analysis*

05/28/2003

GE Powers, Ph.D.

1

Planning

- Understand requirements of pending decisions
- Explicitly identify and manage uncertainties that could lead to decision errors
 - Sampling uncertainties - MARSSIM (Aug 2000)
 - Analytical uncertainties - MARLAP (Dec 2003)
 - Materials specific - MARSAME (Target 2004)
 - Subsurface specific - MARSASS (TBD)
- Implementing the intent of "performance based" (sampling & analysis) - SADA

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2

Instrumentation

- Selecting the proper instrument for surveys
- Advances and improvement
- Exploiting field analytical capabilities
 - Data logging
 - Live Time analysis
 - GPS
- Integration of instrumentation to analytical software

05/28/2003

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3

Sampling Designs

- *Surface Sampling*
 - Uniform: NUREG-5849 – Replaced by MARSSIM
 - Non-parametric random & MDCs: MARSSIM - Active
 - Double Sampling – Some use
- *Sub-Surface Sampling*
 - Bayesian – In testing
 - Adaptive Sampling – In testing
 - Co-Sampling – in development
 - By Exception – in development

05/28/2003

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4

Analysis

- Parametric to non-parametric
- When is enough, enough?
- Iterative Methods - SADA
 - Infill
 - Adaptive Sampling and Analysis Program (ASAP)
 - Markov/Bayes
 - Co-Variance/Co-Kriging
 - Minimize Uncertainty of Exceedence
 - Minimize risk of misclassification

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5

SADA

Spatial Analysis and Decision Assistance

Windows based freeware designed to integrate scientific models with decision and cost analysis frameworks in a seamless, easy to use environment.

- Visualization
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- Human Health Risk Assessment
- Ecological Risk Assessment (Version 2.0)
- Remedial Design Frameworks
- Cost Benefit Analysis
- Secondary Sampling Design

SADA has the support of both the DOE and EPA and has over 850 users (2000) world wide. A number which grew to over 1000 by the end of (2001) the calendar year. There have been 8000 downloads and expect 2000 to be users by end of 2003.

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6

2 DESIGN OBJECTIVES AND OVERALL APPROACH

2.1 Design Objectives

The overarching design objectives of this investigation are realism, clear and complete presentation, accuracy, consistency, and full disclosure of uncertainty in the derivation of the collective doses associated with each clearance alternative. In addition, the approach is required to be consistent and compatible with the methods used to derive individual dose factors, as described in NUREG-1640, as applicable to the derivation of collective doses.

The specific objective of this report is to derive a table that has the following basic form:

Table 2-1 Form of the Final Product

Clearance Alternative	Time-Integrated Collective Doses (person rem \pm 95% confidence level) Associated with Clearance	
	Undiscounted	Discounted
10 mrem/yr		
1 mrem/yr		
0.1 mrem/yr		
0 mrem/yr above background		
Prohibition		
Restricted Use No. 1		
Restricted Use No. 2		
No action (R.G. 1.86)		

Nested within this table is a fine structure that further subdivides the time-integrated collective doses into a broad range of categories, as follows:

- (1) Category of material (e.g., ferrous metal, concrete, copper, aluminum, other)
- (2) Category of facility (e.g., PWRs, BWRs, fuel-cycle facilities, material licensees)
- (3) Category of worker occupational exposure (i.e., radiation worker versus non-radiation worker)
- (4) Category of non-radiation worker occupational exposure (e.g., truck drivers, scrap yard workers, steel mill workers, etc.)
- (5) Category of public exposure based on exposure scenario (exposure to automobiles, structural steel, appliances, agricultural fill, others)

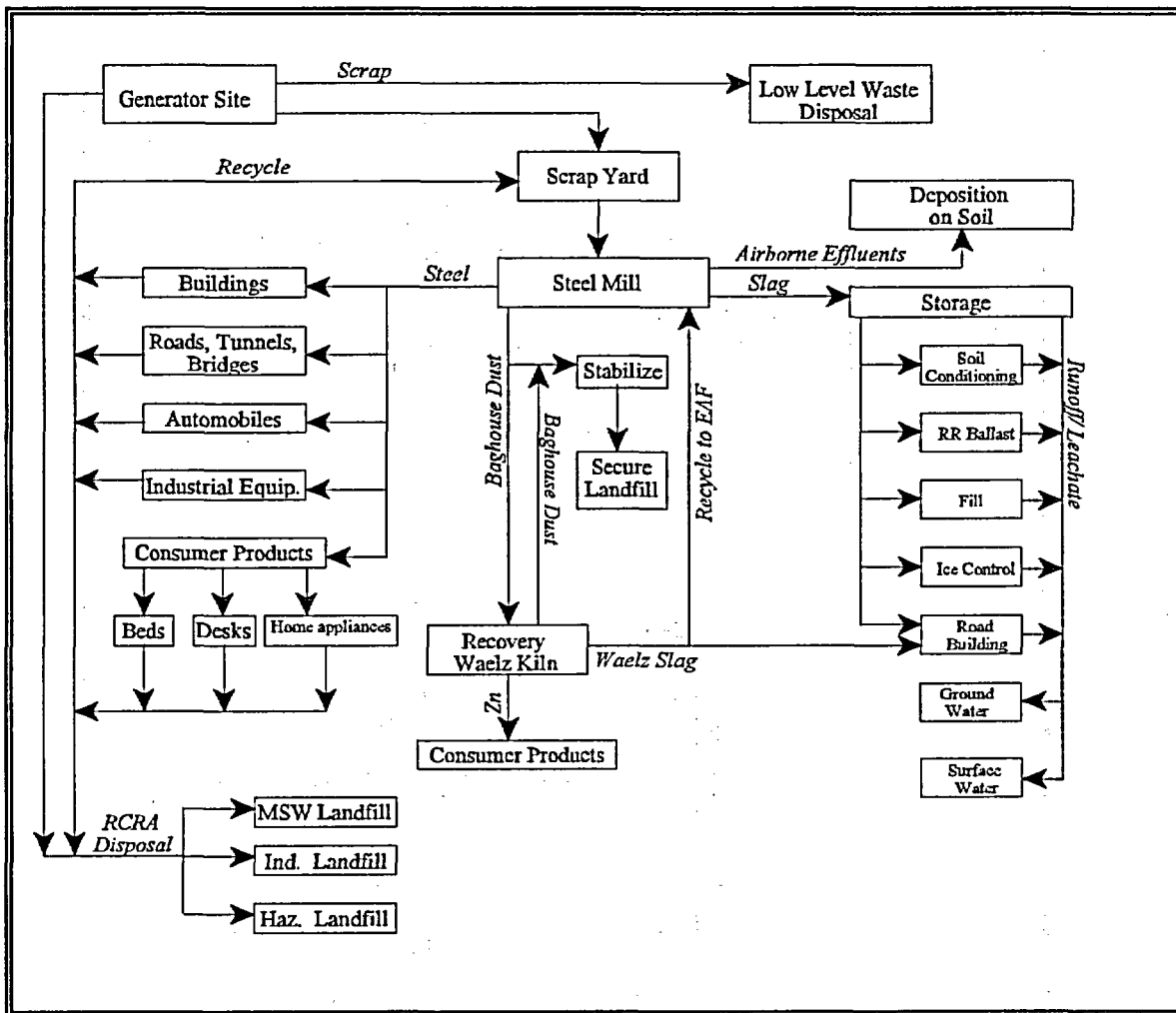
Since the number of categories and subcategories into which the collective doses can be grouped is virtually unlimited, the number of categories is limited to those that are required to achieve the following:

- Capture enough of the time-integrated collective doses associated with each clearance alternative, including uncertainties,¹ to support NRC decision-making pertaining to the alternatives. For the purpose of this report, this objective is accomplished if there is a high level of assurance, based on the peer review process, that the majority of the collective doses has been captured.
- Disclose which categories of NRC licensees and which materials are anticipated to be responsible for most of the collective doses.
- Create a mosaic of exposure categories that reveal the population groups that are anticipated to experience the largest collective doses.
- Disclose how the collective doses change as a function of time so that both discounted and undiscounted collective doses can be estimated.

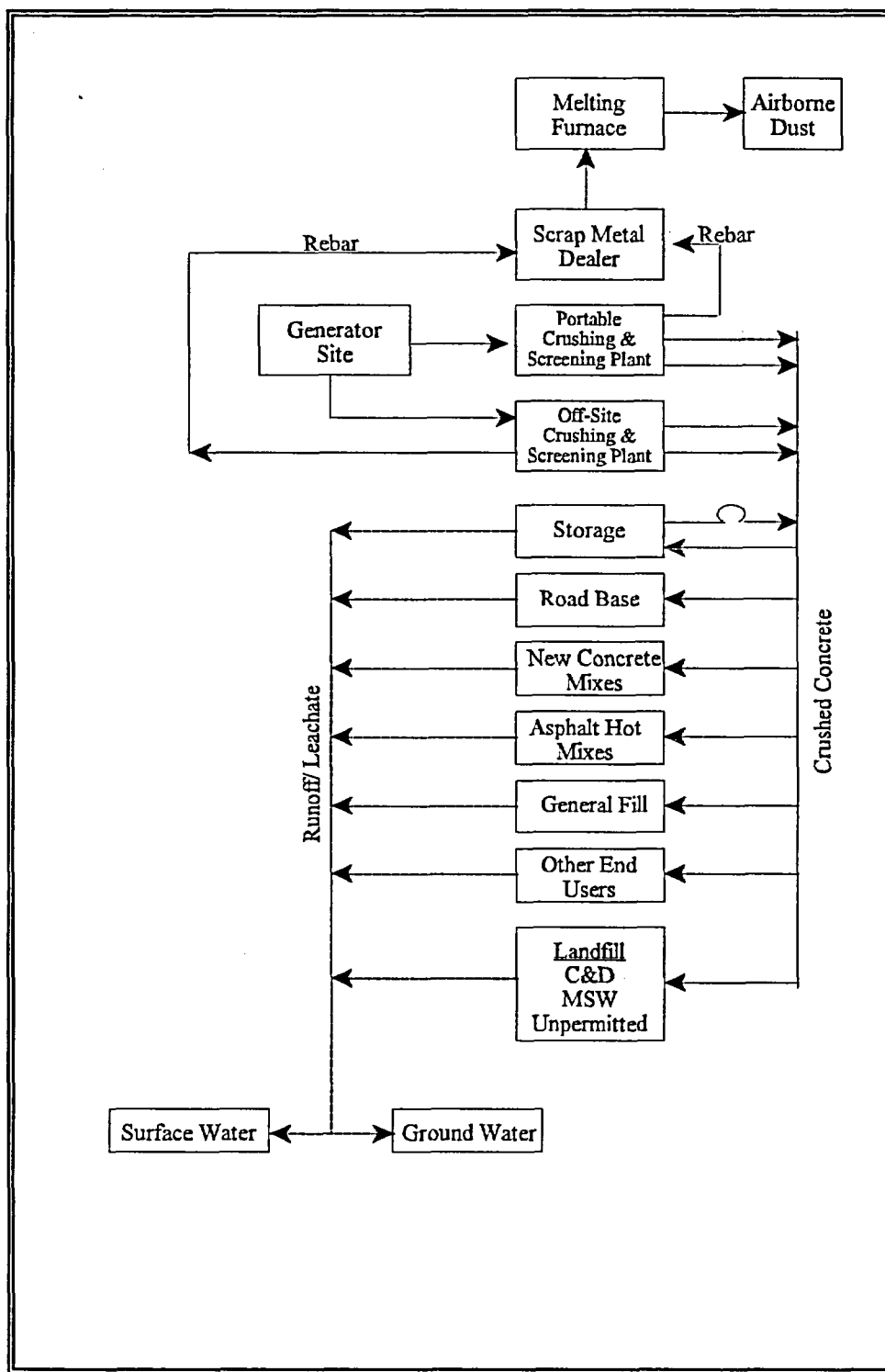
2.2 Overview of Technical Approach

Figures 2-1 and 2-2 present simplified schematic diagrams of the potential exposure scenarios that could result from clearance of scrap metal and concrete from nuclear facilities. Scrap metal and concrete cleared from an NRC/Agreement State-licensed facility could follow one of three paths: disposal in a licensed low-level waste (LLW) disposal facility, clearance for recycling/reuse, and clearance and disposal in a landfill. Collective doses are affected by which pathways are selected, and the pathway selected will be influenced by the clearance alternative.

¹ Unlike the derivation of dose factors in NUREG-1640, which are concerned with the variability and uncertainty in doses among individuals comprising different critical population groups, this report is concerned with the anticipated real but unknown collective doses associated with each clearance alternative. As a result, this report is concerned with the uncertainty in the collective doses. However, the concept of individual variability does not arise, because the analyses are concerned with the time-integrated collective doses associated with each clearance alternative.



**Figure 2-1 Potential Collective Exposure Scenarios
Associated with the Clearance of Scrap Metal**



**Figure 2-2 Potential Collective Exposure Scenarios
Associated with the Clearance of Concrete**

The methods and models used to derive collective doses for the recycling of scrap metal are divided into the following subdivisions, each of which addresses a key step in the dose assessment process for radiation workers, for non-radiation occupational exposures, and for members of the general public:

- (1) Characterization of clearable material
- (2) Exposures associated with the transport and disposal of clearable material at LLW disposal facilities
- (3) Exposure to radiation workers in support of the clearance process
- (4) Exposures associated with the transport and disposal of cleared material at landfills, including RCRA-permitted facilities
- (5) Exposure from the transport of cleared material for recycling and reuse
- (6) Exposure to cleared material at scrap yards and material processing facilities
- (7) Exposure to cleared material at metal melt facilities
- (8) Exposure to effluents from metal melt facilities
- (9) Exposure from transport of products and byproducts from metal melt facilities to facilities for further metal processing
- (10) Exposure to industrial workers at metal processing and manufacturing facilities using recycled metal
- (11) Exposure to workers at baghouse dust processing facilities
- (12) Exposure to workers at slag process and handling facilities
- (13) Exposure to the public from recycled concrete
- (14) Exposure to the public from products made from recycled metal
- (15) Exposure of the public from products made from recycled slag
- (16) Exposure of the public from the disposition of baghouse dust

Items 2 through 16 represent different population groups anticipated to experience exposures associated with the clearance alternative. Each group is addressed separately because the exposure scenario and levels of internal and external exposure are anticipated to be fairly homogeneous within each group, but differ substantially among the groups. As a result, the range

and average exposure rates to the members of each group, the number of individuals comprising each group, and the duration of exposure among the different population groups are anticipated to differ substantially and, therefore, warrant individual attention. In addition, by structuring the analysis in this form, there is a high degree of assurance that all population groups that may contribute significantly to the collective doses are included. This approach also helps to achieve the design objective of transparency.

2.2.1 Characterization of Clearable Material – The Starting Point

The Inventory Report presents a compendium of information characterizing the inventory of clearable material at NRC/Agreement State-licensed facilities. This information serves as the starting point for constructing the clearance source terms. The process begins by creating a database representing each of the approximately 21,000 NRC/Agreement State licensees. The database assigns to each facility, or category of facility, a quantity of potentially clearable carbon steel, concrete, and other material (as appropriate to achieve our objectives) produced by each facility or category of facility as a function of time during anticipated D&D. A separate database is developed characterizing the potentially clearable material generated during facility operation. Due to unavailability of data, the database characterizing potentially clearable material generated during facility operations is not subdivided into types of material, but is simply defined as mixed trash. These data are used as the bases for deriving the collective doses associated with each of the clearance alternatives. Table 2-2 presents an example of the format of the database for carbon steel generated during the D&D of PWRs.

**Table 2-2 Structure of the Clearance Source Term Database
for Carbon Steel from PWRs (metric tons)**

Year of Clearance	Facility # 1	Facility # 2	Facility # n	Total
2003				
2004				
2005				
.				
.				
.				
2050				
Total				

For commercial nuclear power plants and fuel cycle facilities, the time periods are designed to capture the production of clearable material during the D&D and the license termination process. However, in the case of large hospitals, it is assumed that hospitals operate indefinitely, but routinely decontaminate and clear rooms or sections of the hospital where radioactive materials are used or stored.

Each entry includes a best estimate and, where possible, a range of values. The database contains similar tables for other categories of licensees and types of material, grouped in a manner that is compatible with the limitations of NUREG/CR-_____. For example, each light-water reactor (LWR) and fuel cycle facility is individually represented in the database. However, it is neither necessary nor possible to provide entries for each of the thousands of material licensees. Nevertheless, it is possible to group the material licenses by major category (and according to size) and provide individual entries for each major category.

These entries are then used to represent "pulses" of material cleared from each licensee or category of licensee as a function of time under each alternative. These pulses of clearable material (expressed as metric tons of a particular category of material, containing a particular quantity and mix of radionuclides, including uncertainties) serve as input into the collective dose assessment modules for each exposed population group.

Because we are interested in deriving the undiscounted and discounted collective doses, the date when each pulse of material is released is indexed against a reference year, i.e., 2003. In addition, since each pulse of cleared material can deliver exposures over many years (e.g., the Co-60 cleared in a given year and finding its way into automobiles can be expected to deliver exposures for many years thereafter), an accounting is maintained of the collective dose as a function of the year following the reference year.

For the purposes of this analysis, the time when an exposure occurs is assumed to be the time when the dose is delivered. In fact, for inhaled and ingested radionuclides, the dose conversion factors, which are expressed in units of committed dose equivalent per unit intake, reflect the 50-year committed dose. For some radionuclides, those with either a short half-life and/or short biological half-life, the dose from a given intake is delivered over a relatively short period of time (e.g., < 1 year). However, for radionuclides with long radiological and biological half-lives, the dose from a given intake is delivered over a period of 50 years following intake. The discounted collective doses derived in this report do not take into consideration the time-varying nature of the dose following intake.

2.1.2 Conceptual Models

The conceptual models used to derive collective doses associated with the pulses of cleared material differ among the different population groups based on whether the population group experiences a one-time exposure to a pulse of cleared material moving through the group (e.g., exposure to scrap yard workers, steel mill workers, and transporters of cleared material), or the population group is chronically exposed over long periods of time (up to 1,000 years), as is the case for exposure to the various products and byproducts associated with clearance (e.g., exposure to recycled steel in automobiles and structures, slag used as agricultural fill, or material disposed in landfills). For the first category of exposure, we use what we refer to as the "Dose Factor Approach." For the second category, we use the "Reference Population Approach." In addition to these definitive analyses of collective doses, screening analyses are used, which show that the collective dose for a given group is very small as compared to other groups.

The Dose Factor Approach

Ideally, we would like to be able to calculate the doses to each person comprising a population group and then sum up the doses. In principle, this approach can be used for population groups where the distribution of the dose factors for the individual members of a population group is known, or can be derived, along with the number of people in the group. For example, if we know that there are 10,000 people in a given population group and the dose factor distributions reported in NUREG-1640 (expressed in units $\mu\text{Sv/yr per Bq/g}$) apply to this group, it is possible to derive the collective dose to this group, along with uncertainty, in the following manner:

- Step 1: Sample once from the dose factor distribution ($\mu\text{Sv/yr per Bq/g}$) and once from the radionuclide concentration distribution (Bq/g) and multiply the two values to obtain one realization of individual annual dose for one randomly sampled member of the population group ($\mu\text{Sv/yr}$).
- Step 2: Repeat step 1 10,000 times and sum the results, yielding one realization of the collective annual dose to that population (person Sv/yr).
- Step 3: Repeat step 2 1,000 times to obtain a distribution of collective doses for that population group, thereby generating an best estimate and 95 percent confidence level for the estimate of the collective dose for that population group.

Because the NUREG-1640 dose factors apply to critical population groups and include consideration of dilution factors, the actual calculation is somewhat more complex. In addition, uncertainty in this estimate must consider uncertainty in the number of people in the group, and consideration must be given to the time-varying nature of the exposures in order to discount future exposures. Later in this report, where this methodology is used to derive collective doses, a detailed description of the method is provided for each population group.

Reference Scenario Approach

For those population groups where NUREG-1640 dose factors are not readily available or applicable to the derivation of collective doses, it is convenient to employ reference sites, reference population groups, and/or reference scenarios as a means to derive collective doses. For example, population exposure to automobiles from recycled metal is more amenable to modeling using the reference automobile approach, as opposed to the dose factor approach because the population exposures associated with the clearance of a pulse of metal in a given year can extend over several generations. The reference automobile scenario approach involves a six-step process, as follows:

- Step 1: Construct a reference automobile that represents the collective average automobile in the U.S. A reference automobile can be designed or selected based on a review of the designs of all automobiles.

- Step 2: Derive the average external exposure rate per unit activity in the reference automobile, expressed in units of Sv/hr per Bq of a given radionuclide in the reference automobile, along with uncertainty due to uncertainty in the mass and geometry of the real, but unknown average automobile.
- Step 3: Determine the collective exposure duration in units of person hours per year. For example, based on documented usage factors, we can determine the number of person hours per year of automobile occupancy in the U.S., including uncertainty.
- Step 4: The product of these two parameters (Sv/hr-Bq x person hours/year) yields a type of normalized collective dose rate (person Sv/year per Bq of a given radionuclide in the reference automobile), including uncertainty.
- Step 5: Given this parameter, a normalized collective dose per Bq cleared is derived based on information characterizing the fraction of recycled metal in the U.S. that is directed toward a particular end use (in this case an automobile as opposed to other end uses for recycled metal) and the fraction of the radionuclide in cleared metal that partitions to the metal melt.
- Step 6: The product of this normalized collective dose with the amount of a given radionuclide cleared yields the annual collective dose associated with clearance of that material (person Sv/yr).

The time-integrated collective dose is determined by integrating over the exponentially declining collective dose rate over 1,000 years. The depletion coefficient reflects radioactive decay and the removal rate of automobiles from the pool of automobiles (a type of depletion coefficient, λ_e).

The overall word equation takes the following form:

$$\begin{aligned} \text{Undiscounted time-integrated collective dose} = & (\text{Sv/hr-Bq in an automobile}) \\ & \times (\text{person-hrs/yr of automobile occupancy in the U.S.}) \\ & \times (\text{Bq of a given radionuclide cleared by a given facility in a given year}) \\ & \times (\text{fraction of the cleared radionuclide that goes to melt}) \\ & \times (\text{fraction of melt that goes to automobiles}) \\ & \times \int \exp(-\lambda_e t) dt \end{aligned}$$

The discounted time-integrated collective dose can be determined by replacing the environmental depletion coefficient by the sum of the environmental depletion coefficient plus the discount rate (e.g., 0.07/yr).

All these parameters, along with their uncertainty, can be determined.

This approach involves the derivation of several different types of normalized collective doses, including the following:

- Person Sv per Bq in the product causing the exposure (normalized collective dose type 1 as derived in Steps 1-4 above)
- Person Sv per Bq deposited in the melt in a steel mill (normalized collective dose type 2 as derived in step 5 above)
- Person Sv per Bq cleared from the nuclear facility (normalized collective dose type 3 as derived in step 6 above)

The derivation of collective doses for particular end-use products begins with the derivation of type 1 normalized collective doses (e.g., given 1 Bq in a reference product, such as an automobile, what is the time integrated collective dose to the U.S. population?). Type 1 times the fraction of recycled material that goes into a particular product (such as the fraction of all recycled carbon steel that is used to make automobiles) yields type 2. Type 2 times the fraction of the radionuclide in the cleared material that partitions to the product or byproduct during recycling (such as the fraction of a given radionuclide in cleared carbon steel that partitions to the metal melt during recycling) yields type 3. The last category is the "official" normalized collective dose for a given radionuclide and end-use product, while the first two are intermediate versions of the collective dose that have their uses.

Once the type 3 collective dose is derived, the product of the actual quantity of a given radionuclide that is cleared times the type 3 normalized collective dose, yields the collective dose due to the clearance of material containing that particular radionuclide from a particular end-use product.

Screening Analysis

Several methods are available for quickly screening the collective dose to a given population group to determine whether it has the potential to contribute significantly to the overall collective dose. The first method makes use of the dose factors, such as those in NUREG-1640, with appropriate adjustments to account for dilution already incorporated into the dose factors. Specifically, the dose factor distributions in NUREG-1640 characterize the exposures to a number of critical population groups. By definition, they represent the distribution of dose factors for relatively small homogenous groups within a larger group, and not the entire group. For example, NUREG-1640 dose factors for scrap yard workers do not represent all scrap yard workers, but only a smaller, critical group within the scrap yard worker population that will experience high-end exposures. As such, using scrap yard worker dose factors from NUREG-1640 to derive collective doses to the scrap yard worker population will result in an overestimate of the collective dose to this group. The implication is that if, after performing realistic collective dose estimates for other population groups, we find that the conservative estimate of the collective dose to the scrap yard workers is small as compared to other population groups, we can conclude that the scrap yard worker contribution to the collective dose is small and can be disregarded.

The second screening method takes advantage of the fact that collective dose is a function of (1) the average exposure rate per unit activity in the reference product, expressed in units of Sv/hr per Bq of a given radionuclide in the reference end-product and (2) the collective exposure duration to the end-product, expressed in units of person hours per year. The product of these two parameters is an index of the relative collective dose for a given radionuclide for a given end use and can be used as a basis for screening among the vast number of different end-use products.

Databases

As a means of facilitating screening and the derivation of collective doses, a geographic information system (GIS) database is employed. The GIS-based system involves the creation of a base-map of the U.S. with layers of relevant information incorporated into its database. The database includes the following:

- The locations of LWRs, scrap yards, EAF and BOF steel mills, RCRA landfills, and each currently licensed low-level radioactive waste disposal facility
- Data characterizing each facility with regard to pertinent parameters (e.g., quantity and characteristics of cleared material and time of clearance for LWRs; scrap processing rate, number of workers, worker hours per metric ton of material processed, etc., for scrap yards and steel mills)
- Data characterizing the land use and demography in the counties in which each facility is located (e.g., percentage of land used for agriculture, residences, and commercial/industrial use)
- Data characterizing ground water and surface water uses and characteristics in the vicinity of each site
- Major transportation routes connecting the various facilities

The GIS-based information is used to construct reference sites/facilities/population groups, which are then used as input to models for deriving collective doses.

Exposures Associated with the Transport and Disposal of Clearable Material at Low-Level Waste Disposal Facilities

Assuming the prohibition alternative, it is assumed that all of the clearable material is disposed at a licensed LLW disposal facility. For each pulse of material for each facility or category of facility, this module predicts the collective doses to transport workers, to members of the public on the roadway from the licensed facility to the LLW disposal facility, to the workers at the LLW disposal facility, and to the public in the vicinity of the LLW disposal facility. The method used to derive these doses is to extrapolate the doses from previous NUREG and NUREG/CR reports that address these topics generically. The extrapolations take into consideration the quantity and radionuclide composition of the clearable material and distance to the LLW disposal facilities.

The results of these extrapolations are normalized collective doses expressed in terms of person rem per metric ton of each category of material shipped for LLW disposal. The product of the normalized doses with the quantity of each category of material cleared yields the collective doses associated with this scenario.

This report is interested in the collective doses, not the doses to particular individuals. As a result, the calculations are simplified because we are not concerned with individual variabilities. For example, for this scenario, we are interested in the collective dose to workers that transport the clearable material from the licensed facility to the LLW disposal facility. There is enormous individual variability in these doses based on the quantity and types of material shipped, mode of shipment, and distance to the disposal facility. However, by researching the types, quantities, and composition of the clearable material produced, the modes of transportation, and the distances to the LLW disposal facilities for a given licensee or category of licensee, it is possible to construct a reference scenario that represents the average set of conditions for this scenario for a given facility or category of facility and for a given category of material. With this information, a best estimate is derived, including uncertainty, of the normalized collective dose attributable to the shipment of the clearable material to an LLW facility, expressed in units of person rem per metric ton of clearable material representing a given facility or category of facility and a given category of material.



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Results of License Termination Rule Analysis

**Advisory Committee on Nuclear Waste
May 28, 2003**

***Robert L. Johnson and Chris McKenney
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Washington, DC 20555***



United States Nuclear Regulatory Commission

Outline

- Overview of LTR Analysis
 - Background
 - Evaluation Process
 - Summary of Issues and Recommendations
 - Recommended Actions and Schedule
 - Outcomes
- Restricted Release/Institutional Controls
- Realistic Scenarios



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Background – Commission Direction

- SRM-SECY-01-0194 - June 2002
 - Conduct an analysis of LTR implementation issues
 - Emphasis on resolving the restricted release and institutional control issues
 - Goal is to make the restricted release and alternate criteria provisions more available



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Background--Staff's Initial Analysis

- SECY-02-0177 - October 2002
 - Identified and described 8 LTR implementation issues
 - Identified plans for evaluations



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Background—Results of Staff's Analysis

- Results of staff's LTR analysis are given in SECY-03-0069, May 2, 2003
- Commission approved release of the Commission paper to the public
- Commission will consider staff's recommendations and provide direction



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Evaluation Process

- NMSS/OGC team evaluated 8 issues and developed plan for 1 new issue
- Restricted Release/institutional controls (Johnson)
- Relationship between LTR and other release limits
 - Unimportant quantities (Banovac)
 - Separate U/Th standards (Comfort)
 - On-site disposal (Pogue)
 - Controlling disposition of solid materials (Huffert)



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Evaluation Process (cont.)

- Realistic exposure scenarios (McKenney)
- Measures to prevent future legacy sites
 - Changes to financial assurance (Fredrichs)
 - Changes to licensee operations (Shepherd)
- Intentional mixing (new issue)(Widmeyer)
- Evaluated
 - Experience from NRC and others
 - Options
 - Matrix of potential applicability of issues to each decommissioning site



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Restricted Release/Institutional Controls

- Issue: Difficulties arranging institutional controls required for restricted release/alternate criteria
- Outcome: Make restricted release/alternate criteria provisions viable
- Recommendations:
 - Clarify risk-informed graded approach for institutional controls
 - New options for ongoing NRC involvement



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Unimportant Quantities

- Issue: Unclear relationship between LTR unrestricted release criteria and unimportant quantities (0.05 wt %) in 10 CFR40.13(a)
 - Exempt from regulation if source material less than 0.05wt%
 - Criterion for entry into regulation NOT criterion for license termination
- Desired Outcome: Describe appropriate relationship
- Recommendation: Clarify in a RIS that 10 CFR40.13(a) should not be used as a decommissioning criterion



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Separate U/Th Standards

- Issue: Appropriateness of developing a separate unrestricted release standard for uranium and thorium, higher than 10 CFR 20.1402.
 - 10 CFR Part 40 App.A “equivalency” criterion allows higher unrestricted release standard.
 - Meant for few isolated sites with small areas and small component of overall dose
 - Not applicable to LTR decommissioning sites
- Desired Outcome: Decide if developing a separate standard is appropriate
- Recommendation: Not appropriate
 - LTR provisions allow flexibility: 1402, 1403, 1404
 - Rulemaking not cost effective for few existing sites



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On-site Disposal

- Issue: 10 CFR 20.2002 does not establish a clear standard for approving on-site disposals; Agency discretion for case-by-case
- Desired Outcome: Clarify appropriate standard
- Recommendations: Clarify in a RIS to continue the current practice of using a "few millrem" for approving onsite disposals. Permit requests up to 100 mrem/yr along with additional financial assurance for eventual decommissioning



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Controlling Disposition of Solid Materials

- Issue: Unclear relationship between LTR's 25 mrem/yr for unrestricted release and existing guidance of a few mrem/yr for controlling disposition of solid materials. Potential removal of residual contamination from an unrestricted release site.
- Desired Outcome: Describe relationship
- Recommendations: Describe relationship
 - Different purpose, scope, and type of materials
 - ALARA, mixing would reduce dose from offsite use
 - LTR is protective if materials are removed after license termination
 - Analyze off-site use scenarios



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Realistic Exposure Scenarios

- Issue: Clear direction and guidance needed for selecting realistic exposure scenarios
- Desired Outcome: Implement dose assessment exposure scenarios that are realistic, risk-informed, and reflect a logical extension of existing and foreseeable site-specific conditions
- Recommendation: Clarify guidance that more realistic exposure scenarios can be justified by assuming reasonably foreseeable land use for 1,000 year analysis time period



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Changes to Financial Assurance Prevent Future Legacy Sites

- Issue: Financial risks could cause shortfalls in decommissioning funding
 - Underestimation of costs
 - Operations indicators of increasing costs
 - Accidental release increase costs
 - Inadequate financial disclosure
- Desired Outcome: Make regulatory changes so future sites will have adequate decommissioning funding
- Recommendations: Rulemaking/guidance to mitigate financial risks
 - Staff approval of Decommissioning Funding Plan
 - Re-evaluate cost estimate and fund amount when indicators occur
 - Property damage insurance
 - Certification of financial statements



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Changes to Licensee Operations Prevent Future Legacy Sites

- Issue: Licensee Operational risks could cause decommissioning problems
 - Chronic releases to subsurface over time
 - Late identification of contamination and extent
 - Existing regulations/guidance are not specific
- Desired Outcome: Make changes to minimize contamination
- Recommendations: Rulemaking/guidance to mitigate high operational risks
 - Existing licensees should minimize contamination through procedural changes
 - Focus licensee monitoring/reporting on high risk of subsurface contamination
 - Focus staff inspections on high risk sites and operations



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Intentional Mixing

- Issue: Appropriateness of allowing intentional mixing of contaminated soil to meet release criteria
 - Generally not permitted by staff
 - Potential financial and exposure reduction advantage under certain limited circumstances
- Desired Outcome: Determine appropriateness and recommend action
- Planned Evaluations:
 - NRC policy and experience
 - Policy and experience of others (EPA, DOE, Corps)
 - International



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Recommended Actions and Schedules

- Commission paper on mixing: 9/03
- Regulatory Issue Summary (RIS): 3/04
- Rulemaking/guidance for preventing future legacy sites: 9/06 proposed, 9/07 final
- Revised guidance for other issues: 9/06
- Revised inspection/enforcement guidance: 9/05



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Outcomes

- Existing decommissioning sites (complex, long-lived radionuclides, financial difficulties)
 - Facilitate decommissioning
 - More economical decommissioning with use of realistic scenarios
 - Restricted release/alternate criteria provisions more available with new options and clarification of graded approach to institutional controls
 - Clarify/answer questions about relationship of LTR to other NRC regulations
 - Matrix of potential applicability of issues and each decommissioning site (Attachment 11)



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Outcomes (cont.)

- Future decommissioning sites
 - Reduce the potential for future legacy sites
 - Reduce the need for using restricted release/alternate criteria provisions
 - Contributes to Commission preference for unrestricted release and greatest opportunity for productive reuse



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Restricted Release/Institutional Controls

- Issue: Difficulties arranging institutional controls required for restricted release/alternate criteria
 - Governments/Tribes unwilling to accept ownership of private sites due to liability concerns
 - Lack of independent third party and long-term continuity
 - Long-term effectiveness of institutional controls
 - Unclear flexibility of existing LTR risk-informed, graded approach to institutional controls



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Restricted Release/Institutional Controls

- Evaluations
 - EPA, DOE, Agreement States, NAS, ASTM, ECOS LTS Subcommittee
 - Other NRC regulations: Part 40 App. A, Part 61, Part 63, West Valley Policy Statement
 - Existing decommissioning sites
 - 3 sites with long-lived radionuclides
 - Ongoing interactions under staff's phased approach to Decommissioning Plan development



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Restricted Release/Institutional Controls

- Key insights
 - Recognize potential for failure of institutional controls, particularly over long term
 - Appropriately selecting, implementing, monitoring, and enforcing will help minimize or mitigate potential failure
 - Some cases may need ongoing Federal role
 - Flexibility is needed to tailor institutional controls that address site-specific characteristics



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Restricted Release/Institutional Controls

- Recommendation: Clarify the LTR risk-informed, graded approach for restricting use
 - Risk framework (see Table 1, Attachment 1)
 - Based on 10 CFR 20.1403, Statement of Considerations, and guidance in NUREG-1757, but not specifically described
 - Hazard level (dose without institutional controls)
 - Likelihood of hazard occurrence (hazard duration)
 - Lower risk: < 100 mrem/yr OR short term
 - Higher risk: > 100 mrem/yr OR long term
 - Grades (see Table 1, Attachment 1 for examples)
 - Two general grades
 - Lower risk: legally enforceable (e.g., deed restrictions)
 - Higher risk: legally enforceable and durable (e.g., government ownership or control)
 - Specific grades: flexibility to balance site-specific factors

TABLE 1. NRC'S RISK-INFORMED GRADED APPROACH FOR INSTITUTIONAL CONTROLS TO RESTRICT SITE USE

Lower Risk Lower Hazard Level (25-100 mrem/year) Shorter Hazard Duration-- Lower Likelihood Shorter Half-Life (less than 100 years)	Higher Risk Higher Hazard Level (100-500 mrem/year) Longer Hazard Duration-- Higher Likelihood Longer Half-Life (greater than 100 years)¹
<u>General Grade</u> Legally enforceable institutional controls <u>Specific Grade</u> Tailor specific type of institutional controls and land use restrictions to site-specific circumstances <u>Examples</u> Single conventional "deed restriction" such as a restrictive covenant (less control) Layered/redundant controls such as restrictive covenant, deed notice, and State registry (more control)	<u>General Grade</u> Durable and legally enforceable institutional controls <u>Specific Grade</u> Tailor specific type of institutional controls and land use restrictions to site-specific circumstances <u>Examples</u> Layered/redundant controls that includes a State government control (less durable) Conventional institutional control with NRC monitoring and enforcement after license termination using legal agreement (less durable) Conventional institutional control with NRC monitoring and enforcement after license termination using regulatory authority under 10 CFR 20. 1401(c) (more durable) State or Federal government ownership and control (NWSA 151(b)) (most durable)

¹ It may be appropriate to treat sites with longer half-live contamination but doses close to 25 mrem/yr as "Lower Risk" sites.



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Restricted Release/Institutional Controls

- Recommendation: New options involving NRC
- NRC monitoring and enforcing after license termination
 - Under regulation (10 CFR 20.1401(c)) if there is a potential for significant safety threat
 - Under legal agreement and institutional control that includes written NRC authority



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Restricted Release/Institutional Controls

- New option of NRC possession-only specific license after completing remediation
 - All 10 CFR 20.1403 requirements must be met
 - Possession-only license conditions act as the legally enforceable and durable institutional control similar to EPA permits or orders and Ohio's decommissioning possession-only license
 - License conditions would address land use restriction, maintenance, monitoring, reporting
 - Flexibility tailored to site-specific factors



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Restricted Release/Institutional Controls

- Continue to monitor and participate with cooperative, interagency activities to share information and develop solutions (ECOS LTS Subcommittee, DOE LTS Roadmap)
- Implement approved recommendations using revised guidance and describe in a RIS



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Restricted Release/Institutional Controls

- Outcomes
 - Provide more effective restrictions that will protect public health and safety over long term
 - Make LTR restricted release and alternate criteria provisions more available
 - More consistent with EPA, NAS, ASTM
 - Should increase public confidence in restricted release



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Realistic Scenarios

- Issue: Clear direction and guidance are needed for selecting realistic exposure scenarios for both unrestricted release and restricted release without institutional controls
- Common perception: LTR requires licensees use residential-farmer scenario



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Realistic Scenarios

- Evaluation
 - Existing guidance
 - Flexible, but tone discourages alternate scenarios
 - Analysis of viable scenarios for 1,000 years
 - Staff and licensee experience
 - Licensee –initiated/justified scenarios
 - Staff's lack of "corporate" knowledge
 - Lack of well developed examples of alternate scenarios
 - Case studies
 - EPA's CERCLA approach



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Realistic Scenarios

- Options evaluated
 - Continue current approach with additional emphasis on current flexibility
 - Allow scenarios based on reasonably foreseeable land uses (next few decades to possibly 100 years)
- Recommendation: use reasonably foreseeable land uses



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Realistic Scenarios

- Reasonably foreseeable land uses
 - Consistent with LTR's Statement of Considerations about institutional controls
 - Similar to EPA's CERCLA approach
 - Primary justification remains physical features of the site, radionuclide half-life, and time of peak exposure
 - Considers less likely alternates to reasonably foreseeable land uses for robustness/risk-informed analysis



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Realistic Scenarios

- Outcomes
 - More economical decommissioning, while maintaining safety
 - Few restricted release sites