

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Title: BRIEFING ON STATUS OF DRY CASK STORAGE
ISSUES - PUBLIC MEETING

Location: Rockville, Maryland

Date: Thursday, May 30, 1996

Pages: 1 - 63

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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BRIEFING ON STATUS OF DRY CASK STORAGE ISSUES

- - -

PUBLIC MEETING

Nuclear Regulatory Commission
One White Flint North
Rockville, Maryland

Thursday, May 30, 1996

The Commission met in open session, pursuant to notice, at 2:03 p.m., Shirley A. Jackson, Chairman, presiding.

COMMISSIONERS PRESENT:

- SHIRLEY A. JACKSON, Chairman of the Commission
- KENNETH C. ROGERS, Commissioner
- GRETA J. DICUS, Commissioner

1 STAFF SEATED AT THE COMMISSION TABLE:

2 JOHN C. HOYLE, Secretary of the Commission

3 KAREN D. CYR, General Counsel

4 PRESENTERS:

5 JAMES TAYLOR, EDO

6 CARL PAPERIELLO, Director, NMSS

7 WILLIAM TRAVERS, Director, Spent Fuel

8 Project Office, NMSS

9 CHARLES HAUGHNEY, Deputy Director, Spent

10 Fuel Project Office, NMSS

11 WILLIAM RUSSELL, Director, NRR

12 ANDREW KUGLER, Lead Project Manager,

13 Dry Cask Storage, NRR

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P R O C E E D I N G S

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CHAIRMAN JACKSON: Good afternoon, ladies and gentlemen. I am pleased to welcome members of the staff to brief the Commission on the status of dry cask storage issues.

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In the year since the establishment of the Spent Fuel Project Office much has been asked of you. Some recent accomplishments include the publication of a draft standard review plan and the recent workshop on spent fuel storage issues. Nine nuclear power plants have authority for onsite storage of spent fuel under either a specific or general license. I understand that many other licensees are actively pursuing dry cask storage.

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Today's briefing is a status report of the general accomplishments to date and the current status of planned activities. However, for the benefit of those in the audience today, I would first like to ask you to provide a brief summary of the events that occurred at the Point Beach Nuclear Power Plant over the past few days. The Commission has, of course, been watching this situation very carefully and would appreciate any updates that you may have at this time.

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I understand that viewgraphs are available at the entrances to the room.

25

Commissioner Rogers, Commissioner Dicus, do you

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1 have any comments to add?

2 COMMISSIONER ROGERS: Nothing, thank you.

3 COMMISSIONER DICUS: No, thank you.

4 CHAIRMAN JACKSON: You may proceed, Mr. Taylor.

5 MR. TAYLOR: Good afternoon. With me at the table
6 are Carl Paperiello, Bill Travers and Charlie Haughney from
7 the Office of NMSS, and Bill Russell and Andrew Kugler from
8 the Office of Nuclear Reactor Regulation.

9 As you mentioned, Chairman, this is a status
10 briefing. We will cover the activities of the Spent Fuel
11 Project Office, how NMSS and NRR are working together on the
12 dry cask storage licensing and inspection activities at the
13 various locations, and the development and issuance of
14 agency guidance in the area of dry cask storage and
15 transportation.

16 In addition, Chairman, you touched on the event
17 with the cask at Point Beach. That will be covered, and
18 Carl Paperiello will begin with that subject.

19 Carl.

20 DR. PAPERIELLO: Thank you. I will talk about the
21 Point Beach event and then give it to Bill Travers for the
22 plan presentation.

23 On May 28 of this year, about 2:24 in the morning
24 central time, the Point Beach plant initiated welding of the
25 shield lid on a VSC-24 cask. Apparently a small pocket of

1 combustible gas ignited, raising the shield lid slightly to
2 a cocked position. The licensee had completed loading of
3 the cask in the spent fuel pool during the morning of the
4 previous day, May 27, and had installed the shield lid that
5 afternoon.

6 The licensee transferred the cask from the spent
7 fuel pool to the decontamination area at 4:10 p.m., about 11
8 hours before the event.

9 The transferred cask, in addition to spent fuel,
10 was filled with pool water. About 30 gallons of water were
11 removed from the cask vent prior to welding, creating a
12 small pocket of air below the lid and the level of the weld.

13 Yesterday, May 29, early in the morning the shield
14 lid was restored to a level position, and last night the
15 cask was returned to the spent fuel pool. During these
16 operations the cask was purged with nitrogen to eliminate
17 the possibility of combustible gas.

18 Hydrogen gas at concentrations high enough to
19 support combustion was detected in the atmosphere at the
20 cask vent. Dissolved hydrogen was measured in the cask
21 water at far higher concentrations than in the spent fuel
22 pool. Currently, we believe hydrogen was the combustible
23 gas.

24 Other than the displacement of a small amount of
25 spent fuel water from the cask, there were no radiological

1 releases detected. In particular, no noble gas which might
2 be associated with a leaking fuel pin was detected, although
3 monitoring was conducted. Radiation levels at the cask did
4 not appear to change.

5 Currently, as of noon today 23 or 24 fuel bundles
6 have been off-loaded from the cask and no damage observed.

7 There appears to be a white foam deposit on the
8 lid from the burn.

9 After receiving the report of this event on May
10 28, the NRC initiated monitoring of the licensee's response
11 to the event both onsite and in the NRC operations center.
12 We have initiated an augmented inspection team which is
13 currently at the site.

14 As an additional support to the team, I am sending
15 inspectors to the vendor's office.

16 The NRC has notified current and near-term users
17 of dry cask storage of the event.

18 The team's two basic functions are to determine
19 the cause of the event, that is, the origin of the
20 combustible gas, and the consequences of the event.

21 Currently two potential sources of hydrogen gas
22 have been identified, although I do not want to prematurely
23 restrict the search. These potential sources include
24 radiolysis of the water in the cask and/or a chemical
25 reaction between the spent fuel pool water, which routinely

1 contains boric acid at PWRs, and zinc in a protective
2 coating on the basket in the cask. The white foam material
3 under atomic absorption analysis shows the presence of boron
4 and zinc. Samples have been sent off site for further
5 analysis by mass spectroscopy.

6 That is basically what we know coming into this
7 meeting about the event.

8 CHAIRMAN JACKSON: What implications does this
9 have for licensees who are planning to load such casks in
10 the near term?

11 DR. PAPERIELLO: What we need to do is pay
12 attention to whether or not there could be hydrogen build up
13 and be prepared to detect it. It is going to make a big
14 difference on whether or not it was radiolysis, which is
15 going to cut across all casks and be much harder to prevent,
16 or whether or not it was a chemical reaction between this
17 particular coating and the boric acid. This particular
18 coating is only used on this model of cask, and I'm sure we
19 can use different types of coatings that wouldn't have this
20 property.

21 CHAIRMAN JACKSON: Are you planning to issue any
22 requests or see a need to do so at this point relative to
23 holding up the loading of any casks, and secondly, do you
24 see a need to issue any interim guidance to those who may be
25 planning to load casks?

1 DR. PAPERIELLO: We are doing that orally right
2 now by phone. Having checked around, there is nobody that
3 is going to load a cask in the near future. If somebody was
4 going to load a cask, what we would do is take a look and
5 see how this event could bear on that particular action. It
6 would depend upon the type of cask that was being loaded and
7 the coatings involved.

8 CHAIRMAN JACKSON: Commissioner Rogers, any
9 questions?

10 COMMISSIONER ROGERS: No question.

11 CHAIRMAN JACKSON: Commissioner Dicus.

12 COMMISSIONER DICUS: No.

13 DR. PAPERIELLO: Bill.

14 MR. TRAVERS: Thank you. I would like to begin
15 with the plan presentation. For my part of that
16 presentation I would like to cover a few things.

17 Number one, some aspects of the background of why
18 dry storage came to be needed in the nuclear power industry.

19 I would like to follow with a description of NRC
20 regulatory programs, including a description of our
21 licensing process and some of the key technical criteria
22 that are used in our evaluations.

23 I would like to follow that with the status of the
24 current projects or anticipated projects that we have under
25 review.

1 Lastly, I would like to discuss some assessment of
2 industry performance to date and touch on some of the dry
3 cask storage issues that have been identified based on
4 experience.

5 Following my presentation Andy Kugler from NRR is
6 going to be describing some dry cask issues that are
7 particularly relevant to in-plant activities. After Andy,
8 Charlie Haughney, my deputy, is going to be discussing a
9 number of initiatives that the staff has underway to further
10 develop our guidance and aspects of our regulatory program,
11 including inspection procedures.

12 I would like to skip to slide number three.

13 [Slide.]

14 MR. TRAVERS: The first issue I would like to
15 address this afternoon is one that has to an extent caused
16 some confusion. We, NRR and NMSS, have been asked by a
17 number of organizations if we could clarify our respective
18 roles relative to dry cask storage. It is particularly
19 relevant since all of the dry cask storage projects today
20 are ones which are located on power reactor sites.

21 Fundamentally and as a practical matter, there is
22 quite a lot of coordination between NRR and NMSS on these
23 activities, and that includes the regional implementation of
24 our programs.

25 NRR, for example, has designated the lead project

1 manager. Andy Kugler is that lead project manager. It has
2 also designated a lead SES manager to interact with us on
3 these issues.

4 To increase our efficiency and how we go about
5 doing our job, we have agreed on certain lead activities
6 that would be designated to either NMSS or NRR, and I would
7 like to review just for a moment how we separate or divvy up
8 the pie on those lead activities.

9 NMSS, for example, reviews and certifies storage
10 and transportation cask systems. We issue Part 72 licenses
11 for independent spent fuel storage installation. We
12 maintain an inspection plan and support the regional
13 inspections of ISFSIs on power reactor sites.

14 The regional role is an important one and we are
15 very often, together with NRR, supportive of inspections
16 that are carried out on Part 50 sites.

17 NMSS maintains and implements the inspection
18 program for cask vendors and fabricators. Out of the Spent
19 Fuel Project Office we have a section of inspection experts
20 who are fundamentally focused on metal fabrication and
21 vendors.

22 We develop and maintain NRC guidance on
23 independent spent fuel storage installations.

24 If I could have the next slide, please.

25 [Slide.]

1 MR. TRAVERS: NRR in its lead role for Part 50
2 installations maintains the project management inspection
3 program for power reactors. They are responsible
4 principally for reviewing 50.59 evaluations, which evaluate
5 the potential impact of independent spent fuel storage
6 installation activities on the power plant itself.

7 NRR also supports regional inspections that are
8 conducted relative to independent spent fuel storage
9 activities jointly with NMSS.

10 NRR has retained the lead. We think this is an
11 important aspect to ensure consistency in our public
12 interaction. NRR maintains primary contact with both the
13 media and the public for issues related to on-reactor site
14 storage of dry spent fuel storage.

15 If we were dealing ultimately with an ISFSI that
16 was not located on a power reactor site, NMSS would have the
17 lead for essentially all of these activities.

18 CHAIRMAN JACKSON: Before you move ahead, I do
19 have a question. How are the responsibilities divided in
20 terms of who develops or oversees the procedures relative to
21 the loading and unloading of the casks?

22 MR. TRAVERS: Are you referring to our inspection
23 program procedures? Let me see if I can address at least
24 those and move on if you have a further question.

25 We have taken the lead, NMSS Spent Fuel Project

1 Office, for developing a set of procedures that speaks to
2 inspection activities that range from the design through the
3 actual operation of an ISFSI at the power reactor site.
4 However, while we have the lead, it has been well
5 coordinated with NRR and the regions. We have had a lot of
6 comment on the draft procedures that were developed and
7 finalized, and we have incorporated those with a lot of
8 input from the inspectors who are out in the field as well
9 as NRR interaction.

10 CHAIRMAN JACKSON: Where do those inspectors come
11 from? Do they come from your shop?

12 MR. TRAVERS: Yes and no. They come from my shop,
13 because we, as I mentioned, have a dedicated section of
14 inspectors, but many of the inspectors who carry out day to
15 day or week to month inspection activities at ISFSI sites
16 come from the regions; they are region-based inspectors.

17 CHAIRMAN JACKSON: Are they the ones who observe
18 the loading and unloading of the casks?

19 MR. TRAVERS: Yes. Typically we will be looking,
20 at least in part, at preoperational activities to begin
21 with. As an example, the team was recently sent to Arkansas
22 Nuclear One, which we expect will be the next utility to
23 implement a dry cask storage. The team consisted of
24 regional inspectors. I believe it was led by a region-based
25 inspector. It included NMSS personnel as well as NRR

1 personnel.

2 CHAIRMAN JACKSON: Is it part of an inspection
3 module for an inspector on some regularized basis to observe
4 not preoperational but actual fuel transfer from the pool to
5 the cask?

6 MR. TRAVERS: That is part of our inspection
7 program procedures that give guidance to inspectors who not
8 only for pre-op but periodically during operations will go
9 out and observe the activities associated with continuing
10 the loading of these.

11 CHAIRMAN JACKSON: For lack of better terminology,
12 are these Part 50 inspectors or Part 72 inspectors?

13 MR. TRAVERS: They have to be both, in a sense.

14 CHAIRMAN JACKSON: That's what I'm trying to
15 understand, how the responsibilities are divvied up, how it
16 is decided who does what.

17 MR. RUSSELL: If it's a Part 50 reactor licensee
18 conducting the activities of a general licensee under Part
19 72, then it is part of the reactor program oversight of
20 activities that are being conducted under the general
21 license.

22 CHAIRMAN JACKSON: So they would be NRR
23 inspectors.

24 MR. RUSSELL: They would be in the reactor program
25 which is funded and carried out in the regions.

1 The earlier question related to procedures and
2 content of procedures and how that is done. NMSS in the
3 original review and approval of the casks looks at the
4 procedures generically, and there are functional guidelines
5 that are contained in the standard review plan for those
6 procedures.

7 Taking those from the generic procedure to the
8 plant specific to interface with the weight handling systems
9 in the facility, the particulars of a facility, other
10 commitments that they may have with respect to control of
11 heavy loads over safety-related equipment, et cetera, those
12 are plant specific. That is done through the inspection
13 activities because it is a general licensee. Then what we
14 do is make sure that those activities are being conducted
15 consistent with the licensing basis for that facility, where
16 the crane is single failure proof, et cetera. That is the
17 plant specific part, and NRR has responsibility for that.

18 In addition to the standard review plan we have
19 issued draft inspection guidance that covers the scope of
20 the inspection activities to be conducted for loading,
21 off-loading, preoperational. That was also made publicly
22 available at the time of the workshop.

23 CHAIRMAN JACKSON: Thank you.

24 MR. TRAVERS: Can I go to slide five, please.

25 [Slide.]

1 MR. TRAVERS: As background for continuing the
2 description of our regulatory program, I put together two
3 slides that have a chronology that speaks somewhat to how we
4 got to the point to where nuclear power plants need
5 something other than the pools.

6 In 1977 the Administration deferred reprocessing
7 as an option. Since nuclear power plant designs assumed
8 reprocessing and government-sponsored disposal, the pools
9 that are part of the Part 50 design typically are not sized
10 for full life storage of the spent fuel that would be
11 removed during operations.

12 For its part, in 1980 the NRC issued 10 CFR Part
13 72. That regulation anticipated both wet, away from reactor
14 storage as well as dry cask storage. The regulations, which
15 are performance based, speak both to the possibility of cool
16 storage off of reactor site or separate from the normal
17 spent fuel pool and dry cask storage as well.

18 In 1982 the Nuclear Waste Police Act mandated both
19 NRC and DOE several activities relative to dry cask storage.
20 For NRC the Act mandated that we develop streamlined
21 licensing procedures. Up until that point the site-specific
22 licensing option was the only one available under Part 72.

23 The same Act mandated that the Department of
24 Energy carry out demonstrations of dry cask storage, and
25 they did that.

1 [Slide.]

2 MR. TRAVERS: The first independent spent fuel
3 storage installation licenses were granted to Surry and
4 Robinson for dry cask in 1986. These were done with support
5 from the Department of Energy.

6 I should point out that in 1982, ironically
7 enough, the first Part 72 license was issued to GE Morris,
8 which is a wet storage facility in Illinois.

9 In 1990, in response to the Nuclear Waste Policy
10 Act, the NRC added the general license provisions to Part
11 72. I'm going to be speaking in some considerable detail
12 about just how that works in a few moments.

13 In 1993 Palisades became the first utility to
14 implement the provisions of the general license and store
15 fuel dry under those provisions. I know Chairman Jackson
16 has visited that site. They use the VSC-24 system, the same
17 one that Point Beach uses.

18 In 1996, I just wanted to point out that we, based
19 on experience to date, are considering a number of changes
20 to Part 72. As an example, we are thinking of clarifying
21 requirements so that they are specific as to whether they
22 are applicable to wet or dry storage or both. We have had
23 some concern, and I think it is warranted, that the
24 requirements today are a little cloudy in that regard.

25 We are thinking of clarifying requirements that

1 specify whether or not requirements are applicable to either
2 the general or the site-specific provisions. These are
3 typically administrative provisions rather than technical
4 ones.

5 We are looking at changes which would eliminate or
6 modify requirements that up until today have required us to
7 issue exemptions.

8 We are also looking at changes in response to a
9 petition we received from Portland General Electric on a
10 request that Part 72 regulations be expanded to allow for
11 storage of greater than class C waste. Currently that is
12 not provided for in the regulation.

13 Next slide, please.

14 [Slide.]

15 MR. TRAVERS: Next I would like to describe the
16 licensing processes that are available for licensing dry
17 storage. As has already been mentioned, there are two,
18 site-specific and general license.

19 Under the site-specific provisions, this is an
20 option today for Part 50 licensees. However, site-specific
21 provisions of Part 72 are required for any project which is
22 considering dry storage off the reactor site.

23 Although there are significant administrative
24 differences in how you go about implementing either the
25 site-specific or general license, the technical

1 considerations and the technical requirements that you have
2 to meet are essentially the same.

3 Next slide, please.

4 [Slide.]

5 MR. TRAVERS: Under site-specific licensing an
6 application is submitted to NRC, and the application
7 typically consists of both the safety analysis report and an
8 environmental report.

9 An opportunity for hearing is offered. NRC
10 oversight encompasses both the review of the application
11 received, preparation by NRC of a safety evaluation report,
12 and either an environmental assessment or an environmental
13 impact statement.

14 In addition, our normal inspection program acts to
15 ensure compliance with the licensing basis.

16 I should note that for the six site-specific
17 licensees to date we have not had a hearing develop.
18 Largely, where there has been some initial interest in
19 having a hearing, that has been mitigated by agreements that
20 the staff has made to provide information in a timely way to
21 principally states who were interested in the issue. So as
22 of now we have yet to have our first full adjudicative
23 hearing on dry cask storage.

24 Next slide, please.

25 [Slide.]

1 MR. TRAVERS: Again, in response to the mandate of
2 the Nuclear Waste Policy Act, the general license provisions
3 of part 72 were established. They significantly streamline
4 the administrative requirements for receiving a license.

5 Actually, the way to think of it is all Part 50
6 licensees by virtue of the change in the regulations were
7 afforded a general license at the time Part 72 general
8 license provisions were put into place. You have to be a
9 power reactor licensee to make use of the provisions of the
10 general license under Part 72.

11 The most significant difference that exists in
12 that streamlined process that was mandated by the Act is the
13 fact that there is no application required to be submitted
14 for our review; there is license review; there is no SER;
15 there is no EIS or EA prepared; there is no opportunity for
16 hearing afforded. However, the requirements under the
17 general license provision require the use of NRC certified
18 casks. These storage system casks are certified by a
19 rulemaking, which of course is a public process.

20 The general license really relies to a great
21 extent on all of the considerations that were completed in
22 connection with licensing Part 50 siting. Many of the
23 programs for security and EP, and so on, were relied upon in
24 our rulemaking to establish the general license approach.

25 Our NRC role, then, rather than having a direct

1 application review component, is exclusively one of
2 inspection. We have an opportunity to go out in the field
3 and inspect how general licensees are implementing their
4 programs and to ensure that they are in fact in compliance
5 with the requirements of Part 72.

6 It is important to point out that while no
7 application is required, utilities who implement provisions
8 of the general license must evaluate and document their
9 compliance with the technical requirements of Part 72. So
10 our inspection program can go out and review just how the
11 utility is implementing the general license and just how
12 they are complying with the Part 72 requirements.

13 COMMISSIONER ROGERS: You have an inspection
14 manual prepared for that purpose?

15 MR. TRAVERS: We have inspection procedures, yes.
16 We are developing an umbrella inspection manual that will
17 act as the guidelines for those procedures, but we thought
18 it most important to get those procedures out to the
19 regional personnel as quickly as we could. We still have an
20 action to complete the overall inspection manual that guides
21 those procedures.

22 MR. RUSSELL: Some of the Part 50 licensee
23 activities that are related to the cask, including the
24 foundation the pad is placed on, the seismic adequacy of
25 that, et cetera, is also addressed in the inspection

1 guidance to be used in our review of the changes to the
2 facility that are made under 50.59 to ensure that they are
3 done consistently with the design basis for the site. For
4 example, a site hazard and how you characterize the soils
5 and what you do for the seismic input to the pad to make
6 sure, as we had in the Palisades case where it was near
7 slopes, that the slopes were considered so that you would
8 not have the potential for the slopes failing and burying
9 the casks, for example.

10 MR. TRAVERS: That's right. There are really two
11 important components of the evaluation and documentation
12 that these utilities have to do, and one has to do with
13 their compliance with Part 72. The other, as Bill pointed
14 out, has to do with their compliance with their Part 50
15 license.

16 CHAIRMAN JACKSON: I was going to wait and ask
17 relative to your discussion about the safety review later
18 on, but does this then actually apply to spent fuel
19 movements? Are there technical requirements in Part 72 or
20 others that relate to those movements from the pool to the
21 cask?

22 MR. TRAVERS: There are performance requirements
23 that relate to the design and what the design needs to be
24 subject to in terms of the potential for accidents.

25 MR. RUSSELL: The specifics in the reactor for

1 fuel handling is a part of the Part 50 license, and fuel
2 handling accidents are evaluated in the evaluation of
3 dropping a fuel bundle and the consequences of that and the
4 radiological aspects, the ventilation systems associated
5 with the fuel handling area, et cetera, which was one of the
6 advantages of tying this to Part 50. Where those activities
7 had already been done under the Part 50 license you didn't
8 need to repeat them for the review. That was done through
9 the generic rulemaking.

10 We need to make sure that they stay consistent
11 with that licensing basis, that the ventilation systems are
12 operable, that they are in fact consistent with their tech
13 specs, because there are often technical specifications as
14 well associated with load pads, heavy loads that they are
15 handled, et cetera. That's how we got into the issue with
16 the bulletin on Oyster Creek.

17 CHAIRMAN JACKSON: Those requirements are
18 sufficiently broad that they do cover what would be required
19 to load the casks?

20 MR. RUSSELL: That's correct. That is the plant
21 specific aspects for handling the fuel to get it into the
22 cask. Generally the loading and unloading as relates to the
23 cask, the baskets, the shims, putting the lid on, the
24 sampling, the functional requirements are done during a Part
25 72 review of the cask system. The procedures for physically

1 grappling the bundle, moving it with the handling equipment
2 in the fuel building has been done in the past, and those
3 licensing basis requirements are in existence today.

4 We have augmented the inspection guidance,
5 particularly as it relates to 50.59 type reviews, because
6 there will be some changes to the facility that are
7 required. That is, the location of the pad, et cetera.
8 Those kinds of things have to be done under 50.59.

9 They have also got to look at the procedures to
10 interface the specific procedures associated with the cask
11 once the fuel is in the cask and the cask handling with the
12 facility requirements for handling heavy loads, handling
13 fuel, who is supervising the handling of fuel, et cetera.

14 CHAIRMAN JACKSON: I guess this question goes back
15 to the other Bill. Where are the requirements codified
16 having to do with the loading of the cask, sealing it,
17 evacuating it, et cetera? That's what I'm interested in.

18 MR. TRAVERS: There is a requirement in Part 72
19 that general descriptions of procedures be included in an
20 application, or if you are a general licensee, you have to
21 develop them on your own. You don't have to submit them
22 necessarily, but we in our inspection program can go out and
23 ensure that that has in fact been done.

24 CHAIRMAN JACKSON: Thank you.

25 MR. TRAVERS: Next slide, please.

1 [Slide.]

2 MR. TRAVERS: The next is very colorful, at least
3 on the screen. It gives an indication of the existing sites
4 that are currently using dry cask storage systems. As the
5 Chairman pointed out earlier, there are nine of those.
6 Three of the most recent facilities to begin dry cask
7 storage activities are doing so under the general license,
8 and those are Point Beach, Palisades and Davis Besse.

9 CHAIRMAN JACKSON: From your understanding, what
10 drives a licensee to pick the site specific versus the
11 general route?

12 MR. TRAVERS: I think there are a number of
13 factors. Let me see if I can give you my own thinking on
14 it.

15 CHAIRMAN JACKSON: I'm not going to ask you to
16 read their mind, but what are the relative advantages or
17 disadvantages or vulnerabilities or non-vulnerabilities for
18 a licensee?

19 MR. TRAVERS: One obvious advantage to the general
20 license process is that an application isn't needed to be
21 submitted. There is no opportunity for hearing. A
22 disadvantage, however, is if you're a plant -- let me give
23 you an example -- like Trojan or Rancho Seco, and you are
24 considering coming in and implementing dry cask storage
25 activities, your interest is in decommissioning and perhaps

1 getting rid of your Part 50 license and out from under a
2 number of the requirements associated with retaining a Part
3 50 license.

4 If you do that and you have implemented dry
5 storage under the general license provisions, you no longer
6 hold a Part 50 license and are no longer, I believe, legally
7 able to do so and continue that. So what you would need to
8 do at that point is convert your license, and that would
9 require the application submittal, the potential for
10 hearing, and so on and so forth. I think that is the most
11 obvious.

12 DR. PAPERIELLO: I think there may be a slight
13 advantage up to now. There are more casks you could use,
14 and as there are more and more dry casks certified for use
15 under the general license, that might also be a
16 consideration.

17 [Slide.]

18 MR. TRAVERS: The next slide follows through on
19 the last one by giving you an indication of projects that we
20 understand are potential near-term dry cask storage
21 activities. There are number of those. I will point out a
22 couple that are significant. Arkansas Nuclear One is the
23 one we expect under the general license provisions will
24 implement dry storage next. That could occur as early as
25 next month.

1 There are two projects on this map, the TMI-2 fuel
2 at INEL and the Prairie Island off site, which may become
3 the first application that we will receive for off-reactor
4 site dry cask storage.

5 CHAIRMAN JACKSON: Is Arkansas Nuclear One
6 planning to use the VSC-24?

7 MR. TRAVERS: They are, yes.

8 CHAIRMAN JACKSON: But you've been in contact with
9 them relative to Point Beach?

10 MR. TRAVERS: We have.

11 The DOE is sponsoring the INEL TMI-2 fuel. We
12 have had preliminary meetings with them. Their current plan
13 is to get an application in in the summer or fall of this
14 year.

15 The same data or thereabouts applies to the
16 Prairie Island off-site project. That project is driven by
17 a requirement of state law that really necessitates the
18 utility driving forward to identifying and licensing an
19 off-reactor site if they are to continue to make use of
20 their current dry cask storage facility, at least expanding
21 it.

22 Next slide, please.

23 [Slide.]

24 MR. TRAVERS: The growing need for dry storage can
25 be illustrated by an estimate of the projected loss of full

1 core reserve. That is basically what this slide shows.
2 Although core reserve or full core reserve is not a
3 requirement, it is very much on the minds of the utilities
4 who need to plan for the possibility of operation and
5 maintenance and the need to have a full core reserve.

6 Based on the projections that have been made for
7 the pools, another 50 pools or so may reach their capacity
8 at least in terms of full core reserve in the next ten years
9 or so. You can see by where we are on that slope it is a
10 rapidly increasing potential for dry cask storage projects.
11 My statements assume that there is no central storage
12 facility proffered by the Department of Energy or that
13 something else becomes available.

14 COMMISSIONER ROGERS: I'm a little puzzled here
15 about what you mean by reserve. Isn't it a requirement that
16 all operating reactors have to be able to do a full core
17 off-load?

18 MR. RUSSELL: No, it's not a binding requirement
19 in that context. We have expected that they could do that
20 in order to perform inspections, but there may be a
21 situation where they don't have a full core off-load
22 capability. If a requirement to perform an inspection
23 occurred or something else, they may have to shut down.

24 In most cases facilities have maintained a full
25 core off-load capability. There have been periods of time

1 when they have been expanding pools or others that maybe for
2 a short period of time they did not have that, but generally
3 the practice has been to have the capability to off-load the
4 core to be able to perform inspections, but that is not an
5 NRC requirement.

6 COMMISSIONER ROGERS: I see. I was under the
7 impression that if there was some kind of a safety issue
8 that required a full core off-load that it could be done.

9 CHAIRMAN JACKSON: Even if there were an
10 emergency, we don't have a requirement that they be able to
11 do that?

12 MR. RUSSELL: Our requirements are to ensure the
13 capability to cool the fuel and maintain it long term in the
14 vessel. If they had a requirement to perform an inspection
15 and they were not able to perform that inspection, they
16 would either have to get relief or shut down and not operate
17 until such time as they could perform the inspections.

18 MR. TRAVERS: At this point we are going to try
19 something a little different. We have prepared about a
20 three minute video to give some perspective on dry cask
21 storage. It happens to be the very plant that you visited,
22 Chairman Jackson. Palisades prepared it.

23 CHAIRMAN JACKSON: I'm not in it, right?

24 [Laughter.]

25 MR. TRAVERS: Consumers Power provided it to us at

1 our recent workshop. We thought it might provide the
2 Commission perspective on the transfer of this material
3 loading, and so forth. I understand it takes about six
4 seconds for us to get it cued up.

5 [Video shown.]

6 NARRATOR: Casks were constructed on site at
7 Palisades. The casks consist of two large containers, one
8 placed inside the other. The inner container, or the
9 multi-assembly sealed basket, can accommodate 24 spent fuel
10 assemblies. They are designed to last more than 50 years in
11 a harsh coastal marine environment.

12 The basket is placed in a transfer cask and
13 lowered into the spent fuel pool. The spent fuel assemblies
14 are then placed in the basket. At this point the first of
15 two lids that will cover the assemblies is placed on the
16 basket. This shield lid is made up of seven inches of steel
17 encased concrete.

18 The basket is moved to a special area where it is
19 decontaminated and vacuum dried. Here the shield lid is
20 welded in place. The second lid, a thick steel disk, is
21 welded in place over the shield lid and forms the structural
22 lid.

23 The double sealed inner container is then placed
24 inside a larger steel and concrete container and another lid
25 is bolted in place.

1 The transfer of the first 48 fuel assemblies from
2 the spent fuel pool into the dry cask system began May 7,
3 1993. We have seen how it was supposed to work. Now let's
4 take a look at how it actually happened.

5 The basket was set into a transfer cask and
6 lowered into the spent fuel pool. One by one plant
7 operators located the pre-selected assemblies and placed
8 them into the basket using a computer operated fuel handling
9 machine which electronically locates the spent fuel
10 assemblies.

11 Once filled with 24 assemblies, a shield lid was
12 set in place.

13 The basket, still in the transfer cask, was then
14 removed from the spent fuel pool and lifted to a
15 decontamination area where it was cleaned and vacuum dried.

16 The seven inch steel and concrete shield lid was
17 then welded into place. An automatic welding machine was
18 used to secure the basket's steel structural lid.

19 The basket was then set in the steel and concrete
20 cask. Another lid was bolted in place. The cask was ready
21 to move to the storage facility.

22 The storage facility measures 195 feet by 30 feet
23 and is located within the plant's fenced area. The concrete
24 casks are 16-1/2 feet tall and 11 feet in diameter. They
25 weigh 100 tons each when empty and 130 tons when loaded.

1 The transfer was successful by a number of
2 measures. There were no problems, and from a safety
3 standpoint the casks are performing well, shielding
4 radiation three times better than expected.

5 [End of video.]

6 MR. TRAVERS: Short, as promised. We are not
7 going to show all the other designs that are out there, but
8 we thought it might provide an interesting perspective,
9 particularly in light of some of the events of this week.
10 That is in fact the VSC-24 system that is used at Point
11 Beach.

12 If I can turn to slide 13, I will continue by
13 giving you a sense of the focus of our safety review for dry
14 cask storage.

15 [Slide.]

16 MR. TRAVERS: Our review focuses on four principal
17 technical areas with the overall objective of ensuring the
18 fuel is confined and isolated from the public and the
19 environment, protecting workers, ensuring subcriticality,
20 and protecting the fuel itself against degradation to
21 facilitate ultimately its removal and further processing.

22 The thermal evaluation, for example, focuses on
23 maintaining the integrity of the fuel cladding for the
24 20-plus years of assumed storage service. One requirement
25 in association with the thermal evaluation is a requirement

1 that passive cooling be provided to keep the temperatures
2 down over the lifetime of the project.

3 Criticality is assessed and subcriticality must be
4 maintained both in normal and accident conditions.

5 The structural review is focused on the
6 confinement function. As an example of a requirement,
7 redundant sealing systems are required for dry casks. Hence
8 the two lids that you saw used in the VSC-24 design.

9 Next slide, please.

10 [Slide.]

11 MR. TRAVERS: The safety review, in addition,
12 requires that licensees, both site specific and general,
13 review their programs in these areas to ensure that they
14 cover or have been enhanced to cover the dry storage
15 activities. Applicants must review and modify these
16 programs in a host of areas presented to ensure that all of
17 the dry cask storage activities are appropriately
18 considered.

19 The extent of these changes can vary, depending on
20 the programs that are involved. It really comes down to
21 ultimately the operating procedures that the utility needs
22 to modify that I think take up the most time. At our recent
23 workshop we heard utility representatives describe the need
24 for very early planning to facilitate dry cask storage. In
25 fact, as early as five years prior to the beginning of the

1 first storage is not too soon to begin the kind of planning
2 that is believed necessary to implement these kinds of
3 activities.

4 Next slide, please.

5 [Slide.]

6 MR. TRAVERS: Accident conditions at the pad and
7 in transit to the pad are also considered in the Part 72
8 assessment and our assessment of the adequacy of designs.
9 The kinds of accidents that are postulated include fires and
10 explosions, the potential for drops and tipovers, for
11 example, based on real operational height limitations that
12 are associated with the different systems. Fire and
13 explosions and the potential for these kinds of accidents
14 are based on an assessment or at least an assumed situation
15 where combustible material or some outside force is
16 available to impact the cask.

17 CHAIRMAN JACKSON: From the outside in?

18 MR. TRAVERS: Yes. For example, one of the
19 accidents that is typically evaluated is the combustion of
20 the diesel fuel in the transporter as it is being
21 transported out to the site. The impact on the cask of a
22 fire of that sort is evaluated against the performance
23 requirements that casks must maintain.

24 Typically it is the protection of the fuel that is
25 limiting in these evaluations rather than the potential for

1 loss of confinement, given the robustness of these casks.
2 The structural integrity is so vast and the margin so great
3 that typically the limiting factors in the design deal with
4 the potential for damaging or binding the fuel and limiting
5 the ability to withdraw it very easily.

6 Another aspect of what the staff has done
7 relatively recently is to assess the potential impact of a
8 classified sabotage event and evaluate the vulnerabilities
9 of the current cask storage systems that are out there. I
10 understand that we are preparing a separate report for the
11 Commission on this aspect of the results that have been
12 determined to date.

13 I think I am going to skip the next slide and go
14 on to slide 17 and simply point out that one other aspect of
15 the regulations consider and our review considers is the
16 impact of natural events like earthquakes and floods, high
17 winds, wind missiles, and so forth. This is common to the
18 kind of evaluations that are done for nuclear power plant
19 systems as well.

20 [Slide.]

21 MR. TRAVERS: Slide 17 focuses on the principal
22 dose evaluation criteria that are mandated within the
23 requirements of Part 72. They are basically two, that
24 during normal operations the annual dose equivalent to a
25 real individual meet the EPA 40 CFR 190 limits of 25

1 millirem whole body or 75 millirem to the thyroid.

2 The accident site dose evaluation criteria are
3 that at the controlled area boundary you must not exceed 5
4 rem to the whole body or any organ.

5 Typically, when we assess accidents we don't reach
6 values close at all to these limits. Even under
7 extraordinary assumptions, where we assume confinement is
8 lost and the fission product from all of the fuel rods is
9 released, we are only looking at about 100 millirem or less
10 at the site exclusion boundary for these kinds of accidents.

11 Next slide, please.

12 [Slide.]

13 MR. TRAVERS: I wanted to touch on the current
14 cases that we either have in review or expect. I mentioned
15 already the site specific applications that are expected or
16 in house. I want to mention that in addition to looking at
17 site specific licenses or the implementation of the general
18 license we also certify storage cask designs. This second
19 listing includes designs from Vectra, Sierra Nuclear and
20 HOLTEC.

21 These designs are dual purpose designs. Currently
22 in the field all of the dry cask storage systems are single
23 purpose designs. They are not today certified for
24 transportation. Clearly the movement of the industry is in
25 the direction of both storage and transportation. The

1 regulations that apply to transportation are somewhat
2 different. They are not contained in Part 72; they are
3 contained in Part 71. So we are looking at reviews that
4 need to embody both the requirements in Part 71 and Part 72
5 and certifying for both purposes, transportation and
6 storage, these new technologies.

7 CHAIRMAN JACKSON: How do you intend to approach
8 that? Are you just going to draw from each, Part 71 and
9 Part 72? How do you intend to do that?

10 MR. TRAVERS: While the requirements are
11 different, they typically address similar technical issues,
12 like criticality, for example. Where one regulation is
13 bounding we are going to apply that requirement. I will
14 give you an example if it's helpful.

15 For transportation purposes, there is an
16 assumption that you can have an accident and that fresh
17 water can leak into the package. For that purpose, the
18 designer must demonstrate even with water and leakage that
19 subcriticality is maintained. That requirement is bounding
20 because it doesn't exist for Part 72. The package would
21 have to demonstrate that they meet the requirements of both,
22 but Part 71 in this case would be limiting.

23 CHAIRMAN JACKSON: You mentioned the TMI-2 core.
24 Those reviews, is it similar for that fuel at INEL as for
25 the other three that you have listed, or is this only for

1 the undamaged part of the core, or what?

2 MR. TRAVERS: Just about the entire core was
3 damaged in that accident. The fuel that is currently being
4 stored at INEL is in special canisters, which I happened to
5 approve when I was at the site some years ago. I was
6 involved in the technical and safety review of the transport
7 and ultimate storage of that fuel. So it's in special cans
8 now. The system that is being developed would take those
9 canisters and place them in a different kind of egg crate,
10 but basically a canister system for storage dry. Right now
11 they are stored wet in a pool.

12 CHAIRMAN JACKSON: So in a certain sense the
13 nature of the review is somewhat different.

14 MR. TRAVERS: It is going to be somewhat
15 different. The technical aspects are fairly unique.

16 [Slide.]

17 MR. TRAVERS: Other technical reviews that we
18 either have in house or have begun some discussion with the
19 Department of Energy include the General Atomics legal
20 weight truck cask. This is a transport cask that is
21 expected to be used by plants which cannot accommodate the
22 larger rail cask. So it is expected that this cask, if it
23 were approved, would fill a gap for plants that today don't
24 have the infrastructure, either the lifting capacity or the
25 rail spur necessary to accommodate larger, 125 ton rail

1 casks. While it was initially being sponsored by the
2 Department of Energy, today it is not being, and General
3 Atomics is taking on the continued evaluation on its own.

4 The remaining four bullets have to do with
5 projects that the Department of Energy is sponsoring.

6 The first has to do with an attempt by the
7 Department of Energy to establish a methodology for
8 obtaining credit for burnup. In all of our regulatory
9 approvals today we do not assume any credit in assessing
10 criticality potential for the burnup which the fuel is
11 exposed to.

12 We have a meeting tomorrow, I believe, with the
13 Department of Energy on this. We have an application in
14 from them. They are approaching it in phases. In the first
15 phase they would look for depletion of fission products and
16 buildup of actinides as the first potential credit for
17 burnup. It would ultimately allow programs like MPC to
18 optimize the amount of fuel that could be put in one
19 package. Without burnup credit you can't put nearly as much
20 fuel in a package, and in the repository I believe you are
21 more limited in how you could space the fuel if it were at
22 Yucca, or wherever.

23 We have put MPC down here again. This is an on
24 again, off again review. At one time MPC, sponsored by the
25 Department of Energy, was expected to be in by now. Because

1 of funding cuts, it was taken off the plate. It appears to
2 be back on now, at least in preliminary discussions with the
3 Department of Energy, at least as it relates to a
4 transportation version of the MPC.

5 The second to last bullet has to do with the
6 Department of Energy sponsorship of a dry transfer system.
7 This would allow transfer of bare fuel assemblies without
8 the need for a pool. If you were to take as an example
9 Trojan and you decommissioned your spent fuel pool, you
10 might, if the Department of Energy is successful, be able to
11 bring a dry transfer system on if you needed to repackage
12 your fuel assemblies.

13 CHAIRMAN JACKSON: This is like a portable hot
14 cell.

15 MR. TRAVERS: That's correct.

16 Lastly, I wanted to make note of the fact that the
17 Department of Energy has also indicated that even in the
18 absence of legislation for a specific central interim
19 storage site they intend to submit a topical report which
20 would address essentially the same technical issues for an
21 unidentified site for central interim storage. So they
22 would attempt to bound site criteria in this report and
23 attempt to receive topical approval from the Commission.

24 CHAIRMAN JACKSON: Would this be a generic
25 environmental impact?

1 MR. TRAVERS: Yes. It's a generic attempt to see
2 if they can't set up and reach agreement with us on the
3 principal technical issues that need to be evaluated and
4 resolved.

5 The last thing I would like to cover is to take a
6 few minutes and touch on industry performance with dry cask
7 storage and to identify some of the issues that need
8 improvement.

9 Next slide, please.

10 [Slide.]

11 MR. TRAVERS: Surprisingly, industry performance
12 with dry cask storage has been mixed. While some projects
13 have proceeded with relatively few problems, a number of
14 other projects have faced a considerable number of
15 difficulties.

16 The problems are surprising since the technology
17 of dry cask storage is relatively straightforward. This is
18 particularly true compared to the technology of nuclear
19 power plants.

20 While dry storage is relatively low tech, it does,
21 however, require high quality in all aspects of design,
22 fabrication and operation. It is this quality component
23 which has been lacking in a number of dry storage projects
24 to date.

25 Problems we have encountered include incomplete or

1 inadequate applications, inadequate QA programs, failures to
2 adequately control fabrication of equipment, failures to
3 control and document design changes, and failures to control
4 procurement materials and services.

5 These kinds of issues have led in several
6 instances to questions being raised about the fundamental
7 adequacy of some components. Although each specific issue
8 has been resolved and the equipment determined to be
9 acceptable, these problems are troubling because they really
10 are indicative of programmatic errors that could have
11 resulted in more serious outcomes.

12 A number of the problems we have encountered
13 involve vendors, and particularly the fabricators of cask
14 equipment. Typically the cask fabricators are small
15 organizations with little if any recent experience with
16 nuclear applications and quality requirements. It is
17 becoming clearer with experience that the nuclear utilities
18 who are principally responsible need to take an extremely
19 proactive role in ensuring that their contractors provide
20 quality equipment which is well documented to demonstrate
21 that they conform with the licensing basis.

22 In discussions with us utilities at the workshop
23 and other meetings seem to be getting that message, and in
24 fact the message that we are getting is they are setting
25 aside significant resources and efforts to provide strict

1 oversight to their vendors.

2 For our part, we have determined that a number of
3 actions, including development of additional regulatory
4 guidance, should be implemented. Available guidance is
5 relatively sparse, and in a few moments Charlie Haughney is
6 going to discuss more about our dry cask storage
7 initiatives, the ones that are underway and the ones that
8 are planned.

9 Right now I would like to turn it over to Andy
10 Kugler from NRR. Andy plans to speak to dry cask issues
11 which are principally related to in-plant activities.

12 DR. PAPERIELLO: I would like to make one
13 observation. These issues are the same at either
14 specifically licensed or generally licensed facilities. I
15 don't see in the plants that we have been involved with in
16 the last two years any difference in the types of problems
17 between the two facilities. So the type of licensing
18 doesn't seem to be the cause of the problem.

19 CHAIRMAN JACKSON: Okay.

20 MR. KUGLER: I am going to be discussing two
21 issues that we are dealing with for in-plant heavy load
22 control and loading and unloading procedures.

23 [Slide.]

24 MR. KUGLER: In the area of heavy load control,
25 with the formulation of the action plan last year we formed

1 a working group and we started looking at issues related to
2 heavy load control.

3 The group reviewed concerns that had been
4 identified concerning the evaluation of heavy load control
5 activities at one site. As a result of that review and the
6 information we gathered, we developed Bulletin 96-02, which
7 I will be speaking to in a little more detail in a moment.

8 Meanwhile, the group is still evaluating the need
9 to revise the existing inspection procedures to include more
10 information on heavy load control, particularly in light of
11 what we have learned in recent months.

12 Next slide, please.

13 [Slide.]

14 MR. KUGLER: As I mentioned, we issued Bulletin
15 96-02 on April 11 of this year. The bulletin requests
16 licensees to review their heavy load control programs versus
17 the existing regulatory guidelines and their existing
18 licensing basis.

19 I wanted to mention that the bulletin does not
20 just cover cask issues. This is heavy load control for any
21 type of heavy load.

22 The bulletin also requests licensees to review
23 their technical specifications for the handling of heavy
24 loads over spent fuel. In particular, issues such as the
25 handling of the shield lids over the fuel that has been

1 moved into the cask during the loading process.

2 We have also, of course, required them to report
3 back to us the results of their reviews.

4 The emphasis of the bulletin is on ensuring that
5 the activities that are carried out for the handling of
6 heavy loads at power have either previously been analyzed by
7 the staff and approved or that they do receive approval
8 prior to implementation.

9 Although the bulletin was developed as a result of
10 concerns with heavy load control, it really speaks to the
11 general issue of operating a plant within their licensing
12 basis.

13 Next slide, please.

14 [Slide.]

15 COMMISSIONER ROGERS: Are there any organized
16 standards in this area from ASTM or anything of that sort?

17 MR. KUGLER: There are standards for crane design
18 and for testing the cranes and for the design of the lifting
19 equipment.

20 COMMISSIONER ROGERS: But not procedural?

21 MR. KUGLER: No. The ANSI standard does speak to
22 having procedures, but I don't think it goes into detail on
23 what should be in the procedures.

24 MR. RUSSELL: The one other area that I would like
25 to identify is an issue which may make it difficult for some

1 licensees to implement the general license, and that is part
2 of the assumptions that go into a general license review are
3 predicated upon having lifting equipment that meets single
4 failure criteria such that you don't have to address the
5 issue of dropping casks before they are fully assembled,
6 that is, the lift heights and the other things that are part
7 of the certificate of compliance.

8 During the period of time when you are loading and
9 other activities are being done, the assumption is it is
10 being done with a crane and rigging equipment, et cetera,
11 that meets the requirements for single failure. Some
12 facilities do not have such cranes. That's the type of
13 situation we got into with Oyster Creek, and they were
14 looking at how they would modify the crane, the weight
15 handling equipment, et cetera.

16 Ensuring that the assumptions that are associated
17 with licensing of the cask for a general license are in fact
18 consistent with the design of the facility is one of the
19 issues of interface that we have to look at. That is how we
20 got into the issues associated with heavy loads and whether
21 they do or don't have cranes which meet redundant load
22 paths, et cetera.

23 MR. KUGLER: In the area of cask loading and
24 unloading we also formed a working group, a somewhat larger
25 group, to look at issues in that area. We collected issues

1 by reviewing documentation that existed from the sites that
2 have been through the process and from interviews with staff
3 both in the regions and here at headquarters, and then we
4 evaluated those issues.

5 Based on our evaluations, we are recommending
6 changes to the inspection procedures and to the draft
7 standard review plan to ensure that the inspection and
8 licensing reviews consider those issues.

9 We are also proposing an information notice to
10 call selected issues to the attention of the licensees, and
11 we are in the process of drafting that information notice
12 right now.

13 Next slide, please.

14 [Slide.]

15 MR. KUGLER: In terms of the procedures
16 themselves, the inspectors have found the loading procedures
17 to be acceptable. There are a number of factors that
18 simplify the preparation of loading procedures as compared
19 to unloading procedures. During loading process you've
20 characterized the fuel; you know what condition it is in as
21 you put it into the cask. Also you can take advantage of
22 lessons learned from other licensees and from the dry runs
23 that the licensee performs on site.

24 For the unloading procedures, what we are finding
25 is that they are more complex than the loading procedures.

1 Unfortunately some of the older SARs fail to recognize this
2 and tend to indicate that unloading is simply the reverse of
3 loading, which is not true. For one thing, licensees need
4 to consider the potential condition of the fuel when they go
5 to unload it. Depending on the situation, the fuel may have
6 been in the cask for decades, and they need to evaluate the
7 condition of the fuel to the extent possible before they
8 start unloading it.

9 We do put an inert environment into these casks to
10 prevent oxidation of the fuel. Assuming that that
11 environment has been maintained, the fuel should be in good
12 condition when they go to unload it, but they need to
13 evaluate.

14 There are also issues associated with the
15 reflooding of the cask. During the unloading process we
16 have to refill the cask with water. There are some issues
17 associated with that such as cask pressurization due to
18 steam generation as you put cold water onto the hot fuel.
19 Also the consideration of any thermal shock to the fuel as
20 you are reflooding it, and also radiological protection for
21 the workers during that phase, because you will be venting
22 the cask. Generally they are going to direct that venting
23 either to the pool or to a ventilation system, but they need
24 to consider that.

25 In addition, there is essentially no cask

1 unloading experience for them to look back on for lessons
2 learned. So they don't have that information available to
3 them as compared to loading procedures.

4 In addition to the working group activities, the
5 staff has been putting increased emphasis on our inspection
6 activities in this area. The procedures for the recently
7 built facilities have been inspected during the
8 preoperational phase using the new inspection procedures
9 that Bill Travers had mentioned. These inspections were a
10 joint effort between the regions, NRR and NMSS. We
11 basically pool our resources and our expertise to perform
12 those inspections.

13 We plan to continue those inspections for all
14 future facilities.

15 We are also taking a look back at some of the old
16 facilities and looking at what inspections have been
17 performed there to determine whether we feel that we have
18 documented well enough that those procedures have been
19 inspected. If we determine that these older facilities were
20 not well documented, we are going back and take a look at
21 them as well and do further inspections in those locations.

22 That is all I planned to say on loading and
23 unloading. If there are no questions, I will turn it over
24 to Charlie to talk about NRR staff initiatives.

25 MR. HAUGHNEY: Good afternoon.

1 [Slide.]

2 MR. HAUGHNEY: On slide 25 the top bullet talks
3 about an action plan. This document, which was issued by
4 Dr. Paperiello and Mr. Russell about ten months ago, was
5 developed to address a number of interface issues such as
6 some of those we were talking about today: who is in charge
7 of a particular inspection and how often is it done.

8 It actually triggered the heavy loads task group
9 and some other things. The action plan has a number of
10 items that have been completed and a few that remain,
11 including our activities jointly with industry on selected
12 issues involving cask handling and vendor problems where the
13 Nuclear Energy Institute has issued sort of a parallel
14 working group of industry personnel to address these issues.
15 We meet with them periodically.

16 Out of all that, which I think was kind of a
17 natural outcome of the creation of the Spent Fuel Project
18 Office about a year ago and getting our staff to the point
19 where we could really work on these issues, we have begun to
20 focus on improving some fuzzy spots in our regulatory base
21 which I think were understandable in the fact that we
22 haven't been in the dry storage field all that long.

23 Next slide, please.

24 [Slide.]

25 MR. HAUGHNEY: That first bullet just lists some

1 of the more recent activities we have had on a broader scale
2 with the industry. Actually, now I think we are more or
3 less a permanent marquee player in Bill Russell's annual
4 regulatory information conference. We had a session that
5 was a couple of hours long in a 400 seat room, and it was
6 pretty full, just last April. Our workshop here was
7 overflowing. We actually packed the auditorium to the point
8 we had to use this room on an overflow basis.

9 The last one talks about a series of meetings we
10 haven't yet started, but these are looking to go to a
11 utility at about the fuel loading minus 18 to 24 month range
12 in which we will hold public meetings of a fairly extensive
13 duration, probably a day and a half or two days, where we
14 will talk about all these different implementation issues in
15 terms of licensing basis both in Part 50 and Part 72 and how
16 well they are either prepared or are preparing for fuel
17 load.

18 Andy really covered the last one quite well in
19 terms of what we are doing with inspection of loading and
20 unloading procedures. I will just state that I view these
21 as the centerpiece of our overall inspection program in
22 terms of an operational standpoint.

23 Next slide.

24 [Slide.]

25 MR. HAUGHNEY: In February we issued five

1 inspection procedures. They cover the subjects you see
2 there, which would sort of take the project from the
3 conceptual stage to actual fruition.

4 These were written by some seasoned inspectors who
5 also had considerable knowledge of dry cask design. They
6 were tested in the regions a number of times, thoroughly
7 reviewed by NRR and all the pertinent regional staff and the
8 comments incorporated before issuance this past February.

9 Nonetheless, we have had to change them twice
10 already, at least one of the procedures, to add things that
11 have occurred to us as we continue our regulatory
12 examination of issues that have come forth.

13 I don't expect these things will remain static in
14 the inspection manual. I think we will continue to change
15 them periodically.

16 As you know, we issued a draft standard review
17 plan. This particular document is out for public comment,
18 and we are asking for an end to that comment period in
19 mid-June. This particular plan is for the cask systems
20 themselves, either concrete or steel, but doesn't cover
21 ancillary equipment such as pads or cranes or things like
22 that.

23 As we switch to the next slide, there are a couple
24 things of note.

25 [Slide.]

1 MR. HAUGHNEY: We have in progress a siting
2 standard review plan which would get into issues such as pad
3 and pad placement and earthquake and tornado and all these
4 other siting considerations that could affect principally
5 off-reactor site but even potentially on-reactor site
6 analyses.

7 Furthermore, we are committed to writing some
8 transportation cask SRPs kind of in two families. One is
9 for the large spent fuel storage casks and the second is for
10 other radioactive materials for which we do transportation
11 reviews. Examples of that would be radiography cameras,
12 large stationary irradiator shield packages and things like
13 that, the so-called type B transport packages certified
14 under Part 71.

15 Switching back to the top bullet, Inspection
16 Manual Chapter 2690 is a document in the NRR inspection
17 manual that is kind of an umbrella description of how all
18 the individual inspection procedures are to be implemented.
19 It talks about scheduling prioritization.

20 There is a procedure in the manual now that is out
21 of date. It needs to be redone in the light of these new
22 procedures and the experience we have gained over the past
23 couple years. We have got a person slated to join us from
24 Region III who is a very experienced inspector and in fact
25 helped us with the five procedures, and he will be here

1 right after the Fourth of July and hitting the word
2 processor on Manual Chapter 2690.

3 DR. PAPERIELLO: And this will orchestrate who has
4 the responsibility for which of these procedures. Almost
5 every one of these procedures is actually executed by a
6 multidisciplinary team from my office, from Bill's office,
7 and from the regions. So there are multiple skills needed
8 in these things.

9 It will also provide, as we talked earlier, the
10 early meeting with utilities who are planning dry cask
11 storage to try to communicate these problems and ensure that
12 the work is being done so we don't come up to the last
13 minute and have problems.

14 MR. HAUGHNEY: That concludes the staff's
15 presentation.

16 CHAIRMAN JACKSON: I have a couple of quick
17 questions for you.

18 As part of your action plan are you dealing with
19 the issue of potentially overlapping responsibilities that
20 might be confusing to licensees in terms of the guidance you
21 are going to be putting out? For instance, perhaps the
22 issue of monitoring and reporting requirements and to what
23 extent they differ between the parts that are covered by the
24 NRR folks and the activities related with that vice the
25 folks who would be covered by either region-based people, et

1 cetera, or Part 72 folks.

2 I guess the question is, are you planning to
3 address these kinds of issues in the action plan?

4 MR. HAUGHNEY: The answer is yes. One of the
5 things that drove us to the action plan is we were stumbling
6 all over ourselves, to be honest with you, on some of these
7 issues like heavy loads. We knew we were both in charge to
8 some degree or another, but who had the lead and how we were
9 to support each other, that is really the reason the two
10 office directors, I think in frustration, directed us to
11 start the plan.

12 If you look through the action plan itself, there
13 are a few issues that relate directly to internal
14 communications like staff training just so we could talk to
15 each other in Part 72 language, for instance. We have done
16 a lot of that. There are others like heavy loads where we
17 decided it's primarily an NRR issue but we would provide
18 support for them.

19 I think it's in there. Whether it really covers
20 all of the issues, the reporting issue you brought up, to me
21 brings to mind Part 50.72 and Part 50 on reactor reporting
22 requirements, and there is a corresponding requirement in
23 Part 72 that is much simpler.

24 CHAIRMAN JACKSON: Right.

25 MR. HAUGHNEY: In fact this very week we have a

1 team that has that issue to consider at Point Beach.

2 This whole issue or coordination is one that
3 although we have made progress on, I don't think we can
4 declare victory.

5 CHAIRMAN JACKSON: I guess I'm not looking for you
6 to declare victory yet since even you say there are any
7 number of issues you have yet to address, but ones that
8 relate to our interface with the licensees relative to not
9 having confusion about what the requirements are and how we
10 are going to monitor to those requirements, and I guess I am
11 looking for some comfort that that is high on your agenda
12 relative to specifically working it in the action plan.

13 DR. PAPERIELLO: It is, and Manual Chapter 2690
14 should make it clear to people who read it, and we will
15 provide it, of course, to the industry on who has the
16 responsibility for what actions and how they are being
17 coordinated.

18 CHAIRMAN JACKSON: I'm asking something else.

19 MR. RUSSELL: Let me step back to a higher level.
20 We developed a memorandum between the two offices that
21 identifies at the higher level who has responsibility for
22 what activities. The project interface responsibilities
23 remain with NRR until such time as there is no longer wet
24 storage in a fuel pool. We have identified broadly what the
25 interfaces are both in the dry fuel area, in the

1 decommissioning area, et cetera.

2 We have broad agreement between the two offices as
3 to how those are carried out. What we have been talking
4 about is the next level of detail under those as it relates
5 to who has lead responsibility for various inspection
6 procedures, how the details are implemented.

7 But the interface with the licensee, issues that
8 are raised associated with activities on the site, Part 50
9 as compared to an away from a reactor site Part 72 separate
10 license, would be through the project's organization in NRR.
11 We would get issues from NMSS, but the actual correspondence
12 would be issued, so we would maintain a focal point of
13 contact. That was one of the issues we highlighted on the
14 slide that would remain an NRR responsibility, for example.

15 CHAIRMAN JACKSON: I thought I heard, Charlie, you
16 saying something slightly different, that there are some
17 differences with respect to reporting requirements, and the
18 question is, how do those get addressed?

19 MR. HAUGHNEY: This issue has just come up in the
20 last day or so based on this event. Personally, as I read
21 the regulations, the event is reportable under both 72 and
22 50.72. I think I can find people on the staff that on the
23 first reading wouldn't necessarily agree with that. So that
24 is one that we have to consider to begin to look at, whether
25 there is an unnecessary overlap.

1 I think you were also asking about something else,
2 and that is our communication with the industry and whether
3 that is sufficient and clear and covering all these kinds of
4 issues.

5 First of all, the action plan addresses that
6 subject. Whether it is addressing it specifically and
7 broadly enough for every example that would come up I'm not
8 so sure.

9 CHAIRMAN JACKSON: But you do have a focus in the
10 action plan.

11 MR. HAUGHNEY: That's right. It's an item. There
12 are NEI people that we can call in an instant's notice and
13 will understand what we are talking about. We can call
14 meetings in any sort of reasonable forum to address these
15 issues.

16 CHAIRMAN JACKSON: One other question, and it's on
17 the other side of the fence, having to do with public
18 understanding and public participation. I remember the
19 first time I heard about the site specific versus the
20 general licenses. I thought that was interesting. That is
21 why I am happy to have had you discuss it today.

22 Given the very different requirements in terms of
23 opportunities for hearings and what kinds of things are
24 required, what are you doing to enhance public participation
25 and understanding of the technology, what the actual risks

1 are or are not associated with this technology, as well as
2 with the handling of the fuel and moving it from the pools
3 to the casks? What are you doing on that front?

4 MR. HAUGHNEY: We are doing quite a bit, but I
5 must tell you I think it's mostly reactive in response to
6 particular requests to appear at county council meetings or
7 perhaps the staff itself will decide the need for a
8 particular public meeting and we'll do that. We have got an
9 example of that coming up with two inspection activities in
10 Region III. One is a reinspection of the unloading
11 procedures, the revised ones for Palisades. When we hold
12 that exit meeting, that is going to be open to the public.
13 And then this augmented inspection team at Point Beach by
14 procedure will be open to the public.

15 I was just trying to recall today how many places
16 I've been to in the past two or three years, in Grant
17 County, North Dakota, testifying twice before the New Mexico
18 Legislature. It is all kinds of things, but they aren't
19 systematic. There is not something like a two-step process
20 that we have. We just haven't really thought it through nor
21 frankly had the time to develop something like that.

22 CHAIRMAN JACKSON: Is there an opportunity with
23 the regional administrators in their quarterly press
24 conferences, not necessarily all the time but in areas where
25 there might be some potential loading, to just talk about it

1 and in the course of it discuss the difference between a
2 general license and site specific and how it relates to
3 particular facilities in that region so that there is not
4 the confusion in the minds of the public? I just think that
5 is kind of a regularized process that is not strictly
6 reactive and not crisis oriented that allows us to educate
7 the public.

8 MR. TRAVERS: As part of this informal process we
9 do update in terms of the media information that is
10 presented to the regions so that the regional administrators
11 are aware.

12 CHAIRMAN JACKSON: That's what I am saying.

13 MR. TRAVERS: We have further avenues as well.

14 CHAIRMAN JACKSON: You can build off of that.

15 MR. RUSSELL: The one longer term item that was
16 mentioned earlier is that we are planning on conducting on
17 site or near site one to two day technical review meetings
18 on the order of 18 to 24 months prior to use to address
19 these issues, to get ahead of it before it becomes an
20 emotional issue in a local area. That would be another
21 opportunity to explain the differences between licensing and
22 approach, to cover those kinds of issues. We have not
23 gotten far enough ahead of the reactive mode to do that, but
24 it is in the planning process to do that in the future.

25 CHAIRMAN JACKSON: Commissioner Rogers.

1 COMMISSIONER ROGERS: Do we have a clear process
2 now for identifying costs of this kind of activity in a way
3 that allows us to translate them in a meaningful way into
4 our fee structure? It sounds to me like we have got a lot
5 of different things going here and with overlapping
6 beneficiaries of this activity, and who is going to pay for
7 it?

8 CHAIRMAN JACKSON: That's the bottom line.

9 COMMISSIONER ROGERS: When it is all over with it
10 may be difficult to sort it out. As you go along may be a
11 good time to try to make sure that you understand where
12 these things are going to channel into fees to some
13 licensees.

14 MR. TAYLOR: Design reviews are charged to the
15 vendors. Basically the inspection activities are charged to
16 the sites.

17 MR. RUSSELL: Under a general license, since there
18 is no licensing activity, it is all inspection, and plant
19 inspection activity is charged to that licensee. Reactive
20 inspection activity is not. That goes into the general
21 activity. So if there is an event and we react to an event,
22 that is not fee billable, but for planned activities they
23 are. They would get on to the inspection planning process,
24 get on to the schedules for coordination. Those hours are
25 collected and they do pay for those activities.

1 COMMISSIONER ROGERS: If you feel very comfortable
2 that you have got it all sorted out, fine.

3 MR. RUSSELL: That is generally the framework we
4 have to stay within.

5 COMMISSIONER ROGERS: This is an evolving activity
6 and there may be players that are going to derive benefits
7 from some of these activities that are not really going to
8 be carrying their load with fees. It is conceivable.

9 MR. TAYLOR: We can go over some of the cases and
10 back check to see.

11 COMMISSIONER ROGERS: With regard to the accident
12 scenarios that you consider, will this Point Beach incident
13 give us reason to review those scenarios? Right now you
14 have been talking about things that more or less are
15 external events, but this is right in the plant now. It's a
16 different kind of accident than some of the things that you
17 have got on your list here. With the exception of the fires
18 and explosions, most of these are more or less external.

19 MR. TRAVERS: I think it very well could. The AIT
20 team that is on site is going to delve into it and give us a
21 sense of the root cause.

22 You're right. If this is a licensing issue that
23 we had not understood, the mechanism for generation of
24 hydrogen, for example, it may be one that deserves
25 incorporation into our standard review plan regulations.

1 COMMISSIONER ROGERS: Thank you very much.

2 CHAIRMAN JACKSON: Commissioner Dicus.

3 COMMISSIONER DICUS: Do you have a time frame for
4 your revisions to Part 72, and do you think you have
5 identified pretty well all of the revisions or
6 clarifications?

7 MR. TRAVERS: We are in the midst of working with
8 the Office of Research in developing a rulemaking plan that
9 would come to the Commission and which would include a
10 schedule. We are not convinced that we have got our arms
11 around everything we want to change yet or how we should do
12 it. There are options, including breaking into several
13 rulemakings. For example, the issues that have been
14 identified. But we are looking to within the next several
15 months develop and submit the rulemaking plan with a
16 schedule to the Commission.

17 COMMISSIONER DICUS: Thank you.

18 CHAIRMAN JACKSON: Thank you very much. This has
19 been very informative. In the past year I think the
20 Commission believes that the staff has made significant
21 progress in support of inspection and licensing of spent
22 fuel storage installations. I commend you for that progress
23 to date, but I encourage you to continue to work to improve
24 the regulatory framework along the lines that you have been
25 talking about of interim spent fuel storage that comes under

1 our purview.

2 It is also apparent, as we have just been
3 discussing, based upon recent events, the Point Beach one in
4 particular, that this will continue to be an area of intense
5 scrutiny. Nonetheless, we look forward to the results of
6 the AIT. We encourage you to be sure to incorporate any
7 lessons learned into your action plan, whether it has to do
8 with what specific sorts of accident scenario you treat,
9 your inspection manuals and what they require. I think you
10 are moving along the right track and we will wait to see
11 what comes out of this specific evaluation.

12 If my fellow Commissioners have no further
13 comments, the meeting is adjourned.

14 [Whereupon at 3:30 p.m. the meeting was
15 adjourned.]

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CERTIFICATE

This is to certify that the attached description of a meeting of the U.S. Nuclear Regulatory Commission entitled:

TITLE OF MEETING: BRIEFING ON STATUS OF DRY CASK STORAGE
ISSUES - PUBLIC MEETING

PLACE OF MEETING: Rockville, Maryland

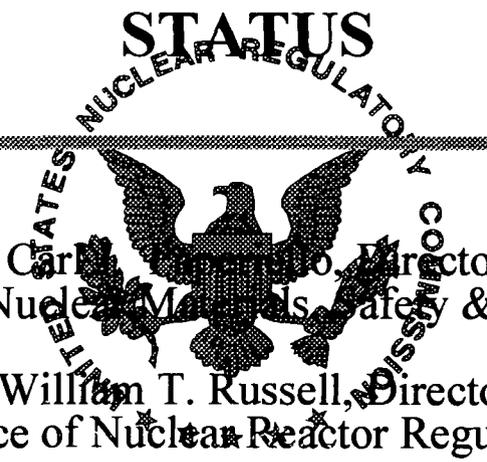
DATE OF MEETING: Thursday, May 30, 1996

was held as herein appears, is a true and accurate record of the meeting, and that this is the original transcript thereof taken stenographically by me, thereafter reduced to typewriting by me or under the direction of the court reporting company

Transcriber: Michael Paulus

Reporter: Michael Paulus

SPENT FUEL PROJECT OFFICE RECENT ACTIVITIES AND STATUS



Carl J. Bernabio, Director
Office of Nuclear Materials, Safety & Safeguards

William T. Russell, Director
Office of Nuclear Reactor Regulation

William D. Travers, Director
Charles J. Haughney, Deputy Director
Spent Fuel Project Office, NMSS

1

Spent Fuel Project Office Responsibilities

- ▶ Storage and Transport Cask Certification for Spent Fuel
- ▶ ISFSI Licensing & Inspection Programs
- ▶ Review and Licensing of Centralized Storage Facilities
- ▶ Package Certification for Transportation of Other Radioactive Materials

2

NMSS/NRR Coordination

▶ NMSS

- Reviews and certifies storage & transportation cask systems
- Issues Part 72 ISFSI licenses
- Maintains the inspection program and supports Region inspections of ISFSIs
- Maintains and implements the inspection program for cask vendors and fabricators
- Develops and maintains NRC guidance on ISFSIs

3

NMSS/NRR Coordination

▶ NRR

- Maintains NPP project management & inspection program
- Review NPP safety issues & 50.59 evaluations resulting from ISFSI activities
- Support Region inspections of ISFSI activities
- Primary NRC contact with media and public

4

Spent Fuel Storage Chronology

- ▶ **1977**
 - ▷ Commercial reprocessing deferred.
- ▶ **1980**
 - ▷ New 10 CFR 72 issued for Independent Spent Fuel Storage Installations (ISFSIs)
- ▶ **1982**
 - ▷ Nuclear Waste Policy Act
 - NRC to develop streamlined licensing process
 - DOE to conduct dry storage demonstrations

5

Spent Fuel Storage Chronology (cont)

- ▶ **1986**
 - ▷ First ISFSI licenses: Surry, Robinson
- ▶ **1990**
 - ▷ 10 CFR 72 adds General License
- ▶ **1993**
 - ▷ Palisades first General Licensee
- ▶ **1996**
 - ▷ Part 72 revisions under consideration

6

Two Methods for Dry Storage Licensing

- ▶ Site Specific
 - ▷ An option for Part 50 licensees
 - ▷ Required for away from reactor sites
- ▶ General License
 - ▷ An option for Part 50 licensees

7

Site Specific Licensing

- ▶ Application Submitted to NRC
 - ▷ Safety Analysis Report
 - ▷ Environmental Report
- ▶ Opportunity for Hearing Provided
- ▶ NRC Oversight
 - ▷ Review of Application
 - ▷ Inspection

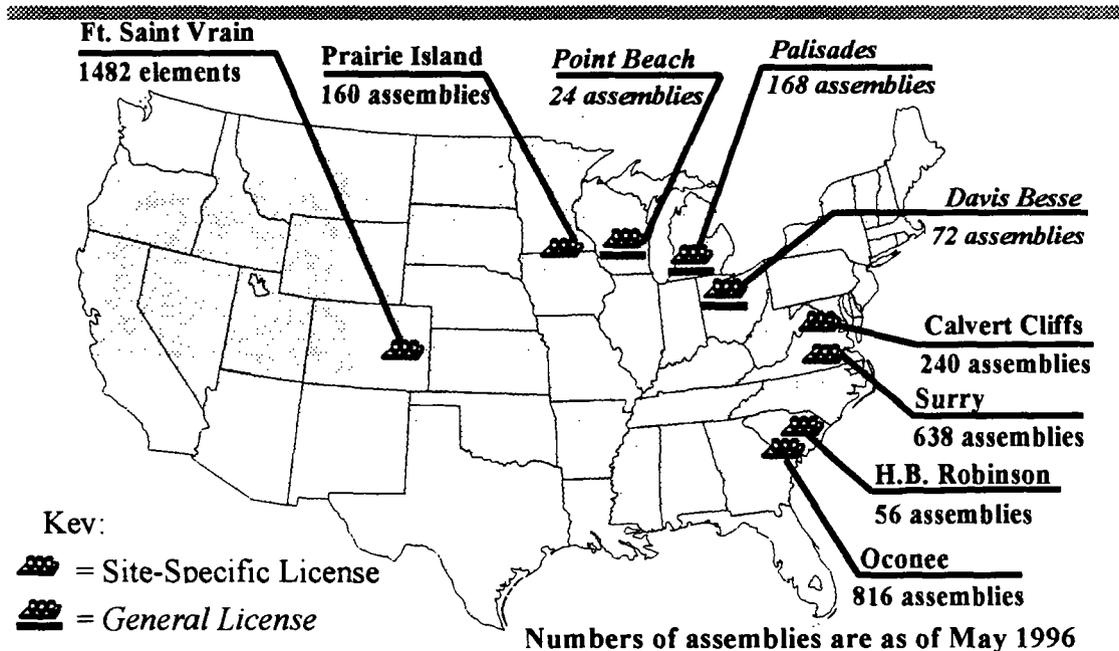
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General License Requirements

- ▶ All Part 50 Licensees
- ▶ No Application or Licensing Review
- ▶ Requires Use of Certified Casks
- ▶ Part 72 Technical Requirements Apply
- ▶ NRC Oversight: Inspection

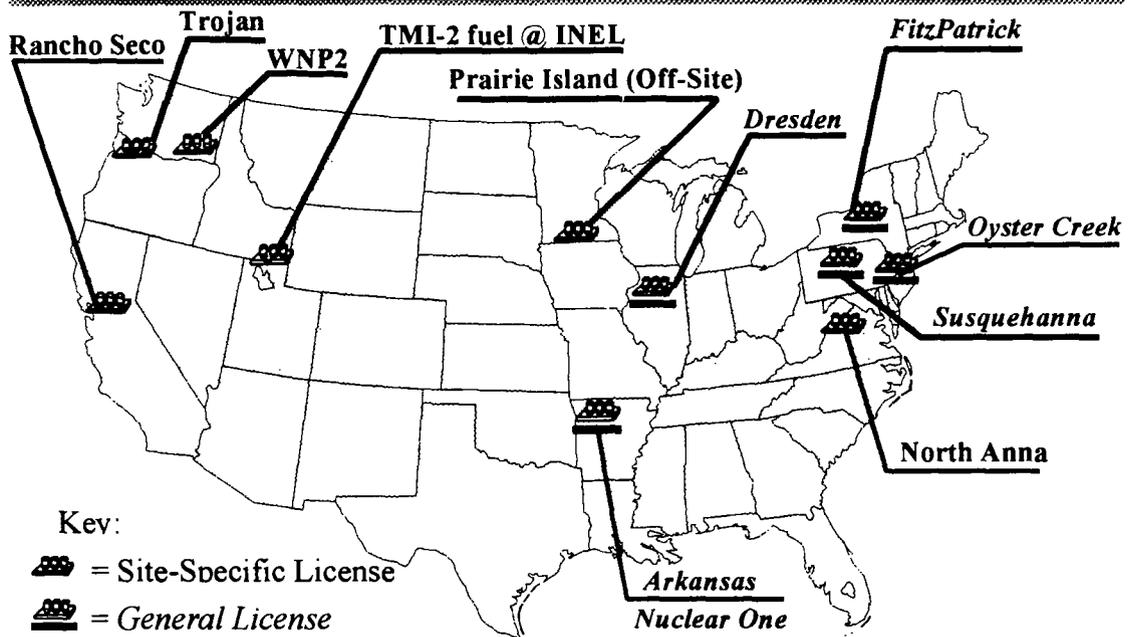
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Existing Sites of Spent Fuel Dry Cask Storage Systems (ISFSI's)



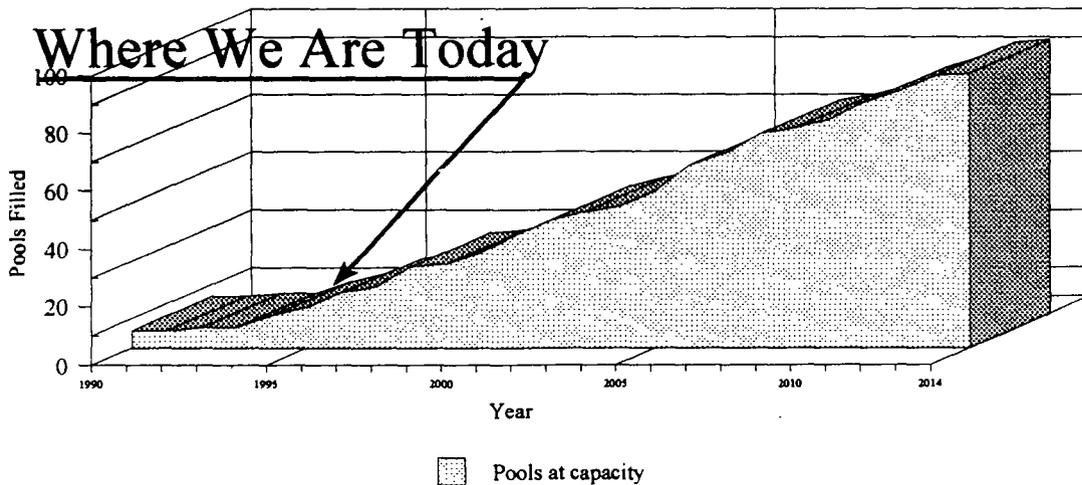
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Potential Near-Term, New Sites for Spent Fuel Dry Cask Storage Systems



11

Projected Loss of Full Core Reserve



12

The Safety Review

Technical Areas

- ▶ Thermal Evaluation
- ▶ Shielding
- ▶ Criticality
- ▶ Structural

13

The Safety Review

Affected Programs

- ▶ Quality Assurance
- ▶ Facility Security
- ▶ Emergency Preparedness
- ▶ Radiation Protection
- ▶ Maintenance & Operations
- ▶ Training

14

The Regulations Consider

- ▶ Accidents
 - ▷ Explosions / Fires
 - ▷ Drops / Tipovers
 - ▷ Airplane Events
- ▶ Sabotage

15

The Regulations Consider

(cont)

- ▶ Natural Events
 - ▷ Earthquakes
 - ▷ High Winds/Tornadoes
 - ▷ Wind Driven Missiles
 - ▷ Floods

16

Site Dose Evaluation Criteria

▶ During Normal Operations

- Annual Dose Equivalent to a Real Individual located beyond the controlled area boundary must not exceed 25 mrem to the Whole Body or 75 mrem to the Thyroid

▶ Under Accident Conditions

- Dose to an individual located at the Controlled Area Boundary must not exceed 5 rem to the Whole Body or any organ.

17

Current Cases in Review

▶ Site Specific Applications

- Trojan
- Rancho Seco
- North Anna
- INEL - DOE: Three Mile Island 2 core

▶ Dual Purpose Cask Designs

- Vectra: MP-187
- Sierra Nuclear: TRANSTOR
- HOLTEC: HISTAR 100

18

Other Technical Reviews

- ▶ GA 4/9: Truck Casks
- ▶ Burnup Topical Report
- ▶ MPC Transportation Review
- ▶ Dry Transfer System
- ▶ Centralized Interim Storage

19

Dry Storage Issues

- ▶ Overall Mixed Performance
- ▶ Fabricator & Vendor Performance Problems
- ▶ Poor Design Change Documentation
 - ▷ Cask designs
 - ▷ Effects on plant components and programs
- ▶ NRC Guidance Lacking

20

Heavy Load Control Issue

- ▶ Working Group Established Under Joint NRR/NMSS Action Plan
 - ▷ Staff concerns with evaluation of heavy load control activities
 - ▷ Reviews contributed to development of bulletin
 - ▷ Evaluating regulatory guidance

21

Heavy Loads Control Issue

- ▶ NRC Bulletin 96-02 Issued 4/11/96 Requests Licensees to:
 - ▷ review their heavy loads program
 - ▷ review the Tech Specs for handling heavy loads over fuel
 - ▷ and requires reporting results to NRC

22

Cask Loading and Unloading Issues

- ▶ Working Group Established Under Joint NMSS/NRR Action Plan
 - ▷ Evaluation of Issues Completed
 - ▷ Recommending Changes to Regulatory Guidance

23

Cask Loading and Unloading Issues (cont)

- ▶ Loading procedures acceptable
- ▶ Unloading procedures more complex than loading
- ▶ Inspections planned at new and older facilities

24

NRC Initiatives for Improved Communications

- ▶ Developed Joint NRR/NMSS Dry Cask Storage Action Plan
- ▶ Review Regulations for Clarity, Revise and/or Issue Guidance as Needed

25

NRC Initiatives

continued

- ▶ Coordinate frequently with industry
 - ▷ Regulatory Information Conference 4/96
 - ▷ Dry Cask Storage Workshop 5/96
 - ▷ Pre-Fabrication Meetings with Utilities
- ▶ Inspection of Loading & Unloading Procedures

26

Guidance Documents Issued

- ▶ Issued 5 Inspection Procedures (2/96)
 - ▷ Design Control
 - ▷ Off Site Fabrication
 - ▷ On Site Construction
 - ▷ Pre-Operational Testing
 - ▷ Operations

- ▶ Issued Draft Standard Review Plan for Dry Cask Storage Systems (2/96)

27

Guidance Development in Progress

- ▶ Inspection Manual Chapter 2690

- ▶ ISFSI Siting SRP

- ▶ Transportation Cask SRPs
 - ▷ Spent Fuel
 - ▷ Other Radioactive Materials

28