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March 18-20, 2008

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- “2007 Strategic Assessment of the Low-Level Radioactive Waste Regulatory Program,” dated March 25, 2008.
- “Review of ICRP Publication 103 - The 2007 Recommendations of the International Commission on Radiological Protection,” dated March 27, 2008.

**MINUTES OF THE 187TH MEETING OF
THE ADVISORY COMMITTEE ON NUCLEAR WASTE & MATERIALS
March 18-20, 2008
Rockville, Maryland**

The **187th** meeting of the Advisory Committee on Nuclear Waste & Materials was held in Conference Room 2B3, Two White Flint North Building, Rockville, Maryland, on **March 18 - 20, 2008**. Notice of this meeting was published in the *Federal Register* on **March 4, 2008 (73 FR 11681)** (Appendix I). The purpose of this meeting was to discuss and take appropriate action on the items listed in the meeting schedule and outline (Appendix II). The meeting was open to public attendance.

A transcript of selected portions of the meeting is available in the NRC's Public Document Room at One White Flint North, Room 1F-19, 11555 Rockville Pike, Rockville, Maryland. Copies of the transcript are available for purchase from Neal R. Gross and Co., Inc., 1323 Rhode Island Avenue, NW, Washington, DC 20005. Transcripts are also available at no cost to download from, or review on, the Internet at <http://www.nrc.gov/ACRS/ACNW>.

ATTENDEES

ACNW&M Members: Dr. Michael T. Ryan (ACNW&M Chairman), Mr. Allen Croff (ACNW&M Vice Chairman), Dr. James H. Clarke, and Dr. Ruth Weiner attended this meeting. For a list of other attendees, see Appendix III.

I. Chairman's Report

[Note: Mr. Antonio Dias was the Designated Federal Official for this portion of the meeting.]

Dr. Michael T. Ryan, Committee Chairman, convened the meeting at 8:30 A.M. He announced in his opening remarks that the meeting was being conducted in accordance with the provisions of the Federal Advisory Committee Act. In addition, he reviewed the agenda for the meeting and noted that no written comments or requests for time to make oral statements from members of the public had been received. Dr. Ryan also noted that a transcript of the open portions of the meeting was being kept and speakers were requested to identify themselves and speak with clarity and volume. He discussed the items of current interest and administrative details for consideration by the full Committee.

HIGHLIGHTS OF KEY ISSUES

II. Use of Burnup Credit for Licensing Spent Fuel Transportation Casks

[Note: Mr. Christopher Brown was the Designated Federal Official for this portion of the meeting.]

Representatives from the NRC Office of Nuclear Material Safety and Safeguards, Division of Spent Fuel Storage and Transportation (NMSS/SFST) and Oak Ridge National Laboratory (ORNL) briefed the Committee on the use of burnup credit (BUC) and the progress in resolving BUC issues for licensing spent fuel transportation casks.

The most common assumption used in criticality safety analysis of spent nuclear fuel (SNF) from nuclear reactors is that spent fuel has the same reactivity as unburned fuel. This approach is typically known as the "fresh fuel" assumption and results in conservatism in the calculated value of the system reactivity. Burnup accounts for the amount of energy released from a fuel assembly in terms of megawatt-days per metric ton of initial uranium (MWD/MTU) and is used as an indication of the reactivity reduction experienced by the fuel assembly once it has been "burned" in the reactor core. Current calculational methods have made possible taking credit for this reduction in reactivity, hence reducing some of the conservatism in the analysis while maintaining an adequate criticality safety margin. NMSS/SFST issued Interim Staff Guidance 8 (ISG-8) in May 1999, providing the first allowance of burnup credit for PWR fuel. Subsequently, ISG-8 has undergone two revisions, which have eliminated or lessened a number of the restrictions. The initial issuance and subsequent revisions of ISG-8 have provided the impetus for industry to proceed with a new generation of high-capacity rail-type cask designs using burnup credit. However, ISG-8 recommends the burnup credit allowance to be limited to that provided by the change in actinide composition only. To accommodate the majority of the SNF in high-capacity rail casks, extended burnup credit is needed (i.e., credit for the fission product nuclides as well). The use of higher-capacity packages enables a reduction in SNF casks, a reduction in cask handling and loading operations, and fewer cask shipments.

SFST staff indicated that computational codes supporting reactor core criticality are constantly being validated due to the monitoring aspect of any reactor operation. Data such as startup criticals or critical boron concentrations can be used to verify the precision of these codes. For SNF transportation, however, the existing reactor operational data does not perfectly fit the geometry and content of a cask. For this reason, the supporting computer codes need to be validated using critical benchmarks that more closely mimic a transportation cask. Dr. Cecil Parks from ORNL discussed why and how validation is done, what needs to be validated for full BUC in transport casks, and the potential data sources for BUC validation. The French critical experiments are the most suitable and currently available sources of data. Recent experiments in Japan using fission products are now becoming available and will be assessed. Domestic experiments at Sandia National Laboratory have been considered but may take time to mature. Dr. Parks indicated that the NRC Office of Nuclear Regulatory Research and ORNL will continue to work to obtain additional assay data for validation; however, sufficient data does exist to allow credit for some key fission products, which might be enough to support the industry's request. In addition, techniques for incorporating bias and uncertainty from assay data have been developed, illustrated, and documented.

The staff also told the Committee that they plan to recommend that data from the French critical experiments for fission product isotopes be obtained.

Dr. Everett Redmond from the Nuclear Energy Institute made a brief statement to the Committee in response to the staff's presentation. He briefly described what studies have been done by the industry. He indicated that a white paper on burnup credit will be submitted to the staff in the summer of 2008.

Committee Action

The Committee plans to write a letter addressing the staff's presentation on BUC.

III. Executive Session

RECONCILIATION OF ACNW&M COMMENTS AND RECOMMENDATIONS WITH
COMMITMENTS TO THE EXECUTIVE DIRECTOR FOR OPERATIONS (EDO)

There were no recent responses from the Executive Director for Operation (EDO) to previous ACNW&M letter reports that required reconciliation by the ACNW&M.

PROPOSED SCHEDULE FOR THE 188th ACNW&M MEETING

The Committee agreed to consider the following topic during the 188th ACNW&M meeting to be held April 8 - 10, 2008:

- Working Group on the Effects of Low Radiation Doses, Science and Policy

The meeting was adjourned on March 20, 2008, at 5:00 PM.

15 U.S.C. 4301 *et. seq.* ("the Act"), SAE Consortium Ltd. ("SAEC") has filed written notifications simultaneously with the Attorney General and the Federal Trade Commission disclosing changes in its membership. The notifications were filed for the purpose of extending the Act's provisions limiting the recovery of antitrust plaintiffs to actual damages under specified circumstances. Specifically, Novartis Pharmaceuticals Corporation, East Hanover, NJ has been added as a party to this venture.

No other changes have been made in either the membership or planned activity of the group research project. Membership in this group research project remains open, and SAEC intends to file additional written notification disclosing all changes in membership.

On September 27, 2007, SAEC filed its original notification pursuant to section 6(a) of the Act. The Department of Justice published a notice in the **Federal Register** pursuant to section 6(b) of the Act on November 7, 2007 (72 FR 62867).

Patricia A. Brink,

Deputy Director of Operations, Antitrust Division.

[FR Doc. 08-923 Filed 3-3-08; 8:45 am]

BILLING CODE 4410-11-M

NEIGHBORHOOD REINVESTMENT CORPORATION

NeighborWorks® America; Regular Board of Directors Meeting; Sunshine Act

TIME AND DATE: 10 a.m., Tuesday, March 4, 2008.

PLACE: 1325 G Street NW., Suite 800, Boardroom, Washington, DC 20005.

STATUS: Open.

CONTACT PERSON FOR MORE INFORMATION:

Erica Hall, Assistant Corporate Secretary, (202) 220-2376; ehall@nw.org.

AGENDA:

- I. Call to Order
- II. Approval of the Minutes
- III. Summary Report of the Audit Committee
- IV. Summary Report of the Corporate Administration Committee
- V. Summary Report of the Finance, Budget and Program Committee
- VI. Financial Report
- VII. Chief Executive Officer's Quarterly Management Report
- VIII. Connecticut Housing Finance Agency Nondiscrimination Resolution
- IX. Field Operations Presentation

X. Adjournment

Erica Hall,

Assistant Corporate Secretary.

[FR Doc. 08-943 Filed 2-29-08; 8:45 am]

BILLING CODE 7570

NUCLEAR REGULATORY COMMISSION

Advisory Committee on Nuclear Waste and Materials; Meeting Notice

The Advisory Committee on Nuclear Waste and Materials (ACNW&M) will hold its 187th meeting on March 18-20, 2008, at 11545 Rockville Pike, Rockville, Maryland.

Tuesday, March 18, 2008, Room T-2B3

8:30 a.m.-8:35 a.m.: Opening Remarks by the ACNW&M Chairman (Open)—The Chairman will make opening remarks regarding the conduct of today's sessions.

8:35 a.m.-5 p.m.: Discussion of ACNW&M Letter Reports (Open)—The Committee will discuss proposed ACNW&M reports on matters considered during previous meetings:

(1) Review of ICRP Publication 103—The 2007 Recommendations of the International Commission on Radiological Protection (ICRP); (2) NRC 2007 Strategic Assessment of the Low-Level Radioactive Waste Regulatory Program; (3) Scope of the Working Group Meeting on Managing Low-Activity Radioactive Waste.

Wednesday, March 19, 2008, Room T-2B3

8:30 a.m.-8:35 a.m.: Opening Remarks by the ACNW&M Chairman (Open)—The Chairman will make opening remarks regarding the conduct of today's sessions.

8:35 a.m.-10:30 a.m.: Use of Burnup Credit for Licensing Spent Fuel Transportation Casks (Open)—The Committee will hear presentations by and hold discussions with representatives of the NRC Office of Nuclear Material Safety and Safeguards, Division of Spent Fuel Storage and Transportation, regarding the use of burnup credit (BUC) and the progress in resolving BUC issues for licensing spent fuel transportation casks.

10:45 a.m.-5 p.m.: Discussion of ACNW&M Letter Reports (Open)—The Committee will continue to discuss potential and proposed ACNW&M letter reports from earlier discussions as well as a potential letter on the Use of Burnup Credit for Licensing Spent Fuel Transportation Casks.

Thursday, March 20, 2008, Room T-2B1

8:30 a.m.-8:35 a.m.: Opening Remarks by the ACNW&M Chairman (Open)—The Chairman will make opening remarks regarding the conduct of today's sessions.

8:35 a.m.-5 p.m.: Discussion of ACNW&M Letter Reports (Open)—The Committee will continue to discuss potential and proposed ACNW&M letter reports.

Procedures for the conduct of and participation in ACNW&M meetings were published in the **Federal Register** on September 26, 2007 (72 FR 54693). In accordance with those procedures, oral or written views may be presented by members of the public. Electronic recordings will be permitted only during those portions of the meeting that are open to the public. Persons desiring to make oral statements should notify Dr. Antonio F. Dias (Telephone 301-415-6805), between 8:15 a.m. and 5 p.m. (ET), as far in advance as practicable so that appropriate arrangements can be made to schedule the necessary time during the meeting for such statements. Use of still, motion picture, and television cameras during the meeting may be limited to selected portions of the meeting as determined by the ACNW&M Chairman. Information regarding the time to be set aside for taking pictures may be obtained by contacting the ACNW&M office prior to the meeting. In view of the possibility that the schedule for ACNW&M meetings may be adjusted by the Chairman as necessary to facilitate the conduct of the meeting, persons planning to attend should notify Dr. Dias as to their particular needs.

Further information regarding topics to be discussed, whether the meeting has been canceled or rescheduled, as well as the Chairman's ruling on requests for the opportunity to present oral statements and the time allotted therefore can be obtained by contacting Dr. Dias.

Video teleconferencing service is available for observing open sessions of ACNW&M meetings. Those wishing to use this service for observing ACNW&M meetings should contact Mr. Theron Brown, ACRS/ACNW&M Audio Visual Assistant (301-415-8066), between 7:30 a.m. and 3:45 p.m., (ET), at least 10 days before the meeting to ensure the availability of this service. Individuals or organizations requesting this service will be responsible for telephone line charges and for providing the equipment and facilities that they use to establish the video teleconferencing link. The availability of video

teleconferencing services is not guaranteed.

During the days of the meeting, phone number 301-415-7360 should be used in order to access anyone in the ACNW&M Office.

ACNW&M meeting agenda, meeting transcripts, and letter reports are available through the NRC Public Document Room at pdr@nrc.gov, or by calling the PDR at 1-800-397-4209, or from the Publicly Available Records System (PARS) component of NRC's document system (ADAMS) which is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> or <http://www.nrc.gov/reading-rm/doc-collections/acnw> (ACNW&M schedules and agendas).

Dated: February 27, 2008.

Andrew L. Bates,

Advisory Committee Management Office.
[FR Doc. E8-4123 Filed 3-3-08; 8:45 am]

BILLING CODE 7590-01-P

NUCLEAR REGULATORY COMMISSION

Sunshine Federal Register Notice

AGENCY HOLDING THE MEETINGS: Nuclear Regulatory Commission.

DATES: Weeks of March 3, 10, 17, 24, 31, April 7, 2008.

PLACE: Commissioners' Conference Room, 11555 Rockville Pike, Rockville, Maryland.

STATUS: Public and Closed.

MATTERS TO BE CONSIDERED:

Week of March 3, 2008

There are no meetings scheduled for the Week of March 3, 2008.

Week of March 10, 2008—Tentative

There are no meetings scheduled for the Week of March 10, 2008.

Week of March 17, 2008—Tentative

Monday, March 17, 2008

1 p.m. Briefing on NRC Reactor, Materials, and Waste Programs (Public Meeting) (Contact: Tamara Bloomer, 301 415-1725).

This meeting will be webcast live at the Web address—<http://www.nrc.gov>.

Tuesday, March 18, 2008

9:30 a.m. Briefing by Independent External Panel to Identify Vulnerabilities in the U.S. NRC's Materials Licensing Program (Public Meeting) (Contact: Aaron T. McCraw, 301-415-1277).

This meeting will be webcast live at the Web address—<http://www.nrc.gov>.

Week of March 24, 2008—Tentative

There are no meetings scheduled for the Week of March 24, 2008.

Week of March 31, 2008—Tentative

There are no meetings scheduled for the Week of March 31, 2008.

Week of April 7, 2008—Tentative

Monday, April 7, 2008

9:30 a.m. Briefing on Digital Instrumentation and Control (Public Meeting) (Contact: Steven Arndt, 301 415-6502).

This meeting will be webcast live at the Web address—<http://www.nrc.gov>.

*The schedule for Commission meetings is subject to change on short notice. To verify the status of meetings, call (recording)—(301) 415-1292. Contact person for more information: Michelle Schroll, (301) 415-1662.

* * * * *

ADDITIONAL INFORMATION: Affirmation of "Final Rule—10 CFR Part 73 'Safeguards Information Protection Requirements' (RIN 3150-AH57) (Tentative)" previously scheduled on February 20, 2008, at 1:25 p.m. was cancelled.

* * * * *

The NRC Commission Meeting Schedule can be found on the Internet at: <http://www.nrc.gov/about-nrc/policy-making/schedule.html>.

* * * * *

The NRC provides reasonable accommodation to individuals with disabilities where appropriate. If you need a reasonable accommodation to participate in these public meetings, or need this meeting notice or the transcript or other information from the meetings, or need this meeting notice or the transcript or other information from the public meetings in another format (e.g. braille, large print), please notify the NRC's Disability Program Coordinator, Rohn Brown, at 301-492-2279, TDD: 301-415-2100, or by e-mail at REB3@nrc.gov. Determinations on requests for reasonable accommodation will be made on a case-by-case basis.

* * * * *

This notice is distributed by mail to several hundred subscribers; if you no longer wish to receive it, or would like to be added to the distribution, please contact the Office of the Secretary, Washington, DC 20555 (301-415-1969). In addition, distribution of this meeting notice over the Internet system is available. If you are interested in receiving this Commission meeting schedule electronically, please send an electronic message to dkw@nrc.gov.

Dated: February 28, 2008.

R. Michelle Schroll,

Office of the Secretary.

[FR Doc. 08-947 Filed 2-29-08; 10:08 am]

BILLING CODE 7590-01-P

OVERSEAS PRIVATE INVESTMENT CORPORATION

March 20, 2008 Public Hearing

Time and Date: 2 p.m. Thursday, March 20, 2008.

Place: Offices of the Corporation, Twelfth Floor Board Room, 1100 New York Avenue, NW., Washington, DC.

Status: Hearing Open to the Public at 2 p.m.

Purpose: Public Hearing in conjunction with each meeting of OPIC's Board of Directors, to afford an opportunity for any person to present views regarding the activities of the Corporation.

Procedures: Individuals wishing to address the hearing orally must provide advance notice to OPIC's Corporate Secretary no later than 5 p.m. Thursday, March 13, 2008. The notice must include the individual's name, title, organization, address, and telephone number, and a concise summary of the subject matter to be presented.

Oral presentations may not exceed ten (10) minutes. The time for individual presentations may be reduced proportionately, if necessary, to afford all participants who have submitted a timely request to participate an opportunity to be heard.

Participants wishing to submit a written statement for the record must submit a copy of such statement to OPIC's Corporate Secretary no later than 5 p.m. Thursday, March 13, 2008. Such statements must be typewritten, double-spaced, and may not exceed twenty-five (25) pages.

Upon receipt of the required notice, OPIC will prepare an agenda for the hearing identifying speakers, setting forth the subject on which each participant will speak, and the time allotted for each presentation. The agenda will be available at the hearing.

A written summary of the hearing will be compiled, and such summary will be made available, upon written request to OPIC's Corporate Secretary, at the cost of reproduction.

FOR FURTHER INFORMATION CONTACT:

Information on the hearing may be obtained from Connie M. Downs at (202) 336-8438, via facsimile at (202) 218-0136, or via e-mail at connie.downs@opic.gov.



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE AND MATERIALS
WASHINGTON, D.C. 20555-0001**

February 26, 2008

**AGENDA
187th ACNW&M MEETING
MARCH 18-20, 2008**

**TUESDAY, MARCH 18, 2008, CONFERENCE ROOM T-2B3, TWO WHITE FLINT NORTH,
ROCKVILLE, MARYLAND**

- 1) 8:30 - 8:35 A.M. Opening Remarks by the ACNW&M Chairman (Open) (MTR/AFD)
The Chairman will make opening remarks regarding the conduct of today's sessions.

- 2) 8:35 - 12:00 P.M. Discussion of ACNW&M Letter Reports (Open) (All)
Discussion of proposed and potential ACNW&M letter reports on:
 - 2.1) Review of ICRP Publication 103 – The 2007 Recommendations of the International Commission on Radiological Protection (ICRP) (MTR/NMC)
 - 2.2) NRC 2007 Strategic Assessment of the Low-Level Radioactive Waste Regulatory Program (MTR/MPL)
 - 2.3) Scope of the Working Group Meeting on Managing Low-Activity Radioactive Waste (MTR/MPL)

- 12:00 - 1:00 P.M. ***** LUNCH *****

- 3) 1:00 - 5:00 P.M. Discussion of ACNW&M Letter Reports (Open) (All)
Continued discussion of proposed and potential ACNW&M letter report listed under Item 2.

- 5:00 P.M. **Adjourn**

**WEDNESDAY, MARCH 19, 2008, CONFERENCE ROOM T-2B3, TWO WHITE FLINT NORTH,
ROCKVILLE, MARYLAND**

- 4) 8:30 - 8:35 A.M. Opening Remarks by the ACNW&M Chairman (Open) (MTR/CLB)
The Chairman will make opening remarks regarding the conduct of today's sessions.

- 5) 8:35 - 10:30 A.M. Use of Burnup Credit for Licensing Spent Fuel Transportation Casks (Open) (RFW/AGC/CLB)
Representatives from the NRC Office of Nuclear Material Safety and Safeguards, Division of Spent Fuel Storage and Transportation, will brief the Committee on the use of burnup credit (BUC) and the progress in resolving BUC issues for licensing spent fuel transportation casks.

- 10:30 - 10:45 A.M. ***** BREAK *****

- 6) 10:45 - 12:00 P.M. Discussion of ACNW&M Letter Reports (Open) (All)
Continued discussion of proposed and potential ACNW&M letter reports listed under Item 2 and:
6.1) Use of Burnup Credit for Licensing Spent Fuel
Transportation Casks (RFW/AGC/CLB)

12:00 - 1:00 P.M. * LUNCH *****

- 7) 1:00 - 5:00 P.M. Discussion of ACNW&M Letter Reports (Open) (All)
Continued discussion of proposed and potential ACNW&M letter report listed under Item 6.

5:00 P.M. Adjourn

THURSDAY, MARCH 20, 2008, CONFERENCE ROOM T-2B1, TWO WHITE FLINT NORTH, ROCKVILLE, MARYLAND

- 8) 8:30 - 8:35 A.M. Opening Remarks by the ACNW&M Chairman (Open) (MTR/MPL)
The Chairman will make opening remarks regarding the conduct of today's sessions.

- 9) 8:35 - 12:00 P.M. Discussion of ACNW&M Letter Reports (Open) (All)
Continued discussion of proposed and potential ACNW&M letter reports listed under Item 6.

12:00 - 1:00 P.M. * LUNCH *****

- 10) 1:00 - 5:00 P.M. Discussion of ACNW&M Letter Reports (Open) (All)
Continued discussion of proposed and potential ACNW&M letter report listed under Item 6.

5:00 P.M. Adjourn

NOTES:

- Presentation time should not exceed 50 percent of the total time allocated for a given item. The remaining 50 percent of the time is reserved for discussion.
- Thirty five (35) hard copies and one (1) electronic copy of the presentation materials should be provided to the ACNW&M in advance of the briefing.
- During the days of the meeting, phone number 301-415-7360 should be used in order to access anyone in the ACNW&M Office.

ADVISORY COMMITTEE ON NUCLEAR WASTE AND MATERIALS
187th FULL COMMITTEE MEETING

March 18-20, 2008

TODAY'S DATE:

March 19, 2008

ATTENDEES PLEASE SIGN BELOW

PLEASE PRINT (CLEARLY)

NRC

	<u>NAME</u>	<u>NRC ORGANIZATION</u>
1.	Shana Helton	NMSS/SFST
2.	John Vera	NMSS/SFST
3.	Matthew Gordon	NMSS/SFST
4.	Mike Call	NMSS/SFST
5.	Zhian Li	NMSS/SFST
6.	Natreon Jordan	NMSS/SFST
7.	Sheera Whaley	NMSS/HLWRS
8.	Kent Wood	NRC/DSS/SR x D
9.	Veronica Wilson	NMSS/SFST
10.	Tony Attard	NRR/DSS/SONPB
11.	Carl Withec	NMSS/SFST
12.	Kim Hardin	NMSS/SFST
13.	MOURAD AISSA	RES/DSA
14.	RICHARD IEL	RES/DSA
15.	Brian Wagner	RES/DRA
16.	NATHAN SIM	RES/DRA
17.	Chris Spauls	NMSS/SFST
18.	ED MACILETT	NMSS/SFST
19.	Donald A. Cool	FSME
20.		

**ADVISORY COMMITTEE ON NUCLEAR WASTE AND MATERIALS
187th FULL COMMITTEE MEETING**

March 18-20, 2008

TODAY'S DATE:

March 19, 2008

ATTENDEES PLEASE SIGN BELOW

PLEASE PRINT (CLEARLY)

NAME

NRC ORGANIZATION

1.	_____	_____
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE AND MATERIALS
WASHINGTON, D.C. 20555-0001

March 18, 2008

AGENDA
188th ACNW&M MEETING
APRIL 8-10, 2008

TUESDAY, APRIL 8, 2008, CONFERENCE ROOM T-2B3, TWO WHITE FLINT NORTH,
ROCKVILLE, MARYLAND

WORKING GROUP ON THE EFFECTS OF LOW RADIATION DOSES
SCIENCE AND POLICY (Open)

Purpose

The objectives of this Working Group Meeting are: (1) to discuss the Linear Non-Threshold (LNT) theory in light of current health physics, medical theory and cohort databases; (2) to review uncertainties about the presence or absence of health effects at low doses; (3) to examine the balance of science and policy in regulatory practice; (4) to discuss possible alternative approaches to the LNT theory in regulatory practice; and (5) to develop the information necessary to provide a letter report to the Commission.

- 1) 8:00 – 8:05 A.M. Greetings and Introductions (MTR/NMC)
Dr. Michael Ryan, the cognizant ACNW&M Member for this meeting topic, will provide an overview of the expected goals for the Working Group Meeting, the planned technical sessions, and introduce the invited speakers.
- 2) 8:05 – 8:25 A.M. Opening Remarks by NRC Commissioner Peter B. Lyons

SESSION I: The State of the Science

- 3) 8:25 – 9:15 A.M. The Linear Non-Threshold Theory (LNT) – Is It Time to Consider a Change in Regulatory Policy?
Keynote Speaker: Professor Kenneth L. Mossman, Arizona State University
- 4) 9:15 – 10:00 A.M. National Council on Radiation Protection (NCRP) Perspective on Important Issues in Understanding the Biological Effects of Low Radiation Doses
Dr. Thomas S. Tenforde, President, NCRP
- 10:00 – 10:15 A.M. *****BREAK*****
- 5) 10:15 – 11:00 A.M. Results from DOE's Low Dose Radiation Research Program – What Does it Tell Us About the LNT Hypothesis?
Dr. Mary H. Barcellos-Hoff, Lawrence Berkeley National Laboratory

- 6) 11:00 – 11:45 A.M. Estimation of the Carcinogenic Effects of Low Doses of Ionizing Radiation – Insights about the LNT Hypothesis
Dr. Bernard Le Guen, Nuclear Plant Operations, Electricité de France; President, Health and Research Section, French Radiation Protection Society
- 11:45 – 1:00 P.M. ***LUNCH*****
- 7) 1:00 – 1:30 P.M. Overview of Uncertainties in the Estimates of Low-Dose Effects
Dr. Charles Land, National Cancer Institute
- 8) 1:30 – 3:00 P.M. Panel Discussion on Session I
ACNW&M Chair, Mike Ryan, will lead a panel discussion with the invited subject matter experts on the topics presented during this session.
- 3:00 – 3:15 P.M. ***BREAK*****
- 9) 3:15 – 4:00 P.M. Stakeholder Comments, Views and Perspectives
Opportunity will be given to attendees to make comments or brief presentations consistent with the purpose and objectives of the working group session.
- 10) 4:00 – 4:10 P.M. **Closing Remarks**
Dr. Mike Ryan, ACNW&M
- 11) 4:10 - 5:00 P.M. Discussion of ACNW&M Letter Reports (Open) (All)
Discussion of proposed and potential ACNW&M letter reports on:
11.1 Managing Low-Activity Radioactive Waste (MTR/MPL)
11.2 Use of Burnup Credit for Licensing Spent Fuel Transportation Casks (RFW/AGC/CLB)
- 5:00 P.M. Adjourn**

WEDNESDAY, APRIL 9, 2008, CONFERENCE ROOM T-2B3, TWO WHITE FLINT NORTH, ROCKVILLE, MARYLAND

**WORKING GROUP ON THE EFFECTS OF LOW RADIATION DOSES
SCIENCE AND POLICY - Continuation (Open)**

SESSION II: Balancing Science and Policy in the Regulatory Area

- 12) 8:30 – 8:45 A.M. Opening Remarks (MTR/NMC)
ACNW&M Chair, Mike Ryan, will open the meeting and make preliminary remarks. A brief overview of the meeting objectives will be given for attendees who were not present on Day 1.
- 13) 8:45 – 9:30 A.M. An Economic Perspective on Regulatory Decision-Making: Benefit vs. Cost Under Linear and Nonlinear Models
Professor James K. Hammitt, Harvard School of Public Health

- 9:00 – 9:45 A.M. ***BREAK*****
- 14) 9:45 – 10:30 A.M. U.S. Environmental Protection Agency (EPA) Perspective
Dr. Jerry Puskin, EPA
- 15) 10:30 – 11:15 A.M. U.S. Nuclear Regulatory Commission (NRC) Staff Perspective
Dr. Vincent Holahan, NRC's Office of Nuclear Regulatory
Research
- 11:15 – 1:00 P.M. ***LUNCH*****
- 16) 1:00 – 3:00 P.M. Panel Discussion and Individual Summaries by Expert Panelists
ACNW&M Chair, Mike Ryan, will lead a panel discussion with the
invited subject matter experts.
- 3:00 – 3:15 P.M. ***BREAK*****
- 17) 3:15 – 4:00 P.M. Stakeholder Comments, Views and Perspectives
As requested. Opportunity will be given to attendees to make
comments or brief presentations consistent with the purpose and
objectives of the working group session.
- 18) 4:00 – 4:10 P.M. **Closing Remarks**
Dr. Mike Ryan, ACNW&M.
- 19) 4:10 - 5:00 P.M. Discussion of ACNW&M Letter Reports (Open) (All)
Continued discussion of proposed and potential ACNW&M letter
reports listed under Item 11 and:
19.1) Effects of Low Radiation Doses (MTR/NMC)
- 5:00 P.M. Adjourn**

**THURSDAY, APRIL 10, 2008, CONFERENCE ROOM T-2B1, TWO WHITE FLINT NORTH,
ROCKVILLE, MARYLAND**

- 20) 8:30 – 8:35 A.M. Opening Remarks by the ACNW&M Chairman (Open) (MTR/AFD)
The Chairman will make opening remarks regarding the conduct
of today's sessions.
- 21) 8:35 - 4:00 P.M. Discussion of ACNW&M Letter Reports (Open) (All)
Continued discussion of proposed and potential ACNW&M letter
reports listed under Item 19. There may be a 1 hour lunch break
at some point during the discussion.
- 22) 4:00 - 5:00 P.M. Miscellaneous (Open) (All)
The Committee will discuss matters related to the conduct of
ACNW&M activities and specific issues that were not completed
during previous meetings. Discussions may include content of
future letters and scope of future Committee Meetings.
- 5:00 P.M. Adjourn**

NOTES:

- Presentation time should not exceed 50 percent of the total time allocated for a given item. The remaining 50 percent of the time is reserved for discussion.
- Thirty five (35) hard copies and one (1) electronic copy of the presentation materials should be provided to the ACNW&M in advance of the briefing.
- During the days of the meeting, phone number 301-415-7360 should be used in order to access anyone in the ACNW&M Office.

ML080780307

**LIST OF DOCUMENTS PROVIDED TO THE COMMITTEE
187th ACNW&M MEETING
March 18-20, 2008**

MEETING HANDOUTS

<u>AGENDA ITEM #</u>	<u>DOCUMENTS/HANDOUTS LISTED IN ORDER</u>
1.	<u>Opening Remarks by the ACNW&M Chairman</u>
2.	<u>Discussion of ACWN&M Reports</u>
3.	<u>Discussion of ACWN&M Reports</u>
4.	<u>Opening Remarks by the ACNW&M Chairman</u>
5.	<u>Use of Burnup Credit for Licensing Spent Fuel Transportation Casks</u> <ol style="list-style-type: none"> 1. Validation Data for PWR Storage and Transportation Casks That Use Burnup Credit (Slides from Oak Ridge National Labs, Cecil Parks) 2. Risk Considerations for Criticality in Burnup Credit Spent Fuel Transportation Casks (Slides from NRC/NMSS, Andrew Barto) 3. Use of Burnup Credit for Design of Criticality Safety Systems in PWR Spent Nuclear Fuel Casks (Slides from NRC, Rahimi/Parks/Barto)
6.	<u>Discussion of ACWN&M Reports</u>
7 - 10.	<u>Discussion of ACWN&M Reports</u>

**Copies of most of the handouts can be obtained through the transcript copy found in the Agency Document Management System (ADAMS) or a complete set can be requested by calling the ACRS office of the NRC.

[Note: Some documents listed herein may have been provided or prepared for the Committee use only. These documents must be reviewed prior to release to the public.]

Handout submitted by email for the 187th Meeting of the Advisory Committee on Nuclear Waste and Materials, March 17th, 2008

The attached letter and paper from Alan Pasternak were provided to the Committee as handouts for the above referenced meeting.

From: Mike Lee
To: ACNW Members
Date: 03/17/2008 9:32:50 AM
Subject: Fwd: Cal Rad Presentation at WM 2008

...also as stated

>>> <apasconslt@aol.com> 03/16/2008 6:36 PM >>>
Mike,

The attached file is my presentation for Cal Rad at last month's Waste Management 2008 held in Phoenix. I would appreciate it if you would distribute this to the members of ACNW&M and staff prior to the meeting on Tuesday, March 18. This presentation references several statements by Commissioners and the NRC concerning the inadequacy of the current policy framework for LLW disposal including a statement in 2002 by former Chairman Meserve on the need for Congressional action.

Alan
Cal Rad Forum
925/283-5210

CC: ACNW Staff; Carol Brown; James Kennedy; Michele Kelton;
Scott Flanders

From: Mike Lee
To: ACNW Members
Date: 03/17/2008 9:32:00 AM
Subject: Fwd: Cal Rad Comments to ACNW&M on NRC staff's Strategic Assessment on LLW Program

...as previously noted

>>> <apasconslt@aol.com> 03/15/2008 1:50 PM >>>
March 15, 2008

From: Alan Pasternak, Technical Director, Cal Rad Forum

To: Mike Lee, NRC ACNW&M

Subj.: Cal Rad Comments to ACNW&M on NRC staff's Strategic Assessment on LLW Program

Mike,

Attached is a letter with Cal Rad Forum's comments on the staff's Strategic Assessment on the LLW Program. I would greatly appreciate it if you would distribute our letter to members of the ACNW&M and appropriate staff in time for the Committee's meeting on March 18.

Alan
925/283-5210

CC: ACNW Staff; Carol Brown; James Kennedy; Michele Kelton; Scott Flanders

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March 15, 2008

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Chairman Mike Ryan and Members of the U.S.
Nuclear Regulatory Commission's Advisory
Committee on Nuclear Waste and Materials

Dear Dr. Ryan and Committee Members,

Cal Rad Forum would like to offer a few comments on the NRC staff's Strategic Assessment of the Commission's low-level waste program as it relates to disposal of Class B and C low-level waste (LLW) after June 30, 2008.

We believe finding disposal options for Class B and C LLW generated by non-DOE users of radioactive materials in the thirty-six states that will lose access to the Barnwell disposal facility next July 1 is the major issue facing the nation in the area of low-level waste disposal. Because this cut-off date is so close, any near-term solution must rely on existing disposal facilities. Unfortunately, the Strategic Assessment fails to assign a high priority to activities that might substantially improve the situation in the near term.

Cal Rad's Proposed Solutions

Long-Term: Cal Rad supports the Health Physics Society's proposal for disposing of non-DOE Class B and C LLW at the disposal facility for non-DOE Greater-than-Class C LLW that the Department of Energy has been mandated by Congress to develop.

Near-Term: Cal Rad proposes disposing of non-DOE Class B and C LLW at existing disposal facilities that the DOE now operates for its own

Visit Cal Rad's web site at www.calradforum.org

wastes. This solution might require some simple, straightforward amendments to existing statutes. In any event, it is certainly not necessary to repeal the existing Policy Act or the Compact framework, only to provide access to DOE disposal facilities for those users of radioactive materials who otherwise will have no pathway for disposal of their Class B and C wastes.

Comments on The Strategic Assessment

Legislative changes should be assigned a high priority. The report's summary of examining legislative changes (page C-11 of the Strategic Assessment) notes a number of potential benefits from this approach and an investment of only 0.15 FTE per year. Nevertheless, the report assigns a low ranking on the questionable basis that this task would be difficult with a low probability. However, we believe examination of legislative changes is justified by the high benefit-to-cost ratio. For example, the report notes the following:

“If new legislation were passed that enabled all LLW to have a reliable disposal path, the effect on safety and security would be significant.”

“The impact of this task on effectiveness would be potentially high if legislative changes are eventually made that allow similar types of waste to be disposed of similarly and on a risk-informed basis.”

“The ultimate benefits of this effort would be potentially large with respect to effectiveness (e.g., improvement in regulatory flexibility, elimination of regulatory overlap) as well as the cost of disposal, and potentially safety and security as well by eliminating any need for long-term storage of LLW.”

But the report argues that “... there is likely to be very large resistance to change in the current system; resistance to change is fairly common in situations in which an established system has been in place for an extended period of time.” Certainly, twenty-eight years since enactment of the LLW Policy Act is a long time, especially when no new disposal facilities have been produced and most of the nation's Class B and C wastes are about to lose their only disposal path. In addition, there is widespread agreement that the current system has failed, so change might not be as difficult as the report asserts.

We hope the Committee, and the Commission; will recognize the benefits of legislative changes. Indeed, the NRC has, in the past, urged a new framework for LLW disposal.

Reliance on Part 61.58 is misplaced. The report's summary of developing guidance to meet the provisions of 10CFR61.58 regarding alternate means of classifying and characterizing waste on a case-specific basis is found on page C-16 of the Assessment. The transcript of the ACNW&M meeting on December 18, 2007 indicates that some place great reliance on use of 10CFR61.58 to solve the Class B, C disposal problem. This reliance is misplaced — at

least for a near-term solution. Utah, the State where most Class A waste is now disposed, and will be disposed for many years, does not include anything equivalent to Part 61.58 in its regulations. Furthermore, in 2005, Utah enacted a law banning storage and disposal of Class B and C wastes (Section 19-3-103.7. Prohibition of certain radioactive wastes.). It is reasonable to expect that Utah would object to any effort to reclassify these wastes now and would assert that their statutory ban applies to waste classes as they were defined when the law was enacted.

We hope the Committee will take our comments into consideration as you prepare your letter on the Strategic Assessment to the Commission.

Cal Rad plans to have a representative on a phone bridge on March 18th to answer any questions the Committee and staff may have concerning our comments and positions.

Sincerely,

Alan Pasternak

cc: Cal Rad Forum Board of Directors
Cal Rad Forum Corporate and Institutional Members

WM2008 Conference, February 24-28, 2008, Phoenix, AZ

Assuring Access to Low-Level Radioactive Waste Disposal Facilities for Non-DOE Users of Radioactive Materials: Solutions “Outside the Box.”

A.D. Pasternak, Ph.D.
California Radioactive Materials Management Forum
P. O. Box 1638, Lafayette, CA 94549-1638

ABSTRACT

This paper proposes both near-term and long-term solutions for disposal of low-level radioactive waste (LLRW) Classes B and C generated by non-DOE organizations in thirty-six states that will lose access to the Barnwell, SC disposal facility on July 1, 2008. The solutions proposed here call for the federal government, specifically the US Department of Energy (DOE), to play a key role and are outside the existing interstate compact framework established by the Low-Level Radioactive Waste Policy Act of 1980 (amended in 1985) and subsequent state ratification and Congressional consent statutes.

INTRODUCTION

South Carolina law and Atlantic Compact policies call for access to the Compact’s regional disposal facility at Barnwell to be restricted to the three Compact states (South Carolina, Connecticut, and New Jersey) on July 1, 2008. Recent events, including rejection by the South Carolina Legislature of a proposed change in law, indicate that this date will stick. How serious is the situation? On July 1, 2008, public and private institutions and corporations and all federal and state government agencies, except the U.S. Department of Energy, that use radioactive materials in thirty-six states, the District of Columbia, and Puerto Rico will have no place to dispose of their Class B and Class C LLRW. These are the states not among the fortunate fourteen in the Northwest, Rocky Mountain, and Atlantic Compacts. The regional disposal facilities in Richland, Washington (Northwest and Rocky Mountain Compacts) and Barnwell, South Carolina (Atlantic Compact) are the only facilities licensed to dispose of Class B and C LLRW. Access to the Richland disposal facility has been restricted to the Northwest and Rocky Mountain Compacts since 1993. Utah statute limits the EnergySolutions disposal facility at Clive to Class A waste. This facility operates outside the compact system and is open to all states except those in the Northwest and Rocky Mountain Compacts. It is the only facility to which organizations in the thirty-six states will be able to send their Class A waste — not including biological wastes and sealed sources — after next July 1. According to data from the DOE’s Manifest Information Management System (MIMS), in 2006, the activity (curies) in low-level waste Classes B and C disposed of at Barnwell by the non-DOE users in these thirty-six states accounted for 95% of the Activity disposed of at all three disposal facilities (Barnwell, SC; Richland, WA; and Clive, UT) by all non-DOE generators. The phrase “non-DOE” more accurately describes those users of radioactive materials with which we are concerned here than the often-used description “commercial.” We are concerned with institutional users such as universities, medical, and research

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centers, agencies of state and federal governments — except for the DOE, as well as commercial users such as utilities with nuclear power plants and industries including pharmaceutical and biotech companies, i.e., all users of radioactive materials except the DOE which has its own disposal facilities.

A solution for Class B and C LLRW, other than indefinite, on-site storage is badly needed. And, of course, on-site storage is not an option for facilities undergoing decommissioning.

THE LOW-LEVEL WASTE POLICY ACT IS NOT WORKING

Since passage of the Low-Level Waste Policy Act in 1980 (amended in 1985), Congress has approved ten interstate disposal compacts, but no new disposal facilities meeting the Act's requirements for disposal of LLRW waste classes A, B, and C have been developed under state oversight as called for in the Policy Act. Only one proposed facility received a conditional license: the proposed Ward Valley disposal facility in California's arid Mojave Desert designed to serve the four states of the Southwestern Compact (Arizona, California, North Dakota, and South Dakota). The Ward Valley facility never opened because of political opposition, first by the Clinton Administration and later by the California Legislature and Governor (former Governor Davis). Only one State, Texas, still has an active program to develop a new disposal facility (Texas and Vermont Compact).

For some time, federal officials have noted that the Act is failing. In a speech on May 14, 2002¹ then-NRC Chairman Richard Meserve noted,

“...the low-level waste siting program in this country is not working. Moreover, barring Congressional action, which is unlikely in the near term, the situation is unlikely to change.”

Cal Rad believes that Chairman Meserve was perceptive in noting the necessity for Congressional action. At the time of this speech, Mr. Meserve was hopeful, as were Cal Rad and others, that Envirocare of Utah (now known as EnergySolutions) would obtain approval from the State of Utah for disposal of Class B and C wastes. However, a state law, enacted in 2005, prohibits the acceptance of Class B and C wastes for storage or disposal.² In his 2002 speech, Chairman Meserve went on to say,

“Sufficient disposal capacity currently exists to handle today's disposal needs, particularly in light of the trend towards license renewal of civilian nuclear power plants. (License renewal delays decommissioning and hence postpones the need to dispose of the waste associated with decommissioning.) In addition, waste minimization, volume reduction, and decay-in-place strategies reduce the overall volume of material. Nonetheless, the disposal situation is increasingly uncertain. With the eventual closure of the Barnwell disposal facility to states outside the Atlantic Compact, the absence of progress in other Compacts to site low-level waste disposal facilities, and few other disposal options, access to facilities for the disposal of low-level waste is increasingly constrained. Although Envirocare of Utah may eventually obtain state approval for disposal of Class B and C

¹ “Providing Certainty in Low-Level Radioactive Waste Disposal: The Continuing Challenge.”

² http://www.le.state.ut.us/~code/TITLE19/19_03.htm

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wastes, the limited options for disposal are likely to keep disposal costs high. There is thus the potential that the decommissioning process for many sites and the medical use of radionuclides will be affected adversely.”

Other members of the NRC — Commissioners Jaczko, Lyons, and Merrifield — have also commented on the post-July 1, 2008 Class B and C LLRW disposal problem.³

In comments on a 2004 report of the General Accounting Office, the NRC noted,

“At the same time, the nearly 20 years of experience under the Low-Level Radioactive Waste Policy Amendments Act of 1995(LLRWPA) has demonstrated the difficulties in siting and licensing a LLRW disposal facility. Not one new facility has been developed in this time under the LLRWPA. Therefore, we believe it is in the national interest to begin exploring alternatives identified in Appendix II that would potentially provide a better legal and policy framework for new disposal options for commercial generators of LLRW.” (Quoted in part; emphasis added.)⁴

PROPOSED LONG-TERM SOLUTION FOR DISPOSAL OF NON-DOE CLASS B AND C LOW-LEVEL RADIOACTIVE WASTES

The Department of Energy has issued a Notice of Intent to Prepare an Environmental Impact Statement for the Disposal of Greater-Than-Class C (GTCC) Low-Level Radioactive Waste. This action by the DOE was pursuant to statute. Cal Rad supports the proposal, first advanced by the Health Physics Society (HPS),⁵ that the GTCC disposal facility also be used for the disposal of non-DOE Class B and C low-level waste. We note that the DOE has already modified the Congressional mandate to dispose of non-DOE GTCC waste to also include its own “greater-than-Class C-like” LLRW and transuranic wastes. It should not be too much of an additional modification for Congress to include non-DOE Class B and C wastes as suggested by the HPS. Existing statute requires further Congressional action in any event. Before issuing a Record of Decision (ROD) for the GTCC facility, the DOE must obtain Congressional approval of its EIS. Furthermore, if a facility can safely dispose of GTCC wastes, it can certainly dispose of Class B and C wastes safely. Also, the additional waste volumes should improve the economics of the GTCC facility.

³ January 11, 2006. Transcript of Meeting of the Commission with Members of the Advisory Committee on Nuclear Waste. Commissioners Jaczko pp. 44-45, Lyons pp. 48-49, and Merrifield (failure of the LLRW Policy Act) pp. 59-60.

⁴ GAO Report, GAO-04-604, p. 49.

⁵ September 17, 2007, Letter from Health Physics Society to Department of Energy Office of Regulatory Compliance: “Comments on Notice of Intent to Prepare an Environmental Impact Statement for the Disposal of Greater-Than-Class C (GTCC) Low-Level Radioactive Waste.”

PROPOSED NEAR-TERM SOLUTION FOR DISPOSAL OF NON-DOE CLASS B AND C LOW-LEVEL RADIOACTIVE WASTES

Development of the GTCC disposal facility, or any new LLRW disposal facility, will take some years. In order to avoid a long period of time during which non-DOE users of radioactive materials would be without access to any disposal facility for their Class B and C wastes, it will be necessary to rely, for some period of time, on facilities that exist today. Here again, we look to the federal government to fashion a national solution: access to existing Department of Energy disposal facilities which dispose of DOE waste materials that are similar to non-DOE wastes classified as B and C under NRC regulations. According to a DOE Inspector General's report issued in 2001, there is excess capacity at disposal facilities operated by the Department for its own LLRW.⁶ There are a number of such facilities around the country. Indeed, in order to fulfill the Congressional mandate for disposal of GTCC wastes, the Department of Energy is looking at its sites that currently have waste disposal operations. Specifically, DOE plans to include in its GTCC EIS analysis the WIPP repository, Hanford and Oak Ridge Reservations, Idaho and Los Alamos National Laboratories, Nevada Test Site, and Savannah River Site.

It should be noted that the Department of Energy is already contributing to a management solution for some non-DOE wastes. Through a program run by the Los Alamos National Laboratory, the Department's Off-Site Recovery Project (OSRP) collects and stores sealed radioactive sources from a wide variety of commercial and institutional users. This project exemplifies a federal resolution of a national waste problem — the kind of federal role that is needed today to resolve the Class B and C LLRW disposal problem in a timely, safe, and economical way.

⁶ "Utilization of the Department's Low-Level Waste Disposal Facilities," DOE/IG-05-5, May 25, 2001.

Validation Data for PWR Storage and Transportation Casks That Use Burnup Credit

**Presented by
Cecil Parks
Oak Ridge National Laboratory**

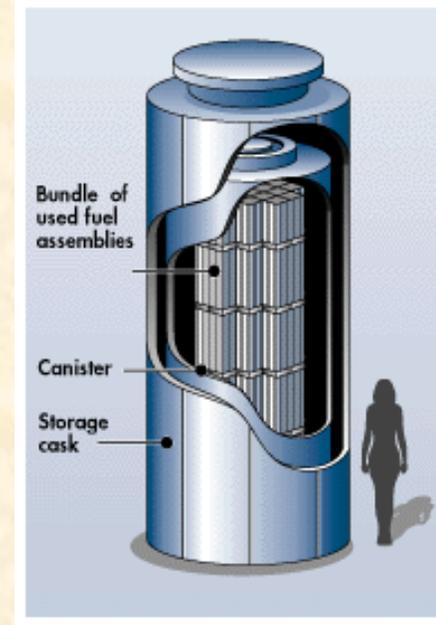
**Briefing for
Advisory Committee on Nuclear Waste
and Materials
March 19, 2008**

Topics

- **Why and how validation is done**
- **What needs to be validated for burnup credit in transport packages**
- **Data sources for burnup credit validation**

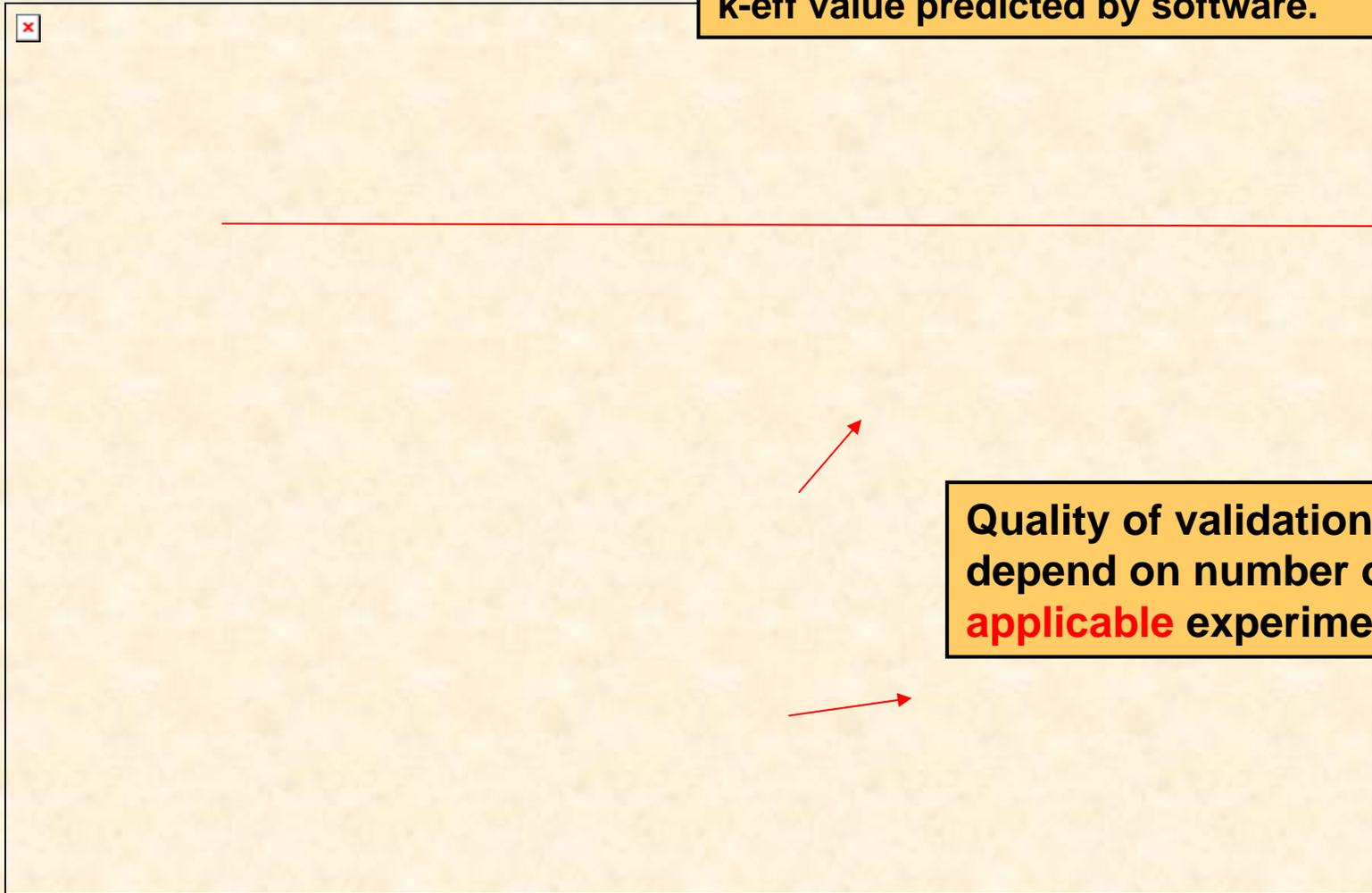
Software validation expected for Part 71 consistent with well-established domestic and international practice for criticality safety

- **Part 71 (and NMSS) approach endorses and follows domestic (ANSI) and international (ISO) standards for **out-of-reactor** criticality safety analyses**
 - Standards require comparison of predicted vs. experimental data to obtain bias and bias uncertainty
 - **Goal is to establish an acceptance criteria (e.g., .98) below which there is a high degree of confidence that a system that is calculated to be subcritical is indeed subcritical**
- **The ability to demonstrate confidence in the predicted margin of subcriticality (i.e., validation) is crucial to assuring credible events do not cause a potential for criticality**
 - A larger margin (system k-eff very low) may allow a lower expectation in the quality of the validation
 - Crediting contributors to margin without adequate validation of their predicted contribution reduces confidence in the ability to assure subcriticality.



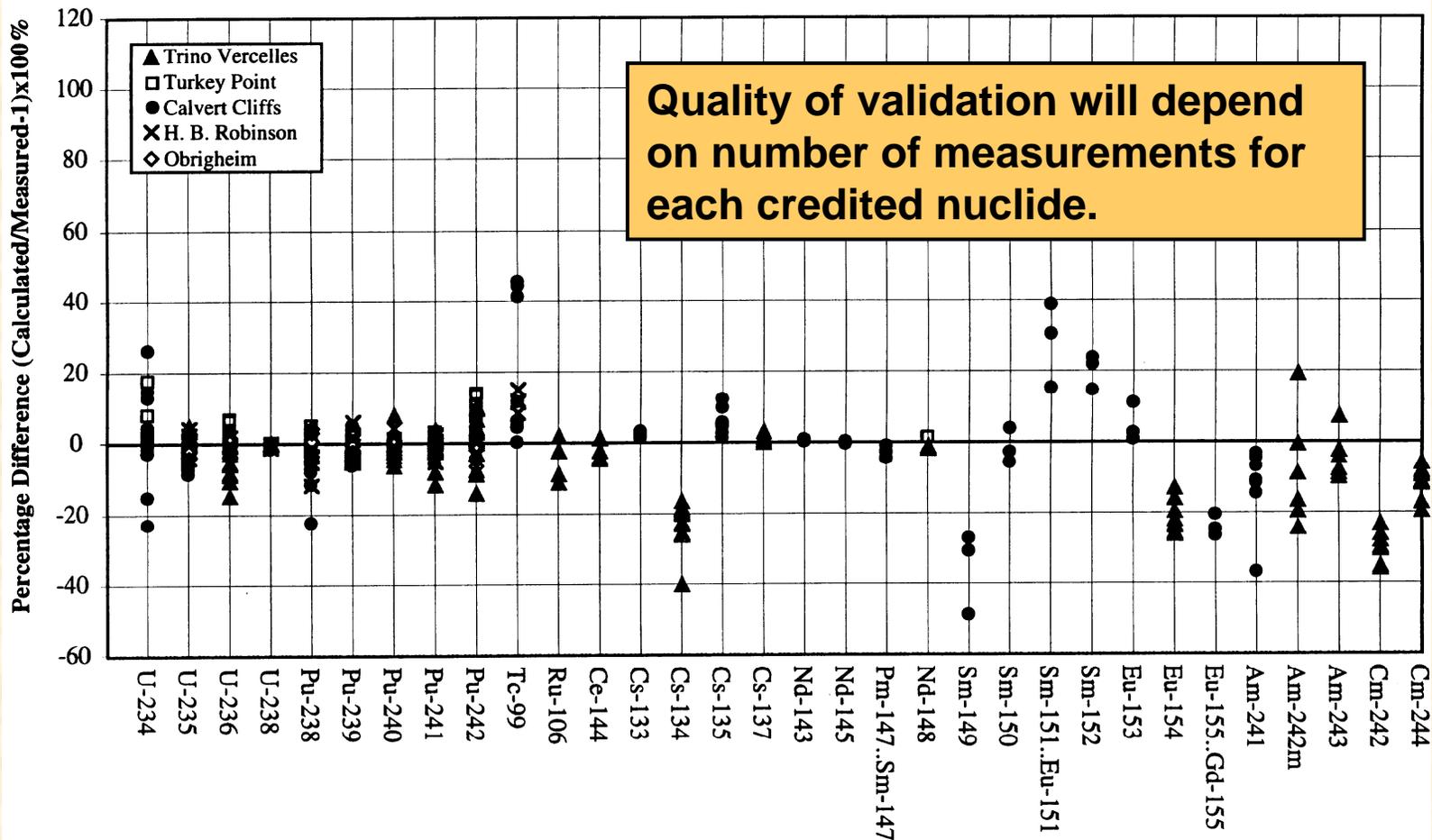
Confidence in calculated k-effective typically obtained from statistical assessment of bias and uncertainty in prediction of critical ($k = 1.0$) experiments.

Illustrative Example – Each point represents k-eff value predicted by software.



Quality of validation will depend on number of applicable experiments.

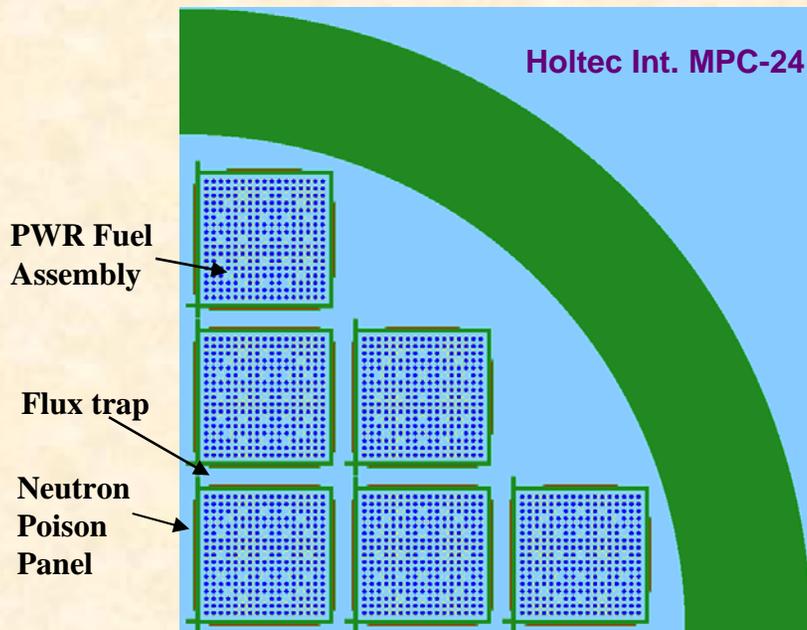
Validation using measured assay data can be done in similar manner to enable prediction of bias and uncertainty for calculated isotopic composition of spent fuel.



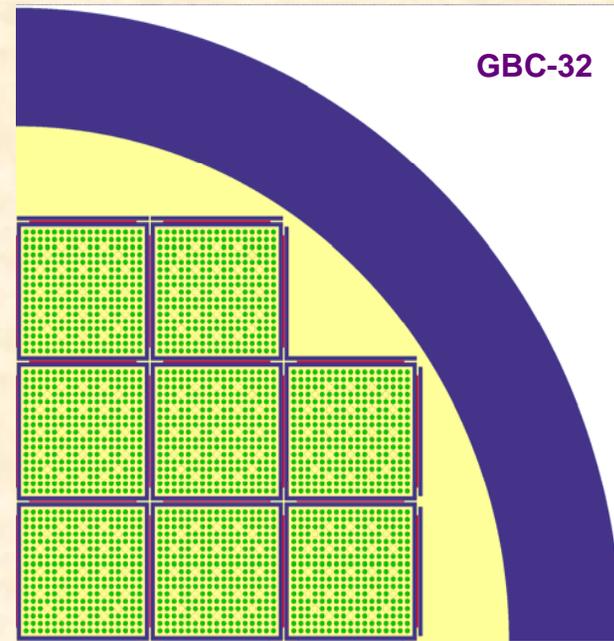
For US, burnup credit offers significant advantages for transport and storage

- More cost-effective, **higher-density** storage and transport
- Validation should consider **applicability** to the materials of interest and the system of concern

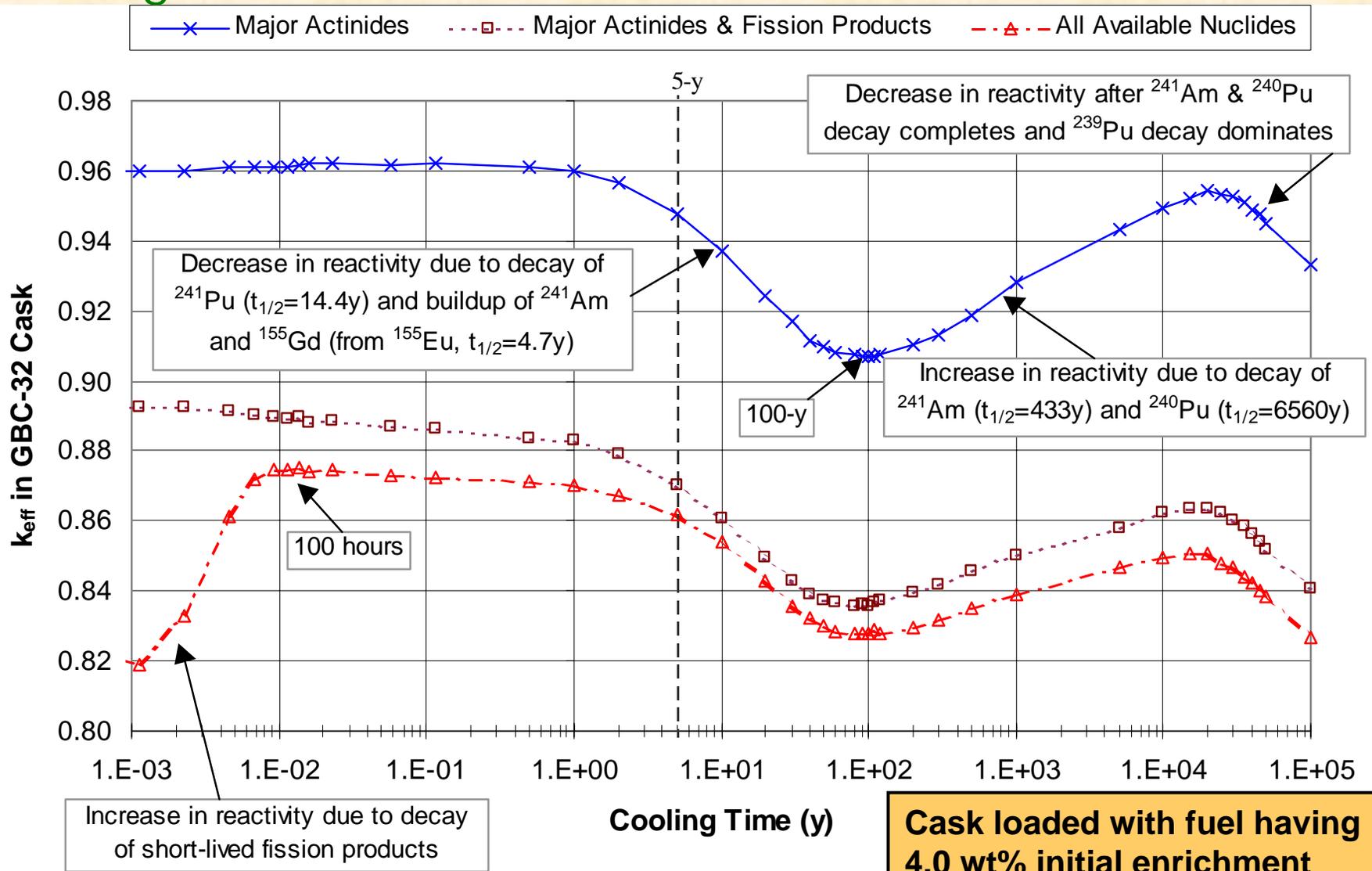
Non-burnup credit cask



High-capacity BUC transport cask

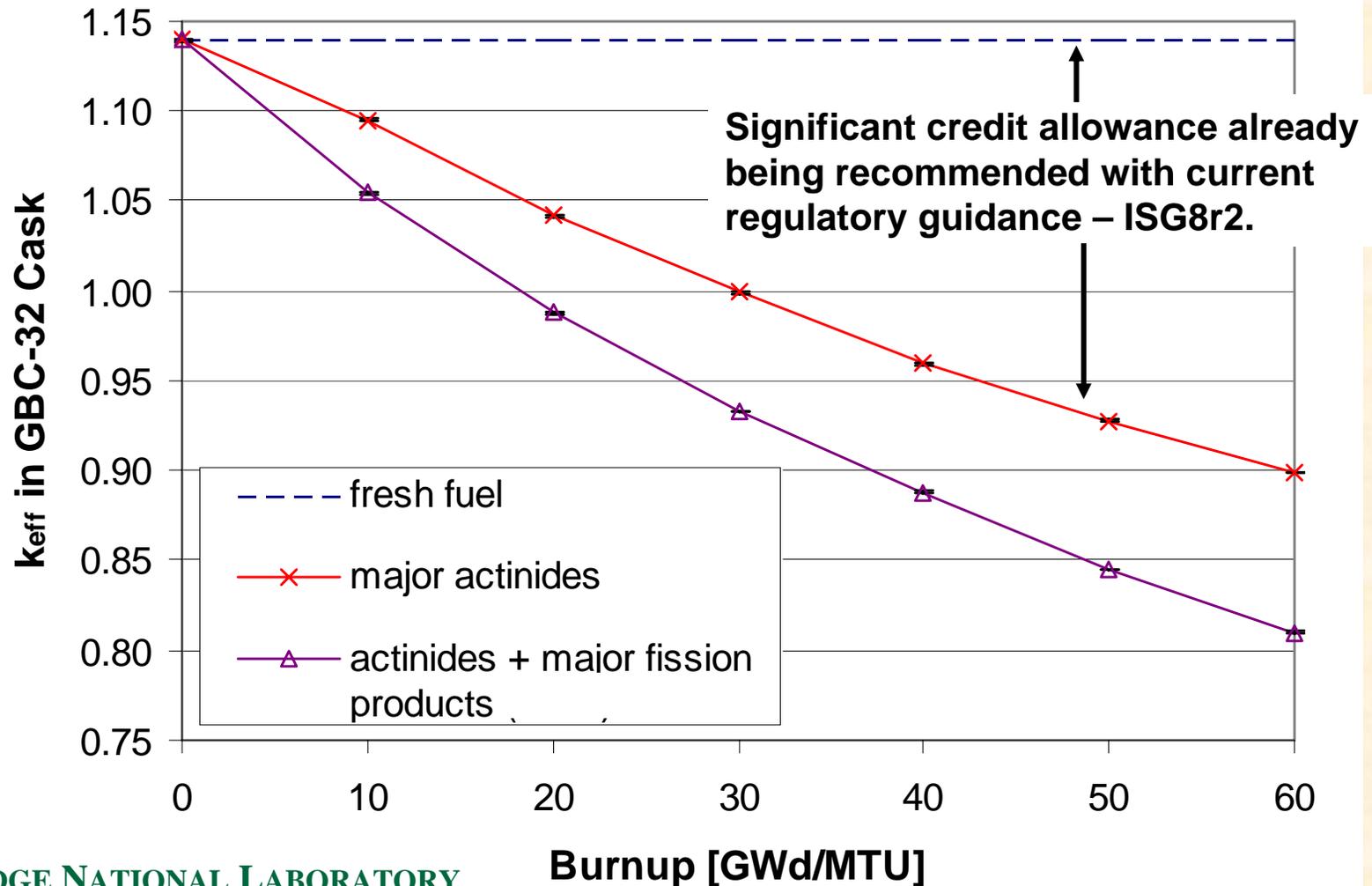


k-eff and the nuclides of importance will change with cooling time.



Cask loaded with fuel having 4.0 wt% initial enrichment and burned to 40 GWd/MTU.

In comparison with fresh fuel, negative reactivity margin associated with actinides much greater than estimated additional reactivity provided by fission products (FPs).

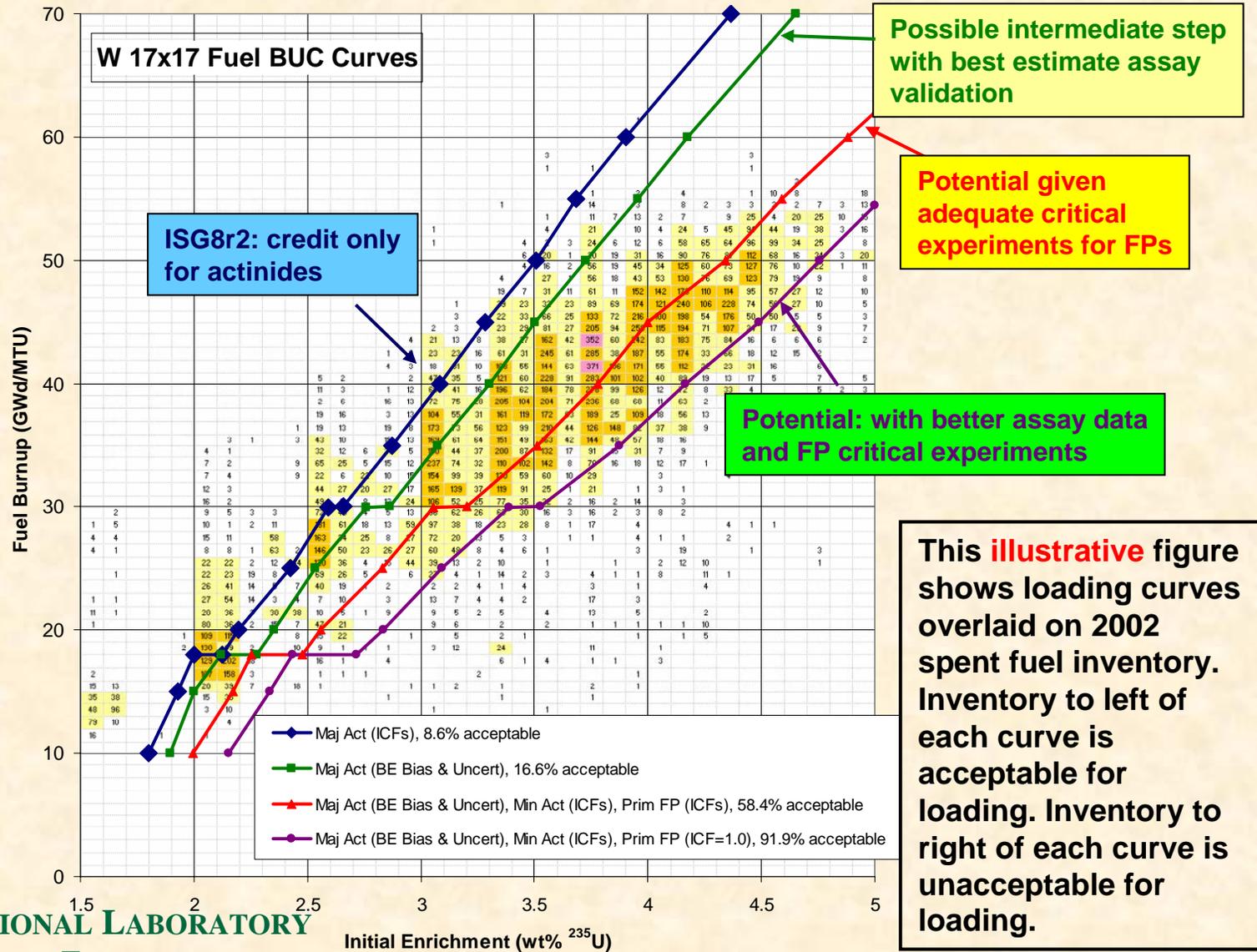


FP Reactivity Worth for "Typical" Burnup in Generic Burnup Credit Cask (GBC-32)

4 wt% Westinghouse 17 × 17 OFA, Burned to 40 GWd/MTU

	k_{eff}	Δk	$\% \Delta k$	$\% \text{Worth}$
Fresh Fuel	1.13653			
Major Actinides	0.94507	0.19146	71.9	
All Actinides	0.93486	0.01021	3.8	
Key 6 FP	0.88499	0.04987	18.7	
^{149}Sm	0.91926			29.3
^{143}Nd	0.92261			23.0
^{103}Rh	0.92609			16.5
^{151}Sm	0.92646			15.8
^{133}Cs	0.93065			7.9
^{155}Gd	0.93082			7.5
				100% of 18.7
All FP	0.87010	0.01489	5.6	
Total		0.26643	100	

Percentage of fuel inventory that can be loaded improves significantly as needed data for validation is obtained.



Validation consistent with standards requires additional experiment data for fission products

- **EPRI has concurred that experimental data for validation are a limiting factor for extending to full BUC**

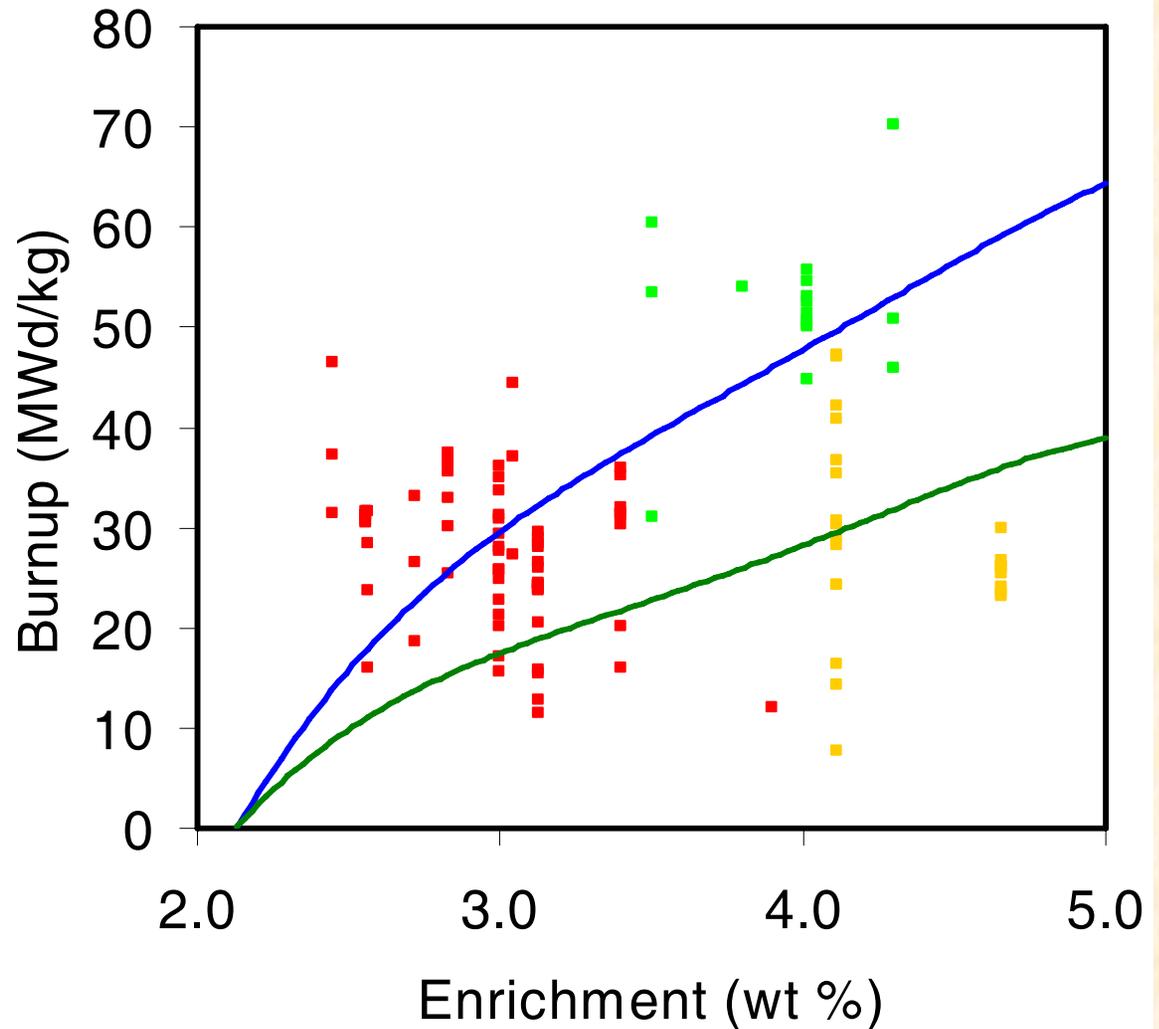
“ISG-8, Revision 2 can be viewed as providing as much burnup credit flexibility as can be currently expected (UO₂ fuel irradiated in PWRs only, with no credit for fission products) based on the extent and range of the available data” (Source: EPRI 1002879)

- **Sources of data sought include**
 - **Domestic experimental facilities and programs**
 - **Commercial reactor critical (CRC) configurations**
 - **Non-domestic and international programs**

PWR Experimental Data

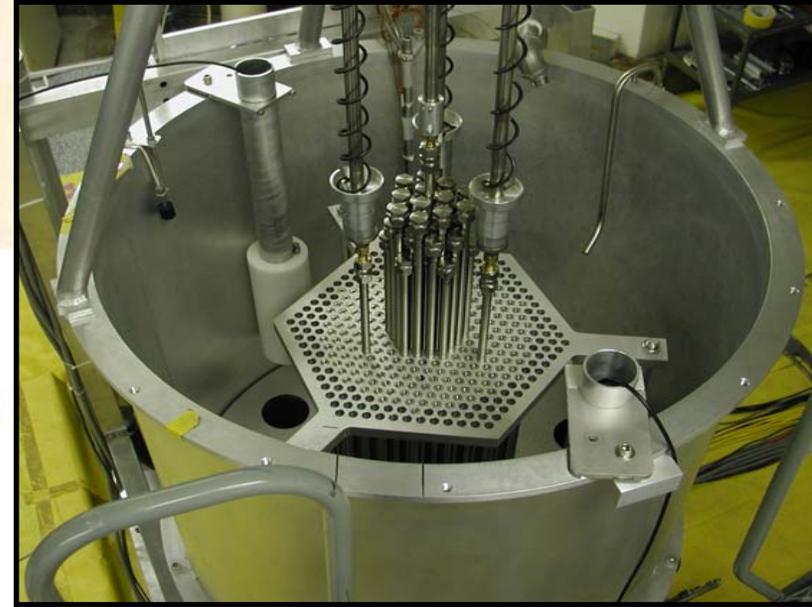
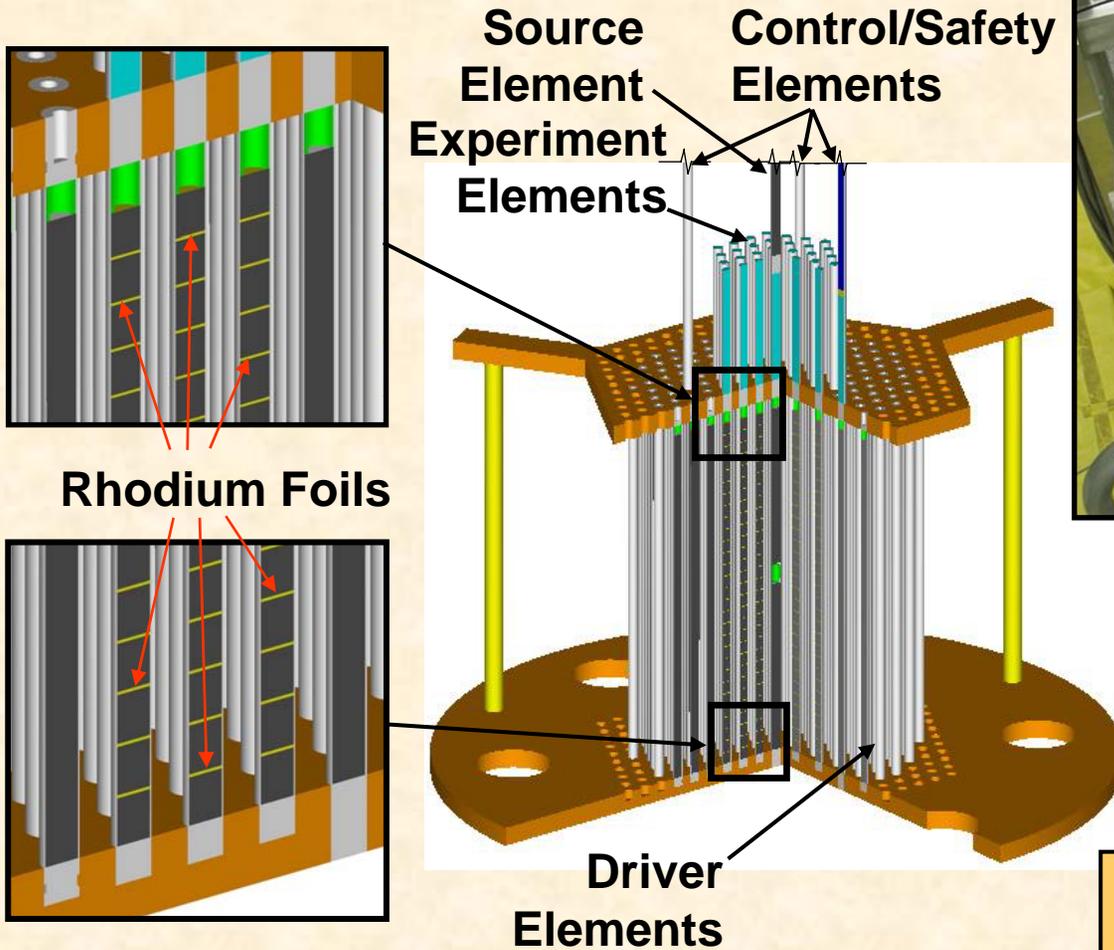
Illustrating Range and
Isotopic Data Measured

**NRC/RES and ORNL
continue to work to
obtain additional assay
data for validation, but
sufficient data exists to
credit some key fission
products**



■ Complete sets ■ Actinide only ■ Partial sets

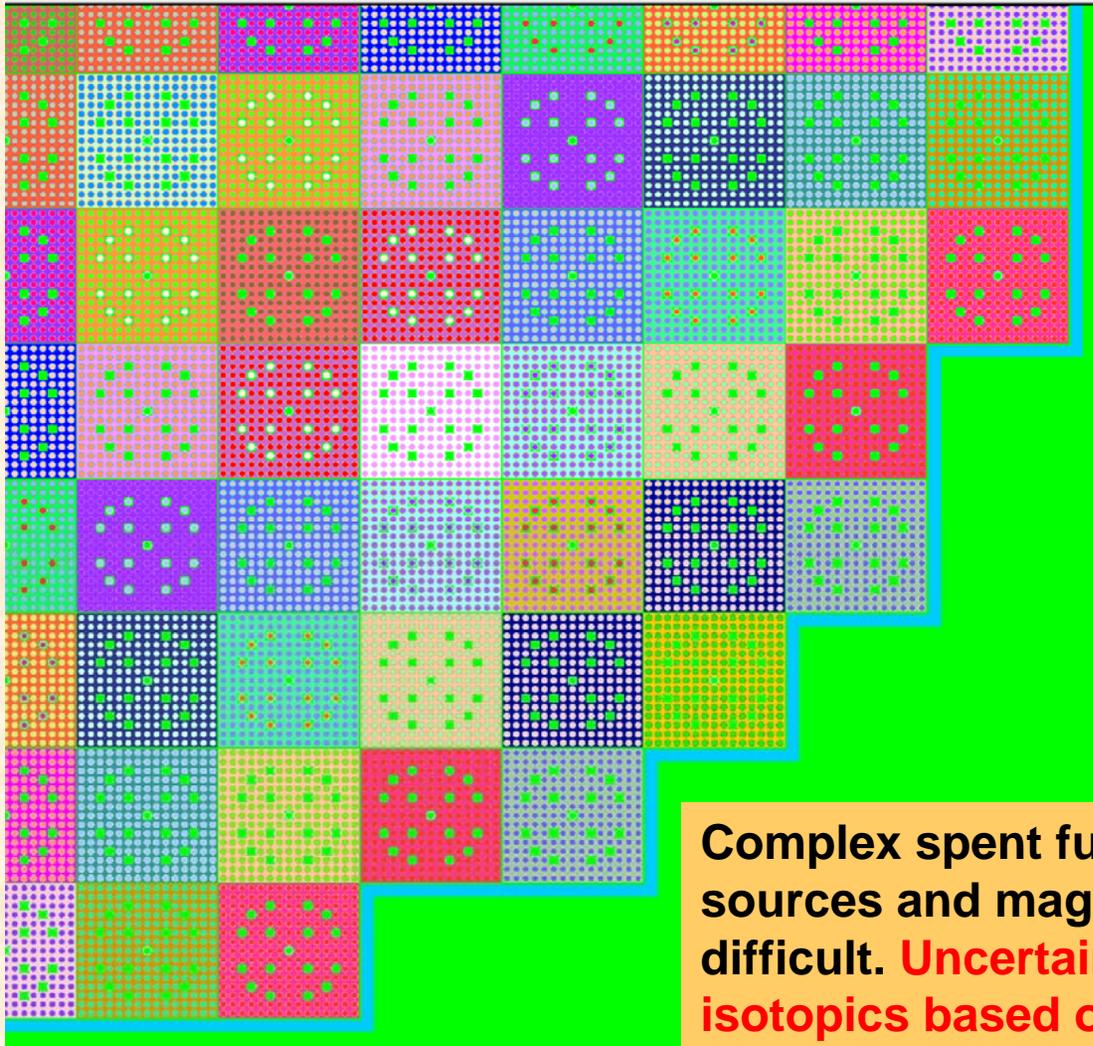
Critical Experiments at Sandia have been investigated to support FP credit



Experiments investigated using: ^{143}Nd , ^{149}Sm , ^{103}Rh , ^{151}Sm , ^{133}Cs , ^{155}Gd

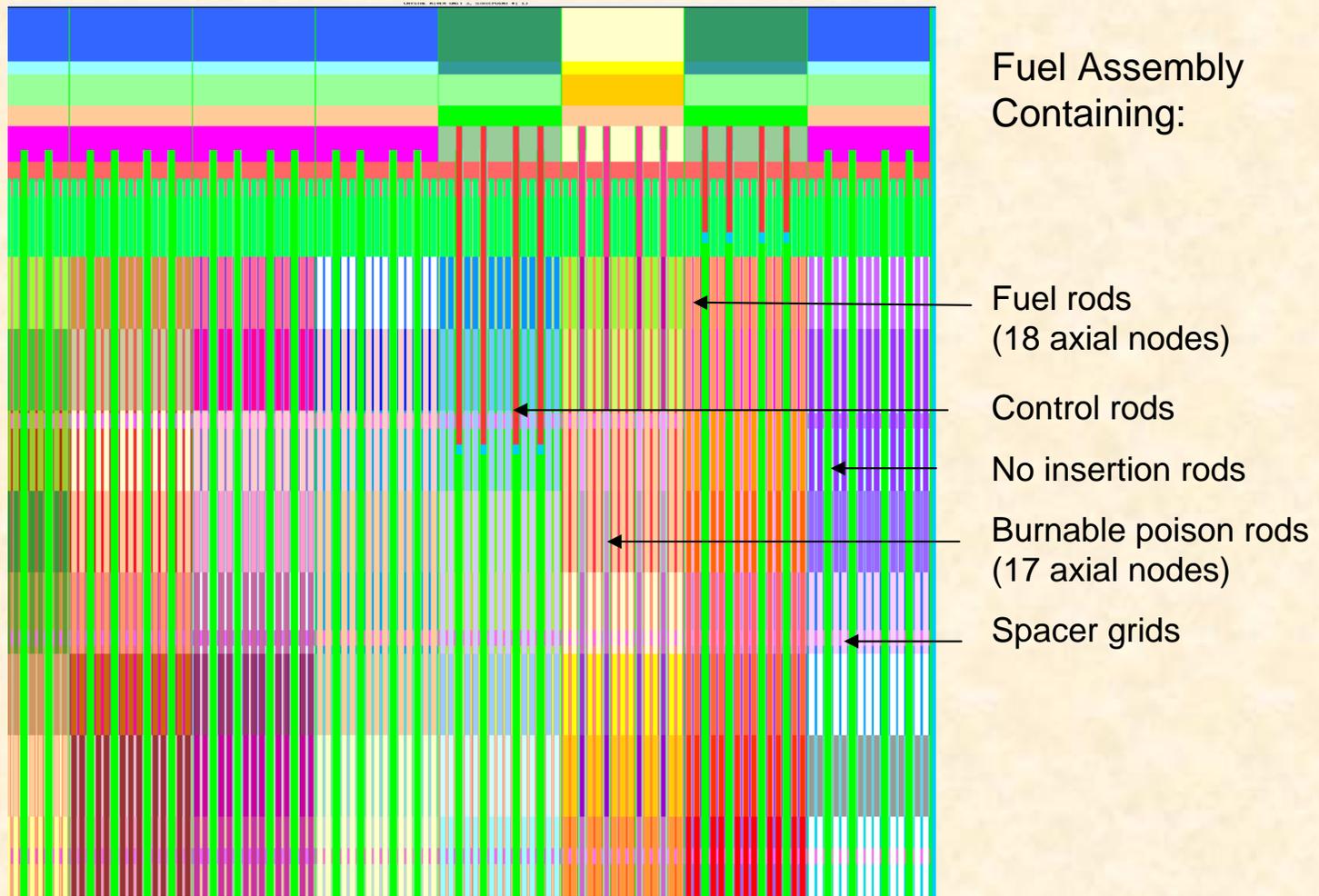
Funding and time lag to obtain data have been key obstacles.

Commercial Reactor Criticals (CRCs) – Crystal River – top view of quarter core model



Complex spent fuel system. Understanding sources and magnitude of uncertainty is difficult. Uncertainties are not quantified and isotopics based on calculated values.

Crystal River – side view of model near top of core

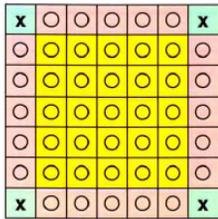


REBUS International Programme (Belgonucleaire)

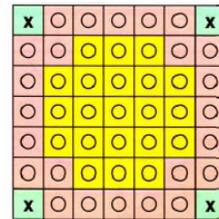
View of Venus critical facility

REBUS test bundles cross sections

Commercial UO₂ case



BR3 UO₂ case



x Structure

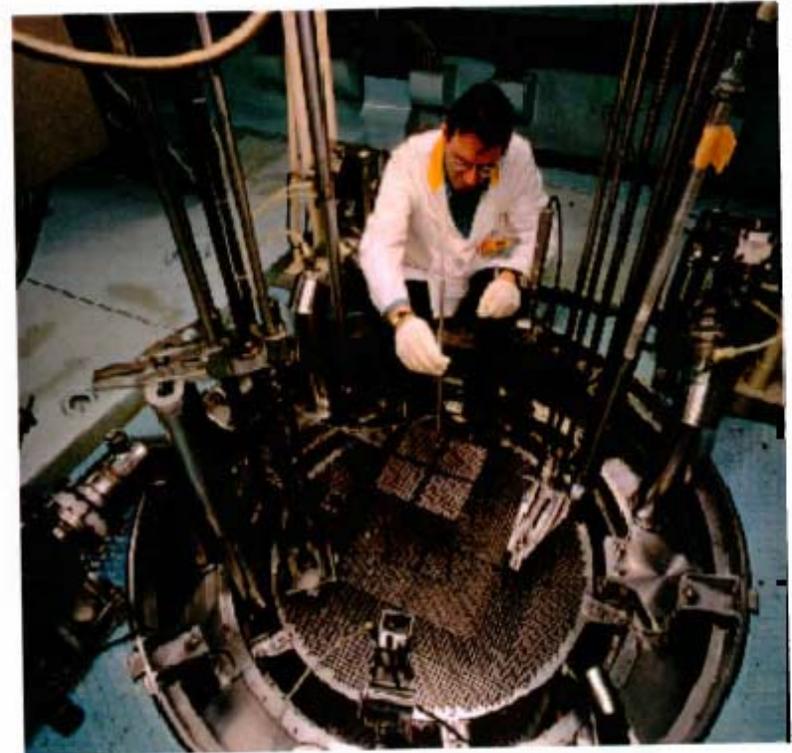
○ Investigated zone (UO₂ commercial)

○ Driver zone (U3.3)

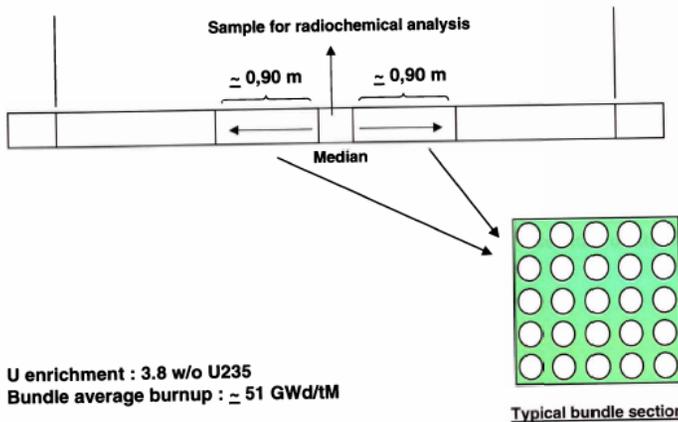
x Structure

○ Investigated zone (BR3 UO₂)

○ Driver zone (U3.3)

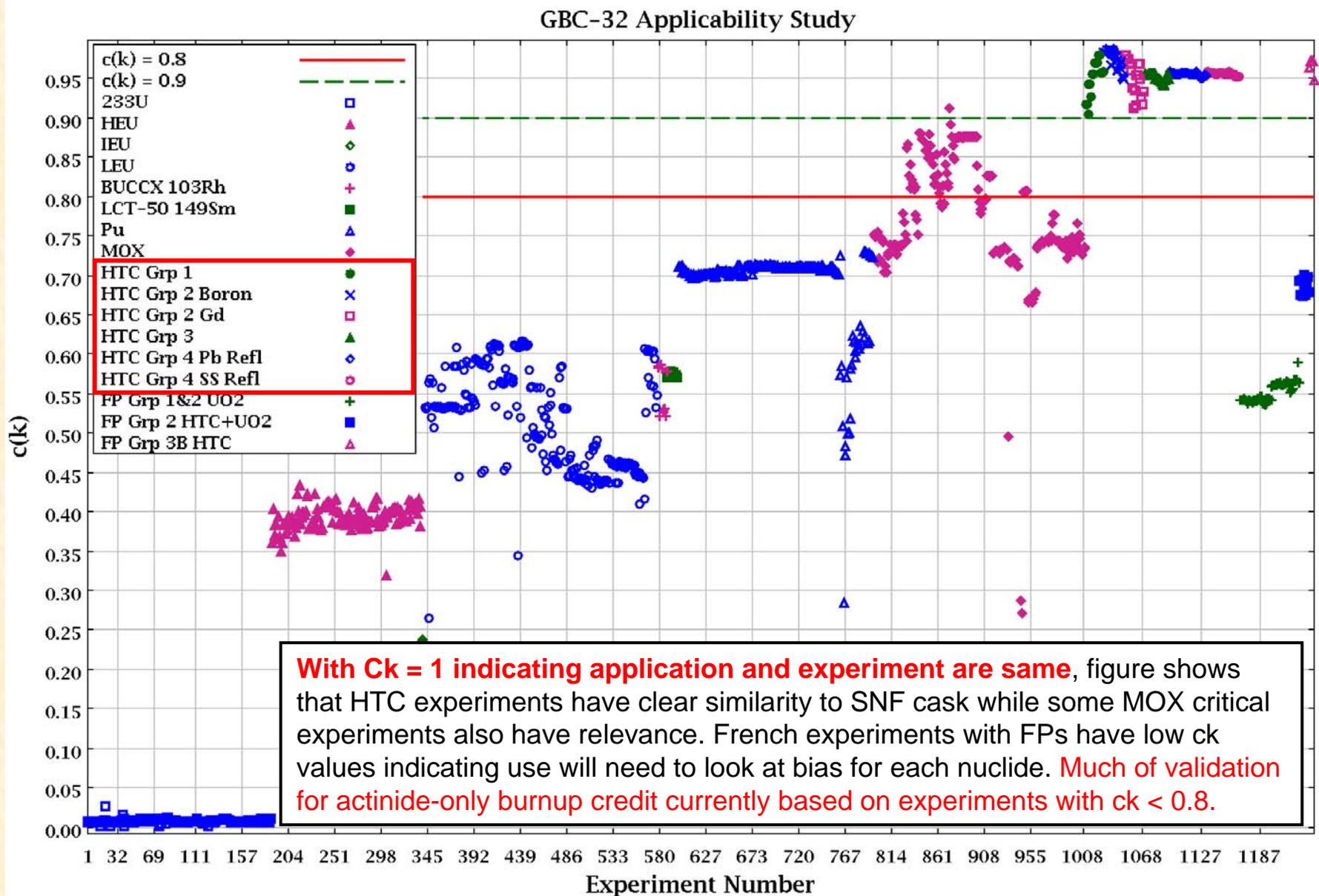


REBUS PWR (commercial fuel)



Worth Experiments where spent fuel has very little worth to system – looks like fresh fuel system. Little value to spent fuel validation.

Applicability of the available sources of existing experiments have been thoroughly studied: domestic and international experiments

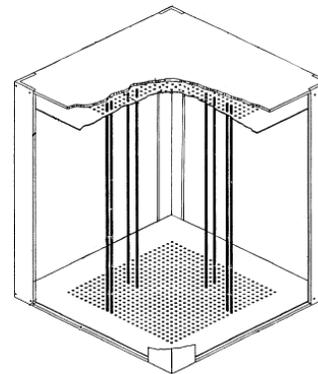


"HTC" Critical Experiments

- Performed at Valduc facility in France. Funded by AREVA and IRSN.
- MOX fuel pins with U and Pu compositions designed to mimic PWR U(4.5%)O₂ rods with 37,500 MWd/MTU burnup
- 156 critical configurations in 4 groups

1. 18 simple arrays with pin pitch 1.3 to 2.3 cm
2. 41 simple arrays with Gd or boron solution, varied pin pitch
3. 26 2x2 assembly arrays, some with borated steel, Boral, Cd panels around each assembly
4. 71 2x2 assembly arrays, some with poison panels, all reflected by thick lead or steel

HTC Critical Experiments



Groups 1 & 2

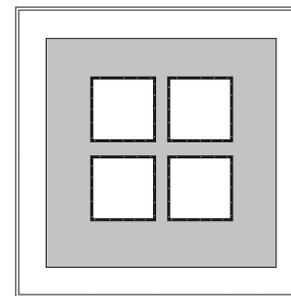
All with MOX rods designed to look like burned fuel

Group 1 - Single array, pin pitch varied, clean water

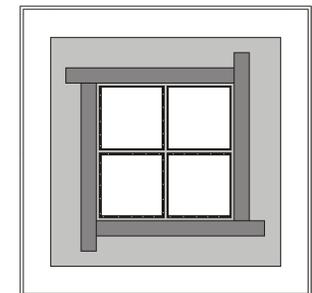
Group 2 - Single array, pin pitch varied, water with Gd or B

Group 3 - 4 assemblies, some with borated steel, Boral™, or Cd side panels, clean water, spacing between assemblies varied

Group 4 - like Group 3 except thick lead or steel shields around outside of array



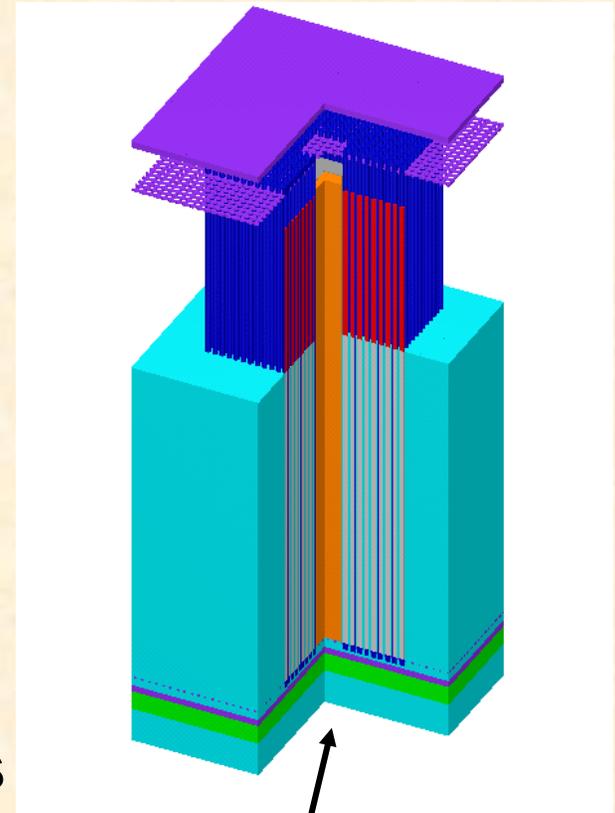
Group 3



Group 4

French fission product "PF" critical experiments

- **Fission products:**
 - ^{103}Rh , ^{133}Cs , $^{\text{nat}}\text{Nd}$,
Sm (95 or 97% ^{149}Sm),
Sm (98% ^{152}Sm),
Gd (92% ^{155}Gd)
 - No ^{151}Sm – 90 year half-life
- 74 of 147 experiments had fission products
- 14 of 74 contained some MOX HTC rods
- 4 of 14 contained only MOX HTC rods
- 3 of 4 were nearly identical, representing only 1 critical configuration



Central tank with FP solution surrounded by lattice of UO_2 and/or HTC rods

Summary: Assay data validation

- **Available data sources**
 - Domestic assay data
 - International programs
- **Potential data sources**
 - Ongoing international programs
 - Planned assay data program conducted for YMP
 - EPRI efforts to acquire data
- **Current approach**
 - Techniques for incorporating bias and uncertainty from assay data have been developed, illustrated, and documented
 - Some assay data for validation exist for all key nuclides
 - **Unfortunately, number of measurements low for several FPs**
 - Continue participation and collaboration with domestic and international programs to identify, acquire, and assess additional data

Summary: Criticality validation

- **Available data sources**
 - French critical experiments using simulated actinide compositions of SNF have been **evaluated** for use in Parts 71 & 72
 - ORNL currently responding to NRC comments on NUREG/CR report
 - Solidifies criticality validation for actinides and allows stronger technical basis for extension to allow FP credit.
 - Available for public release this spring
 - French critical experiments that include key fission products have been received and assessed at ORNL
 - Rights to distribute data have not been purchased from AREVA/IRSN
 - Other sources of available data – domestic and foreign - have been assessed
 - **Quality and extent of French data exceeds other available data**
- **Potential data sources**
 - Recent experiments in Japan using fission products are now coming available and will be assessed
 - Performance of domestic experiments at SNL has been studied
- **Current Approach**
 - Recent work focused on developing a technical basis for utilizing the PF (and other) data for validation of the FPs
 - Other data could potentially be utilized (e.g., CRCs) with larger uncertainties and penalties



Risk Considerations for Criticality in Burnup Credit Spent Fuel Transportation Casks

**Andrew Barto
Division of Spent Fuel Storage and
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March 19, 2008

Risk Considerations for Criticality in Burnup Credit Spent Fuel Transportation Casks

- Use risk considerations as part of the basis for potential changes to burnup credit methodology:
 - isotopic depletion and criticality code validation
 - burnup verification

Criticality in Transportation Would Require:

- **Transportation**
 - Accident severe enough to allow water intrusion
 - Presence of fresh water after accident
 - Misload with sufficient excess reactivity to cause criticality
- **Loading and Unloading**
 - Cask filled with fresh water
 - Misload with sufficient excess reactivity to cause criticality

Probability of Criticality in Transportation Casks

- **Previous EPRI Study (1013449 –Dec. 2006) looked at criticality in transit**
- **Probability of fresh water during unloading could be $>$ fresh water as a result of a severe accident**
- **Unloading conditions are unknown**
- **10 CFR 71.55 *requires* consideration of fresh water moderation**

Probability of Misload in Burnup Credit Spent Fuel Transportation Cask

- **EPRI Report: on the order of 10^{-5} per cask based on identified pool misload events and total number of fuel movements**
- **ORNL Draft NUREG looks at probability of misload in independent analysis**

Burnup Measurements

- **ISG 8, Rev. 2 requires out-of-reactor burnup measurement to prevent misload of severely underburned fuel**
- **Draft ORNL NUREG on burnup measurements:**
 - Review of available measurement techniques
 - Comparison of in-core vs. ex-core burnup determinations
 - Independent estimate of misload probability
 - Consequences (Δk_{eff}) of assembly misload
- **Could provide information resulting in changes to ISG 8 requirement**

Consequences of Criticality in Transportation

- **EPRI Report on consequences of misload in terms of Δk_{eff}**
- **Consequences of misload in terms of Δk_{eff} (NUREG/CR-6955)**
 - single *fresh* fuel assembly increases k_{eff} by as much as 0.06
 - single, 90% *underburned* assembly increases k_{eff} by as much as 0.03
 - 2, 90% *underburned* assemblies increase k_{eff} by as much as 0.065
- **Draft report on consequences of criticality being developed by ORNL**

Future Actions on Criticality Risk

- Coordinate with RES through User Need to develop independent estimate of criticality risk in transportation
- Work internally at NRC, as well as with ORNL and Industry to explore options to current burnup credit methodology



Use of Burnup Credit for Design of Criticality Safety Systems in PWR Spent Nuclear Fuel Casks

ACNW&M Briefing
March 19, 2008

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AGENDA

- Background
- Criticality safety for spent fuel pools
- Criticality safety for spent fuel casks
- Computer Code Validation for Spent Fuel Casks
- Consideration of criticality risks in Burnup-Credit casks

BACKGROUND

- Burnup is the amount of energy released from a fuel assembly in reactors in terms of Megawatt-Days per Metric Ton of initial Uranium (MWD/MTU) which results in overall reduction of fuel assembly reactivity
- To maintain critical conditions for power production in reactors, burnup becomes a liability for which compensation is made by reduction in reactor core boron concentration and refueling

BACKGROUND (cont.)

- To maintain subcritical conditions in spent fuel pools and casks, burnup becomes an asset (i.e. Burnup Credit) in designing criticality safety systems
- To predict critical/subcritical conditions (i.e., k -effective) of spent fuels in cores, pools, or casks, the computer codes need to be validated (i.e., benchmarked)

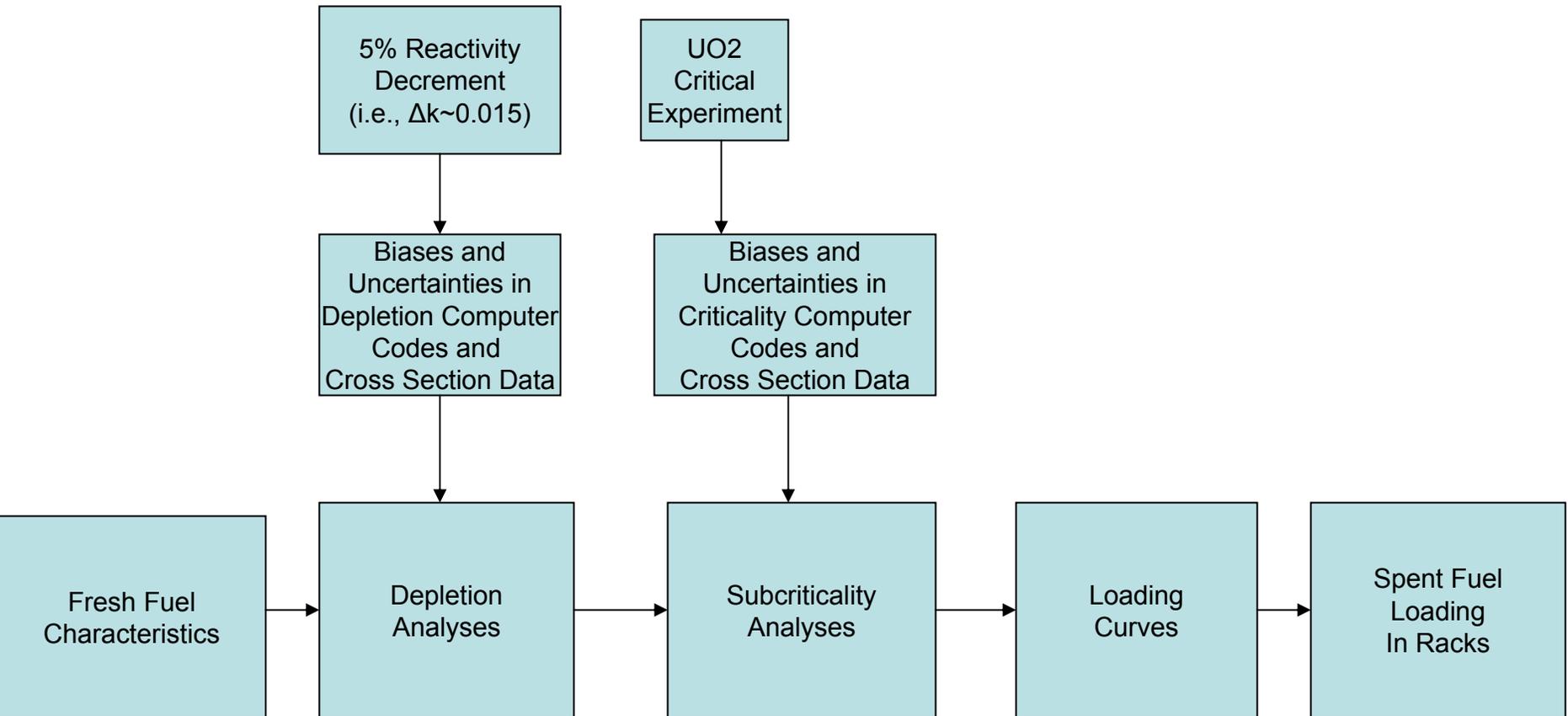
BACKGROUND (cont.)

- For reactor cores, which is a very controlled environment, computer codes are validated over time based on critical boron concentration
- For spent fuel pools, with some controls, computer codes are validated using some critical benchmarks and presence of heavy soluble boron as part of defense-in-depth in predicting reactivity of stored spent fuels

Criticality Safety for Spent Fuel Pools

- Regulatory requirements
 - GDC 62: Prevention of Criticality in Fuel Storage and Handling
 - 10 CFR Part 50.68: Criticality Accident Requirements
 - 50.68(b)(4) states
 - “ ... **If credit is taken for soluble boron**, the k-effective of the spent fuel storage racks loaded with fuel of the maximum fuel assembly reactivity must not exceed 0.95, at a 95 percent probability, 95 percent confidence level, if flooded with borated water, and the **k-effective must remain below 1.0** (subcritical), at a 95 percent probability, 95 percent confidence level, if flooded with unborated water.”

Criticality Safety for Spent Fuel Pools (with burnup credit)



Criticality Safety for Spent Fuel Casks

- For spent fuel storage casks soluble boron is used as part of primary criticality safety controls with burnup credit as unquantified safety margin during loading at reactors
- For spent fuel transportation casks, with less control during transport and no soluble boron, a more accurate prediction of subcriticality is necessary

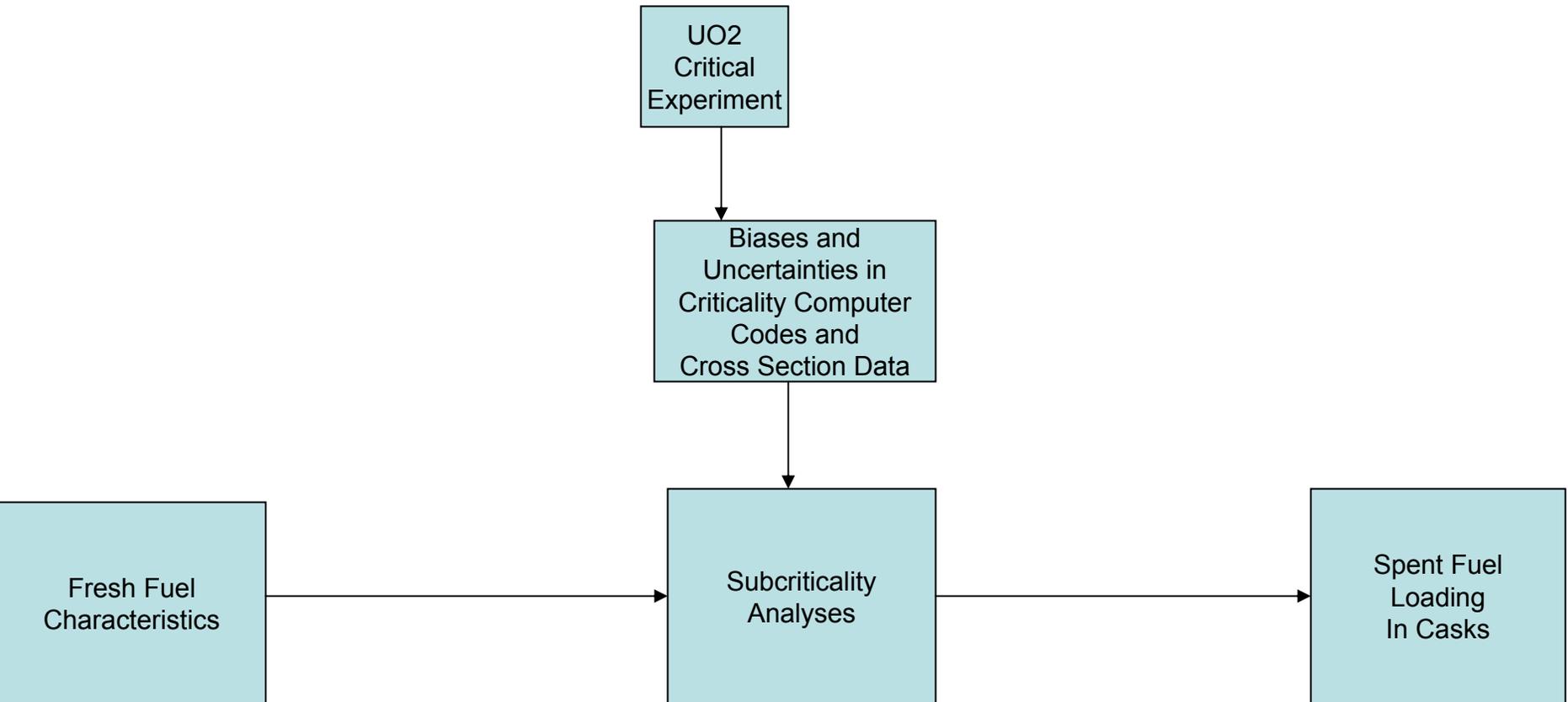
Criticality Safety for Spent Fuel Casks

- 10 CFR 71.55 (b)
 - “... a package used for the shipment of fissile material must be so designed and constructed and its contents so limited that it would be subcritical if water were to leak into the containment system, or liquid contents were to leak out of the containment system so that, under following conditions, maximum reactivity of the fissile material would be attained...”

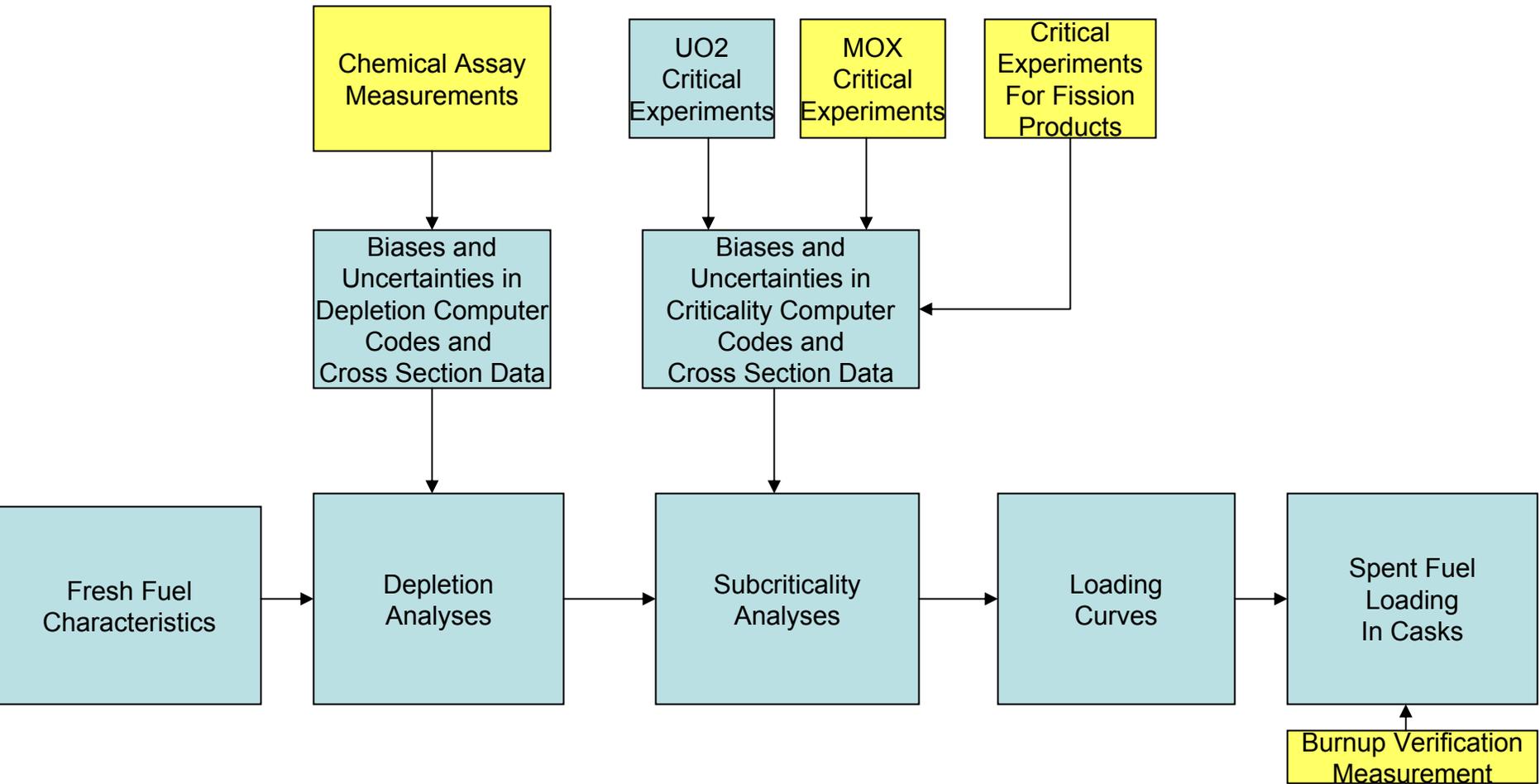
Criticality Safety for Spent Fuel Casks

- 10 CFR 71.83
 - “When the isotopic abundance, mass, concentration, degree of irradiation, degree of moderation, or other pertinent property of fissile material in any package is not known, the licensee shall package the fissile material as if the unknown properties have credible values that will cause the maximum neutron multiplication.”

Criticality Safety for Spent Fuel Casks (fresh fuel assumption)



Criticality Safety for Spent Fuel Casks (with burnup credit)



PATH FORWARD

SFST is examining the use of a generic bounding bias and uncertainties for isotopic validation while continuing to review burnup credit applications for casks based on a case-by-case isotopic validation methodology.

PATH FORWARD (cont.)

SFST is recommending to obtain the data from French critical experiments for fission product isotopes while continuing to review applications using Commercial Reactor Criticals.

PATH FORWARD (cont.)

- SFST is examining the risks of criticality in Burnup Credit casks in order to consider alternative acceptance criteria in the following areas
 - Burnup verification measurement
 - Depletion computer code validation
 - Criticality computer code validation