COMMISSION BRIEFING SLIDES/EXHIBITS

BRIEFING ON RESEARCH

AND TEST REACTOR CHALLENGES

AUGUST 11, 2009

Lessons Learned from Licensing the Oregon State TRIGA Reactor

August 11, 2009

Steve Reese
Director
Radiation Center
Oregon State University

Oregon State TRIGA Reactor

- 1MW$_t$ TRIGA Mark II reactor
- Original license 1967
- Conversion process started two years ***after*** license renewal application

License Renewal Timeline

1/2003	Safety Analysis Review (SAR) begins
10/2004	License renewal application submitted
9/2006	Conversion SAR (CSAR) work begins
10/2006	First Request for Additional Information (RAI) for license renewal
11/2007	CSAR submitted
9/2008	NRC issues license renewal/conversion

What Worked Well

For OSU:

- **Developed *extraordinary* in-depth knowledge of facility design and performance characteristics**
- **Increased involvement with faculty/students**
  - **Phenomenal real-world experience for nuclear engineering students**
  - **Reinforced working relationship between reactor and academic unit**

What Worked Well (cont.)

For OSU/NRC:

- Face-to-face meetings between the NRC Project Manager, NRC reviewer and licensee vital in handling responses to RAIs
- Provided time after RAIs issued for licensee to formulate responses before meeting (i.e., have answers in hand)

What Didn't Work Well

- Initial NRC license renewal effort was a false start:
  - Not directed by NRC Project Manager
  - Slow progress
  - Completely new set of RAIs after Project Manager assumed leadership
- Not enough reviewers

What Didn't Work Well (Cont.)

- NRC Management significantly underestimated the workload brought about by the conversions
- These pressures likely contributed to the loss of RTR experienced staff in recent years

Lessons Learned

- **End result – accident doses less than 10 CFR 20.1301(a)(1) (i.e., < 100 mrem)**
- **For OSU, 85% of the *licensing/conversion* effort went into:**
  - **Chapter 4, Reactor (Core) Description**
  - **Chapter 13, Accident Analysis**

Lessons Learned (Cont.)

- **For OSU, 95% of the *RAI* effort went into:**
  - **Chapters 4 and 13**
- **The other chapters were either summaries of existing procedures or the training manual**

Lessons Learned (Cont.)

- Consider consolidating latest generation of analyses into a reference document so that the effort does not have to be repeated for smaller facilities.
- In hindsight, license renewal should not take more than two years once application is submitted to the NRC.

Lessons Learned (Cont.)

- **Additional staff could be assigned temporarily under the direction of each facility's program manager who acts as the "filter"**

Licensing Issues at Washington State University

August 11, 2009

Donald Wall, Director
Nuclear Radiation Center
Washington State University

History

- March 9, 1961: First criticality as Materials Test Reactor
- 1967: Converted to TRIGA fuel
- 1976: Converted to HEU/LEU
- 2008: Reactor converted to entirely LEU fuel

WSU: HEU to LEU Conversion

- Conversion SAR submitted August, 2007
- RAI resolution conducted during 2008
- Conversion milestone met September, 2008

Conversion SAR

The following were updated as part of the HEU to LEU conversion:

- **Reactor Description (Ch. 4)**
- **Accident Analysis (Ch. 13)**
- **Technical Specifications (Ch. 14)**

The License Renewal Process

- WSU submitted Safety Analysis Report (SAR) consistent with NUREG-1537 on June 24, 2002
- WSU 2002 SAR was four years in preparation
- Essentially stalled since 2002

NUREG-1537

- **NUREG-1537 Parts I & II is a *very* thorough guidance document**

  Part I = 521 pages

  Part II = 348 pages

  Total = 869 pages

- **Treats license renewals as new applications: requires a complete rewrite of SAR**

SECY-08-161

- Four issues contributing to license renewal backlog
  - Historic NRC staffing and emergent issues
  - Limited licensee resources
  - Poor existing license infrastructure
  - Regulatory requirements and broad scope of the license renewal process

SECY-09-0095

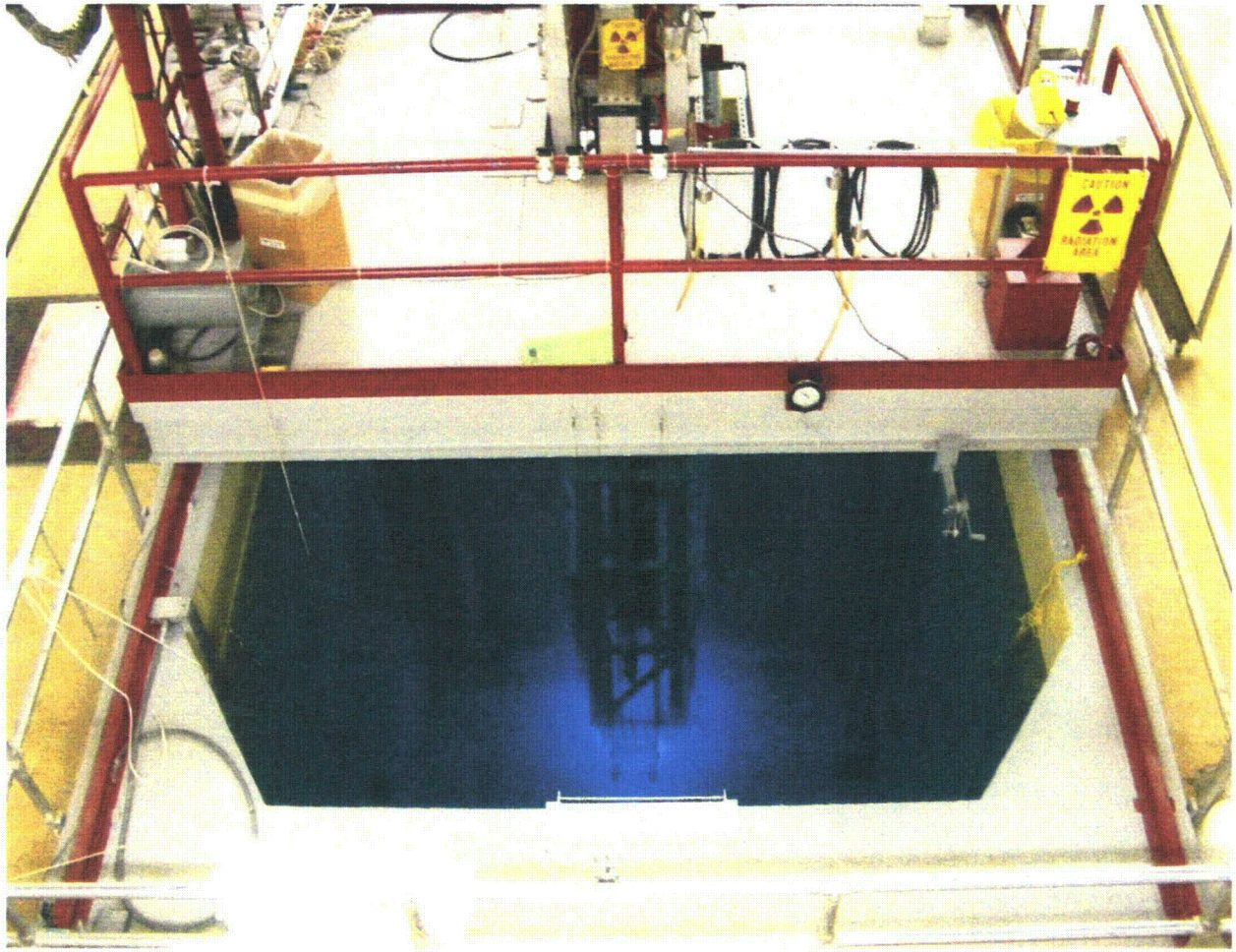
- Describes a graded approach with criterion level set at 2 MW(t)
- For less than 2 MW(t) Interim Staff Guidance (ISG) is focused on
  - Reactor design and operation
  - Accident analysis
  - Technical specifications

Focused Review

From WSU's perspective, the pertinent information has already been submitted and a Focused Review, in accordance with SECY-09-0095 should center on:

- Reactor Description
- Accident Analysis
- Technical Specifications

48 Years of Safe Operation



Conclusions

- ***48 years*** **of safe operation suggests that ISG in SECY-09-0095 is appropriate**
- **WSU supports:**
  - **Focused Review process for RTR less than 2 MW(t)**
  - **Decoupling NUREG-1537 formatted SAR from license renewal**

RELICENSING PROCESS IMPROVEMENT AND STREAMLINING FROM THE RTR PERSPECTIVE

11 August 2009

Jere Jenkins

Chairman-elect, TRTR

TRTR

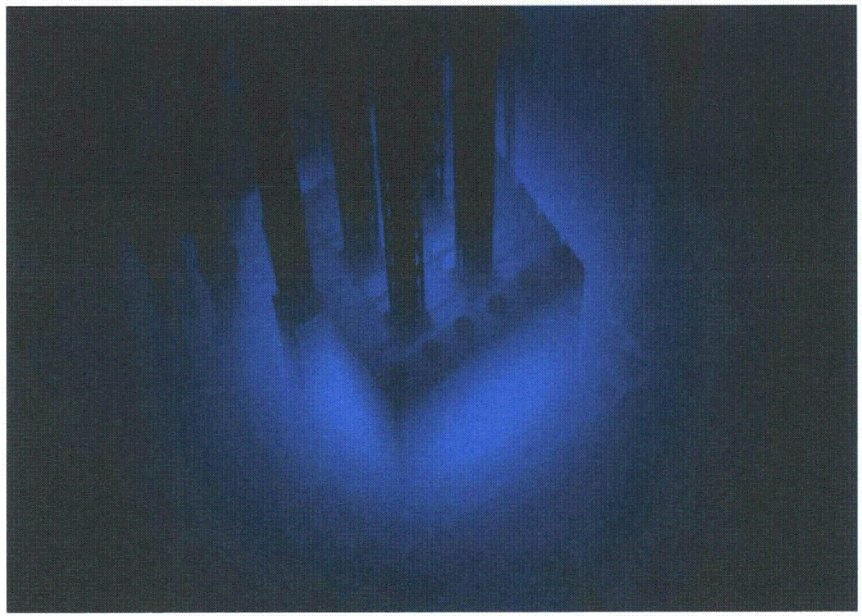
- National Organization of Test, Research and Training Reactors
  - Mission
  - Membership
- Commitment
  - Maintained safe and secure facilities
  - Education opportunities for public

Purdue University/Jere Jenkins

- Facility Director for Purdue University Reactor (PUR-1)
  - 1 kW Material Test Reactor (10 kW design)
  - Converted to LEU in 2007
  - Relicense application submitted in 2008
- Chairman of TRTR 2009-10

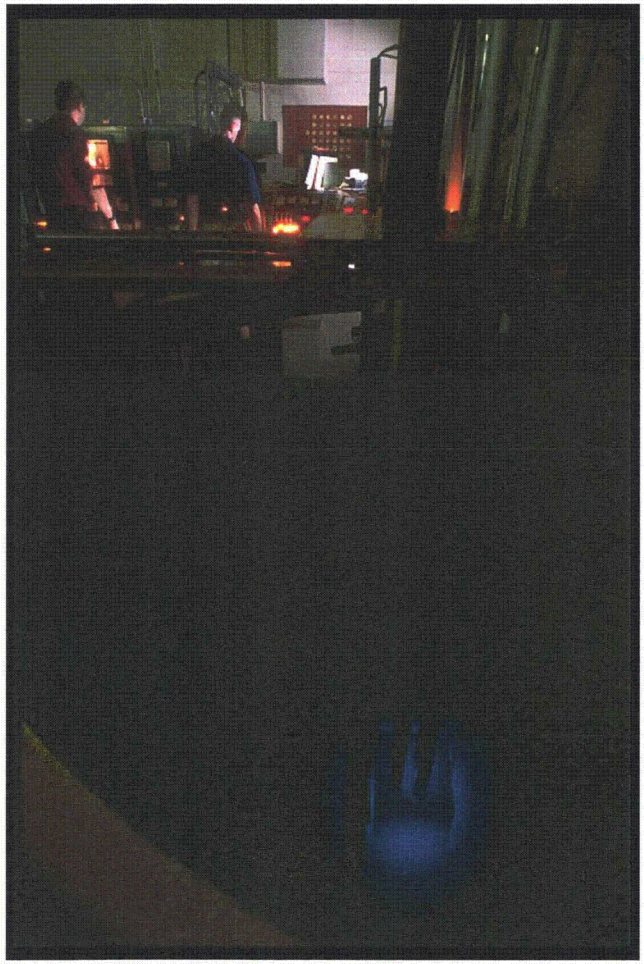
Research and Test Reactors/Non-Power Reactors

- Very low risk to public safety
- Vital to research, training and education missions



Research and Test Reactors/Non-Power Reactors

- Sizes and staffing
- Most exist on minimal support from home institutions, no support from DOE



Prior Licensing Activities

- 1st, 2nd and 3rd generation licenses
- Evolution of Safety Analysis Report (SAR) requirements
- NUREG 1537, ANSI 15.21
- "New license" requirement with each renewal

Recent Past and Present Licensing Challenges

- Budget and staffing capabilities of facilities and NRC stretched thin
- "Elevation" of previously acceptable SARs to new standards
- Process is slow, cumbersome
- Request for Additional Information (RAIs)

Present and Near Future Licensing Challenges

- Budget and staffing capabilities of facilities stretched even farther
- New NRC project managers, staff and management unfamiliar with facilities
- Involvement of other units within NRC

Assets

- Long history of safe and secure operation at all facilities
- 10 CFR 50.59 reviews
- Prior license documentation, i.e. Safety Evaluation Reports (SERs)
- Reactor Conversions experience
- Recently renewed licenses

Focus Areas

- Chapters 4 and 13 of the SAR
- Risk-informed judgment and decision-making processes
- Project manager familiarity with facilities
- Increase the familiarity among all branch staff with minimal risk presented by RTR/NPRs

Points to Consider

- Utilization of existing NRC know-how
- Distant future licensing concerns (15, 20 years)
- Change must bring improvement
- Continued stakeholder involvement

U.S.NRC

United States Nuclear Regulatory Commission

Protecting People and the Environment

BRIEFING ON RESEARCH AND TEST REACTOR (RTR) CHALLENGES

Office of Nuclear Reactor Regulation

August 11, 2009

INTRODUCTION

- **Introduction**
  - **Bill Borchardt, Executive Director for Operations**
- **Agenda**
  - **Eric Leeds, Director, Office of Nuclear Reactor Regulation**
- **Contributing Causes**
  - **Tom Blount, Deputy Director, Division of Policy and Rulemaking, NRR**
- **RTR License Renewal Streamlining**
  - **Kathryn Brock, Chief, Research and Test Reactors Branch A, NRR**

AGENDA

- Overview
- Contributing Causes
- Objective of the Process Improvement
  - Benefits to be achieved
  - Actions to be taken

Contributing Causes

- 32 Research and Test Reactors (RTR)
- Backlog of 21 facilities
- Contributing Causes
  - Limited Licensee resources
  - Limited NRC Staff resources
  - Knowledge Management Issues

RTR License Renewal Streamlining

- Process Improvement Objectives
- Benefits to be Realized
- Short-Term Plan
- Challenges
- Long-Term Plan

Process Improvement Objectives

- Eliminate license renewal backlog by end of FY10
  - Maintain focus on Safety & Security
- Establish a new streamlined regulatory framework by 2014
- Reduce Unnecessary Regulatory Burden

Benefits to be Realized

- Enhanced Focus on Safety / Security
- Improve Efficiency and Effectiveness
- Increased Stakeholder involvement

Short-Term Plan

- License Renewal Streamlining
  - Recent staff actions
    - Graded Approach – 2MWt
    - Resource evaluation
    - Work Breakdown
  - ISG Development
    - Primary Review Areas
    - Secondary Review Areas

INVENTORY

Completed	Facility	Date	Power
	Oregon State University	9/2/2008	1.1 MW
	University of Missouri, ROLLA	3/30/2009	200 KW
	National Institute of Standards & Technology	7/2/2009	20MW

≥ 2MWt	Facility	Application	Power
	Rhode Island Atomic Energy Commission	5/3/2004	2 MW
	Massachusetts Institute Technology	7/8/1999	6 MW
	University of Missouri -Columbia	8/31/2006	10 MW

< 2 MWt	Facility	Application	Power
	All Remaining Backlog Facilities (17)	7/22/1997 to 7/7/2008	5 W to 1.1 MW

Challenges

- **Staffing**
- **Emergent work**
- **Deferred work**
- **Validity of Assumptions**

Long-Term Plan

- Described in SECY-09-0095
- Rulemaking
  - Transition ISG process into NUREG
- Stakeholder involvement
- Sustainability