January 22, 1997

LICENSEE: Union Electric Company

FACILITY: Callaway Plant, Unit 1

SUBJECT: MEETING WITH UNION ELECTRIC COMPANY TO DISCUSS FUTURE PLANS FOR CORE RELOAD DESIGN ANALYSIS FOR THE CALLAWAY PLANT

On January 14, 1997, a meeting was held with Union Electric Company (UE) to discuss UE's future plans for core reload design analysis for the Callaway Plant. Attachment 1 is a list of meeting attendees. Attachment 2 is the handout material presented by UE and Westinghouse in the meeting.

Westinghouse currently performs the core reload analysis for the Callaway Plant. During the meeting, UE informed the staff that beginning early 1997, UE will begin obtaining the Westinghouse reload design and safety analysis technology. In the area of core physics, UE plans to complete the technology transfer by 1999. In the area of safety analysis and thermal hydraulics, UE plans to complete the technology transfer by 2001.

UE informed the staff that they did not plan to request NRC approval to acquire the responsibility for performing core reload design and safety analysis activities for the Callaway Plant. The staff informed UE that NRC review and approval of these activities would be required.

ORIGINAL SIGNED BY

Kristine M. Thomas, Project Manager
Project Directorate IV-2
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-483

Attachments: 1. List of Attendees
2. Meeting slides

cc w/atts: See next page

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Meeting Participants

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DATE	1/22/97	1/22/97	1/24/97

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

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Attachment 1

ATTENDEES AT MEETING ON JANUARY 14, 1997

RELOAD DESIGN ANALYSIS FOR THE CALLAWAY PLANT, UNIT 1

UNION ELECTRIC

D. Shafer
K. Hock
R. Irwin
N. Slaten
T. Michalek
M. Walz
S. Lo

NRC

K. Thomas
J. Lyons
F. Orr
L. Kopp

WESTINGHOUSE

B. Johansen
J. Sechrist

RELOAD DESIGN ANALYSIS

UNION ELECTRIC COMPANY

Meeting with NRC

January 14, 1997

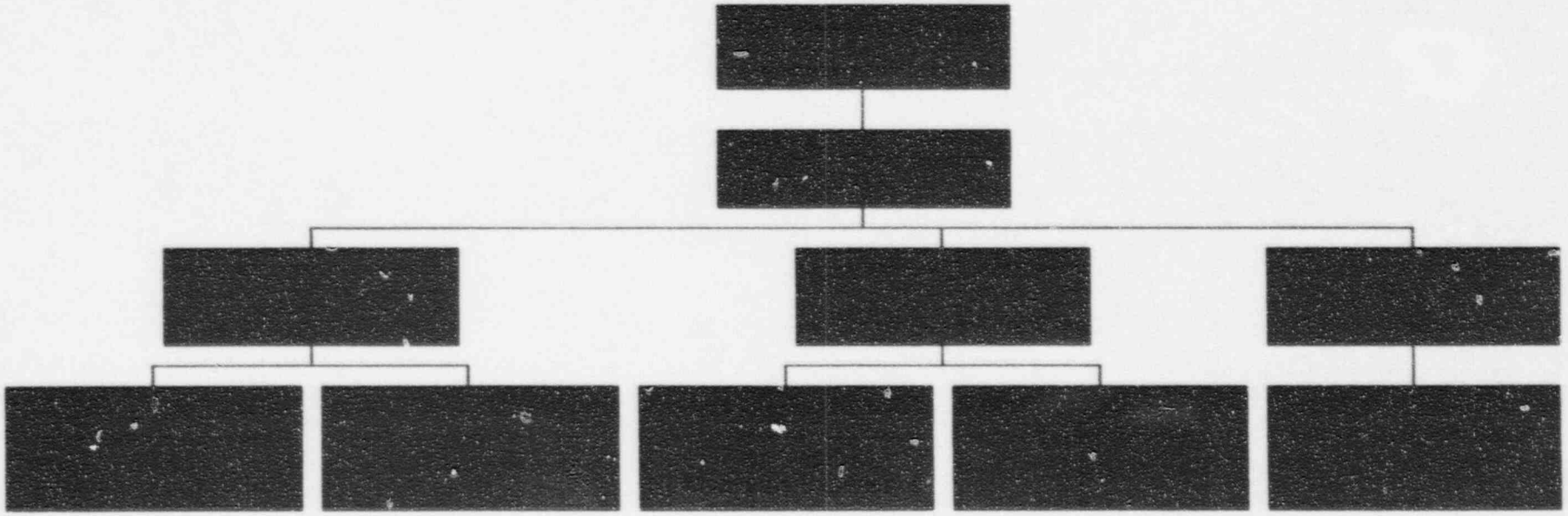
AGENDA

■ Introduction	Dave Shafer
■ UE Background/Schedule Goals	Randy Irwin
■ Core Physics Experience/Future Plans/Benchmarking	Keith Hock
■ Safety Analysis Experience/Future Plans/Benchmarking	Mark Walz
■ Training/Quality Assurance Prog .n/Design Interface	Neal Slaten
■ Westinghouse Technology Licensing Status	Jim Sechrist
■ Summary	Neal Slaten
■ Open Discussion	All

CALLAWAY NUCLEAR PLANT

- Westinghouse 4-Loop PWR
  - Located near Fulton, MO
  - Commercial Operation: 12/19/84
  - Uprated to 3565 MWth
- Long Term Westinghouse Fuel Fabrication Contract
  - Reload Design Currently Performed by Westinghouse
- 18 Month Fuel Cycle

LICENSING & FUELS ORGANIZATION



RELOAD DESIGN TECHNOLOGY

- UE obtaining Westinghouse Reload Design and Safety Analysis Technology

  Nuclear Design Codes- PHOENIX-P/ANC
  Thermal Hydraulic Codes- VIPRE-W
  Non-LOCA Safety Analysis Codes- RETRAN-02/TWINKLE/FACTRAN

  Design Procedures- Physics, Safety Analysis and Thermal Hydraulics

- Technology transfer scheduled to begin 1st Qtr '97

RELOAD DESIGN TECHNOLOGY

- STRENGTHS OF UE/W TECHNOLOGY PARTNERSHIP
  - SAME CODES AND METHODS USED BY FUEL VENDOR
  - ONGOING VENDOR TECHNOLOGY SUPPORT
    - » Code maintenance
    - » Training
    - » Error reporting
    - » User group meetings
  - WESTINGHOUSE HAS ESTABLISHED SIMILAR PARTNERSHIPS WITH OVER 30 UTILITIES
    - » About 1/3 have licensed use of W core design technology
    - » Five U.S. utilities are licensed to use W core design technology

SCHEDULE GOALS

■ TECHNOLOGY TRANSFER (1ST QTR '97)

CORE PHYSICS SCHEDULE

- Training (1997)
- Benchmarking (4/1997 - 9/1997)
- Parallel design with Westinghouse for Cycle 10 (startup 5/1998)
- UE design for Cycle 11 (startup 11/1999)

SCHEDULE GOALS (CONT'D)

SAFETY ANALYSIS AND THERMAL HYDRAULIC SCHEDULE

- Training (1997)
- Benchmarking (1/1998 - 9/1998)
- UE design for Cycle 12 (startup 5/2001)

CORE PHYSICS EXPERIENCE

- 10+ years experience with CASMO/SIMULATE
- Wide Range of Design Features
  - LOPAR, OFA, V5, V+ fuel types
  - Pyrex, WABA, IFBA absorber types
  - Axial blankets (natural and enriched, solid and annular pellets)
  - Enrichments from 2.1 to 4.6 w/o U-235
- 8 Cycles of Benchmark Data (currently in Cycle 9)
  - Power Distributions (172 flux maps)
  - Boron letdown curves
  - Startup physics testing data
  - ECC data (14 mid-cycle startups)
  - Plant transients

CORE PHYSICS CAPABILITIES

- Enrichment Setting
- Loading Pattern Design
- NRC Approved Rod Swap Methodology
- Startup and Operations Package
- SIMULATOR Input Data
- Core Follow
- Plant Support
  - Axial Offset Anomaly Modeling Methodology
  - ECC predictions
  - Power maneuver predictions
- NRC Approved Spent Fuel Pool Criticality Analysis

CORE PHYSICS FUTURE PLANS

- Enrichment Setting
- Loading Pattern Design
- **Input to Safety Analysis and T/H Analysis**
  - FAC Analysis (RAOC) and RSAC
- Complete Startup Physics Testing Predictions
- Nuclear Design Report
  - Verification of Shutdown Margin (Modes 1-5)
- **Peaking Factor Surveillance**
  - W(z) factors for F_q Surveillance

CORE PHYSICS FUTURE PLANS

- SIMULATOR Data
- **Core Operating Limits Report (COLR)**
- Core Follow
- Plant Support
  - Axial Offset Anomaly (AOA) modeling methodology
  - ECC predictions
  - Power maneuver predictions
- **Online Monitor (BEACON) Input Data**

CORE PHYSICS BENCHMARKING

- Callaway cycles 6, 7 and 8 will be modeled with the Westinghouse methods and the results compared to plant data.
- Previous Westinghouse calculations for these cycles will be compared to the Union Electric results.
- Westinghouse prescribed acceptance criteria will be used to evaluate the results of the Union Electric calculations.
- Westinghouse will review Union Electric calculations to insure proper model setup and usage.
- Comparison calculations will be documented and available for NRC audit

PAST CALLAWAY CYCLES

	Feed Assemblies	Burnup (MWD/MTU)	Burnable Absorber	Axial Blankets	Axial Offset Anomaly
Cycle 6	88 assemblies 44 @ 4.0 w/o 44 @ 4.4 w/o	20932	IFBA (1.5 x) 120 in. (centered) 7168 total	Natural U (0.74 w/o) Solid All feed assemblies	YES
Cycle 7	96 assemblies 60 @ 3.8 w/o 36 @ 4.2 w/o	20656	IFBA (1.0x & 1.5x) 126 in. (offset +3 in) 132 in. (centered) 8080 total	Enriched U (2.6 w/o) Solid All but 4 feed assemblies	NO
Cycle 8	96 assemblies 36 @ 4.0 w/o 60 @ 4.4 w/o	21769	IFBA (2.0 x) 120 in. (centered) 126 in. (offset +3 in) 6272 total	Enriched U (2.6 w/o) Annular All feed assemblies	YES

CORE PHYSICS BENCHMARKING

- HZP CRITERIA
  - Critical Boron Concentrations
  - Isothermal Temperature Coefficients
  - Control Rod Worths
  - Differential Boron Worths
- HFP CRITERIA
  - Boron Letdown Curves
  - Power Peaking Factors
  - Radial and Axial Power Distributions
  - Axial Offsets

SAFETY ANALYSIS EXPERIENCE

RETRAN CODE APPLIED FOR LICENSING AND PLANT SUPPORT ANALYSES

- Licensed to perform Steam Generator Tube Rupture (SGTR) Analysis
- Analysis of Turbine Trip Event to Support Relaxation of Lift Setting Tolerance of Main Steam Safety Valves
- Analysis of Main Steamline Break Event to Support the Main Steam and Feed Isolation System (MSFIS) Evaluation

SAFETY ANALYSIS FUTURE PLANS

PERFORM FSAR CHAPTER 15 NON-LOCA SAFETY ANALYSES WITH NRC APPROVED CODES AND METHODOLOGY (W)

- Utilize RETRAN-02 for System Transient Analysis
- Utilize VIPRE-W for Sub-Channel Analysis
- Utilize FACTRAN/TWINKLE for analysis of fast reactivity events (RWFS/Rod Ejection)
- OTDT/OPDT Setpoint Methodology

SAFETY ANALYSIS FUTURE PLANS

PERFORM FSAR CHAPTER 15 NON-LOCA SAFETY ANALYSES WITH NRC APPROVED CODES AND METHODOLOGY (W)

- Westinghouse will continue to supply LOCA analyses
- Westinghouse will continue to provide fuel assembly mechanical design and fuel performance support

SAFETY ANALYSIS BENCHMARKING

PERFORM COMPARISON CALCULATIONS TO DEMONSTRATE COMPETENCY

- Operating data from previous plant transients will be used for computer model qualification
- Selected RETRAN/VIPRE-W analysis results will be compared to those obtained from other NRC approved codes
- Comparison calculations will be documented and available for NRC audit

TRAINING

- We are in the process of establishing a training program to ensure each user:
  - Is competent in the setup and use of the applicable codes and methods
  - Can interpret and understand the output results
  - Is cognizant of the limitations associated with the codes and methods
- Documentation of each user's qualifications and training records will be available for NRC audit

QA PROGRAM

- A program is in place to validate computer codes from outside vendors
- This program insures that each code is verified on the Union Electric platform before it is used
- Provisions will be established to insure Union Electric informs Westinghouse of any errors

DESIGN INTERFACE AGREEMENT

- PURPOSE

  Define and communicate interfaces between Westinghouse and Union Electric

- CONTENTS

  - List of reload design interface activities
  - Schedules
  - Detailed descriptions of transmittals, including example transmittals

DESIGN INTERFACE AGREEMENT (CONT'D)

- Activities could include the following
  - Selection of reload engineering services (UE to W)
  - Tentative and final scheduled fuel delivery date (UE to W)
  - Final fuel loading, enrichments, BA requirements and configuration (UE to W)
  - Fuel rod design input data (UE to W)
  - Large break LOCA input assumptions (W to UE)
  - Confirmation of large break LOCA input assumptions (UE to W)
  - Projected allowable burnups for fuel rod (W to UE)
  - Reload safety evaluation input (W to UE)

WESTINGHOUSE TECHNOLOGY LICENSING STATUS

■ CORE DESIGN

PHOENIX-P/ANC based methodology	Approved by NRC 6/88

■ SAFETY ANALYSIS

– TWINKLE based methodology	Approved by NRC 7/74
– FACTRAN based methodology	Approved by NRC 9/86
– OTDT/OPDT setpoint methodology	Approved by NRC 4/86
– RETRAN based methodology	Submit to NRC 3/97
– VIPRE-W based methodology	Submit to NRC 3/97

■ UTILITY APPLICATIONS

HL&P Replacement Steam Generator	Submit to NRC 2 QTR '98

SUMMARY

- Union Electric's reload design applications will be based on NRC-approved codes and Westinghouse reload design methodology.
- Union Electric will establish and implement procedures for reload design applications, ensuring that the use of approved methods is consistent with the code qualification and approved application of the methodology.
- Union Electric will institute a program for which Westinghouse will provide training in reload design applications to Union Electric personnel.
- Union Electric will demonstrate competency by performing comparison calculations (i.e., benchmarking against vendor results and/or plant operating data).
- All safety-related licensing calculations performed by Union Electric will be conducted under the control of a QA program which complies with the requirements of Appendix B to 10CFR50.
- Union Electric will inform the NRC prior to acquiring responsibility in any of the previously mentioned areas