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# **LEAD PLANT IMPLEMENTATION OF MODE 6 ALTERNATIVE DECAY HEAT REMOVAL**

**November 14, 2000**



# MEETING AGENDA

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- **CONCEPT**
- **MOTIVATION**
- **TOPICAL REPORT**
  - TECHNICAL BASIS
  - PROGRAM
- **SCHEDULE FOR SUBMITTAL**



# MEETING OBJECTIVES

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- **SUBMITTAL OF A TOPICAL REPORT**
- **TECHNICAL BASIS**
- **PROGRAM**
- **SCHEDULE**
- **DISCUSSION WITH THE NRC OF TECHNICAL & PROGRAM ISSUES**



# CONCEPT

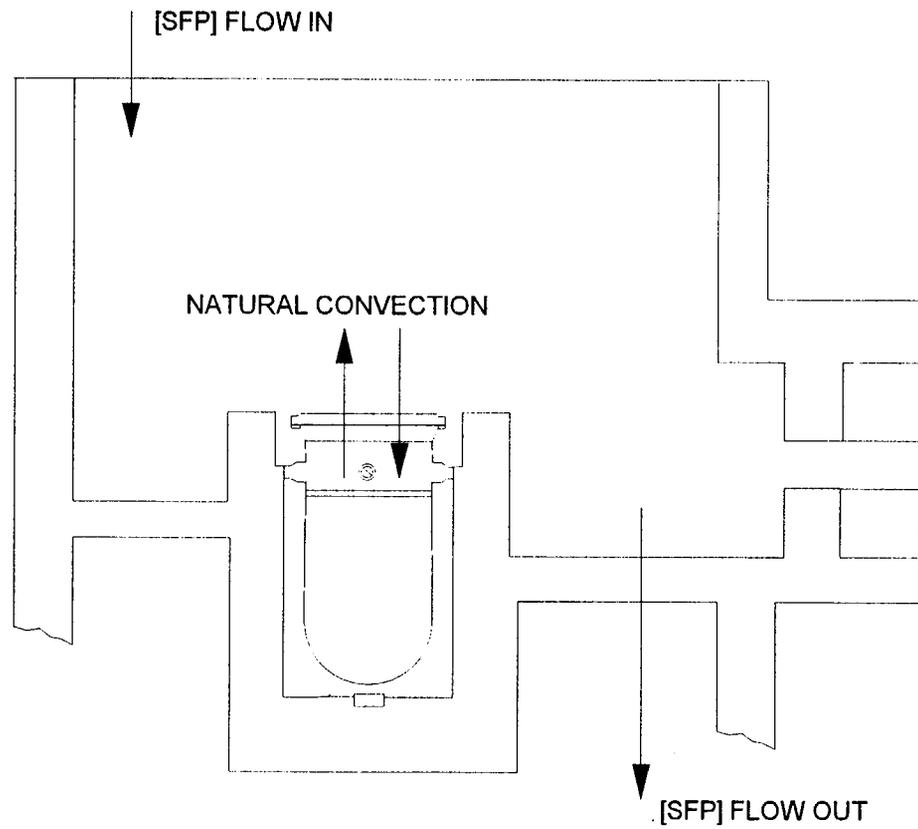
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- **Alternative decay heat removal in Mode 6 when the refueling pool is fully flooded.**
  - Shutdown cooling is secured
  - Natural convection of decay heat to pool.
  - Heat removed by by the SFP cooling system.
  - SFP flow re-circulated back to the refueling cavity.
- **Support changes in Technical Specifications to permit SDC trains to be removed from service for an indefinite time.**



# ALTERNATE COOLING PATH

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# TECHNICAL BASIS FOR ALTERNATE HEAT REMOVAL

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- **CEOG TASK 978**
  - Flow rates for successful operation
  - Time to boil with/without active cooling
  - Fluid velocity as could affect fuel movement
  - Benchmarking of Predictions
  
- **Meeting with NRC-September 2, 1998**
  - Discussion of technical issues
  - No' show stoppers' for pursuing further



# CURRENT GENERIC TECHNICAL SPECIFICATION

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## Decay Heat Removal, Mode 6, Refueling, >23 ft.

- **One Shutdown Cooling Train Required To Be Operating**
  - This Train Can Be Removed From Service For Up To 1 hour per 8 hour time frame For Core Alterations In The Vicinity Of The Hot Legs.
- **Second Shutdown Cooling Train; No Requirement**



# PROPOSED TECHNICAL SPECIFICATION

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## **Decay Heat Removal, Mode 6, Refueling, >23 ft.**

- One Shutdown Cooling Train Required To Be Operating**
  - or**
- One Train of Alternate Cooling Aligned to Remove Heat from Refueling Pool with RV Head Removed**
- No Requirement on Availability of Non-Operating SDC Trains**
- Fuel movement allowed**



# MOTIVATION TO CHANGE TECHNICAL SPECIFICATIONS

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- **Limits with Current Technical Specifications**
- **Changes in Technical Specifications**
  - Improve safety with addition of passive and alternate source of cooling
  - Increase available windows for system maintenance and repairs
- **Topical Report**
  - Support changes in Technical Specifications
  - Topical to include support for lead plant submittal
  - Subsequent plants reference Topical



# PROGRAM IN SUPPORT OF TOPICAL REPORT

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- **Lead Plant Implementation of Mode 6 Alternative Decay Heat Removal**
- **Current Participants**
  - CCNPPI                      Calvert Cliffs (Lead Plant)
  - Consumers Energy        Palisades
  - Entergy                      ANO2, WSES3
  - Dominion Power         Millstone-2
- **Other CE and Westinghouse plants interested**



## PROGRAM OBJECTIVES

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- **Address any identified technical issues.**
- **Submit to the NRC a generic topical report documenting methodology and lead plant evaluation**
- **Continue dialogue with NRC regarding shutdown operations.**
- **Plant specific technical specifications changes based on generic topical.**



# PROGRAM SCOPE

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- **Topical report to support TS changes**
  - Operation with or without fuel movement.
  - Other plants to reference topical report
  - Meetings with the NRC prior to starting work on the Topical Report and at other milestones throughout the program
- **Submittal of TS changes for lead plant**
  - Specific NRC issues addressed
  - Implementation criteria, e.g., flow rates for alternative cooling paths.



# PROGRAM: LEAD PLANT

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- **Lead Plant: Calvert Cliffs**
  - Plant has basic piping configurations
  - Prior work utilized Calvert Cliffs data to determine parameters
- **Other plants**
  - Consider plant modifications to establish necessary alignment



# PROGRAM: WORKSCOPE-1

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- **Technical Specifications:**
  - Changes in Technical Specifications
  - Define requirements to support these changes
  - Perform analyses to support changes
  - Identify interfaces required for implementation



## PROGRAM: WORKSCOPE-2

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- **Analyses:**
  - Time dependent parametric heat load calculations to develop TS and operational criteria for Calvert Cliffs.
    - Core decay heat
    - Time after shutdown
    - Existing heat load in SFP
    - Containment temperature/humidity
    - Containment cooling rate
- **Comparison with Data:**
  - Benchmark analysis with data on refueling pool temperatures to be taken during RFO, March, 2001



## PROGRAM: WORKSCOPE-3

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- **Risk Informed Evaluation:**
  - Shutdown risk model and deterministic insights as the basis for demonstrating that alternative technique does not significantly impact plant safety
- **Licensing Support:**
  - Schedule meetings with the NRC at significant milestones
- **Ground rules for the submittal:**
  - Meet with the NRC to establish requirements in the submittal.



# TOPICAL REPORT

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- **INTRODUCTION**
- **CONCEPT**
- **TECHNICAL SPECIFICATIONS**
  - Current & Revised
- **METHODOLOGY**
  - Analyses to support changes in Technical Specifications
  - Required SFP cooling; windows for operation
  - Delta risk evaluation
- **CONCLUSIONS**
- **APPENDICES**
  - Natural circulation algorithm
  - Computational Fluid Dynamics model
  - Benchmarking data
- **ADDENDUM**
  - Support CCNPPI Changes to Technical Specifications



# SCHEDULE

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- **Technical Specifications in place for 2004 outage**
  - CEOG Program completed
  - NRC Approval of Topical Report & Technical Specifications
  
- **Topical Report**
  - submitted to NRC January, 2002
  - approved by NRC January, 2004
  
- **Technical Specifications**
  - submitted to NRC August, 2002
  - approved by NRC January, 2004
  
- **Implementation** March, 2004

