52-A-5

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

May 3, 1996

APPLICANT: Westinghouse Electric Corporation

PROJECT: AP600

SUBJECT: SUMMARY OF MEETING WITH WESTINGHOUSE TO DISCUSS THE INITIAL TEST PROGRAM FOR THE AP600

The Nuclear Regulatory Commission (NRC) staff and representatives of Westinghouse Electric Corporation held a meeting in Westinghouse's Rockville, Maryland, office on April 18, 1996. The purpose of the meeting was to discuss the AP600 initial test program (Standard Safety Analysis Report Chapter 14). Attachment 1 is the list of the meeting attendees. Attachment 2 includes the handouts presented during the meeting.

Highlights of the discussion are summarized as follows:

Westinghouse first addressed the purpose of the meeting which was to: initiate discussions with the NRC staff on the revised Chapter 14 material, explain Westinghouse's overall approach to Chapter 14, and discuss specific preoperational test abstracts for three systems that Westinghouse had submitted in an April 16, 1996, letter to the NRC.

Westinghouse explained that in March 1995, they had proposed a new approach to Chapter 14 to address concerns of the NRC staff (Westinghouse letter to the NRC on "Proposed Criteria for AP600 Safety-Related and Non-Safety Related Testing (SSAR Chapter 14)," dated March 31, 1995). However, the Chapter 14 submittal based on this new approach had been deferred until now. The new approach involved developing criteria for test selection based on Regulatory Guide (RG) 1.68, Revision 2, in conjunction with criteria for systems and/or design features that were not envisioned at the time the regulatory guide was published. For the latter Westinghouse developed the criteria for test selection based on whether the systems/components perform Safety-related functions, defense in depth (DID) functions, or have been determined to have importance based on Regulatory Treatment of Non-safety systems (RTNSS) evaluations.

The staff was concerned that the new approach may not meet the intent of RG 1.68, as it was not clear that the population of structures, systems, and components (SSC) and/or design features selected for testing based on this criteria would correspond to those selected in accordance with Regulatory Position (RP) C.1, "Criteria for Selection of Plant Features to be Tested," of RG 1.68. The staff was also concerned that test abstracts that were previously included in Chapter 14 would be removed using the new approach. Westinghouse agreed to submit to the NRC a list of systems and/or design features that they feel do not meet the selection criteria of RG 1.68, RP C.1 and the rationale for why such systems and or design features do not meet the criteria. Westinghouse also stated that it would (1) modify its Chapter 14

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test selection criteria by using its new selection criteria in conjunction with RP C.1 of RG 1.68, (2) submit a list of test abstracts that will be included in Chapter 14 and (3) identify what test abstracts will be the responsibility of the combined license (COL) applicant. The NRC staff agreed to provide feedback to Westinghouse on the new approach after they received the above submittals. The staff also clarified that this issue was related to an outstanding request for additional information (draft safety evaluation report Open Item 14.2.1-1).

Westinghouse also presented their criteria for tests that would be performed on the first plant only. The staff was concerned that the test abstracts for some of the unique features of the passive plant, especially for tests that would only be performed on the first plant, may need to be more detailed than test abstracts that were supplied for previous plants. The staff was also concerned with Westinghouse's proposal to provide draft portions of Chapter 14 for staff review at separate intervals rather than providing a single submittal. The staff felt that reviewing the material in this fashion would prove to be cumbersome because of system interactions concerns (e.g. steam generator water level effects on the passive residual heat removal system) as well as difficulties associated with the need to coordinate the review among the NRC technical branches. The staff felt that there was a need to have further discussions on these issues.

During the final portion of the meeting Westinghouse discussed the preoperational test abstracts for the reactor coolant, passive core cooling, and normal residual heat removal systems that it submitted to the NRC in an April 16, 1996, letter. Westinghouse explained that the test abstracts now include functions to be tested, and references to the appropriate SSAR section(s). The test abstracts have also been expanded to include general test descriptions needed to assess the ability of the system to perform the required functions, and specific test acceptance criteria.

The meeting adjourned with the mutual understanding that further interactions between the staff and Westinghouse would take place in the near future in order to continue to discuss these issues.

original signed by:

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Docket No. 52-003
Attachments: As stated
cc w/attachments:
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WESTINGHOUSE/NRC AP600
MEETING ATTENDEES
APRIL 18, 1996

NAME	ORGANIZATION
John Butler	Westinghouse
Mike Corletti	Westinghouse
Larry Conway	Westinghouse
Gene Piplica	Westinghouse
Terry Schulz	Westinghouse
Alan Levin	NRR/DSSA/SRXB
George Thomas	NRR/DSSA/SRXB
Juan Peralta	NRR/DRCH/HQMB
Bob Gramm	NRR/DRCH/HQMB
Ralph Architzel (part time)	NRC/DRPM/PDST
Joe Sebrosky	NRC/DRPM/PDST

Attachment 1

AP600 Initial Test Program

SSAR Chapter 14

Kickoff Meeting with NRC Staff

Westinghouse Rockville Licensing Center

Rockville, MD

April 18, 1996

AP600 Initial Test Program

Meeting Purpose

- Initiate Discussions with the NRC Staff on the AP600 Initial Test Program Prior to the Submittal of Revised Chapter 14
- Provide NRC Staff with Westinghouse's Overall Approach to Chapter 14
  - Content of Chapter 14
  - Test Selection Criteria
  - First Plant Only Criteria
  - Test Abstract Development

AP600 Initial Test Program

Meeting Purpose (continued)

- Provide NRC Staff with Overviews of Specific Preoperational Test Abstracts
  - Reactor Coolant System Testing
  - Passive Core Cooling System Testing
  - Normal Residual Heal Removal System Testing
- Obtain Staff Feedback and Develop Schedule for Future Submittals and Review

AP600 Initial Test Program

Background

- AP600 SSAR Chapter 14 Included in 1992 Submittal
- NRC Staff Review Resulted in Nearly 50 RAI's and DSER O/I's Requesting Westinghouse
  - Add basis for acceptance criteria to the test results
  - Provide additional detail for test methods in test abstracts
  - Provide justification or criteria for first plant only testing
  - Add 36 test abstracts to meet requirements of RG 1.68 Rev. 2
  - Provide detailed design descriptions for design features not tested

AP600 Initial Test Program

Background

- In March 1995, Westinghouse Proposed a New Approach to Chapter 14 to Address NRC O/I's
  - Use a Graded Approach to Initial Testing as Allowed in RG 1.68 Rev. 2
  - Globally address NRC RAI's and DSER O/I's
  - Develop Criteria for Test Selection Based on Safety-Related and DID/RTNSS Functions
  - Develop Criteria for First Plant Only Test Selection
- NRC Staff agreed to overall approach, however Chapter 14 Submittal was Deferred to 1996

AP600 Initial Test Program

Content of Chapter 14

- Summary and Objectives of the Initial Test Program is Provided (14.2.1)
  - Construction and Installation Testing
  - Preoperational Testing
  - Startup Testing

AP600 Initial Test Program

Content of Chapter 14

- Responsibilities of the COL Applicant are Delineated
  - Organization and Staffing (14.2.2)
  - Conduct of the Test Program (14.2.3)
  - Test Procedures (14.2.3)
  - Test Quality Assurance Requirements (14.2.3)
  - Test Program Schedule (14.2.8)
  - Test Abstracts for Construction and Installation Testing (14.2.3)
  - Test Abstracts for Non-Safety System Testing Unrelated to DID/RTNSS functions (14.2.3)

AP600 Initial Test Program

Content of Chapter 14

- Test Abstracts are Provided for
  - Preoperational Testing of Safety-Related Functions (14.2.9.1)
  - Preoperational Testing of DID/RTNSS Functions (14.2.9.2)
  - Startup Testing (14.2.7, 14.2.10)

AP600 Initial Test Program

Content of Chapter 14

- Other Requirements
  - Compliance with Reg Guides (14.2.4) Refers to SSAR Subsection 1.9.1
  - Utilization of Operating and Test Experience (14.2.5)
  - Use of Plant Operating and Emergency Procedures (14.2.6)
  - Interface with AP600 ITAAC (14.3)
  - COL Action Items (14.4)

AP600 Initial Test Program

Testing Abstract Selection Criteria

- Graded Approach for Preoperational Test Selection
- Testing Selection Based on Functions
  - Safety Related
  - DID or RTNSS Important
- Safety Related, DID and RTNSS Functions Defined by System in RAI 100.11 Response

AP600 Initial Test Program

First Plant Only Test Selection Criteria

- A Special Preoperational or Startup Test is Performed on the First AP600 Plant Under the Following Conditions:
  - A Unique Performance Parameter of a New Design Feature Will Be Measured or Established
  - Previous Tests (e.g., Certification, Qualification, or Prototype) Did Not Provide This Parameter
  - The Parameter Will Not Change From Plant to Plant
  - Construction/Installation Inspections and Other Initial Tests are Performed on Every Plant

AP600 Initial Test Program

Preoperational Testing Abstract Development

- Abstract is Provided for Each System that Performs a Safety-Related or DID Function
- Test Purpose Now Includes:
  - Functions to Be Tested
  - Reference to the Appropriate SSAR Section
- Prerequisites are Amplified to Provide
  - Requirements and/or Conditions Needed Prior to Testing

AP600 Initial Test Program

Preoperational Testing Abstract Development

- Test Methods and Acceptance Criteria Expanded to Include:
  - General Test Descriptions Needed to Assess Ability to Perform the Required Functions
  - Specific Test Acceptance Criteria with References to Other SSAR Sections, Design Documentation as Appropriate

AP600 Preoperational Tests

- Safety-Related Tests
  - Reactor Coolant System
  - Passive Core Cooling System
- DID/RTNSS Tests
  - Reactor Coolant System
  - Normal Residual System

RCS Safety-Related Testing

Purpose:

Verify RCS Performs Its Safety-Related Functions

- RCS Pressure Boundary Integrity
- Core Cooling and Boration in Conjunction with PXS
- Measure Process Parameters Required for Safety-Related Interlocks
- Measure Process Parameters Required for PAMS

Reactor Coolant Pressure Boundary Integrity Testing

Cold Hydrostatic Pressure Test

Pressurizer Safety Valves/Rupture Disks

RCS Leakage

RCS Pressure Isolation Valve Integrity

RCS Core Cooling/Boration Functions

Demonstrated as Part of PXS Testing

Startup Tests Verify Other Aspects

- RCP Coastdown
- Natural Circulation (First Plant Only)

Testing Required for Safety-Related Actuations/PAMS

Instrumentation

- Hot Leg and Cold Leg RTDs (Narrow Range)
- Cold Leg Flow
- RCS Wide Range Pressure
- Hot Leg Level
- Pressurizer Pressure
- Pressurizer Level
- RCP Bearing Water Temperature
- RCP Speed Sensors

Components

- Reactor Vessel Head Vent Valves
- RCP Trip Breakers

Reactor Coolant System DID/RTNSS Testing

Purpose: Verify RCS Performs its DID and RTNSS-Important Functions

Circulation of Reactor Coolant

- Reactor Coolant Pump Operability Tests
- RCS Hot Functional Tests
  - Operate RCS at Full Flow for at Least 240 Hours
  - RCS Temperature Increased to $T_{NO\ LOAD}$ (545° F)
  - RCS Temperature > 515° F 50% of the Time

Pressurizer Pressure and Level Control Tests

Passive Core Cooling System (PXS) Testing

Purpose:

Verify that PXS Properly Performs Safety-Related Functions

- Emergency Core Decay Heat Removal
- RCS Emergency Makeup and Boration
- Safety Injection
- Containment pH Control (Verified by Inspection, No Actual Tests Required)

PXS Emergency Decay Heat Removal Testing

PRHR HX Heat Removal with Natural Circulation Flow

- RCS at Hot Functional Testing Conditions (> 515° F)
- RCPs Not Running
- IRWST Water Heatup Measured (Vertical Temperature Gradient at the HX and at Several Distances from HX)*

PRHR HX Heat Removal with Forced Flow

- RCS at HX Inservice Testing Conditions (~ 250° F)
- All Four RCPs Operating
- Baseline for HX Verifications During Plant Operating Life

* This Verification is Performed Only for the First Plant

PXS Emergency Makeup and Boration Testing

CMT Discharge Line Resistance Established by Gravity Draindown into Empty RCS (See Safety Injection Testing Below)

CMT CL Balance Line Resistance Measured by Filling CMT at High Flow Rate Using RNS Pumps

PXS Emergency Makeup and Boration Testing

(continued)

CMT Natural Circulation is Demonstrated*

- RCS Initially at Hot Functional Testing Conditions (> 515° F)
- CMT Discharge Valves Opened by Simulated Safety Signal
- RCPs Shut-Off After Time Delay
- Net Injection Versus RCS CL Temperature and CMT Water Temperature Demonstrated

* This Verification is Performed Only for the First Plant

PXS Safety Injection Testing

CMT to RCS, IRWST to RCS, IRWST to Sump, and Sump to RCS Discharge Line Resistances Established by Gravity Draindowns into Empty RCS

Accumulator Discharge Line Resistance Established by Blowdown Tests into Empty RCS

ADS Stage 1, 2, 3, and 4 Flowpath Resistances Verified by Cold Flow Testing Using RNS Pump

PXS Safety Injection Testing

(continued)

ADS Sparger Operation Demonstrated by High Pressure Blowdown of RCS to the IRWST*

CMT Operation Demonstrated by Draindown Test with Steam Replacing Drained Water*

- RCS Hot and Pressurized, Drained to Hot Leg
- CMT Steam Distributor Operation Verified

In-Situ Squib Valve Tests of Each Size and Type

* This Verification is Performed only for the First Plant

Normal Residual Heat Removal System (RNS) Testing

Purpose:

Verify RNS Properly Performs Its Defense-In-Depth and RTNSS-Important Functions

- Remove Core Decay Heat, and Complete and Maintain RCS Cooldown During Shutdown Operations
- Remove Core Decay Heat During Reduced RCS Inventory Operations in Modes 5 and 6
- Provide Makeup to the RCS at Low Pressure and After IRWST Draindown
- Provide Low Temperature Overpressure Protection for RCS

Normal Residual Heat Removal System Testing

RNS Pump Operation Demonstrated

- Recirculation To and From RCS at Mid-Loop Hot Leg Water Level
- Makeup to RCS Taking Suction From the IRWST at Minimum Water Level

Verify RNS Heat Exchanger Heat Removal Capacity by Cooling Heated RCS During Hot Functional Testing

RNS Relief Valve Set Pressure Test