

DEC 24 1985

Docket No.: 50-461

APPLICANT: Illinois Power Company

FACILITY: Clinton Power Station

SUBJECT: SUMMARY OF MEETING WITH ILLINOIS POWER COMPANY RELATED TO CLINTON'S ACCELERATED POWER ASCENSION PROGRAM

A meeting between representatives of the Illinois Power Company (IP) and the NRC staff was held on December 16, 1985, at the NRC Office in Bethesda, Maryland. The purpose of the meeting was the following:

- o IP to apprise the staff of Clinton's Power Ascension Program Acceleration (PAPA) concept;
- o IP to apprise the staff that single recirculation loop operation will be requested; and
- o IP to apprise the staff of the need for expedited reviews of submittals.

Enclosure 1 contains a copy of meeting attendees and Enclosure 2 contains a copy of the meeting handouts.

A discussion of schedular commitments for submittals and review followed the presentation. IP stated that the initial submittal in the PAPA program would be the week of January 14th. IP was encourage to prioritize the items in the PAPA program and submit parts of the package as they are completed. Further schedule discussions will occur as the submittals are received due to the tight schedular requirements of the program.

Enclosure:
As stated

cc: See next page

Original Signed by

Byron Siegel, Project Manager
BWR Project Directorate No. 4
Division of BWR Licensing

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

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A handwritten signature in cursive script, appearing to read "Byron Siegel".

Byron Siegel, Project Manager
BWR Project Directorate No. 4
Division of BWR Licensing

Enclosure:
As stated

cc: See next page

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MEETING RELATED TO POWER ASCENSION PROGRAM ACCELERATION

December 16, 1985

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**ILLINOIS POWER COMPANY
CLINTON POWER STATION (CPS)**

PRESENTATION TO NRC STAFF

**POWER ASCENSION
PROGRAM
ACCELERATION
(PAPA)**

DECEMBER 16, 1985

MEETING OBJECTIVES

- APPRISE NRC STAFF OF CPS POWER ASCENSION PROGRAM ACCELERATION (PAPA) CONCEPT

- OBTAIN NRC STAFF SUPPORT FOR BASIC CPS PAPA ELEMENTS
 - TEST SIMPLIFICATION AND ELIMINATION
 - TECHNICAL SPECIFICATION EXCEPTIONS

- EQUIPMENT OUT OF SERVICE ANALYSIS - SINGLE RECIRCULATION LOOP OPERATION

- APPRISE NRC STAFF OF NEED FOR EXPEDITED REVIEWS OF CPS SUBMITTALS

CPS STARTUP TEST PROGRAM OBJECTIVES

- PROVIDE ASSURANCE THAT CPS HAS BEEN ADEQUATELY DESIGNED AND CONSTRUCTED
 - VALIDATE ANALYTICAL MODELS AND ASSUMPTIONS USED
- DEMONSTRATE THAT CPS CAN BE OPERATED IN ACCORDANCE WITH PLANT DESIGN REQUIREMENTS
- PROVIDE OPERATOR TRAINING (TO EXTENT PRACTICAL)
- VERIFICATION OF THE ADEQUACY OF CPS OPERATING AND EMERGENCY PROCEDURES (TO EXTENT PRACTICAL)

HIGH QUALITY PROGRAM NEEDED TO MEET THESE OBJECTIVE AND MEET NRC STAFF REQUIREMENTS AND GUIDANCE PROVIDED BY REGULATORY GUIDE 1.68

APPLICATION OF TECHNOLOGICAL EVOLUTION TO CPS STARTUP TEST PROGRAM OBJECTIVES

OBJECTIVE

- PROVIDE ASSURANCE THAT CPS HAS BEEN ADEQUATELY DESIGNED AND CONSTRUCTED
- VALIDATE ANALYTICAL MODELS AND ASSUMPTIONS USED FOR DESIGN
- DEMONSTRATE CPS CAN BE OPERATED IN ACCORDANCE WITH DESIGN REQUIREMENTS & TECH SPECS

TECHNOLOGICAL IMPROVEMENT

- ADVANCED BWR/6 MK III DESIGN
- DESIGN CONFIGURATION AND CHANGE CONTROL PROGRAM
- QA/QC PROGRAM/PROCEDURES
- FSAR & TECHNICAL SPECIFICATION CERTIFICATION
- APPLIED "LESSONS LEARNED"
- EXTENSIVE TESTING OF KEY TECHNICAL ISSUES
- IMPROVED ANALYTICAL TECHNIQUES AND MODELS
- EXTENSIVE BWR TEST DATA BASE AND EXPERIENCE
- ENHANCED PLANT DATA ACQUISITION SYSTEMS
- MORE COMPREHENSIVE TECH SPEC SURVEILLANCES
- THOROUGH AND AGGRESIVE PRE-OP TEST PROGRAM

APPLICATION OF TECHNOLOGICAL EVOLUTION TO CPS STARTUP TEST PROGRAM OBJECTIVES

OBJECTIVES

- PROVIDE OPERATOR TRAINING
(TO EXTENT PRACTICAL)

- VERIFICATION OF ADEQUACY
OF OPERATING/EMERGENCY
PROCEDURES (TO EXTENT
PRACTICAL)

TECHNOLOGICAL IMPROVEMENT

- ENHANCED TRAINING PROGRAM
- HIGHLY TRAINED STARTUP
STAFF
- EXPERIENCE FROM OTHER
PROJECTS
- GE TRAINING SUPPORT

- ENHANCED TRAINING PROGRAM
- HIGHLY TRAINED STAFF/
SIMULATOR EXPERIENCE
- EXPERIENCE FROM OTHER
PROJECTS
- SYMPTOMATIC EMERGENCY
PROCEDURES

**COMBINATION OF CPS STARTUP TEST
PROGRAM & TECHNOLOGICAL
IMPROVEMENTS ENSURES
OBJECTIVES ARE MET.**

CPS PAPA ELEMENTS REQUIRING NRC REVIEW

- TEST SIMPLIFICATION AND ELIMINATION
 - MAJOR ACTIVITIES
 - CATEGORIZATION OF TESTING ACCELERATION
 - TECHNICAL SPECIFICATION EXCEPTIONS

- EQUIPMENT OUT OF SERVICE

TEST SIMPLIFICATION AND ELIMINATION MAJOR ACTIVITIES OF PROGRAM

CONCEPTUAL LICENSING BASIS

GE PRESENTATION TO NRC/NRR STAFF

AUGUST 8, 1985

GE PRESENTATION TO REGIONAL STAFF

SEPTEMBER 11, 1985

ESTABLISHED PAPA PROGRAM IMPLEMENTATION APPROACHES

HOPE CREEK - SAFETY EVALUATION REPORT

RIVERBEND - 10CFR50.59 REVIEWS (AS REQUIRED)

CPS PROGRAM

DETAILED ENGINEERING / PRELIMINARY SAFETY REVIEW (GE)

SAFETY EVALUATION REVIEW (IP)

REVISED STARTUP TEST SPECIFICATION (GE)

FSAR CHAPTER #14 AMENDMENT (IP)

UPDATE STARTUP TEST PROCEDURES (IP)

UPDATE PLANT OPERATING PROCEDURES (IP)

LICENSING SUPPORT (GE)

TEST CHANGE PACKAGES SUBMITAL TO NRC (IP)

SUBMIT FSAR CHANGES TO NRC (IP)

SUBMIT TEST PROCEDURES CHANGES TO REGION III (IP)

SYSTEMATIC APPROACH TO ENSURE QUALITY IS MAINTAINED
FOR AN ACCELERATED TEST PROGRAM

CATEGORIZATION OF TESTING ACCELERATION

- **FOUR CATEGORIES IDENTIFIED**
 1. **SUBSTITUTE WITH TECH SPEC SURVEILLANCE**
 2. **DELETION OF NON-ESSENTIAL
EQUIPMENT TESTS**
 3. **TEST SIMPLIFICATION**
 4. **REPLACEMENT OF TESTING WITH DATA
FROM OTHER TESTS**

- **MAJORITY OF STARTUP TEST PROGRAM CHANGES
ARE DELETION OF REDUNDANT TESTS**

- **MAJORITY OF CHANGES DO NOT AFFECT
COMPLIANCE WITH REG. GUIDE 1.68**

**POWER ASCENSION PROGRAM CHANGES DO NOT
CONSTITUTE AN UNREVIEWED SAFETY CONCERN**

CPS PAPA DETAILED EXAMPLES

- TEST SIMPLIFICATION AND ELIMINATION EXAMPLES
- TECHNICAL SPECIFICATION EXCEPTION EXAMPLES
TO SUPPORT TEST SIMPLIFICATION

CATEGORY 1
SUBSTITUTE WITH TECH SPEC
SURVEILLANCE
STARTUP TEST # 19
CORE PERFORMANCE

- **OBJECTIVE** - EVALUATE CORE THERMAL POWER, FLOW, THERMAL MARGINS AND FEEDBACK DATA TO THE DESIGN PROCESS

- **REQUIREMENTS** - REG. GUIDE 1.68, APPENDIX A, PARAGRAPH 5.B REQUIRES STEADY-STATE CORE PERFORMANCE IN ACCORDANCE WITH DESIGN THROUGHOUT PERMISSIBLE POWER-TO-FLOW CONDITIONS

- **DISCUSSION**
 - DEMONSTRATE COMPLIANCE WITH TECH SPEC THERMAL LIMITS

 - TECH SPECS DEFINE MONITORING REQUIREMENTS
 - AT LEAST ONCE PER 24 HOURS
 - WITHIN 12 HOURS AFTER 15% THERMAL POWER INCREASE

CATEGORY 1 EXAMPLE (CONTINUED)

● DISCUSSION -

- OPERATING PLANT DATABASE ADEQUATELY CONFIRMS BASIC DESIGN CHARACTERISTICS
- EXPERIENCED STAFF AVAILABLE TO ASSIST OPERATIONS PERSONNEL IN IMPLEMENTING SURVEILLANCE PROCEDURES
- PAST GAMMA SCANS HAVE QUALIFIED DESIGN PROCESS
- OTHER TESTS VERIFY CORE POWER AND FLOW
 - PLANT SURVEILLANCE TESTS USED TO CALIBRATE LOCAL / AVERAGE POWER RANGE MONITORS
 - TEST #13, PROCESS COMPUTER, EVALUATES THERMAL LIMITS (MANUAL HEAT BALANCE & BUCLE PERFORMED TO VERIFY COMPUTER)
 - TESTS #30C AND 35, RECIRCULATION SYSTEM PERFORMANCE AND FLOW CALIBRATION, PROVIDES ASSURANCE OF ACCURATE CORE FLOW MEASUREMENTS
- REG. GUIDE 1.68 OBJECTIVES ARE MET

CATEGORY 2 EXAMPLE
DELETION OF NON-ESSENTIAL
EQUIPMENT TESTS
STARTUP TEST #5 - CONTROL ROD
DRIVE/GANGED ROD TESTING

- **OBJECTIVE - DEMONSTRATE THE PROPER OPERATION OF THE GANGED ROD MODE OF OPERATION OF THE CONTROL ROD DRIVE SYSTEM**

- **REQUIREMENTS - REG. GUIDE 1.68, APPENDIX A, PARAGRAPH 2.B REQUIRES THAT TESTING OF CONTROL ROD WITHDRAWAL AND INSERT SPEEDS, SEQUENCERS AND CONTROL FUNCTIONS BE TESTED AFTER THE CORE IS FULLY LOADED**

- **DISCUSSION -**
 - **BWR/6 HAS CAPABILITY TO MOVE "GANG" OF CONTROL RODS**
 - **GANGED MODE TESTING TO ENSURE THAT CONTROL RODS WITHIN GANG MOVE TOGETHER**
 - **GANGED ROD MODE IS OPERATIONAL IMPROVEMENT**
 - **GANGED MODE IS NOT SAFETY RELATED FUNCTION**
 - **GANGED ROD MODE OF OPERATION WILL NOT BE USED PRIOR TO TESTING**
 - **INDEPENDENT TESTING PERFORMED ON CONTROL ROD SEQUENCERS WHICH ENFORCE COMPLIANCE TO SAFETY ANALYSIS ASSUMPTIONS**
 - **CONTROL ROD DROP ACCIDENT**
 - **ROD WITHDRAWAL ERROR**

- **REG. GUIDE 1.68 OBJECTIVES ARE MET**

CATEGORY 3 EXAMPLE
SIMPLIFY TESTING
TEST #29 - RECIRCULATION FLOW
CONTROL SYSTEM

- **OBJECTIVE** - DEMONSTRATE ACCEPTABLE RECIRC FLOW CONTROL SYSTEM PERFORMANCE FOR DESIRED MODES OF OPERATION AND OPTIMIZE SETTINGS OF RECIRC FLOW CONTROLLER

- **REQUIREMENTS** - REG. GUIDE 1.68, APPENDIX A, PARAGRAPH 5.S REQUIRES RECIRC FLOW CONTROL SYSTEM BE CALIBRATED AND PERFORMANCE VERIFIED. PARAGRAPH 5.H.H REQUIRES DEMONSTRATION OF PLANT DYNAMIC RESPONSE TO DESIGN LOAD SWINGS

- **DISCUSSION** -
 - DEMONSTRATE THE TRANSIENT RESPONSE OF ANY SYSTEM RELATED VARIABLE TO ANY TEST INPUT DOES NOT DIVERGE
 - NUMBER OF INTERMEDIATE FLOW CONDITIONS & TEST INPUTS (RAMP AND STEP DEMANDS) CAN BE REDUCED
 - PRIOR TO TEST, PREDICTIONS OF SYSTEM BEHAVIOR PERFORMED TO AID IN TUNING OF FLOW CONTROL
 - EXTENSIVE BWR TEST EXPERIENCE FROM KUOSHENG 1 & 2, LASALLE 1 & 2, AND LEIBSTADT QUALIFIES APPROACH

CATEGORY 3 EXAMPLE (CONTINUED)

DISCUSSION -

- **IMPROVED ANALYTICAL MODELS PROVIDE MORE ACCURATE PREDICTION OF SYSTEM BEHAVIOR**
- **ENHANCED DATA ACQUISITION SYSTEM PROVIDES SUBSTANTIAL INFORMATION FROM EACH TEST**
- **REG. GUIDE 1.68 OBJECTIVES ARE MET**

**NUMBER OF FLOW CONDITIONS AND TEST
INPUTS CAN BE REDUCED BASED ON PRIOR
EXPERIENCE & PRE-OP CALIBRATION.**

CATEGORY 4 EXAMPLE
REPLACE TEST WITH DATA FROM
OTHER TEST STARTUP TEST #30D
- RECIRCULATION RUNBACK

- **OBJECTIVE - VERIFY ADEQUACY OF RECIRCULATION RUNBACK TO AVOID SCRAM UPON A LOSS OF ONE FEEDWATER PUMP**

- **REQUIREMENTS - REG GUIDE 1.68, APPENDIX A, PARAGRAPH 5.5 REQUIRES THAT RECIRC FLOW CONTROL SYSTEM BE CALIBRATED AS NECESSARY AND PERFORMANCE VERIFIED**

- **DISCUSSION -**
 - **STARTUP TEST #300 SIMULATES LOSS OF FEEDWATER PUMP**
 - ACCEPTANCE CRITERIA REQUIRE ONLY THAT RECIRC RUNBACK OCCURS
 - SCRAM AVOIDANCE IS NOT DEMONSTRATED DURING TEST, ONLY CAPABILITY OF RUNBACK

 - **STARTUP TEST #23C PERFORMS FEEDWATER PUMP TRIP TEST**
 - ACTUAL DEMONSTRATION OF RECIRC RUNBACK CAPABILITIES UNDER REAL CONDITIONS
 - SCRAM AVOIDANCE CAPABILITIES DEMONSTRATED DURING TEST

 - **RECIRC RUNBACK FEATURE IS NOT SAFETY RELATED**
 - NO CREDIT TAKEN IN SAFETY ANALYSIS FOR RUNBACK FEATURE

- **REG GUIDE 1.68 OBJECTIVES MET**

CATEGORY 4 EXAMPLE
JUSTIFY TEST DELETION
TEST #21 - CORE POWER-VOID
MODE RESPONSE

- **OBJECTIVE -** MEASURE STABILITY OF CORE POWER-VOID DYNAMIC RESPONSE & DEMONSTRATE ACCEPTABLE LIMITS BY MOVING A VERY HIGH WORTH CONTROL ROD ONE OR TWO NOTCHES

- **REQUIREMENTS -** NO SPECIFIC REG. GUIDE 1.68 REQUIREMENT TO PERFORM DURING POWER ASCENSION TESTING (PARAGRAPHS 5.S, 5.V, AND 5.H.H REQUIRE DEMONSTRATION OF ACCEPTABLE CONTROL SYSTEM RESPONSES DURING STEADY STATE & TRANSIENT CONDITIONS)

- **DISCUSSION -**
 - PERFORMED IN CONJUNCTION WITH STARTUP TEST #22 MEASURES DYNAMIC RESPONSE TO PRESSURE REGULATOR STEP CHANGES

 - CURRENTLY PLANNED FOR TEST CONDITIONS 4 & 5

 - DEMONSTRATES RESPONSE OF SYSTEM VARIABLES (HEAT FLUX & REACTOR PRESSURE) TO CONTROL ROD MOVEMENT EXHIBITS NON-DIVERGENT BEHAVIOR

CATEGORY 4 EXAMPLE

(CONTINUED)

● DISCUSSION -

● MEASUREMENT OF SYSTEM STABILITY TO CONTROL ROD MOVEMENT DEVELOPED FOR SMALL REACTOR CORES

- DOES NOT PROVIDE SIGNIFICANT INFORMATION FOR LARGE LOOSELY COUPLED BWRS (LOW SIGNAL-TO-NOISE RATIO)

- CORE WIDE DISTURBANCE PROVIDES MORE MEANINGFUL DATA FOR LARGE CORES

● STARTUP TEST #22 YIELDS VALUABLE CORE STABILITY DATA

● NORMAL OBSERVATIONS OF OPERATIONAL POWER MANEUVERS PROVIDES SUFFICIENT DATA

● PREVIOUS EXTENSIVE SPECIAL TESTS OF BWRS HAVE DEMONSTRATED STABILITY CHARACTERISTICS

- PEACH BOTTOM 2, VERMONT YANKEE, CAORSO, LEIBSTADT, & BROWNS FERRY

- ENHANCED DATA ACQUISITION SYSTEMS USED TO PROVIDE MAXIMUM INFORMATION

CATEGORY EXAMPLE 4 (CONTINUED)

• DISCUSSION -

- NEW STABILITY LICENSING BASIS NO LONGER REQUIRES TEST**
 - SIL-380 RECOMMENDS MONITORING OF SYSTEM BEHAVIOR**
 - CAN BE PERFORMED DURING TEST CONDITION 5**
 - NEUTRON FLUX CHARACTERISTICS DURING NORMAL OPERATION AT HIGH POWER / LOW FLOW & ABNORMAL OPERATING CONDITIONS (TECH SPECS)**
 - IMPROVED ANALYTICAL MODELS DEMONSTRATE FUEL LIMITS ARE NOT EXCEEDED**
 - DO NOT ALLOW CONTINUED OPERATION AT NATURAL CIRCULATION FLOW WHICH IS LEAST STABLE (TECH SPECS)**

**GE BWR FUEL & CORE DESIGNS MEET
STABILITY CRITERIA OF 10CFR50 APPENDIX A,
GENERAL DESIGN CRITERIA 10 & 12.
DETAILED PROTOTYPE TESTING & TECH SPECS
ALLOW DELETION OF THIS TEST.**

TECHNICAL SPECIFICATION EXCEPTIONS TO SUPPORT TEST SIMPLIFICATION / ELIMINATION

- **TEST #3 - FUEL LOADING**

- TEST SIMPLIFICATION - ELIMINATE FUEL LOADING CHAMBERS
- PERFORM FUEL LOADING IN AN OFF CENTER SPIRAL PATTERN
- TECH SPEC EXCEPTION FOR MINIMUM REQUIRED OPERABLE SRM CHANNELS AND NO MONITORING FOR FIRST 16 BUNDLES

- **TEST #5 - CONTROL ROD DRIVE / HOT SINGLE ROD SCRAM TESTING IN CONJUNCTION WITH PLANT SCRAMS**

- REPLACE INDIVIDUAL CRD SCRAM TIMING AT RATED PRESSURE WITH FULL CORE SCRAM DATA
 - EXEMPT SELECTED INDIVIDUAL CRDS FROM SCRAM TIMING AT RATED PRESSURE

TECHNICAL SPECIFICATION EXCEPTION

TEST #3 - FUEL LOADING

TEST SIMPLIFICATION

• OBJECTIVE OF TECH SPEC SURVEILLANCE

- PROVIDE CONTINUOUS MONITORING OF NEUTRON FLUX DURING FUEL LOADING

• MINIMUM SYSTEM REQUIREMENTS

- SUFFICIENT MONITORING TO ENSURE LICENSING LIMITS ARE NOT EXCEEDED DURING LICENSING BASIS ACCIDENTS DURING FUEL LOADING

• CURRENT TESTING

- PERFORM FUEL LOADING WITH PORTABLE FUEL LOADING CHAMBERS (FLC'S) WITH MINIMUM REQUIRED COUNT RATE OF 3 COUNTS PER SECOND (CPS)

• PROPOSED CHANGES

- REPLACE FLC'S WITH SOURCE RANGE MONITORS (SRM) INSTRUMENTS AND LOWER MINIMUM COUNT RATE TO 0.7 CPS

• EXCEPTION TO TECH SPECS

- LOWER MINIMUM COUNT RATE TO 0.7 CPS
- EXEMPT MINIMUM COUNT RATE REQUIREMENT FOR INITIAL 16 BUNDLES LOADED
- ALLOW USE OF PORTABLE SOURCES TO DEMONSTRATE SRM OPERABILITY
- REQUIRE ONLY ONE SRM TO BE CONTINUOUSLY INDICATING IN CONTROL ROOM

TEST #3 - FUEL LOADING (CONTINUED)

- **BASIS FOR TECH SPEC EXCEPTION**
- **MINIMUM COUNT RATE REDUCED TO 0.7 CPS**
 - DEMONSTRATION OF ACCEPTABLE SIGNAL-TO-NOISE RATIO REQUIRED (2:1)
 - CAPABILITY OF INSTRUMENTATION SYSTEM AT LOWER COUNT RATE DEMONSTRATED AT OTHER PLANTS
 - INITIAL CORE FUEL (NO EXPOSURE) HAS LOWER GAMMA NOISE
- **EXEMPT MINIMUM COUNT RATE REQUIREMENT FOR INITIAL 16 BUNDLES LOADED**
 - ANALYSIS DEMONSTRATES THAT 16 FUEL BUNDLES CAN BE LOADED WITH CONTROL RODS WITHDRAWN AND STILL MAINTAIN SUBCRITICAL CORE
- **ALLOW USE OF PORTABLE SOURCES TO DEMONSTRATE SRM OPERABILITY**
 - PROVIDES FUNCTIONAL CHECK OF SRM'S NOT SURROUNDED BY FUEL
 - PORTABLE SOURCE WIDELY USED IN NUCLEAR INDUSTRY FOR INSTRUMENT CHECKS
 - PRECEDENT AT PREVIOUS PLANTS FOR USE

TEST #3 - FUEL LOADING (CONTINUED)

- **REQUIRE ONLY ONE SRM TO BE CONTINUOUSLY INDICATING IN CONTROL ROOM**
 - TWO SRM CHANNELS WILL BE DEMONSTRATED OPERABLE AT ALL TIMES
 - AT LEAST ONE SRM CHANNEL IN QUADRANT OF FUEL LOAD AND ADJACENT QUADRANT WILL BE DEMONSTRATED OPERABLE
 - SRM SURROUNDED BY WATER NOT REQUIRED TO BE CONTINUOUSLY INDICATING
 - SAFETY ANALYSES NOT DEPENDENT ON SRM'S
- **NO IMPACT ON SAFETY ANALYSES**
- **REG GUIDE 1.68 OBJECTIVES ARE MET**

TECHNICAL SPECIFICATION EXCEPTION TEST #5 - CONTROL ROD DRIVE / HOT SINGLE ROD SCRAM TESTING IN CONJUNCTION WITH PLANT SCRAMS

● OBJECTIVE OF TECH SPEC SURVEILLANCE

- VERIFY CONTROL ROD SYSTEM PERFORMANCE TO ASSURE ADEQUATE SCRAM REACTIVITY

● MINIMUM SYSTEM REQUIREMENTS

- SUFFICIENT SCRAM REACTIVITY SHALL BE AVAILABLE TO ENSURE LICENSING LIMITS ARE NOT EXCEEDED DURING LICENSING BASIS TRANSIENT EVENTS REQUIRING SCRAM FOR MITIGATION

● CURRENT TESTING

- PERFORM DURING PRE-OP TESTING, COLD CONDITIONS AFTER FUEL LOADED, DURING HEATUP, HOT CONDITIONS WITH RATED REACTOR PRESSURE, & IN CONJUNCTION WITH PLANNED SCRAMS FROM OTHER STARTUP TESTS

● PROPOSED EXCEPTIONS TO TECH SPECS

- POSTPONE HOT SCRAM TECH SPEC SURVEILLANCE TESTS OF SELECTED CONTROL ROD DRIVES FOR INITIAL FUEL CYCLE

TEST #5 - CRD / HOT SINGLE ROD SCRAM TESTING (CONTINUED)

● BASIS FOR TECH SPEC EXCEPTION

- SCRAM PERFORMANCE OF ALL RODS IS VERIFIED DURING PRE-OPS AND OPEN VESSEL PHASES
- SCRAM PERFORMANCE OF WITHDRAWN RODS IS VERIFIED DURING STARTUP TEST 28
 - PRIOR TO 40% POWER PER TECH SPECS
 - ANALYSIS CAN BE PERFORMED TO JUSTIFY LACK OF DATA FOR SELECTED CONTROL RODS NOT FULLY WITHDRAWN DURING SCRAMS
 - ANALYSIS WILL DEMONSTRATE BOL & EOC REACTIVITY ARE NOT SIGNIFICANTLY DEGRADED EVEN IF SELECTED RODS DO NOT SCRAM
 - SCRAM INSERTION OF EXEMPTED RODS VERIFIED DURING FULL CORE SCRAMS
 - NO IMPACT ON OPERATING LIMITS
- DATA ACQUISITION SYSTEM WILL RECORD SCRAM TIMES FROM ALL CONTROL RODS DURING FULL CORE SCRAM
 - PLANNED SCRAMS AT TEST CONDITIONS 1 & 2 USED TO OBTAIN SCRAM TIME DATA
- ALL LICENSING LIMITS ARE MET
- REG. GUIDE 1.68 OBJECTIVES ARE MET

EQUIPMENT OUT OF SERVICE

- ANALYSIS TO JUSTIFY CONTINUED CPS OPERATION UP TO AND INCLUDING FULL POWER WHEN CERTAIN EQUIPMENT IS OUT OF SERVICE
- SPECIFIC EQUIPMENT UNDER PAPA SCOPE INVOLVES SINGLE RECIRCULATION LOOP OPERATION
- CONTINGENCY PLANNING WHICH MAINTAINS MARGINS TO ESTABLISHED SAFETY CRITERIA

REACTOR RECIRCULATION SYSTEM SINGLE LOOP OPERATION (SLO)

- **PURPOSE** - TO ALLOW OPERATION FOR AN INDEFINITE PERIOD OF TIME WITH ONE RECIRCULATION LOOP OUT OF SERVICE
- **CURRENT STATUS** - CPS TECH SPEC LIMIT OF TWELVE (12) HOURS OF OPERATION WHEN ONE RECIRCULATION LOOP IS INOPERABLE
- **BENEFITS** - AVOIDS UNNECESSARY STARTUP DELAYS DUE TO EQUIPMENT FAILURES
 - PROVIDES OPERATIONAL FLEXIBILITY FOR THE PLANT LIFETIME
 - INCREASED PLANT AVAILABILITY/
CAPACITY FACTOR

SINGLE LOOP OPERATION PROGRAM SCOPE

● EVALUATIONS

- RECIRCULATION LOOP FLOW
 - JET PUMP CAVITATION
 - RECIRCULATION FLOW CONTROL
 - MINIMUM CRITICAL POWER RATIO SAFETY AND OPERATING LIMITS
 - THERMAL HYDRAULIC STABILITY
 - ECCS / LOCA ANALYSIS
 - CONTAINMENT ANALYSIS
 - FUEL MECHANICAL PERFORMANCE
 - IMPACT ON ANTICIPATED TRANSIENTS WITHOUT SCRAM
 - VESSEL INTERNAL VIBRATION
 - REACTOR WATER CHEMISTRY
-
- LICENSING REPORT / FSAR AMENDMENT SUBMITAL TO NRC
 - TECHNICAL SPECIFICATION REVISION FOLLOWING NRC APPROVAL

TOTAL SYSTEMS EVALUATION

CPS STARTUP TEST PROGRAM MANAGEMENT

- **TEST PROGRAM DURATION CAN BE REDUCED BY
MANAGEMENT ATTENTION AND COMMITMENT**
 - **ADEQUATE PLANNING, PRIORITIES & RESOURCES**
 - **MEETS REG. GUIDE 1.68 OBJECTIVES**

- **STARTUP TEST ORGANIZATION**
 - **GE EXPERIENCED SUPPORT**
 - **COOPERATION & SUPPORT FROM ENTIRE PLANT STAFF**

CPS STARTUP TEST PROGRAM MANAGEMENT (CONTINUED)

- **STARTUP TEST PROCEDURES MUST BE BOTH
TECHNICALLY AND OPERATIONALLY CORRECT**
 - **TEST METHODS PRODUCE DATA WHICH SATISFY INTENT OF
ACCEPTANCE CRITERIA**
 - **TEST METHODS ARE DOABLE**
 - **TEST METHODS DO NOT JEOPARDIZE OR CHALLENGE PLANT
EQUIPMENT UNNECESSARILY**

- **SPECIFIC TRAINING OF STARTUP TEST & OPERATIONS
PERSONNEL TO IMPROVE PERFORMANCE**
 - **LEARN FROM EXPERIENCE AT OTHER PLANTS**
 - **REVIEW OR WALKTHROUGH PROCEDURES**
 - **RUN PROCEDURES ON SIMULATOR WHERE POSSIBLE**
 - **ABILITY TO ACQUIRE & UTILIZE UNPLANNED TRANSIENT DATA**

CPS PAPA LICENSING APPROACH

- PRESENTATION REPRESENTS INITIAL NRC REVIEW OF CPS PROGRAM
- INITIAL TEST CHANGE PACKAGES - EXPECT SUBMITTAL TO NRC STAFF BY EARLY JANUARY 1986
- REQUEST NRC REVIEWS AND APPROVAL VIA SAFETY EVALUATION REPORT PROCESS
- GENERIC APPLICATIONS FROM HOPE CREEK PAPA ARE EVIDENT
- FSAR CHAPTER # 14 REVISION SUBMITTALS WILL COME AFTER FUEL LOAD - MINIMIZE IMPACT ON ISSUANCE OF LOW POWER OPERATING LICENSING
- CPS LICENSING STAFF WILL WORK CLOSELY WITH NRC CPS LICENSING PROJECT MANAGER TO ENSURE TIMELY STAFF REVIEWS
- NRC REGION III REVIEWS OF TEST PROCEDURE CHANGES WILL REQUIRE CLOSE ATTENTION TO MEET TIGHT SCHEDULES

CPS PAPA SUMMARY

- **NRC SUPPORT AND EXPEDITED REVIEW REQUIRED FOR SUCCESSFUL POWER ASCENSION PROGRAM ACCELERATION**
 - OUT OF SERVICE EQUIPMENT ANALYSIS - SINGLE RECIRC LOOP OPERATION
 - TEST SIMPLIFICATION AND ELIMINATION
 - TECH SPEC EXPECTATIONS

- **PROGRAM QUALITY WILL BE MAINTAINED / ENHANCED**
 - APPLICATION OF TECHNOLOGICAL IMPROVEMENTS
 - SYSTEMATIC REVIEW OF REQUIREMENTS
 - REGULATORY REQUIREMENTS / OBJECTIVES ARE MET

- **POWER ASCENSION PROGRAM CAN BE SIGNIFICANTLY REDUCED**
 - HISTORIC PROBLEMS ADDRESSED
 - PROGRAM MANAGEMENT ATTENTION

- **CPS SCHEDULE IS TIGHT**
 - MINIMAL REG. GUIDE 1.68 RELIEF REQUIRED
 - TWO TECH SPEC EXCEPTIONS REQUIRED
 - 19 OUT OF THE 26 ITEMS SUBMITTED BY HOPE CREEK

CLINTON POWER STATION
TEST SIMPLIFICATION AND ELIMINATION

TEST NO.	TEST NAME	CATEGORY
✓ 1.0	CHEMICAL & RADIOLOGICAL	3
✓ 2.0	RADIATION MEASUREMENT	1
3.0	FUEL LOADING	3
✓ 5.1	CRD/HOT FRICTION TEST	3
✓ 5.2	CRD/HOT SINGLE ROD SCRM	4
✓ 5.3	CRD/GANGED ROD TESTING	2
8.0	CONTROL ROD SEQUENCE EXCHANGE	4
✓ 11.0	LPRM RESPONSE CHECKS	3
✓ 12.0	APRM CALIBRATION	1
✓ 14.0	RCIC	3
16.0	L6A SELECT PROCESS TEMP	1
18.0	TIP UNCERTAINTY	4
19.0	CORE PERFORMANCE	1
21.0	CORE POWER-VOID MODE	4
22.0	PRESSURE REGULATOR	3
23.1	23A FEEDWATER SYSTEM RESPONSE	3
24.0	TURBINE VALVE SURVEILLANCE	1
✓ 25.1	25A MSIV FUNCTION TEST	1
✓ 26.0	RELIEF VALVES/250 PSIG	3
27.0	TURBINE TRIP/LOAD REJECT	3
29.0	RECIRCULATION FLOW CONTROL	3
30.1	30A ONE RPT/TC #6	3
30.3	30B TWO RPT	4
30.4	30D RECIRC RUNBACK	4
30.5	30E RECIRC CAVITATION	3
99.0	TEST CONDITION 4	4

PROCESS FOR TEST SIMPLIFICATION/ELIMINATION

GE

UTILITY

NRC

<p>CONCEPTUAL LICENSING BASIS</p>	<p>(COMPLETED)</p>	
<p>PRELIMINARY NRC CONCURRENCE/GUIDELINES</p>	<p>(COMPLETED)</p>	<p>ESTABLISH REVIEW GUIDELINES</p>
<p>DETAILED ENGINEERING/ PRELIMINARY SAFETY REVIEW</p>	<p>SAFETY EVALUATION REVIEW</p>	
<p>REVISED STARTUP TEST SPECIFICATION/FDI</p>	<p>FSAR AMENDMENT</p>	
<p>UPDATE STARTUP TEST PROCEDURES/REVIEW</p>	<p>UPDATE PROCEDURES</p>	
<p>LICENSING SUPPORT</p>	<p>SUBMIT FSAR AND PROCEDURES</p>	<p>FSAR/PROCEDURE REVIEW & APPROVAL</p>

CLINTON POWER STATION
TEST SIMPLIFICATION AND ELIMINATION

TEST NO.	TEST NAME	IMPLEMENTATION
1.0	CHEMICAL & RADIOLOGICAL	TEST SIMPLIFICATION, REDUCE # OF TESTS
2.0	RADIATION MEASUREMENT	SUBSTITUTE WITH TECH SPEC SURVEILLANCE
3.0	FUEL LOADING	TEST SIMPLIFICATION, ELIMINATE FLCs
5.1	CRD/HOT FRICTION TEST	TEST SIMPLIFICATION
5.2	CRD/HOT SINGLE ROD SCRM	IN CONJUNCTION WITH TEST 28
5.3	CRD/GANGED ROD TESTING	DELETE, NON ESSENTIAL EQUIPMENT TEST
8.0	CONTROL ROD SEQUENCE EXCHANGE	JUSTIFY TEST DELETION
11.0	LPRM RESPONSE CHECKS	TEST SIMPLIFICATION, REDUCE # OF TESTS
12.0	APRM CALIBRATION	SUBSTITUTE WITH TECH SPEC SURVEILLANCE
14.0	RCIC	TEST SIMPLIFICATION, REDUCE # OF TESTS
16.0	16A SELECT PROCESS TEMP	TEST SIMPLIFICATION, REDUCE # OF TESTS
18.0	TIP UNCERTAINTY	JUSTIFY TEST DELETION
19.0	CORE PERFORMANCE	SUBSTITUTE WITH TECH SPEC SURVEILLANCE
21.0	CORE POWER-VOID MODE	JUSTIFY TEST DELETION
22.0	PR REG SETPOINT CHANGE	TEST SIMPLIFICATION, REDUCE # OF TESTS
23.1	23A FW SYS RESPONSE	TEST SIMPLIFICATION, RELAX LVL 2 CRITERIA
24.0	TURB VALVE SURVEILLANCE	SUBSTITUTE WITH TECH SPEC SURVEILLANCE
25.1	25A MSIV FUNCTION TEST	SUBSTITUTE WITH TECH SPEC SURVEILLANCE
25.2	25B REACTOR ISOLATION	TEST SIMPLIFICATION, EXPAND TEST WINDOW
26.0	RELIEF VALVES/250 PSIG	TEST SIMPLIFICATION, REDUCE # OF TESTS
27.0	TURBINE TRIP/LOAD REJECT	TEST SIMPLIFICATION, REDUCE # OF TESTS
29.0	RECIRC FLOW CONTROL	TEST SIMPLIFICATION, REDUCE # OF STEPS
30.1	30A ONE RPT/TC #6	TEST SIMPLIFICATION, REDUCE # OF TESTS
30.3	30B TWO RPT	IN CONJUNCTION WITH TEST 27
30.4	30D RECIRC RUNBACK	IN CONJUNCTION WITH TEST 23A
30.5	30E RECIRC CAVITATION	TEST SIMPLIFICATION, REDUCE # OF TESTS
99.0	TEST CONDITION 4	JUSTIFY TEST CONDITION DELETION

COMPLIANCE TO REGULATORY GUIDE 1.68, APPENDIX A

<u>PARAGRAPH</u>	<u>DESCRIPTION</u>	<u>TESTING</u> *	<u>OPEN VESSEL</u>	<u>HEATUP</u>
2.	FUEL LOADING	3, TS**	X	
2.A	SHUTDOWN MARGIN	3, 4, TS	X	
2.B	CRD TESTING	PREOPS, 5, TS	X	
2.C	RPS TESTING	PREOPS, TS	X	
2.D	LEAK RATE TEST	PREOPS, TS	X	
2.E	WATER QUALITY	1, TS	X	
2.F	VIBRATION TESTS	33	X	
2.G	SRM/IRM	6, 10, TS	X	
2.H	INCORE MONITORS	13	X	
4.	<u>LOW POWER TESTING</u>			
4.A	(PWR)	-		X
4.B	(PWR)	-		X
4.C	(PWR)	-		X
4.D	SRM/IRM OVERLAP	6, 10		X
4.E	FLUX DISTRIBUTION	11, 18, TS		X
4.F	RADIATION SURVEYS	2, TS		X
4.G	RADIATION MONITORS	2, 74, TS		X
4.H	CHEMICAL/RADIOCHEM.	1, TS		X
4.I	ROD CONTROL SYSTEMS	5, TS***		X
4.J	CONT. VENTILATION	BOP		X
4.K	STEAM DRIVEN ECCS	14, 15, TS		X
4.L	MSIV OPERABILITY	15, TS		X
4.M	MSIV LEAKAGE SYSTEM	PREOPS		X
4.N	COMPUTER	13		X
4.O	CRD SCRAM TIMES	5, TS		X
4.P	RELIEF VALVES	26, TS		X
4.Q	TURBINE, BYPASS VALVES	24, TS		X
4.R	RWCU	70, TS		X
4.S	INTERNAL VIBRATION	PREOPS, 34		X
4.T	(PWR)	-		X
4.U	CONTROL SYSTEMS	14, 15, 22, 23A, 29		X

- * REFERS TO STARTUP TEST NUMBER (ST-X)
- ** TS = TECHNICAL SPECIFICATION SURVEILLANCE REQUIREMENT
- *** BOP = BALANCE OF PLANT TESTING
- = DELETED TESTING AT INDICATED TEST CONDITION

COMPLIANCE TO REGULATORY GUIDE 1.68, APPENDIX A (CONT'D)

PARAGRAPH	DESCRIPTION	TESTING	TEST CONDITION					
			1	2	3	4	5	6
5.	POWER ASCENSION							
5.A	POWER VS FLOW	13, 19, 30C, 35, TS	x	x	x	(x)	x	x
5.B	CORE PERFORMANCE	19, TS		x	x		x	x
5.C	SEQUENCE EXCHANGE	8, TS						
5.D	(PWR)	-						
5.E	(PWR)	-						
5.F	(PWR)	-						
5.G	ROD CONTROL SYSTEMS	5, TS		x				
5.H	CRD SCRAM TIMES	5, 25B, 27, 28, 31, TS	x	x	x			x
5.I	(PWR)	-						
5.J	(PWR)	-						
5.K	ECCS HIGH PRESSURE	14, 15, TS		x	x			
5.L	RESIDUAL HEAT REMOVAL	14, 29, 71, TS		x				x
5.M	REACTOR COOLANT SYSTEM	16A, 30C, 33, 35		x	x	(x)		x
5.N	LOOSE PARTS MONITOR	PREOPS						
5.O	LEAK RATE DETECTION	PREOPS, 14, 15, TS, BOP						
5.P	INTERNAL VIBRATION	PREOPS, 34						
5.Q	FAILED FUEL DETECTORS	PREOPS, 27, 74, TS	x		x			x
5.R	PROCESS COMPUTER	13	x		x		x	
5.S	CONTROL SYSTEMS	14, 15, 22, 23A, 29		x	x	(x)	x	x
5.T	RELIEF VALVES	26, TS	x	x	x			x
5.U	MSIV	25, TS	x	x			x	
5.V	FEEDWATER SYSTEM	23A, 23B, 23C		x	x	(x)	x	x
5.W	SHIELDING	BOP						
5.X	AUXILIARY ECCS SYSTEMS	BOP						
5.Y	INSTRUMENT CALIBRATION	11, 12, 18, 35, TS	x	x	x		x	x
5.Z	RADIATION MONITORS	PREOPS, 27, 74, TS	x		x			x
5.A.A	CHEMICAL/RADIOCHEMICAL	1, TS	x		(x)		x	x
5.B.B	RADIATION SURVEYS	2, TS	x		x			x
5.C.C	RADWASTE	BOP						
5.D.D	SHUTDOWN OUTSIDE CR	28	x					
5.E.E	CONT, INERTING/PURGE	BOP						
5.F.F	VENTILATION & A/C	BOP						
5.G.G	ATWS	PREOPS, 27, 30B, TS			x			x
5.H.H	LOAD SWINGS	29		x	x		x	x
5.I.I	PUMP TRIPS	23D, 27, 30A, 30B			(x)			x
5.J.J	LOSS OF OFFSITE POWER	31		x				
5.K.K	LOSS OF FW HEATING	23B			(x)			x
5.L.L	TURBINE TRIP	27			(x)			x
5.M.M	FULL ISOLATION	25B						x
5.N.N	LOAD REJECTION	27	x					x
5.O.O	VIBRATIONS/EXPANSION	17, 33, BOP	x	x	x			x

CATEGORY 4 EXAMPLE
REPLACE TEST WITH DATA
FROM OTHER TEST
TEST #27 - TURBINE TRIP AND
GENERATOR LOAD REJECTION

- **OBJECTIVE - DEMONSTRATE RESPONSE OF REACTOR AND CONTROL SYSTEMS TO PROTECTIVE TURBINE TRIPS AND GENERATOR LOAD REJECTIONS**

- **REQUIREMENTS - REG. GUIDE 1.68, APPENDIX A, PARAGRAPHS 5.L.L AND 5.N.N REQUIRES TESTING AT 100% POWER TO DEMONSTRATE PLANT DYNAMIC RESPONSE IN ACCORDANCE WITH DESIGN (TESTS MAY BE COMBINED IF TURBINE TRIP IS INITIATED DIRECTLY FROM GENERATOR LOAD REJECTION)**

- **DISCUSSION -**
 - **STARTUP TEST 27 CURRENTLY INCLUDES**
 - **GENERATOR LOAD REJECTION DURING TEST CONDITION 1 OR 2 (WITHIN PLANT BYPASS CAPACITY)**
 - **TURBINE TRIP DURING TEST CONDITION 3 (75% POWER)**
 - **GENERATOR LOAD REJECTION AT TEST CONDITION 6 (100% POWER)**

CATEGORY 4 EXAMPLE

(CONTINUED)

● DISCUSSION -

● LEVEL 1 CRITERIA

- PROPER OPERATION OF TURBINE CONTROL & STOP VALVE CLOSURE TIMES WITH RESPECT TO BYPASS VALVE OPENING TIMES
- ADEQUATE BYPASS VALVE RESPONSE TIMES
- PROPER FEEDWATER CONTROL SYSTEM LEVEL RESPONSE TO PREVENT FLOODING OF STEAM LINES
- RECIRC FLOW COASTDOWN FOLLOWING PROTECTIVE TRIPS IS WITHIN DESIGN
- ACCEPTABLE VESSEL DOME PRESSURE & SIMULATED HEAT FLUX RESPONSE
- PROPER OPERATION OF LOW-LOW SET PRESSURE LOGIC FOR SAFETY RELIEF VALVES (SRVS)

● LEVEL 2 CRITERIA

- NO MSIV CLOSURE OCCURS IN FIRST THREE MINUTES
- VESSEL DOME PRESSURE & SIMULATED HEAT FLUX DO NOT EXCEED PREDICTED VALUES
- FOR GENERATOR LOAD REJECTION WITHIN BYPASS CAPACITY: REACTOR DOES NOT SCRAM, BYPASS CAPACITY GREATER THAN OR EQUAL TO FSAR VALUES ANALYZED, LOW WATER LEVEL RECIRC PUMP TRIP IS AVOIDED, FEEDWATER LEVEL CONTROL AVOIDS HIGH LEVEL FEEDWATER TRIP, SRV DISCHARGE TEMPERATURES REMAIN WITHIN ACCEPTABLE LIMITS.

CATEGORY 4 EXAMPLE (CONTINUED)

● DISCUSSION -

- **TURBINE TRIP PERFORMED INSTEAD OF LOAD REJECTION AT LOW POWER TO DEMONSTRATE BYPASS VALVE PERFORMANCE**
- **TURBINE TRIP AT A TEST CONDITION 3 DELETED**
- **FEEDWATER CONTROL SYSTEM IS TUNED IN STARTUP TEST #23A - HIGH / LOW LEVEL AVOIDANCE RESPONSES CHECKED DURING FULL POWER LOAD REJECTION TEST**
- **RECIRC PUMP COASTDOWN CHECKED DURING FULL POWER LOAD REJECTION TEST**
- **ENHANCED DATA ACQUISITION SYSTEMS ALLOW SUBSTANTIAL AMOUNT OF DATA OBTAINED FROM FULL POWER LOAD REJECTION TEST**
- **IMPROVED ANALYTICAL MODELS & QUALIFICATION TO PLANT TESTS ASSURES ACCURATE PREDICTION OF SYSTEM RESPONSE**
- **STARTUP TEST #22, PRESSURE REGULATOR, ENSURES NO MSIV CLOSURES ON LOW TURBINE INLET PRESSURE**
- **OTHER SYSTEM RESPONSES THOROUGHLY CHECKED DURING PRE-OPS & OTHER TESTS (E.G., SCRAM OPERATION, SRVS, TURBINE STOP VALVE CLOSURE TIMES)**
- **EXTENSIVE OPERATOR TRAINING FOR PLANNED SCRAMS ACHIEVED ON CPS SIMULATOR**
- **REG. GUIDE 1.68 OBJECTIVES ARE MET**