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**DUKE POWER**

August 21, 1996

U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Attention: Document Control Desk

SUBJECT: Catawba Nuclear Station  
Simulator Four Year Report

This report is submitted as the four year report for the Catawba Nuclear Station Unit One Simulator in accordance with 10CFR55.45 b.5.ii and b.5.vi. The required information is included in the form of attachments to this letter as follows:

ATTACHMENT 1.0 UNCORRECTED PERFORMANCE TEST FAILURES  
ATTACHMENT 2.0 DESCRIPTION OF PERFORMANCE TESTS COMPLETED  
(1992 - 1995)  
ATTACHMENT 3.0 NEXT FOUR YEAR TEST SCHEDULE (1996 - 1999)  
ATTACHMENT 4.0 SIMULATOR VS PLANT DIFFERENCES  
ATTACHMENT 5.0 ACRONYM LIST

If there are any questions concerning this report, please feel free to call Glenn Spurlin (803)-831-3117.

A handwritten signature in cursive script, appearing to read 'W. H. Miller', written over a horizontal line.

W. H. Miller  
Training Manager  
Catawba Nuclear Station

cc: W.R. McCollum  
G.R. Peterson

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ATTACHMENT 1.0  
Uncorrected Performance Test Failures

The Catawba Nuclear Station Unit One Simulator has no unresolved performance test failures. There are three outstanding work requests (request for correction of the problem) associated with transient testing from 1995. These work requests were generated to track resolution of differences between transient reference data supplied by our Duke Power Safety Analysis Group and by simulator performance. These differences are a result of replacement steam generator modeling on the simulator which was completed in 1995 due to replacement of our Unit 1 Steam Generators. New data for our transients was generated and compared to simulator response. The outstanding work requests are:

- AFW-045      Written to track differences in cooldown effect of Auxiliary Feedwater (CA) on the system. This is a generic issue on all transients where CA is used. Target date for completion is 12/31/96.
  
- RCS-028      Tracks resolution of differences in Core Exit thermocouple and Reactor Coolant system pressure response on a Small Break LOCA with Inadequate Core Cooling (Transient 15). Target date for completion is 12/31/96.
  
- RCS-029      Tracks resolution of differences in Tavg and Reactor Power during a loss of all feedwater with an ATWS (Transient 14). Simulator parameters do not decrease as quickly as reference data. Target date for completion is 12/31/96.

The direction of each of the parameters tracked above is correct. The magnitude of the change is not significant enough to detract from training.

ATTACHMENT 2.0  
Description of Tests Completed - 1992

Transients:

Completion Date

#1	SGTR	12/09/92
#2	LOCA	12/15/92
#3	Sm Brk LOCA	12/09/92
#4	Loss Of Offsite Power	12/14/92
#5	NCP Trip	09/24/92
#6	Loss of CF	11/30/92
#7	Loss of FDW	12/09/92
#8	Dropped Rod BOL	09/24/92
#9	Load Rejection	12/14/92
#10	Spray Valve Failure	11/30/92
#11	Rx Trip	12/09/92
#12	Steam Line Break	12/09/92
#13	Feed Line Break	12/09/92
#14	Loss CF with ATWS	12/14/92
#15	Small Break LOCA	04/05/93
#16	SGTR, Failed PORV	12/14/92

Malfunctions

NDX-4	ND Pump Discharge Rupture	11/20/92
EPL-2	Loss of Vital Channel	04/06/93
KCX-2	KC Relief Valve Failure	11/20/92
IRX-10	Stuck Rod	11/20/92
CHX-1	Variable NC Activity	09/24/92
EGB-2	Main generator Breaker Trip	11/20/92
ILE-1	PZR Level Master Failure	11/20/92
NCX-2	PZR PORV Failure	11/20/92
CFX-7	Main Feedline Break	04/05/93

Others

Steady State Normal Ops Test (Four Power Levels including the one hour test at 100% operations.)	04/05/93
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Simulator real Time Test	12/29/92
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ATTACHMENT 2.0 (cont.)  
Description of Tests Completed - 1993

<u>Transients:</u>	<u>Completion Date</u>
#1 SGTR	03/24/94
#2 LOCA	03/24/94
#3 Sm Brk LOCA	03/24/94
#4 Loss Of Offsite Power	03/24/94
#5 NCP Trip	03/24/94
#6 Loss of CF	03/24/94
#7 Loss of FDW	03/24/94
#8 Dropped Rod BOL	03/29/94
#9 Load Rejection	11/30/93
#10 Spray Valve Failure	11/30/93
#11 Rx Trip	11/30/93
#12 Steam Line Break	11/30/93
#13 Feed Line Break	12/02/93
#14 Loss CF with ATWS	12/03/93
#15 Small Break LOCA	12/13/93
#16 SGTR, Failed PORV	12/09/93

Malfunctions

SGX-1	SGTR	04/12/93
NCX-7	NC Leak	03/31/94
EPX-2	Loss of Switchyard	11/03/93
DGX-1	DG Failure to Start	04/12/93
RNX-3	RN Pump Failure	04/12/93
CFX-1	Loss of FWPT Vacuum	03/31/94
IRX-6	Dropped Rod	11/03/93
IRX-9	Rods Fail to Move	11/03/93
IRX-3	Uncontrolled Rod Motion	04/12/93
SMX-7	Steam Line Break Inside Containment	11/03/93

Others

Steady State Normal Ops Test (Four Power Levels including the one hour test at 100% operations.)	03/31/94
Simulator real Time Test	01/09/94

ATTACHMENT 2.0 (cont.)  
Description of Tests Completed - 1994

Transients:

		<u>Completion Date</u>
#1	SGTR	02/02/95
#2	LOCA	02/02/95
#3	Sm Brk LOCA	02/02/95
#4	Loss Of Offsite Power	02/02/95
#5	NCP Trip	02/02/95
#6	Loss of CF	02/02/95
#7	Loss of FDW	03/16/95
#8	Dropped Rod BOL	02/02/95
#9	Load Rejection	02/02/95
#10	Spray Valve Failure	02/20/95
#11	Rx Trip	02/02/95
#12	Steam Line Break	02/06/95
#13	Feed Line Break	02/06/95
#14	Loss CF with ATWS	02/02/95
#15	Small Break LOCA	03/16/95
#16	SGTR, Failed PORV	02/06/95

Malfunctions

NCX-8	LOCA	01/04/95
VIX-1	Loss of VI	01/04/95
EPX-8	Loss of 4160 VAC Bus	01/04/95
NCP-1	NCP Trip	12/01/94
IRX-13	Improper Overlap on NIs	12/01/94
EHC-1	Inadvertent Turbine Trip	12/01/94
ENB-11	Power Range Detector Failure	12/01/94
IPE-1	Pzr Master Pressure Controller Failure	12/01/94
IPX-1	Auto Rx Trip Failure	01/04/95

Others

Steady State Normal Ops Test (Four Power Levels including the one hour test at 100% operations.)	02/06/95
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Simulator real Time Test	12/29/94
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ATTACHMENT 2.0 (cont.)  
Description of Tests Completed - 1995

Transients:

Completion Date

#1	SGTR	01/25/96
#2	LOCA	03/13/96
#3	Sm Brk LOCA	03/13/96
#4	Loss Of Offsite Power	03/13/96
#5	NCP Trip	12/04/96
#6	Loss of CF	03/13/96
#7	Loss of FDW	03/07/96
#8	Dropped Rod BOL and EOL	01/25/96
#9	Load Rejection	03/07/96
#10	Prz PORV Failure	01/09/96
#11	Rx Trip	01/29/96
#12	Steam Line Break	01/27/96
#13	Feed Line Break	03/06/96
#14	Loss CF with ATWS	03/12/96
#15	Small Break LOCA	03/12/96
#16	SGTR, Failed PORV: This transient was deleted and will be replaced with a Hot Leg LOCA in 1996. The SGTR, failed PORV provided no useful data for simulator fidelity.	

Malfunctions

NCX-3	Pzr Safety Failure	11/01/95
EPX-5	Loss of 6900 V Switchgear	11/01/95
MTX-3	Loss of Cond Vacuum	11/01/95
NDX-1	ND Pump Failure	11/01/95
MLT-2	Loss of All Feedwater- ran Transient 6 for this test.	
EPL-4	Loss of Protective System Channel	01/02/96
IRE-1	Process Instrument and Control Failure	11/01/95
NIX-4	ECCS Header Valve Fail to Open on ECCS	11/01/95
IRX-2	Uncontrolled Rod Withdrawal	12/05/95

Others

Steady State Normal Ops Test (Four Power Levels including the one hour test at 100% operations.)	01/04/96 **
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Simulator real Time Test	Test not run.
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\*\*The 100% test was run satisfactorily against predicted data. Other tests were not run due to S/G replacement project. No new data will be available for steady state tests until after Unit 1 startup.



ATTACHMENT 3.0  
Annual Simulator Testing Schedule for 1996

Transients:

Transient #1	S/G Tube Leak
Transient #2	Large Break LOCA
Transient #3	Small Break LOCA
Transient #4	Loss of Offsite Power
Transient #5	Single NC Pump Trip
Transient #6	Loss of Main Feedwater
Transient #7	Loss of All Feedwater
Transient #8	Dropped Rod (EOL and BOL)
Transient #9	Load Rejection
Transient #10	PORV Failure
Transient #11	Reactor Trip
Transient #12	Steam Line Break
Transient #13	Feedwater Line Break
Transient #14	Loss of CF ATWS
Transient #15	Small Break LOCA ICC
Transient #16	Hot Leg LOCA

Malfunctions:

NDX4	ND Pump Discharge Rupture
EPL2	Loss of Vital Channel
KCX2	KC Relief Valve Failure
IRX10	Stuck Rod
CHX1	Variable NC Activity
EGB2	Main Generator Breaker Trip
ILE1	PZR Level Master Failure
NCX2	PZR PORV Failure
CFX7	Main Feedline Break

Others:

Steady State/Normal Ops Test -  
(Four Power levels, including the one hour at  
100% normal operations)

Simulator Real Time Test

ATTACHMENT 3.0 (cont.)  
Annual Simulator Testing Schedule For 1997

Transients:

Transient #1	S/G Tube Leak
Transient #2	Large Break LOCA
Transient #3	Small Break LOCA
Transient #4	Loss of Offsite Power
Transient #5	Single NC Pump Trip
Transient #6	Loss of Main Feedwater
Transient #7	Loss of All Feedwater
Transient #8	Dropped Rod (EOL and BOL)
Transient #9	Load Rejection
Transient #10	PORV Failure
Transient #11	Reactor Trip
Transient #12	Steam Line Break
Transient #13	Feedwater Line Break
Transient #14	Loss of CF ATWS
Transient #15	Small Break LOCA ICC
Transient #16	Hot Leg LOCA

Malfunctions:

SGX1	SGTR
NCX7	NC Leak
EPX2	Loss of Switchyard
DGX1	D/G Failure to Start
RNX3	RN Pump Failure
CFX1	Loss of FWPT Vacuum
IRX6	Dropped Rod
IRX9	Rods Fail to Move
IRX3	Uncontrolled Rod Motion
SMX7	Steam Line Break Inside Containment

Others:

Steady State/Normal Ops Test  
(Four Power levels, including the one hour at  
100% normal operations)

Simulator Real Time Test



ATTACHMENT 3.0 (cont.)

Annual Simulator Testing Schedule for 1998

Transients:

Transient #1	S/G Tube Leak
Transient #2	Large Break LOCA
Transient #3	Small Break LOCA
Transient #4	Loss of Offsite Power
Transient #5	Single NC Pump Trip
Transient #6	Loss of Main Feedwater
Transient #7	Loss of All Feedwater
Transient #8	Dropped Rod (EOL and BOL)
Transient #9	Load Rejection
Transient #10	Porv Failure
Transient #11	Reactor Trip
Transient #12	Steam Line Break
Transient #13	Feedwater Line Break
Transient #14	Loss of CF ATWS
Transient #15	Small Break LOCA ICC
Transient #16	Hot Leg LOCA

Malfunctions:

NCX8	LOCA
VIX1	Loss of VI
EPX8	Loss of 4160 VAC Bus
NCP1	NCP Trip
IRX13	Improper Overlap
EHC1	Inadvertent Turbine Trip
ENB11	Power Range Det. Failure
IPE1	PZR Master Pressure Controller Failure
IPX1	Auto Reactor Trip Failure

Others:

Steady State/Normal Ops Test  
(Four Power levels, including the one hour at  
100% normal operations)

Simulator Real Time Test

### ATTACHMENT 3.0 (cont.)

#### Annual Simulator Testing Schedule for 1999

##### Transients:

Transient #1	S/G Tube Leak
Transient #2	Large Break LOCA
Transient #3	Small Break LOCA
Transient #4	Loss of Offsite Power
Transient #5	Single NC Pump Trip
Transient #6	Loss of Main Feedwater
Transient #7	Loss of All Feedwater
Transient #8	Dropped Rod (EOL and BOL)
Transient #9	Load Rejection
Transient #10	PORV Failure
Transient #11	Reactor Trip
Transient #12	Steam Line Break
Transient #13	Feedwater Line Break
Transient #14	Loss of CF ATWS
Transient #15	Small Break LOCA ICC
Transient #16	Hot Leg LOCA

##### Malfunctions:

NCX3	PZR Safety Failure
EPX5	Loss of 6900 Switchgear
MTX3	Loss of Cond. Vacuum
NDX1	ND Pump Failure
MLT2	Loss of All Feedwater
EPL4	Loss of Protective System Channel
IRE1	Process Instrument and Control Failure
NIX4	ECCS Header Valves Fail to Open on ECCS Activation
IRX2	Uncontrolled Rod Withdrawal

##### Others:

Steady State/Normal Ops Test  
(Four Power levels, including the one hour at  
100% normal operations)

Simulator Real Time Test

ATTACHMENT 4.0  
Simulator vs Plant Differences

The following items are changes made to the simulator since the last four year certification. These items do not reflect true plant conditions in either size, layout, environmental surroundings, or actual operation. Each change has been evaluated and determined to be beneficial to training. No negative impacts have been caused by the differences.

1. A new D/G simulator has been added to the simulator. The panels for the D/G are the same size, design and layout as the plant. A difference does exist in the environment surrounding the panels. The simulator panels do not reflect the true temperature, noise level and ventilation effects experienced at the local panels.
2. A small panel has been added to allow operation and indication of the Unit 2 Nuclear Service Water pumps. This panel does not reflect the size or location of the actual Unit 2 control boards in the plant. This panel was installed at the request of Operations to give the operators quick information on the operation of these pumps. Before installation of the panels, operators were required to call the booth for status of the pumps.
3. The Loose Parts Monitor System has been replaced in the plant. This modification will not be done on the simulator. The existing simulator panel is face front only and provides no training benefit. This panel will be deleted from the simulator.

ATTACHMENT 5.0  
Catawba System Designators

System Designator

System Nomenclature

AS	Auxiliary Steam
BB	Steam Generator Blowdown Recycle
BW	Steam Generator Wet Lay-Up
CA	Auxiliary Feedwater
CF	Main Feedwater
CL	CF Pump Turbine Condensate Seal
CM	Condensate
CS	Condensate Sampling

Electrical Systems (3 letter)

EBA	230KV Switchyard
EBE	230KV Switchyard Control
EDA	Control Rod Position Indication
EEA	Environmental Instrumentation
EEB	Meteorological Instrumentation
EFA	Fire Detection
EGB	Generator Excitation
EMA	Emergency Safeguards Feature, 1.47 Bypass
EMB	Annunciators, Status and Monitor Lights
EMC	Event Recorder
EMD	Loose Parts Monitoring
ENA	Incore Instrumentation
ENB	Excore Instrumentation
ENC	Boron Dilution Mitigation
EPA	Unit Main Power
EPB	6.9KV Unit Normal Auxiliary Power
EPC	4.16KV Essential Auxiliary Power
EPD	600VAC Unit Normal Auxiliary Power
EPE	600VAC Essential Auxiliary Power
EPF	240/120VAC Auxiliary Control Power
EPG	120VAC Vital Instrument and Control Power
EPJ	250VAC Auxiliary Power
EPK	125VAC Auxiliary Control Power
EPL	125VAC Vital Instrument and Control Power
EPM	13.8KV Auxiliary Power
EQB	Diesel Generator Load Sequencer
EQC	Diesel Generator

ATTACHMENT 5.0 (cont.)  
Catawba System Designators

System Designator

EQD

System Nomenclature

Standby Shutdown Facility Diesel Generator

Mechanical Systems

FD	D/G Engine Fuel Oil
GH	Generation Hydrogen
HA	Bleed Steam to 'A' Heaters
HB	Bleed Steam to 'B' Heaters
HC	Bleed Steam to 'C' Heaters
HD	Bleed Steam to 'D' Heaters
HE	Bleed Steam to 'E' Heaters
HF	Bleed Steam to 'G' Heaters
HM	Moisture Separator Reheater Bleed Steam
ICCM	Inadequate Core Cooling Monitor
IDE	Steam Dump Control
IFE	Feedwater Control
IKE	Operator Aid Computer
ILE	Pressurizer Pressure & Level Control
IPE	Reactor Protection
IRE	Rod Control
ISE	ESF Actuation
ITE	Main Turbine Instrumentation & Control (I&C)
IWE	Feedwater Pump Turbine I & C
KC	Component Cooling
KD	D/G Engine Cooling Water
KF	Spent Fuel Cooling
KG	Generator Stator Cooling Water
KR	Recirculated Cooling Water
LD	D/G Engine Lube Oil
LF	CF Pump Turbine Lube Oil
LG	Generator Seal Oil
LH	Main Generator Hydraulic Oil
LP	CF Pump Turbine Hydraulic Oil
LT	Main Turbine Lube Oil
NC	Reactor Coolant
ND	Residual Heat Removal
NF	Ice Condenser Refrigeration
NI	Safety Injection

ATTACHMENT 5.0 (cont.)  
Catawba System Designators

System Designator

System Nomenclature

NS	Containment Spray
NV	Chemical and Volume Control
NW	Containment Isolation Valve Injection Water
RC	Condenser Circulating Water
RL	Conventional Low Pressure Service Water
RN	Nuclear Service Water
SM	Main Steam
SP	Main Steam Supply to CF Pump Turbines
SV	Main Steam to Atmosphere
VC	Control Area HVAC
VE	Annulus Ventilation
VF	Fuel Pool Ventilation
VI	Instrument Air
VP	Containment Purge
VO	Containment Air Release and Addition
VS	Station Air
VV	Containment Ventilation
VX	Containment Air Return & Hydrogen Reduction
WG	Waste Gas
WL	Liquid Waste Recycle
YC	Control Area Chilled Water
ZM	Main Vacuum