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RECIP.NAME RECIPIENT AFFILIATION
EISENHUT,D.G. Division of Licensing

SUBJECT: Forwards responses to Generic Ltr 82-28 re inadequate core cooling sys for facility.W/five oversize drawings.Aperture cards are available in PDR. "See Encls & drawings"

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P. O. BOX 14000, JUNO BEACH, FL 33408

FLORIDA POWER & LIGHT COMPANY

March 10, 1983
L-83-133

Office of Nuclear Reactor Regulation
Attention: Mr. Darrell G. Eisenhut, Director
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Eisenhut:

Re: St. Lucie Unit 1
Docket No. 50-335
Post-TMI Requirements
Inadequate Core Cooling Instrumentation System
Response to Generic Letter 82-28

Please find attached our response to NRC Generic Letter 82-28 concerning the Inadequate Core Cooling System for St. Lucie Unit 1.

Very truly yours,

Robert E. Uhrig
Vice President
Advanced System & Technology

REU/PKG/js

Attachment

cc: Mr. James P. O'Reilly, Region II
Harold F. Reis, Esquire
PNS-LI-83-175-1

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RESPONSES TO NRC GENERIC LETTER NO. 82-28

ST. LUCIE PLANT UNIT NO. 1

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE

This document contains responses to the NRC Generic Letter No. 82-28, Dated December 10, 1982, requesting information regarding the Inadequate Core Cooling Instrumentation System being installed in St. Lucie Plant Unit 1 to comply with the requirements of NUREG-0737, Section II.F.2.

The scope of this document covers the specific information requested in each one of the three separate items of the NRC letter which apply to St. Lucie Plant Unit 1. However, generic information is referenced when it is contained in specific documents.

The information included in this document includes the following topics:

1. Identification of the Reactor Coolant Inventory System selected for this plant.

2. Generic design description of the system.

3. Detailed schedule for engineering, procurement and installation of the system.

4. System compliance with the NUREG-0737 Section II.F.2.

2.0 REFERENCES

1. CEN-185, "DOCUMENTATION OF INADEQUATE CORE COOLING INSTRUMENTATION FOR COMBUSTION ENGINEERING NUCLEAR STEAM SUPPLY SYSTEMS," SEPTEMBER 1981, COMBUSTION ENGINEERING, INC.

2. CEN-185-P, SUPPLEMENT 1, "HEATED JUNCTION THERMOCOUPLE: PHASE 1 TEST REPORT," NOVEMBER, 1981, COMBUSTION ENGINEERING, INC.

3. CEN-185-P, SUPPLEMENT 2, " HEATED JUNCTION THERMOCOUPLE: PHASE II TEST REPORT," NOVEMBER 1981, COMBUSTION ENGINEERING, INC.

4. CEN-185-P, SUPPLEMENT 3, "HEATED JUNCTION THERMOCOUPLE: PHASE III TEST REPORT," JUNE, 1982, COMBUSTION ENGINEERING, INC.

5. CEN-181-P, "GENERIC RESPONSES TO NRC QUESTIONS ON THE C-E INADEQUATE CORE COOLING INSTRUMENTATION," SEPTEMBER, 1981, COMBUSTION ENGINEERING, INC.

6. CEN-152 Rev. 1, "CE EMERGENCY PROCEDURE GUIDELINES", NOVEMBER 1982.

7. FPL SUBMITTAL TO NRC DATED APRIL 3, 1980 (LETTER L-80-113)

8. FPL SUBMITTAL TO NRC DATED DECEMBER 23, 1980, (LETTER L-80-418)

9. FPL SUBMITTAL TO NRC DATED JANUARY 8, 1981, (LETTER L-82-3)

10. FPL SUBMITTAL TO NRC DATED JUNE 19, 1981, (LETTER L-81-254)

NOTE: References 1 through 6 have been submitted to the NRC by the CE owner's group.

3.0 RESPONSES TO NRC REQUEST NO. 1, GENERIC LETTER NO. 82-28

The following discussion covers the ICCS asked for in Request No. 3 as well as the RCIS.

1. Identification of the Reactor Coolant Inventory System (RCIS) Selected for St. Lucie Unit 1 Plant.

   The Combustion Engineering's Inadequate Core Cooling System (ICCS) which includes the Heated Junction Thermocouple System (HJTC) for the RCIS, was selected for implementation in St. Lucie Unit 1 Plant.

2. General Design Description of the Inadequate Core Cooling System (ICCS).

   (This description supersedes the generic description of our previous submittal, Reference 10).

   The ICCS as designed by C.E., is comprised of the following instrument sensor packages for detection of inadequate core cooling:

   (1) Heated Junction Thermocouple System (HJTC).
   (2) Subcooling Margin Monitor (SMM) Detection System, which includes hot leg and cold leg RTD's (Resistance Temperature Detectors), and RCS pressure sensors.
   (3) Core Exit Thermocouple System (CET's).

   The above instrument sensor packages are inputs to the Qualified Safety Parameter Display System (QSPDS), which comprises the sensor processing equipment, operator interface equipment, and isolated data link with the Safety Assessment System (SAS). The ICCS instrument sensor packages are described in the CE generic document, Reference 1. The plant specific ICCS inputs are described in the Data Bases, Attachment 4.

   The QSPDS is described in the CE generic document, Attachment 1. The plant specific functional design description for the QSPDS is detailed in Attachment 3. Note that the QSPDS for this plant is only used to process the ICCS parameters, and is not a back-up Safety Parameter Display System (SPDS) as described in Attachment 1.

   The QSPDS functional design for the display is described in the CE generic document Attachment 2. The plant specific display design for the QSPDS is detailed in Attachment 5.

   The display system for this plant only includes the ICCS sensor packages as described above.

   The HJTC sensors are located in part length control rod locations No. 11 and 13, which have been modified in the internals and pressure boundary to accommodate the new HJTC probe assemblies.

   Mineral insulated cable will be routed in two separate channels from the reactor head to the two redundant electrical penetrations designed for the ICCS inputs.

Outside the containment the HJTC sensors will be connected to the two redundant channels of QSPDS processing equipment with organic cables routed in two channels. The data link cables will interconnect the QSPDS cabinet with the display in the Control Room and the Safety Assessment System (SAS).

The CET cabling system including connectors is being up-graded to meet containment environmental qualification as required by NUREG-0737.

Plant Change Modification packages have been prepared for the installation of the ICCS. These implementation packages include the installation of the QSPDS equipment, electrical penetrations, MI cables inside containment, reactor head and reactor internals modification, new in-core instrumentation assemblies and flanges, interconnecting cables outside containment and Class IE power supply equipment for the ICCS.

3. Schedule for Engineering, Procurement and Installation of the ICCS

a) Engineering Schedule

a-1) The Engineering for the installation of the ICC System has been completed.

a-2) The Engineering for the ICC System hardware has been completed.

b) Procurement Schedule

All ICCS hardware and software have been purchased. Some equipment has already been delivered to the job site. The following is the delivery schedule for the remainder of the equipment.

QSPDS hardware (including electronics, display, page control module, power supply and cables).	March 21, 1983
HJTC Probe	March 10, 1983
Probe Handling Canister	March 10, 1983
MI Cable	March 26, 1983
SPND cable	February 25, 1983
Head cable support equipment. (Trays, Clamps, Disconnect Panels)	February 25, 1983
In-Core detectors	April 1, 1983
ICI Flanges	February 18, 1983

Electrical Penetrations	February 11, 1983
Pressure Transmitters	March 11, 1983

c) Installation Schedule

The ICCS installation is projected to be completed during the 1983 refueling outage and to be operational by May, 1983 pending delivery of the hardware.

The modifications of the part length control rods, that will be used for the HJTC probes were completed during the 1982 refueling outage. This modification includes reactor internals and pressure boundary modification. The rest of the installation involves the following:

1. Installation of the MI cable for the HJTC system from the two new flanges at the reactor head to the two new electrical penetrations for the ICCS inputs.

2. Installation of the MI cable for the CET's and ICI from the new ICI nozzles to the two electrical penetrations and the SPND organic cables from the MI cable transition to the SPND disconnect panels.

3. Installation of the new ICI flanges and ICI assemblies.

4. Installation of the two new electrical penetrations.

5. Installation of the QSPDS cabinets.

6. Installation of the ICCS plasma displays and Page Control modules.

7. Installation of interconnecting cables outside containment, including communication cables from QSPDS to SAS and displays.

8. Installation of the Class IE inverters.

9. Installation of the second Class IE battery. One battery has been installed.

10. Installation of the battery charger.

11. Installation of interconnecting cable for the Class IE power to ICCS

Since the main control board modification will be implemented during this outage, the present Subcooling Margin Monitors (SMM) will be removed. The same SMM inputs will be re-routed to the QSPDS cabinets in two redundant separated channels. The two ICCS displays in the main control board will show the SMM continuously.

The ICCS will be used for operator training purposes and for SMM display only, until the control room design review and pre-implementation review by NRC is completed. However the operators will be trained with the new SMM display in the ICCS and the operating procedures will be up-dated to include the new SMM using the ICCS display by the completion of the 1983 outage.

Qualification and test reports, operating procedures, emergency procedures and licensing documentation will be completed after the unit start-up. (See section 3-d below).

d) Test and Qualification Reports

The HJTC test reports are documented in supplements 1, 2 and 3 of CEN-185 (References 2, 3 and 4)

The QSPDS test is on-going and is schedule to be completed by June 1, 1983.

The MI cable qualification test report is projected to be completed by September 1, 1983.

The pressure boundary safety analysis and stress report will be available by the end of the refueling outage.

The qualification report for the electrical penetration will be available by June 1, 1983.

The qualification report for battery charger will be available by December 1, 1983.

The qualification report for pressure transmitters is available

The operating procedures will be up-dated to use ICCS as indication of SMM by the end of the refueling outage.

The final emergency and operation procedure for the whole ICCS system will be addressed in our response to the NRC Generic Letter No. 82-33.

The qualification reports for the complete ICCS will be available by September 1, 1983.

4.0 RESPONSE TO NRC REQUEST NO. 2, GENERIC LETTER NO. 82-28

STATUS OF CONFORMANCE OF THE ICCS WITH NUREG-0737 SECTION II.F.2

TABLE 1

(Refers to same item number in the Appendix to the the generic letter 82-28)

Item	Reference No. ( )	Deviation (Note 3)	Schedule
1.a.	CEN-185 (1)	No	(Note 1)
	11181-ICE-3219 Attachment 4	No	(Note 2)
	NPROD-ICE-3201 Attachment 1	No	(Note 4)
	11181-ICE-3218 Attachment 3	No	(Note 2)
	NPROD-ICE-3202 Attachment 2	No	(Note 2)
	11181-ICE-3220 Attachment 5	No	(Note 2)
	CEN-181-P (5)	No	(Note 1)
	CEN-185 Suppl. 1 (2)	No	(Note 1)
	CEN-185 Suppl. 2 (3)	No	(Note 1)
	CEN-185 Suppl. 3 (4)	No	(Note 1)

1.b. See our previous submittals, references 7, 8 and 9.
The existing Instrumentation systems which provide information pertinent to ICC considerations are the single channel Sub-cooling Margin Monitor and the Core Exit Thermocouples. The Subcooling Margin Monitor, displays temperature margin continuously and any hot leg or cold leg RTD temperature or Reactor Coolant Pressure under demand. The hot leg RTD's range is 212°F to 705°F. The cold leg RTD's range is 212°F to 705°F. The Reactor Coolant Pressure Transmitters range are as follows: (2 transmitters) (0-1600 psig) and (2 transmitters) (1500-2500 psig).

There are (4) four hot leg RTD's (2) per hot leg and (4) four cold leg RTD's, 1 each per cold leg inputs to the SMM. All four pressure transmitters are input to the single channel SMM. The SMM was upgraded per our commitments described in letter L-80-113, dated 4/3/80.

The Core Exit Thermocouples provide input to the Digital Data Processing System (DDPS). A print-out can be obtained upon demand. In addition a digital display for CET's is provided in the operator console under demand (one at a time).

1.c. The SMM system described in item 1.b. will be removed from the control room and the inputs from hot leg and cold leg RTD's will be utilized as inputs to the two QSPDS cabinents. These RTD's will be re-routed through separate penetration to the two QSPDS cabinets. Two new wide range pressure transmitters (0-3000 psia) will be used as input to the QSPDS instead of the four narrow range transmitters, these transmitters will also be routed through separate penetrations.

The CET's will be separated in two channels and routed through the two ICCS penetrations to the QSPDS cabinets. The existing input to the DDPS and the operator console will be removed. All SMM parameters and CET's will be recorded in SAS/SPDS under demand

Item	Reference No. ( )	Deviation (Note 3)	Schedule
2.	CEN-185 (App. A) (1)	No	(Note 1)
	CEN-185 Suppl. 1 (2)	No	(Note 1)
	CEN-185 Suppl. 2 (3)	No	(Note 1)
	CEN-185 Suppl. 3 (4)	No	(Note 1)
	CEN-181-P Question #2 (5)	No	(Note 1)
	CEOG letter 6/1/82 to D. Crutchfield (NRC) (Questions 1,2,3&4).	No	(Note 1)
	QSPDS Factory Test Report	No	April, 1983
3.	CEN-185 Suppl. 1 (2)	No	(Note 1)
	CEN-185 Suppl. 2 (3)	No	(Note 1)
	CEN-185 Suppl. 3 (4)	No	(Note 1)
	CEN-185 Section 5.0 (1)	No	(Note 1)
	CEN-181-P Question #12 (5)	No	(Note 1)
	Qualification Report of the ICCS-(CE hardware)	No	Sept. 1983
	ICCS Technical Manual (including instrument calibration).		Sept. 1983
4.	CEN-185 Section 8 (1)	No	(Note 1)
	Table 2 of this document also addresses App. B (NUREG-0737)	No	
	Table 3 of this document Also addresses Attachment 1 (NUREG-0737)	No	
5.	CEN-185 Section 3 (1)	No	(Note 1)
	CEN-185 Suppl. 3 (4)	No	(Note 1)
	NPROD-ICE-3201.02 Attachment 1	No	(Note 2)
	NPROD-ICE-3202 Attachment 2	No	(Note 2)
	11181-ICE-3218 Attachment 3	No	(Note 2)
	11181-ICE-3219 Attachment 4	No	(Note 2)
	11181-ICE-3220 Attachment 5	No	(Note 2)
	11181-ICE-3111 Attachment 6	No	(Note 2)
6.	Installation schedule for the new instrumentation is addressed in the response to NRC request No. 1 and No. 3.	No	
	ICCS test reports	No	Sept. 1983
	ICCS instrument calibration will be included in the test reports.		

Item	Reference No. ( )	Deviation (Note 3)	Schedule
7.	CEN-185 Section 2 (1) CEN-181-P Question 2 (5) CEOG letter 6/1/82 to Crutchfield (NRC) (question #1) CEN-152 Rev. 1 (6)	No No No No	(Note 1) (Note 1) (Note 1) (Note 1)
8.	CEN-152 Rev. 1 (6) Final Emergency Operating Procedure	No	(Note 1) (See 3.d)
9.	No additional submittals are projected after this document. Additonal information is available upon NRC request.		
**B.	The spacing of the HJTC sensor from the core alignment plate to the top of the Reactor Vessel head is shown on the C.E. Drawing E-19367-165-501.Rev. 01, Sht. 1, Attachment 9. Loss of a single sensor will not affect the ability of the system to detect an approach to ICC because the system is completely redundant. Two HJTC probes with eight sensors each are provided.		

NOTES - Tables 1 & 2

Note 1: Document submitted to NRC by CE owners group - (Complete)

Note 2: Document attached

Note 3: After implementation of the ICCS there are no deviations from NUREG-0737 requirements.

Note 4: This document is proprietary and can only be viewed at CE's or FPL's premises.

TABLE -2

CONFORMANCE WITH APPENDIX B OF NUREG -0737

Item	Reference No. ()	Deviation (Note 3)
1.	CEN-185 (section 5) (1) CEN-185 suppl. 3 (4) Test Report to comply with Req. Guide 1.89 (NUREG-0588)	No
2.	CEN-181-P (5) Question #11 CEOG - Letter 6/1/82 to NRC (Question #4)	No
3.	Plant Change Modification Package is available. (Class IE Power Supply for ICCS)	No
4.	CEN-185 Suppl. 3 (4) CEN-181-P (5) Question #12 CEOG letter 6/1/82 to NRC (Question #4)	No
5.	CE Quality Assurance Design Manual. All other manufacturers of Class IE equipment Q.A. manual	No
6.	CEN-185 (Section 2&4) (1)	No
7.	Recording is accomplished in the SAS.	No
8.	Described in the Plant Change Modification Packages	No
9.	Isolation is accomplished in the QSPDS cabinet.	No

TABLE - 3

Conformance with NUREG-0737 II.F.2

ATTACHMENT 1
(CET Criteria)

1. Core exit thermocouple locations are shown on C.E. Drawings No.:

   E-19367-165-051 Sheet 1
   E-19367-165-052 Sheet 1
   (Attachment #7)

2. For a description of the primary operator display, refer to the following documents:

NPROD-ICE-3202	Attachment 1
11181-ICE-3220	Attachment 5
See Attachment 8	

3. The back-up display is redundant to the primary display. (See item 2 above).

4. Emergency operating procedure for the ICCS will be addressed in our response to the NRC Generic Letter No. 82-33.

   The operators will be trained in the operation of the ICCS per the plant specific training program.

5. a) Control Room design task analysis will be provided in the response to NRC generic letter No. 82-33, Supplement 1 to NUREG-0737, Requirement for Emergency Response Capability.

   (b) The Core Exit Thermocouples meet the criteria of NUREG-0737, Attachment 1 and Appendix B.

6. The complete system is powered from two independent and redundant class IE power sources. Isolation is met at the QSPDS cabinets.

7. Environmental qualification report will be provided for the CET's cabling and connectors by September, 1983.

   CET's themselves are not required to be qualified per Reg. Guide 1.97.

5.0 RESPONSE TO NRC REQUEST NO. 3 GENERIC LETTER NO. 82-28 INSTALLATION OF ICCS PLANT SPECIFIC SCHEDULE

The response to request #3 has been included in response #1.

ATTACHMENT NO. 1

A
FUNCTIONAL DESIGN SPECIFICATION
FOR THE
QUALIFIED SAFETY PARAMETER DISPLAY SYSTEM
FUNCTIONAL DESIGN SPECIFICATION NO. NPROD-ICE-3201, REV. 2

NUCLEAR POWER SYSTEM
COMBUSTION ENGINEERING, INC.
WINDSOR, CONNECTICUT

Note: Since the above document is a Combustion Engineering proprietary document, it cannot be transmitted with our submittal.

A non-proprietary document will be prepared by Combustion Engineering at a later date.

STATE OF FLORIDA)
) ss.
COUNTY OF DADE)

Robert E. Uhrig, being first duly sworn, deposes and says:

That he is Vice President of Florida Power & Light Company, the Licensee herein;

That he has executed the foregoing document; that the statements made in this said document are true and correct to the best of his knowledge, information, and belief, and that he is authorized to execute the document on behalf of said

Robert E. Uhrig

Robert E. Uhrig

Subscribed and sworn to before me this

10th day of March, 1983

Cheryl L. Fredrick

NOTARY PUBLIC, in and for the County of Dade, State of Florida

Notary Public, State of Florida at Large
My Commission Expires October 30, 1983
Bonded thru Maynard Bonding Agency

My commission expires: