Duquesne Light

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March 25, 1983

Director of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
Attn: Mr. Darrell G. Eisenhut, Director
Division of Licensing
Washington, DC 20555

Reference: Beaver Valley Power Station, Unit No. 1
Docket No. 50-334, License No. DPR-66
Generic Letter No. 82-28; Inadequate Core Cooling
Instrumentation System

Gentlemen:

Your letter of December 10, 1982, requested additional information pertaining to an Inadequate Core Cooling Instrumentation System consisting of upgraded subcooling margin monitors, core-exit thermocouples and a reactor coolant inventory tracking system. This information has been included with this letter as an attachment for your review. Additionally, you have requested that we identify the design for the reactor coolant inventory system we have selected and submit schedules for engineering, procurement and installation. We have selected the Westinghouse Differential Pressure System and have provided information regarding its design and installation in previous submittals. These submittals are further referenced in the attachment.

The current schedule is to complete installation of the Reactor Vessel Level Indication System (RVLIS) hardware during our third refueling outage scheduled to begin in June of 1983. System calibration is planned after refueling during Cold Operations and system testing is planned during Hot Operations. If the work associated with making the system operable, including final system calibration and testing, cannot be accomplished within our existing 14 week scheduled outage, we will not delay the return of the unit to service solely for the completion of these activites.

We believe this action to be reasonable since the RVLIS cannot be used for its intended purpose until the plant specific design and installation has been approved by the NRC staff, until we have completed that portion of the control room design review where the operator must evaluate RVLIS indications and until instructions for the use of RVLIS have been incorporated into our emergency operating procedures. Until such time as these actions are complete, this instrument cannot be used by the operators for the purpose of taking mitigating actions during an emergency condition.



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The reactor vessel level instrument is an aid, but not a necessity in the detection of the onset of inadquate core cooling. It is our position that resuming operation without RVLIS will not decrease our margin of safety.

As indicated in the attachment, additional information will be provided by April 21, 1983 to complete our response to this generic letter. We have been in contact with our NRC Project Manager with respect to providing this submittal beyond the requested response date and have discussed the scope of your request for additional information with members of your staff. Based on a March 21 conference call for obtaining clarification with a staff reviewer, we have re-evaluated and expanded upon our response and have determined additional time would be required to provide a complete response which satisfies the scope of your request. Specific areas requiring additional review are indicated in the attachment.

If you have any questions regarding this response, please contact myself or members of my staff.

Very truly yours,

J. J. Carey

J. J. Carey
Vice President, Nuclear

cc: Mr. W. M. Troskoski, Resident Inspector
U. S. Nuclear Regulatory Commission
Beaver Valley Power Station
Shippingport, PA 15077

U. S. Nuclear Regulatory Commission
c/o Document Management Branch
Washington, DC 20555

COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF BEAVER )

On this 25th day of March, 1983, before me, Sheila M. Fattore, a Notary Public in and for said Commonwealth and County, personally appeared J. J. Carey, who being duly sworn, deposed, and said that (1) he is Vice President of Duquesne Light, (2) he is duly authorized to execute and file the foregoing Submittal on behalf of said Company, and (3) the statements set forth in the Submittal are true and correct to the best of his knowledge, information and belief.

Sheila M. Fattore

SHEILA M. FATTORE, NOTARY PUBLIC
SHIPPINGPORT BORO, BEAVER COUNTY
MY COMMISSION EXPIRES SEPT. 16, 1985
Member, Pennsylvania Association of Notaries

ATTACHMENT

Response to Generic Letter 82-28
Inadequate Core Cooling Instrumentation System
dated December 10, 1982

Checklist
for Plant Specific Review of
Inadequate Core Cooling (ICC) Instrumentation System

For: Beaver Valley Power Station, Unit No. 1 Docket No. 50-334

Operated by: Duquesne Light Company

The following items for review are taken from NUREG-0737, pp II.F.2-3, and 4. Responses should be made to full requirements in NUREG-0737, not abbreviated forms below. Applicants should provide reference to either the applicant's submittal or the generic description under the column labled "Reference." These items are required to be reviewed on a plant specific basis by NUREG-0737 for all plants. Differences from the generic descriptions provided by Westinghouse, the Westinghouse Owner's Group, Combustion Engineering, or Combustion Engineering Owner's Group must be indicated by "yes or no" in the column labled deviations and must be justified. Under the Column labeled schedule, either indicate that your documentation of the item is complete or provide a proposed schedule for your submittal.

| | Reference | Deviations | Schedule |
|---|---|---|---|
| 1. Description of the proposed final system including: | | | |
| a. a final design description of additional instrumentation and displays; | 1, 4 | No | Complete |
| b. detailed description of existing instrumentation systems | 1, 6 | Yes | Complete |

Description of Core Exit Thermocouples

The thermocouple incore temperature measuring system consists of 51 chromel-alumel thermocouples installed within selected guide tubes which penetrate the reactor vessel head and terminate at the exit flow end (top) of selected fuel assemblies. The thermocouple extension wires (chromel-alumel) which are external of the core are terminated in two reference junction boxes within the containment. The reference junctions, which are maintained within a controlled temperature range, permit the use of conventional isolated copper wiring from the junction boxes through the containment penetrations to the thermocouple readout devices. These thermocouple signals pass through reference junctions, through penetrations in the containment and

then to terminal strips in the flux mapping console. From there, they branch into two signals, one connecting to the computer and the other to a precision indicator with manual selector switches. Primary readout of the incore thermocouples is by the plant computer, with backup readout provided by the precision indicator in the Incore Flux Mapping Control Console (FMCC) which is intended for use in the event the computer is inoperable.

Each thermocouple is 1/8 inch (nominal) diameter, stainless steel sheathed, aluminum oxide insulated, with the trailing end terminated in a male thermocouple connector. The thermoelectric characteristics conform to the K calibration curve within ± 2F from zero to 530F and within ± 3/8 percent of any point from 530 to 700F. Each thermocouple is supplied to the specific length required for its assigned location.

The two thermocouple reference junction boxes (Dynasciences Corp. Model BRJW14S-36TT) provide a controlled 160F temperature reference for the incore thermocouples. Each reference junction box contains three platinum resistance temperature detectors (RTD). Two of the RTD's from each unit are connected directly to the plant computer for monitoring of reference junction temperature; the third RTD in each unit is an installed spare.

The Honeywell Precision Temperature Indicator (Model YI56188) is mounted in the Flux Mapping Control Console. This instrument is supplied with a double range measuring circuit which permits measurement within the ranges 100 to 400F or 400 to 700F. Selection of the single thermocouple to be indicated is made by the nonlocking key switches on the front of the indicator. The switch must be manually held in position (left or right) to monitor the desired thermocouple. The switch is spring returned to the neutral (center) position. Since the thermocouple input signal to the indicator is in parallel with the plant computer, a contact closure signal is provided to inform the computer when any thermocouple is being monitored by the indicator.

Design and/or Operating Data

Incore Thermocouples

| | |
|---|---|
| Number | 51 |
| Type | Chromel-Alumel |
| Nominal O.D., In. | 1/8 |
| Range, F | 0-700 |
| Accuracy, F (0-530F) | ± 2 |
| % (530-700F) | ± 3/8 |

Deviation: A deviation is indicated based on the final system design with respect to environmental qualifications since this equipment does not satisfy all NRC final design criteria. This will be further discussed when addressing the qualification of the ICC Instrumentation System. Justification will be provided as part of the submittal on environmental qualification of electrical equipment.

Note: The NRC Staff has completed an evaluation of our subcooling margin monitor. This is documented in reference 7 which was an evaluation of our action taken to satisfy the TMI Lesson Learned Category "A" items. The long term action on the subcooling monitor as identified in the NRC clarification letters, reference 8, and reference 9 (enclosure 1), states the instrumentation qualifications must be upgraded to meet the requirements of Regulatory Guide 1.97. An evaluation of Regulatory Guide 1.97, Rev. 2, will be completed in accordance with our response to Supplement I of NUREG-0737.

| | Reference | Deviations | Schedule |
|---|---|---|---|
| c. description of completed or planned modifications | 1, 6 | Yes | Complete |

Deviation: A deviation is indicated based on the completed modification which installed the subcooling margin monitor which has inputs that do not satisfy all NRC final design criteria with respect to environmental qualification. This will be further discussed when addressing the qualification of the ICC Instrumentation System. Justification will be provided as part of the submittal on environmental qualification of electrical equipment.

Note: A schedule providing a description of planned modifications, if any, to instrumentation systems described in 1b above will be addressed within the implementation plan developed in response to Generic Letter 82-33, Supplement I to NUREG-0737 or in subsequent submittals relating to environmental qualification. It is therefore considered that additional submittals for the purpose of addressing NUREG-0737, II.F.2; item 1C of Documentation Required or item 1C of Generic Letter 82-28 will not be necessary.

| | Reference | Deviations | Schedule |
|---|---|---|---|
| 2. A design analysis and evaluation of inventory trend instrumentation, and test data to support design in Item 1 | 1 | No | Complete |
| 3. Description of tests planned and results of tests completed for evaluation, qualification, and calibration of additional instrumentation. | 1, 4 | No | Complete |

| | | Reference | Deviations | Schedule |
|---|---|---|---|---|
| 4. | Provide a table or description covering the evaluation of conformance with NUREG-0737: II.F.2, Attachment 1, and Appendix B (to be reviewed on a plant specific basis)* | 1, 3, 5 | Yes | 4/21/83 |
| 5. | Describe computer, software and display functions associated with ICC monitoring in the plant. | 1 | - | 4/21/83 |
| 6. | Provide a proposed schedule for installation, testing and calibration and implementation of any proposed new instrumentation or information displays. | 1, 2 | No | Complete |
| | NOTE: This submittal provides our current schedule | | | |
| 7. | Describe guidelines for use of reactor coolant inventory tracking system, and analyses used to develop procedures. | 1 | No | Complete |
| 8. | Operator instructions in emergency operating procedures for ICC and how these procedures will be modified when final monitoring system is implemented. | 1 | No | Complete |

Note: New emergency operating procedures are currently being developed based on the Westinghouse Owner's Group Emergency Response Guidelines (ERG's). These ERGs have been submitted by the Owner's Group to the NRC for review. Additional submittals on this subject will be provided as part of Supplement I to NUREG-0737.

9. Provide a schedule for additional submittals required** 4/21/83

Schedule: Additional information covering the evaluation of conformance with NUREG-0737 Item II.F.2 Attachment 1 and Appendix B as requested in Item 4 above and additional information describing computer software and display functions associated with ICC monitoring as requested in Item 5 above will be provided by the above date.

*II.F.2 Attachment 1 (for Core Exit Thermocouples)

In response to item 4 in the above checklist, the following materials should be included to show that the proposed system meets the design and qualification criteria for the core exit thermocouple system.

Response: This information requested will be provided in response to item 4 in the above checklist consistent with the above schedule.

Appendix B (of NUREG-0737, II.F.2)

Confirm explicitly the conformance to the Appendix B items listed below for the ICC instrumentation, i.e, the SMM, the reactor coolant inventory tracking system, the core exit thermocouples and the display systems.

Reactor Coolant Inventory Tracking System

| | | Reference | Deviations |
|---|---|---|---|
| 1. | Environmental qualification | 3 | No |
| 2. | Single failure analysis | 3 | No |
| 3. | Class IE power source | 3 | No |
| 4. | Availability prior to an accident | 3 | No |
| 5. | Quality Assurance | 3 | Designed to meet 10 CFR 50, App. B |
| 6. | Continuous indications | 3 | No |
| 7. | Recording of instrument outputs | 3 | No |
| 8. | Identification of instruments | 3 | No |
| 9. | Isolation | 3 | No |

Note: Additional information will be provided on the subcooling margin monitor and the core exit thermocouples and display systems by 4/21/83.

**For the users of either Combustion Engineering Heated Junction Thermocouple (HJTC) System or Westinghouse Differential Pressure (dp) system a detailed response to the plant specific items stated below should be provided:

| | | Reference | Deviations |
|---|---|---|---|
| A. | Westinghouse dp System | | |
| 1. | Describe the effect of instrument uncertainties on the measurement of level. | 4 | No |
| 2. | Are the differential pressure transducers located outside containment? | 1 | No |
| 3. | Are hydraulic isolators and sensors included in the impulse lines? | 1 | No |

| | Reference | Deviations |
|---|---|---|
| B. CE HJTC System | | |
| 1. Discuss the spacing of the sensors from the core alignment plate to the top of the reactor vessel head. How would the decrease in resolution due to the loss of a single sensor affect the ability of the system to detect an approach to ICC? | N/A | |

References

1. Letter, C. N. Dunn to D. G. Eisenhut, dated 12/30/80
2. Letter, J. J. Carey to D. G. Eisenhut, dated 4/28/82
3. Letter, J. J. Carey to S. A. Varga, dated 4/15/81
4. Letter, J. J. Carey to S. A. Varga, dated 9/2/81
5. Letter, J. J. Carey to S. A. Varga, dated 12/30/81
6. Letter, C. N. Dunn to D. G. Eisenhut, dated 6/26/80
7. Letter, S. A. Varga to C. N. Dunn, dated 10/9/80
8. Letter, H. R. Denton to All Operating Nuclear Power Plants, dated 10/30/79
9. Letter, D. G. Eisenhut to All Licensees, dated 10/31/80; NUREG-0737