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MURRAY R. EDELMAN
VICE PRESIDENT
NUCLEAR

April 15, 1985
PY-CEI/OIEW-0003L

Mr. Brian K. Grimes
Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Perry Nuclear Power Plant
Docket No. 50-440
Integrated Design Inspection

Dear Mr. Grimes:

Enclosed is an update on the status of items remaining open from the Integrated Design Inspection for Perry Nuclear Power Plant contained in NRC Inspection Report 50-440/84-29, transmitted by Mr. DeYoung's letter of December 12, 1984. In addition to the summary status of the open items, supplementary information is also enclosed as requested during the follow-up reinspection conducted by the Office of Inspection and Enforcement at Gilbert/Commonwealth Inc. offices from February 27 through March 1, 1985.

All work required for the remaining open items is either complete or will be completed by April 30, 1985, as noted in the enclosed summary status of the open items. We are available to work with you toward timely closeout of this inspection. Our staff will provide any information you may require in addition to the enclosed.

Very truly yours,

Murray R. Edelman

Murray R. Edelman
Vice President
Nuclear Group

MRE:bmr
Enclosure
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Supplemental Response No. 2
To
Perry Nuclear Power Plant
Integrated Design Inspection

The following provides supplementary information and/or a summary status of the open items listed in the attachment to the Nuclear Regulatory Commission (NRC) letter dated March 26, 1985.

D2.1-3 Attached is the "Emergency Service Water System Water Hammer Test Program" as committed to in the supplemental response to this item which was included with our March 8, 1985 letter.

In the process of developing this test program it was noted that portions of the ESW piping are routed higher than the system discharge and therefore could develop air voids. These potential air voids are a possible source of water hammer.

Prior to testing the ESW system for water hammer the piping will be rerouted or system operation modified such that these air voids will not be present.

D3.2-5 G/C is proceeding with analysis of the remaining pieces of flexible equipment. The current status of that effort is as follows:

A. RHR Pumps: Analysis of C002A is complete and acceptable. The remaining two pumps, C002B and C002C are in process.

B. LPCS Pump: Discharge nozzle piping is complete and acceptable. Suction piping is acceptable but requires verification.

C. HPCS Pump: Analysis in process.

D. RCIC Turbine: Inlet piping is complete and acceptable with the exception of the attached drain line which is still in process. The exhaust nozzle and piping is rigid.

E. HCV: Analysis is complete and acceptable.

F. HPCS Diesel Exhaust Silencer: There is currently on-going communication with GE in order to obtain the vendor model and frequency.

G. Chilled Water System Chillers: Of the ten (10) connected piping subsystems, six (6) are acceptable but require verification, one (1) is in process, and three (3) are being addressed as similar.

H. M-23 and M-25 HVAC Plenums (4 total): Review of vendor stress report resulted in recommendation to stiffen the framework. This is being pursued further.

I. M-39 Plenum: Review of vendor stress report has concluded that this plenum is rigid as far as effects on attached piping.

D5.4-1 The Inspection Team expressed two concerns regarding Item 5.4-1.

1. Failure to consider the minimum acceptable equipment voltage during the selection of battery voltage.

2. Failure to consider additional cable run required for the motor series winding of DC motor operated valves reviewed by calculation R42-10E.

Our response to the above items is:

1. Calculation R42-13 was performed and verified to determine battery voltage while considering minimum acceptable equipment voltage. All resistances were considered including starting resistance as well as inrush and full load currents.

2. Calculation R42-10E has been revised to consider all cable runs for DC motor operated valves. All resistance values have been identified and factored into the calculation.

D5.6-1, 2, 4 & 5 Calculations are complete.

D5.7-1 The value of degraded voltage of 442 volts of the 480 volt bus will be confirmed upon completion of load flow calculations. Preliminary results of load flow calculations show no apparent concerns.

D5.7-3 This effort is 85% complete and should be finalized by April 30, 1985.

D5.9-1 This item remained open pending the completion of the GE analysis on control room duct fill concerns.

This analysis is attached and was previously reviewed by the Inspection Team.

The Inspection Team had the following additional comments:

1. The PGCC duct fill criteria should be well defined. No reference could be found in the Perry FSAR.

2. Determine the status of the GE computerized program tracking duct fill.

3. Discuss method used in installing cables which are part of backfit design so as not to cause damage due to overfilled ducts.

Our response to the above items is:

1. The PGCC duct fill criteria is established in NEDO-10466-A and was submitted to the NRC and approved 7-13-78 via letter O.D. Pan (NRC) to G.G. Sherwood (GE). These documents are Licensing Topical Reports submitted to the NRC for approval and as such are not referenced in the FSAR, nor are they required to be referenced. These documents are recorded and on file as part of the Perry Nuclear Power Plant design.

2. The GE computer program is utilized to track duct fill for GE designed cables and cables which are added via GE circuit nomenclature. This program is still active.

D5.9-1 (Cont'd)

3. Cables which are not added via GE circuit nomenclature are installed via a QA backed site installation procedure which visibly inspects the intended cable route and ensures adequate space within the control room duct to avoid exceeding the height of the duct siderails as well as other design considerations.

   The GE analysis has supported the acceptability of exceeding a calculated 50% fill while maintaining the integrity of circuits contained in the duct.

   This should clarify all concerns dealing with PGCC duct fill.

D5.10-3 The following is the formalized response expanding upon the supplemental information provided with our March 8, 1985 letter.

The Inspection Team expressed the following concerns regarding Items 5.10-3 and 5.10-5.

1. GE reports DRFA00-794-6 and A42-53 should be issued to CEI officially.

2. Either expand the explanation in report DRF A00-794-6 or explain via separate letter, the arrangement of cable in contact with flexible conduit. It appears from the picture in the report that the cable was tie wrapped to the conduit, however, no written description was contained in the report.

3. Address area of thermal gain. Would a lesser current over a longer time frame be a harsher condition? Issuance of Report DRFA42-53 would be sufficient to close this item.

4. Revision 4 of GE design specification 22A3728 should be issued to CEI officially.

The following is our response to the above items:

1. Reports DRFA00-794-6 and A42-53 have been issued to CEI via PY-GEN/CEI-2328 dated March 5, 1985 and are now controlled by the Perry Document Control system. GE has also made these documents a part of the GE Design Record files for Perry.

2 & 3. The following excerpts from A42-53 answer the concern of long term thermal gain.

CONDUIT HEATING EFFECTS

"Ampacity calculations were performed for PGCC floor section cable ducts to determine the maximum long term current required to raise the conduit temperature to the maximum fault temperature rating of the insulation. The calculation was based upon a DuPont Chemical Company paper titled: "Calculation of Ampacity, Multi-Conductor Cable in Tray" by Fr. J.R. Perkins, and on IEEE paper 70TP557-PWR, "Ampacities for Cables in Closely Filled Trays" by J. Stolpe. This current is 57 amps.

D5.10-3
(Cont'd)

A prolonged, medium impedance fault was considered using Dr. J.R. Perkins' analysis of a single overloaded conductor in a cable tray. The limiting temperature of the conduit was taken to the maximum fault current temperature rating of Tefzel or Vulkene (250o). The calculated current in the conduit is 57 amps. If an internal fault which produces a current of 57 amps is cleared by the protective devices, no damage will occur to the adjacent cables.

At 57 amps a 30 amp breaker will clear a fault in approximately 120 seconds and a 30 amp fuse will melt in approximately 3 seconds. Therefore, faults within conduits protected by 30 amp breakers or fuses do not pose a threat to essential cabling in the same duct.

As confirmation of the long term heat flow calculations, the temperature rise was also calculated assuming no heat is transferred to anything. This can be done from the definition of specific heat. The method is widely used for short term (3 or 4 seconds) fault heating calculation. It is ultra conservative for the 120 second opening time of the breaker. Calculating the temperature rise with no heat transfer from the conduit gives a final temperature of 125oC, which is far below the maximum overload temperature rating of Tefzel or Vulkene insulation."

From Test Report A00-794-6 a constant monitoring of temperature internal to the flexible conduit and external to the flexible conduit was accomplished by use of various thermocouples. The results of this was summarized in Report Data Sheet 6.2.

The maximum temperature recorded external to the flexible conduit (Thermocouple #5) was 56.7oC (134o) at 360 sec. which is when the cable internal to the flexible conduit burned apart and current flow ceased.

In addition, cable purchased by CEI for general plant areas which may be routed in the control room duct system (pull through circuit) or internal to panels has been rated 90oC for normal operating condition over 40 years and will support fault current temperatures of 250oC.

This closes Item 3 as well as IDI item D6.8-1.

The referenced letter and its attached reports noted that the cable adjacent to the flexible conduit was in contact with the conduit by use of tie wraps and/or metal straps thus closing Item 2.

The referenced letter also addressed the fact that the test arrangement had wires in contact on both sides of a metal barrier. Therefore, the letter addressed the concerns raised in IDI Item D6.8-2.

D5.10-3 (Cont'd)

4. For Item 4, a communique from GE on February 27, 1985 has supplied G/C with an advanced copy of 22A3728 Rev. 4 and notation that formal issue to both CEI and G/C is in process. A follow-up phone call with GE on March 7, 1985 has confirmed this.

D5.14-1 Class 1E Motor Operating Voltages

Load flow calculations are proceeding and are scheduled to be completed by April 30, 1985.

U5.2-1 Motor Accelerating Time

This effort is proceeding with supporting vendor information and will be finalized by April 30, 1985.

D6.2-1 Attached is the formal documentation and verification of circuit separation analysis as requested by the Inspection Team.

D6.2-2 Attached is the formal documentation and verification of the isolation analysis as requested by the Inspection Team.