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February 28, 1985
5211-85-2043

Office of Nuclear Reactor Regulation
Attn: J. F. Stolz, Chief
Operating Reactor Branch No. 4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Stolz:

Three Mile Island Nuclear Station Unit 1 (TMI-1)
Operating License No. DPR-50
Docket No. 50-289
Control Room Habitability (III.D.3.4 NUREG 0737)
Control Building Ventilation Test Results

As committed in our letter of November 30, 1984 (5211-84-2289), GPU Nuclear Corporation (GPUN) performed a series of tests on the Control Building HVAC System, to determine control room differential pressure and air inleakage during the emergency mode of operation combined with single failure of ventilation system dampers.

The test results show that the control room differential pressure with respect to outside pressure remained positive for all cases.

The test acceptance criteria are discussed in Attachment 1. The test results, conclusions and modifications required, are discussed in Attachment 2.

This fulfills our commitment of November 30, 1984. We anticipate that this information will assure you that TMI-1 Control Room Operators will be adequately protected from any radiological releases.

Sincerely,

J. J. Colitz for H. D. Hukill

H. D. Hukill
Director, TMI-1

HDH/MI/dls:1036f
Attachments

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cc: R. Conte
O. Thompson

ATTACHMENT 1

ACCEPTANCE CRITERIA
CONTROL BUILDING VENTILATION SYSTEM
FAILURE MODE AND EFFECTS ANALYSIS (FMEA) AND TEST

The acceptance criteria for the Control Room Ventilation System are based on the requirements that the integrated whole body dose shall not exceed 5 Rem or its equivalent to any part of the body for the duration of the accident.

To satisfy the above acceptance criteria the following conservative system performance objectives were established. These performance objectives are based on the radiation hazards analysis and the FMEA performed for Control Room Habitability.

Single failure of any CBVS component shall not:

1.1 Allow inflow of unfiltered air to the control room. (This is conservative since analysis shows that the integrated whole body dose will be within acceptable limits with inflow of 2650 cfm of unfiltered air for 30 minutes.)

A positive pressure in the control room must be maintained for all single failures. By maintaining a positive pressure, no unfiltered air would enter the control room.

1.2 Allow more than 12,000 cfm filtered inflow to the emergency envelope. (The emergency envelope is comprised of control building floor elevations 322', 338'-6", and 355' excluding the hallway areas.) This value is the upper limit at which the integrated dose or other equivalent exposure limit to the operator is calculated to be exceeded after 30 days.

During the test, air flow was measured during various failure modes utilizing the system flow recorder and the flow indicator located at the output of the emergency filtration unit.

1.3 Allow the positive pressure requirement of the control room to be compromised by reducing intake flow to less than 3000 cfm or by breach of the emergency envelope pressure boundary.

NOTE: The testing of March, 1984 established that the positive pressure is achieved with an intake flow of 3000 cfm, with the intake damper closed. (Reference: GPUN Letter 5211-84-2099 dated April 30, 1984.)

ATTACHMENT 2

RESULTS AND CONCLUSIONS

The TMI-1 Control Room Ventilation System (CBVS) single failure testing took place on January 31, 1985 and February 5, 1985. The preliminary testing on January 31, 1985 indicated that some of the leakage paths would have to be sealed to achieve the goals established by the acceptance criteria. Certain leakage paths were sealed for the test, a return air register on elevation 355'-0" inside the corriodor between control room and control tower stairway was blanked off, and the test was performed on February 5, 1985 with the following results.

1. Normal Emergency Mode

   The C.B. Ventilation System was tested for normal emergency mode, i.e. dampers AH-D-28, 37, 39 and 41 closed and damper AH-D-36 (System Recirculating Damper) open. The control room pressure remained positive during testing and met the acceptance criteria.

   A reverse air flow through damper AH-D-28 (the supply air damper to elevation 306'-0") occurs during this mode. This reverse air flow (approx. 500 cfm) is added to the total amount of outside filtered air brought within the emergency envelope, during emergency mode operation. The total filtered air intake of approximately 5500 cfm is still below the upper limit of 12000 cfm.

2. Exhaust Damper AH-D-37

   During the test, the damper AH-D-37 was fully opened to simulate the worst case damper failure. The control room pressure remained positive and measured flow indicated approximately 9500 cfm of filtered inflow was added to the system. It is therefore, concluded that the acceptance criteria are satisfied.

3. Normal Duty Supply Fan (AH-E-17) Intake Damper (AH-D-41A)

   During this single failure test the damper (AH-D-41A) was fully opened to simulate the worst case damper failure. The control room pressure remained slightly positive and flow measurement data indicated approximately 7000 cfm of filtered inflow was added to the system. It is concluded that the acceptance criteria requirements are satisfied.

4. Control Access Area Isolation Damper (AH-D-28)

   During the test, the damper AH-D-28 was fully opened to simulate the worst case damper failure. The control room pressure remained slightly positive, the flow measurement data indicated 6500 cfm of filtered air was added to the system, and 4500 cfm of air was exhausted through the failed damper without entering control room. It is concluded that the acceptance criteria are satisfied.

Modification Requirements

GPUN plans to appropriately seal door gaps for doors located on the emergency envelope that required sealing during the test and relocate the aforementioned return air register to another area of elevation 355'-0". This will increase leak tightness of the control room envelope and assure that a positive pressure is maintained during emergency operation of the ventilation system for the single failures discussed above.