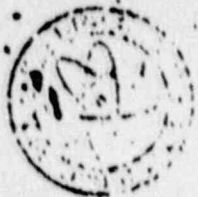


A. Rose



UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

August 4, 1969

V. A. More, Chief, Instrumentation & Power Technology Branch, DRL

LEVIN'S ON "FUNCTION OF FACTORY TESTS, REACTOR EQUIPMENT FOR ASSEMBLIES"
SUBMITTED TO INTERNATIONAL ATOMIC ENERGY COMMISSION (SUNNYVALE 15, CALIF. UNIT)

Attached is my evaluation of the proposed factory tests of the reactor building for assemblies. In summary, the report is incomplete and will require amplification. Particular items of concern include the relationship of the test environment to accident conditions and the level of acceptability for each of the tests.

I will direct my evaluation of these tests with D. F. Rose, Reactor Projects Branch 3.

R. D. Folland
Instrumentation & Power
Technology Branch
Division of Reactor Licensing

RE-5052
D.L.HICK:GOLDF

Enclosure:
As stated

- cc: S. Levine
- R. DeYoung
- C. Long
- D. F. Rose
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POOR ORIGINAL

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August 4, 1959

REVIEW OF REACTOR BUILDING FAN ASSEMBLIES
FACTORY TESTS FOR THREE MILE ISLAND UNIT 1

The preliminary report covering tests of the reactor building fan assemblies for TMI Unit 1 was filed on 27 May 1959. This report consists of three sections which describe the proposed tests of the emergency cooling coil, the fan assembly housing relief valves and the fan motors.

I. Emergency Cooling Coil Performance Test

This test is to provide assurance that the emergency cooling coil is capable of the design heat removal rate under accident conditions. It is doubtful that a steam/air mixture duplicates the accident environment, especially if containment spray is actuated.

II. Relief Valve Test

This test considers only the set point, reset point, and capacity of one relief valve. It provides no assurance that a sufficient number of valves will be installed, in the correct locations, to prevent a localized rupture of the housing and a resultant reduction in air flow through the cooling coils.

III. Water Cooled Motor Tests

A. Motor Ratings

1. The voltage rating is variously specified as 460 v and 440 v. Operation at T.H. will be from a 480 v bus.
2. The unit ratings in the report and/or the PSAR are:

	H.P.	Voltage (volts)	Current (amps)	Speed (rpm)	Air Flow (cfm)
Normal	150	460	181	1200	108,000
Emergency	75	460	120	600	54,000

When the fact that accident conditions are 70 psia and 100% R.H. is considered, it is doubtful that all of the above figures are correct.

B. Motor Insulation

The Joy Manufacturing Company's bill of material specifies the motor insulation as "Class H, For Nuclear Applications." The KAPL test report, included in the test summary, documents the suitability of this class of insulation provided it is not used in a sealed container because of gas evolution under radiation. The bill of material further states that the motor is "totally enclosed water cooled" and that the containment

atmosphere cannot contact the motor internals. Therefore, either the insulation's suitability is not verified by the KAPL tests and must be re-evaluated or the atmosphere can contact the motor internals and this must be considered.

C. Shaft Seal Test

The motor is equipped with a pressurized water shaft seal and each of the tests apparently assumes no leakage of this seal. It is questionable that this is a valid assumption. One unit is normally shut down and may not be continuously supplied with seal water. In addition, the loss of electrical power and seal water pressure coincident with an accident atmospheric condition is a distinct possibility.

D. Motor Cooling

The method of cooling the motor is not clearly explained. The bill of material describes water circulation between the stator shells implying a metal to water heat transfer. The general description of the G.E. custom 8000 stator mentions only the circulation of cool air. Is air cooling applicable to this particular motor? Motor cooling water flow, temperature,

and pressure are not specified.

E. Proposed Test Outline

1. The motor will be subjected to a heat-aging test at 130°C for at least 100 hours. No justification for this temperature or test duration is provided. How much credit is being taken for this aging? What is the reason for the test following, rather than preceding, the vibration test?
2. The vibration test includes only the motor, and, presumably, the motor cooler. No provision is made for evaluating the entire fan assembly's ability to withstand design seismic conditions.
3. The insulation and dielectric tests are to be performed after each test section. No requirement is specified as to how soon after each test these electrical tests are to be performed.
4. The purpose of the inclusion of the fan/motor performance tests at various blade angles and measurement of fan/motor sound power level is not stated. If these tests provide any assurance that the unit is suitable for this particular application, it should be so stated.

3. The proposed operational test under the simulated accident conditions probably will not duplicate the actual conditions with respect to thrust load on the bearings, motor loading, and caustic spray. It is doubtful that friction heating of the air by the fan will maintain the test temperature of 300°F, at the design air flow, during water spray. It appears likely that steam rather than water spray will be required to maintain the test conditions.

IV. Recommendations

- A. The basis for choosing each of the test parameters should be specified.
- B. The minimum levels of acceptance for all of the test results should be specified.
- C. Consideration should be given to the fact that the insulation which, presumably, passes the tests has not been irradiated.
- D. Seal water pressure should be removed in a simulated accident environment and the results evaluated.
- E. Provision should be made to test the effect of the caustic spray solution on each of the fan assembly's components.

- F. Electrical tests should be performed immediately upon completion of each motor test.