FINAL

SYSTEM DESCRIPTION

(Index No. 54)

REACTOR BUILDING
LEAK RATE TEST SYSTEM
(B&R Dwg. No. 2517 Rev. 6)

JERSEY CENTRAL POWER AND LIGHT COMPANY

THREE MILE ISLAND NUCLEAR STATION

UNIT NO. 2

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FOR

REACTOR BUILDING

LEAK RATE TEST SYSTEM

APPENDIX

1.0 INTRODUCTION

1.1 System Functions

The functions of the Reactor Building Test System is to:

a. Pressurize the Reactor Building with compressed air

b. Control Reactor Building pressurization and depressurization

c. Remove moisture from compressed air

d. Cool and clean the compressed air

e. Measure containment temperature, pressure, and humidity (dewpoint)

f. Superimpose a known leakage rate on the Containment

The leak Rate Test System interfaces with Nuclear Services River Water (B&R Dwg. 2033) for cooling, and with the Reactor Building Ventilation and Purge System (B&R Dwg. 2041) for containment air distribution, recirculation, and exhaust. The Reactor Building Containment is leak tested about every 3 years. It is not within the scope of this System Description to describe the Leak Rate Test and its associated precautions.

1.2 Summary Description of System (Ref. to B&R Dwg. No. 2517 Rev. 6)

For the initial Leakage Test, two construction air compressors are used as the air source.

The discharge of the compressor is cooled by an aftercooler and separator which remove condensate and other material from the air. The moisture and oil content is further reduced by passing the compressed air through an Air Dryer. LR-V44 maintains a constant 90 psig back pressure on the Air Dryer and compressors.

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The air then passes through a removable spool piece, through AH-V7 and AH-V80 into the Reactor Building containment. The containment is depressurized by opening Reactor Building Purge Valves AH-V80 and AH-V81, and controlling downstream pressure with AH-V82.

1.3 System Design Requirements

The Leak Rate Test System is capable of providing 6,000 SCFM of 100 psig air to the Reactor Building Containment. The System is conventional Seismic Class II. The components meet ASME and UL Standards. The System is capable of simulating a known leakage rate by bleeding off through a flow indicator.

2.0 DETAILED DESCRIPTION OF SYSTEM

2.1.1 Aftercooler and Cyclone Separator LR-V-1

The aftercooler and cyclone moisture separator are between the air air compressors and the air dryer. Air temperature in the cooler is reduced by Nuclear Service River Water. The cyclone separator reduces other impurities. The liquid from the aftercooler and cyclone separator is collecteed in trap LR-U1 The aftercooler, cyclone separator, and air dryer are located on the 280' level of the Diesel Building.

2.1.2 Air Dryer, LR-Q-1

The air dryer is downstream of the aftercooler-cyclone separator, and upsteam of pressure control valve, LR-V44. The single chamber dryer is divided into a Mechanical Separation and Desicant Section. The Mechanical Separator distributes air, and preceipitates moisture and leaves microscopic particles to the condensate drain. Air flow passes through

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the desicant tablets were additional moisture is removed. When the depth of the bed drops below the dryer level sight glass, the vessel should be depressurized and desicant tablets added through the fill hatch. Each desicant tablet retains its hardness and effectiveness until it is consumed by the captured moisture which forms on it and gradually melts away the tablet. As the spent chemical is drained away with the moisture, new tablets are automatically moving down into the drying area.

The collected liquid is automatically blowndown. The frequency of the blowdown is adjustable from 2 hours to 6 hours.

2.1.3 Major System Valves Air Dryer Pressure Control Valve, LR-V44

This 4 inch, 150 psig. 100°F, carbon steel valve controls pressure to maintain 90 psig, in the Air Dryer. The valve may also be operated manually with a handwheel. The valve fails open upon loss of instrument air.

2.1.4 Reactor Building Pressurization/Depressurization Valves (AH-V80 and AH-V81), and Depressuaization Control Valve (AH-V82)

These valves are discussed in Reactor Building Ventilation and Purge system Description (Index No. 35A).

2.2 Instruments, Controls, and Protective Devices

Instrumentation is included in Table 3. There are two sets of accurate pressure and flow indicators. Twenty-four temperature elements and 10 dewcells are located within the Continament. Dewcells measure moisture by indicating the dewpoint temperature of the air.

After testing, the: all test instruments are removed and stored. They are calibrated before being installed for the next test.

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There are no alarms associated with this system. The only automatic feature of the system is the operation of LR-V44 and the air dryer blowdown, both discussed in Section 2.2. The System is protected by relief valve LR-R11 on the air dryer, set at 125 psig.

3.0 PRINCIPAL MODES OF OPERATION

3.1 Startup

Prior to starting the air compressor, the level of the air dryer descicant should be checked, system integrity verified, and cooling water flow to the aftercoolers initated. After starting the compressors, the drain lines are blowdown, and the inlet valve to the Air Dryer opened. When operating pressure, 100 psig, is reached, the air dryer outlet valve, LR-V43, is slowly opened and compressed air flows into the containment as required by the test procedure.

3.2 Normal Operation

The System and its associated air compressor operate as required by the test procedure. As part of the test a know leakage rate is superimposed by bleeding air at a given rate through the flow indicator.

3.3 Shutdown

At the completion of this test, the containment is depressurized by bleeding through AH-V80, AH-V81, and the pressure control valve AH-V82 to the station vent via the Reactor Building Purge System.

Instruments are removed and stored. The aftercooler shell is drained. The System is Purged with nitrogen and sealed.

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3.4 Special or Infrequent Operation

Operation of the Leakage Rate System is a Special and Infrequent Operation. System operation is discussed in Sections 3.1, 3.2, and 3.3.

3.5 Emergency

The Reactor Building Leak Rate System has no emergency function.

4.0 HAZARDS AND PRECAUTIONS

Compressed air is hazardous. Before each Leak Rate test, the integrity of the system should be verified. Ensure that 90 psig pressure is maintained at the Air Dryer.

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TABLE 1

Leak Rate Test

Aftercooler and Cyclone Separator

Identification	LR-C -1
Number Installed	1
Manufacture	Worthington
Model No.	13 AP
Rated Capacity, SCFM	6,000
Air Pressure Drop. psi	0.7
Maximum Operating Pressure, psig	125
Inlet Air Temperature, ^{o}F	220
Outlet Air Temperature, ^{o}F	105
Cooling Water Flow, gpm	98
Inlet Water Temperature, ^{o}F	95
Outlet Water Temperature, ^{o}F	120
Water Pressure Drop, psi	2

Classification

Code	C
Quality	4
Seismic	II
Cleanliness	D

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TABLE 2

Leak Rate Test Air Dryer

Van Air MODEL D114

Identification	LR-Q-1
Number Installed	1
Manufacture	Van Air
Model No.	D114
Rated Capacity, SCFM at 100 psi	6,635
Maximum Operating Pressure, psig	125
Air Pressure Drop, % of Operating Pressure	1
Desicant	Dry-O-Lite 455

10,000 lbs recommended initial load & operating Sorry

Classification	
Code	C
Quality	4
Seismic	II
Cleanliness	D

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TMI DOCUMENTS

DOCUMENT NO: TM-C 303

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