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SUBJECT: Forwards repts re ventilation sys electromechanical devices, auxiliary feedwater valve motor operators, environ qualification of conduits, & fuel transfer tubes, in response to 790511 request.

See Repts

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June 11, 1979

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Mr. John F. Stolz, Chief
Light Water Reactors Branch No. 1
Division of Project Management
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Re: Docket No. 50-275-OL
Docket No. 50-323-OL
Diablo Canyon Units 1 & 2

Dear Mr. Stolz:

The following material is supplied in response to Items 3, 4, 5 and 8 of your May 16, 1979 Request for Additional Information.

Item 3 - Ventilation System Electromechanical Devices

Attachment #1 is an advance copy of material which will be part of an amendment to the Diablo Canyon operating license application. This material provides justification for the premise that contact chatter is acceptable during seismic shaking of ventilation system electromechanical devices.

Item 4 - Auxiliary Feedwater Valve Motor Operators

Attachment #2 (Environmental Qualification Report B0003) is the generic qualification of the SMB Limitorque Valve Actuators for a steam line break outside the containment. The cover letter to that report from Limitorque Corporation states that the SMC-04 is generically qualified by that report. This is true because the materials of construction in the SMC-04 are the same as those in the SMB, and the designs are the same in the areas affected by the environment (motor, termination, switches, etc.).

Attachment #3 (Seismic Test on SMC-04 valve control Report 6-6246-1 Aero Nav Laboratories, Inc.) is the seismic test conducted to provide assurance that the SMC-04 falls within the generic envelope. Combined, the test reports provide the environmental qualification of the auxiliary feedwater isolation valve motor operators (type SMC-04).

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B001
SE 1/40

Run
20 cups
of Encl's

Mr. John F. Stolz

2

June 11, 1979

Item 5 - Environmental Qualification of Conduits

Attachment #4 (Qualification Report for Conductor Modules for Arkansas Nuclear One - Unit 2 - Conax IPS-409) is the certification and environmental qualification report on conduit seals to be used in connecting limit switches and Rosemount transmitters inside containment.

Item 8 - Fuel Transfer Tube

Attachment #5 (Fuel Transfer Tube Shielding) describes precautions taken to prevent inadvertent personnel access during fuel transfer to the very high radiation areas in the vicinity of the fuel transfer tube.

Five copies of this submittal have been sent directly to Mr. Bart Buckley.

Kindly acknowledge receipt of the above material on the enclosed copy of this letter and return it to me in the enclosed addressed envelope.

Very truly yours,

Philip A. Greene

Attachments

CC w/attachments: Mr. Bart Buckley

10.3.24A VENTILATING CONTROL, ELECTRO-MECHANICAL DEVICES

10.3.24A.1 Description of Equipment

This section describes electro-mechanical devices for the control of the following Unit 1, Class 1, Plant Ventilating Systems:

1. Control Room Complex Air Conditioning.

a) Supply Air Fans S-35 and S-36.

b) Supply Fans S-39 and S-40 for Filter Unit FU-39.

c) Air cooled Condensors CR-35 and CR-36.

d) Compressor Units CP-35 and CP-36.

e) Common Devices for Mode Selection of the Control Room Ventilation.

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Unit 1 and Unit 2 control room HVAC systems are separate systems. Each consists of redundant air conditioning units, supply fans, filter booster fans and monitoring devices, and a train of ducts and filters.

2. Auxiliary Building Ventilation (excluding the Fuel Handling Area), Supply Fans S-31 and S-32 and Exhaust Fans E-1 and E-2.

3. Fuel Handling Area of the Auxiliary Building, Supply Fans S-1 and S-2, Exhaust Fans E-4, E-5 and E-6.

4. DC/480 V Switchgear Rooms of the Auxiliary Building, Supply Fans S-43 and S-44.

5. 4 KV Switchgear Rooms of the Turbine Building, Supply Fans S-67, S-68 and S-69.

6. Miscellaneous Devices for Ventilation Control.

#1

The Control Room Complex air conditioning equipment electrical power is supplied from two circuit breaker panelboards. The panelboards are Westinghouse Type WEHB, 100A mains, 3-pole, 3-wire, suitable for 480 V a-c, complete with molded case circuit breakers. The panelboards are housed in steel cabinets approximately 20" wide, 34" high and 5.75" deep. The cabinets are surface mounted to concrete walls, with front door access. X

The panelboards are fed from separate 480 V vital load centers. They provide power to separate, redundant air conditioning systems.

Motor Controllers for the supply air fans are full voltage magnetic starters, NEMA Size 1, 480 V, 3-phase, with 480/24 V control power transformer, with 2-pole disconnect switch and fuses for the control power, in NEMA Type 1 enclosure, Square "D" Company Drawing or Bulletin Number C31044-015-52.

Motor Controllers for the supply air booster fans for the filter units are full voltage magnetic starters NEMA size 0, 480 V, 3-phase, with 480/24 V control power transformer, in NEMA Type 1 enclosure, Square "D" Company Drawing or Bulletin Number C31042-087-50.

Motor Controllers for the air cooled condensers are full voltage magnetic starters NEMA Size 1, 480 V, 3-phase in NEMA Type 1 enclosure, Square "D" Company Drawing or Bulletin Number A30054-247.

These motor controllers are surface mounted rigidly to concrete walls.

The Controllers for the compressor units consist of a 60A, 480 V, 3-phase contact with separate overload relay (Cutler Hammer Number 817), a 480/24 V, 350VA control power transformer, and an auxiliary relay. The devices are mounted inside a 26" wide, 20" high and 6" deep steel enclosure.

A separate compartment of the enclosure contains the refrigerant high and low pressure switch and the oil pressure control switch, manufactured by Penn Control Incorporated.

Separate doors are provided for the controller and pressure switch portions of the enclosure.

The enclosure is mounted to a rigid UNISTRUT structure which is fastened on a concrete floor.

The Common Control Relay Cabinet houses the ventilation mode selection devices. The steel cabinet is 30" wide, 48" high and 10" deep, with a full size front door. The following devices are mounted to a subpanel inside the cabinet:

- a) Four Mode Selector Relays, Allen-Bradley Number 700BR600A24.
- b) Two Mode Selector Relays, Allen-Bradley Number 700C400A24.
- c) Twelve Mode Selector Solenoid Valves, Barber Colman Number AL100 (eight older models and four newer models).
- d) Twelve Pressure Gages, Barber Colman Number AL322 (eight older models and four newer models).

The pressure gages have no electrical function. They are listed here because of their physical location adjacent to the mode selector solenoid valves.

- e) Terminal blocks, electrical wiring and instrument air tubing.

The Common Control Relay Cabinet is mounted rigidly to the concrete wall.

Two Control Relay Cabinets house additional control devices for the redundant fans, compressors, and condensers. The cabinets are made of steel and are 24" wide, 30" high and 8" deep. They have a full sized front door and a subpanel. The following devices are mounted inside each of the cabinets:

- a) One Control Power Transformer, single phase, 480/24 V, 750VA.
- b) Two DPST Toggle Switches for control power circuit isolation.

- c) Four fuses for control power circuit protection.
- d) Condenser Relay, SPST 120 V a-c operating coil, Potter and Brumfield Number PRDLAGO-120 V.
- e) Selector Relay, SPST, 24 V operating coil, Barber-Colman Part Number AE 301. For filter unit supply fan control.
- f) Fan Relay, SPDT, 24 V operating coil, Barber-Colman Part Number AE 302. For filter unit supply fan control.
- g) Compressor Relay, SPST, 24 V operating coil, Barber-Colman Part Number AE 301.
- h) Terminal blocks and interconnecting electrical wiring.

The Control Relay Cabinets are mounted rigidly to the concrete wall.

Two Air Flow Switches, SPDT, Mc Donnell-Miller Number AF1-S for Supply Air Fan flow indication.

Two Room Thermostats for heating and cooling, Barber-Colman Part Number TC 1191. For Compressor and Heater control. The heater has no safety function.

Two Position Switches are installed on the wall adjacent to mode and inlet dampers of the filter unit supply fans for position indication of these dampers. The switches are Allen-Bradley Number 802T-HW1 Limit Switches.

Refer to Figure 10-28 for the interconnection of above devices.

Each of the Auxiliary Building Ventilation Fans (S-31, S-32, E-1, E-2) and the Fuel Handling Area Ventilation Fans (S-1, S-2, E-4, E-5 & E-6) has a constant volume control. The following electro-mechanical devices are part of each fan control.

- a) Position Switches for fan inlet damper indication, 2-pole, NAMCO Reverse Lever Snaplock Limit Switch, Number D-2400-X-R2-WS.
- b) 3-way Solenoid Valve for fan inlet damper control, ASCO Number HTB320A24.

All fans, with the exception of Fan E4, have the following redundant air flow switches for indication and for input to the ventilation logic:

- a) Air Flow Switch, SPDT, Mc Donnell-Miller Number AFL-S.
- b) Air Flow Switch, SPDT, Dwyer Number 1638-1.

Exhaust Fan E-4 has two redundant Mc Donnell-Miller AFL-S Air Flow Switches.

The motor controllers for these fans are part of the vital load center which is described in Section 10.3.25.

The DC/480 V Switchgear Rooms Supply Fans are controlled by three two-stage Thermostats per fan. One thermostat for each fan is wall mounted in each of the three Inverter Rooms. Thermostats are Penn Controls Type A28AA-4 and Type T25A-13. (These two types are used interchangeably.)

Motor controllers for these fans are part of the local starters described in Section 10.3.14.

Each of the three 4 KV Switchgear Rooms is served by a Supply Fan which is controlled by a wall mounted thermostat located in the respective switchgear room. The thermostats are Penn Controls Type A28AA-4 and Type T25A-B. (These two types are used interchangeably.)

Motor controllers for these fans are part of the local starters described in Section 10.3.14.

Miscellaneous Devices for the ventilating control are:

a) Solenoid Valves, ASCO. The following models are used:

HT-8316B15

HT-8316D45

HT-8320A24

HT-8320A185

HT-8331A45

b) Position Switches used in the ventilation system, other than the control room complex, are NAMCO Reverse Lever Snaplock Limit Switches, Catalog Number D-2400-X-R2-WS.

10.3.24A.2 Safety Function

The electro-mechanical devices provide control for motors and dampers and indication of damper positions for the air conditioning of the control room complex and for ventilating systems of the auxiliary building and the fuel handling area.

The air conditioning system of the control room complex provides heating (non-vital), cooling and ventilation air for the control room, computer room, safeguard room (containing the solid state protection system) and other miscellaneous rooms. The system is designed for four modes of operation as follows:

1. Normal operation.
2. Operation in the event of a fire in the control room complex.
3. Operation in the event of airborne radioactivity or chlorine in the control room complex.
4. Intermittent operation to control carbon dioxide levels in the control room area in the event of airborne radioactivity or chlorine.

The safety function of the individual electro-mechanical devices are:

- a) The circuit breaker panelboards are required to distribute 480 V 3-phase power to the control room complex air conditioning system. Momentary power interruptions will not adversely affect the air conditioning or ventilation of the system. The two panelboards provide separate power to redundant air conditioning systems.
- b) Motor controllers are used to control electric power for the fans, compressors and condensers.
- c) The mode selection devices, relays and solenoid valves, control the pneumatic dampers of the air conditioning system.
- d) The devices of each control relay cabinet provide control circuit power and control to interlock a particular set of air conditioning devices, such as supply air fan, filter unit supply fan, compressor and condenser.

The two control relay cabinets and equipment controls are redundant.

- e) Air flow switches monitor the air flow of the supply air fans and initiate an alarm on the plants main annunciator in case of no air flow.
- f) Thermostats sense the control room temperature and control the heating (non-vital) or cooling of the control room complex by causing the respective heating or cooling electro-magnetic controllers to open or close.
- g) Position switches provide indication of the operational status of the mode damper and the filter unit supply fan dampers. The indication is made by lights in the control room.

The damper position switches, associated with the auxiliary building and fuel handling area ventilation, have two functions. They provide signals to the ventilation control logic system for fan control and they provide indication of the damper position by lights in the control room.

The solenoid valves control the pneumatic air supply for closing or opening the mode dampers.

A listing of the position switches and solenoid valves is given on the Ventilation Mode Damper Schedules, Figure 10-29.

The air flow switches sense air flow at the fan outlets and provide signals of air flow or no air flow to the ventilation control logic. Loss of air flow will cause automatic start of the redundant fan after a preset time delay and also will alarm loss of air flow in the control room.

Thermostats start and stop air supply fans at a preset temperature level. Two-stage settings are used for the DC/480 V D-C switchgear room supply fans. A lower setting starts the fan on low speed and a higher setting starts the fan on high speed. Thermostats for the redundant fan are set to operate at proportionally higher temperatures. Single settings are used for the 4 KV Switchgear rooms.

10.3.24A.3 Qualification

The equipment described in 10.3.24A.1 was not tested for its performance under simulated seismic conditions. However, similar electro-mechanical devices for the Diablo Canyon Power Plant have been tested extensively for purposes of seismic qualification for the Hosgri 75M event. In many cases the devices tested were subjected to a greater number of test runs than normally required for such tests. The seismic acceleration test levels of some of the devices were extremely high because of the highly amplified response of the structures in which they are located. In no instance did any of these electro-mechanical devices sustain physical damage during the seismic simulation tests. See specific references below.

The requirements for the ventilation control electro-mechanical devices are that they perform their safety function before and after seismic events. Momentary chatter of contacts during a seismic event will neither adversely affect the ventilation system performance nor cause damage to any of its components.

The design and construction of the motor control equipment is very similar to the design and construction of controllers which have been seismically qualified by testing for the Hosgri 7.5M requirements. The structural integrity of the typical panel or cabinet mountings to concrete walls or floors has been assured by engineering calculations. Thermostats and flow switches are mounted securely to walls. Limit switches are an integral part of the respective dampers which have been generically qualified for the Hosgri 7.5M requirements.

Extensive experience shows that the electro-mechanical ventilation control equipment described in this chapter will not undergo any significant damage during a seismic event and will perform its required safety function after occurrence of the postulated Hosgri 7.5M seismic event.

Similar or identical items have been qualified in this report as follows:

Circuit breaker panelboards were qualified in Section 10.3.11 and also were tested as part of the DC Switchgear described in Section 10.3.5.2.

Seismic qualification testing of local starters is described in Section 10.3.14.

Relays of various designs, some of which are highly sensitive protective type relays, were tested as part of virtually every major electrical equipment. Refer to Section 10.3.21, (Safeguard Relay Board), Section 10.3.26, (4160 Volt Metal Clad Switchgear) and Section 10.3.25A (Vital Load Center Auxiliary Relay Panels). These relays experienced especially high accelerations and a great number of test runs, and were not damaged in the process.

Seismic qualification of solenoid valves is described in Section 10.3.13.2 as part of Local Instrument Panels.

Limit switches, NAMCO model D-2400-X are qualified as part of the NSSS valves. Refer to Section 10.3.30.

10.3.24A.4 Conclusion

It can be concluded, based on many generic seismic tests of similar equipment (and, in some cases, identical equipment), that the ventilation control electro-mechanical devices will perform their safety function after a postulated 7.5M Hosgri event. With the exception of the flow switches and thermostats all devices will be operated by means of manual control switches by the plant operator. Any malfunction will be readily detected, which will permit the operator to switch to redundant ventilating systems should a given device have failed. The physical characteristics of the equipment and its mounting, are of such a nature that they would not undergo significant damage during a seismic event and they would perform their required safety functions.