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TOLEDO EDISON

LOWELL E. ROE
Vice President
Facilities Development
(419) 259-5242

Director of Nuclear Reactor Regulation
Attention: Mr. Robert W. Reid, Chief
Operating Reactors Branch No. 4
Division of Operating Reactors
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Reid:

In accordance with our commitment made in Revision 4 (Serial No. 468 of November 25, 1978) of the Davis-Besse Nuclear Power Station Unit 1 Fire Protection Program, enclosed is Revision 5 to our Fire Hazard Analysis Report. Revision 5 provides responses to item 35.

Yours very truly,

Lowell E. Roe

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LER:TJM

Enclosure

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35. State whether the collapse of the turbine building roof due to a fire would effect the integrity of safe shutdown or associated equipment in the area or adjacent to the turbine building. Demonstrate that safe shutdown can be accomplished in the event of the turbine building roof collapse.

RESPONSE

The turbine building is constructed of noncombustible materials. This type of construction does not contribute fuel to a fire originating in the contents of the building. A fire safety advantage of noncombustible construction is its freedom from the spread of fire throughout the roof and intermediate floor structures.

The clean and used turbine lube oil storage tanks are enclosed in 3-hour fire-rated enclosures. These room enclosures are designed to hold the entire contents of the tank in the event of a tank rupture. The tank enclosure opening is provided with a self-closing Class A fire door. The door opening is protected by a sill which is high enough to contain the entire contents of the tank within the room. The sill has been built to withstand the lateral pressure due to the liquid head, and the walls and floor are waterproof. Automatic wet pipe sprinklers are installed in the clean and used Turbine Lube Oil Tank Rooms 249 and 432.

The various lubricants are dispensed from Oil Drum Storage Room 337, as required, to perform routine maintenance. The walls, floor, and ceiling are fire-rated for 3 hours. Automatic wet pipe-type sprinklers are installed in, and provide primary fire suppression for, the oil drum storage room.

Based on the fire tests discussed in Section 6 of the Fire Hazards Analysis Report, an overloaded cable in a tray or conduit will not provide a source of fire to surrounding external cables, thus surrounding cables will not self-ignite. Therefore, a cable fire is considered not credible in the turbine building.

Based on data accumulated from 1970 to 1974 by the National Fire Protection Association (NFPA), 92 percent of all fires reported in sprinklered buildings were controlled by 20 sprinkler heads or less.

Therefore if an event, such as an exposure-type fire, were to occur from a transient fire load on floor elevations under the turbine operating floor, there is a high probability that the sprinkler system would control and suppress the fire before it reached a temperature magnitude that could cause structural deformation to turbine building steel.

Turbine building elevations 565'-0", 585'-0", and 603'-0" are sprinklered (see Appendix 1, Dwgs. A1 through A6 for sprinklered areas). The three sprinkler systems protecting the turbine building are pre-action-type systems.

Each of the systems' piping is sized hydraulically in accordance with the requirements of NFPA 13. During non-fire or normal conditions the system piping is dry and is supervised by air. Should a sprinkler head be fused or the system piping damaged, the loss of supervisory air pressure will affect a pressure switch. This system condition sounds a local trouble alarm and, concurrently, this system condition is alarmed and annunciated in the control room. The pre-action deluge control valves will not trip (activate) on a loss of supervisory air pressure.

Each pre-action deluge control valve is actuated by its own thermal detection and actuation circuit. The rate-compensated type heat detectors are installed in accordance with the requirements of NFPA 72E and the manufacturer's recommended installation instructions. These detectors also activate a local, audible fire alarm.

During emergency fire conditions the heat generated by the fire condition will be sensed by the rate-compensated thermal detectors. Once the thermal setpoint of the rate-compensated thermal detector is reached the circiut is completed and the system control panel activates the pre-action deluge system control valve. The activation of this valve will admit water into the sprinkler system piping. If the temperature continues to increase the fusible link will drop out of the affected sprinkler head, thus, allowing water to be sprayed directly on the fire by the affected sprinkler head(s).

The sprinkler systems incorporated in the turbine building design provide a density of 0.3 gpm per sq. ft. of floor area for any (including the most remote 3,000-sq. ft.) area and, at the same time, provide essentially a density of 0.2 gpm per sq. ft. for any 10,000-sq. ft. of floor area under the turbine operating floor.

Manual, backup fire fighting is distributed throughout the turbine building in the form of portable CO_2 and multipurpose dry chemical fire extinguishers and hose rack stations (see Dwgs. A4 through A7 in Appendix 1 for manual fire suppression equipment locations).

Each hose rack station is equipped with 75 feet of 1 1/2-inch rubber covered fire hose, with an adjustable nozzle. Adjacent to each hose rack station is a separate 2 1/2-inch hose connection for fire department use.

The main turbine bearings including the exciter bearings are protected by a manual deluge water spray system.

Additionally, the turbine building has smoke and heat vents installed in the roof which are equipped with 165 F fusible links. When the turbine building ceiling temperature exceeds 165 F, the vents open automatically assuring the release of smoke and heat with a resultant decrease in ceiling temperatures making the collapse of the turbine building roof unlikely.

4

A detailed fire hazards analysis was performed to determine the potential of damage to the auxiliary building in the event of a fire in the turbine building. The evaluation was based on the postulation of a transient fire having a temperature intensity of 1500 F, a duration of 65 minutes, and a location anywhere in the turbine building, including the heater bay.

The maximum allowable thermal expansion between the turbine building and the auxiliary bui' ing at the operating floor is one inch. Inasmuch as the turbine building has a limited free expansion capability the imposition of forces from the resulting expansion could have adverse effects on the adjoining auxiliary building.

The maximum thermal expansion could be exceeded should the fire be postulated at the base of almost any system of structural elements within the turbine building.

A fire of the nature assumed for analytical purposes is considered to be extremely conservative and is not anticipated due to the fire propagation control features previously noted. Therefore, structural damage is not expected. However, since structural damage to the auxiliary building resulting from turbine building expansion cannot be precisely evaluated, in order to minimize the potential of damage, additional sprinkler protection will be added to all elevations of the Heater Bay, at the roof truss elevation above the railroad bay, inside the lunch room and inside the instrumentation and control shop at the operating deck elevation. This additional sprinkler protection has distinct advantages over a passive fire proofing philosophy as follows: 5

1. An active system will suppress or control a fire until manual fire fighting action can be taken. Thus sprinkler protection will limit fire growth and reduce the amount of property damage experienced by the structure.

2. An active system will limit the thermal growth of the structural steel by application of water to structural members and by cooling the atmosphere directly around structural steel supporting members.

The turbine building roof truss elevation over the railroad bay and each elevation of the heater bay will be protected by its own separate preaction type sprinkler system. The sprinklers will be hydraulically designed and have the same characteristics as the existing systems discussed previously. The sprinkler system for the lunch room and instrumentation and control shop will be a separate wet pipe system.