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CRUTCHFIELD,D. Operating Reactors Branch 5

SUBJECT: Summarizes Gilbert & Associates,Inc study re active & passive sys to control fires in areas of exposed structural steel,in response to NRC 790214 fire protection safety evaluation,Item 3.2.8.

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LEON D. WHITE, JR.
VICE PRESIDENT

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June 30, 1980

Director of Nuclear Reactor Regulation
Attention: Mr. Dennis M. Crutchfield, Chief
Operating Reactors Branch #5
Division of Operating Reactors
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Re: Fire Protection at R.E. Ginna
Nuclear Power Plant
Docket No. 50-244

Dear Mr. Crutchfield:

In the Fire Protection Safety Evaluation Report for Ginna Station which was issued by the NRC on February 14, 1979, requirements were established for the Rochester Gas and Electric Corporation to supply additional information in selected areas.

The purpose of this letter is to respond to item 3.2.8 (Exposed Structural Steel) which requires a study to show what active and passive systems should be installed to control fires in high fire load areas to prevent structural failures that could jeopardize safe shutdown of the plant.

The following is a summary of a study conducted by Gilbert Associates, Inc. for the Rochester Gas and Electric Corporation.

All areas of the plant with high fire loadings have been identified by the Ginna Station Fire Protection Evaluation, GAI Report No. 1936, with a list of planned modifications to reduce the affects of a fire on the safe shutdown capability of the plant.

Several buildings at the power station are steel structures. These buildings are: Intermediate Building, Control Complex, Turbine Building, Diesel Generator Building, Turbine Oil Storage Room, Screen House, and operating floor of the Auxiliary Building. There are no passive fire protection materials applied to these steel structures, however, fire protection for these buildings is based on a defense in depth concept providing plant protection for any fire hazard. The fire protection systems provide prompt fire detection alarm, protection and extinguishment.

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Protection of the exposed structural steel is proposed in all areas which meet either of two principal criteria; a) where a significant fire loading exists and no fixed suppression system is provided, or b) where the rate of combustion of combustibles could lead to failure of an exposed structural steel member before the fixed suppression systems have become effective. Cable insulation, charcoal filter and oil spill fires were evaluated for their effects on structural steel in the area of the hazard. It was concluded that an oil fire was the only type of fire that would result in failure of steel structures before the actuation of fixed water spray systems or manual firefighting efforts due to its rate of combustion, high heat release and close proximity to structural steel members.

Cable Insulation Fires

Automatic fixed fire suppression systems are currently being designed in accordance with NFPA Standards 13 and 15 for protection of areas where high concentrations of cable are present. These systems will extinguish exposure fires and internally generated fires in the cable trays by the application of water directly to the cable trays and by area protection through open sprinklers and nozzles. The addition of these automatic systems will provide the protection needed to ensure that a cable fire or an exposure fire within the boundaries of the system does not cause structural failures that may jeopardize safe shutdown of the plant. An early warning smoke detection system is also being designed in accordance with NFPA Standards 72D and 72E to be installed in all areas of the plant where safety related cables and equipment are located. Installation of the smoke detection system will allow rapid detection of a fire in its early stages, ensuring a timely response by the station fire brigade well before damage to the structural steel can occur. Manual hose stations located throughout the power plant will be used as a backup for fixed fire suppression systems.

Charcoal Filter Fires

Because of the slow rate of combustion, the charcoal filters are not considered to be a hazard to structural steel. Capability to detect and extinguish fires in these filters is considered fully adequate.

Oil Fires

Oil fires may occur in several areas of the plant. The steel structures evaluated where oil volumes are located were the Turbine Building, Diesel Generator Buildings A and B, Turbine Oil Storage Room, the northern zone of the Intermediate Building elevation 253'-6", the Screen House elevation 253'-6", and Reactor Containment Building.

There is no safety related equipment in the Turbine Building. However, the Turbine Building is adjacent to three structures which house safety related equipment: the Diesel Generator Buildings, Control Complex, and Intermediate Building. The potential for Turbine Building fires adjacent to these structures, their suppression, and potential effects have been evaluated as follows:

The Diesel Generator Building structure and Turbine Building structure are independent of each other and separated by a three hour rated concrete wall. There are no fixed oil hazards located in this area that would affect the Turbine Building structural steel.

A fire near the Turbine-Intermediate Building wall would be extinguished by manual hose streams. No fixed oil hazards are located in this area. Failure of the structural steel would not occur before actuation of the manual hose streams due to the low fire loading along this wall, primarily cable insulation of characteristically low combustion rate and the large volume of the Turbine Building will prevent a concentrated heat buildup during the early stages of the fire.

The most significant hazard in the Turbine Building is the turbine oil reservoir. This oil reservoir is located about 40 feet from the Intermediate Building wall in the center of the Turbine Building. Leakage from the tank and associated equipment will be collected in a diked area surrounding the reservoir. The diked area is capable of containing the entire contents of the turbine lube oil system. The turbine oil reservoir area is protected by a fixed remote manual water spray system and detector alarm system. The fixed system is backed up by manual suppression equipment in the form of hose stations and portable extinguishers. These containment and suppression features are all designed to offer multiple assurances that a fire originating in the oil reservoir area will not grow to the point where the Turbine Building structural integrity is threatened.

In the case of a postulated fire around the turbine oil reservoir, there may be localized structural failure. Coating protection of structural steel columns and members will be provided to preclude this failure. However, review of the steel structure indicates that this failure will not propagate to the point where the Intermediate Building wall will fail.

A fire near the Turbine Building-Control Complex wall would be extinguished by manual hose streams. No fixed oil hazards are located in this area. A fire in a cable tray would have the same effect as a cable fire near the Turbine Building-Intermediate Building and is assumed not to cause failure of the steel structure. The control room pressure resisting wall located in the Turbine

Building will be provided with an automatic water curtain spray system to prevent structural failure and reduce heat transfer in the control room during a Turbine Building fire.

The nearest concentration of oil in the Turbine Building to the Control Complex wall is the hydrogen seal oil unit on the Turbine Building basement floor. This unit is 40 feet from the northwest corner of the Control Complex. The hydrogen seal oil unit is protected by a manual deluge water spray system and detector alarm system. Leakage from the unit will collect in the trench which completely surrounds the unit and drains into an oil interceptor. The floor area surrounding the unit is also sloped towards the condenser pit where an additional manual water spray system and detector alarm system is provided. Failure of the Turbine Building steel will be prevented by the detector alarm system and manual actuation of the water spray system.

Other water suppression systems installed in the Turbine Building provide protection for the Turbine Island and Condenser pit. Oil lines to the turbine bearings are run in guarded piping and protected by the Turbine Island automatic sprinkler system. The basement floor adjacent to the condenser pit is sloped toward the pit where a manual water spray system and alarm system is provided. The capacity of the condenser pit is sufficient to contain the entire contents of the tank and the water from the water spray system.

The northern zone of the Intermediate Building, elevation 253'-6", is constructed of unprotected steel columns supporting a steel floor-ceiling assembly. This zone contains the auxiliary turbine driven feedwater pump and associated oil tank. The existing oil tank manual deluge system and detector alarm system is being extended to also provide protection for its associated pump. The oil tank will be provided with a curb capable of containing the entire capacity of the tank. Failure of the steel is prevented by the detector alarm system and manual actuation of the water spray system. Additionally, an automatic fixed fire suppression system for protection of the Intermediate Building cable trays is being installed directly above the area of the oil tank and pump. This automatic system would actuate if the operator failed to actuate the manual deluge station, thereby, providing added insurance against structural steel damage. In the unlikely event that failure of the steel were to occur before these fire suppression measures could extinguish the fire, local collapse of the steel floor-ceiling assembly may take place. This localized failure might result in the loss of one main steam header support located on the intermediate floor, elevation 271'-0". However, the main steam header would be adequately supported by the remaining steel supports. Thus the postulated fire in the Intermediate Building and the highly unlikely building failure would not jeopardize the function of safety related equipment located in the area.

Diesel Generators A and B will be protected by automatic preaction sprinkler systems. Each diesel generator is enclosed within three hour rated walls. The roof structure for each generator room is unprotected steel which is independent of all adjacent steel structures - redundant Diesel Generator Room, Turbine Oil Storage room, and Turbine Building. Since all the steel for each room is independent of its adjacent structure, the collapse of the roof would not cause collapse of the adjacent roof structures of the redundant Diesel Generator Room, Turbine Oil Storage Room, or Turbine Building steel framing. A failure of a diesel building structure would not impair the safe shutdown of the plant since the redundant diesel or offsite power supply is adequate to satisfy the shutdown requirements.

The Turbine Oil Storage Room is similar in construction to the Diesel Generator Buildings. The room is protected by an automatic deluge system which is considered adequate to suppress a fire and protect the steel structure. The steel roof structure is also independent of all adjacent steel in the Diesel Generator Building A and the Turbine Building.

The Screen House elevation 253'-6" is constructed of unprotected steel columns supporting a steel roof assembly. The diesel driven fire pump oil tank is located in the southeast corner of the building where a curb has been installed around the tank capable of containing the tanks capacity. An automatic wet pipe sprinkler system is being installed in this area for protection of the service water pumps and fire pumps. In addition a smoke detection system is being installed in the service water pump area providing early warning of a fire condition.

In the Containment Building within each reactor coolant pump area the floors are sloped to a single drain. The drain and associated piping are capable of handling 79 GPM. Each pump contains lube oil which could leak from the pump should a seal deteriorate or a crack develop in the casing. This oil will be contained in the proposed oil collection system installed on each motor. This will keep any fire in one pump area from spreading to adjacent areas. Closed circuit television cameras provide monitoring of each pump area from the control room. Should a fire start, the fire brigade would respond and extinguish the fire with readily available fire extinguishers and manual fire hose streams. In addition separate heat detection shall be provided for each pump.

Failures of the Control Complex steel structure are prevented by the addition of automatic and manual fixed fire suppression systems and smoke detection systems now being installed. The early warning fire detection system, suppression systems (water spray and Halon 1301), quick response to a fire alarm by the fire brigade and the availability of manual fire hose stations will preclude the damage to the steel structure. The existing Halon

1301 gaseous suppression systems for the relay and computer rooms are being converted from manual to automatic operation. Manual fixed water spray fire suppression systems are also being installed in the relay room as a back-up to the existing Halon 1301 suppression system.

Very truly yours,

L. D. White, Jr.

L. D. White, Jr.