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TECHNICAL EVALUATION REPORT

REVIEW OF THE DESIGN AND OPERATION OF VENTILATION SYSTEMS FOR SEP PLANTS

ROCHESTER GAS AND ELECTRIC COMPANY

R.E. GINNA NUCLEAR POWER PLANT

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1. INTRODUCTION

This review of the design and operation of ventilation systems at the R. E. Ginna Nuclear Power Plant is under Topic IX-5 of the Systematic Evaluation Program (SEP) and consists of the review and assessment of safety margins in light of changes in design conditions and criteria. The purpose of this review is to assure that ventilation systems at the Ginna plant have the capability to provide a safe environment for plant personnel under all modes of operation and to determine whether all safety-related equipment can function properly to assure safe shutdown of the reactor under normal and emergency conditions.

As background for this review, the SEP has been established to evaluate the safety of 11 of the older nuclear plants. Comparison of each plant against current licensing criteria is an important part of the SEP, with 137 selected topics being studied. Information for these studies is derived from a wide range of sources, including final safety analysis reports, more recent drawings and system descriptions, licensee submittals, and onsite review and inspection.

Information for this review included the above sources, elements of related SEP topics already reviewed for the Ginna plant, and a plant visit that was held on July 21-22, 1981.

2. REVIEW CRITERIA

In determining the ventilation systems to be evaluated, Franklin Research Center (FRC) was guided by the purposes of the SEP with its emphasis on the review and assessment of safety margins. In accordance with Assignment 15, a ventilation system or portion thereof is considered essential to safety if it services systems or parts of systems that are necessary to ensure:

- o the integrity of the reactor coolant pressure boundary
- o the capability to shut down the reactor and maintain it in a safe condition.
- o the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable to the guidelines of 10CFR100, "Reactor Site Criteria."

The criteria and guidelines used to determine if the ventilation systems meet the topic safety objectives are those provided in the following sections of the Standard Review Plan:

Section	Subject
9.4.1	Control Room Area Ventilation System
9.4.2	Spent Fuel Pool Area Ventilation System
9.4.3	Auxiliary and Radwaste Area Ventilation System
9.4.4	Turbine Area Ventilation System
9.4.5	Engineered Safety Feature Ventilation System

In addition, applicable portions of related safety topic reviews were used where possible.

In accordance with Task 1, Paragraph E, of Assignment 15, the following criteria will also be used to evaluate those heating, ventilation, and air conditioning (HVAC) systems or portions thereof that are relied upon to assure the operation of safety-related equipment:

1. Whether a single active failure cannot result in loss of the system functional performance capability.

2. Whether the failure of a non-safety-related portion of a system will affect the performance of the essential portion of the system or will result in an unacceptable release, as was defined during licensing review, of radioactive contaminants.

3. Whether the capability exists to detect the need for isolation and to isolate safety-related portions of the system in the event of failures or malfunctions, and the capability of the isolated system to function under such conditions.

4. Whether the ventilation systems (except for the control room) have the capability to direct ventilation air from areas of low radioactivity to areas of progressively higher radioactivity.

5. Whether both control room and engineered safety feature area ventilation systems have the capability to maintain temperature within the design parameters range for safety-related equipment.

6. Whether the engineered safety feature area ventilation system has the capability to circulate air to prevent accumulation of flammable or explosive fuel vapor mixtures from stored fuel.

3. RELATED SAFETY TOPICS

The scope of review for this topic was limited to avoid duplication of effort, since some aspects of the review are covered under related topics. These related topics are identified below. Each related topic report contains acceptance criteria and review guidance for its subject matter.

SEP Topic	Subject
II-2.A	Severe Weather Phenomena
II-3.3	Flooding Potential
II-4	
III-1	Classification of Structures, Components and Systems (Seismic and Quality)
III-2	Wind and Tornado Loadings
III-3	Hydrodynamic Loads
III-4	Missile Generation and Penetration
III-5.A	Pipe Breaks Inside Containment
III-5.B	Pipe Breaks Outside Containment
III-6	Seismic Design Considerations
III-12	Environmental Qualification of Safety-Related Equipment
VI-4	Containment Isolation System
VI-7.C.1	Independence of Onsite Power
VI-8	Control Room Habitability
VII-3	Systems Required for Safe Shutdown
IX-3	Station Service and Cooling Water
IX-6	Fire Protection
XV-20	Radiological Consequence of Fuel Damaging Accidents (Inside and Outside Containment)
TMI III.D.3.4	Control Room Habitability

4. TECHNICAL EVALUATION

4.1 CONTROL ROOM AREA VENTILATION

The function of the control room area ventilation system is to provide a controlled environment for the safety and comfort of control room personnel and to assure the operability of control room components during normal operating, anticipated operational transient, and design basis accident conditions.

However, the control room system is being reviewed generically under TMI Item III.D.3.4, "Control Room Habitability," to assure compliance with 10CFR50, Appendix A, "General Design Criteria for Nuclear Power Plants," Criterion 19, "Control Room." For this reason, the control room area ventilation system was not evaluated as a part of this review.

4.2 SPENT FUEL POOL AREA VENTILATION SYSTEM

As a part of the auxiliary building ventilation system, the spent fuel pool area ventilation system serves to control airborne radioactivity in the spent fuel pool area during normal operating, anticipated operational transient, and design basis accident conditions. This is accomplished by ducting a portion of the air from the auxiliary building's outside air supply and conditioning system to the spent fuel pool area where it is directed across both the spent fuel pool and the decontamination pit to separate exhaust air collectors. Air collected from both the decontamination pit and spent fuel pool collectors is drawn by and ducted to auxiliary building exhaust fan No. C. While the exhaust air from the decontamination pit is ducted directly to fan No. C, exhaust air from the spent fuel pool water surface is drawn through a filter assembly constructed to provide a choice of charcoal and/or roughing filters. This combination filter assembly is a recent addition to the Ginna plant.

A review of Ginna's fuel handling accident analysis in Section 14.2.1 of the FSAR indicates that the ventilation system is not essential for preventing or mitigating the consequences of accidents that could result in potential exposures comparable to the exposure guidelines of 10CFR100, "Reactor Site Criteria." No further review or assessment is included.

4.3 AUXILIARY BUILDING AND RADWASTE AREA VENTILATION SYSTEM

This system provides clean, filtered, tempered air to all regions of the operating floor of the auxiliary building, including the spent fuel pool and decontamination pit areas. The system exhausts air from all regions of the auxiliary building and its specific equipment rooms and work areas by means of four separate exhaust subsystems, in addition to providing exhaust for the service building and intermediate building. Other than the spent fuel pool and decontamination pit area, which has a dedicated air supply and exhaust path within this system, the auxiliary building supply air is directed to the open work areas of the main operating floor from which a major portion of the ventilating air makes its way down to the intermediate and basement levels of the auxiliary building by means of stairwells and other floor openings. Separate exhaust ducts collect the air in specific regions of all floors. In this manner, the air is directed from regions of low radioactivity potential on the general operating floor to areas of progressively greater radioactivity potential on the intermediate and basement levels in satisfaction of one acceptance criterion of Section 2.

During normal plant operation, outside air is introduced and tempered by one air handling unit, then collected from all regions of the auxiliary building as well as from the service building and the intermediate building by a closed ducting system, and then filtered through a large HEPA filter and exhausted through the plant vent stack. The large, redundant exhaust fans assure an adequate flow of exhaust air to create sufficiently low pressure to promote air leakage into, rather than out of, the auxiliary building. Air-actuated dampers on all system branches, as well as on the outside air inlet and exhaust, provide for isolation of a region when necessary. Although the environmental qualification of the isolation dampers is not documented, conditions within the auxiliary building during normal operation or following a design basis accident are expected to remain at atmospheric pressure with temperatures ranging between 50 and 104°F (see Appendix A, Reference 19).

During shutdown with a loss of offsite power, the air handling unit supplying outside air shuts down and is isolated by its dampers, and the large main exhaust fans shut down with closed redundant dampers; however, a reduced

quantity of air is circulated and exhausted by redundant fans in each of the separate exhaust collector subsystems. These fans are automatically connected to the emergency diesel-powered buses.

A more detailed review of each exhaust collector subsystem follows. Note that these discussions consider mainly the supply and exhaust of ventilation air. Specific cooling of safety-related equipment is reviewed later in this report.

The first of the four subsystems, the ventilation system for the spent fuel pool and decontamination pit areas, although a subsystem of the auxiliary building ventilation system, is discussed in Section 4.2 of this report.

Two exhaust subsystems deliver air to a combined HEPA and charcoal filter, installed in recent years on the intermediate level. One of these lines collects exhaust air from the general operating floor area, the boric acid tank area, and the drumming station, while the other collects exhaust air from selected areas of the intermediate amd basement floors. Both exhaust lines are equipped with air-actuated isolation dampers mounted in each line just before the filter. Both isolation dampers are actuated from the motor controller of auxiliary building exhaust fan No. 1G. With a loss of the isolation signal, each damper fails to the open position to allow continued ventilation.

The remaining exhaust subsystem also collects air from the basement and intermediate levels, including the waste evaporator area, the waste holdup tank area, the concentrate holdup tank, and the gas decay tank areas. Within this subsystem, the volume control tank and reactor coolant filter areas are served with an additional booster exhaust fan, No. 1F. This exhaust air subsystem servicing radwaste areas employs a charcoal filter, redundant fans, and air-actuated isolators at its discharge. The line into which it discharges is serviced by exhaust fan No. 1G before reaching the main HEPA filters and the main exhaust fans that deliver the exhaust to the plant venting stack.

The more complex ventilating system shown on Ginna Drawing No. 33013-533 (dated Sept. 30, 1975) is a revision of the original ventilating system. The major changes include the addition of the intermediate level charcoal and HEPA

filters and exhaust fan No. 1G. As previously mentioned, discharge ducts from two separate areas discharge to the intermediate HEPA filter and each area may be isolated by air-actuated dampers. The exhaust from the radwaste area charcoal filter, powered by redundant exhaust fans, discharges to the intermediate HEPA filter output side. Auxiliary building exhaust fan No. 1G acts as a booster fan in this line. This review indicates that, during an emergency shutdown when the plant is operating under onsite diesel power, these fan loads are arranged on either the A or B diesel-powered buses. While a single failure (one diesel failure) will not cause the system to fail (with backflow into areas of lesser radiation), it is noted that, with a failure to diesel unit A, exhaust fan No. 1G will shut down, thus reducing the exhaust removal from areas of the operating floor and areas at the intermediate and basement levels. While this will not prevent a safe shutdown, it could inhibit personnel access to these areas.

Final exhaust air handling from the auxiliary building is provided by a large HEPA filter, redundant fans (auxiliary building exhaust fans Nos. 1A and 1B), and associated isolation dampers. It is noted that these final large fans operate on 4160 V power and are not connected to the emergency diesel buses. A loss of offsite power would leave the ventilation exhaust function to the smaller fans in each subsystem, augmented only by any natural draft gained from the plant vent stack. Any positive pressure developed in the final ducting located in the intermediate building could cause contaminated exhaust air to leak from the ducting to the intermediate building controlled access area. This would be in violation of the acceptability criterion (Section 2) for ducting air from regions of low radioactivity potential to regions of higher radioactivity potential.

Under these same emergency shutdown conditions using onsite diesel power, it is noted that a number of exhaust subsystem ducts discharge at the inlet to the main HEPA filter, each of which is powered by at least one exhaust fan or a redundant parallel set of two exhaust fans. Without draft augmentation from the plant vent stack, it is possible that the pressure-flow characteristics of these parallel subsystems are not matched sufficiently and that the subsystem providing the highest pressure potential at this point could cause exhaust air to flow backward through one or more exhaust subsystems. Note that the duct

from the intermediate level HEPA filter has exhaust fan No. 1G in series with the other parallel fan set in this subsystem. Although fan No. 1G has been identified as an axial flow fan (with automatically controlled variable-pitch blades) that maintains only a differential pressure of 4.5 inches of water across the fan; the pressure-flow characteristics of the other fans are not known. With an outage on diesel unit B, one fan on each redundant fan set will shut down, thus lessening the flow in each subsystem and increasing the influence of added series fan No. 1G on the one line from the radwaste area. Therefore, it is recommended that the situation be investigated to assure that exhaust air from the radwaste area cannot flow backward into the intermediate building and/or into the controlled access area interface with the service building. Note that the air handling units supplying outside air to each of these areas are not powered by the primary emergency diesel generator but only by buses connectable to the diesel power source.

4.4 TURBINE BUILDING VENTILATION SYSTEM

The turbine building, while not requiring an HVAC system, uses roof-vent fans, wall vent fans, windows, and unit heaters for ventilation and temperature control. The fans are not supplied by emergency diesel-generated power, and loss of these fans would not be critical to a safe shutdown.

The turbine building does not house systems required for safe shutdown. Although it is the source for ventilation air to other rooms that do contain safety-related systems, revisions are currently being made to the plant to provide outside air ducts to these systems. The turbine building ventilation system appears to be in accordance with the acceptance criteria of Section 2.0.

4.5 ENGINEERED SAFETY FEATURES VENTILATION SYSTEMS

The engineered safety features ventilation systems include those ventilating and cooling systems that service equipment required following an accident or needed to assure a safe shutdown of the plant. Equipment and/or areas serviced by these ventilating and cooling systems include the following:

- o engineered safeguard equipment
- o relay room

- battery rooms
- auxiliary and emergency systems
- diesel generator rooms.

4.5.1 Engineered Safeguard Equipment Ventilation and Cooling

Definition and identification of the following safeguard systems are taken from the Ginna FSAR:

- safety injection system
- containment spray system
- hydrogen recombiner.

4.5.1.1 Safety Injection System

The safety injection system acts to limit the release of fission products from the reactor fuel by maintaining core cooling. This keeps the fuel in place, limiting the metal-water reaction to an insignificant amount. The safety injection system is comprised of both high and low pressure electric motor-driven centrifugal pumps located on the basement level of the auxiliary building.

Cooling of the pump-drive motors is by two redundant, stand-alone air cooling units that are shared with the containment spray pumps and from which the cooled air is ducted to a point adjacent to the cooling intake vents of each drive motor. The cooling units comprise a water-cooled heat exchanger and a blower. Service water is the cooling medium. The redundant cooling units are connected to the 1C and 1D electrical motor control centers that, in turn, are connected separately to diesel-powered buses 14 and 13, respectively, when offsite power is not available. A single active failure will not cause a total loss of cooling. Should the service water supply fail, the main auxiliary building ventilation system will circulate air to prevent a rapid rise in temperature. With a loss of this portion of the auxiliary building's ventilation system, the coolers will provide motor cooling. The FSAR states that the coolers were designed to Seismic Class I.

4.5.1.2 Containment Spray System

The containment spray system is an engineered safety feature initiated by a set of high containment pressure signals and designed to reduce the pressure and radioactivity levels within the reactor containment.

Cooling of the pump-drive motors on the basement level of the auxiliary building is by the redundant, service water-cooled air cooling units shared with the safety injection pump motors and described in Section 4.5.1.1 of this report. In a similar manner as for the safety injection pump motors, the cooling air is ducted to a point adjacent to the cooling vents of the two drive motors. By the same reasoning employed for the safety injection pump motors, the ventilation and cooling system for the containment spray pump motors is considered to be satisfactory with respect to the acceptability criteria discussed in Section 2.

4.5.1.3 Hydrogen Recombiner

As described in the FSAR, the hydrogen recombiner consists of two full-rated subsystems, each capable of maintaining the ambient H_2 concentration at 2 V/O. While the associated gaseous fuel and combustor systems are not serviced by the ventilation systems under review in the study, the control panel is located in the intermediate building and is cooled by that building's ventilation system. In response to a question to the Ginna plant engineering staff regarding the ventilation and cooling needs of the control panel, the Licensee has replied that the intermediate building ventilation should maintain the environment in the area of the recombiner panel below 104°F.

4.5.2 Relay Room

The relay room contains two self-contained, water-cooled heat pump air cooling units that maintain a low-normal room temperature. Power to these cooling units is supplied by the 1B motor control center that, while not automatically connected to the emergency diesel-generated power, in the event of a loss of offsite power can be connected by the operator to the diesel power via bus 15.

In addition, a filtered wall vent to an outside air source was noted.

4.5.3 Battery Rooms

The ventilation and cooling system for the battery rooms has been modified to include a refrigerated air handling system. This equipment is located in the main equipment (air conditioning) room for the control room. Cool air from this system is ducted to both battery rooms. While the system recirculates the air, enough new air is introduced to prevent any appreciable hydrogen accumulation in the rooms.

For backup, a dc fan, powered by the batteries, supplies air from the control room's main air handling room to one battery room and through a normally open vent into the second battery room. The vent between the two battery rooms is equipped with a fire damper. Isolation dampers are included on the blower system.

It should be noted that, at the time of the plant visit, modifications were being made to install an exhaust duct that will direct the exhaust air from the main air handling room and battery rooms to an outside vent instead of venting it into the lower level of the turbine building.

Reference 18 indicates that additional battery-powered fans are to be installed in the future to assure that sufficient air handling capacity is provided to maintain the battery rooms at acceptable ambient conditions.

4.5.4 Auxiliary and Emergency Systems

FRC defined and identified the auxiliary and emergency systems in accordance with the FSAR. The following essential systems were seen to require ventilation and/or cooling.

4.5.4.1 Chemical and Volume Control System

The chemical and volume control system is located in the auxiliary building where its ventilation and cooling needs are supplied by the auxiliary building ventilation system.

In addition to general cooling by ambient air, the charging pumps are cooled by redundant fan-driven air coolers using service water as the cooling

medium. To assure that the pumps and drive motors are cooled, the cooled air is ducted directly to them from the coolers.

Emergency onsite diesel-generated power is supplied automatically to the cooling fans by means of motor control centers 1C and 1D. This places one cooler on diesel A and the other on diesel B for redundancy. The capacity of each cooling unit is sufficient to maintain acceptable operating temperatures.

The cooling units were designed and installed in accordance with Seismic Class I criteria.

4.5.4.2 Auxiliary Coolant System

The auxiliary coolant system, comprised of the residual heat removal loop and the component cooling water loop, is located in the auxiliary building and is a system essential to safety.

Within the residual heat removal loop, the electric motor-driven pumps circulate reactor coolant through heat exchangers to transfer the heat to the component cooling water system which, in turn, transfers it to service water for return to the heat sink, Lake Ontario. The heat exchangers are located on the basement and intermediate levels of the auxiliary building and add to the overall heat removal load of the auxiliary building ventilation system. The residual heat removal pumps are located in a pit beneath the basement floor and are cooled by coolers comprised of fin-type, service-water-cooled, heat exchangers and electric motor-driven fans that direct the cooling air directly to the pumps and drive motor vent openings. The coolers were designed and installed in accordance with Seismic Class I criteria at the time of plant construction. During post-accident conditions and during shutdowns where offsite power is not available, the redundant cooling units are transferred automatically to separate diesel-powered buses.

The component cooling water loop serves as the intermediary heat removal system, removing heat from the residual heat removal loop as well as providing cooling water to many other components. This is also a system essential to safety.

The primary ventilation and cooling requirements of the component cooling water system are associated with its circulation pump motors. These motors are located on the main operating floor of the auxiliary building where cooling is provided by the ambient air of the operating floor provided by the auxiliary building supply air handling unit from an outside air source. Since the operating floor is not subjected to the heat dissipation of the lower floors and since it is close to the source of cooled supply air, the pump motors of the component cooling water system do not require additional cooling directed to the motor vents.

While the ventilation and cooling systems for the residual heat removal and component cooling water loops appear to satisfy the acceptance criteria for normal operation and the usual scenarios of post-accident conditions, there is a concern that the residual heat removal system could be susceptible to a single failure. Consider the possibility of a major pump seal leak or a coolant pipe rupture in the residual heat removal system in the pump pit. High pressure reactor coolant could be released into the pump pit and would flash to steam, producing a hot, highly humid atmosphere. FRC's concern is that this environment may produce failures in one or both residual heat removal pump motors in the pit to render the residual heat removal system inoperative. A severe leak could possibly affect the residual heat removal pump cooling unit mounted immediately above the pump pit on the basement floor. At that location, the highly humid atmosphere may be drawn into the coolers and, if not entirely condensed by the cooling coils, return a condensing atmosphere to the residual heat removal pump motor vents.

4.5.4.3 Circulating Water Screen House

The circulating water system provides, by means of four safety-related service water pumps, the water used for heat removal from the reactor during shutdown operations. Ventilation of the screen house, in which the service water pumps are located, is provided by exhaust fans in the building roof and manually controlled lowered vents in the walls. Power to the roof exhaust fans is supplied via bus 17 that is connectable by operator action to the diesel-generated power during emergencies.

An onsite inspection showed that windows and doors (both personnel and vehicle access doors) may be opened to increase the flow of ambient air through the screen house when necessary. The inspection also revealed the use of portable fans to increase the circulation of air around each of three operating service water pumps. Although special motor cooling systems were stated to be not necessary for the service water pumps, it apparently has been advantageous on hot summer days to reduce the motor operating temperatures with the portable fans.

4.5.5 Diesel Generator Rooms

Since the two diesel-powered generators supply redundant onsite electrical power, the diesel generator systems are obviously safety related and must be serviced adequately by their respective ventilation systems. The diesel generators (with associated electrical switchgear) are housed in adjacent, but separate, rooms, each serviced by a ventilation system. Each room is ventilated by two inlet fans supplying outside air, with one fan in each room discharging a copious supply of air directly on the electrical switchgear cabinets. Excess air is discharged through automatic, pressure-actuated roof vents. No refrigeration or service water air cooling is used.

Each ventilation system is automatically connected to its respective diesel-generated power source when the diesels are started. This assures a continuation of ventilation for equipment cooling and for the removal of any hydrocarbon gasses. Combustion intake air to each diesel is via separate outside air sources.

Heating of each room is by unit steam heaters (two per room). Should one of these steam lines break, only its respective diesel generator would be affected. The other diesel would continue independently, to supply emergency power while the steam line is being isolated.

5. CONCLUSIONS

5.1 CONTROL ROOM AREA VENTILATION

Ventilation of the control room is not reviewed here since it is a part of the generic study, "Control Room Habitability," being reviewed under TMI Item III.D.3.4. That study is to assure compliance with 10CFR50, Appendix A, "Ground Design Criteria for Nuclear Power Plants," Criterion 19, "Control Room."

5.2 SPENT FUEL POOL AREA VENTILATION

The spent fuel pool area ventilation system including the decontamination pit area was not considered to be a safety-related system within the definition of this review. Consequently, it was not reviewed in depth. However, during the plant visit it was noted that the exhaust air collected along the side of the spent fuel pool area was more recently fitted with a filter that may operate as a charcoal and/or roughing filter. Discharge from this filter is directed to the main HEPA filter in the auxiliary building ventilation system.

5.3 AUXILIARY BUILDING AND RADWASTE AREA VENTILATION SYSTEM

Although the ventilation system ductwork and special component air cooling units were designed and installed to Seismic Class I criteria at the time of plant construction, the system generally includes non-safety grade equipment. Although the anticipated environments during normal plant operation and following design basis accidents include atmospheric pressure and a temperature range of 50° to 104°F, safety grade equipment must be addressed (see Section 5.6).

In general, the ventilation of the auxiliary building appears to be adequate and does promote the flow of air from areas of low radioactivity potential to areas of higher radioactivity potential. However, two conditions exist that could possibly violate that requirement, both of which occur with the main exhaust fans shut down when offsite power is not available and the plant is operating on emergency diesel power.

The first condition is one in which exhaust air, with a higher radioactivity potential, could leak into the intermediate building housing the controlled access area. With the main exhaust fans shut down, the positive pressure created on the input side of the HEPA filter could cause exhaust leakage into the intermediate building if there is insufficient partial vacuum created by the plant vent stack.

The second possibility could occur under the same main exhaust fan shutdown conditions with the plant vent stack providing insufficient partial vacuum on the system. With four separate exhaust subsystems discharging to a common point at the HEPA filter input, it is possible that the flow-pressure characteristics of the fans could be sufficiently mismatched to produce backflow through an operating fan (isolation dampers open) and thus introduce higher radioactive exhaust to an area of generally lower radioactivity potential.

It is recommended that both possibilities be investigated to assure that exhaust air always flows from areas of low radioactivity potential to areas of high radioactivity potential.

5.4 TURBINE BUILDING

While it does not house systems required for safe shutdown, the turbine building does serve as the source of air for ventilation to the control room's HVAC system equipment room and the battery rooms. However, during the plant visit, modifications were observed that will provide outside air to these areas as well as return their exhaust to an outside vent.

The turbine building ventilation system appears to satisfy the acceptance criteria cited herein.

5.5 ENGINEERED SAFETY FEATURES VENTILATION

The engineered safety features covered in this review are:

- engineered safeguard equipment
  - safety injection system
  - containment spray system

hydrogen recombiner

- o relay room
- o battery rooms
- o auxiliary and emergency systems

  chemical and volume control system
  auxiliary coolant system
  circulating water screen house

- o diesel generator rooms

Equipment cooling using either refrigerated or service water air cooling systems, as required, is the main subject of this review under the engineered safeguard equipment and the auxiliary and emergency systems categories. Redundant emergency bus-powered coolers used for these equipment items were designed and installed to Seismic Class I criteria at the time of plant construction. No other qualification documentation was noted.

The relay and battery rooms employ refrigerated air cooling of the rooms rather than cooling of specific equipment. The history of performance is said to be good. Qualification includes Seismic Class I criteria.

The diesel generator rooms are ventilated by two outside air supply fans with one fan ducted to discharge outside air directly on the electrical switchgear cabinet in each room. Power for the fans is automatically switched to that room's respective diesel-generated power when the diesels are started. Excess air from each room is exhausted through pressure-actuated roof vents.

The ventilation systems for the relay room, diesel generator rooms, chemical and volume control system, and the circulating water screen house appear to satisfy the acceptance criteria cited here.

As discussed in Section 4.5.4.2, the ventilation and cooling systems for the residual heat removal system appear to satisfy these acceptance criteria except for consideration of a major seal leak or pipe rupture in the residual heat removal pump pit. For this condition, concern was expressed in Section 4.5.4.2 that the hot humid environment introduced to the pump pit could cause both of the redundant (parallel) pump motors to fail, that is, the residual

heat removal pumping system could be susceptible to a single failure. It is recommended that the Licensee investigate this possibility in greater depth.

5.6 SAFETY GRADE EQUIPMENT

A "safety grade" system, as defined by NUREG-0138, is one that is qualified to Seismic Category I (Regulatory Guide 1.29) and quality group C or better (Regulatory Guide 1.26) and is operated by electrical instruments and controls that meet IEEE criteria for nuclear power plant protection systems (IEEE Std 279). The Ginna plant was constructed, for the most part, prior to the issuance of these documents; as a consequence, much of the equipment used in the ventilation systems is not documented to be of safety grade. Therefore, the Licensee is encouraged to determine which of these ventilation systems, if any, are required to enable the safety equipment, located in the areas serviced, to perform their respective functions. If it is determined that ventilation is required for any of the safety systems thus serviced, then the appropriate upgrading of its associated ventilation equipment should be considered.

6. REFERENCES

1. 10 CFR Part 50, Appendix A, General Design Criterion 2, "Design Basis for Protection Against Natural Phenomena"

2. 10 CFR Part 50, Appendix A, General Design Criterion 4, "Environmental and Missile Design Bases"

3. 10 CFR Part 50, Appendix A, General Design Criterion 5, "Sharing of Structures, Systems and Component"

4. Standard Review Plan, Section 9.4.1, "Control Room Area Ventilation System"

5. Standard Review Plan, Section 9.4.2, "Spent Fuel Pool Area Ventilation System"

6. Standard Review Plan, Section 9.4.3, "Auxiliary and Radwaste Area Ventilation System"

7. Standard Review Plan, Section 9.4.4, "Turbine Area Ventilation System"

8. Standard Review Plan, 9.4.5, "Engineered Safety Feature Ventilation System"

9. Standard Review Plan, Section 9.5.1, "Fire Protection Systems"

10. Regulatory Guide 1.13, "Spent Fuel Storage Facility Design Basis"

11. Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water, Steam and Radioactive-Waste-Containing Components of Nuclear Power Plants"

12. Regulatory Guide 1,29, "Seismic Design Classification"

13. Regulatory Guide 1.105, "Instrument Setpoints"

14. Regulatory Guide 1.117, "Tornado Design Classification"

15. Branch Technical Position ASB 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants"

16. SEP Topic VII-3, "SEP Review of Safe Shutdown Systems for the R. E. Ginna Nuclear Power Plant, Revision 2," April 1981

17. SEP Topic VII-3, "Electrical, Instrumentation and Control Features of Systems Required for Safe Shutdown," Final Draft, February 1981