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Director, Office of Nuclear Reactor Regulation
Attention: D. M. Crutchfield, Chief
Operating Reactors Branch No. 5
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Gentlemen:

Subject: Docket No. 50-206
SEP Topic IX-5
San Onofre Nuclear Generating Station
Unit 1

Enclosed is the draft assessment for SEP Topic IX-5, Ventilation Systems. If you have any questions on this draft topic assessment or require additional information, please let me know.

Very truly yours,

R. W. Krieger
Supervising Engineer,
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Enclosure

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SEP REVIEW

OF

VENTILATION SYSTEMS

TOPIC IX-5

FOR THE

SAN ONOFRE NUCLEAR PLANT

UNIT 1

I. INTRODUCTION

To assure that the ventilation systems have the capability to provide a safe environment for plant personnel and for engineered safety features, it is necessary to review the design and operation of these systems. For example, the function of the spent fuel pool area ventilation system is to provide ventilation in the spent fuel pool equipment areas, to permit personnel access, and to control airborne radioactivity in the area during normal operation, anticipated operational transients, and following postulated fuel handling accidents.

II. REVIEW CRITERIA

The current criteria and guidelines used to determine if the plant systems meet the topic safety objective are those provided in Standard Review Plan (SRP) Sections 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" and 9.4.5, "Engineered Safety Feature Ventilation System". In determining if plant design conforms to a safety objective, use is made, where possible, of applicable portions of previous reviews.

III. RELATED SAFETY TOPICS AND INTERFACES

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

II-2.A	Severe Weather Phenomena
III-1	Classification of Structures, Components and Systems
III-6	Seismic Design Considerations
III-12	Environmental Qualification of Electrical Equipment
VI-4	Containment Isolation System
VI-7.C.1	Appendix K - EI&C Reviews
VI-8	Control Room Habitability
VII-3	Systems Required for Safe Shutdown
IX-3	Station Service and Cooling Water Systems

IX-6	Fire Protection
XV-20	Radiological Consequences of Fuel Damaging Accidents (Inside and Outside Containment)
TMI III.D.3.4	Control Room Habitability

IV. REVIEW GUIDELINES

In determining which systems to evaluate under this topic, the definition of "systems important to safety" provided in Reference 1 was used. The definition states systems important to safety are those necessary to ensure 1) the integrity of the reactor coolant pressure boundary,[1] 2) the capability to shut down the reactor and maintain it in a safe condition, or 3) the capability to prevent, or mitigate the consequences of accidents that could result in potential offsite exposures comparable to the guidelines of 10 CFR Part 100, "Reactor Site Criteria". This definition was used to determine which systems or portions of systems were "essential". Systems or portions of systems which perform functions important to safety were considered to be essential.

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[1] Reactor Coolant Pressure Boundary is defined in 10 CFR Part 50 & 50.2 (v).

V. EVALUATION

The systems reviewed under this topic are (1) the Control Area Heating, Ventilating, and Air Conditioning System, (2) the Fuel Storage Building Ventilation System, (3) the Reactor Auxiliary Building Ventilation System, (4) the Containment Sphere Purging and Exhaust System (portions associated with vent stack), (5) the 4160 V Switchgear Room Ventilation System, (6) the 480 V Switchgear Room Ventilation System, (7) the Diesel Generator Building Heating and Ventilating System, and (8) the Administration Building Heating, Ventilating, and Air Conditioning System. Ventilation systems inside the containment are reviewed under topics VI-3, Containment Pressure and Heat Removal Capability, and VI-5, Combustible Gas Control.

The turbine area is open to the outside atmosphere. The area is semi-enclosed on three sides by large louvers (the fourth side is open); thus no mechanical ventilation system is needed.

A. Control Area Heating, Ventilating and Air Conditioning System

The function of the Control Area Heating, Ventilating, and Air Conditioning System is to provide a controlled environment for the comfort and safety of control room personnel and to assure the operability of control room components during normal operation, anticipated operational transients and design basis accident conditions.

As a result of TMI this system is being reviewed generically (TMI Item III.D.3.4, Control Room Habitability) to assure compliance with Criterion 19, "Control Room" of Appendix A to 10 CFR Part 50. Therefore this system was not reviewed under this topic.

B. Fuel Storage Building Ventilation System

The function of the Fuel Storage Building Ventilation System (FSBVS) is to maintain ventilation in the spent fuel pool equipment areas, to permit personnel access, and to control airborne radioactivity in the area during normal operation, anticipated operational transients, and following postulated fuel handling accidents.

During normal operation, the dose rate in the fuel storage building is low due to the shielding of the water as discussed in Section 4.2.6 of the FSAR. Based on review of the fuel handling accident analysis in References 4 and 5, it is concluded that the system is nonessential as defined in Section IV, because the potential radiation releases are below those defined in 10 CFR Part 100.

C. Reactor Auxiliary Building Ventilation System

The function of the Reactor Auxiliary Building Ventilation System (RABVS) is to provide ventilation during normal operation for areas within the reactor auxiliary building, including the liquid radwaste

hold up tank rooms, the demineralizer area, the spent resin cubicle, the liquid radwaste processing area, the gaseous radwaste processing and decay area, the charging pump room, and the boric acid control area. These areas house equipment (charging pumps) which operates post-accident or for safe shutdown of the plant.

The RABVS consists of an air handling unit, A-25, with a prefilter and a gravity operated discharge damper. Air handling unit A-25 is powered from train 2 of the safety bus.

Filtered fresh air is supplied to the reactor auxiliary building by air handling unit A-25. This unit is manually started at the heating and ventilating control board. The ventilating air to the various compartments in this building is provided in such a manner as to insure a supply of fresh air to occupied areas and maintain air flow in a direction toward possibly contaminated areas. The containment sphere purging and exhaust system air handling units maintain the reactor auxiliary building under a negative pressure of 1.0 inch w.g. through pressure switches dPS-14 and 15. If the air pressure rises to -0.5 inch w.g., the supply air unit A-25 is stopped by pressure switch dPS-12. This will keep any radioactive particles and gases under control. If pressure switch dPS-12 fails to operate to stop air handling unit A-25, airborne radioactivity could escape from the building due to loss of negative pressure. However, such releases are expected to be minimal.

Active equipment in the RABVS is air handling unit A-25 and differential pressure switch dPS-12. On failure of either of these items, ventilation of the charging pump room could be lost. SCE will perform an analysis to determine the effect of losing A-25 on charging pump operation and/or investigate modification to ensure a reliable source of ventilation to the charging pump room. The results of this analysis are scheduled to be available by February 15, 1981.

D. Containment Sphere Purging and Exhaust System

The function of the Containment Sphere Purging and Exhaust System (CSPES) is to exhaust air to the vent stack from the RABVS, the FSBVS and the containment equalizing line after filtration or other treatment and also to supply outside air to the containment sphere when personnel access is required. During normal operation the CSPES is used to exhaust air from the RABVS, the FSBVS and the containment equalizing line. Purging and exhaust from the containment is used only during shutdown and is isolated during normal operation by POV 9 and POV 10. Purging and exhaust will be discussed in SEP Topic VI-4, Containment Isolation System.

The CSPES consists of three air handling units, A-21, A-22 and A-24. Suction dampers (PO-19 and PO-20) and discharge dampers (PO-17 and PO-18) are provided on air handling units A-22 and A-24. HEPA filters are provided on units A-22 and A-24. A prefilter is

provided on unit A-21. Units A-21 and A-22 are powered from safety bus 2. Unit A-24 is powered from safety bus 1. Units A-22 and A-24 are connected by a common upstream plenum.

During normal operation, one air handling unit (A-22 or A-24) discharges exhaust air from the fuel storage building and the reactor auxiliary building to the vent stack. Fan A-21 is normally operating to provide vent stack dilution. The operating fan, A-22 or A-24, takes suction through dampers PO-19 or PO-20 which are controlled by dPS-14 and dPS-15, respectively. The differential pressure switches (dPS-14 or 15) maintain a constant negative pressure (approx. 5 in. w.g.) in the exhaust ducts from the fuel storage and reactor auxiliary buildings by automatically positioning the fan suction dampers (PO-19 or 20). The second unit (A-22 or A-24) is in the OFF position. Fan A-21 is operated manually from the heating and ventilating control board and takes suction from outside air through louvers. Dampers PO-17 and PO-18 at the discharge of fans A-22 and 24, respectively, are interlocked to open when the fans are started and close when the fans are stopped.

The CSPES is not required under design basis accident conditions since the containment is isolated. Failure of this system will result in loss of negative pressure in the RABVS and FSBVS. This will result in the release of airborne radioactivity from these buildings instead of from the vent stack. However, this will not affect the maximum calculated doses at the site boundary.

E. 4160 V Switchgear Room Ventilation System

The 4160 V switchgear room is located in the control administration building. The room houses switchgear and power cabling for the reactor protection and control system, instrumentation for shutdown and cool down, emergency power (AC and DC), and control power for safe shutdown systems all of which are considered important to safety.

The 4160 V switchgear room ventilation consists of one ventilation fan. If this fan were to fail, ventilation to this room would be lost. A study is currently in progress to evaluate the need for cooling and ventilating equipment for this room. Results of this study are scheduled to be available by May, 1982.

F. 480 V Switchgear Room Ventilation System

The 480 V switchgear room is located in the fuel storage building. The room houses switchgear and power cabling for the reactor protection and control system, instrumentation for shutdown and cooldown, emergency power (AC and DC), and control power for safe shutdown systems, all of which are considered important to safety.

The 480 V switchgear room ventilation consists of one ventilation fan. If this fan were to fail, ventilation to this room would be lost. A study is currently in progress to evaluate the need for cooling and ventilating equipment for this room. Results of this study are scheduled to be available by May, 1982.

G. Diesel Generator Building Heating and Ventilating System

The function of the Diesel Generator Building Heating and Ventilating System (DGBHVS) is to provide ventilation to the diesel generator building. The diesel generator building contains the diesel generators and their auxiliaries, station batteries and hydrogen recombiner control panels. Since the diesel generators and the batteries supply power to essential services after a loss of offsite power, the DGBHVS is essential. Each diesel generator is located in a separate room. The station batteries are also located in a separate room.

The active components of the DGBHVS are four cooling fans for each generator room; EF-1A, EF-1B, EF-1C and EF-1D; EF-2A, EF-2B, EF-2C and EF-2D; respectively. A common intake plenum is shared by the four fans in each room.

In each of the diesel generator rooms, outside air is drawn in through the removable wall louvers at one end of the building and exhausted by one to four ventilating exhaust fans located at the other end (west) of the room. Normally, only the normal/emergency fan, EF-1D, (for DG 1) and EF-2D (for DG 2) is started and running at slow speed. On a rise in the room temperature to 95°F, the first emergency fan, EF-1A (EF-2A) will start and EF-1D (EF-2D) will shut-off automatically. A continuing rise in room temperature will automatically trigger the other emergency fans to run. Fan EF-1B (EF-2B) will start at 100°F and EF-1C (EF-2C) will start at 105°F. Further temperature rise to 113°F will automatically re-start the normal/ emergency fan, EF-1D (EF-2D) on high speed. Temperature switches for the fans are set accordingly for the step control operation.

A single failure of any one fan or the associated controls will not result in excessive temperatures because the system is designed to operate satisfactorily with one fan not in service. Failure of an electrical train will not result in unacceptable consequences because the fans for each generator are powered by the train supplied by the generator they are ventilating. The other train and fans would therefore be available.

The battery room is normally ventilated by the diesel generator room fan(s) through an 18" x 18" opening on the ceiling. Heating is furnished by an electric baseboard heater located on the west wall, beside the outside air intake opening. The heater is non-safety related, designed for $\Delta T = 25^{o}F$ and is controlled by a wall-mounted thermostat set at $61^{o}F$. A wall mounted temperature switch will sound an alarm in the control room when the temperature falls below $61^{o}F$. No active equipment is used for essential battery room ventilation. The heater is not normally energized during an accident situation.

A ceiling mounted ventilating fan, EF-3 is provided to operate in the abnormal event that the diesel room exhaust fans are inoperable or the diesel generator is down for overhaul. The fan is classified as non-safety related, however, seismic category A structural supports are provided for it. A local switch will turn on the fan to effect 4 air changes per hour.

H. <u>Administration Building Heating, Ventilating, and Air Conditioning System</u>

The function of the Administration Building Heating, Ventilating, and Air Conditioning System (ABHVACS) is to provide a controlled environment in the administration building for the comfort of the personnel. This building also contains the battery room, the

radiochemical laboratory, the sample station, and the chemical control room. Only the battery and inverter rooms are considered essential.

If the portion of the system ventilating the battery and inverter rooms fails, ventilation to these rooms would be lost. SCE will perform an analysis to determine the effect of losing ventilation in these rooms and/or investigate modifications to ensure a reliable source of ventilation. The results of this analysis are scheduled to be available by February 15, 1981.

VI. SUMMARY

The FSBVS and CSPES are not considered essential systems as discussed above. The DGBHVS, which is an essential system, meets current criteria.

The RABVS, ABHVACS, and ventilation for the 4160 V, and 480 V rooms do not meet current criteria. The need for cooling and ventilation equipment in these areas will be evaluated as discussed above. If it is determined that ventilation is required in any of these areas, then appropriate modifications will be considered in the SEP integrated assessment.

VII. REFERENCES

1. Regulatory Guide 1.105, System Setpoints

2. NUREG-0737, Clarification of TMI Action Plan Requirements

3. Final Safety Analysis, San Onofre Nuclear Generating Station, Unit 1.

4. Amendment No. 36 to Provisional Operating License No. DPR-13 dated September 25, 1978.

5. Letter from Dennis L. Ziemann to R. Dietch dated January 17, 1980, regarding SEP Topic XV-20.

6. P&ID 568782, Air Conditioning System.

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