9.4.13 Smoke Confinement System

The smoke confinement system (SCS) operates to mitigate the effects of smoke or gases that could result from fire in the MCR and adjacent rooms. The SCS functions in close coordination with the fire protection system. Refer to Section 9.5.1 for a description of the fire protection program. The SCS maintains the emergency egress paths free of smoke. The SCS is normally switched off and remains in a standby mode for operation in the event of a fire.

The SCS is designed to protect rescue routes against the inflow of smoke from fire inside the adjacent rooms by supplying fresh outdoor air and pressurizing the rescue routes and staircases in relation to the adjacent rooms.

The SCS applies to the following areas and buildings of the NI:

- Safeguard Building (SB) divisions 2 and 3 interconnected passageway (egress path between MCR and RSS).

The SCS is not required to operate during simultaneous events involving a potential release of radioactive contamination and fire. Airborne radioactivity is processed by the applicable building ventilation systems prior to release to the environment.

9.4.13.1 Design Bases

All components of the SCS are non-safety related and Non-Seismic, as specified in Section 3.2. The SCS performs no safety-related functions and is not required to operate during a design basis accident.

The SCS performs the following important non-safety-related system functions:

- Prevents smoke, hot gases, or fire suppressant agents from migrating from one area to another to the extent that they could adversely affect the safe-shutdown capabilities, including operator action. The environmental control systems are physically separated to satisfy these requirements, per SECY-90-016, Issue II.D (Reference 1).

- Protects access and egress pathway between the MCR and RSS for habitability by maintaining higher pressure than adjacent areas to minimize smoke infiltration during a fire.

9.4.13.2 System Description

9.4.13.2.1 General Description

In the event of a fire, the SCS is initiated either automatically through the plant fire alarm system signal or manually by the fire brigade. The system is designed to protect rescue routes between the MCR and RSS against inflow of smoke from fire inside the

adjacent rooms by supplying fresh outdoor air, pressurizing these areas in relation to adjacent rooms.

The SCS consists of the following subsystems:

- The supply and exhaust air subsystem for the interconnecting passageway between SB division 2 and division 3.

Supply and Exhaust Air Subsystem for the Interconnecting Passageway between Safeguard Building Division 2 and Division 3

The interconnecting passageway between SB division 2 and division 3 is supplied with intake air through a fire-resistant concrete air intake ventilation chase with a motor-operated isolation damper and a supply fan as shown in Figure 9.4.13-1. The intake air opening located at the top of the building has weather-protected grilles.

The air from the supply fan is directed through a galvanized steel ductwork to the bottom of the escape ladder shaft and to the interconnecting passageway.

A pressure control damper and motor-operated isolation damper installed on the exhaust ductwork provide pressure control in the interconnecting passageway and associated rooms.

9.4.13.2.2 Component Description

The major components of the SCS are listed in the following paragraphs.

Refer to Section 3.2 for the seismic and system quality group classification of these components.

Supply Air Fans

The supply air fans have an axial design with an electrical motor driver.

Isolation Dampers

Motorized bubble-tight dampers are used to isolate each exhaust and supply duct from outside air during normal plant operation (i.e., SCS not in operation).

Back Draft Dampers

Back draft dampers are used to isolate smoke exhaust ducts from outside air during normal plant operation (i.e., SCS not in operation).

Fire Dampers

Fire dampers are installed where SCS ductwork penetrates a fire barrier. Fire damper design meets the requirements of UL 555 (Reference 2) and the damper fire rating is commensurate with the fire rating of the barrier penetrated.

Fire in a room is detected by the fire detection system. Fire dampers are equipped with fusible links for automatic closure when the temperature reaches a predetermined setpoint.

Pressure Control Dampers

Adjustable pressure relief dampers are used to limit and control overpressurization inside the interconnecting passageways.

Ducts

The ductwork is made of galvanized steel.

9.4.13.2.3 System Operation

Normal Operating Conditions

The SCS is normally switched off and is in standby mode during normal plant operations. Only the systems or subsystems related to a specific area operate in the event of a fire in that area. The systems in that area are switched on either automatically by the plant fire alarm system or manually by the fire brigade. Other components or systems that are not associated with the area remain closed and in standby mode.

The SCS protects rescue routes against the inflow of smoke from fire inside the adjacent rooms, supplies fresh outdoor air, pressurizes the rescue routes to control spread of fire or smoke.

Abnormal Operating Conditions

Plant abnormal operating conditions have no impact on the operation of SCS since the system is in standby mode and operates only in the event of a fire in a specific area. During a fire, the SCS provides habitable conditions for the fire brigade. These dampers open during a fire in a specified fire area.

9.4.13.3 Safety Evaluation

The system is not required for the safe shutdown of the plant or for mitigating the consequences of a design basis accident; the system has no safety-related function.

The SCS is powered by the normal power supply system.

9.4.13.4 Inspection and Testing Requirements

Refer to Section 14.2 (test abstract #085) for initial plant startup test program. Initial inplace acceptance testing of the SCS will be performed in accordance with NFPA 92A (Reference 3).

9.4.13.5 Instrumentation Requirements

The plant fire alarm system controls electrical components of the SCS. Indication of the operational status of the equipment is provided in the main control room (MCR).

9.4.13.6 References

1. SECY-90-016, "Evolutionary LWR Certification Issues and Their Relationship to Current Regulatory Requirements," U.S. Nuclear Regulatory Commission, January 1990.

2. UL 555, "Standard for Fire Dampers," Underwriter's Laboratories, Sixth Edition, June 1999.

3. NFPA 92A (06), "Recommended Practice for Smoke-Control Systems," National Fire Protection Association, 2006.

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