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NUCLEAR OPERATIONS

April 12, 1982

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Virgil C. Summer Nuclear Station
Docket No. 50/395
Update of FSAR Section 9.4

Dear Mr. Denton:

In completing the construction and startup programs for the Virgil C. Summer Nuclear Station, South Carolina Electric and Gas Company has made several minor changes to the Heating Ventilation and Air Conditioning System (HVAC). Attached is a mark-up of FSAR pages in Section 9.4 to reflect the as-built configuration of HVAC systems. These changes will be incorporated into Amendment 31 to the FSAR.

If you have any questions, please let us know.

Very truly yours,

H T Babb

T. C. Nichols, Jr.

for

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9.4 AIR CONDITIONING, HEATING, COOLING, AND VENTILATION SYSTEMS

9.4.1 CONTROL BUILDING AREA VENTILATION SYSTEM

Air conditioning, heating, cooling and ventilating systems are provided for the control room and other control building areas to satisfy the following general requirements:

1. To maintain ambient air temperatures in all areas as required for the comfort and safety of personnel.

2. To satisfy environmental requirements of equipment.

3. To meet the radiation control requirements of 10 CFR 20.

4. To satisfy the design requirements of General Design Criterion 19, relative to the control room.

9.4.1.1 Design Bases

The systems for the control building areas are designed in accordance with the following:

1. The general requirements indicated in Section 9.4.1 are satisfied.

2. Equipment, motors and controls in Safety Class 2b systems, excluding the instrument air system, are supplied from Class 1E power sources and are separated and redundant to meet the single failure criteria.

3. Instrumentation and control is provided to detect abnormal conditions, such as smoke, high temperature or high radiation levels which require operation in the ~~recirculation mode~~ emergency filtration mode or outside air purging mode. | 31

Amendment 31
April 1982

f. Provide means for automatically placing the system in the emergency mode and starting the emergency filter system upon receipt of safety injection or high radiation signal from the gaseous activity channel of RM-A1. Provide means to automatically start the normal air handling units and emergency filter fans following loss of offsite power.

g. Provide means, in the control room, for manually initiating system damper positioning for the emergency modes of operation and starting the emergency filter system.

h. Provide means, in the control room, for manually overriding the emergency mode of system operation and to indicate, in the control room, that system override is in effect.

i. Maintain positive control room pressure by manually adjusting outside ~~[illegible]~~ air dampers. Control room pressure in excess of system setpoints causes an alarm in the control room.

j. Automatically maintain control room temperature by modulating face and bypass damper position and an electric reheat coil in the supply duct.

k. Automatically maintain control room humidity by controlling a humidifier.

l. Indicate, in the control room, air handling unit or emergency filter fan operation.

THE TECHNICAL SUPPORT CENTER

The system continuously supplies filtered, cooled or heated air to the control room, and the cable spreading area under the control room, during normal conditions. Filtered and cooled air is provided during post accident and loss of offsite power conditions. By operation of either one of the two supply air trains, and control of the proper dampers, the system admits small amounts of outside ~~ventilation~~ make-up air to the control room to maintain positive pressure during normal and emergency operation, or admits 100 percent outside air during purge mode. The system maintains space temperature by automatically varying the volume of air passing through the cooling coil and by energizing circuits in the electric reheat coil. The cooling coil is supplied with chilled water from the chilled water system (see Section 9.4.7.2.4). | 31 | 31 | 22

Upon receipt of a safety injection or high radiation signal from the gaseous activity channel of RM-A1, the system automatically places the dampers in the emergency mode and starts the normal air handling unit and emergency filter fan. A loss of offsite power causes the air handling units and emergency filter fans to start automatically. In the event of loss of offsite power, the system can be manually reset for normal operation. Operation of the emergency filter fans passes control room return air through the emergency filter system. Normal operation of the system is accomplished using manual switches in the control room. | 22

The mechanical components, control devices and supply and return ductwork are redundant and separated to ensure system availability. Each system component requiring electrical power is supplied from the Class 1E electrical system. Both systems are supplied with required instrument air from the non-nuclear safety class instrument air system. Since instrument air is not ~~necessary for~~ safety-related, system ~~operations~~ design is such that failure of instrument air will not inhibit system operation in the safety related mode.

CONTROL ROOM AIR IS ~~BROUGHT~~ recirculated THROUGH THE CONTROL ROOM TOILETS AND KITCHEN, VIA AN EXHAUST FAN AND CARBON FILTER, AND IS DISCHARGED INTO THE RETURN DUCTWORK. | 31

d. Provide means for automatically placing the system in the emergency recirculation mode (close outside air and relief dampers and open return dampers) and starting the air handling units upon receipt of a safety injection signal or high radiation signal from the gaseous activity channel of RM-A1. Loss of offsite power starts the air handling units but does not cause dampers to be positioned for operation in the recirculation mode. | 2

e. Provide means for manually initiating system damper positioning for the emergency recirculation mode of operation. | 2

f. Provide means for manual control of outside, return and relief damper position. | 2

g. Automatically maintain relay room temperature by modulating face and bypass damper position and an electric reheat coil in the supply duct. | 2

h. Indicate, in the control room, air handling unit operation. | 2

The system continuously supplies filtered, cooled or heated air to the relay room AND TECHNICAL SUPPORT CENTER EQUIPMENT ROOM under normal conditions. Filtered and cooled air is provided under post accident and loss of offsite power conditions. By operation of either one of the two supply air trains and by automatic control of the proper dampers, the system admits fixed amounts of outside ventilation air, no outside air (i.e., recirculation mode) or 100 percent outside air (i.e., purge mode). The system maintains space temperature by automatically varying the volume of air passing through the cooling coil and by energizing circuits in the electric | 31

reheat coil. The cooling coil is supplied by mechanically chilled water. Upon receipt of a safety injection or high radiation signal from the gaseous activity channel of RM-A1, the system automatically positions the outside air dampers for the recirculation mode. ~~and stops the air handling units.~~ Receipt of ~~a loss of offsite power~~ AN ESFLS signal starts the fans IN BOTH AIR HANDLING UNITS. ~~but does not affect the system dampers~~. The units are normally operated from the control room. Mechanical components, controls, duct system redundancy, separation, power supply and equipment location are the same as for the control room system, discussed in Section 9.4.1.2.1. 31

9.4.1.2.3 Computer Room System

The main components of this system include:

1. Two 100 percent capacity air handling units, each with roughing filters (80 percent efficiency on NBS dust), face and bypass section, chilled water cooling coil and fan section. 2

2. Electric reheat coils in the supply duct.

3. Redundant supply, return, relief and outside air ducts.

4. Air operated, spring opposed dampers in the face and bypass damper sections of the air handling units and in the outside, return and relief air ducts.

5. Instrumentation and control devices to perform the following functions:

   a. Measure the pressure drop across the air handling unit filter bank (local indication only). 2

is available. By operation of either one of the two supply air trains and by automatic control of the proper dampers, the system admits fixed amounts of outside ventilation air, no outside air (i.e., recirculation mode) or admits 100 percent outside air (i.e., purge mode). The system maintains space temperature by automatically varying the volume of air passing through the cooling coils and by energizing circuits in the electric reheat coil. The cooling coil is supplied by mechanically chilled water. Upon receipt of a ~~safety injection~~ HIGH RADIATION signal, the system DAMPERS ARE automatically placed ~~the dampers~~ in the recirculation mode position and the system continues to ~~run~~ OPERATE NORMAL if ~~offsite~~ power is available. The units are connected to Class 1E power buses. The units are normally operated from the control room. 2 31

9.4.1.2.4 Controlled Access Area Supply System

The main components of this system include:

1. A 100 percent capacity air handling unit including roughing filters (80 percent efficiency on NBS dust), electric preheating coil, fan section, coil section with chilled water coil and electric heating coil and a hot and cold deck zoning damper section. 2

2. A 100 percent capacity sample room and radiochemical laboratory hood supply fan.

3. Outside air, zone supply and hood supply ducts.

4. Air operated, spring opposed dampers to isolate the controlled access air handling unit and laboratory hood supply fan when not in use; in the air handling unit zoning damper section; and in the outside air intake duct.

UPON RECEIPT OF AN ESF SIGNAL, THE SYSTEM DAMPERS ARE AUTOMATICALLY PLACED IN THE RECIRCULATION MODE POSITION WITH THE FAN MOTORS BLOCKED FROM OPERATION UNTIL MANUALLY RESET. 31

The gaseous activity channel of RM-A1 automatically closes the outside air dampers of the relay room and places both systems in the recirculation or emergency mode upon detection of high activity in the air supplied to the control room. Smoke or high temperature in the supply ducts to the control room and to the relay room or in the discharge duct from the emergency filter system cause alarms to be actuated in the control room. Air flow rates in the outside air ducts to the control room and to the relay room are indicated in the control room. 31

During normal and emergency operation, the control room is ~~automatically~~ pressurized through the ~~controlled~~ introduction of a fixed amount of outside air. The flow of outside air to the relay room is fixed but is manually adjustable. In the ~~recirculation mode, no outside air is introduced for control room pressurization. However,~~ control room air is filtered through roughing, HEPA and charcoal filters. Recirculated relay room air is not filtered. For smoke removal, system dampers for both control and relay room systems can be positioned manually ~~from the control room~~ to purge with outside air at rates ~~from 0~~ up to 100 percent. Degradation of equipment performance as a result of excess temperature and humidity is not anticipated since the control and relay room systems are designed in accordance with the criteria specified above. 31

9.4.1.4 Inspection and Testing Requirements

The control building area systems are subjected to preoperational testing in accordance with written procedures to verify proper wiring and control hookup, filter and duct system inplace integrity and leak tightness, proper function of system components and control devices and to establish system design water and air flow rates.

To ensure a continued state of readiness of the control building area systems after completion of the preoperational tests, the following inspection, maintenance and test procedures are performed.

The manual damper that limits outside air make-up to the control room must be repositioned and the purge damper isolation plate removed prior to purging the control room.

and have sufficient separation and redundancy to satisfy the single failure criteria.

3. Provision is made for monitoring and actuating alarms in the control room upon detection of: high temperature in ducts, HEPA/charcoal plenums, or pump cubicles; high smoke concentration in ducts; high vibration at fan motors; and motor trip. Provisions are also made for monitoring the following in the control room: damper positions, main plant vent flow rate, and radiation levels in the main plant vent (RM-A3), waste gas decay tank vent (RM-A10); and HEPA/charcoal plenum (RM-A5a, RM-A5b).

4. Manual control of these systems AS INDICATED is provided in the control room. Pump room units operate automatically when the respective pump operates. | 31

5. Continuous, controlled air flow is maintained from areas of low to progressively higher radiation levels. Maintenance of a negative auxiliary building pressure ensures that exfiltration from the auxiliary building does not occur.

6. Exhaust air flows through roughing and HEPA filters or through roughing, HEPA, charcoal and HEPA filters, depending upon the potential radioactivity of the areas exhausted.

7. System functions, ambient conditions, safety class and seismic category are listed in Table 9.4-2.

9.4.2.2 System Description

The system diagrams for the various auxiliary building and radwaste area systems are as follows:

1. Figure 9.4-6, Auxiliary Building Main Supply System.
2. Figure 9.4-7, Auxiliary Building HEPA Exhaust System.
3. Figure 9.4-8, Auxiliary Building Charcoal Exhaust System.
4. Figure 9.4-9, Auxiliary Building Main Exhaust System.
5. Figure 9.4-10, Auxiliary Building Pump Room and Motor Control Center Cooling Systems. | 2
6. Figure 9.4-10a, Hot Machine Shop Ventilation System.
7. Figure 9.4-10b, Miscellaneous Auxiliary Building HVAC Systems. | 31

9.4.2.2.1 Auxiliary Building Main Supply System

The main components of this system include:

1. A 100 percent capacity supply fan directing ventilation air to various areas of the auxiliary building, ~~and the~~ radwaste areas, AND TO THE FUEL HANDLING BUILDING. | 31
2. Two 50 percent capacity supply air filter plenums, each consisting of roughing filters (80 percent efficiency on NBS dust) and electric preheat coils. | 2
3. Electric reheat coils in the zone supply ducts.
4. Air operated, spring opposed dampers to isolate the supply fan when not in use and to close or control the outside air supply.
5. Ductwork from the outside air connection to the filtering and preheating plenums, to the supply fan and to the various auxiliary building areas. ^and radwaste | 31
6. Instrumentation and control devices to perform the following functions:
   a. Measure the pressure drop across the roughing filter banks (local indication only).
   b. Cause an alarm in the control room upon detection of high concentration of smoke in the supply main to the various auxiliary building areas.

c. Cause an alarm in the control room upon detection of high temperature in the supply main to the various auxiliary building areas.

d. Indicate, in the control room, supply fan isolation damper and outside air damper position.

e. Cause an alarm in the control room upon detection of excessive vibration of the supply fan.

f. Cause an alarm in the control room upon detection of high or low auxiliary building ambient air pressure.

g. Provide means for manual operation, from the control room, of the supply fan interlocked with its isolation dampers and with the main exhaust fans.

h. Automatically maintain minimum supply air temperature by controlling the supply system preheat coils and provide interlocks to prevent preheat coil operation unless supply fans are operating.

i. Maintain negative ambient static pressure within the auxiliary building by the setting of manual balancing dampers. 31

~~j. Automatically maintain ambient negative static pressure within the auxiliary building by modulating the supply air damper.~~

k. Indicate, in the control room, supply air fan operation.

l. Cause an alarm in the control room upon detection of supply air fan motor trip.

AUTOMATICALLY MAINTAIN FIXED ZONE SUPPLY AIR TEMPERATURE BY CONTROLLING THE ZONE REHEAT COILS.

h. Indicate, in the control room, exhaust fan operation.

i. Cause an alarm in the control room upon detection of exhaust fan motor trip.

j. Cause an alarm in the control room upon detection of a high radiation level in the main plant vent (RM-A3).

The auxiliary building main exhaust system operates continuously to direct all air from the fuel handling building exhaust system, the auxiliary building HEPA exhaust system and the auxiliary building charcoal exhaust system to the main plant vent. Interlocking of the various systems prevents operation of the auxiliary or fuel building supply fans unless the exhaust system is operating. Similar interlocking prevents operation of the auxiliary building HEPA exhaust fans unless the auxiliary building charcoal exhaust fans are operating. Thus, the auxiliary building and fuel handling building ambient pressure does not become positive and the exhaust flow paths toward increasing potential radioactivity are not violated. The main exhaust fans are manually controlled from the control room and use non-Class 1E power. | 31 | 31

9.4.2.2.5 Auxiliary Building Pump Room Cooling Systems

The main components of these systems include:

1. For each charging pump room and each residual heat removal/reactor building spray pump room, a 100 percent capacity air handling unit consisting of fan section, chilled water coil and roughing filter.

2. Ductwork supply and return from each air handling unit to its respective room.

3. Instrumentation and control devices for each system to perform the following functions:

9.4.2.7 Hot Machine Shop Decontamination Area Ventilation System (See insert)

31

9.4.2.2.8 Auxiliary Building Motor Control Center and Switchgear Areas Cooling Systems

The main components of these systems include:

1. Three 100 percent capacity air handling units. Each of these air handling units serves one of the three motor control center and switchgear areas. The air handling units serving motor control center and switchgear areas at elevations 412' and 463' each include a fan section, chilled water coil and roughing filter. The air handling unit serving the motor control center and switchgear area at elevation 436' includes a fan section, direct expansion type cooling coil and roughing filter. Also a part of the system for elevation 436' is a remotely mounted condensing unit, including refrigerant compressor, condensing section, piping and controls.

2

2. Ductwork from the various air handling units to the areas requiring cooling.

3. Instrumentation and control devices for each system to perform the following functions:

   a. Measure the pressure drop across the roughing filter (local indication only), EXCEPT THE 436'-0" UNIT.

31

   b. Cause an alarm in the control room upon detection of high concentration of smoke in the electrical equipment room.

   c. Cause an alarm in the control room upon detection of high temperature in the discharge of the air handling unit or in the electrical equipment room.

31
AMENDMENT ~~F~~
~~JUNE, 1977~~
April, 1982

INSERT - SEE Pg. 9.4-30b

9.4.2.2.7 Hot Machine Shop Decontamination Area Ventilation System

The main components of this system include:

1. An air handling unit comprised of a roughing filter section, an electric heating coil section and a fan section. The unit is rated at 100% of the required supply air flow.

2. An exhaust fan rated at 100% of the required exhaust air flow.

3. A filter plenum containing a roughing and a HEPA filter bank. The filter is rated at 100% of the exhaust air flow.

4. Ductwork between the air handling unit and the points of distribution, between the wall hoods and the filter, between the filter and the exhaust fan, and between the exhaust fan and the plant vent. The ductwork contains an automatic isolation damper for each fan which closes when the respective fan is off and vice versa.

5. Instrumentation and control devices to perform the following functions:

   a. To sense and correct the air handling unit supply air temperature by energizing the electric heating coil.

   b. To sense and alarm locally in the event of high temperature air in both the supply and exhaust ducts.

   c. To indicate locally the pressure differential air on each EXHAUST filter bank.

All components of this system are non-nuclear safety. Both fans operate

INSERT - SEE Pg. 9.4-30b

continuously, when normal power is available, to supply air to and exhaust air from the wall hoods. The fans are controlled from local stations and are supplied from non-class 1E power sources.

d. Indicate, in the control room, fan operation (safety related fans only).

e. Cause an alarm in the control room upon detection of fan motor trip.

f. Automatically cycle the selected air handling unit in response to a room thermostat (safety related fans only).

The air handling units in each of the two safety related areas recirculate and cool while cycling on/off in response to a room thermostat. Under emergency conditions, the thermostat control of air handling units at elevations 412' and 463' is bypassed and the units start and operate continuously following receipt of a safety injection or loss of offsite power signal. Power is supplied to the units at elevations 412' and 463' from separated, independent Class 1E power sources. Power is supplied to the system at elevation 436' from a non-Class 1E source. The air handling unit at elevation 436' operates continuously when started at the local control station. A room thermostat controls the refrigerant solenoid valves. The air handling units can be manually started or stopped from the control room. 2

9.4.2.2.9 Hot Instrument Repair Shop Ventilation System.
9.4.2.2.10 Auxiliary Building Elevator Machine Room Exhaust System
9.4.2.2.11 Calibration Lab and Repair Shop air Conditioning System } See inserts 3 1

9.4.2.3 Safety Evaluation

HP

The auxiliary and radwaste area systems, excluding the pump room units, and motor control center and switchgear cooling units at elevations 412' and 463', are not safety class systems. However, redundant fans are provided for the main exhaust, the charcoal exhaust and the HEPA exhaust systems. Charcoal exhaust fans and plenums are physically separated, housed in shielded concrete enclosures and the fans receive power from the Class 1E electric system. All charcoal and HEPA filter plenums are constructed in accordance with Seismic Category I requirements. Additionally, provision is made for suitable maintenance and change-out space and adequate instrumentation and lighting, all of which reduce personnel exposure. 1

INSERT - SEE Pg. 9.4-30c

9.4.2.2.9 Hot Instrument Repair Shop ~~Air Conditioning~~ VENTILATION System

The main components of this system are contained in a single, factory-assembled, through the wall, air conditioner with built-in electric heating coil. All controls are self-contained. No ductwork is employed with this system which is classed as non-nuclear safety.

This system operates continuously. The unit compressor and electric heating coil cycle as required to maintain the room temperature controlled by the self-contained thermostat.

9.4.2.2.10 Auxiliary Building Elevator Machine Room Exhaust System

The main components of this system are an exhaust fan with back-draft damper, a gravity-operated air louver and an electric unit heater. A room thermostat cycles the fan. A self-contained thermostat cycles the unit heater. No ductwork is employed. The system is non-nuclear safety class.

9.4.2.2.11 HP Calibration Lab and Repair Shop ~~Air Conditioning~~ HVAC System

The main components of this system include:

1. A self-contained, air-cooled heat pump containing a compressor motor, an indoor fan motor, an outdoor fan motor and an electric heating coil.

2. Ductwork to and from the lab and shop including manual balancing dampers in the return and outside air ducts, a splitter damper in the supply duct, supply air diffusers, return registers and a roughing filter.

3. Controls include a compressor crankcase heater, automatic defrost package, room thermostat and switchbase, emergency heat relay and outdoor

INSERT - SEE Pg. 9.4-30c

thermostat package. All motors have thermal-and-current-sensitive overload devices.

This system is classed as non-nuclear safety.

The heat pump is started by a remote manual switch which causes its indoor fan to operate continuously to provide air circulation and ventilation. The compressor and electric heating coil cycle automatically under thermostatic control to maintain the space temperature.

The pump room systems and the motor control center and switchgear cooling units are not redundant but are arranged as single units for each pump room. Loss of a pump room, motor control center or switchgear cooling unit requires use of redundant equipment and its cooling unit. The cooling units are separated, located in an accessible, shielded location and are not subject to floods, weather, external missiles, jet impingement or pipe whip. The pump room units are powered from separated Class 1E power supplies. 2

where indicated
~~All~~ units are administratively controlled from the control room during normal operating or refueling periods. This control is subject to protective electric interlocking so that negative auxiliary building pressure and design air flow paths are maintained. Operation of the pump room units is automatic. These units operate when the associated pump operates. 31

where indicated
~~All~~ units are monitored from and alarms are provided in the control room. The charcoal plenums have manually actuated water deluge systems for fire protection. 31

Radiation levels in the charcoal filters, the exhaust from the gas decay vent and the main plant vent exhaust are monitored from, and alarms are provided in, the control room. Exhaust filter plenums provide a minimum of 95 percent removal efficiency for both organic and elemental forms of iodine.

9.4.2.4. Inspection and Testing Requirements

The auxiliary and radwaste area ventilation systems are subjected to preoperational test procedures to verify proper wiring and control

4. Auxiliary Building Main Exhaust System

Auxiliary building main exhaust system inspection, maintenance and testing requirements are the same as auxiliary building charcoal exhaust system requirements b through d.

4. Auxiliary Building Main Supply System

Auxiliary building main supply system inspection, maintenance and testing requirements are the same as auxiliary building charcoal exhaust system requirements a, c and d.

5. Auxiliary Building Pump Room Cooling System

Auxiliary building pump room cooling system inspection, maintenance and testing requirements are the same as auxiliary building charcoal exhaust system requirements a through d. 31

9.4.3 FUEL HANDLING BUILDING VENTILATION

Continuous ventilation and exhaust of the spent fuel pool area and the fuel handling building results in an environment suitable for personnel and equipment. Additionally condensation from the fuel pool area and the release of airborne radioactivity to the atmosphere is minimized.

9.4.3.1 Design Bases

The systems for the spent fuel pool area are designed in accordance with the following:

1. Equipment motors and controls in the safety class portions of the systems are supplied from Class 1E electric power sources and have sufficient redundancy to satisfy the single failure criteria.

2. Provision is made for monitoring and manual control of the safety class portions of the systems from the control room. Operation of exhaust system fans and dampers is initiated automatically by a loss of offsite power signal.

3. The supply and exhaust systems provide continuous flow across the spent fuel pool water surface and provide controlled ventilation air flow in other fuel handling building spaces. Ventilation air flow is from areas of low to progressively higher radiation levels.

4. Ventilation air is supplied to the fuel handling building from the auxiliary building by two non-safety related fans. These fans are not automatically tripped during accident or high radiation situatons and will usually operate during normal and emergency conditions. One of two safety related exhaust fans is operated during normal and emergency conditions. Supply and exhaust air flows are balanced so that a negative pressure with respect to the outside of at least 1/8 inch water gage is maintained in the fuel handling building with both supply fans and one exhaust fan operating. Postulated failures of the non-safety related supply fans would result in a negative pressure of more than 1/8 inch which would provide additional assurance in preventing the outflow of unfiltered air. 19

5. Ventilation air flow is directed through a roughing, HEPA and charcoal filter assembly to minimize the radioactivity being released to the plant vent. 13

6. Provision is made to maintain a minimum VENTILATING SUPPLY AIR TEMPERATURE TO THE fuel handling building ~~temperature~~ of 65°F. 13 31

7. Provision is made to monitor normal and abnormal radiation levels in the area. 13

8. The safety class and seismic category of the system components are as listed in Table 9.4-3. 13

9.4.3.2 System Description

The system diagrams for the various spent fuel pool area systems are as follows:

INSERT - SEE Pg. 9.4-33

9.4.2.4 Inspection and Testing Requirements

1. OK as it
2. OK as it
3. OK as it
4. OK as it
5. OK as it

6. Hot Machine Shop Ventilation System

Hot machine shop ventilation system inspection, maintenance and testing requirements are the same as the auxiliary building charcoal exhaust system requirements a through d.

7. Hot Machine Shop Decontamination Ventilation System

Hot machine shop decontamination ventilation system inspection, maintenance and testing requirements are the same as the auxiliary building charcoal exhaust requirements a through d, plus inplace leak test of HEPA filters.

8. Auxiliary Building Motor Control Center and Switchgear Areas Cooling System

Auxiliary building motor control center and switchgear areas cooling system inspection, maintenance and testing requirements are the same as the auxiliary building charcoal exhaust system requirements a through d.

INSERT - SEE Pg. 9.4-33

9. Hot Instrument Repair Shop ~~Package HVAC~~ VENTILATION System

Hot instrument repair shop package HVAC system inspection, maintenance and testing requirements are the same as the auxiliary building charcoal exhaust system requirement d.

10. Auxiliary Building Elevator Machine Room Exhaust System

Auxiliary building elevator machine room exhaust system inspection, maintenance and testing requirements are the same as the auxiliary building charcoal exhaust system requirement d.

11. HP Calibration Lab and Repair Shop ~~Air Conditioning~~ HVAC System

Calibration lab and repair shop air conditioning system inspection, maintenance and testing requirements are the same as the auxiliary building charcoal exhaust system requirements b and d.

1. Figure 9.4-11, Fuel Handling Building Charcoal Exhaust System and Air Supply Distribution.

2. Figure 9.4-6, Auxiliary Building Main Supply System.

Design and performance data are indicated on these figures.

9.4.3.2.1 Fuel Handling Building Supply and Charcoal Exhaust System

The main components of this system include:

1. Two 100 percent capacity fuel handling building exhaust fans which draw air through the HEPA/charcoal filter plenums.

2. Three 50 percent capacity filter plenums, each consisting of roughing filters (80 percent efficiency on NBS dust), HEPA filters (99.97 percent efficiency on 0.3 micron particles), charcoal filters (95 percent efficiency on methyl iodide at 85 percent relative humidity and 70°F), and final HEPA filters (same efficiency as previous HEPA filter). The filter plenum also includes a water deluge system. | 2

3. A 100 percent capacity supply fan which directs outside air across the spent fuel pool surface.

4. Air operated, spring opposed dampers to isolate the supply and exhaust fans when not in use.

5. One electric reheat coil in ~~the~~ EACH supply duct. | 31

6. Ductwork which directs the supply air to the spent fuel pool surface, exhausts this air from the spent fuel pool surface VARIOUS AREAS OF THE BUILDING, | 31

g. Provide means for automatic operation of the exhaust fans upon receipt of a loss of offsite power signal.

h. Automatically maintain minimum supply air temperature by controlling the supply system reheat coil.

i. Indicate, in the control room, supply or exhaust fan operation.

j. Cause an alarm in the control room upon detection of exhaust fan motor trip.

k. Provide for radiation monitoring (RM-A6) and cause an alarm in the control room upon detection of radioactivity levels exceeding the setpoint in the fuel handling building exhaust (see Section 12.2.4).

The system continuously supplies outside air that has been drawn through the auxiliary building supply air plenums where it is filtered and heated as required. The supply air is directed across the width of the spent fuel pool water surface so that gases or particles are entrained in the "push-pull" air flow above the water surface. The exhaust air is collected along the opposite side of the spent fuel pool. Exhaust air is also drawn from various decontamination, holdup, filter and general areas of the fuel handling building with air flow rates varying from six to ten changes per hour. Ventilation air flow is directed from areas of low to progressively higher activity. Higher ventilation air flow rates occur in potentially high radioactive areas.

SUPPLY AIR IS ALSO DIRECTED TO VARIOUS OTHER AREAS OF THE BUILDING.

The total exhaust from the fuel handling building is drawn through the HEPA/charcoal filters and ducted to the AUXILIARY BUILDING main exhaust fans and the main plant vent. Both fuel handling building exhaust fans operate following a loss of offsite power. Continuing exhaust flow maintains fuel handling building negative pressure under loss of offsite power conditions. The

Amendment 31
April 1982

9.4.4.2 System Description

The system diagrams for the turbine building area ventilation system are as follows:

1. Figure 9.4-12, Turbine Building Ventilation System.

2. Figure 9.4-13, Turbine Building Switchgear Room Cooling System.

9.4.4.2.1 Turbine Building Ventilation System and Switchgear Room Cooling System

The main components of this system include:

1. Seven 120 inch diameter roof exhaust fans with powered isolation dampers over the general turbine building roof.

2. Three 48 inch diameter roof exhaust fans with powered isolation dampers over the heater bay roof.

3. Inlet wall louvers along the north and east walls of the heater bay and along the south wall of the general turbine building.

4. Two "draw-through" type air handling units for the switchgear rooms, each with roughing filters, chilled water cooling coil, fan and motor section.

31

5. Supply and return ductwork from the switchgear units to the turbine room switchgear areas at elevations 412', 436' and 463'.

6. Eight thermostatically controlled electric unit heaters for the switchgear rooms.

* Chilled water is provided by the Turbine Building Switchgear Rooms Chilled Water System. See 9.4.7.2.11.

7. Instrumentation and control devices to perform the following functions:

a. Measure the pressure drop across the switchgear room air handling unit roughing filter bank (local indication only).

b. Cause an alarm in the control room upon detection of high temperature in the switchgear cooling system air handling unit supply duct or in the switchgear rooms.

c. Cause an alarm in the control room upon detection of high concentration of smoke in the switchgear room cooling system air handling unit supply duct or at the turbine building exhaust fans.

d. Provide interlocks so that the turbine building exhaust fans do not operate unless the exhaust dampers at the roof exhaust fans are open.

e. Provide means for manual operation and control of the roof exhaust fans from a local control station.

f. Provide for operation of switchgear room cooling system air handling units from a local station ~~with subsequent~~ and automatic control by means of room thermostats. of chilled water pumps 31

g. Provide interlocks so that switchgear room cooling system air handling units do not operate unless isolation dampers are fully open.

h. Cause an alarm in the control room upon trip of the switchgear room cooling system air handling unit.

Amendment 31
April, 1982

2. Furnish continuous outside air ventilation for the battery room system.

3. Safety Class 2b systems are designed for adequate physical separation and are so located as not to be affected by floods, weather, external missiles, jet impingement or pipe whip.

4. Equipment, motors and controls in Safety Class 2b systems are supplied from Class 1E power sources and have sufficient redundancy to satisfy the single failure criterion.

5. Provide, in the control room, for monitoring of process conditions and equipment status necessary for operation of the systems.

6. Provide for operation and manual control of the intermediate building ventilation systems as described in Sections 9.4.6.2.1, 9.4.6.2.2, 9.4.6.2.3, 9.4.6.2.4, ~~and~~ 9.4.6.2.5~~,~~ AND 9.4.6.2.6.

9.4.6.2 System Description

The system diagrams for the various intermediate building systems are as follows:

1. Figure 9.4-14, CRDM Switchgear Room Cooling System and Chiller Area Ventilation System.

2. Figure 9.4-15, ESF Switchgear Rooms and Speed Switch Rooms Cooling Systems.

3. Figure 9.4-16, Battery Room System and BOP Charger Area System. |3| | 16

4. Figure 9.4-17, Intermediate Building and Intermediate Building Pump Room Cooling Systems.

g. Cause an alarm in the control room upon detection of air handling unit motor trip.

The pump room air handling units start automatically with their respective pump. The air handling units remove heat generated in the pump rooms. Air handling units are supplied by separated Class 1E power sources and are located in separate equipment rooms in the intermediate building.

9.4.6.2.6 Water Chiller Area Ventilating System

The main components of this system include:

1. One ventilating fan arranged to supply, relieve and return outside ventilating air.

2. One duct mounted heating coil.

3. Ductwork with control dampers and fire dampers arranged to supply, relieve and return air as required. 2

4. Instrumentation and control devices to perform the following functions:

   a. Cause an alarm in the control room upon detection of high smoke concentration in the return air duct.

   b. Cause an alarm in the control room upon detection of high temperature in the fan discharge.

   c. Automatically control the outside AND return ~~and exhaust~~ dampers and the heating coil using a temperature controller which senses return air temperature. 31

1. Figure 9.4-18, Diesel Generator Building Ventilation System.
2. Figure 9.4-19, Service Water Pumphouse Ventilation System.
3. Figures 9.4-20 and 9.4-21, Service Building Ventilation System.
4. Figures 9.4-22 through 9.4-24, Chilled Water System.
5. Figure 9.4-25, Industrial Cooling Water System.
6. Figure 9.4-26, Substation Relay House System.
7. Figure 9.4-26a, Penetration Room Ventilation System.
8. Figure 9.4-26b, Miscellaneous Pump Room Systems and Lube Oil Room System.
9. Figure 9.4-26c, Water Treating Area Laboratory Heating and Cooling System.
10. Figure 9.4-32 , CRDM Cooling Water System. 26
11. Figure 9.4-33, chilled water -Turbine Building Switchgear Rooms 31

Design and performance data are provided on these figures.

9.4.7.2.1 Diesel Generator Building Ventilation System

The main components of this system for each diesel room include:

1. Two 50 percent capacity ventilation fans to supply outside air to the diesel generator room, the diesel generator electric equipment room, and the diesel generator cable-pipe-basement area. 16

2. Air operated, spring opposed dampers with damper position limit switches to isolate the ventilation supply fans when not in use.

3. Ductwork to connect the two supply fans and distribute supply air to the various diesel room areas.

4. Instrumentation and control devices to perform the following functions:

   a. Cause an alarm in the control room upon detection of high smoke concentration in the discharge of each fan.

a. Cause an alarm in the control room upon detection of high smoke concentration in the ~~system main return duct~~ RETURN DUCT TO EACH FAN.

b. Cause an alarm in the control room upon detection of high temperature in the discharge duct of each ventilation supply fan.

c. Indicate, in the control room, open and closed positions of ventilation supply fan isolation, outside, return and relief air dampers.

d. Cause an alarm in the control room upon detection of excess vibration of the ventilation supply fans.

e. Indicate, in the control room, the air flow rate in the outside air supply ducts to the ventilation supply fans.

f. Automatically control outside, return and relief air damper position by means of a ~~discharge~~ RETURN AIR temperature controller.

g. Provide means for manually operating the ventilation system fans from the control room. These fans are interlocked with the associated inlet isolation dampers.

h. Provide an outside/return air manual control station in the control room.

i. Provide means for automatically starting the ventilation air supply fans upon receipt of a safety injection or loss of offsite power signal and bypassing the discharge temperature controller upon receipt of a safety injection signal.

j. Indicate, in the control room, high and low ambient temperatures in the ~~pump room, switchgear room and motor control center room~~ PUMP/SCREEN ROOM AND IN SWITCHGEAR ROOMS.

k. Indicate, in the control room, ventilation supply fan operation.

l. Cause an alarm in the control room upon detection of ventilation supply fan motor trip.

Either of the two supply fans operates continuously during normal operating periods. Both fans start automatically following receipt of a safety injection or loss of offsite power signal. Outside, ~~and~~ return AND RELIEF RETURN AIR air damper positions are automatically controlled by a ~~discharge~~ temperature controller. Alternatively, position of these dampers can be manually controlled by a hand control station in the control room. The fans are powered from separate Class 1E power sources. The fans are manually started from the control room or are automatically started as previously noted. The air handling equipment is located in a shielded ~~equipment~~ FAN room above the equipment areas. Ductwork in the equipment areas is fireproofed. Fireproofing is accomplished by "boxing-in" the duct, ~~or by covering the duct where the location makes "boxing-in" impractical. The fireproofing material is metal lathe with magnesium oxichloride applied for a three hour fire rating~~. System operation is monitored from the control room. 31 1

9.4.7.2.3 Service Building Ventilation System

The main components for this system include:

1. Two zoning type air handling units, one to service the office areas of each floor of the service building. Each unit consists of a zoning damper section, an electric heating coil, a direct expansion cooling coil, a fan section and a roughing filter section.

2. Two roof mounted, air conditioning units to service the meeting room and kitchen. The units consist of a roughing filter, a direct expansion cooling coil, fan section and a refrigeration and condensing section. 2

e. Automatic control of the storage room and meeting room system reheat coils in response to space temperature and air handling unit operation.

The units are manually started and stopped from local stations with automatic control of heating and cooling and outside, return and relief dampers. Equipment is supplied with normal power. The zoning type air handling units are located in an equipment room on the first floor of the service building. The storage room unit is located on the northeast portion of the first floor. The meeting room unit is located outside on the roof. Condensing units furnishing the chilled refrigerant for the zoning air handling units are also located on the roof.

31 9.4.7.2.4 Chilled Water System (Central System. See also Turbine Building Switchgear Rooms Chilled Water System 9.4.7.2.11.)

The main components of this system include:

1. Three 100 percent capacity centrifugal type, electric motor driven water chilling machines.

2. Three 100 percent capacity chilled water pumps.

3. Chilled water cooling coils for the following areas:

   a. Charging pump rooms ~~- 2 coils.~~
   b. Residual heat removal/reactor building spray pump rooms ~~- 2 coils~~.
   c. Emergency feedwater pump areas ~~- 2 coils~~.
   d. Service water booster pump rooms ~~- 2 coils~~.
   e. CRDM switchgear rooms - ~~2 coils~~.
31 ~~f. Turbine building switchgear rooms - 2 coils.~~ delete
   f ~~g.~~ ESF switchgear rooms - ~~2 coils~~.

Amendment 31
April 1982

g ~~k~~. Control room/~~2 units~~ Technical Support Center

h ~~k~~. Controlled access area - ~~3 units~~.

i ~~k~~. Relay room/~~4 X-units~~ Technical Support Equipment Room

j ~~k~~. Process computer room - ~~2 units~~.

K ~~k~~. ~~Instrument repair~~ Vax Computer room - ~~1 unit~~.

l ~~m~~. BOP charger area ~~1 unit~~.

2 m ~~n~~. Auxiliary building motor control center cooling units ~~2 units~~.

n. Battery Room Spare Switch Room

4. Pump motor cooling jackets for component cooling water pumps.

31 5. charging pump gear and oil cooler

6 ~~8~~. Piping supply and return mains with expansion tanks, chemical feed system and provisions for balancing, manual and automatic isolation of portions of the system.

7 ~~8~~. Instrumentation and control devices to perform the following functions:

a. Cause an alarm in the control room upon detection of low chilled water flow.

b. Indicate, in the control room, which chiller and chilled water pump are energized.

c. Cause an alarm in the control room upon detection of chilled water pump motor trip.

d. Cause an alarm in the control room upon detection of low chilled water pressure in pipe mains.

e. Indicate, in the control room, chilled water temperature in the supply pipe mains and cause an alarm in the control room upon detection of high or low chilled water temperature.

9.4.7.2.6 Substation Relay House Cooling System

The main components of this system include:

1. One 100 percent capacity self-contained cooling unit consisting of casing, roughing filters, direct expansion cooling coils, fan and motor section and controls.

2. One 100 percent capacity air cooled condensing unit consisting of refrigerant compressor, condensing coil, condenser fan and motor section and controls.

3. Ductwork system with outlets, balancing devices and electrically operated outside air dampers.

4. Refrigerant piping system between condensing unit and cooling unit.

5. One 100 percent capacity, wall mounted, battery room exhaust fan.

6. Five electric unit heaters for the relay room and storage areas.

The substation relay house cooling unit operates continuously after local manual start and is subsequently controlled automatically by self-contained equipment controls. Equipment is supplied from normal power supplies. No provisions are made for power supplied from an emergency source. The air handling unit is located along the east end of the substation relay house. The condensing unit is pad mounted directly outside.

9.4.7.2.7 Penetration Access Areas Ventilation System

The main components of this system include:

1. Two 100 percent capacity exhaust fans.

~~2.~~ Two 50 percent capacity ventilation supply air fans for each of the following locations:

2

31

AMENDMENT ~~F~~ 31
~~JUNE, 1977~~
April, 1982

a. Elevation 412', east penetration area.

b. Elevation 412', west penetration area.

c. Elevation 436', east penetration area.

d. Elevation 436', west penetration area.

3~~2~~. Supply d ~~Ductwork~~ with outlets, control dampers and intake outside air ~~and relief~~ provisions. Exhaust ductwork with control dampers and make-up air intake provisions. 31

4~~3~~. Instrumentation and control devices to perform the following functions:

a. ~~Cause an~~ A alarm in the control room upon detection of high concentrations of smoke in each penetration area, upon a fan motor trip, upon excessive exhaust fan vibration, and upon low exhaust air flow.

2 b. ~~Provide means for manually operating supply air~~ Manual operation of supply and exhaust fans from ~~local~~ remote control stations. The fans are also interlocked with their respective ~~discharge~~ isolation dampers which open when their respective fan runs and vice versa.

c. Automatically control outside and return air dampers in response to a room thermostat.

d. Indicate, ~~locally, ventilation~~ at each switch fan operation.

e. Automatically control the exhaust fan make-up damper in response to a flow monitor covered in (a) above.

~~e. Cause an alarm in the control room upon detection of fan motor trip.~~

The fans operate continuously after manual start from the local control stations. The amount of outside air introduced is controlled automatically by a room thermostat. The fans are powered from a non-Class 1E power source.

EXHAUST AIR IS DISCHARGED TO OUTDOORS THRU THE PLANT VENT.

d. Provide local indication of fan operation.

e. Provide control room indication of fan motor trip in the turbine lube oil treatment room.

f. Provide thermostat control of electric unit heaters.

Roof ventilators and dampers operate automatically in response to thermostats after manual start. Unit heaters operate in response to integral thermostats. Equipment is powered from non-Class 1E power sources.

9.4.7.2.9 Water Treating Area Laboratory Heating and Cooling System

2 The main components of this system include:

1. One package type heating and cooling unit, including direct expansion type air handling unit with electric heating coil and roughing filter and refrigerant condensing unit.

2. Two laboratory hood exhaust fans and a chemical storage area exhaust fan.

3. Thirteen electric unit heaters in the chemical storage and general floor areas.

4. Ductwork connecting the air handling unit with the sample room and the water treating laboratory and for supply and exhaust of the laboratory hoods.

5. Instrumentation and control devices to perform the following functions:

9.4.7.2.10 CRDM Cooling Water System

The main components of this system include:

1. One CRDM Cooler Rack Assembly which is an air to water heat exchanger.

27 | 2. One CRDM Cooling Water Industrial Cooler, including two electric heaters, eight forced convection fans, and four circulation pumps.

3. One Expansion Tank to control thermally induced water volume changes.

4. Two 100% Circulating Water Pumps, including a bypass line with a chemical feed tank.

5. Four motor operated containment isolation valves, including two check valves on bypass lines on the Reactor Building Side.

The system is designed to remove heat from the containment air used to cool the Control Rod Drive Mechanism (CRDM) and dissipate this heat to the atmosphere via the Industrial Cooler.

The system can operate continuously while the plant is in operation. System components are powered from non-Class 1E power sources, except for the motor operators on the containment isolation valves, which are supplied from Class 1E power sources.

31 | 9.4.7.2.11 (See insert)

9.4.7.3 Safety Evaluation

The service building ventilation system, industrial cooling water system, 31 | ~~and~~ substation relay house cooling system perform no safety function. The CRDM Cooling Water System performs no safety function except for the 26 containment isolation valves where motor operators are supplied by Class 1E power suppliers. They do provide acceptable temperature levels in the various buildings.

Insert
penetration access area ventilation system, miscellaneous pump room systems and lube oil room systems, water treating area laboratory heating and cooling system and turbine building switchgear rooms chilled water system.

INSERT - SEE Pg. 9.4-69e

9.4.7.2.11 Turbine Building Switchgear Rooms Chilled Water System

The main components of this system include:

1. One air-cooled, electric motor drive, reciprocating water chiller.

2. One primary water pump.

3. Two 100% capacity secondary water pumps.

4. Chilled water piping system including a compression tank, an air separator, a chemical feed tank, and valves.

5. Chilled Water Coils - one coil in each of two redundant turbine building switchgear rooms air handling units. Each coil has two connections.

6. Instrumentation and control devices to perform the following functions:

   a. Control the chiller. Included in a factory-furnished, factory-wired controls are a positive-acting timer to prevent short cycling of the compressors and to delay restart after shutdown, high and low pressure refrigerant safety pressurestats to stop the compressors, a multiple-step water temperature controller, a chilled water safety thermostat, circuit breakers, motor contactors, control relays, a control circuit ON-OFF switch, and a chilled water flow switch. The chiller energized automatically when primary flow is established.

INSERT - SEE Pg. 9.4-69e

b. Control the primary pump. The pump is started by a remote manual switch. The pump will shutdown on a chiller malfunction.

c. Control the secondary pumps. These pumps are redundant and each is wired to run only with its respective air handling unit. The active pump is controlled by one of three parallel - wired room thermostats.

d. Indicate locally the level of water in the compressor tank and alarm of low level in the control.

e. Alarm in the control room of low water flow.

f. Indicate locally the temperature of water entering and leaving the chiller and provide a computer high temperature alarm and CRT display in the control room of water leaving the chiller.

g. Indicate locally the pressure of water entering and leaving each pump.

Under normal conditions, the primary pump continuously circulates water in the primary pipe loop. This water is maintained at 45 F by the chiller which loads/unloads and cycles automatically under its self-contained controls. The secondary pump circulates water between the primary loop and the chilled water coils identified in Section 9.4.4.2.1, subitem 4. It cycles upon demand of room thermostats. The system is non-nuclear safety class.

[redacted] Additionally, the substation battery room exhaust fan in the substation relay house cooling system prevents the occurrence of any appreciable hydrogen concentration in the battery room.

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The diesel generator building ventilation system, service water pumphouse ventilation system and chilled water system do perform safety functions since total loss of the heat removal capability of any one of these systems could produce conditions affecting the safety of the plant. These systems are designed with redundant equipment and piping systems and are so arranged, serviced and maintained that complete loss of system function or system cooling is highly unlikely. Each of the safety class systems is located in equipment rooms accessible for maintenance but not subject to floods, weather, external missiles, main steam line break effects, jet impingement or pipe whip. Each is supplied by separated Class 1E power supplies. The safety class systems are administratively controlled from the control room. Operation of the diesel generator building ventilation system is automatically initiated by diesel operation. Operation of the service water pumphouse ventilation system and the chilled water system are automatically initiated by receipt of a safety injection or loss of offsite power signal. Safety class systems are monitored and alarms are annunciated in the control room.

9.4.7.4 Inspection and Testing Requirements

The miscellaneous building ventilation and cooling systems are subjected to preoperational testing to verify proper wiring and control hookup, system "in-place" integrity and leak tightness, proper function of system components and control devices and to establish system design air and water flow rates. To ensure a continued state of readiness of the miscellaneous building ventilation and cooling systems after completion of the preoperational tests, the following inspection, maintenance and test procedures are performed:

~~1. Diesel Generator Building Ventilation System~~ 31

a. Verify function of dampers or control devices necessary for monitoring or component isolation or changeover from normal to emergency mode.

b. Bearing lubrication.

c. Switch components from standby to operating mode.

~~2. Service Water Pumphouse Ventilation System~~

~~Inspection, maintenance and testing requirements are the same as diesel generator building ventilation system requirements.~~ 31

~~3. Chilled Water System~~

~~Inspection, maintenance and testing requirements are the same as diesel generator building ventilation system requirements.~~

9.4.8 REACTOR BUILDING COOLING AND FILTERING SYSTEMS

Under normal operating conditions, continuous circulation and cooling of the reactor building air is required to maintain the ambient air temperature at a suitable level for continuous operation of equipment within the building.

Under shutdown conditions, heating and cooling of the reactor building is provided by the ventilation system as required.

Cleanup of the reactor building atmosphere is required before purging to minimize the release of radioactivity to the environment. Purging

m. Measure, record, and provide high radiation alarms and interlocks to close purge supply and exhaust isolation valves on the occurrence of high radiation levels in the manipulator crane area of the reactor building (RM-G17A and RM-G17B) (see Section 12.1.4).

16 n. Close the purge supply and exhaust isolation valves upon receipt of a containment isolation signal.

The 36 inch reactor building supply and exhaust system may be operated during cold shutdown and refueling to maintain suitable radiation levels inside the reactor building. [~~The only other plant condition during which the 36 inch reactor building purge system is permitted to operate is an emergency situation during hot shutdown if expeditious access to the reactor building is required.~~] This system is operated prior to personnel entering the reactor building to reduce radiation levels inside.

31 DELETE

The 36 inch purge system supplies filtered and tempered outside air to
17 the reactor building and exhausts air from the reactor building through HEPA and charcoal filters to the purge exhaust vent. The 36 inch purge system is powered from normal power sources, except for the solenoid valves and limit switches associated with the system containment isolation valves. These components are powered from Class IE power sources. System equipment is operated and monitored from the control room. The 36 inch purge system supply and exhaust fans and plenums are located in the auxiliary building.

The 36 inch purge system and the 6 inch alternate purge system (see Section 9.4.8.2.3) use common outside air supply and exhaust vents, a common outside air intake damper and a common exhaust filter plenum. In other respects these two systems are separate.

9.4.8.2.3 Alternate Reactor Building Purge System

Major components of the alternate reactor building purge system include
16 the following:

1. One 100 percent capacity pressure blower to supply filtered outside air to the reactor building.

canal and refueling cavity. The exhaust from this system is directed to the reactor building purge exhaust system. Each unit is supplied from normal power supplies. The fans are operated from a local control station. The supply and exhaust fans are mounted on the secondary compartment shield walls above the operating floor.

The rod position indication cooling system operates continuously during normal operating periods to maintain the rod position indicator data cabinet at a suitable ambient temperature. The air handling unit is served by normal power supplies. The cooling coil is supplied from the service water system. The air handling unit is located adjacent to the rod position data cabinet. 2

9.4.8.2.8 Reactor Building CRDM Shroud Cooling System 16

The main components of this system include:

1. Four 50 percent capacity exhaust fans to draw general reactor building ambient air through the CRDM shroud for cooling.

2. Gravity dampers to isolate the inactive fans.

3. Ductwork connecting the exhaust ports of the CRDM shroud to the inlet connections of the exhaust fans.

ADD → 4. ONE COOLER RACK ASSEMBLY IN DISCHARGE DUCTWORK AS DESCRIBED IN SECTION 9.4.7.2.10. 31

~~4.~~ 5. Instrumentation and control devices to perform the following functions:

   a. Indicate, in the control room, the temperature of the air leaving the CRDM shroud and cause an alarm in the control room upon detection of high air temperature.

AMENDMENT ~~16~~ 31
~~NOVEMBER, 1979~~ April, 1982

e. Cause an alarm in the control room upon detection of excessive fan and motor vibration. | 3

f. Indicate, in the control room, fan motor status.

g. Cause an alarm in the control room upon fan motor trip.

Two of the four fans operate continuously during normal operation so that suitable operating temperature is maintained around the CRDM. Operation of the fans draws cooled reactor building air over the mechanisms where the heat is removed, through connecting shroud nozzles to the exhaust fans where it is discharged through THE CRDM COOLER RACK ASSEMBLY to the reactor building atmosphere. Each fan is supplied from a normal power source. However, provision is made to manually connect one unit to a Class 1E bus. The fans are operated and monitored from the control room. The fans are located below the operating floor. | 31 | 2

9.4.8.2.9 Reactor Building Elevator Machine Room System

Major components of the control building elevator machine room system include the following:

1. A 100 percent capacity exhaust fan.

2. Fixed, wall inlet louvers.

3. Instrumentation and control devices to automatically limit maximum elevator machine room temperature by cycling the exhaust fan. | 17

The system cylically exhausts air from the elevator machine room to the general open area of the reactor building in response to a room thermostat when normal power is available. Makeup air from the general open area of the reactor building enters the room through fixed, wall inlet louvers. Equipment is located in the reactor building elevator machine room wall.

TABLE 9.4-2 (Additional)

Amendment 31
April, 1982

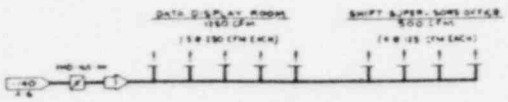
SYSTEM	NORMAL SYSTEM FUNCTION	NORMAL CONDITIONS MAINTAINED	SAFETY CLASS	SEISMIC CATEGORY
Hot Machine Shop Ventilation System	Supply filtered tempered air. Exhaust air to the Fuel Handling Building exhaust filter plenum. Maintain a negative pressure differential with respect to outside.	65 F min. 104 F max.	NNS	None
Hot Machine Shop Decontamination Area Ventilation System	Supply filtered tempered air. HEPA filter exhaust air and direct to plant vent.	65 F Supply Air	NNS	None
Auxiliary Building Motor Control Center and Switchgear Areas Cooling System	Provide cooling to three areas, each with its own air handling unit	75 F	2 units-2b 1 unit NNS	I None
Hot Instrument Repair Shop Ventilation System	Provide space heating and cooling	75F	NNS	None
Auxiliary Building Elevator Machine ~~Shop~~ Room Exhaust System	Provide space cooling	104 F MAX	NSS	None
HP Calibration Lab and Repair Shop Heat Pump	Provide space heating, cooling and ventilation	77F 65 F min	NSS	None

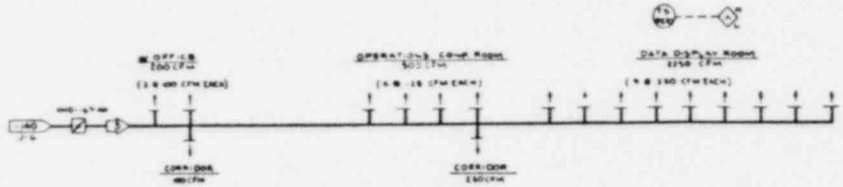
9.4-88a

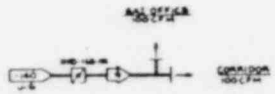
DRAWING NUMBER	FSAR FIGURE NUMBER
114E073	9.3-16
114E077	11.2-2 and 11.3-4
D-302-161	9.2-8
D-302-222	9.2-2
D-302-841	9.4-22
D-302-842	9.4-23
D-302-843	9.4-24
D-302-844	9.4-33
D-302-851	9.4-25
D-302-852	9.4-32
D-912-102	9.4-27
D-912-103	9.4-28
D-912-104	9.4-29
D-912-105	9.4-30
D-912-106	9.4-31
D-912-115	9.4-6
D-912-120	9.4-7
D-912-125	9.4-8
D-912-130	9.4-9
D-912-131	9.4-11
D-912-132	9.4-10
D-912-133	9.4-10b
D-912-134	9.4-18
D-912-136	9.4-2
D-912-138	9.4-16
D-912-139	9.4-14
D-912-140	9.4-1
D-912-144	9.4-3
D-912-147	9.4-4
D-912-150	9.4-10a
D-912-151	9.4-20

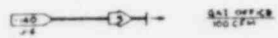
SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION

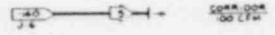
Section 9.4
Drawing/Figure
Cross-Reference Sheet
(Sheet 1)



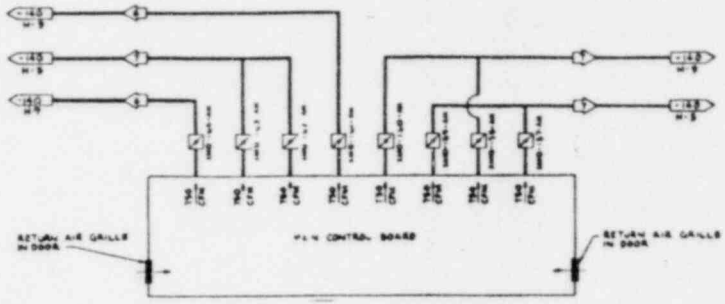








TECHNICAL SUPPORT CENTER VENTILATION SYSTEM



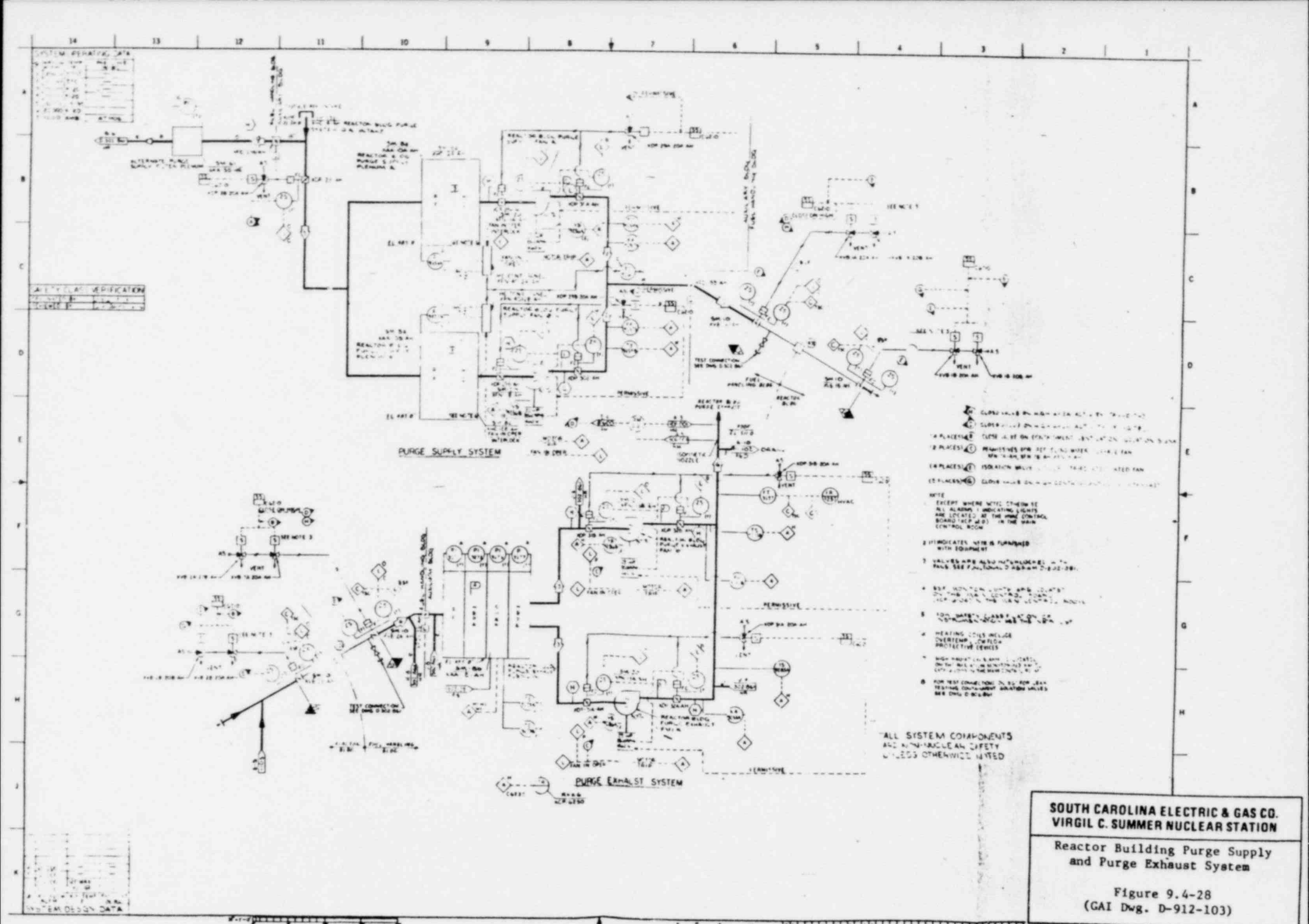
CONTROL ROOM MAIN CONTROL BOARD VENTILATION SYSTEM

ALL SYSTEM COMPONENTS ARE SAFETY CLASS 2B

SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION

Technical Support Center
and Main Control Board
Ventilation System

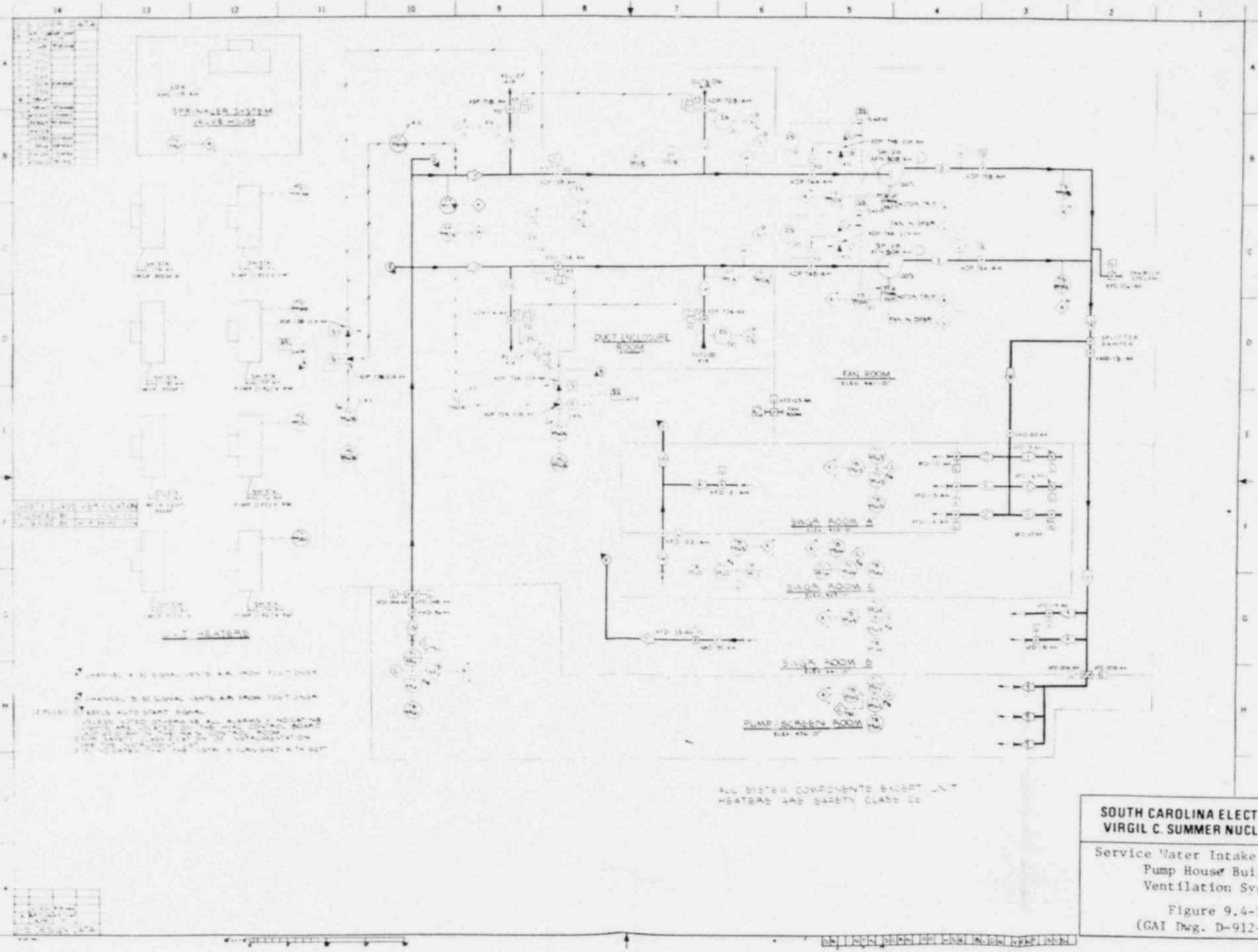
Figure 9.4-33
(GAI Dwg. D-912-141)



SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION

Reactor Building Purge Supply and Purge Exhaust System

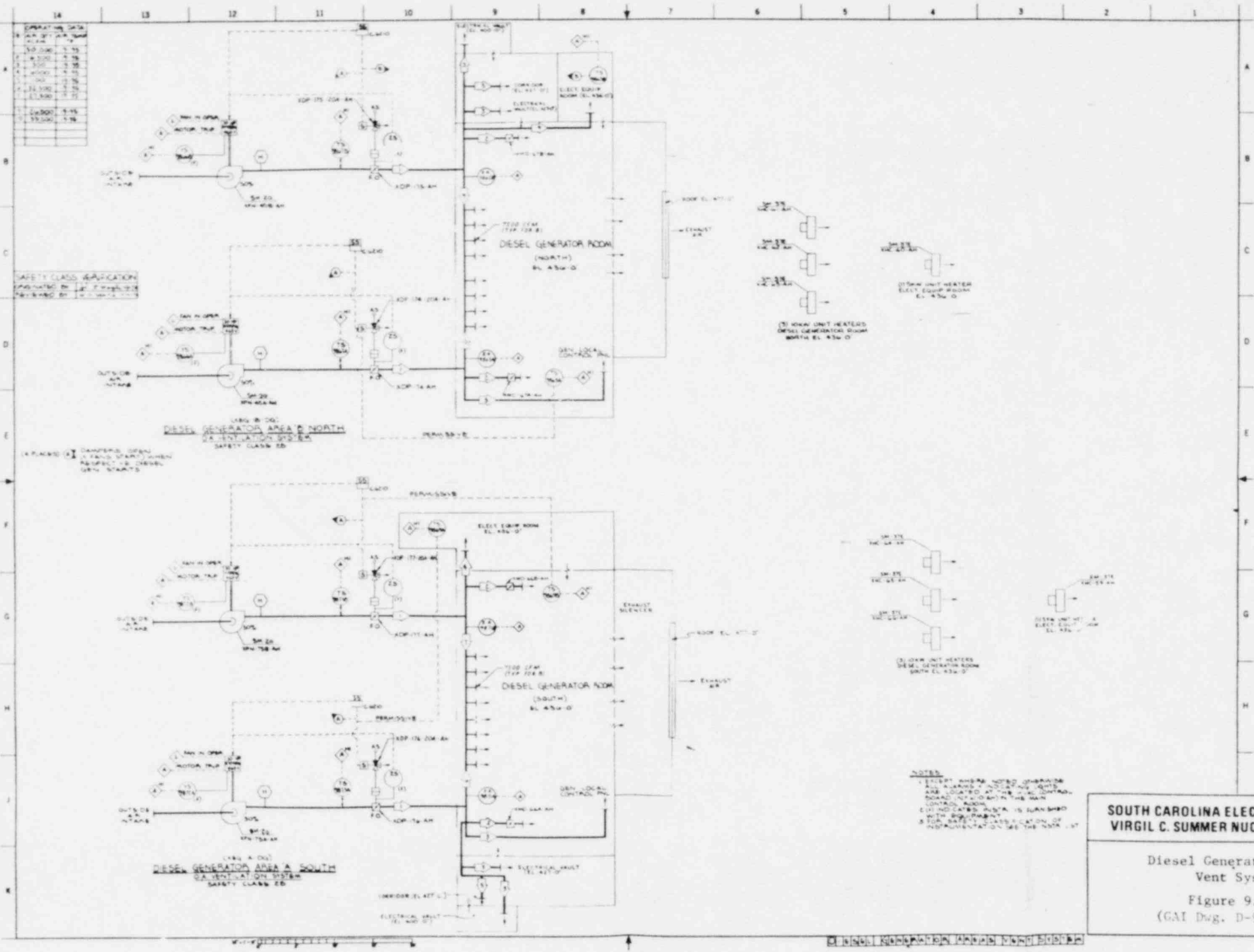
Figure 9.4-28
(GAI Dwg. D-912-103)



SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION

Service Water Intake Screen and
Pump House Building
Ventilation System

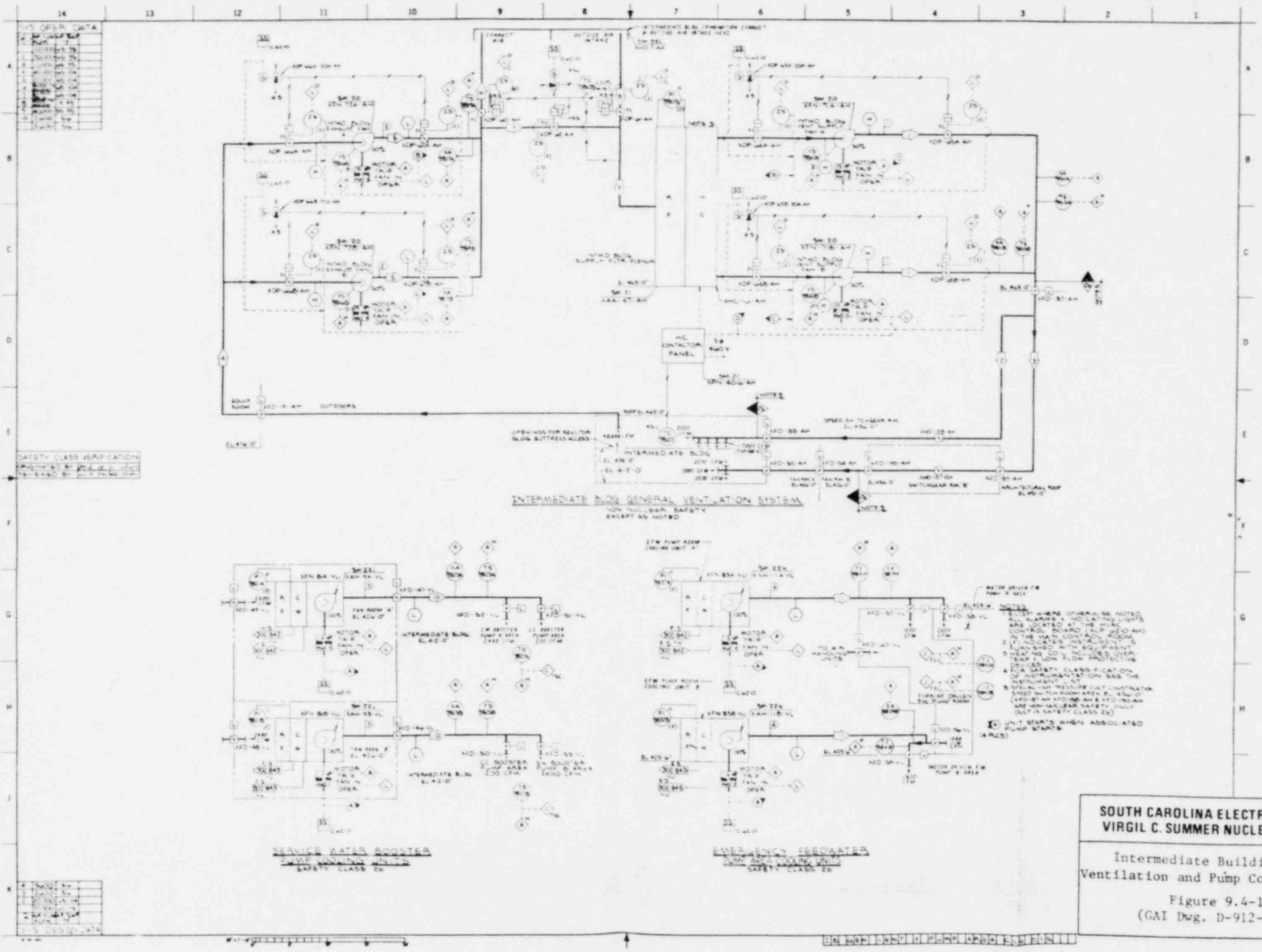
Figure 9.4-19
(GAI Dwg. D-912-155)



SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION

Diesel Generator Areas
Vent System

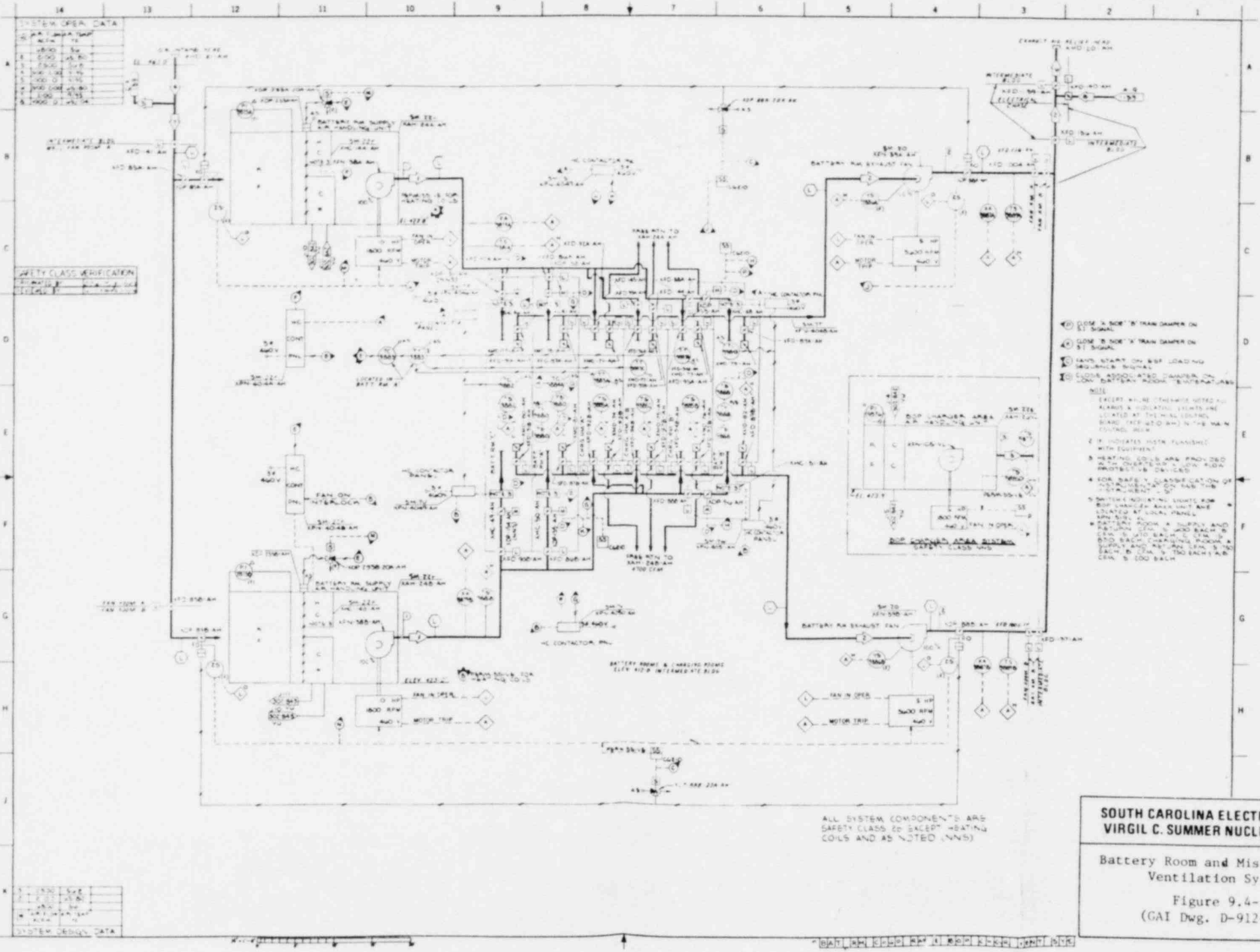
Figure 9.4-18
(GAI Dwg. D-912-134)



SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION

Intermediate Building General Ventilation and Pump Cooling System

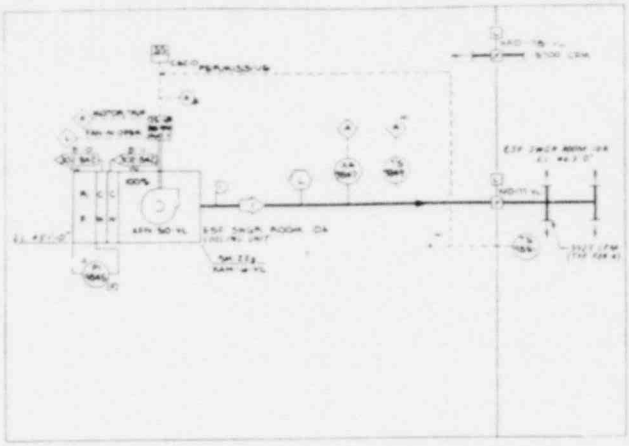
Figure 9.4-17
(GAI Dwg. D-912-158)



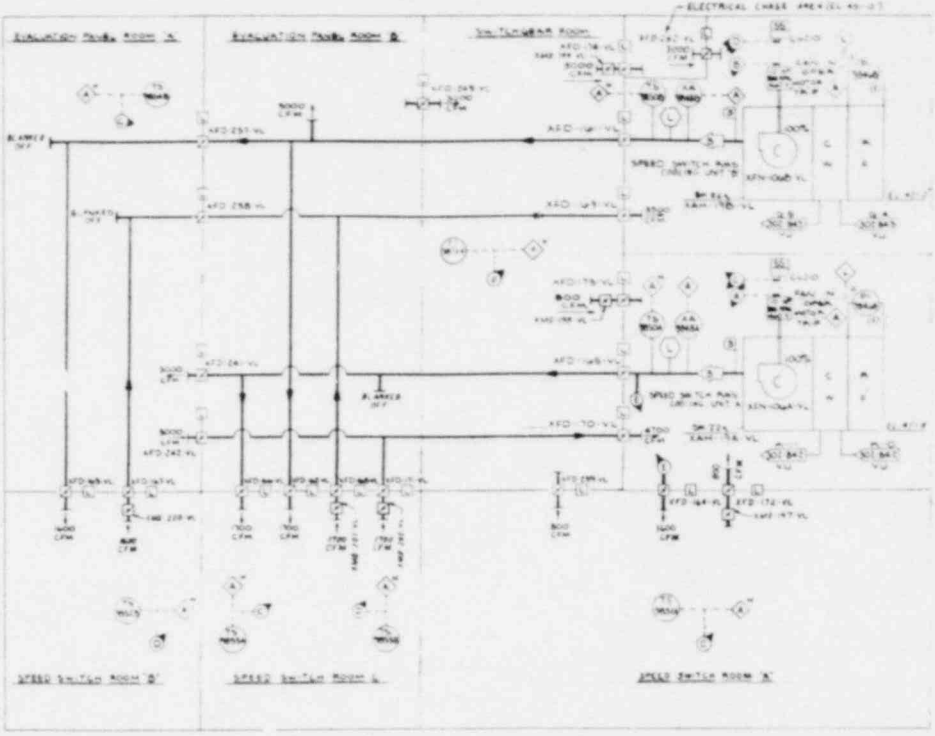
SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION

Battery Room and Misc. Building Ventilation System

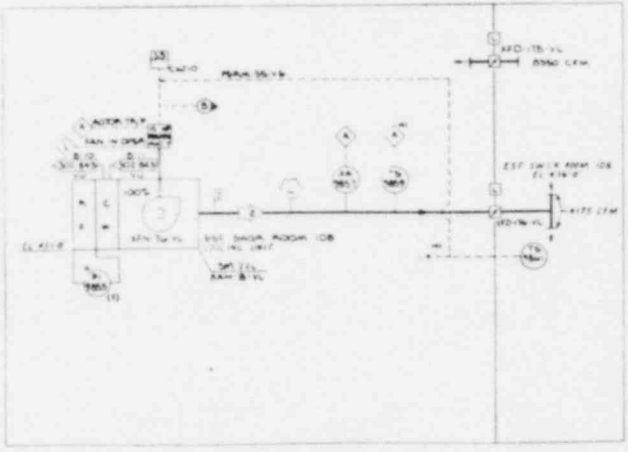
Figure 9.4-16
(GAI Dwg. D-912-138)



ESF SWGR ROOM 1DA COOLING SYSTEM



SPEED SWITCH ROOM COOLING SYSTEM



ESF SWGR ROOM 1DB COOLING SYSTEM

A ESF LOADING SEQUENCE SIGNAL CHANNEL A START SIGNAL

B ESF LOADING SEQUENCE SIGNAL CHANNEL B START SIGNAL

ALL SYSTEM COMPONENTS ARE SAFETY CLASS 2b

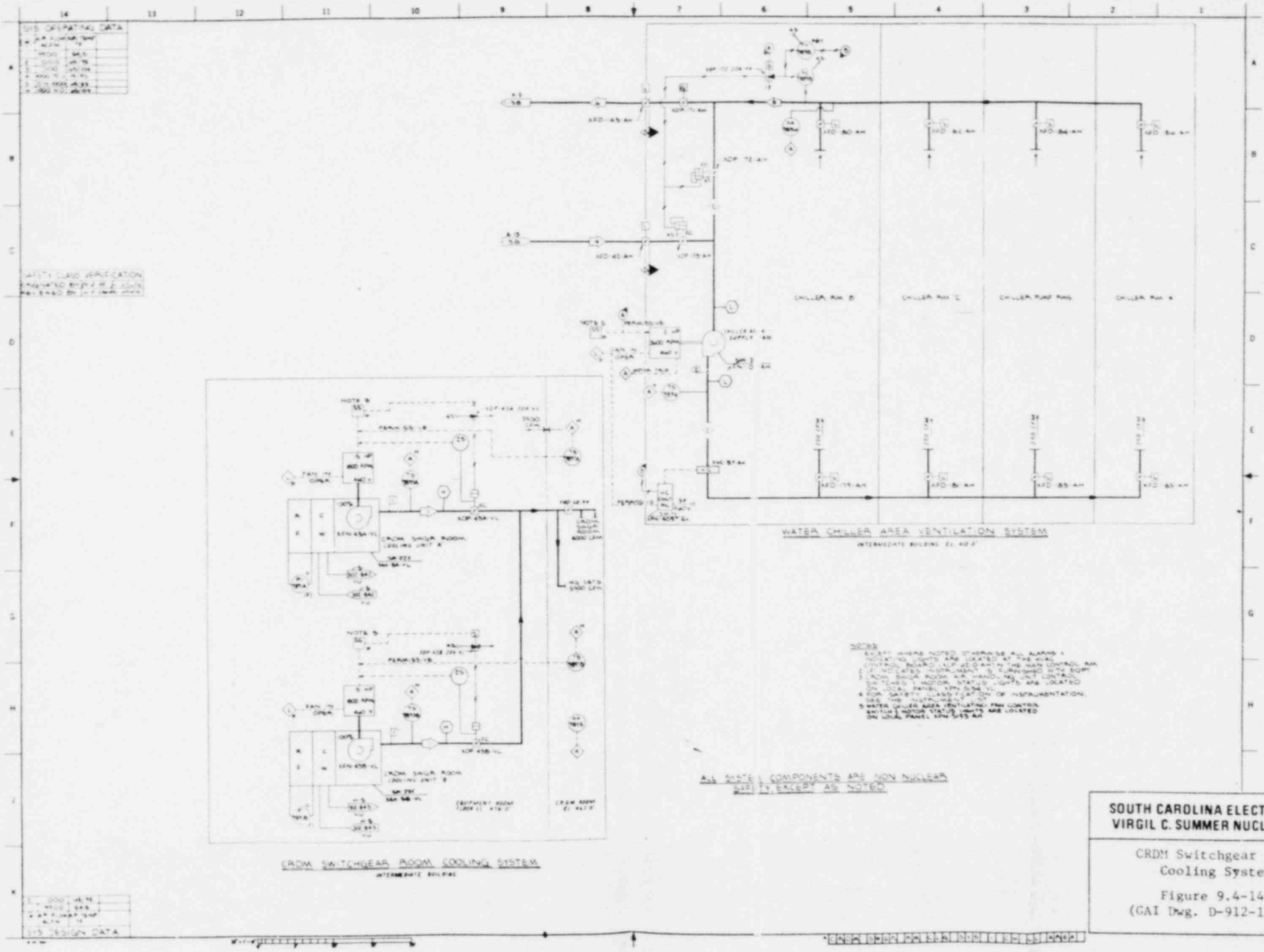
NOTES

1. EXCEPT WHERE NOTED OTHERWISE ALL ALARMS AND INDICATING LIGHTS ARE LOCATED AT THE HVAC CONTROL BOARD (HVAC AHU) IN THE MAIN CONTROL ROOM.
2. (T) INDICATES NOTE IS FURNISHED WITH EQUIPMENT.
3. FOR SAFETY CLASSIFICATION OF INSTRUMENTATION SEE THE NOTE "S"

SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION

Intermediate Building ESF Swgr. Rooms - Cooling System

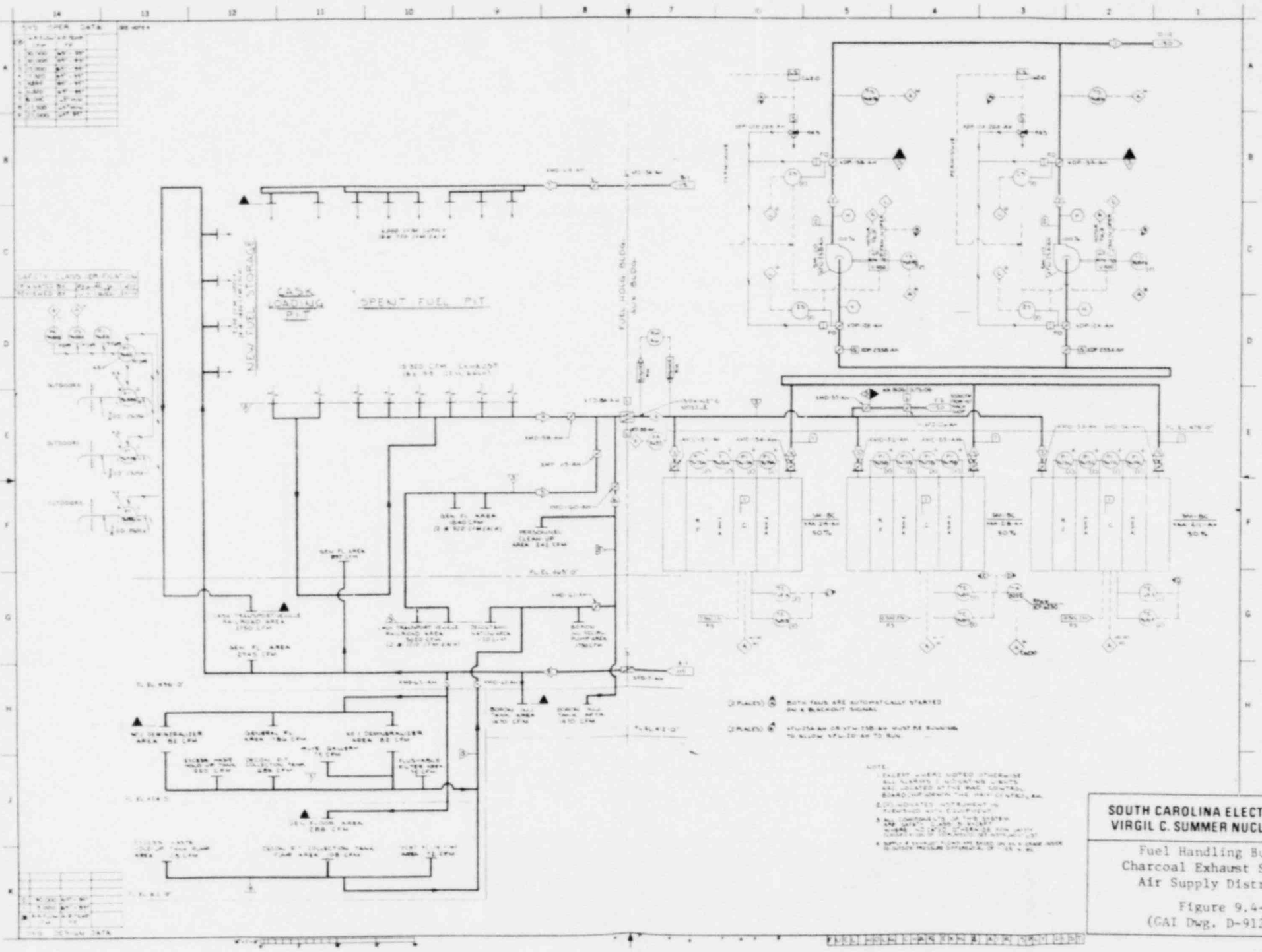
Figure 9.4-15
(GAI Dwg. D-912-157)



SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION

CRDM Switchgear Room
Cooling System

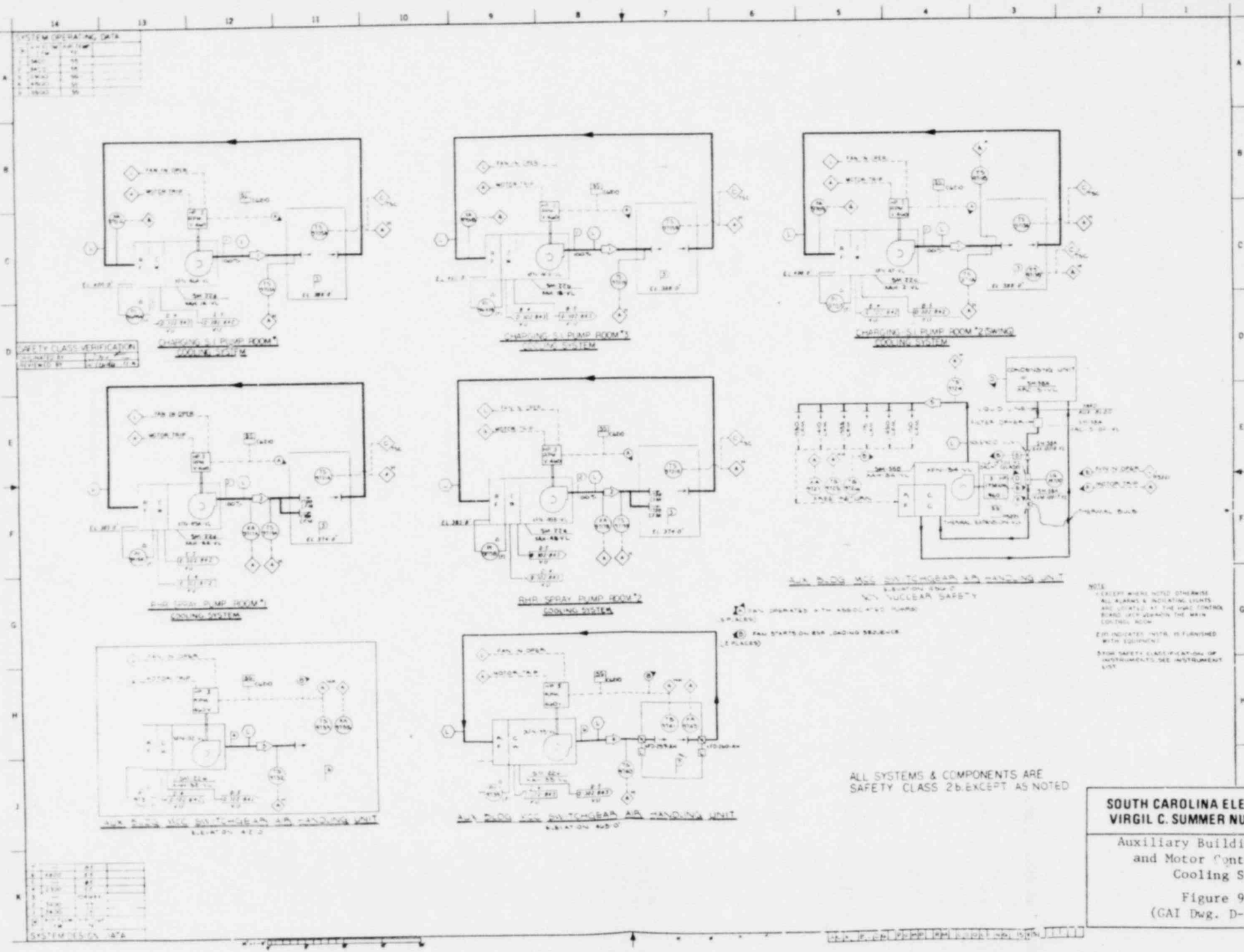
Figure 9.4-14
(GAI Dwg. D-912-139)



SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION

Fuel Handling Building
Charcoal Exhaust System and
Air Supply Distribution

Figure 9.4-11
(GAI Dwg. D-912-131)

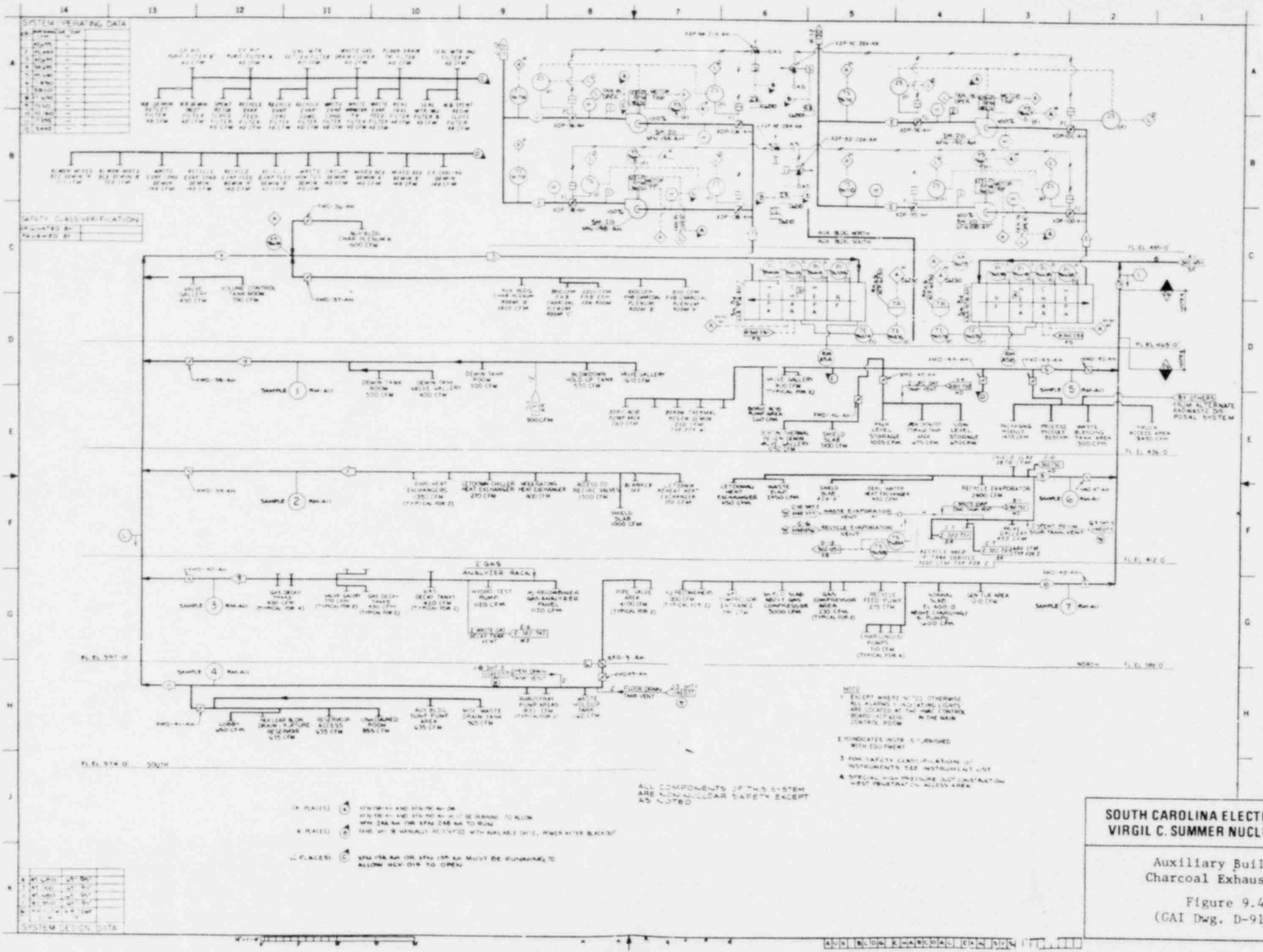


ALL SYSTEMS & COMPONENTS ARE SAFETY CLASS 2b EXCEPT AS NOTED

SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION

Auxiliary Building Pump Room and Motor Control Center Cooling Systems

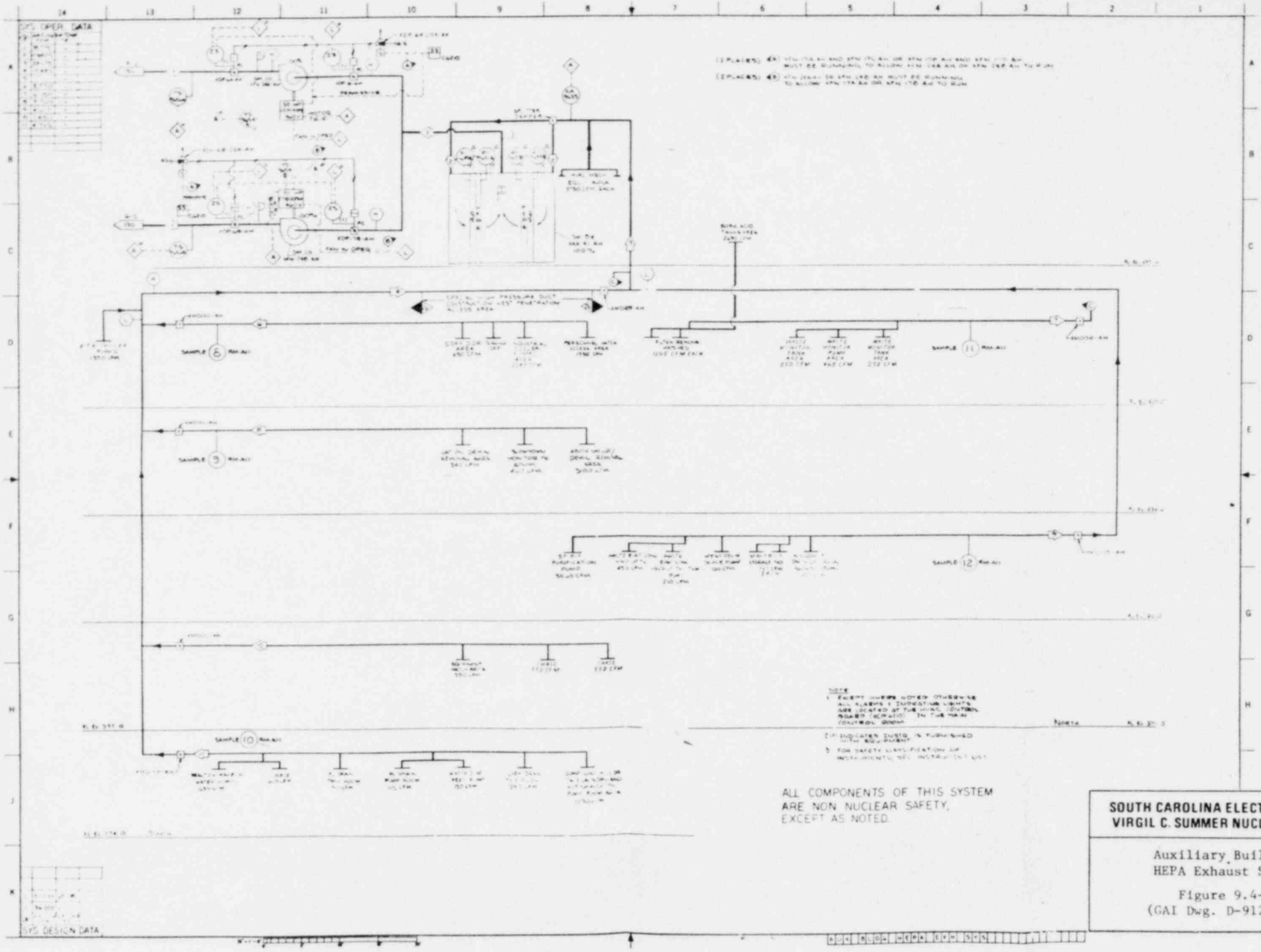
Figure 9.4-10
(GAI Dwg. D-912-132)



SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION

Auxiliary Building
Charcoal Exhaust System

Figure 9.4-8
(CAI Dwg. D-912-125)

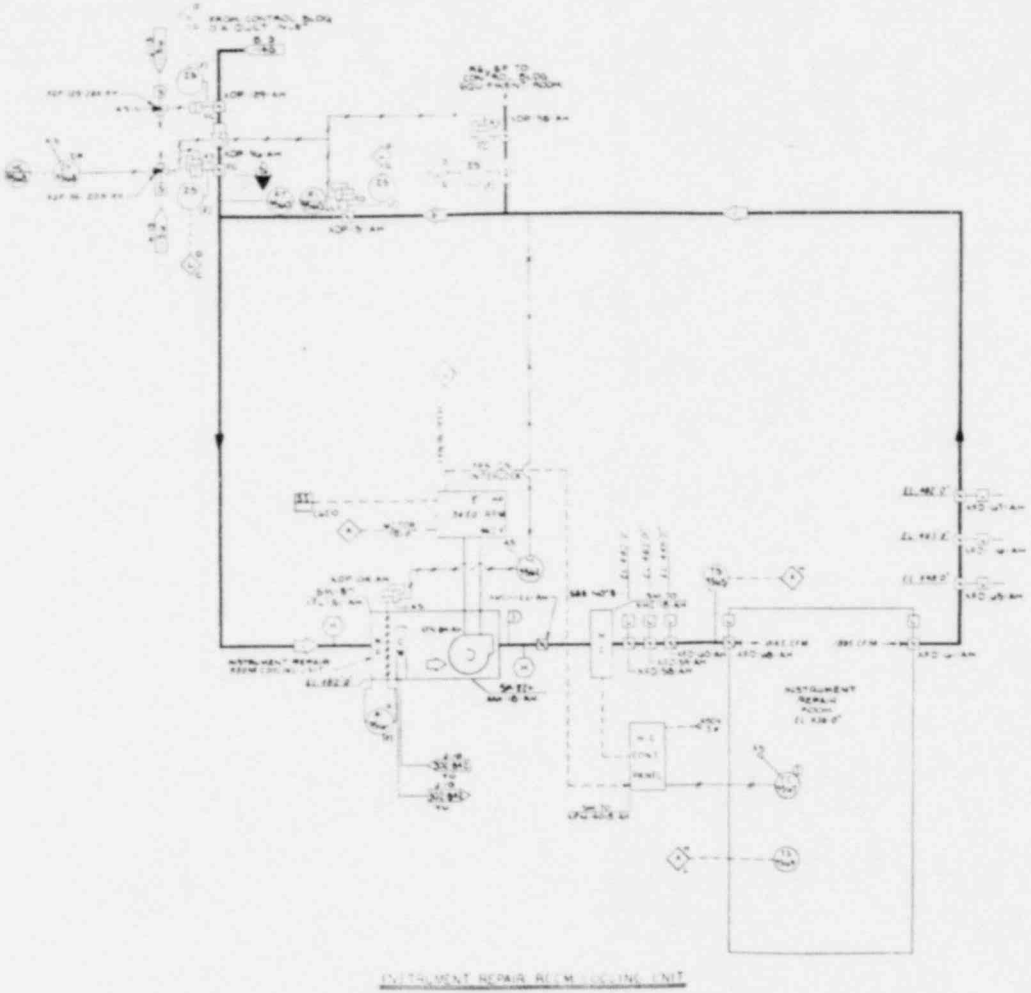


ALL COMPONENTS OF THIS SYSTEM ARE NON NUCLEAR SAFETY, EXCEPT AS NOTED.

SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION

Auxiliary Building
HEPA Exhaust System

Figure 9.4-7
(GAI Dwg. D-912-120)



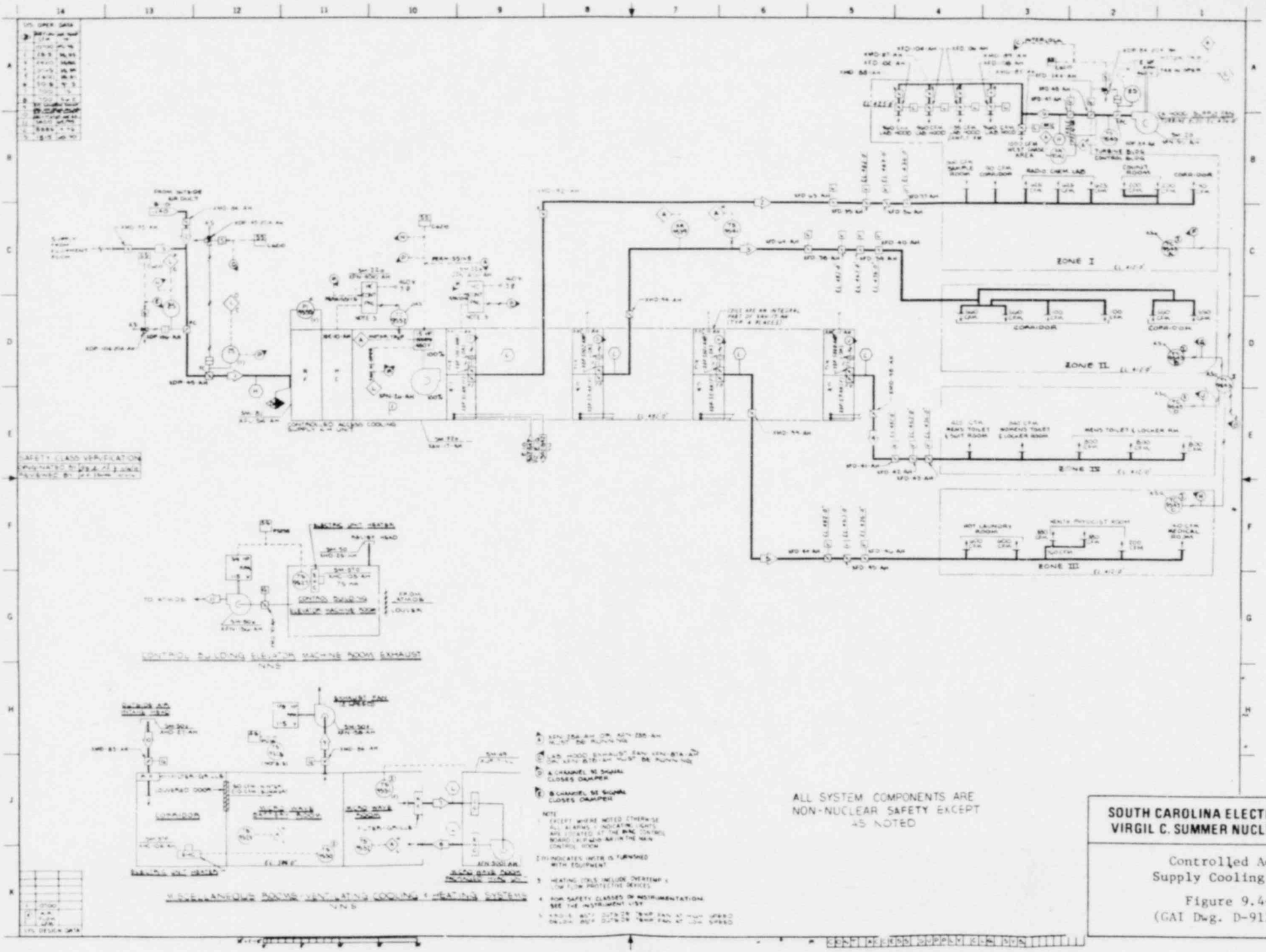
INSTRUMENT REPAIR ROOM COOLING UNIT

ALL SYSTEM COMPONENTS ARE NON NUCLEAR SAFETY EXCEPT AS NOTED

SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION

Instrument Repair Room
Cooling Unit

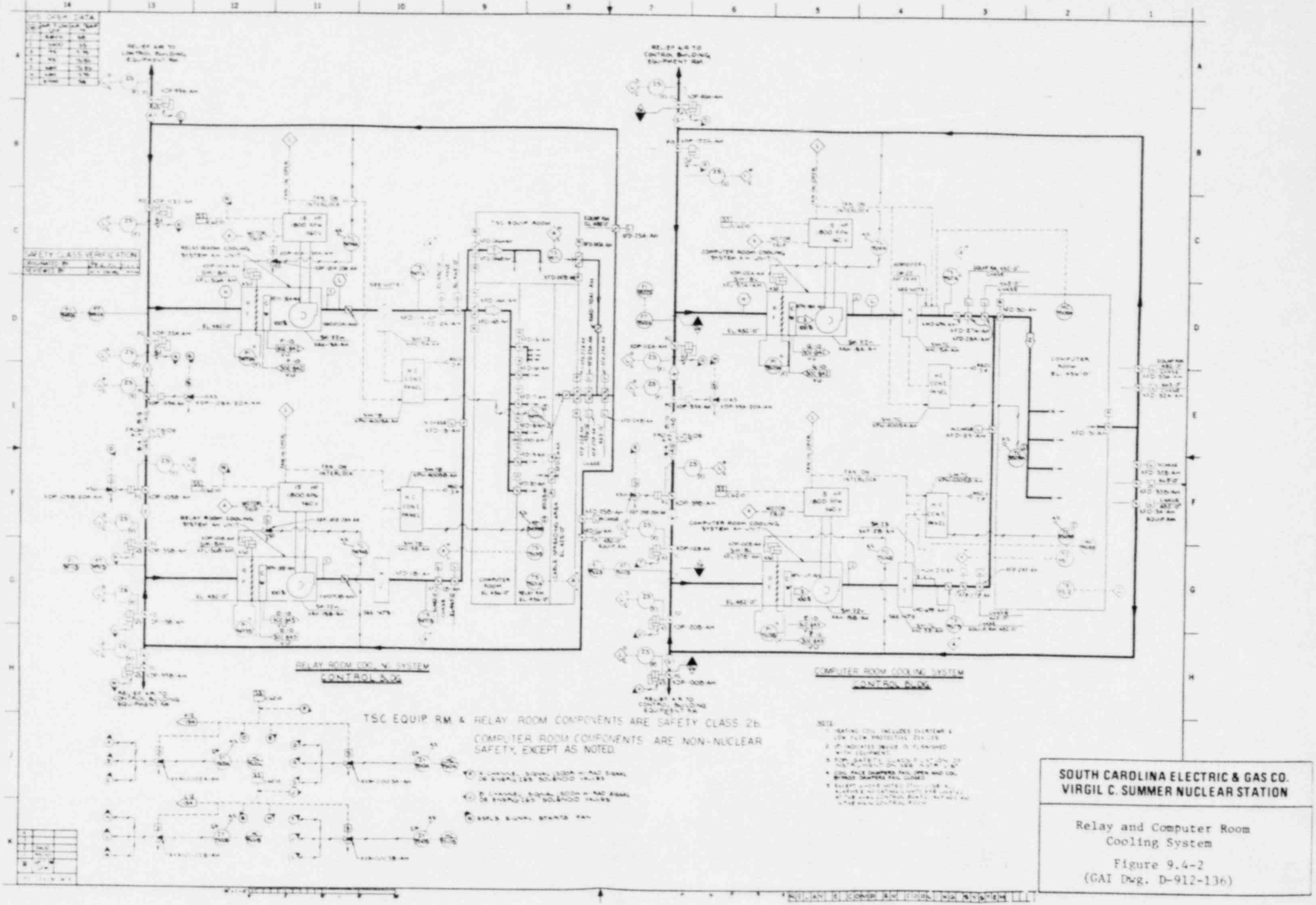
Figure 9.4-5
(GAI Dwg. D-913-154)



SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION

Controlled Access
Supply Cooling System

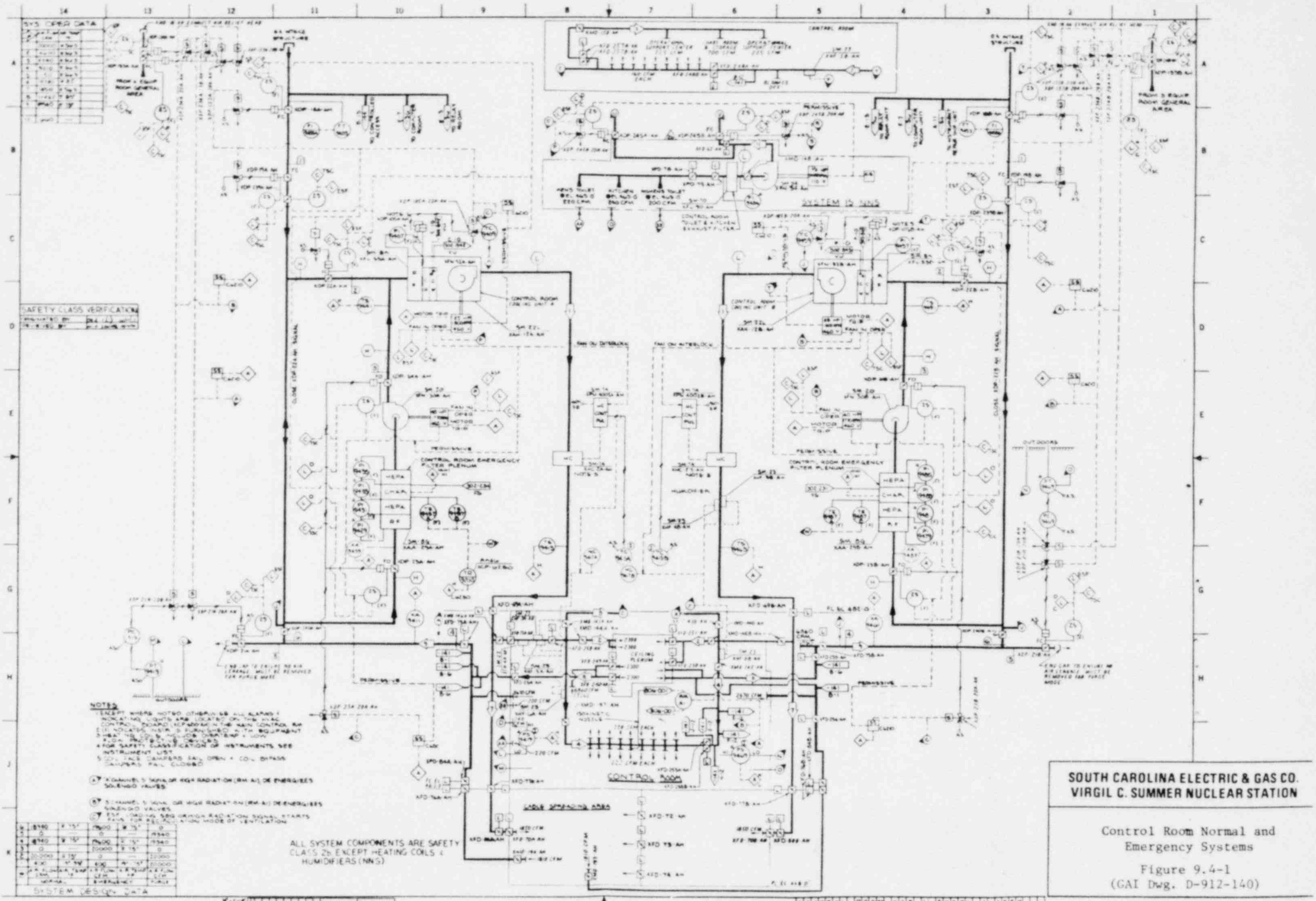
Figure 9.4-3
(GAI Dwg. D-912-144)



SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION

Relay and Computer Room Cooling System

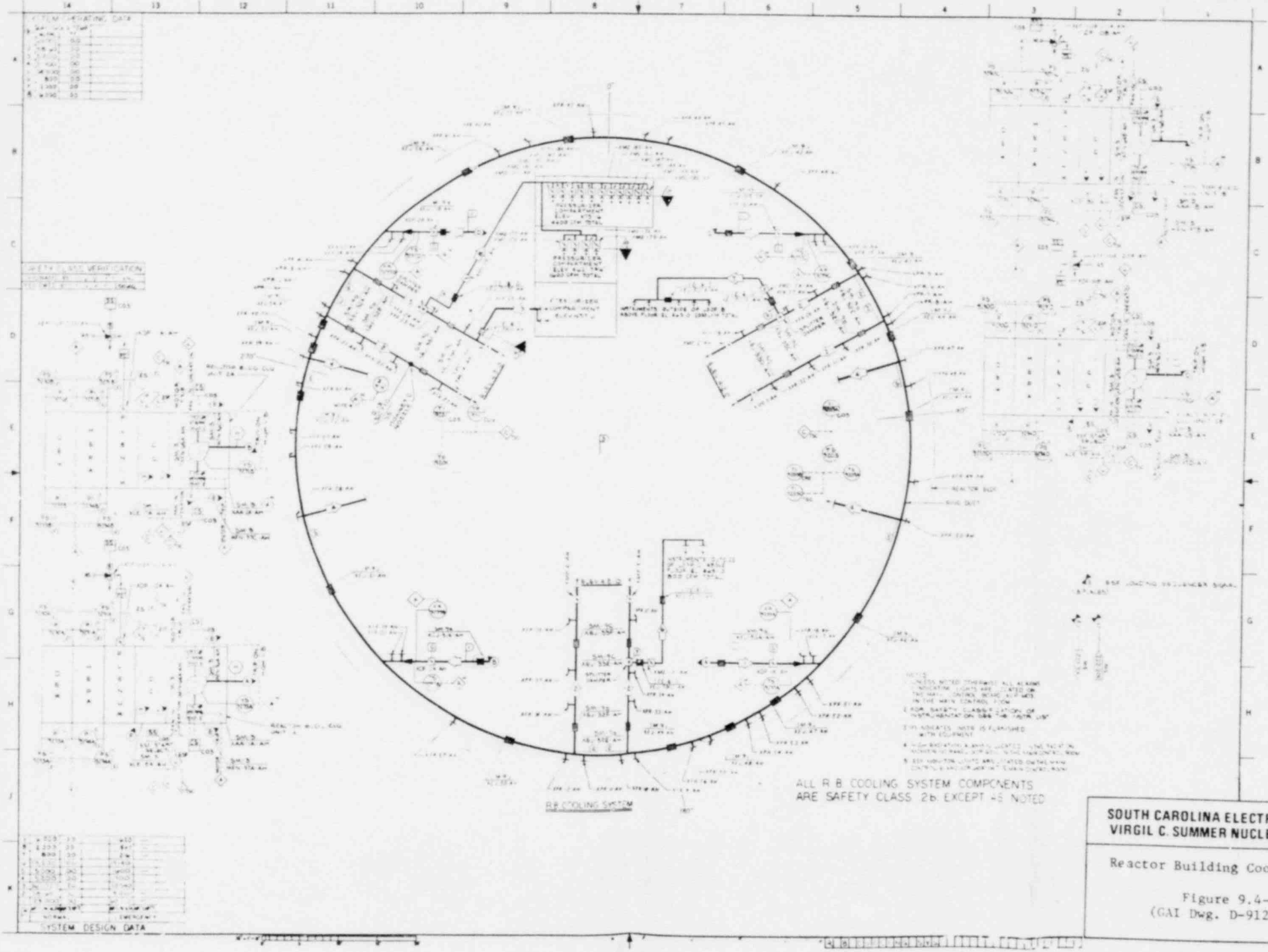
Figure 9.4-2
(GAI Dwg. D-912-136)



SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION

Control Room Normal and Emergency Systems

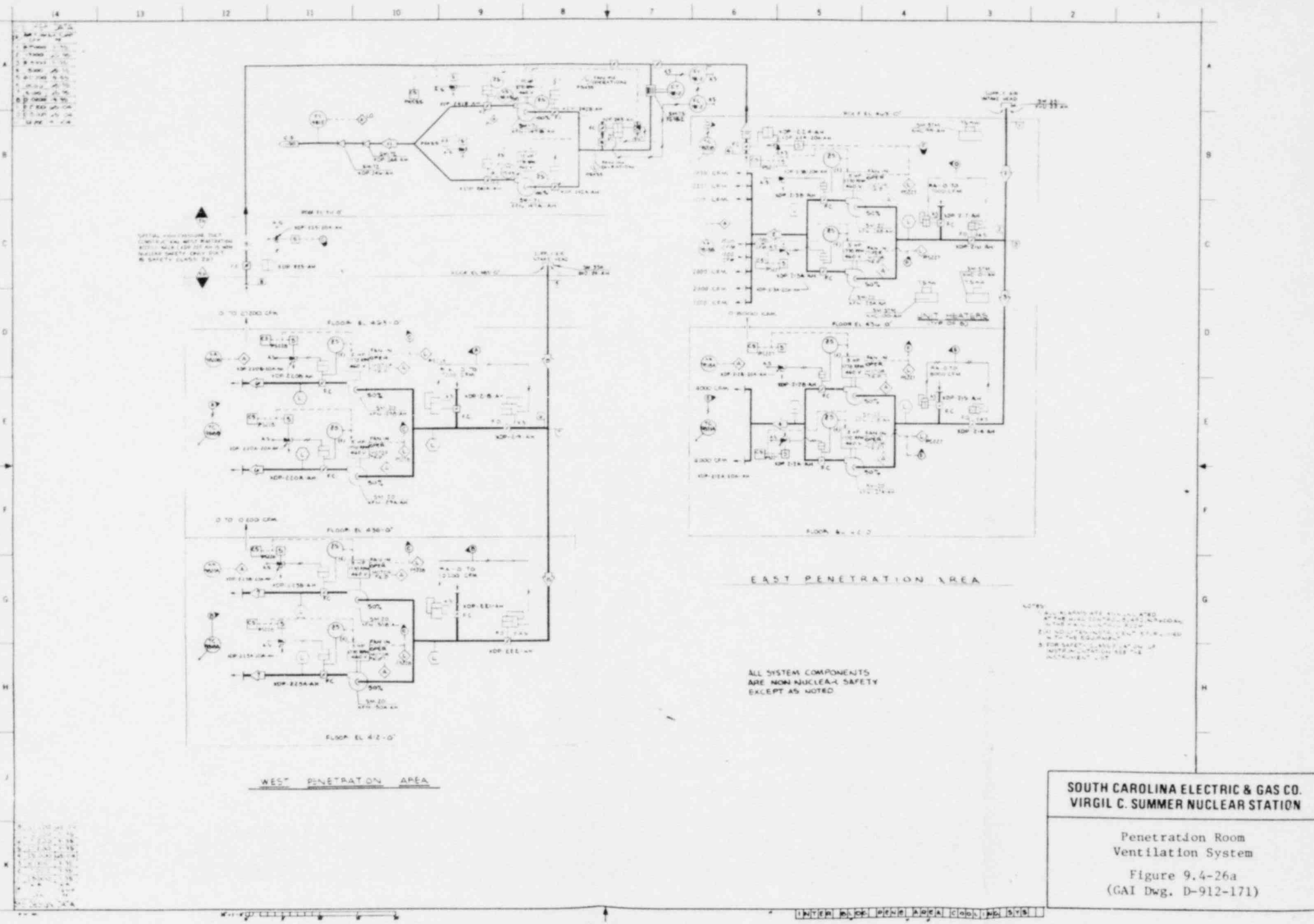
Figure 9.4-1
(GAI Dwg. D-912-140)



SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION

Reactor Building Cooling System

Figure 9.4-27
(GAI Dwg. D-912-102)



SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION

Penetration Room
Ventilation System

Figure 9.4-26a
(GAI Dwg. D-912-171)