

SYSTRIPTION
(Inc 38B)

HEATING, LATING AND
AIR CONDITIONING SYSTEM - DL ROOM, CONTROL BUILDING
B&R Dwg. 144, Rev. 13)

JERSEY CENTRAR & LIGHT COMPANY
THREE MILE INUCLEAR STATION

D. 2

Date:
Apr, 1975

Pr by:
J.Khreys

Burns & Co, Inc.
700 Kindek Road
Orad, J.
07

196 316

TABLE OF CONTENTS
FOR
HEATING, VENTILATING AND
AIR CONDITIONING SYSTEM - CONTROL ROOM, CONTROL BUILDING

<u>Section</u>		<u>Page</u>
1.0	<u>INTRODUCTION</u>	1
1.1	System Functions	1
1.2	Summary Description of System	1
1.3	System Design Requirements	3
2.0	<u>DETAILED DESCRIPTION OF SYSTEM</u>	5
2.1	Components	5
2.2	Instruments, Controls, Alarms and Protective Devices	15
3.0	<u>PRINCIPAL MODES OF OPERATION</u>	18
3.1	Startup	18
3.2	Normal Operation	20
3.3	Special or Infrequent Operation	21
3.4	Shutdown	22
3.5	Emergency	23
4.0	<u>HAZARDS AND PRECAUTIONS</u>	24

APPENDIX

<u>TITLE</u>	<u>TABLE NO.</u>
Control Room Fan Coil Units	1
Control Room Supply Filter	2
Control Room Bypass Supply Fans	3
Control Room Bypass Roll-Apice Filter	4
Control Room Bypass Absorbent Filter	5
Control Room Bypass Carbon Filter	6
Control Room Exhaust Fan	7
Kitchen Exhaust Fan	8
Toilet Exhaust Fan	9
Control Building Liquid Chiller Unit	10
Control Building Liquid Cooler Pumps	11
Chilled Water Expansion Tank	12
Chilled Water Chemical Feed Tank	13
Instrumentation and Controls	14
Panel Mounted Annunciators and Computer Inputs	15

HEATING, VENTILATING AND
AIR CONDITIONING SYSTEM - CONTROL ROOM, CONTROL BUILDING

1.0 INTRODUCTION

1.1 System Functions

The functions of the Control Room Heating, Ventilating and Air Conditioning System are:

a. To provide fresh, filtered, tempered ventilating air to all spaces within the Control Room, office, toilet, kitchen, locker room and associated corridors during normal plant operation and to maintain room temperatures suitable for the operating personnel and the mechanical and electrical equipment. To supply chilled water in a closed loop to both the Control Room and Cable Room cooling coils.

1.1 b. To provide 100% recirculation on detection of an incipient explosion, fire or chlorine gas in the Air Intake Tunnel. To recirculate filtered air with minimum outside air (1000 CFM) during LOCA and detection of high radiation in the supply duct to provide a positive pressure in the Control Room which prevents in leakage of contaminated air.

1.2 Summary Description of System (Refer to B&R Dwg. 2044, Rev. 13)

The system is a push-pull heating, ventilating and air conditioning system with recirculation. It consists of the following subsystems:

- a. Supply system
- b. Main exhaust system
- c. Kitchen exhaust system
- d. Toilet exhaust system
- e. Recirculation system
- f. Chilled water system

196 319

The supply system consists of two 100% capacity centrifugal fans with filters, electric heating coils, cooling coils, and necessary sheet metal ducts arranged to take outside air from the Air Intake Tunnel and deliver it to the various spaces in and associated with the Control Room. The Control Room air supply duct is provided with a sound attenuator.

The main exhaust system consists of one 100% capacity centrifugal fan with a bypass and necessary sheet metal ducts arranged to exhaust air from all ventilated spaces (except the kitchen and toilet) directly to atmosphere via an opening in the building wall. The exhaust fan air inlet duct is provided with a sound attenuator.

The kitchen and toilet exhaust systems each consist of a 100% capacity fan with sheet metal ductwork to carry exhaust air directly to atmosphere through an aperture in the building wall. The kitchen exhaust air passes through a grease filter before entering the fan.

The recirculation system consists of ducts from the Control Room exhaust fan discharge to the inlet of the supply air fans, and a parallel high efficiency filtration path through which Control Room air is recirculated when the Control Room bypass supply fans are energized. This high efficiency filtration path contains two 100% capacity centrifugal fans together with a filter train that includes a prefilter, a high efficiency particulate air (HEPA) filter, a charcoal filter and a second high efficiency particulate air filter in series.

The chilled water system is a closed loop that consists of a two 100% capacity centrifugal pumps, which are used to pump water through 100% capacity chiller to any of the air cooling coils in the Control Room ducts. An expansion tank at the suction of the chilled water pumps and a chemical feed tank are provided along with piping connecting the tanks with the closed loop. A line from the Demineralized Service Water System provides makeup water to the chilled water loop.

The Nuclear Services River Water System consists of two 100% capacity Control Building river water booster pumps, which can take suction from either of the redundant Nuclear Services River Water System Headers and supply cooling water to the condenser of either liquid chiller and from there, discharge to the Mechanical Draft Cooling Tower. The system also includes river water piping that supplies Nuclear Services River Water directly to the air cooling coils of the Mechanical Equipment Room and discharges from there to the Mechanical Draft Cooling Tower.

1.3 System Design Requirements

The ventilating system is designed to provide fresh air to the Control Room during normal operation. When outside air temperature is below 70°F, fresh air will be admitted in sufficient quantity to maintain a Control Room temperature of 75°F. If the outside air temperature is above 70°F, or when the Control Room bypass fans are energized, 1000 CFM of fresh air will be supplied through the minimum outside air duct for replenishment purposes. On a signal from the chlorine gas monitoring System or the Fire Protection System, the air supply damper AH-D4092C shuts and no fresh air is supplied to the Control Room.

The system is designed to provide 100% outside air at the option of the operator during normal operation. The supply fans deliver LATER CFM of fresh air which is sufficient for more than LATER air changes per hour.

Two chiller units are each designed to supply all the required cooling of the Control Room and Cable Room to maintain a 75°F temperature when the ventilation system is in the minimum outside air recirculation mode with an outside air air temperature of 92°F. The units are rated at 110 tons of air conditioning. Chilled water is circulated through cooling coils in the Control Room (35 tons) and the Cable, Battery and Switchgear Rooms (75 tons).

The heaters are designed to heat the replenishment and recirculation air mixture to maintain a 75°F temperature in the Control Room. The heater coils are rated at 51 KW each and are interlocked with supply fans so that the heaters cannot be energized unless its corresponding fan is operating. The heaters are designed to maintain the 75°F temperature during the minimum outside air recirculation mode with an outside temperature of 4°F.

The system is designed to minimize the possibility of introducing radioactive contamination, smoke or vapors into the Control Room. A LOCA or detection of high radiation in the Control Room supply duct will provide signals which will start one of the Control Room bypass supply fans which automatically places the system in the minimum outside air recirculation mode. All the air passes through the Control Room bypass filter unit before it enters the Control Room spaces. The 1000 CFM of

196 322

outside air will cause a slight overpressure in the Control Room spaces which will preclude any in leakage from surrounding areas. In the mode, Control Room personnel on eight hour shifts during a 90 day period following a LOCA would not receive an integrated whole body dose in excess of 3 rem from all sources of direct radiation, including exposure during egress and ingress for shift changes. If an incipient explosion, fire or chlorine gas is detected in the Air Intake Tunnel Auxiliary relays will automatically shut the Control Room air supply shutoff damper , AH-D4092C, and place the Control Room Ventilating System in the 100% recirculation mode. The detection of combustible vapors in the Air Intake Tunnel is alarmed on Panels No. 7. The operator then can place the Control Room Ventilating System in the minimum outside air recirculation mode by starting the Control Room bypass supply fans from Panel No. 25. In either recirculation mode the chiller units will supply the necessary cooling.

2.0 DETAILED DESCRIPTION OF SYSTEM

2.1 Components

The following major components are employed in the Control Room heating, ventilating and air condition system:

2.1.1 Major System Dampers

Air Supply Shutoff Damper - AH-D4092C

A pneumatic cylinder operated, quick closing, opposed blade damper is located in the supply duct upstream of the minimum outside air duct. The damper shuts automatically on detection of fire or smoke in the Control Room or detection of fire, incipient explosion or chlorine gas in the Air Intake Tunnel.

An accumulator is located in the air supply line to ensure the damper remains open during a LOCA. A limit switch on the damper is interlocked with solenoid valves AH-V125A & B which position the recirculation dampers, AH-D4092D, AH-D4092E and AH-ED4098 for recirculation when AH-D4092C is closed.

Air is supplied from the Instrument Air System, the 3-way solenoid, AH-EP-5290, receives power from 120V AC (Green) circuit Panel No. 25.

Normal Air Supply Shutoff Damper, AH-D4092A, and Bypass Air Supply Shutoff Damper, AH-D4092B

One pneumatic cylinder operated, quick closing, opposed blade damper is located in the normal supply duct to the Control Room fan coil units and one pneumatic cylinder operated, quick opening, opposed blade damper is located in the supply duct to the Control Room bypass supply fans. The dampers are interlocked with the Control Room bypass supply fans to simultaneously divert supply air through the Control Room bypass supply fans and filter unit when the either Control Room bypass supply fan is energized. Air is supplied by the instrument air system, 3-way solenoid valves AH-V124A and AH-124B receive power from 120v AC Cabinet 173 and 174 respectively. Damper position is indicated on Panel No. 13.

Recirculation Control Dampers - AH-D4092D & E and AH -ED4098

Three pneumatic cylinder actuated opposed blade damper with positioners are used to control air recirculation. AH-D4092D (quick-closing) in the supply duct and AH-D4092E (quick opening) in the unfiltered recirculation duct are operated to control recirculation flow. AH-ED4098 (quick-closing), located in Control Room air exhaust duct, is used to control the exhaust air flow rate. AH-D4092D & E and AH-ED4098 are operated as a unit by the same control signal. These dampers are modulated by thermostat AH-TS-5209 and positioned for 100% outside air by push button AH-KHS-5209 on Panel 25. The dampers are positioned for re-

circulation by AH-TIC-5209 at outside air temperature over 70°F, ES Signal, local pushbuttons, interlocks with the Control Room bypass supply fans and supply damper AH-D4092C limit switch and a signal from the Fire Protection System. Air is supplied by the Instrument Air System, power for 3-way solenoid valves AH-V125A & 125B is supplied from 120v AC Cabinet 173 and 174 respectively. Damper position is indicated on Panel No. 13.

Supply Fan Discharge Dampers - AH-D4096A & B - and Bypass

Supply Fan Discharge Dampers - AH-D4091A & B

One pneumatic cylinder operated, parallel blade damper, located at the discharge of each supply and bypass supply fan, opens automatically when the associated fan starts and closes automatically when the fan stops. Air is supplied by the Instrument Air System, the 4-way solenoid valves receives power their associated fan control circuit. Accumulators are provided with each damper to ensure the damper can be properly positioned during accident conditions.

Kitchen and Toilet Exhaust Fan Discharge Dampers -

AH-D4093 and AH-D4094

One electric motor operated, parallel blade shutoff damper in the discharge duct of each fan opens automatically when the associated fan starts and closes automatically when the fan stops. Both dampers receive power from 120V power panel MP2-42C.

Control Room Exhaust Fan Bypass Damper - AH-D4092G

One pneumatic cylinder operated, parallel blade damper closes automatically when the exhaust fan is operating and opens automatically when the exhaust fan shuts down. Air is supplied by the Instrument Air System, the 4-way solenoid AH-EP-5207 receives from the exhaust fan control circuit.

Control Room Bypass Supply Fan Inlet Dampers, AH-VD4091A & B

One pneumatic operated, variable pitch, vortex damper is located at the inlet to each of the Control Room bypass supply fans. The damper blade pitch is controlled by differential pressure controller, AH-DPIC-5211, to maintain a constant pressure drop, i.e. flow, across the Control Room bypass filter unit. Air is supplied by the Instrument Air system.

Miscellaneous Dampers

In addition to the dampers described above, hand operated opposed blade dampers are provided at the inlet and outlet of the Control Room exhaust fan and the inlets of the Control Room bypass supply fans for isolation of the fans. Hand operated opposed blade dampers are provided in the supply duct, the unfiltered recirculation duct, the minimum outside air supply duct, the Control Room supply fan inlets, and the Control Room exhaust duct.

2.1.2 Major System Valves

The following valves are utilized in the operation of the chilled water and Nuclear Services River Water Systems used to cool Control Room air:

Cooling Coil Water Flow Regulating Valves - AH-V33A & B

One 3" 150 psi ANSI, 100°F CS, bypass control valve with a pneumatic operator and a positioner is located at the discharge of each cooling coil to regulate chilled water flow to the cooling coils during the air conditioning mode of operation. These valves are controlled by thermostat AH-TS-5209. Air is supplied from the Instrument Air System.

Cooling Coil Water Supply Shutoff Valves - AH-V32A & B

One, 3", 150 psi ANSI, 100°F CS, butterfly valve with a pneumatic operator is located in the chilled water supply line to each cooling coil and opens automatically when the associated fan starts and closes automatically when the fan stops. Air is supplied from the Instrument Air System, the 4-way solenoid valves receives power from the associated fan control circuit. The valves are provided with accumulators to ensure proper positioning during accident conditions.

Liquid Chiller River Water Flow Regulating Valves - NR-V145A & B

One 4", 150 psi ANSI, 160°F CS, butterfly valve with a pneumatic operator and positioner is located at the discharge of each liquid chiller condenser to regulate condenser pressure by throttling river water. These valves are controlled by refrigeration temperature controllers AH-TIC-5204 & 5250. Air is supplied from the Instrument Air System, the valves fail open on loss of air.

Liquid Chiller River Water Shutoff Valves -NR-V144A &B

One 4", 150 psi ANSI, 85°F CS, butterfly valve located in the Nuclear Services River Water supply line to each liquid chiller condenser opens automatically when chilled water flow is detected passing through the associated water cooler and closes automatically when flow stops. Air is supplied from the Instrument Air System and the valves are fitted with accumulators to ensure proper operation during accident conditions. The 4-way solenoid valves receive power from their associated chiller control circuit.

Miscellaneous Valves

In addition to the above valves, manually operated valves are provided for vents, drains and instrument connections, and for isolation of cooling coils, liquid cooler pumps, water coolers and condensers in the liquid chiller units, and chemical feed and expansion tanks in the chilled water loops. Makeup valve DW-V15 is provided to admit makeup water automatically to the chilled water loops.

2.1.3 Control Room Fan-Coil Units AH-C-16A & B

Two Control Room fan-coil units (see Table 1) are located in the Mechanical Equipment Room in the Control Building, Elev. 351.5'. Each fan coil unit is designed for 100% capacity (15,620 CFM) and provides a fully redundant ventilating air supply to the Control Room. The corresponding fan outlet damper and chilled water inlet valve to the cooling coil are interlocked with the fan to open when their respective fan is energized and closed when the fan is de-energized. If the operating fan trips for any reason, the second fan coil unit will start automatically and the trip condition will be annunciated on Panel No. 25. The fans can be controlled locally by pushbuttons, with indicating lights, or remotely by selector switches (PULL-TO-LOCK-STOP-AUTO-START), AH-HS-5216 & 5217 on Panel No. 25 also with indicating lights. The fans AH-C-16A and 16B, are driven by 15 HP motors which are powered from 480V Buses 2-12E & 2-22E respectively. The cooling coils are designed to cool air from 75.4°F Dry Bulb/63.2°F Wet Bulb to 57.1°F Dry Bulb/55.3°F Wet Bulb (440,000 BTU/hr) with 45°F chilled water. Both three step 51 KW electric heaters (17KW/step) are powered from MCC 2-42C. The electric heaters and the bypass control for the cooling coils valves are controlled

196 328

by temperature controller AH-TS-5209.

2.1.4 Control Room Supply Air Filters - AH-F-2A & B

One Control Room supply air filter (see Table 2) is located in the inlet duct of each Control Room fan coil unit. Both filters are 2 in. thick, glass fiber media, Roll-Aire filters, automatically progressed to maintain uniform pressure drip, followed by replaceable cartridge type filters. A 1/16 HP motor receives power from Panel MP-2-42C. Local controls and indicating lights are provided.

2.1.5 Control Room Bypass Supply Fans AH-E-4A & 4B

Two Control Room bypass supply fans (see Table 3), are located in the Mechanical Equipment Room Elev. 351.5'. Each consists of a cabinet housing a 100% capacity (15,620 CFM) centrifugal fan. The fans are automatically circulate air thru the Control Room bypass filters furing LOCA, high radiation in the Control Room supply duct and chlorine gas in the Air Intake Tunnel. The fans can be controlled locally by pushbuttons or remotely by selector switches (PULL-TO-LOCK-STOP-AUTO-START), AH-HS-5265 and 5266 on Panel No. 25. Each fan motor, AH-E-4A & B, is rated at 40 HP each and powered from 480V BUS 2-12E & 2-22E respectively. Pilot lights are provided both locally and on Panel no. 25 in the Control Room to indicate fan operation.

2.1.6 Control Room Bypass Filter Unit

The Control Room bypass filter unit (see 2.1.6.1 through 2.1.6.3) is a 100% capacity (15,620 CFM) filter train located in the Mechanical Equipment Room, Elev. 351.5'. The filter train consists of the following component filters.

2.1.6.1 Roll-Aire Filter, AH-F-3

The Rolle-Aire filter (see Table 4) is located at the upstream end of the filter train. The filter is constructed of 2" thick fiber glass, reinforced by steel wires, and is automatically progressed to maintain a uniform pressure drop across the filter. The Roll-Aire filters have a 1/16 HP motor with local controls and indicating lights. The motor receives power from 120V power panel MP 2-35.

2.1.6.2 HEPA Filters, AH-F-4 and 29

The high efficiency particulate air filters (see Table 5) are the second and fourth filters in the filter train. The HEPA filters are constructed of a dry, fibrous, high interception, sub-micron glass fiber which has an efficiency of 99.97% for particles larger than 0.3 microns. The pressure drop across a clean filter at rated capacity is 1.2 inches H₂O.

2.1.6.3 Activated Carbon Filter, AH-F-5

The activated carbon filter (see Tabel 6) is located between the HEPA filters in the filter train. The carbon filter is constructed of impregnated activated charcoal and is water repellant and fire resistant. The carbon filter is designed to trap and remove gaseous contaminants from the air stream. A deluge system is provided for spraying the cells at a minimum flow rate of 1.5 gpm per nozzle on the air entering side of the bank for fire protection.

2.1.7 Control Room Exhaust Fan AH-E-35

One Control Room exhaust fan (see Table 7), is located in the Mechanical Equipment Room, Elev. 351.5'. The fan is 100%

capacity (15,620 CFM) and is controlled automatically by an interlock with fan-coil unit fans AH-C-16A & B. The fan may be controlled locally by a pushbutton or remotely from Panel No. 25 by selector switches (PULL-TO-LOCK-STOP-AUTO-START) AH-HS-5207. The fan, rated at 10HP is powered from 480V BUS 2-12E. Local and remote pilot lights indicate the fan's operating condition.

2.1.8 Miscellaneous Fans

One kitchen exhaust fan with grease filter and one toilet exhaust fan (see Tables 8 & 9) are both rated at 200 CFM. Each fan is controlled by an interlock with its associated light switch. The kitchen exhaust fan, rated at 1/6 HP, is powered from MP2-42C, the toilet exhaust rated at 1/6 HP, from MP 2-42C.

2.1.9 Control Building Liquid Chiller Units AH-C-8A & B

Two 100% capacity Control Room liquid chiller units (see Table 10) are located in the Mechanical Equipment Room Elev. 351.5', each rated at 110 tons refrigeration capacity. These units cool water in the closed chilled water system and reject heat to water supplied by the Control Building river water booster pumps. The chiller units are controlled locally by a pushbutton station with indicating lights and remotely by a selector switch (PULL-TO-LOCK-STOP-AUTO-START) with indicating lights located on Panel No. 25. The chiller units AH-C-8A & B, are powered from 480V BUS 2-12E & 2-22E respectively.

196 331

2.1.10 Control Building Liquid Cooler Pumps AH-P-1A and B

Two 100% capacity Control Building liquid cooler pumps (see Table 11) single-stage, centrifugal type, located in the Mechanical Equipment Room, Elev. 351.5', are rated at 275 gpm each with a total discharge head of 220 ft. The pumps circulate chilled water through the water coolers of the Control Room liquid chillers and the cooling coils of the Control Room and Cable, Battery and Switchgear Rooms fan-coil units. The pumps are controlled locally by pushbuttons or remotely from Panel No. 25 by selector switches (ON-OFF), AH-HS-5206 & 5209. The pumps AH-P-1A & 1B are rated at 10HP each and receive power from 480V BUS 2-12E & 2-22E respectively. Pump operation is indicated by pilot lights locally and on Panel No. 25 in the Control Room.

2.1.11 Chilled Water System Expansion Tank AH-T-1

The expansion tank (see Table 12) is constructed of carbon steel. It has a capacity of 65 gallons and is 1'6" in diameter. The tank is located in the Mechanical Equipment Room of the Control Building near the liquid cooler pumps. The tank has a vent, a valve drain and is connected to the common suction of the liquid cooler pumps.

2.1.12 Chilled Water System Chemical Feed Tank AH-T-2

The Chemical feed tank (see Table 13) is constructed of carbon steel. It has a capacity of five gallons and is 8½" in diameter and 25-7/8" long. The tank is mounted horizontally in the Mechanical Equipment Room of the Control Building near the liquid cooler pumps.

The tank has a fill connection, vent and drain valves, a relief valve set at 55 psi and inlet and outlet connections common on both liquid cooler pumps.

2.2 Instruments, Controls, Alarms and Protective Devices

The following instruments, controls, alarms and protective devices are used in the Control Room Heating, Ventilating and Air Conditioning System (see Tables 14 and 15):

Selector switches, with pilot lights to indicate operation, are furnished on HVAC Control Panel No. 25 in the Control Room for remote operation of the supply air fans. An electrical interlock starts the exhaust fan when either supply fan starts. Solenoid valves admit instrument air which opens the damper located in the discharge duct of each supply fan, and opens the shut-off valve at the water inlet of the cooling coil when the associated fan motor is energized. A solenoid valve, AH-EP-5207, admits instrument air to the operator closing the damper located in the exhaust fan bypass when the exhaust fan motor is energized.

The control room bypass supply fans receive a start signal from the Safety Features Actuation System, Radiation Monitoring System (high radiation in the Control Room supply duct) and the Chlorine Gas Monitoring System (Air Intake Tunnel and Control Building Air Intake Duct). Interlocks, with dampers place the Control Room in the minimum outside in recirculation mode when the fans start. The Control Room bypass supply fans may be started manually either locally or in the Control Room.

The Control Room supply damper, AH-D4092C, is closed by detection of chlorine gas, fire or incipient explosion in the Air Intake Tunnel. A limit switch on the supply damper is interlocked with damper AH-D4092D & E and AH-ED 4098 to position them for recirculation when AH-D4092C is closed.

Red pilot lights on Panel No. 25 indicate operation of all fans, green lights indicate the fan is de-energized.

A selector switch for the exhaust fan is provided on Panel No. 25 for testing purposes.

Interlocks with light switches place kitchen and toilet fans in operation when the lights in these areas are turned on.

The roll type filters in the supply air system and the control Room bypass system are progressed automatically by electric motors actuated by differential pressure switches. A high differential pressure across the bypass filters, indicative of dirty filters, is indicated locally. Limit switches on each Roll-Aire filters actuates an alarm on Panel No. 25 when the roll has advanced to the end of its travel.

A bypass supply differential pressure controller modulates the inlet vanes of the bypass supply fans to maintain constant flow through the filters as filter resistance builds up.

Flow switches in the outlet ducts from the Control Room supply fans are provided to energize red lights on Panel No. 25 when flow is established. A flow alarm is actuated if a fan is energized and there is insufficient flow.

Heating coils, recirculation dampers, and cooling water flow are controlled by the Control Room pneumatic thermostat AH-TS-5209. Heating coil operation is indicated by a local pilot light. A temperature controller is provided in the outside air supply duct to place the system on minimum outside air recirculation when ever the outside air temperature rises above 70°F. The controller closes supply damper AH-D4092D and exhaust damper AH-ED4098 and opens recirculation damper AH-D4092E. Replenishment air (1000 CFM) enters through the minimum outside air duct to prevent the air from becoming stale.

Level controllers on the chilled water expansion tank AH-T-1 control makeup water to the system by opening and shutting the demineralized water make-up valve DW-V15.

If the tank level exceeds its normal operating band high and low level alarms are annuciated on Panel No. 25.

The Control Room temperature is recorded by a multiple pen recorder on Panel No. 25. The recorder gives the operator a continuous record of Control Room temperature during normal and emergency conditions. Also the operator may detect trends which can be used in evaluating the operation of the ventilating system. The outside air temperature is indicated locally at the supply duct in the Mechanical Equipment Room.

Selector switches and indicating lights are provided on Panel No. 25 for remote operation of Control Building river water booster pumps, liquid cooler pumps and liquid chillers. Chilled water and river water temperatures are recorded on a multiple pen recorder on Panel No. 25 and are indicated locally. Local pressure indicators are also furnished for river water chilled water pressure indication.

A flow switch is provided in each river water and chilled water circuit to energized indicating lights on Panel No. 25 whenever flow is established in its respective circuit.

The flow switches in the chilled water lines are also interlocked to open the liquid chiller river water shutoff valve to the associated liquid chiller condenser and to permit starting of the associated liquid chiller compressor when chilled water flow is established. White and green pilot lights on Panel No. 13 indicate the position of NR-V144A & B.

3.0 PRINCIPAL MODES OF OPERATION

3.1 Startup

The valves and damper positions are checked for proper line up. The fire dampers are checked by opening the adjacent access door. One of the two fans (AH-C-16A & 16B) in the fan coil unit is started remotely from the Control Room (Panel No. 25) by AH-HS-5216 or 5217. The second fan is a standby unit. Indication of which fan is operating is shown in the Control Room. The second fan automatically starts if the first fan stops for any reason. When the fan is started, the associated solenoid valves are energized, which allows instrument air to open the associated two-position fan discharge damper (AH-D4096A or B) and cooling coil water supply shutoff valve (AH-V32A or B) in the chilled water supply pipe line.

1.26 336

By electrical interlock, when either of the supply fans (AH-E-16A & B) is started, the main exhaust-return air fan (AH-E-36) is started. When the exhaust-return air fan is operated, the associated solenoid valve is energized, which allows instrument air to close the two-position damper in the bypass duct around the exhaust fan. If the exhaust-return air fan motor should fail or be stopped manually, the solenoid valve repositions and allows instrument air to open the damper in the by-pass duct allowing free passage of air to the exhaust-return duct system.

After a Control Room supply fan has been started, flow switch AH-FS-5215 or 5219 in the supply fan inlet duct energizes flow light AH-FL-5215 or 5219 or verify that air supply flow has been established. A flow alarm on Panel No. 25 will be actuated if a fan is energized and flow is not sufficient.

After a supply fan has been, started, chilled water supply to the Control and Cable Rooms is established as follows: A chilled water pump, AH-P-1A or 1B, is started from Panel No. 25 using control switch AH-HS-5206 or 5269. Once chilled water flow is established through a water cooler a flow switch will open the river water inlet valve, NR-V144A or B, to the associated chiller condenser. A Control Building River Water Booster Pump NR-P-2A or 2B, is started from Panel No. 25 using control switch AH-HS-5267 or 5268. A chiller unit compressor is then started. Interlocks prevent starting a chiller unit unless chilled water flow have been established through the unit and one Control Building River Water Booster pump is operating.

Flow lights AH-FL-5205 & 5282 and AH-FL-5280 & 5281 are provided on Panel No. 25 to indicate flow into the chilled water pumps and from the control Building River Water booster pumps respectively.

All fans, chillers and pumps have local controls in addition to those located on Panel No. 25. Red and green indicating lights are provided with local and remote control switches. When the controls are in the "PULL-TO-LOCK" or "AUTO" positions and the equipment is not running, the green light is energized and when the equipment is operating the red light is energized.

3.2 Normal Operation

The thermostat (AH-TS-5209) in the Control Room maintains the set temperature as follows: As the room temperature drops below the set point (75°F), the operating fan-coil unit electrical heating elements are energized in multiple stages. The heating elements in the idle fan-coil unit are not energized due to an electrical interlock with the fan motor. As the room temperature rises the heaters are de-energized and when the temperature is above the set point, the thermostat positions the outside, return and exhaust dampers AH-D4092D, AH-1092E and AH-D4098 so as to increase the proportion of outside air handled by the fan, and decrease the proportion of recirculated air. If the room temperature continues to rise and the dampers are positioned for 100% outside air, the thermostat modulates the three-way valve (AH-V33A or 33B) located at the outlet of the cooling coils to admit chilled water to the cooling coils chiller.

Control of the outside, return and exhaust dampers is removed from the Control Room thermostat whenever the outside air temperature is above 70°F. This is accomplished by the temperature indicating controller AH-TIC-5209, with its sensing element located in the outside air duct. The controller positions the damper for minimum outside air recirculation. In this mode, all of the cooling is supplied by the chiller units.

The rolled media of inlet filters AH-F-2A & B are advanced automatically by a differential pressure switch when pressure drop across the filter reaches a predetermined value.

The exhaust fans serving the kitchen (AH-E-25) and toilet (AH-E-5) areas and their associated dampers are electrically interlocked with the light switches for these areas so that they will operate whenever the lights are turned on.

Annunciators are provided per Table 4 to annunciate deviations from normal operating conditions on Panel No. 25 in the Control Room.

3.3 Special and Infrequent Operation

Control switch AH-HS-5207 allows the operator to test the exhaust fan AH-E-35 without starting either supply fan in fan-coil unit AH-C-16A or B. The switch also allows the operator to stop the exhaust fan by placing the switch in the "PULL-TO-LOCK" position without de-energizing supply fans.

To remove smoke and vapors from the Control Room, the toggle switch in the local fire detection panel must be placed to

"DISCONNECT". This overrides all the interlocks associated with the local fire detection panel and allows the dampers to be positioned for 100% outside air and the supply fans to be started. The override switch may be returned to normal when the smoke and vapors have been reduced sufficiently to reset the detectors.

Provision is made to allow the system to being in all outside air, with no recirculation air, regardless of the outside air temperature. This is accomplished by a Manual Switch (AH-KHS-5209) on Panel No. 25 in the Control Room which actuates an electric/pneumatic relay in the control line to the outside, return and exhaust dampers. When this is activated, the cooling coils may not have sufficient cooling capacity to maintain Control Room temperature at 75°F. This mode would be used to clear the Control Room of smoke and vapors after a fire.

3.4 Shutdown

The chiller units should be shutdown first; however, ensure that they are not required for cooling the Cable Room. The chiller units and the liquid cooler pump can be shutdown locally or remotely from Panel No. 25. Before stopping the supply fans or the bypass supply fans, if they are running, the control switch for the standby fans must be placed in "PULL-TO-LOCK". The running bypass supply fan is de-energized and ten (10) seconds later the control switch on the standby fan may be placed in "AUTO". The control switch for the supply fans must be placed in "PULL-TO-LOCK" to prevent restarting after it has been stopped. The exhaust fan will stop automatically when both supply fans are de-energized.

3.5 Emergency

A signal from the Safety Features Actuation System, Radiation Monitoring System or Chlorine Gas Monitoring System automatically starts one Control Room bypass supply fan which are interlocked with AH-V 124A & B and AH-V125A & B to position dampers AH-D4092A, B, D and AH-ED4098 for recirculation. A signal from the Chlorine Gas Monitoring System also closes damper AH-D4092C which places the ventilation system in the 100% recirculation mode. The SFAS system also starts Control Building RW Booster pumps, a chilled water pump and a liquid chiller unit.

After detection of an incipient explosion, fire or chlorine gas in the Air Intake Tunnel, the system is shifted to 100% recirculation, by shutting the air supply shutoff damper, AH-D4092C.

Operation of a Control Room bypass fan energizes its associated solenoid valve which allows instrument air to open the two-position damper in the fan discharge duct. A differential pressure controller (AH-DPIC-5211), controls the inlet vane dampers to allow constant flow as the filters become loaded. A differential pressure switch (AH-dPS-5212) actuates an alarm in the Control Room when the filters become loaded with dust, as indicated by an increased pressure drop across the filters.

A signal from the local fire detection panel stops all the fans and repositions the dampers AH-D-4092A, B, C and AH-ED-4092 for 100% recirculation when fires or smoke is detected in the Control Room.

4.0 HAZARDS AND PRECAUTIONS

Care must be taken to start a liquid cooler pump before starting a Control Building river water booster pump and stopping these booster pumps if there is no demand for river water to prevent them from running at a shutoff head for long periods of time.

The filters in the Control Room bypass filter train must be treated as potentially contaminated. Care must be taken when changing these filters especially after a LOCA or high radiation emergency.

Combustable vapors in the Air Intake Tunnel alarm on Panels No. 1 but no automatic action is provided.

TABLE 1
CONTROL ROOM FAN - COIL UNITS

Unit Details

Identification	AH-C-16A & B
No. Installed	2
Manufacturer	Buffalo Forge
Model No.	160 PC

Cooling Coil Details

Manufacturer	Buffalo Forge
Model No.	160 PC
Cooling Coil Area, ft ²	27.7
Rows and Nominal Fins per inch	6;2.4
Circuit	Full
Cooling Capacity, BTU/hr.	440,000
Cooling Water Flow, GPM	82
Air Velocity, FPM	564
Cooling Water Head Loss, ft H ₂ O	15
Cooling Water Temperature, In °F/Out, °F	45/55.7
Entering Air, Dry-Bulb, °F/Wet-Bulb, °F	75.4/63.2
Leaving Air, Dry-Bulb, °F/Wet-Bulb, °F	57.1/55.3

Fan Details

Model No.	2-365 BLD
Type	Centrifugal
Rated Capacity, CFM	15,620
Static Press., in. H ₂ O.	2.5

TABLE 1 (Continued)
CONTROL ROOM FAN - COIL UNITS

Fan Details

Rated Speed (rpm)	2093
Other	N/A

Fan Motor Details

Manufacturer	Westinghouse
Type	2847
Enclosure	Open
Rated hp	15
Rated Speed, rpm	1800
Lubricant-Coolant	Oil/Air
Power Requirements	460V, 3Ø, 60Hz
Power Source	480V Buses 2-12E for AH-C-16A 2-22E for AH-C-16B.

Heater Details

Manufacturer	I
Model No.	
Type	Electric Coil
Capacity, Kw/step	15, 15 & 20
Power Requirements	480V, 3Ø, 60Hz
Power Source	480V MCC 2-42C

Classification

Code	C
Quality	4
Seismic	I
Cleanliness	C

TABLE 2
CONTROL ROOM SUPPLY FILTER

Filter Details

Identification	Control Room Supply Filter - AH-F-2A & B
No. Installed	2
Manufacturer	MSA
Type	Horizontal Roll Filter
Model No.	H66AC
Size	3'0 X 10'11"
Capacity	15,620
Pressure Drop, Clean in H ₂ O	0.16
Efficiency	85% (NBS Dust Spot Test)

Drive Motor Details

Manufacturer	
Type	Induction Motor
Enclosure	Open
Rated hp	1/6
Rated Speed	1450
Lubricant Coolant	Oil/Air
Power Requirements	115V 1Ø 60Hz
Power Source	120V Power Panel MP2-42C

Classification

Code	C
Quality	4
Seismic	I
Cleanliness	D

TABLE 3CONTROL ROOM - BYPASS SUPPLY FANSFan Details

Identification	Control Room Bypass Supply Fans AH-E-4A & B
Number Installed	2
Manufacturer	Buffalo Forge
Model No.	Later
Type	Centrifugal
Rated Capacity, CFM	15,620
Static Press., in. H ₂ O	11
Rated Speed, rpm	2187
Other	Variable inlet vane with air operator and positioner

Fan Motor Details

Manufacturer	Westinghouse
Type	Squirrel Cage Induction
Enclosure	Open
Rated hp	40
Rated Speed, rpm	1800
Lubricant-Coolant	Oil/Air
Power Requirements	460V, 3Ø, 60 Hz
Power Source	480V BUSSES 2-12E for AH-E-4A 2-22E for AH-E-4B

Classification

Code	C
Quality	4
Seismic	I
Cleanliness	D

TABLE 4CONTROL ROOM BYPASS ROLL-AIRE FILTERFilter Details

Identification	Control Room Bypass Roll-Aire Filter AH-F-3
Number Installed	1
Manufacturer	MSA
Type	Vertical Roll Filter
Model No.	V66AC
Size	5'0" X 7'8"
Capacity	15,620
Pressure Drop, Clean, in H ₂ O	0.16
Efficiency, %	85 (NBS Dust Spot Test)

Drive Motor Details

Manufacturer	
Type	Induction
Enclosure	Open
Rated hp	1/6
Rated Speed, . . .	1450
Lubricant-Coolant	Oil/Air
Power Requirements	115V, 3Ø, 60 Hz
Power Source	120V Power Panel MP2-42C

Classification

Code	C
Quality	4
Seismic	I
Cleanliness	D

TABLE 5
CONTROL ROOM BYPASS ABSOLUTE AIR FILTERS

Filter Details

Identification	Control Room Bypass Absolute Filter AH-F-4, AH-F-29
Number Installed	2
Manufacturer	MSA
Type	HEPA
Model No.	None
Size	24" X 24" X 11½"
Capacity, CFM	15,620
Pressure Drop, Clean, in H ₂ O	1.2
Efficiency, %	99.97%

Classification

Code	C
Quality	4
Seismic	I
Cleanliness	D

TABLE 6
CONTROL ROOM BYPASS CARBON AIR FILTER

Filter Details

Identification	Control Room Bypass Activated Carbon Filter AH-F-5
Number Installed	1
Manufacturer	MSA
Type	Activated Charcoal
Model No.	None
Size	24" X 40" X 7-3/4"
Capacity, CFM	15,620
Pressure Drop, Clean, in H ₂ O	1.0
Efficiency, %	99 (Retention) 99.9 (Iodine)

Classification

Code	C
Quality	4
Seismic	I
Cleanliness	D

TABLE 7
CONTROL ROOM EXHAUST FAN

Fan Details

Identification	Control Room Exhaust Fan AH-E-35
Number Installed	1
Manufacturer	Buffalo Forge
Model No.	730
Type	Centrifugal
Rated Capacity, CFM	15,620
Static Press., in. H ₂ O	2
Rated Speed, (RPM)	772
Other	N/A

Fan Motor Details

Manufacturer	Westinghouse
Type	Squirrel Cage Induction
Enclosure	Open
Rated hp	10
Rated Speed, (RPM)	1800
Lubricant-Coolant	Oil/Air
Power Requirements	460V, 3Ø 60, Hz
Power Source	480V BUS 2-12E

Classification

Code	C
Quality	4
Seismic	I
Cleanliness	D

TABLE 8
KITCHEN EXHAUST FAN

Fan Details

Identification	Kitchen Exhaust Fan AH-E-25
Number Installed	1
Manufacturer	Buffalo Forge
Model No.	C
Type	Centrifugal
Rated Capacity, CFM	200
Static Press., in. H ₂ O	3/4
Rated Speed, (RPM)	1725
Other	N/A

Fan Motor Details

Manufacturer	General Electric
Type	Induction
Enclosure	Open
Rated hp	1/6
Rated Speed, rpm	1725
Lubricant-Coolant	Oil/Air
Power Requirements	115V, 1Ø, 60 Hz
Power Source	120V Power Panel MP2-42C

Classification

Code	C
Quality	4
Seismic	II
Cleanliness	D

TABLE 9
TOILET EXHAUST FAN

Fan Details

Identification	Toilet Exhaust Fan AH-E-5
Number Installed	1
Manufacturer	Buffalo Forge
Model No.	C
Type	Centrifugal
Rated Capacity, CFM	200
Static Press., in. H ₂ O	3/4
Rated Speed, RPM	1725
Other	N/A

Fan Motor Details

Manufacturer	General Electric
Type	Induction
Enclosure	Open
Rated hp	1/6
Rated Speed, RPM	1725
Lubricant-Coolant	Oil/Air
Power Requirements	115V, 1Ø, 60 Hz
Power Source	120V Power Panel MP2-42C

Classification

Code	C
Quality	4
Seismic	II
Cleanliness	D

TABLE 10
CONTROL BUILDING LIQUID CHILLER UNIT

Unit Details

Identification	AH-C-2A & B
Number Installed	2
Manufacturer	York
Model No.	HT-A3-A4-AB
Type	Hermetic Turbopak
Capacity, tons	110
Chilled Water Flow, GPM	275
Chilled Water Inlet Temperature, °F	54.6
Chilled Water Outlet Temperature, °F	45.0
Chilled Water Cooler Pressure Drop, ft.	13.6
River Water Flow, GPM	243
River Water Inlet Temperature, °F	85
River Water Condenser Pressure Drop, ft.	7.1
Chilled Water Cooler Fouling Factor, in.	.0005
Condenser Fouling Factor, in.	.001
Condensing Temperature, °F	110

Compressor Motor Details

Manufacturer	Borge Warner
Type	Induction
Enclosure	Closed (Hermetic)
Rated hp	95
Rated Speed, rpm	Later

TABLE 10 (Continued)
CONTROL BUILDING LIQUID CHILLER UNIT

Compressor Motor Details

Lubricant-Coolant

Oil/Air

Power Requirements

460V 3Ø 60 Hz

Power Supply

480V BUSES 2-12E for
AH-C-8A 2-22E for AH-C-8B

Classification

Code

C

Quality Control

4

Seismic

I

Cleanliness

D

126 354

TABLE 11
CONTROL BUILDING LIQUID COOLER PUMPS

Pump Details

Identification	Control Building Liquid Cooler Pumps AH-P-1A & B
Number Installed	2
Manufacturer	Crane-Deming
Model No.	A 40
Type	Horizontal Centrifugal
Rated Speed, RPM	1750
Rated Capacity, gpm	275
Rated Total Dynamic Head, ft.	60
Submergency Required at Rated Flow, ft.	4
Design Pressure, Casing, psig	50
Design Temperature, °F	45-55
Lubricant-Coolant	Oil/Water
Min. Flow Requirements, gpm	3

Motor Details

Manufacturer	Westinghouse
Type	Squirrel Cage Induction
Enclosure	Open
Rated hp	10
Speed, rpm	1750
Lubricant-Coolant	Oil/Air
Power Requirements	460V, 3Ø, 60 Hz Full Load Current 13.5 amps
Power Source (for each Pump motor)	480V, BUSES2-12E for AH-P-1A 2-22E for AH-P-1B.

TABLE 11 (Continued)
CONTROL BUILDING LIQUID COOLER PUMPS

Classification

Code	C
Quality Control	4
Seismic	I
Cleanliness	D

196 356

TABLE 12

CHILLED WATER SYSTEM EXPANSION TANK

Identification	AH-T-1
Manufacturer	RECO
Capacity, gallons	65
Installation	Indoor
Outside diameter & length	18" X 5'0"
Shell Material	A53 Carbon Steel
Shell Thickness, in.	.562
Design Temperature, °F	100
Design Pressure, psig	75
Corrosion Allowance, in.	None
Design Code	ASME
Code Stamp Required	Yes
Lining	ENCOR-PC-700-HB

Classification

Code	C
Quality Control	4
Seismic	I
Cleanliness	D

TABLE 13
CHILLED WATER SYSTEM CHEMICAL FEED TANK

Identification	AH-T-2
Manufacturer	Neptune
Capacity, gal.	5
Installation	Horizontal
O.D. & Length, in.	8½' X 25-7/8"
Shell Material	CS
Shell Thickness, in.	.12
Design Temperature, °F	65
Design Pressure, psi	50
Corrosion Allowance, in.	None
Design Code	N/A
Code Stamp Required	N/A

Classification

Code	C
Quality Control	4
Seismic	I
Cleanliness	D

DT.....DATE.....
 CHAS. ST.....DATE.....
 SUBJECT.....
 PROJECT NO.....
 JOB NO.....

TABLE 14
 INSTRUMENTATION AND CONTROLS

Identification	Description	Function	Location	DT/2	Input Range	Output Range	Rel Point
AI-PS-5100/5101	Flow Switch	Detect flow in the 4" river water inlet line to the Liquid Chillers AI-C-8A & 8B respectively.	Pipe	None Actuated	Later	N/A	50 gpm
AI-PS-5100/5101	Indicating Light	Indicate (Flow-No Flow) condition in the 4" river water inlet line to the Liquid Chillers AI-C-8A & 8B respectively.	Panel 35	Red-Green	N/A	N/A	N/A
AI-PS-5102/5103	Flow Switch	Detect flow in the inlet to the Liquid Cooler Pumps AI-P-1A & 1B respectively. Interlocked with AI-V10A & B and AI-C-8A & 8B.	Pipe	None Actuated	Later	N/A	137 gpm
AI-PS-5102/5103	Indicating Light	Indicate (Flow-No Flow) condition in the inlet to the Liquid Cooler Pumps AI-P-1A & 1B respectively.	Panel 35	Red-Green	N/A	N/A	N/A
AI-LS-5103/5113	Limit Switch	Provide indication of when replacement of filter AI-F-2B & 2A respectively is necessary.	Filter	Limit Switch	N/A	N/A	End of Travel
AI-LI-5105	Level Indicator	Indicate level in Chilled Water Expansion Tank.	Tank	Gauge Class 0-5"	0-5"	0-5"	N/A
AI-PS-5104/5105	Tank Level Control	Provide indication of high and low level in Chilled Water Expansion Tank.	Tank	Pressure Switch	1-45" W.G.	N/A	34"/25"
AI-PS-5106/5109	Tank Level Control	Provide "Open" and "Shut" signal to Chilled Water Expansion Tank fill valve (AI-V15).	Tank	Pressure Switch	1-45" W.G.	N/A	31.5"/27.5"
AI-TS-5109	Resistance Thermometer	Detect temperature of Control Room and transmit signal to recorder AI-MTS-5109	Pipe	RTD	0-200°F	92.93-135.97/Δ	N/A
AI-MTS-5109	Recorder Point	Record on multipoint temperature recorder temperatures received from resistance thermometer AI-TS-5109	Panel 25	Multipoint Recorder	92.93-135.97/Δ	0-200°F	N/A
AI-TS-5200/5201	Resistance Thermometer	Detect chilled water temperature entering the water cooler in Liquid Chillers AI-C-8B & 8A respectively.	Pipe	RTD	0-200°F	92.93-135.97/Δ	N/A
AI-MTS-5200/5201	Recorder Point	Record on multipoint temperature recorder temperatures received from resistance thermometers AI-TS-5200 & 5201 respectively.	Panel 25	Multipoint Recorder	92.93-135.97/Δ	0-200°F	N/A
AI-TS-5202/5203	Resistance Thermometer	Detect river water temperature leaving the condensate in the Liquid Chillers AI-C-8B & 8A respectively.	Pipe	RTD	0-200°F	92.93-135.97/Δ	N/A
AI-MTS-5202/5203	Recorder Point	Record on multipoint temperature recorder temperatures received from resistance thermometers AI-TS-5202 & 5203 respectively.	Panel 25	Multipoint Recorder	92.93-135.97/Δ	0-200°F	N/A
AI-TIC-5304/5350	Temperature Controller	Regulate river water flow to Liquid Chiller Condensers	Chiller	Proportional Controller	-50 to 134°F	3-15 gpm	70°F
AI-OP-5306/5309	Motor Operator	Provide (auto-on-off) control for Liquid Cooler Pumps AI-P-1A & 1B respectively.	Panel 25	ON Switch	N/A	N/A	N/A

BY DATE
CMB: BY DATE

SUBJECT
JOE MO

SHIRT NO.
JOE MO

OF

TABLE 14 (Continued)

INSTRUMENTATION AND CONTROLS

Identification	Description	Function	Location	Type	Input Range	Output Range	Set Point
AM-EX-5206/5208	Indicating Light	Indicate (Power-on Power-off) on the control panel for Liquid Cooler Pumps AM-B-1A & 1B respectively	Panel 25	Red-Green	N/A	N/A	N/A
AM-EX-5207	Motor Operator	Provide (Auto-on-off) control for Makeup Fan AM-B-15	Panel 25	SSM Switch	N/A	N/A	N/A
AM-EX-5207	Indicating Light	Indicate (Power-on Power-off) on the control panel for Exhaust Fan AM-B-15	Panel 25	Red-Green	N/A	N/A	N/A
AM-EX-5208	Flow Switch	Detect flow at the outlet of Exhaust Fan AM-B-15	Duct	Wane Activated Red-Green	0-100 FPM	N/A	15 FPM
AM-EX-5208	Indicating Light	Indicate (Flow-No Flow) to the outlet from Exhaust Fan AM-B-15	Panel 25	Red-Green	N/A	N/A	N/A
AM-EX-5209	Control Relay	Receive signal from temperature indicating controller AM-VTC-5209 and control cooling coil throttle valve and heater	Back	Pneumatic Relay	3-8 psi	0-15 psi	N/A
AM-EX-5209	Control Relay	Control Makeup AM-DA0000, B and AM-824002	Back	Pneumatic Relay	0-25 psi	3-8 psi	N/A
AM-EX-5209	Temperature Indicating Controller	Detect temperature in the Control Room inlet duct upstream of the bypass and transmit a pneumatic signal to Duplex Pressure Selector AM-DRP-5209B	Back	Capillary Tube and Bulb	-10 to 114°	Later	75°
AM-EX-5209	Thermostat	Control temperature in Control Room by operating Bypass Controllers 5214 & 5218 for the electric heaters the pneumatic operators for the chilled water flow bypass valve to the cooling coils in Fan-Coil Unit AM-C-10A & B and the recirculation dampers AM-DA002 D & E and AM-D-4058	Back	Pneumatic Thermostat	24-215	Later	75°
AM-EX-5209	Push Button	Provide manual shift to 100% outside air ventilation overriding automatic temperature controls	Panel 25	Pushbutton	N/A	N/A	N/A
AM-EX-5211	Flow Element	Measure dynamic pressure head and indicate flow in the common inlet duct to By-pass Supply Fans AM-B-4A & 4B	Duct	Pilot Tube	0-15.430 FPM	0-2.8" WG	N/A
AM-EX-5211	Differential Pressure Indicating Controller	Maintain constant flow through the By-pass Supply Fans by keeping a constant pressure drop across filters upstream of fans. The constant pressure drop is maintained by adjusting the inlet vane dampers in the By-pass Supply Fans with a pneumatic operator	Duct	Diaphragm	0-3" W.G.	3-15 psi	2.5" W.G.
AM-EX-5212	Limit Switch	Provide indication of when replacement of the prefilter in By-pass Supply Filter Bank is necessary	Filter	Limit Switch	N/A	N/A	End of Travel
AM-EX-5212	Differential Pressure Switch	Provide indication of high differential pressure across By-pass Supply Filter Bank	Back	Later	0-8" WG	3-10 psi	3" WG
AM-EX-5212/5213	Flow Switch	Detect flow at outlet of Fan-Coil Units AM-C-10A & 10B respectively	Duct	Wane Activated	0-30 FPM	N/A	15 FPM

BY..... DATE..... SUBJECT..... SHEET NO..... OF.....
 CMD. BY..... DATE..... JOE NO.....

TABLE 14 (Continued)
 INSTRUMENTATION AND CONTROLS

Identification	Description	Function	Location	Type	Input Range	Output Range	Set Point
AM-PL-5215/5219	Indicating Light	Indicate (Flow-No Flow) at the outlet of Fan-Coil Units AH-C-16A & 16B respectively.	Panel 25	Red-Green	N/A	N/A	N/A
AM-B-5216/5217	Control Switch	Provide (auto-on-off) control for the fans in Fan-Coil Units AH-C-16A & 16B respectively.	Panel 25	SBM Switch	N/A	N/A	N/A
AM-KL-5216/5217	Indicating Light	Indicate (Power-on Power-off) on the control panel for the fans in Fan-Coil Units AH-C-16A & 16B respectively.	Panel 25	Red-Green	N/A	N/A	N/A
AM-NS-5265/5266	Control Switch	Provide (auto-on-off) control for By-pass Supply Fans AH-E-4A & 4B respectively.	Panel 25	SBM Switch	N/A	N/A	N/A
AM-KL-5265/5266	Indicating Light	Indicate (Power-on Power-off) on the control panel for By-pass Supply Fans AH-E-4A & 4B respectively.	Panel 25	Red-Green	N/A	N/A	N/A
AM-NS-5770/5771	Control Switch	Provide remote (auto-on-off) control for the Liquid Chillers AH-C-8A & 8B respectively.	Panel 25	SBM Switch	N/A	N/A	N/A
AM-KL-5770/5771	Indicating Lights	Provide (Power-on, Power-off) on Panel 25 for Liquid Chillers AH-C-8A & 8B respectively.	Panel 25	Red-Green	N/A/	N/A	N/A

197 001

BY.....DATE..... SUBJECT..... SHEET NO..... OF.....
 CHR.B. BY.....DATE..... JOB NO.....

TABLE 15

PANEL MOUNTED ANNUNCIATORS

Identification	Measured Description, Units	Alarm		Input Source	Ver. Range	Panel
		Hi	Low			
AH-KSA-5103/5213	End of travel for Rolled Media Filters AH-F-2A & B respectively.	N/A	N/A	AH-KS-5103/5213	N/A	25
AH-LA-5106	High or low level in Chilled Water Expansion Tank AH-T-1	34°	26°	AH-LA-5105/5106	1-45" W.G.	25
AH-KSA-5212	End of travel for Rolled Media Prefilter AH-F-3	N/A	N/A	AH-KS-5212	N/A	25
AH-8MSA-5212	High differential pressure across By-pass Filter Bank	0" W.G.	N/A	AH-LPS-5212	1-20 psi	25
	Control Room Fan-Coil Unit AH-C-16A & B Fan overload	N/A	N/A	OLX	N/A	25
	Control Room By-pass Supply Fans AH-B-4A & B overload	N/A	N/A	OLX	N/A	25
	Control Room Exhaust Fan AH-E-35 overload	N/A	N/A	OLX	N/A	25
	Control Building Liquid Cooler Pumps AH-P-1A & B overload	N/A	N/A	OLX	N/A	25

COMPUTER INPUTS

NONE

197 002

TMI DOCUMENTS

DOCUMENT NO: 7111-C-278

COPY MADE ON 5/8/79 OF DOCUMENT PROVIDED BY
METROPOLITAN EDISON COMPANY.

W.R. Mullinix
Wilda R. Mullinix, NRC

7906140377.

196 315