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August 2, 1985

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

Subject: Byron Station Units 1 and 2
Braidwood Station Units 1 and 2
Environmental Effects of
High Energy Line Breaks
NRC Docket Nos. 50-454, 50-455
50-456 and 50-457

References (a): May 17, 1985 letter from K. A. Ainger
to H. R. Denton

(b): May 20, 1985 letter from B. J. Youngblood
to D. L. Farrar

Dear Mr. Denton:

Reference (a) informed you of revised predicted environmental parameters resulting from high energy line breaks in the Steam Generator Blowdown (SD) and Auxiliary Steam (AS) systems. High energy line breaks in these systems were found to have a greater potential effect on environmental conditions than originally predicted. In order to justify continued operation of Byron Unit 1 until permanent modifications could be installed, we have posted personnel at designated locations in the Auxiliary Building so that the breaks could be promptly detected and terminated manually before environmental conditions exceeded predicted values. Included in reference (a) was a conceptual description of our plans for the permanent modifications to detect and isolate these breaks along with our schedule for installation of the modifications.

Reference (b) provided your concurrence with our temporary measures to deal with the effects of these lines breaks and also requested that we submit the details of the permanent modifications for NRC review. Enclosed is a detailed technical description of the permanent modifications that will be installed by August 31, 1985 on Byron Unit 1. The modifications consist of temperature sensors mounted in potentially affected areas coupled with automatic isolation of the systems, control room alarms, and appropriate procedures.

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Similar modifications, depending on specific break locations, will be installed on Byron Unit 2 and Braidwood Units 1 and 2 prior to their respective fuel load dates.

Please address any questions regarding this matter to this office.

One signed original and fifteen copies of this letter and enclosure are provided for NRC review.

Very truly yours,

K. A. Ainger

K. A. Ainger
Nuclear Licensing Administrator

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Enclosure

cc: Byron Resident Inspector

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HELB MONITORING/ISOLATION

DESIGN FOR SD AND AS SYSTEMS

In order to assure that a high energy line break (HELB) in the Steam Generator Blowdown (SD) or the Auxiliary Steam (AS) Systems does not result in significant increases in Auxiliary Building temperatures, modifications are being made to isolate those systems in the event of a break. Due to the internal flow resistance of the systems and the potential for a variety of break sizes, system flow monitoring was found to not be an optimal method of break detection. The modifications, therefore, consist of temperature sensors mounted in potentially affected areas coupled with automatic isolation of the systems, control room alarms and appropriate procedures.

SD SYSTEM MODIFICATIONS

The SD System consists of blowdown lines from each steam generator which penetrate the containment boundary and travel through the Main Steam Tunnel to a point (station location Q-10) where the lines penetrate into the Auxiliary Building. In the Auxiliary Building the piping is then routed into the blowdown condenser room. Breaks are postulated at the point where the piping enters the Auxiliary Building and in the blowdown condenser room as shown on Figure 1C.

Temperature Sensors are being installed at the locations indicated on Figure 1C. At each of these sensor locations, redundant 1E instruments will be installed, receiving power from electrical divisions 11 and 12, respectively. When the temperature in either area reaches 150°F, an alarm will be sounded in the control room and the four SD containment isolation valves will be automatically closed as shown on Figure 1B. These valves are shown on Figure 1A (SD002, B, D, F and H). As shown on Figure 1A, the SD System has only one containment isolation valve on each line due to the fact that it is a closed system inside the containment and requires only one automatic isolation valve to meet GDC requirements for containment isolation. As a redundant feature to assure that the system is isolated in the event of a malfunction of one of the SD002 valves, procedures will be developed to require local manual isolation of the system by closing the SD001 valves when the alarm in the control room is activated. This can be accomplished because the SD001 valves are located in the safety valve rooms which are remotely located from Auxiliary Building break locations.

AS SYSTEM MODIFICATIONS

The AS System provides low pressure (50 psig) steam to various Auxiliary Building loads including the boric acid and radwaste systems. Auxiliary steam is furnished either by the AS boiler or by extraction steam. In either case the AS routed to the Auxiliary Building flows through pressure

regulating valves AS013 and AS167 in the Turbine Building and is then routed in the Auxiliary Building in the AS Tunnel where it is distributed to various loads (see Figure 2A). At postulated break locations in the Auxiliary Building where the break is large enough to affect a large general area and the break effects cannot be shown to be restricted to non-safety areas, temperature sensors are being installed to alarm if the temperature reaches 150°F and to initiate automatic isolation of the AS System from the Auxiliary Building areas. Figures 2C through 2F show the break locations and sensor locations.

The temperature sensor design provides 1E redundant instrumentation at the necessary locations. When the temperature reaches 150°F, a signal will be initiated to close the AS013 and AS167 valves (Figure 2B) and an alarm will annunciate in the control room. These valves fail closed and are located in the Turbine Building in the Category II portion of the AS System. The electrical system (cables, conduit, and solenoids) for the AS013/AS167 isolation is made up of 1E components which have been reclassified as non-safety because they cross into the Turbine Building, while in the Auxiliary Building the system is seismically supported. To assure that steam flow is isolated in the event of failure of the AS013 or AS167 valves, procedures will be developed requiring local manual closure of valve AS012 after receipt of the control room alarm. This will provide redundancy in the isolation of the AS System and can be accomplished because the AS012 valve is located in the Turbine Building remotely located from the Auxiliary Building break locations.

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FIGURE 1A

STEAM GENERATOR BLOWDOWN CONFIGURATION (UNIT 1)

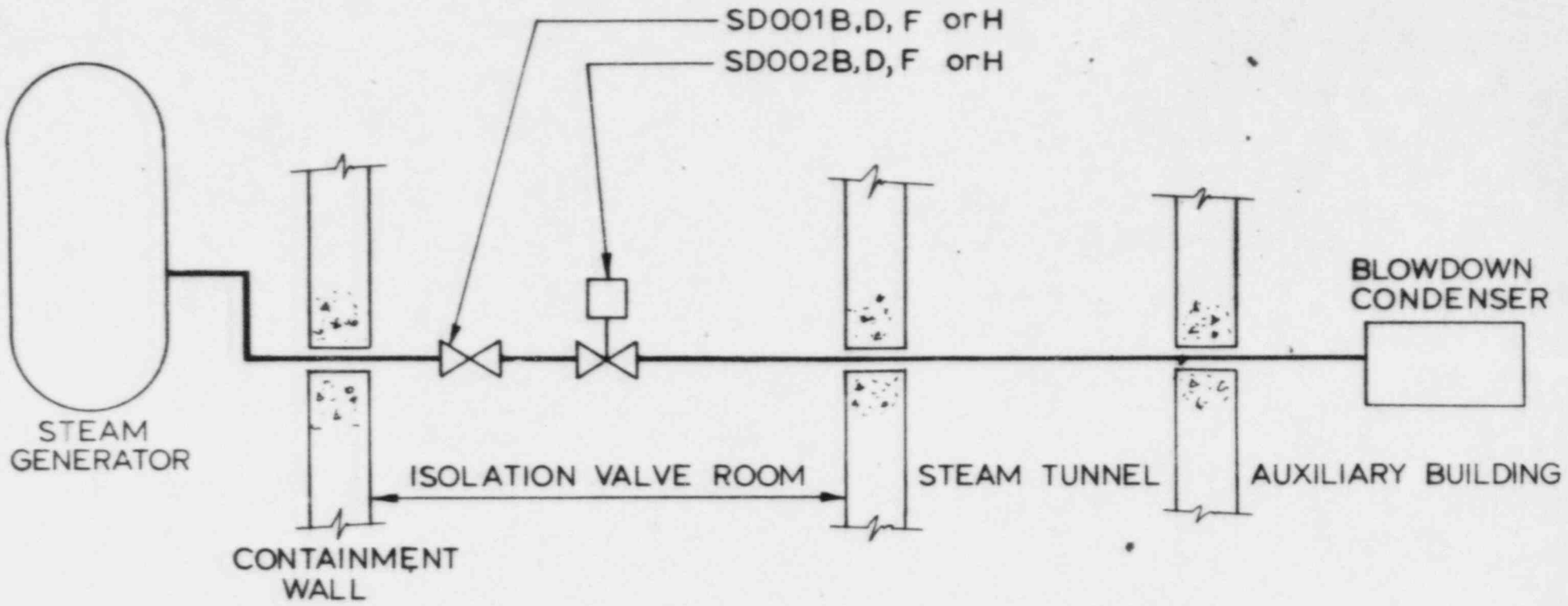
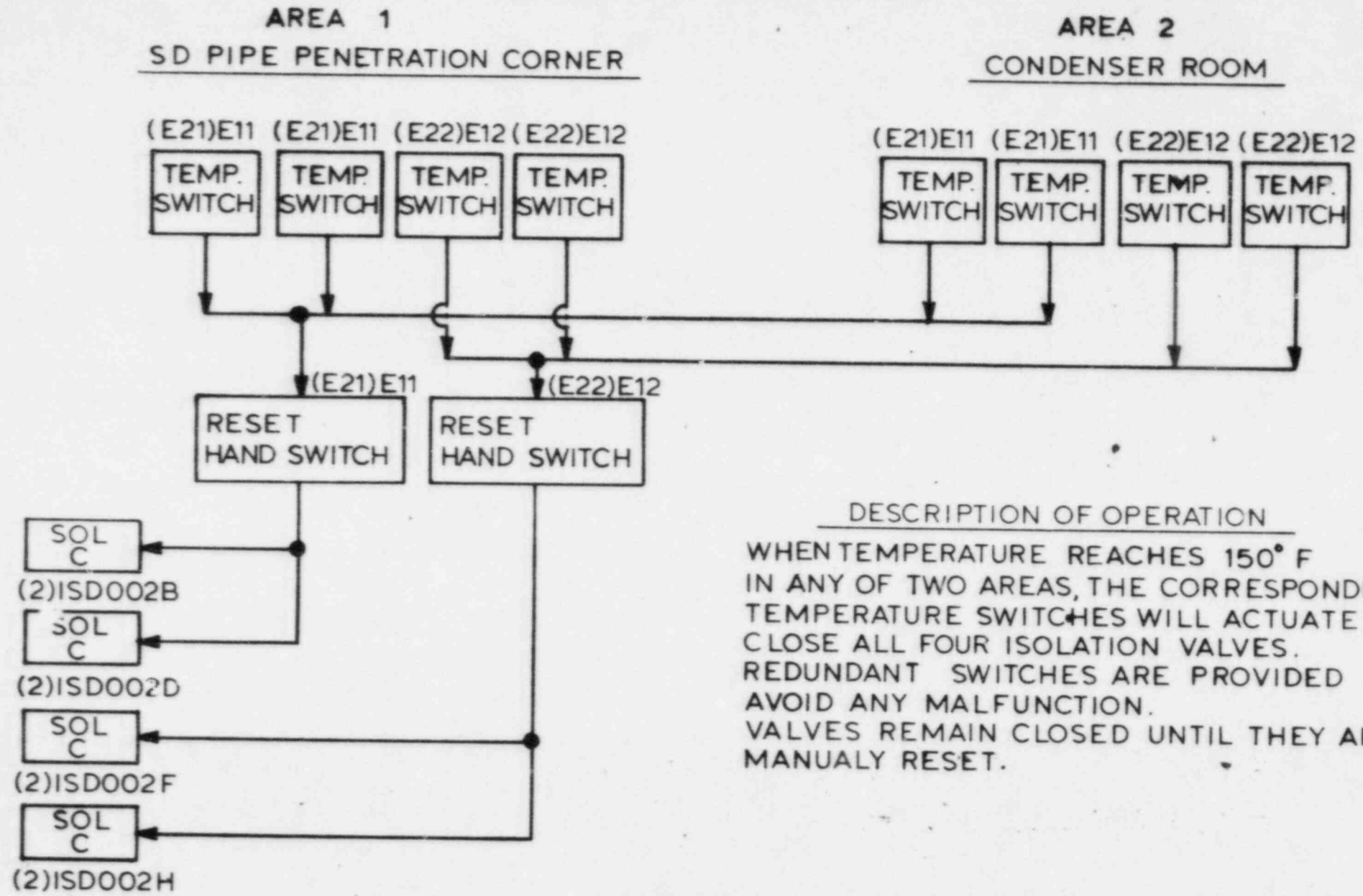


FIGURE 1B
S.G. BLDN ISOL VALVES TEMPERATURE CONTROL
(BLOCK DIAGRAM)



DESCRIPTION OF OPERATION

WHEN TEMPERATURE REACHES 150° F IN ANY OF TWO AREAS, THE CORRESPONDING TEMPERATURE SWITCHES WILL ACTUATE TO CLOSE ALL FOUR ISOLATION VALVES. REDUNDANT SWITCHES ARE PROVIDED TO AVOID ANY MALFUNCTION. VALVES REMAIN CLOSED UNTIL THEY ARE MANUALY RESET.

FIGURE 1C
STEAM GENERATOR BLOWDOWN SYSTEM HELB MONITORING (UNIT 1)

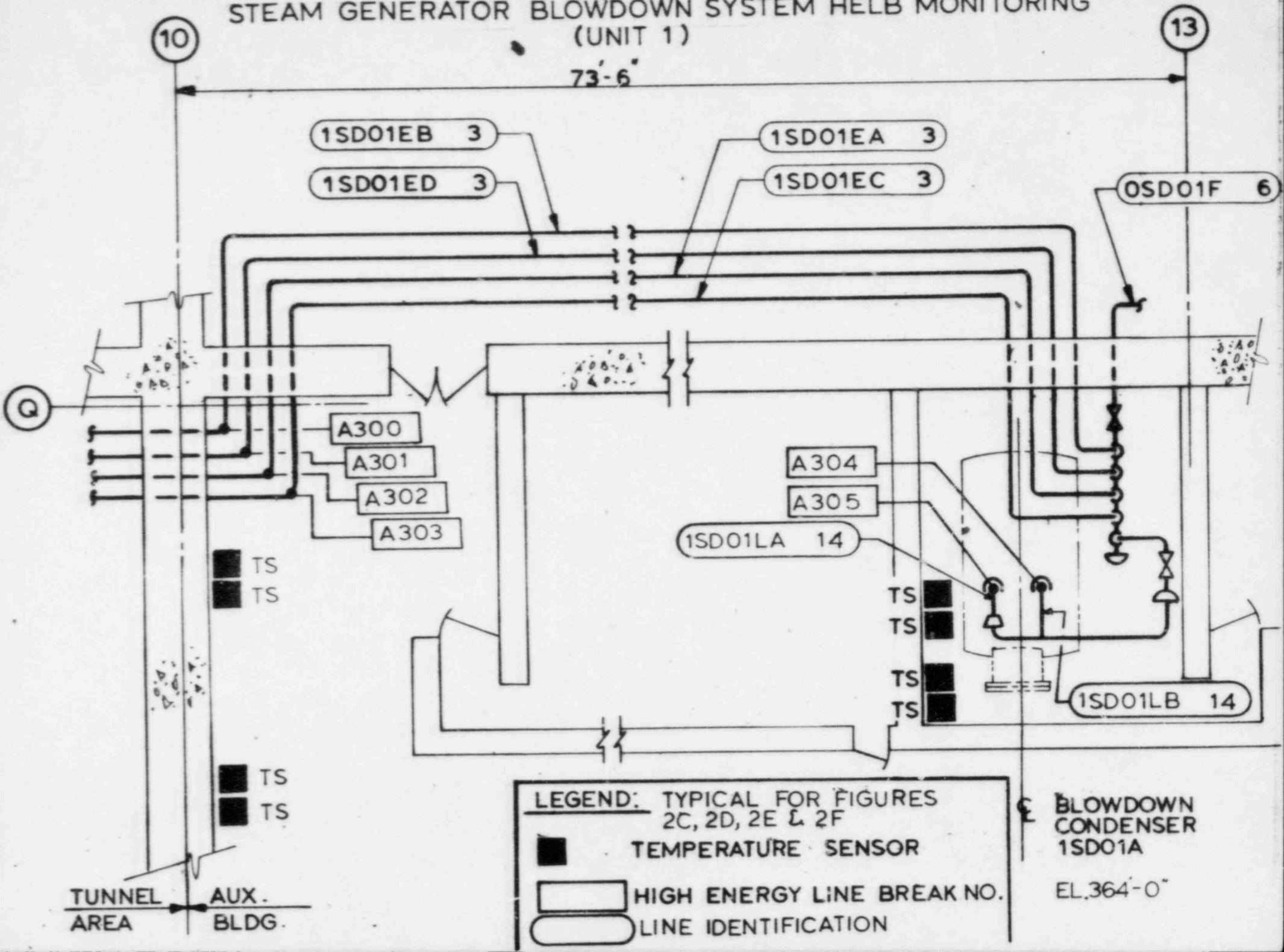


FIGURE 2A
AUXILIARY STEAM CONFIGURATION (UNIT 1)

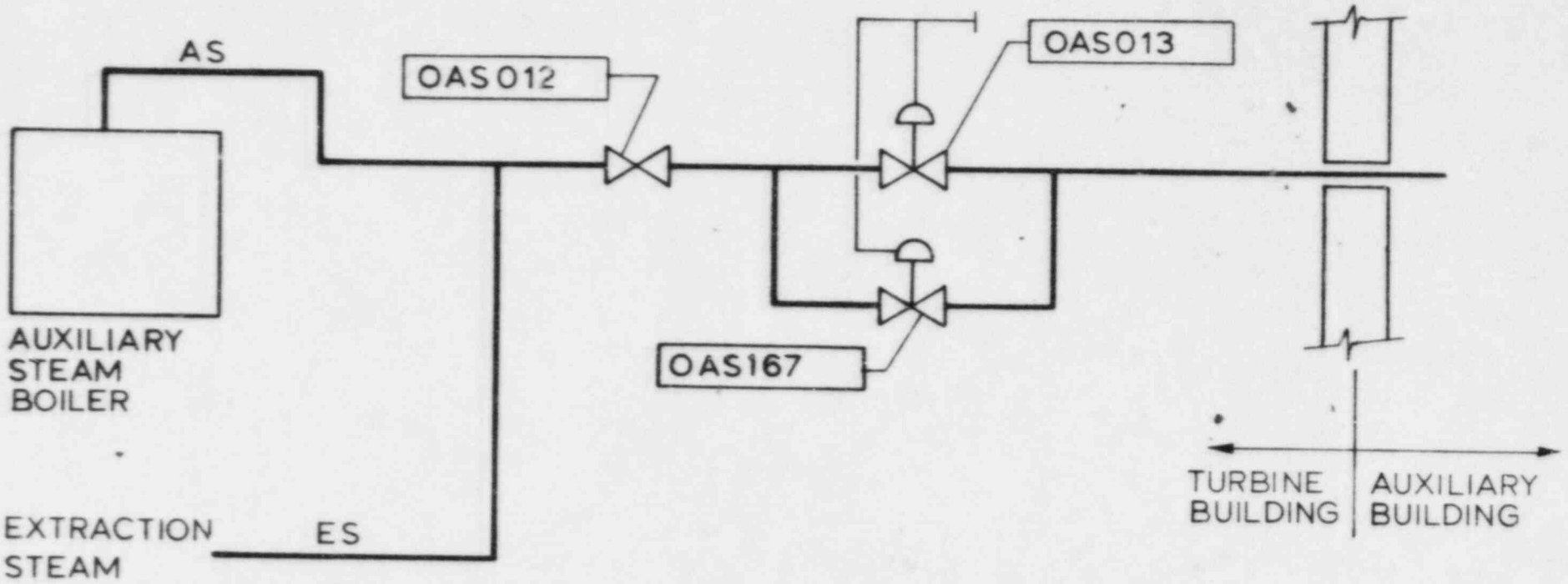
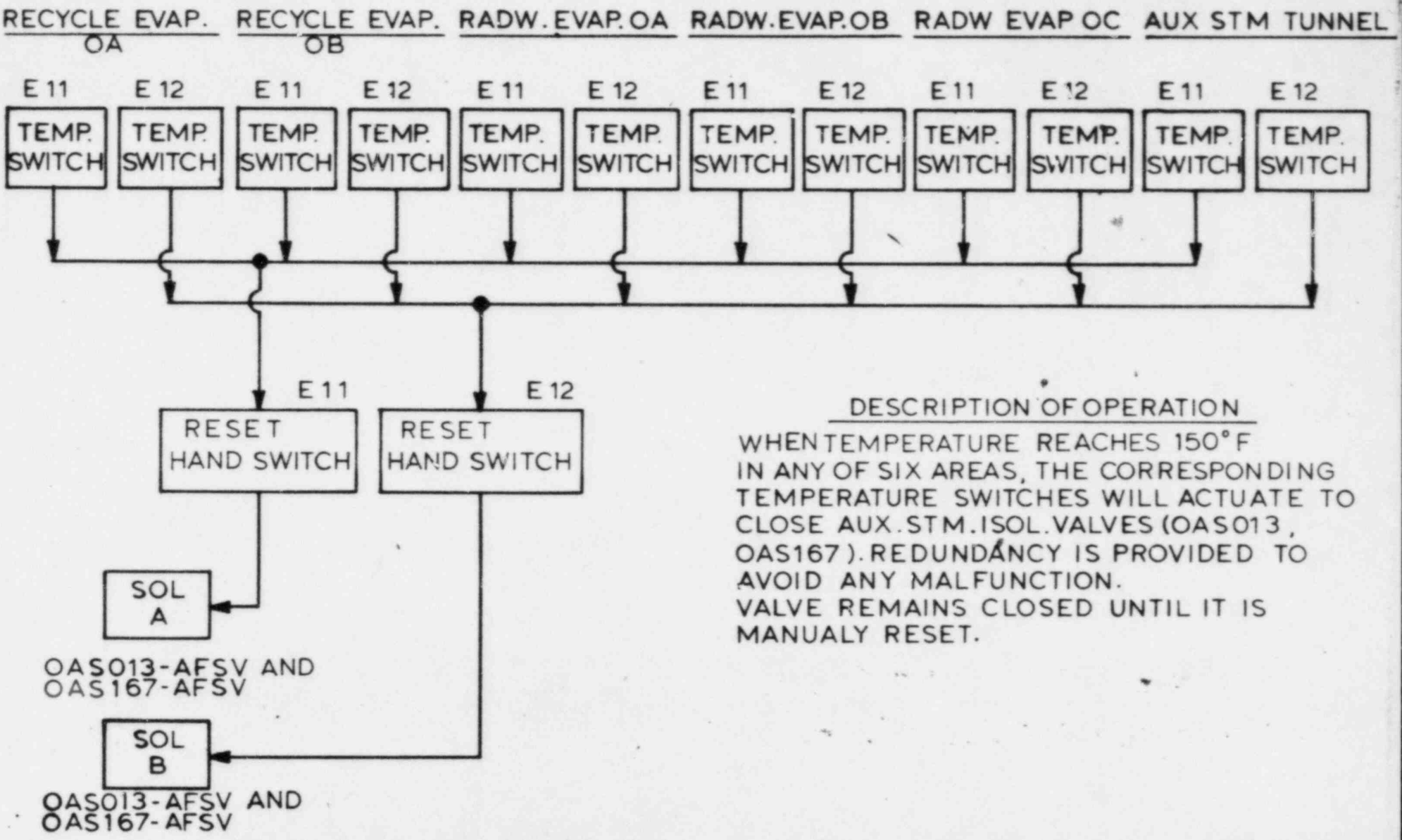


FIGURE 2B
AUX.STEAM ISOLATION VALVE TEMPERATURE CONTROL
(BLOCK DIAGRAM)



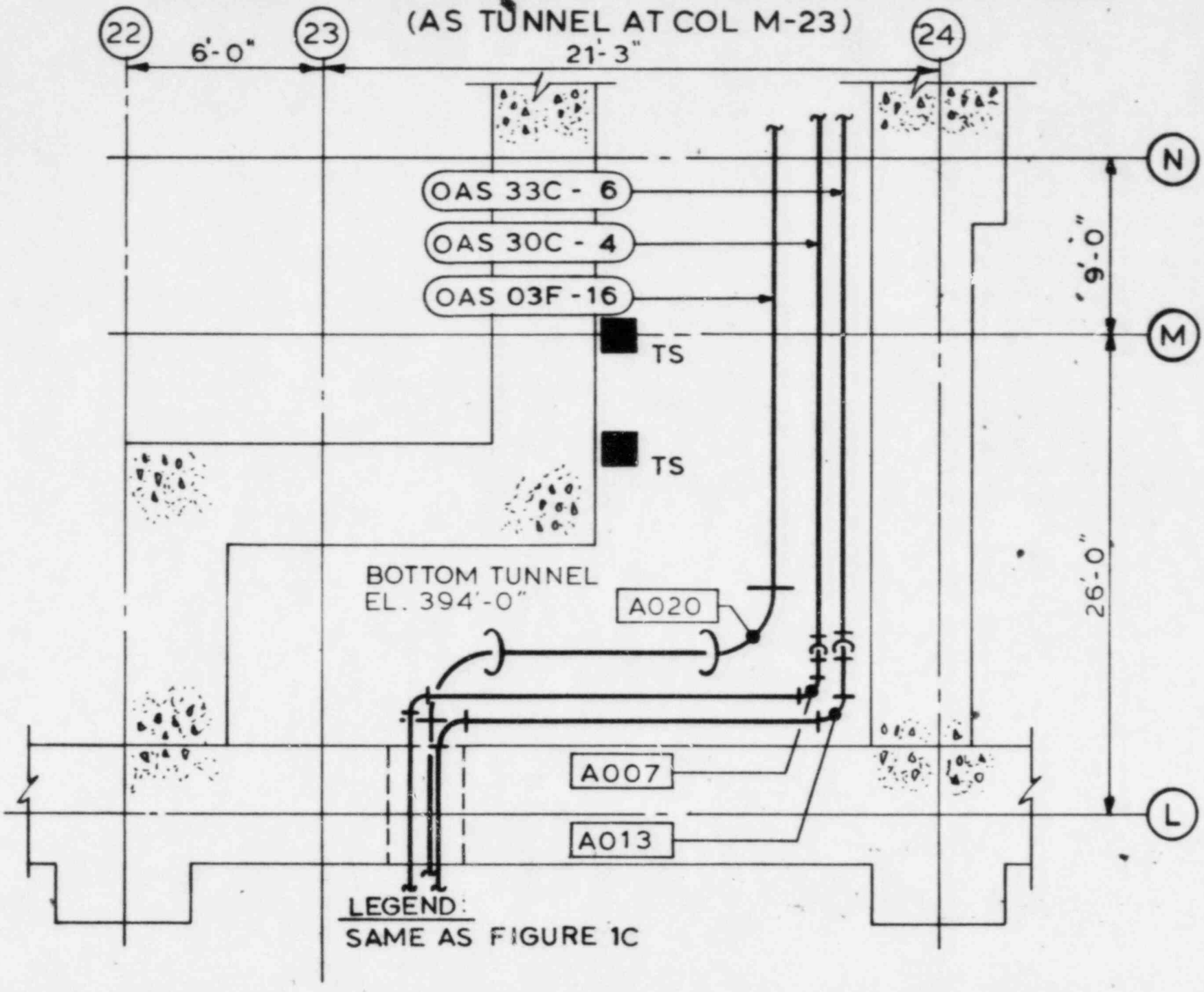
DESCRIPTION OF OPERATION

WHEN TEMPERATURE REACHES 150°F IN ANY OF SIX AREAS, THE CORRESPONDING TEMPERATURE SWITCHES WILL ACTUATE TO CLOSE AUX. STM. ISOL. VALVES (OAS013, OAS167). REDUNDANCY IS PROVIDED TO AVOID ANY MALFUNCTION.
VALVE REMAINS CLOSED UNTIL IT IS MANUALY RESET.

FIGURE 2C

AUX. STEAM SYSTEM HELB MONITORING (UNITS 1 &2)

(AS TUNNEL AT COL M-23)



LEGEND:
SAME AS FIGURE 1C

FIGURE 2D

AUXILIARY STEAM SYSTEM HELB MONITORING (UNITS 1&2)

(RECYCLE WASTE EVAPORATOR ROOMS)

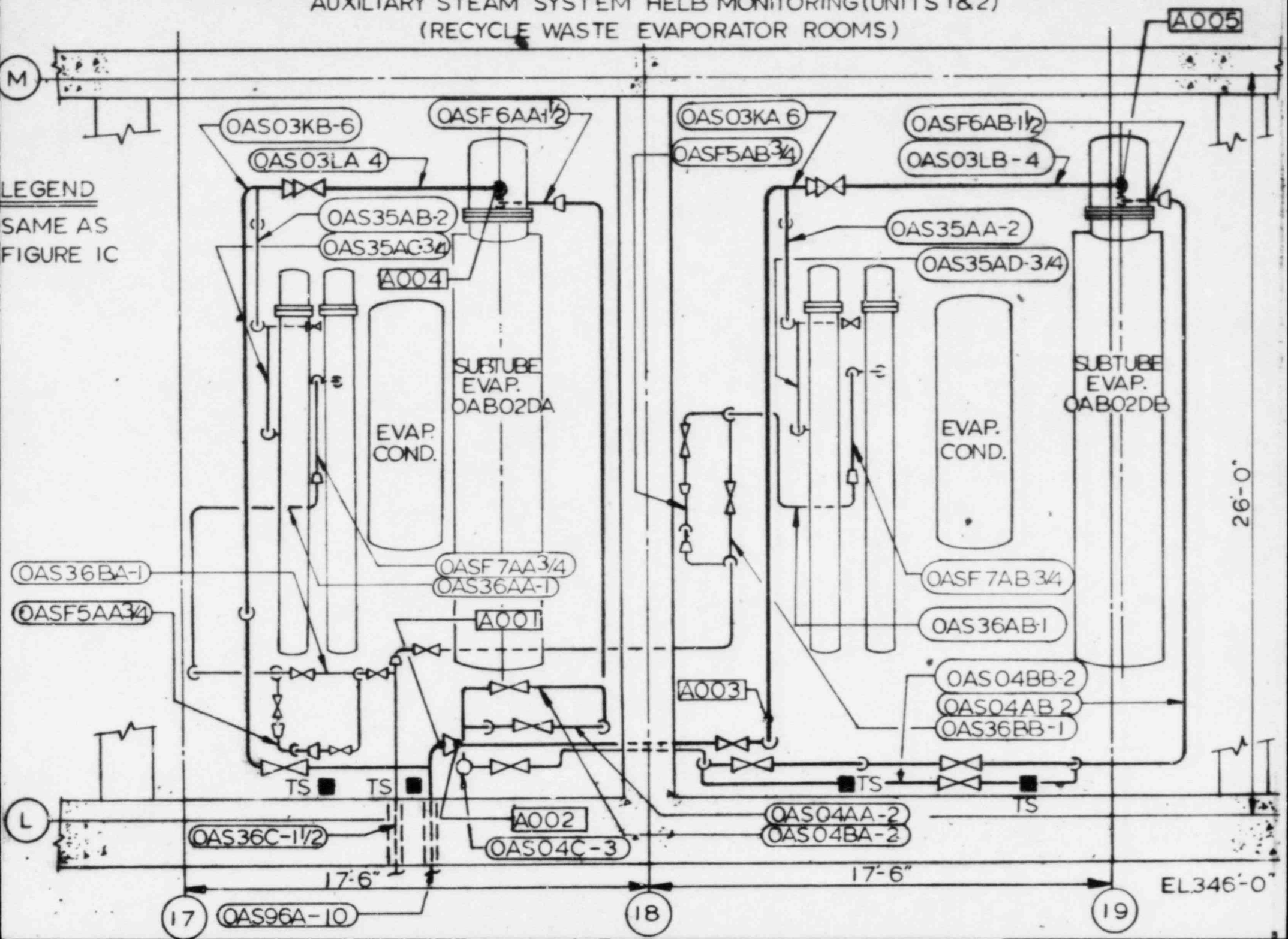
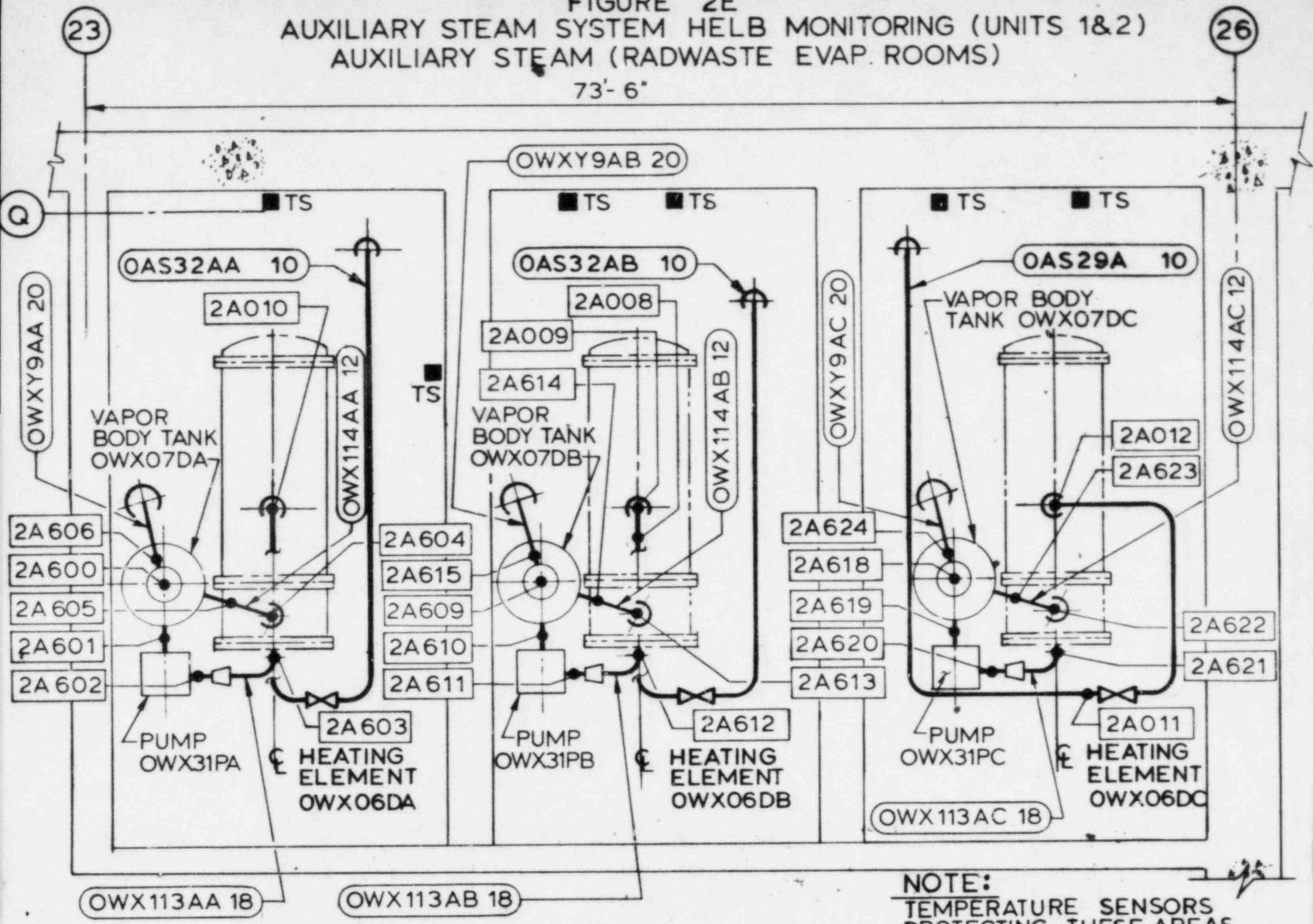


FIGURE 2E
AUXILIARY STEAM SYSTEM HELB MONITORING (UNITS 1&2)
AUXILIARY STEAM (RADWASTE EVAP. ROOMS)

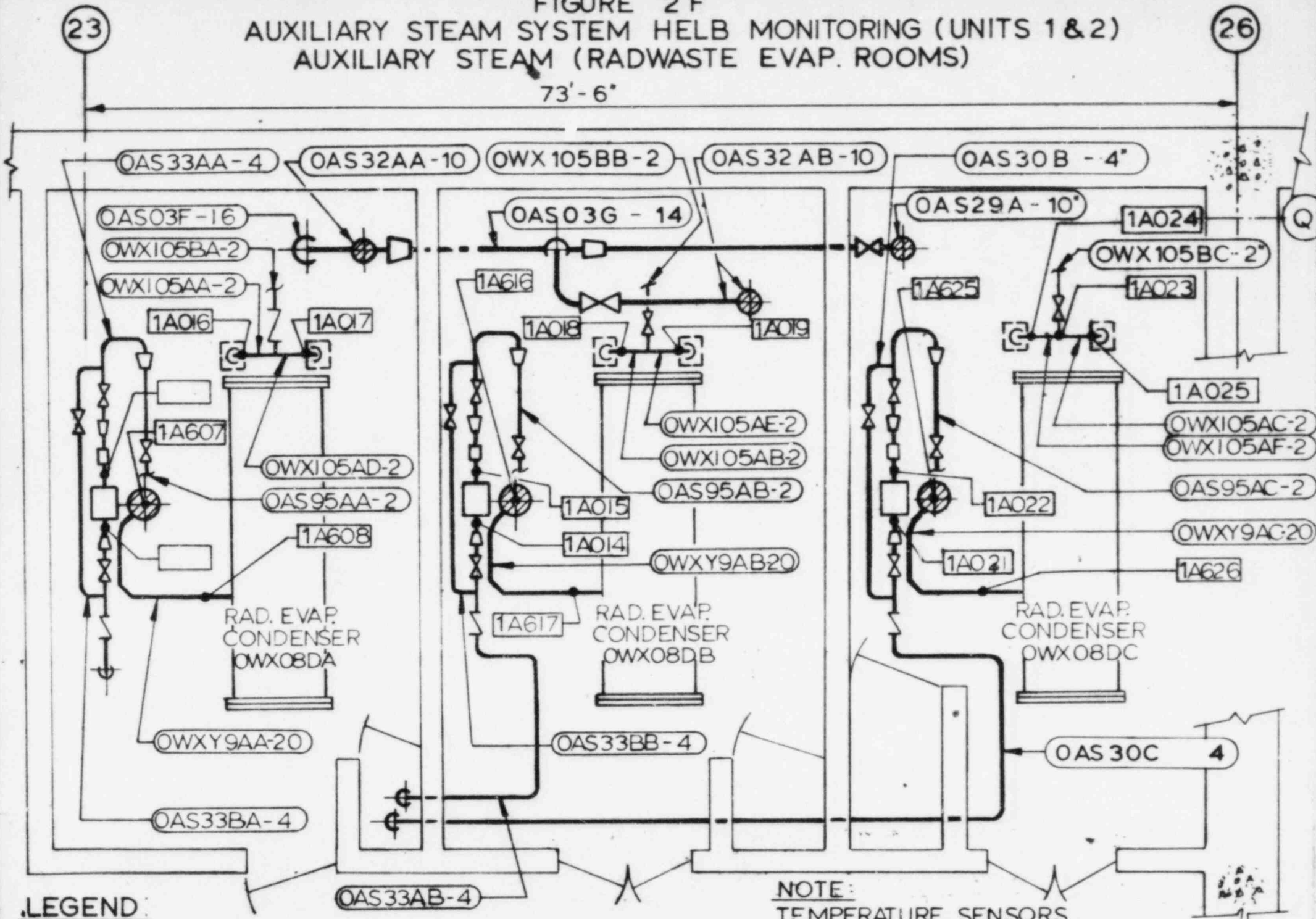


LEGEND:
SAME AS FIG. 1C

EL 414'-0"

NOTE:
TEMPERATURE SENSORS PROTECTING THESE AREAS ALSO PROTECT AREAS SHOWN ON FIG. 2F (401'-0")

FIGURE 2 F
AUXILIARY STEAM SYSTEM HELB MONITORING (UNITS 1 & 2)
AUXILIARY STEAM (RADWASTE EVAP. ROOMS)



LEGEND:
SAME AS FIG. 1C

EL. 401'-0"

NOTE:
TEMPERATURE SENSORS PROTECTING THESE AREAS ARE THE SAME AS THOSE INDICATED ON FIGURE 2E (EL 414'-0")