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O. W. DIXON, JR.
VICE PRESIDENT
NUCLEAR OPERATIONS

April 16, 1984

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
Operating License No. NPF-12
Inadequate Core Cooling

Dear Mr. Denton:

In a telephone conference held with the Staff on March 22, 1984, plans for upgrading the Virgil C. Summer Nuclear Station Core Exit Thermocouple (CET) System were discussed. The Staff requested that a summary description of the CET System be provided to supplement previous submittals dated March 5, 1983, August 26, 1983 and February 17, 1984.

The attached figure illustrates the system components described below.

Qualified cable, connectors and penetrations will be installed for all fifty-one (51) CETs inside the Reactor Building. With the exception of the area where the thermocouples exit the reactor vessel head, the circuits will be divided into two trains and electrical separation will be maintained. In addition, the circuits will be seismically supported. The need for reference junction boxes inside the Reactor Building will be eliminated through the use of electrical penetrations with cromel and alumel conductors.

Outside of the Reactor Building, the circuits will be routed from the penetrations to the thermocouple transmitter/isolation cabinets maintaining electrical separation and utilizing qualified cable and seismic supports. A thermocouple transmitter/isolation cabinet will be provided for each train containing electronic modules which provide cold junction compensation and 1E electrical isolation for each thermocouple. This electrical isolation will assure that any credible faults on the non 1E circuits connected to the output of the isolators will not degrade the 1E thermocouple circuits connected to the input of the isolators. These cabinets will be located in the cable spreading area one floor below the Control Room.

The signals from the output of the isolators will then be wired to the input of two computers and the microprocessor based subcooling monitors.

All 51 signals are inputs to both the plant process computer (primary display) and the Technical Support Center computer (Safety Parameter Display System [SPDS] and Technical Support Center/Emergency Operations Facility displays). Eight A-Train signals (two per core quadrant) are input to the A-Train subcooling monitor and eight B-Train signals (two per core quadrant) are input to the B-Train subcooling monitor. Since separation cannot be maintained for inputs to the computers, all circuits from the output of the isolators will be routed as X-Train.

The subcooling monitors are microprocessor based systems that calculate subcooling margin based on Reactor Coolant System temperature and pressure inputs. The inputs to each monitor include two hot leg and two cold leg wide range temperatures (Resistance Temperature Detectors), one narrow range and two wide range pressures, and eight core exit thermocouple temperatures (two per core quadrant). Each monitor calculates two subcooling margins: one based on auctioneered high wide range temperature and auctioneered low pressure; and a second based on auctioneered high core exit temperature and auctioneered low pressure. Both calculated subcooling margins and all of the input values can be called up on an alpha-numeric display on the monitors which are located in the Control Room. Both subcooling margins from both monitors are displayed continuously on four separate vertical indicators on the main control board.

The CET readout on the subcooling monitors is a backup to the plant process computer and SPDS displays available in the Control Room. Although a fully documented seismic qualification of the subcooling monitors has not been completed, the monitors and the cabinet in which they are mounted were designed and built to be seismically qualified. Preliminary seismic tests have confirmed the adequacy of this design.

Should the CET temperatures be required following a seismic event which disables all of the Control Room CET readouts, the CET signals can be read manually at the input to the thermocouple transmitter/isolator cabinets with a handheld thermocouple meter. This operation will be included in a documented training program for operators.

Considering the confidence we have in the seismic design of the subcooling monitors, the low probability of inadequate core cooling conditions resulting from a seismic event and the ready access to fully qualified signals for manual measurement, South Carolina Electric and Gas Company (SCE&G) considers this design adequate to address the intent of the requirements for display of this information.

In order to satisfy license condition 2.C.23(d), we are proceeding with design and procurement of this system as described to support installation

during the first refueling outage.

If you have any further questions, please advise.

Very truly yours,

O. W. Dixon, Jr.

AMP/OWD/gj
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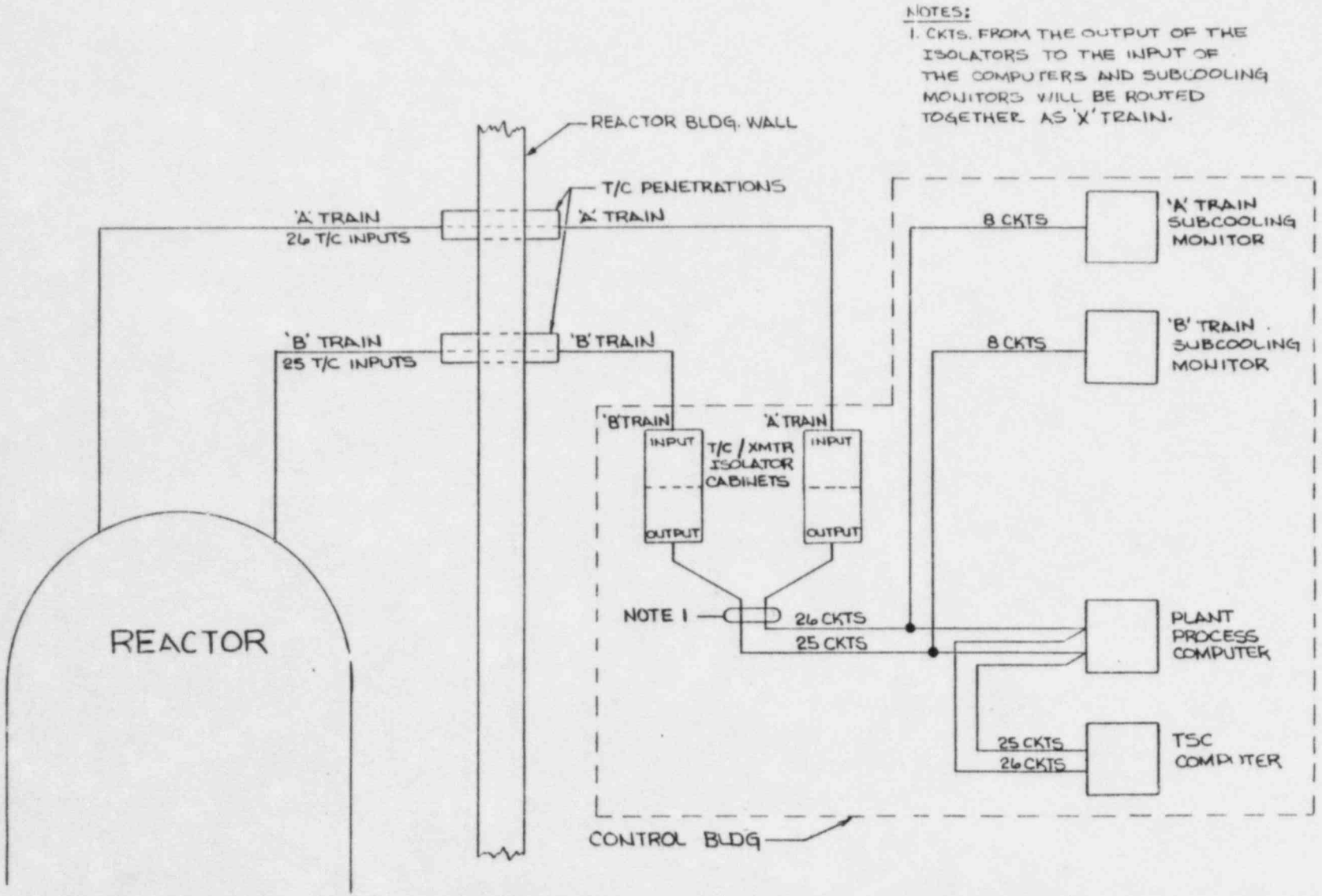
ATTACHMENT


NOTES:
1. CKTS. FROM THE OUTPUT OF THE ISOLATORS TO THE INPUT OF THE COMPUTERS AND SUBCOOLING MONITORS WILL BE ROUTED TOGETHER AS 'X' TRAIN.
REACTOR BLDG. WALL
T/C PENETRATIONS
'A' TRAIN
26 T/C INPUTS
'A' TRAIN
'B' TRAIN
25 T/C INPUTS
'B' TRAIN
'B' TRAIN
'A' TRAIN
INPUT
T/C / XMTR ISOLATOR CABINETS
INPUT
OUTPUT
OUTPUT
REACTOR
NOTE 1
26 CKTS
25 CKTS
8 CKTS
'A' TRAIN SUBCOOLING MONITOR
8 CKTS
'B' TRAIN SUBCOOLING MONITOR
PLANT PROCESS COMPUTER
25 CKTS
26 CKTS
TSC COMPUTER
CONTROL BLDG