VERMONT YANKEE NUCLEAR POWER CORPORATION

SEVENTY SEVEN GROVE STREET

RUTLAND, VERMONT 05701

June 16, 1982

2.C.2.1
FVY 82-72

REPLY TO:
ENGINEERING OFFICE
1671 WORCESTER ROAD
FRAMINGHAM, MASSACHUSETTS 01701
TELEPHONE 617-872-8100

United States Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Office of Nuclear Reactor Regulation
Mr. Domenic B. Vassallo, Chief
Operating Reactors Branch No. 2
Division of Licensing

References:
(a) License No. DPR-28 (Docket No. 50-271)
(b) Letter, USNRC to VYNPC, dated May 10, 1982
(c) Letter, VYNPC to USNRC, FVY 82-52, dated May 10, 1982
(d) Letter, VYNPC to USNRC, FVY 81-109, dated July 31, 1981
(e) Letter, USNRC to VYNPC, dated February 20, 1981 (Generic Letter 81-12)

Subject: Alternate Shutdown System

Dear Sir:

Enclosure 4 to Reference (b) requested Vermont Yankee to submit additional information regarding our proposed alternate shutdown system. The purpose of this letter is to forward the attached information in response to that request.

It should be noted that the enclosed information supplements information previously submitted to you via Reference (d). This Reference submitted our proposed alternate shutdown system design and was intended to respond to the request for information in Reference (e). During a subsequent telecon in November of 1981, between NRC Staff, Vermont Yankee, and the NRC's consultants (Brookhaven), Reference (d) was discussed. Questions were presented by the NRC's consultant and answered to his satisfaction. Vermont Yankee was informed at that time that these questions would be formally transmitted to us for formal resolution. The questions were subsequently forwarded as Enclosure 4 to Reference (b).

To the best of our knowledge, these questions represent the only outstanding information necessary for your staff to complete their review of our submittal. Certain information, such as detailed drawings, is not provided because it has not yet been developed at this stage of the design. However, this information can be made available to you at our engineering offices located in Framingham, MA, as it is developed.

We trust that this information is acceptable; however, should you deem additional information is necessary, please inform us as soon as possible.

Very truly yours,

VERMONT YANKEE NUCLEAR POWER CORPORATION

J. B. Sinclair

J. B. Sinclair
Licensing Engineer

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ENCLOSURE 1

VERMONT YANKEE ANSWERS TO NRC REQUESTS FOR INFORMATION

BACKGROUND:

Vermont Yankee submitted its detailed concept for an Alternate Shutdown System July 31, 1981. Information about equipment details was not supplied at that time because these details were still under development. Although the NRC has not approved this design concept, engineering has gone ahead. Some equipment has been ordered, and specifications for the balance are being completed. Since the 1981 submittal, engineering and purchase has proceeded, assuming installation at the next outage after the fall of 1981, which is Spring, 1983.

It is intended to furnish as much information as is available now. For anything not yet purchased, details will be supplied when available.

NRC REQUESTS FOR ADDITIONAL INFORMATION (RAI):

1. Confirm that the capability will be provided to achieve cold shutdown within 72 hours as required by Appendix R of 10CFR Part 50.

   RESPONSE:

   Vermont Yankee's design will be able to achieve cold shutdown in 72 hours. The RCIC steam turbine-driven pump supplies reactor makeup and removes heat via the steam consumed. Once reactor vessel level is maintained, after an initial drop, pump flow will be split. Flow not needed for reactor makeup will return to the condensate storage tank via the full flow test line. Thus, vessel cooldown will be controlled by turbine steam flow, which is regulated by setting the pump to full flow on the controller or governor. Vessel level will be controlled by full flow test line throttling. When cooled sufficiently, RHR will be placed in service for vessel cooldown, as designed. Previously, it will have been on torus cooling.

2. Please commit and provide a schedule for developing and implementing the procedures for shutdown operation. These procedures should address manpower requirement and manual actions to accomplish shutdown.

   RESPONSE:

   Procedures will be developed on a schedule consistent with the installation of system modifications. This is targeted for the 1983 refueling outage. Based on Fire Brigade requirements, there will be three people available to operate the Alternate Shutdown System, but only two people are needed. The design concept specified certain manual operations. Procedures will specify whether operations are manual or via control device.

3. Identify the type of isolation proposed for the RCIC control and instrumentation circuits, the diesel generator 125 volt dc loads, the RHR loads, the service water load and the uninterruptable power supply loads. Details and schematics should be provided for the above.

RESPONSE:

Isolation will be provided by local transfer/isolation switches located outside the fire areas. These transfer switches will be Class 1E devices similar to Electroswitch Corporation Series 24 switches. They will isolate all control circuits which could affect operation of the required equipment due to a fire in the control room, cable vault or either of the switchgear rooms. Once the circuits are isolated by the isolation switches, the cables routed through the fire area will have no effect on the equipment.

Details and schematics for the circuits are presently in the design phase. A typical control wiring diagram for the RHR System has been marked up for preliminary use to indicate the design philosophy for these isolation switches. Similar design is used for the isolation of control and instrumentation circuits of other applicable systems such as RCIC, Service Water, Diesel Generator, etc.

4. Provide a point-by-point response with respect to interactions of associated circuits as outlined in Enclosure 2 of the February 20, 1981 letter (including all requested tables).

RESPONSE:

To determine the interaction of associated circuits with shutdown systems outlined in the February 20, 1981 letter, Vermont Yankee has taken a systems approach as clarified on Page 8 of Attachment 2 of the May 10, 1982 letter. NRC concerns are listed below, followed by Vermont Yankee's response:

Concern a: Describe the methodology used to assess the potential of associated circuit adversely affecting the alternative or dedicated shutdown capability. The description of the methodology should include the methods used to identify the circuits which share a common power supply or a common enclosure with the alternative or dedicated shutdown system and the circuits whose spurious operation would affect shutdown. Additionally, the description should include the methods used to identify if these circuits are associated circuits of concern due to their location in the fire area.

RESPONSE:

Control and power circuits required for the shutdown systems listed in our February 21, 1981 letter have been identified. Manual isolation will be provided for those circuits routed through the fire area. These switches will be located outside the fire area as described in the answer to RAI 3. Local control stations will provide any required control. Associated circuits with a common power supply to those of shutdown system have been identified. Although not of concern, these included those routed totally outside the fire area as well as those routed through the fire area. Current interrupting devices, mainly circuit breakers and in a few instances fuses, are provided to electrically isolate these associated circuits from their power supply in the event of a fault

on the associated circuit. The coordination between the load interrupting device and that of the bus supply feeder was done by the architect engineer of Vermont Yankee as part of the original design. This meets NRC guidelines.

Next, circuits were identified in the fire area whose spurious operation could affect the operation of the shutdown systems, or cause a LOCA. Hot shorts, cold shorts and open circuits as a result of a fire were considered. In the event of a fire, these circuits will be manually isolated outside the fire area. Local control stations will provide the isolation and control where required. This isolation method precludes any interaction of associated circuits in the fire area which could cause spurious movement.

A few circuits identified as either being required by, or associated to, the safe shutdown systems could not be isolated from the fire area without loss of the desired function. These cables will be protected by a one-hour fire barrier. This barrier, in conjunction with the existing fixed detection and suppression system, will provide adequate protection in conformance with NRC guidelines.

Concern b: Provide a table that lists all associated circuits of concern located in the fire area.

RESPONSE:

Associated circuits with a common power supply to those of shutdown systems are listed in Table I. Although not of concern, those circuits routed totally outside the fire area are included. All these circuits are protected by interrupting devices as indicated.

Associated circuits in the fire area whose spurious operation could affect the capability to safely shutdown, affect the operation of the shutdown, or cause a LOCA are listed in Table II. These circuits will be manually isolatable outside the fire area.

The few circuits which cannot be isolated will be protected by a one-hour barrier. These are listed in Table III along with the location of the fire barrier and the method of suppression.

Concern c: Show that fire-induced failures (hot shorts, open circuits or shorts to ground) of each of the cables listed in (b) will not prevent operation or cause maloperation of the alternative or dedicated shutdown method.

RESPONSE:

These associated circuits will be isolated as described in (a) above. Where necessary, local control will be provided for repositioning should this equipment spuriously operate before the cables in the fire area can be isolated. In other cases, isolating the circuit results in a fail safe position for the equipment.

Concern d: For each cable listed in (b) where new electrical isolation has been provided, provide detailed electrical schematic drawings that show how each cable is isolated from the fire area.

RESPONSE:

Details and schematics for the circuits are presently in the design phase. A preliminary control wiring diagram is provided in our response to RAI 3.

Concern e: Provide a location at the site or other offices where all the tables and drawings generated by this methodology approach for the associated circuits review may be audited to verify the information provided above.

RESPONSE:

The tables generated by this methodology are included in the response to RAI 4 (b) above. Further details will be included in the Engineering Design Change Requests (EDCRs) used for the implementation of the alternate shutdown system. These are currently in the design phase and should be completed by the end of 1982. When the implementation is completed, these EDCRs and supporting documentation will be located at Vermont Yankee for your verification.

5. In your submittal dated July 31, 1981, the high-low pressure interface was identified as two valves in the RHR system and two valves for the reactor head vents. However, you did not respond to the request to list the cables involved and to identify cables separation in accordance with Section III.G.2 of Appendix R. Please provide the information requested in Enclosure 2, Question 2 of the February 20, 1981 letter.

RESPONSE:

The circuits, cables, and schematics for these valves are presently in the design phase. A preliminary list of the cables to be isolated for these valves is shown below.

Valve	Cable Number	Purpose
V10-17	C-11308B	Control Circuit
	C-11308C	Control Circuit
	C-11308D	Instrumentation Circuit
V10-18	C-11309B	Control Circuit
	C-11309C	Control Circuit
	C-11309D	Instrumentation Circuit
FCV 2-17	C-1833A	Control Circuit
FCV 2-18	C-18833B	Control Circuit

Rather than attempt to provide separation as described in Section III.G.2 of Appendix R, the cables to these valves will be isolated from outside the fire areas. This method has been described in answers to RAIs 3 and 4. This isolation method precludes any interaction of associated circuits in these fire areas. Once the circuits are isolated by the isolation switches, the cables routed through the fire area will have no effect on the valves. If the fire causes the reactor head vent valves (FCV 2-17, FCV 2-18) to spuriously open before isolation can be activated, isolating the control circuits will force these valves to move to their fail safe, closed position. However, the likelihood of a high-low interface valve spuriously moving because of hot shorts in the time it takes the operator to go from the control room to the isolation switches in the reactor building is extremely remote and is, therefore, disregarded. In addition, procedures will require that isolation of these valves have priority.

TABLE I
CIRCUITS ASSOCIATED BY POWER SUPPLY

Bus #	Voltage	Circuit	Interrupting Device
4	4160 V	Tie to 4160 V Bus 2	Air Circuit Breaker
		Core Spray Pump P46-1A	Air Circuit Breaker
		Tie to Vernon Station	Air Circuit Breaker
Bus 9,	480 V	Auxiliary Meters	Fuse
		Reactor Bldg. Cooling Water Pump P-59-1A	Circuit Breaker, Magnetic
		CRD Water Pump P-38-1A	Circuit Breaker, Magnetic
		Fire Pump P-40-1B	Circuit Breaker, Magnetic
		Tie to 480 V Bus 8	Circuit Breaker, Magnetic
MCC 9A	480 V	SGT Heater EUH-2	Circuit Breaker, Magnetic
		SGT Exhaust Fan Ref-2A	Circuit Breaker, Magnetic
		Battery Charger BC-1-1B	Circuit Breaker, Thermal Magnetic
		RPS M/G Set M3-5-1B	Circuit Breaker, Thermal Magnetic
		Lighting Transformer LP-1K	Circuit Breaker, Thermal Magnetic
		Lighting Transformer LP-1SH	Circuit Breaker, Thermal Magnetic
		Distribution Transformer DT-1	Circuit Breaker, Thermal Magnetic
		Distribution Transformer DT-3	Circuit Breaker, Thermal Magnetic
		Distribution Transformer DT-6	Circuit Breaker, Thermal Magnetic
		Security System	Circuit Breaker, Thermal Magnetic
		Switchgear Room Exhaust Fan	Circuit Breaker, Thermal Magnetic
		Condensate Vacuum V65-13	Circuit Breaker, Magnetic
MCC 9B	480 V	Lighting Transformer LP-1T	Circuit Breaker, Thermal Magnetic
		Lighting Transformer LP-1M	Circuit Breaker, Thermal Magnetic
		Lighting Transformer LP-1L	Circuit Breaker, Thermal Magnetic
		Lighting Transformer LP-1Q	Circuit Breaker, Thermal Magnetic
		Lighting Transformer LP-1P	Circuit Breaker, Thermal Magnetic
		Elevator	Circuit Breaker, Thermal Magnetic
		Lighting Transformer LP-NE-1B	Circuit Breaker, Thermal Magnetic
		RRU-13	Circuit Breaker, Magnetic
		SLC Tank Heater	Circuit Breaker, Thermal Magnetic
		SLC Pump 45-1A	Circuit Breaker, Magnetic
		RRU-3	Circuit Breaker, Magnetic

TABLE I (Cont.)

Bus #	Voltage	Circuit	Interrupting Device
MCC 9B	480 V	Containment Air Compressor	Circuit Breaker, Magnetic
		CRD Pressure Reg. Valve V3-20	Circuit Breaker, Magnetic
		CS Discharge Valve V14-5A	Circuit Breaker, Magnetic
		Emergency Intertie Valve V10-184	Circuit Breaker, Magnetic
		Cleanup Return Isol. Valve V12-68	Circuit Breaker, Magnetic
		CS Discharge Valve V14-11A	Circuit Breaker, Magnetic
		CS Discharge Valve V14-12A	Circuit Breaker, Magnetic
		RHR Pump Bypass Valve V10-16A	Circuit Breaker, Magnetic
		Suppression Pool Suction Valve V10-13C	Circuit Breaker, Magnetic
		Containment Spray Isolation Valve V10-26A	Circuit Breaker, Magnetic
		CS Suction Valve V14-7A	Circuit Breaker, Magnetic
		Containment Spray Inj. Valve V10-31A	Circuit Breaker, Magnetic
		Suppression Chamber Spray Valve V10-38A	Circuit Breaker, Magnetic
		CAD Air Compressor C-105B	Circuit Breaker, Magnetic
		CS Test Valve V14-26A	Circuit Breaker, Magnetic
		Recirculation Supply Suction Valve V10-15C	Circuit Breaker, Magnetic
		Vent System MOV-VG-22B	Circuit Breaker, Magnetic
		Supply to MCC 89A	Circuit Breaker, Thermal Magnetic
MCC 9C	480 V	Power Receptacle	Circuit Breaker, Thermal Magnetic
		Cooling Tower Fan Feeder	Circuit Breaker, Thermal Magnetic
		Station & Instrument Air Compressor C-1-1B	Circuit Breaker, Magnetic
		TB Cooling Water Pump P-58-1B	Circuit Breaker, Magnetic
		DG-1-1A Air Compressor	Circuit Breaker, Magnetic
		Fuel Storage Area Sump Pump P94-1A	Circuit Breaker, Magnetic
		Lighting Panel LP-1AH	Circuit Breaker, Thermal Magnetic
		Steam Packing Exhauster Blast Valve V65-12A	Circuit Breaker, Magnetic
		Steam Packing Exhauster Blast Valve V65-12B	Circuit Breaker, Magnetic
		DG 1-1A Auxiliaries	Circuit Breaker, Thermal Magnetic
		CR Air Conditioner Standby Fan SAC-1B	Circuit Breaker, Magnetic

TABLE I (Cont.)

Bus #	Voltage	Circuit	Interrupting Device
MCC 9C	480 V	Service Bldg. Chilled Water Pump SP-2	Circuit Breaker, Magnetic
		Water Chiller SCH-2	Circuit Breaker, Thermal Magnetic
MCC 9D	480 V	24 V dc Battery Charger B	Circuit Breaker, Thermal Magnetic
		RHR Loop Cross Tie Valve V10-20	Circuit Breaker, Magnetic
		HPCI Isol. Valve V23-15	Circuit Breaker, Magnetic
		RRU-4	Circuit Breaker, Magnetic
		Distribution Transformer DT-10	Circuit Breaker, Thermal Magnetic
		Cooling Water V70-118	Circuit Breaker, Magnetic
		CRD Removal Hoist Receptacle	Circuit Breaker, Thermal Magnetic
MCC 89A	480 V	Maintenance Tie to 480 V MCC 9B	Circuit Breaker, Thermal Magnetic
		Recirculation Discharge Valve V2-53A	Circuit Breaker, Magnetic
		Potential Transformer	Fuse
		Recirculation Discharge Valve V2-54A	Circuit Breaker, Magnetic
		Recirculation Cross Tie Valve V2-65A	Circuit Breaker, Magnetic
		Recirculation Bypass Valve V2-66A	Circuit Breaker, Magnetic
MCC 89B	480 V	Recirculation Discharge Bypass Valve V2-54B	Circuit Breaker, Magnetic
		Recirculation Discharge Valve V2-53B	Circuit Breaker, Magnetic
		Recirculation Suction Valve V2-43B	Circuit Breaker, Magnetic
		Recirculation Manifold Cross Tie Valve V2-65B	Circuit Breaker, Magnetic
		Recirculation Manifold Cross Tie Bypass V2-66B	Circuit Breaker, Magnetic
		Potential Transformer	Fuse
		RHR Upstream Isolation Valve V10-27B	Circuit Breaker, Magnetic
		RHR Downstream Isolation Valve V10-25B	Circuit Breaker, Magnetic
		Maintenance Tie to MCC 8B	Circuit Breaker, Thermal Magnetic
MCC DC-2B	125 V dc	No Associated Circuits.	

TABLE II
ASSOCIATED CIRCUITS ISOLATED DUE TO SPURIOUS OPERATION

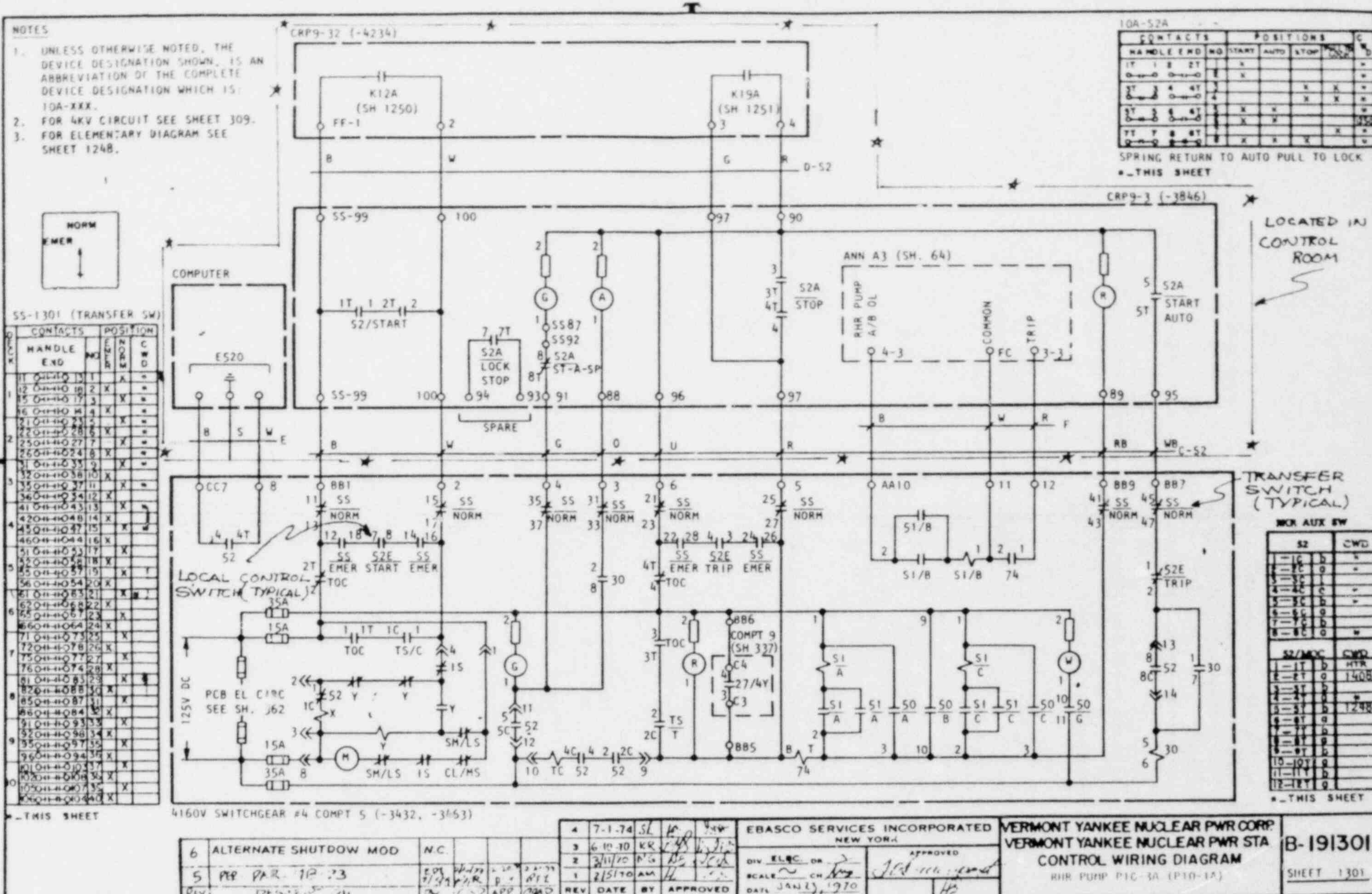
Purpose	Circuit	Function
RCIC System	LCV-13-12, LCV-13-13 Condensate Pump Isolation Valves	Control
	V13-1 RCIC Trip Throttle Valve	Control
	RCIC Gland Seal Vac Tank Condensate Pump	Control
	RCIC Gland Seal Vacuum Pump	Control
	V13-15 Steam Supply Line Isolation Valve	Control
	V13-16 Steam Supply Line Isolation Valve	Control
	V13-18 Pump Suction from Cond. Stg. Tk.	Control
	V13-20 Pump Discharge Valve	Control
	V13-21 Pump Discharge Valve	Control
	V13-27 RCIC Minimum Flow Bypass to Supp. Chamber	Control
	V13-30 RCIC Test Bypass to Condensate Storage Tank	Control
	V13-39 RCIC Pump Suction from Suppression Chamber	Control
	V13-41 RCIC Pump Suction from Suppression Chamber	Control
	V13-131 RCIC Steam to Turbine Valve	Control
	V13-132 RCIC Turbine Cooling Water Supply Valve	Control
RHR System	V10-15A Recirculation Supply to Pump Suction Valve	Control
	V10-13A Suppression Pool to Pump Suction Valve	Control
	V10-17 RHR Reactor Head Spray Isolation Valve	Control
	V10-29A RHR Inboard Injection Valve	Control
	V10-27A RHR Outboard Injection Valve	Control
	V10-34A Suppression Chamber Spray Bypass Valve	Control

TABLE II (Cont.)

Purpose	Circuit	Function
RHR (Cont.)	V10-39A Suppression Chamber Spray Upstream Valve	Control
	V10-65A RHR Pumps Discharge Valves	Control
	V10-89A RHR Service Water Discharge Valve	Control
	V10-18 RHR Reactor Shutdown Cooling Isolation Valve (Inboard)	Control
	V10-66 RHR Discharge to Rad Waste Isolation Valve	Control
	V2-43A Recirculation Pump A Suction	Control
	RRU-5 RHR Service Water Pump Area	Control
	RRU-7 RHR and Core Spray Pump Area	Control
Service Water System	V70-20 Turbine Building Cooling Water Valve	Control
Reactor Vent Valves	FCV-2-17, FCV-2-18 Reactor Vent Valves	Control

TABLE III
CABLES TO BE PROTECTED BY FIRE BARRIER

Cable No.	Purpose	Location of Fire Barrier	Existing Suppression
1335J1SII 1335J2SII	MCC 9B, 480 V Feeder	Switchgear Room/ Cable Vault	Automatic CO_2
C-11550A,B,C, D,E,F,G,L, M,N,P,S,T, U,V C-11551A,B,C, D,E,F,G,L, M,N,P,S,T, U,V C-11552A,B,C, D,E,F,G,L, M,N,P,S,T, U,V	Reactor Feed Pumps Control Circuits	Switchgear Room/ Cable Vault	Automatic CO_2


NOTES
1. UNLESS OTHERWISE NOTED, THE DEVICE DESIGNATION SHOWN, IS AN ABBREVIATION OF THE COMPLETE DEVICE DESIGNATION WHICH IS: 10A-XXX.
2. FOR 4KV CIRCUIT SEE SHEET 309.
3. FOR ELEMENTARY DIAGRAM SEE SHEET 1248.
CRP9-32 (-4234)
K12A (SH 1250)
K19A (SH 1251)
D-S2
CRP9-3 (-3846)
LOCATED IN CONTROL ROOM
COMPUTER
ES20
ANN A3 (SH. 64)
RHR PUMP A/B OL
COMMON
TRIP
S2/START
S2A LOCK STOP
SPARE
S2A STOP
S2A START AUTO
S2A ST-A-SP
SS-1301 (TRANSFER SW)
10A-S2A
SPRING RETURN TO AUTO PULL TO LOCK
*_THIS SHEET
NORM
EMER
TRANSFER SWITCH (TYPICAL)
LOCAL CONTROL SWITCH (TYPICAL)
SS NORM
SS EMER
S2E START
S2E TRIP
TOC
TS/C
PCB EL CIRC SEE SH. 362
125V DC
COMPT 9 (SH 337)
27/4Y
SM/LS
CL/MS
4160V SWITCHGEAR #4 COMPT 5 (-3432, -3463)
C-S2
6 ALTERNATE SHUTDOWN MOD N.C.
5 PER PAR. 1B 23
REV DESCRIPTION BY APP
4 7-1-74
3 6-10-70
2 3/11/70
1 2/5/70
REV DATE BY APPROVED
EBASCO SERVICES INCORPORATED NEW YORK
DIV ELEC
DATE JAN 23, 1970
APPROVED
VERMONT YANKEE NUCLEAR PWR CORP.
VERMONT YANKEE NUCLEAR PWR STA
CONTROL WIRING DIAGRAM
RHR PUMP P10-3A (P10-1A)
B-191301
SHEET 1301
INCHES CM