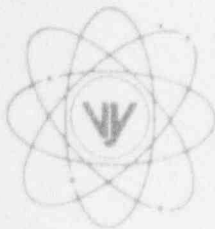


VERMONT YANKEE NUCLEAR POWER CORPORATION



Ferry Road, Brattleboro, VT 05301-7002

REPLY TO
ENGINEERING OFFICE
580 MAIN STREET
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(508) 779-6711

February 23, 1994
BVY 94-25

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attn: Document Control Desk

Reference: a) License No. DPR-28 (Docket No. 50-271)

Dear Sir:

Subject: **Inoperability of Both Vital Fire Suppression Water Pumps**

The attached Special Report is submitted pursuant to the reporting requirements established by Vermont Yankee Technical Specifications as detailed herein.

We trust that the information provided is adequate; however, should you have any questions or require additional information, please do not hesitate to contact us.

Very truly yours,

Vermont Yankee Nuclear Power Corporation

Robert J. Wanczyk
Plant Manager

cc: USNRC Region 1 Administrator
USNRC Resident Inspector, VYNPS
USNRC Project Manager, VYNPS

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REPORT DATE: February 23, 1994

OCCURRENCE DATES: 1. January 27, 1994 - 2010 Hrs.
2. February 9, 1994 - 2105 Hrs.

FACILITY: Vermont Yankee, Vernon, Vermont

IDENTIFICATION OF OCCURRENCES:

This report is submitted to satisfy the Vermont Yankee Technical Specification reporting requirements for the following events:

1. The 7-day Limiting Condition for Operation (LCO) for an inoperable diesel fire pump (P-40-1A) was exceeded on 1/27/94, requiring a report to the Commission within 30 days.
2. The electric fire pump (P-40-1B) motor failed to start on 2/9/94, due to a motor breaker trip, while the diesel fire pump was inoperable. A report to the Commission within 14 days of this event is required.

CONDITIONS PRIOR TO OCCURRENCES:

1. The plant was operating at 100% power at the time of the diesel fire pump failure on 1/20/94.
2. The plant was increasing power through 66% at the time of the electric fire pump failure on 2/9/94.

DESCRIPTION OF OCCURRENCES:

1. EVENT 1: 7 DAY LCO EXCEEDED FOR INOPERABLE DIESEL FIRE PUMP

At 2010 hrs on 1/20/94, with the plant operating at 100% power, the diesel fire pump (P-40-1A) engine failed to start automatically during planned surveillance testing. The pump was started successfully approximately one hour later.

Based upon engine manufacturer representative investigation and evaluation, the failure was attributed to sustained exposure to low ambient temperature. Subsequent assessments and efforts to provide supplemental room heating did not provide reasonable assurance that the diesel fire pump could be declared operable. A decision was made to remain in the LCO and to aggressively pursue design change options.

Due to (1) the inability to implement manufacturer-recommended engine modifications within 7 days, and (2) continuing cold weather, the pump was inoperable beyond the 7 day LCO period.

The diesel fire pump is governed by plant Technical Specification 3.13.B.2, as follows: "From and after the date that less than the above required equipment is operable, restore the component to operable status within 7 days or submit a report within the next 30 days to the Commission as specified in 6.7.C.2 outlining the plans and procedures to be used to provide for the loss of redundancy in this system".

Vermont Yankee procedure OP 2181, "Service Water/Alternate Cooling Operating Procedure", establishes the measures for vital fire suppression water supply system back-up through cross-connection with the plant Service Water system. This back-up capability compensates for the loss of fire pump redundancy and would be implemented through operation of one isolation valve, as specified by the procedure.

2. EVENT 2: VITAL FIRE SUPPRESSION WATER SUPPLY SYSTEM INOPERABLE

At 2105 hrs. on 2/9/94, with the diesel fire pump inoperable, the electric fire pump motor tripped off-line when the pump attempted to start automatically. A fire water system yard hydrant had been opened to fill a local fire department tanker truck, lowering system pressure. The motor breaker immediately tripped open when the electric pump (P-40-1B) responded to the low pressure start signal. The diesel fire pump engine also failed to start.

The breaker was removed, inspected, tested and reinstalled. The breaker over-current trip set-points were reviewed and determined to be appropriate. The electric fire pump subsequently started successfully in both manual and automatic start modes. The electric fire pump was declared operable at 1642 hrs on 2/10/94.

Plant Technical Specification 3.13.B.3.a requires that, "With the fire suppression water supply system inoperable ... establish a backup fire suppression water system within 24 hours ... ". A backup water supply was established at 0025 hrs. on 2/10/94, by opening the the Service Water/vital fire suppression water system cross-connect isolation valve previously discussed. The valve was closed, isolating the back-up supply, shortly after electric fire pump operability was restored.

Plant Technical Specification 3.13.B.3.b requires that "With the fire suppression water supply system inoperable Submit a Special Report as specified in 6.7.C.2;

- 1) By telephone within 24 hours,

- 2) Confirmed by telegraph, mailgram or facsimile transmission no later than the first working day following the event and
- 3) In writing within 14 days following the event, outlining the action taken, the cause of the inoperability and the plans and schedule for restoring the system to operable status ... "

Telephone notification to the NRC Operations Center was made on 2/10/94 at 1828 hrs, and confirmed by facsimile transmission on 2/10/94 at 1900 hrs.

DESIGNATION OF CAUSES OF OCCURRENCES:

1. EVENT 1: DIESEL FIRE PUMP INOPERABILITY

The root cause of the diesel fire pump start failure has been attributed to engine exposure to sustained low ambient temperatures. At the time of the 1/20/94 event, the outside ambient temperature was approximately -15°F and the fire pump room air temperature was approximately +40°F. The minimum ambient temperature recommended by the manufacturer is +50° F.

Following the failure to start on one battery set, the diesel engine controls switched to the alternate batteries. Failing to start the engine on the second battery set, the controls blocked further start attempts for a pre-set time period, as designed. Both battery sets were tested and found to be operable. Examination of fuel samples revealed no evidence of fuel gelling.

Investigation determined that the HVAC system in the Service Water Pump Room (which encloses the diesel fire pump room) had been altered from its original design. Air intake and exhaust dampers originally provided were subsequently removed. These dampers regulate Service Water Pump Room ambient temperature by reducing heat loss/cold air infiltration under cold outside ambient conditions. The investigation failed to identify any work or design documentation related to damper removal.

On-site evaluation by the manufacturer's representative resulted in recommendations to install water jacket and lubrication oil heating subsystems introduced since the time of engine purchase. The diesel fire pump engine (Cummins model #NT-380-IF) was purchased in 1969. No auxiliary subsystems to facilitate automatic engine starting under cold ambient temperature conditions were listed by the manufacturer at that time. No evidence has been identified that such systems were recommended by the manufacturer at a later date, prior to this event.

2. EVENT 2: ELECTRIC FIRE PUMP INOPERABILITY

No root cause for the electric pump breaker trip was identified during subsequent troubleshooting and testing. Following its reinstallation, the pump was successfully started in both manual and automatic start modes.

The apparent cause for breaker trip is attributed to spurious malfunction. The breaker is equipped with a General Electric RMS-9 digital trip unit for which incidents of inadvertant tripping were reported in NRC Information Notice 93-75. However, no evidence was found indicating that conditions or events similar to those detailed in IN 93-75 occurred at the time of the electric fire pump breaker trip.

SHORT TERM CORRECTIVE ACTIONS:

Short term corrective actions taken included:

1. Establishing a back-up vital fire suppression water supply less than 4 hours after primary water supply inoperability by cross-connecting the vital fire water loop with the Service Water system.
2. Expediting on-site diesel engine inspection and evaluation by the manufacturer's representative.
3. Attempting to provide supplemental heating by redirecting a room heater discharge to the diesel fire pump engine area.
4. Initiating a Nuclear Network Operating Experience (OE) entry to alert industry members of this event.

LONG TERM CORRECTIVE ACTION:

Planned long term corrective actions include the following:

1. A design modification has been initiated to install water jacket and lubrication oil heating subsystems on the diesel engine. Installation is scheduled for completion by 2/25/94.
2. As a conservative measure, the feasibility of replacing the electric fire pump breaker RMS-9 digital trip unit with a different trip unit type is under investigation.
3. A work order request has been initiated to reinstall the missing Service Water Pump Room HVAC system air intake and exhaust dampers.

ADDITIONAL INFORMATION:

Diesel Fire Pump: Cummins
Model# NT-380-IF
Serial# 690907