

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

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FACILITY NAME: Vermont Yankee Nuclear Power Station
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INSPECTOR:

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Electrical Section, EB, DRS

11 Jan 94
Date

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1/13/94
Date

Area Inspected: This was an announced inspection of Vermont Yankee by regional personnel to observe the maintenance performed on the "B" emergency diesel generator (EDG), and to review the status of previously identified issues to determine the adequacy of the licensee's actions to resolve these issues. In addition, the adequacy of the licensee's actions to resolve problems associated with installed RMS-9 overcurrent trip devices was also reviewed.

Results: A non-cited violation associated with procedural compliance was identified during the performance of the EDG maintenance. Additionally, two unresolved items were identified. The first unresolved item was concerned with root cause analyses and corrective actions associated with a failed air start distributor. The second unresolved item was concerned with the control and updating of the EDG vendor manual. The updating of the vendor manual is of particular concern especially since the procedures at Vermont Yankee are written in such a way that require the technicians to rely heavily on the vendor manuals. A weakness was also identified in that the licensee had no administratively-controlled mechanism to address the generation and incorporation of improvements into maintenance department procedure revisions. Two previously identified violations and a previously identified unresolved item were closed.

The licensee's identification and correction of the discrepancy between the bolts installed in the air inlet housing and those identified in the vendor manual parts list was noteworthy.

DETAILS

1.0 PURPOSE

The purpose of this inspection was to review and determine the adequacy of the licensee's maintenance performed on the "B" emergency diesel generator (EDG). In addition, a review of the licensee's actions to resolve previously identified issues associated with the EDGs and with the RMS-9 overcurrent trip devices was performed.

2.0 EDG MAINTENANCE (62700)

2.1 Introduction

Vermont Yankee has two EDGs. Each has a continuous rating of 2750 kW and is driven by a Fairbanks-Morse (now a division of Coltec Industries) Model 38D Series 8-1/8 twelve-cylinder, two-cycle, opposed-piston, turbocharged diesel engine.

The maintenance performed on the "B" EDG by Vermont Yankee included the refueling cycle preventive maintenance, corrective maintenance and various other initiatives controlled through the work order process. The inspector reviewed a sample of these work items as described below.

2.2 Maintenance Personnel Qualifications

The inspector reviewed the qualifications of the personnel associated with the EDG maintenance. Each shift worked 12-hour days and consisted of a mechanical maintenance engineer, a lead mechanical technician, three mechanical technicians, and three contracted Coltec Industries diesel technicians. For each shift, the lead mechanical technician and one of the other mechanical technicians were documented as qualified per the licensee's maintenance qualification matrix. Additionally, Vermont Yankee had certification from Coltec Industries regarding the qualifications of the diesel technicians.

The inspector reviewed Procedure MMTPD, Revision 6, "Plant Mechanical Training Program Description," dated November 1992. This procedure described the initial training required for mechanical technicians, which consists of classroom instruction (with a test that requires 70% to pass) and on-the-job training (OJT). There were also particular requirements to qualify an individual for the independent performance of certain tasks. For a mechanical technician to be qualified to perform EDG maintenance, the mechanical technicians can attend an 80-hour Engine Overhaul Course given by Coltec Industries or complete OJT/Evaluation Training Guide 811005, "Emergency Diesel Generator Maintenance." During the course given by Coltec Industries, students disassemble and reassemble the major components of the Fairbanks Morse opposed-piston engine, including the turbocharger. The course consists of 80% hands-on training and 20% classroom instruction. At least three mechanical technicians and one mechanical maintenance engineer have completed this course. Maintenance Guide 811005 requires the technician to perform, simulate, or discuss tasks as described by the EDG PM Procedure OP-5223. These tasks are

signed completed by a qualified mechanic, and then the individuals are evaluated by one of the training evaluators. This information is documented in the individual's maintenance guide. The inspector found the qualifications of the Vermont Yankee personnel performing the EDG maintenance to be acceptable.

2.3 Preventive Maintenance

Background

The preventive maintenance on the EDGs is normally performed on a 18-month cycle, based on the vendor's recommendations. The Maintenance Planning and Control (MPAC) system at Vermont Yankee allowed no tolerance on exceeding this 18 months, without an evaluation justifying the extension. The "B" EDG was due for its 18-month maintenance in April 1993; however, Vermont Yankee determined that performing the evaluation for a one time extension of the maintenance period to 24 months would be advantageous due to other scheduling concerns. Therefore, in April 1993, Vermont Yankee performed an abbreviated inspection on the "B" EDG, in accordance with guidance provided by Coltec Industries. The results of this inspection were evaluated by Vermont Yankee and Coltec Industries and there was no evidence of unacceptable conditions in the components inspected. Coltec Industries concurred with Vermont Yankee with the one time extension of the preventive maintenance cycle period for the "B" EDG to 24 months. The inspector reviewed the correspondence between Vermont Yankee and Coltec regarding the "B" EDG preventive maintenance cycle extension and found no problems.

The inspector reviewed Procedure OP 5223, Revision 13, "Emergency Diesel Generator Maintenance," and the associated Work Order 93-02395-00. The preventive maintenance recommended in the vendor manual was incorporated into Procedure OP 5223, surveillance or electrical maintenance procedures. The inspector noted that Procedure OP 5223 often refers to the vendor manual for details of various steps required to be completed. In addition, the procedure relies on the skill of the trade in a number of areas. The inspector did not consider this a weakness based on the training and qualifications of the technicians performing the maintenance.

In addition to the preventive maintenance performed through Procedure OP 5223, Vermont Yankee was also performing a number of other initiatives through the work order process. These initiatives included:

- 1) Replacement of air and fuel line copper tubing;
- 2) Testing of piston insert hardness;
- 3) Replacement of turbocharger;
- 4) Clean and inspection of air start distributor; and
- 5) Measurement of piston internals.

Overview of Preventive Maintenance Inspected

During his inspection, the inspector observed various aspects of the preventive maintenance performed on the EDG. The inspector observed the work of the maintenance crews on day shift, swing shift, night shift and over the weekend. In addition, the inspector attended several of the shift turnover meetings between the two working crews. During these meetings, the work completed in the previous shift was discussed, including any problems that were encountered. The work planned for the oncoming shift and potential difficulties were also discussed. The inspector found effective communications between the two working crews.

Some of the work observed included:

- 1) The pop testing of the fuel injectors, to verify that the fuel injectors operate at the proper pressure and developed a satisfactory spray pattern.
- 2) The cleaning of various EDG components and parts, including the fuel injectors, pistons and piston internals.
- 3) The taking of various measurements and the verification that the results of those measurements were within the limits specified in the vendor manual.
- 4) The replacing of various parts and components, and the resolutions of discrepancies identified by the licensee to ensure the proper parts were installed, and that proper evaluations were performed when identical replacement parts were not available.
- 5) The installation of the upper pistons.
- 6) The break-in testing as performed in accordance with the procedure provide in Service Information Letter (SIL) A-5.

The inspector noted the concern and questioning attitude of the maintenance technicians with respect to ensuring that the proper replacement parts were installed, and that the proper torque values were applied to the various fasteners throughout the EDG. Also, the work area and the housekeeping was maintained in accordance with Procedure AP6024, "Plant Housekeeping," Revision 8, which refers to ANSI Standard N45.2.3.

Information Notice 93-76

Recently issued Information Notice 93-76, "Inadequate Control of Paint and Cleaners for Safety-Related Equipment," dated September 21, 1993, described the use of the cleaner, "Planisol-M," on the EDGs at another nuclear power plant. This cleaner was found to dry out the lubricants and leave a residue, which caused the fuel control linkage to stick, causing the EDG to fail to start. Prior to this inspection, the licensee had not reviewed this

information notice. However, discussions with the licensee indicated that the cleaner "Planisol-M" described in the information notice was not used at Vermont Yankee, and the only cleaners being used were acceptable based on discussion with the diesel vendor and past experiences. The inspector verified that "Planisol-M" was not on Vermont Yankee's list of approved chemicals.

Inadequate Procedure Compliance for Torsional Dampers Inspection, and Weakness with the Control of Procedure Improvement Changes

On October 8, 1993, during review of the partially completed Procedure OP 5223, the inspector questioned the maintenance engineer about Step B 2 on VYOPF 5223.06, which instructs the technicians to refer to the vendor manual for the disassembly instructions and acceptance criteria for the torsional damper inspection. The purpose of the torsional damper is to dampen torsional vibrations that are potentially destructive to the crankshaft. The vendor manual states that the outer diameter (OD) of the pin and the bushing are to be measured, and the inner diameter (ID) of the bushing and the weight are to be measured. All measurements were to be compared with the specifications provided in the vendor manual. The technicians followed the disassembly procedures; however, the only measurements taken and recorded were the OD of the pin, and the ID and OD of the weight. This line item was signed off as complete. The inspector's review identified that measurements of the bushings were not recorded. This was discussed with the night shift mechanical engineer, and it was determined that the measurements for the bushing were not taken. The technicians then took the required measurements for the bushing, which were found to be within specification. In addition, the night shift engineer submitted a procedure change suggestion to provide greater detail to this step in Procedure OP 5223. Technical Specification 6.5.A requires that detailed written procedures shall be prepared and adhered to for maintenance operations that could have an effect on the safety of the reactor. This failure to adhere to procedure is a violation. However, it was not cited because the criteria specified in Section VII.B.1 of the Enforcement Policy were satisfied.

The inspector reviewed the Procedure AP 0037, Revision 1, dated August 16, 1993, "Plant Procedures." One of the purposes of this procedure is to establish proper procedural format and methods of review and revision. This procedure did not address the use of procedure change suggestions, from either a submitting or a incorporating point of view. However, the engineers and management were aware of the mechanism and the need to incorporate procedure improvements into the procedure review and revision process. Discussions with the Maintenance Department Manager indicated that the Instrumentation and Controls (I&C) Department Procedure AP 0310, "Surveillance, Preventative and Corrective Maintenance Program," did provide a formalize process for initiating and incorporating procedure change improvements. Additionally, the Maintenance Department Manager stated that it was his intention to incorporate the mechanism used by the I&C department into the Maintenance Department Procedures. Vermont Yankee has committed to develop and incorporate a

mechanism for the controlling the procedure change improvement process into the maintenance department administrative procedures, or into a site wide procedure. This lack of a mechanism for the control of suggested procedure changes within the Maintenance Department was considered a weakness in the Vermont Yankee maintenance program.

Post-Maintenance Testing

The inspector observed portions of the EDG post-maintenance break-in testing. This testing was performed in accordance with the vendor's recommendations as described in SIL A-5. Subsequent to the onsite inspection, the results of the break-in and pre-operational tests were reviewed by the inspector and found acceptable with the following exception. While performing the break-in testing on October 14, 1993, the engine failed to roll during a start attempt. The licensee investigated the air-start system and determined the failure to have originated in the air-start distributor. Two problems were identified within the air start distributor. First, air-start pilot valve 4 was stuck, which prevented the engine from starting. Second, air-start pilot valve 6 was found to have an improperly installed spring. Both of these problems were corrected and the remainder of the testing indicated that the system was operable. The licensee documented, in Work Order 93-02395-18, that the probable cause of the problem associated with air-start pilot valve 6 was that it was not assembled properly during the recently performed maintenance. No root cause was documented for the stuck air-pilot valve.

Discussions with the licensee indicated that the stuck air-start pilot valve was probably due to a combination of the very tight tolerances associated with these valves and the possible introduction of fine particles of foreign material to the system. These discussions also revealed that this was the first time Vermont Yankee had performed this maintenance on the air-start distributor for either EDG. Since these problems were corrected and the EDG was tested and found to operate satisfactorily, there is no present safety concern with this issue. However, there is a concern with the apparent lack of documentation and corrective action to preclude repetition associated with this issue. Discussions with the licensee indicated that these problems were attributed to maintenance errors, and that for problems initiated during maintenance and subsequently discovered and repaired prior to returning the equipment to an operable status, the determination for the need for formal root cause analysis is left up to the maintenance department and is not controlled through a formalized process. Therefore, the concern is both specific to this case with the EDG air-start distributor problems and from a general point on how Vermont Yankee handles the root cause analysis and corrective action for problems initiated during maintenance activities that are subsequently discovered and repaired prior to returning the equipment to an operable status. This item is considered unresolved pending further licensee evaluation and subsequent NRC review of the causes leading to the air-start distributor failure and of the corrective actions necessary to document and evaluate problems identified during maintenance activities (50-271/93-20-01).

Conclusion

The inspector's review of the Vermont Yankee preventative maintenance performed on the "B" EDG was found to be in accordance with the vendor's recommendations. Procedures associated with this maintenance were found to contain the appropriate level of detail, and the technicians were observed to comply with these procedures with the exception of the measuring of the torsional damper bushings described above. Problems identified by the licensee during this maintenance were found to be adequately documented, with the exception of the root cause of the failed air start distributor discussed above. A weakness was also identified in that the licensee had no administratively controlled mechanism to address the generation and incorporation of improvements into maintenance department procedure revisions. The inspector had no further concerns regarding the preventative maintenance performed on the EDG.

2.4 Cylinder Liner Replacement

The inspector reviewed Work Order #93-00475-00, "Replace Cylinder Liners during Major Inspections," and the associated One for One Evaluation #92-086, dated October 30 1992. The purpose of the cylinder liner replacement is to change from vendor part number 16606472 to 16609706. The new part is what is listed in the current vendor manual. According to the One for One Evaluation the only differences between the old liners and the new liners are:

- 1) An improved seal arrangement consisting of an additional O-Ring at the top and bottom seals of the cylinder liner and jacket assembly. This is to provide an improved sealing capability without changing the fit, form or function of the main component assembly and allows for complete interchangeability with the original equipment.
- 2) The O-Ring material was upgraded from Buna-N to Viton. Viton is capable of withstanding higher temperatures and is acceptable based on the absence of radiolysis in the diesel cubical.

According to this evaluation, the replacement of the cylinder liners will not affect the operation of the diesel generator. The work order refers the technician to the vendor manual for step-by-step instructions. The inspector found the vendor manual to contain adequate detail for installation of the cylinder liners. Also the inspector found the One-for-One Evaluation to contain an appropriate review of the impact of this change on the overall design and intended operation of the EDG.

Upon the completion of the cylinder liner replacement, the licensee performed a fluorescent magnetic particle inspection of the removed cylinder liners, as described in Work Order 93-09124-00. No relevant indications were found during this fluorescent magnetic particle inspection.

The inspector observed various aspects of the cylinder liner replacement. The only concern identified was regarding the updating and control of the vendor manual described in the following section.

Update and Control of Vendor Manuals

The inspector observed various steps associated with the replacement of the cylinder liners, including the actual installation of the new cylinder liners. On the evening of October 5, 1993, the inspector questioned the maintenance crew regarding the use of an O-ring lube rather than the liquid soap described in the vendor manual and the use of "Anti-Seize" as a thread lubricant for the cylinder liner studs rather than "White Lead" as described in the vendor manual. The technicians stated that they were instructed to use these products instead of those listed in the vendor manual. A subsequent interview with the mechanical maintenance engineer indicated that Vermont Yankee did discuss these topics with Coltec Industries prior to the work but had no documentation of these discussions. Later Vermont Yankee contacted Coltec Industries again to confirm the acceptable use of these products and this time Vermont Yankee documented the discussion in a memorandum to file for the EDGs. A review of this memorandum to file revealed that "White Lead" had not been available for approximately ten years. This indicated that the vendor manual had not been properly updated, and was a concern to the inspector especially since the procedures at Vermont Yankee are written in such a way that require the technicians to rely heavily on the vendor manuals.

Through discussions with the licensee the inspector ascertained that they were aware of the need to revise and update the EDG vendor manuals. They have recently performed a review and update of the vendor manual with respect to vendor information letters as described in Section 3.3 of this report. Additionally, the licensee was actively pursuing the needed revision and updating of the EDG vendor manuals as documented by internal Vermont Yankee correspondence in June 1993.

The inspector was also concerned with the control of the EDG vendor manuals. There was a question regarding whether the EDG vendor manual assigned to the I&C Department was a controlled copy. The I&C Department copy of the EDG vendor manual was marked as a controlled copy; however, it was not on the licensee's master list of controlled documents. Furthermore, this copy was noted not to contain the last few revisions.

The need to control and update safety-related component vendor information is addressed in Generic Letter 83-28. This concern is an unresolved item, pending the licensee's evaluation and subsequent NRC review of Vermont Yankee's corrective actions to ensure that vendor manuals are properly maintained and controlled (50-271/93-20-02).

2.5 Turbocharger Replacement

The inspector reviewed the Work Order 93-02395-08, which described the turbocharger replacement on the "B" EDG. The replacement turbocharger was identical to the previously installed turbocharger, and the inspector verified that the part numbers matched. The turbocharger replacement was a result of a weakness identified by Vermont Yankee during a review of their EDG maintenance and surveillance programs. This review determined that the exhaust side of the turbochargers has not been inspected for twenty years. The vendor recommends an inspection, and cleaning if needed, of the turbocharger on a 4½ to 5 year cycle. The end float of the impeller of the previously installed turbocharger was measured and found to be within the vendor's specifications. Vermont Yankee intends to refurbish the previously installed turbocharger and use it as a spare. In addition to reviewing the documentation associated with the turbocharger replacement, the inspector observed the performance of various steps of the maintenance. Both the documentation and the work observed were found to be satisfactory.

2.6 Lubricating Oil Element Replacement

The inspector reviewed Work Order 93-05983-00, and One-for-One Evaluation 92-088, regarding the replacement of the EDG lubricating (lube) oil temperature control elements. The lube oil temperature on the diesel is regulated by a temperature control valve. The previously installed temperature control elements were 195°F elements, and operated such that they start to open at 190°F and are full open at 205°F. The replacement temperature control elements are 180°F elements, and operate such that they start to open at 175°F and are full open at 195°F. This change in lube oil operating temperature will cause the film thickness of lube oil to double, therefore, increase engine protection. The ability of the diesel to perform its intended function and the operation is not effected by this change. In addition to reviewing the documentation associated with the temperature control element replacement, the inspector observed the performance of various steps of the maintenance. Both the documentation and the work observe were found to be satisfactory.

2.7 Overspeed Trip Setpoint Adjustment

The inspector reviewed Work Order 93-00875-00, "Test/Set Overspeed Trip Setting to 115% to 117% In Accordance with FM SIL A-25 and the vendor manual," and Maintenance Department Setpoint Change Request (MDSCR) 93-01. The reason for this setpoint change as stated in MDSCR was to incorporate the vendor's recommendation for changing the overspeed setpoint to 115 - 117% to preclude premature trip of the EDG on fast-start machines. The previous overspeed setpoint was 110-117%; therefore, Vermont Yankee only reduced the acceptable band for the overspeed trip setpoint. The Fairbanks Morse SIL Volume A Issue 25 was also reviewed by the inspector and it was verified that the change was in accordance with the SIL.

The inspector's review of the vendor manual found little guidance for the adjusting of the overspeed trip setpoint. However, discussions with the technicians and the mechanical maintenance engineer indicate that this task is considered skill of the craft, and that changing of the overspeed setpoint is discussed during the course provided by the Coltec Industries, which several of the qualified technicians have attended.

To adjust the overspeed setpoint, the number of shims in the overspeed trip device is varied. The thumb rule used by Vermont Yankee is that 0.001 inches of shim equals approximately 1 rpm. The previous test of the overspeed trip setpoint demonstrated that the overspeed trip setpoint was at 1019 rpm. Since the rated speed of the EDG is 900 rpm, the licensee determined that an addition of 0.030 inches of shim were required. After the addition of the shims, the overspeed trip setpoint was tested, and was determined to be set at 1042 rpm. This was within the new acceptance criterion of 1044 rpm \pm 9 rpm (115% to 117% of rated speed). The inspector found the review and implementation of the overspeed trip setpoint change to be acceptable, and had no further questions regarding this issue.

2.8 Air Inlet Housing Replacement

The inspector reviewed Work Order 92-02709-00, "Replace Inverted Y Air Inlet Housing with New Cast-in Baffle Design under PO 92-00665-00," and the associated One-for-One Evaluation 92-071. The replacement of the air inlet housing was based on the Fairbanks Morse SIL Volume A Issue 7, "Air Inlet Housing," dated December 16, 1985, that recommended the replacement of the old housing with a new design. The One-for-One Evaluation stated that the replacement air inlet housing is a direct replacement for the original air inlet housing. The replacement housing was purchased from the original equipment manufacturer as a safety-related purchase, in accordance with their approved QA program. The inspector found the documentation associated with the replacement of the air inlet housing acceptable.

The inspector observed the replacement of the air inlet housing and found the work performed in an satisfactory manner. Noteworthy was the licensee's identification of the improper capscrew threads on the installed fasteners used to secure the air inlet housing to the air inlet check valve. The inlet housing was found installed with a fine thread capscrews, and the vendor manual called for a coarse thread capscrew. The installed bolts were tested and verified that they exceeded the requirements of the bolts identified in the vendor manual. The licensee documented this discrepancy in Nonconformance Report (NCR) 93-30.

The licensee was unable to replace the installed capscrews with those identified in the vendors manual, because that part was not in stock. However, these bolts were replaced with safety class capscrews having the exact form, fit, and function to those referenced in the vendor manual. The licensee verified that the replacement capscrews exceeded the strength requirements of the originally installed capscrews. The inspector reviewed the licensee's documentation associated with the capscrew replacement, One-for-One Evaluation 93-159, and found it appropriate.

2.9 Conclusion - EDG Maintenance

The inspectors concluded that the maintenance performed on the "B" EDG by Vermont Yankee was in accordance with the vendor's recommendations. The quality of work performed by technicians and shift supervision was found to be good, especially their attention to detail as evidenced by the identification and correction of the discrepancy between the bolts installed in the air inlet housing, and those identified in the vendor manual part list. However, the inspector identified concerns in the areas of root cause and corrective actions associated with the failed air-start distributor, and vendor manual update and control. The procedures at Vermont Yankee are written in such a way that require the technicians to rely heavily on the vendor manuals. A weakness was also identified in that the licensee had no administratively controlled mechanism to address the generation and incorporation of improvements into maintenance department procedure revisions.

3.0 PREVIOUSLY IDENTIFIED EDG ISSUES (62700, 92701, 92702)

3.1 (Closed) Violation (50-271/92-21-01) Adequacy of Procedure Associated with EDG Bolting

In September 1992, following the return-to-service of the "A" EDG, several fasteners were found either loose or missing on the flange for the turbocharger inlet air. Further review indicated that the procedures governing the diesel maintenance did not include detailed instructions necessary to control the installation of fasteners on the "A" EDG. As documented in Vermont Yankee's letter to the NRC, dated December 9, 1992, to address this issue, the licensee assigned an independent task force to investigate the cause of the loose fasteners and to recommend actions to prevent recurrence. The results of the task force's investigation were documented in corrective action report (CAR) 92-36. The recommendations of this CAR were used by the licensee to resolve the concerns raised in the findings.

The CAR recommendations included: providing the torque values for particular-use bolts and a general use bolts torque chart in the vendor manual; using lockwashers in certain high vibration applications; and developing Procedure OP 0212, "General Bolting Guidelines" based on EPRI Good Bolting Practices. This procedure outlined the general requirements for assembling joints held together by threaded fasteners and the torquing of these fasteners. The procedure also included torque sequencing methods, fastener identification markings, standard torque tables based on the bolt diameter and material, gasket requirements, and the proper use of torque wrenches. The inspector found this procedure to be acceptable.

The EDG Maintenance Procedure OP 5223, "Emergency Diesel Generator Maintenance," and the EDG vendor manual were reviewed and found to contain adequate instructions for the installation of fasteners with the proper torque values. In addition, the current revision of Procedure OP 5223 includes steps to perform the following:

- 1) bolt torque checks after the engine operation and cooldown;
- 2) bolt torque checks routinely, subsequent surveillance, until two consecutive bolt checks are performed with no bolt loosening; and
- 3) a bolt check approximately 6 months after the date of the overhaul.

The inspector's review found the corrective actions associated the procedures and instructions to control the maintenance involving the installation of fasteners on the EDGs acceptable. In addition, the concern demonstrated by the technicians performing the EDG maintenance to ensure that they used the proper torque values and sequencing was observed to be good. This item (50-271/92-21-01) is considered closed. However, even though Procedure OP 5223 was updated to address the bolting issues, there were other discrepancies identified in the vendor manual, which are described in Section 2.4 of this report.

3.2 (Closed) Violation (50-271/93-10-08) Documentation of the 'A' EDG Cylinder Liners

Inspection 50-271/93-10 identified a condition where Vermont Yankee failed to include a record of the engineering evaluation basis for the equivalency evaluation for the "A" EDG replacement cylinder liners. (This violation was referred to as 50-271/93-10-01 in Inspection Report 50-271/93-10, and subsequently reassigned as 50/271-93-10-08). The inspector reviewed Vermont Yankee's corrective actions associated with this violation. These actions included providing supplemental written justification to support the original equivalency evaluation, revisions to Procedure VYP:329, "Equivalency Evaluation Procedure," and formal retraining of the procurement engineering staff in the requirements of VYP:329. The supplemental written justification to support the equivalency evaluation was reviewed during inspection 50-271/93-10. During this inspection a review of VYP:329 was performed.

The purpose of VYP:329 is to provide instruction for performing equivalency evaluations for alternate replacement items. The review found VYP:329 to contain a section on *System Interaction*, which required a determination of whether the differences that exist in the alternate items could create interaction problems with other related parts, components, systems or structures when it is used in its intended application. The equivalency evaluation form associated with VYP:329 was also found to contain a section addressing *System Interaction*, to ensure the appropriate information is documented. The inspector also reviewed the training given to the procurement engineering staff in July 1993, addressing the Vermont Yankee expectations of the equivalency evaluations with respect to system interaction. The inspector found these corrective actions to be acceptable, and considers this item closed.

3.3 (Closed) Unresolved Item (50-271/93-10-07) Implementation of EDG vendor SILs

During their review of the licensee's implementation of the vendor's service information letters (SILs), the inspectors found one example where the SIL recommendations had not been implemented. They expressed a concern regarding their addressing SILs in general. The specific SIL identified was Volume A, Issue 25, dated August 1, 1991, fast start engines, i.e., engines in nuclear service, were recommended to have their overspeed trip reset to 115% to 117% of rated speed to prevent inadvertent engine shutdown.

Since the initial NRC review, this particular item was incorporated into the operation of the EDGs, as discussed in Section 2.7 of this report. Also, as a result of one of the recommendations of the Diesel Generator Task Force and in response to the unresolved item, Vermont Yankee obtained and reviewed all SILs from the vendor. The SILs were added to the vendor manual, the applicable references were added to the Procedure OP 5223, "Emergency Diesel Generator Maintenance," and, where necessary, SILs were incorporated in the design via modifications. The inspector reviewed Vermont Yankee's actions associated with the review and implementation of vendor SILs and found them acceptable. This item (50-271/93-10-07) is considered closed.

4.0 MICROVERSATRIP RMS-9 OVERCURRENT DEVICES (92720)

As a result of events involving spurious trips of 480V circuit breakers equipped with the General Electric (GE) MicroVersaTrip RMS-9 trip devices at Maine Yankee Nuclear Power Station (as describe in NRC Inspection Report, 50-307/93-18 and 50-309/93-21) and three unexplained spurious trips of nonsafety-related circuit breakers equipped with RMS-9 trip devices, during the 1993 refueling outage at Vermont Yankee, the licensee developed an action plan to address the potential safety concern. The scope of the Vermont Yankee action plan was described in a September 5, 1993, memorandum to the Operations Superintendent, and recommended that the safety-related circuit breakers equipped with RMS-9 trip devices be replaced with safety-related circuit breakers with EC trip devices.

Subsequently, on September 17, 1993, the NRC issued Information Notice 93-75, "Spurious Tripping of Low-Voltage Power Circuit Breakers with GE RMS-9 Digital Trip Devices." This Information Notice describes how the ungrounded delta-connected 480 Vac distribution systems at Browns Ferry Nuclear Plant and Maine Yankee Nuclear Power Plant had experienced short-duration high-amplitude current transients that caused unwanted tripping of some GE AK-type circuit breakers fitted with the GE RMS-9 solid-state digital trip units. The safety significance associated with these spurious trips, is that a common mode initiator of intermittent ground faults on nonsafety-related and unqualified circuits, such as a loss of coolant accident or high-energy line break, could conceivably cause propagation of current spikes to multiple portions of an electrical distribution system. They may not trip Class 1E isolation circuit breakers not equipped with RMS-9s, and may not trip some with RMS-9s, but could result in unwanted tripping of other RMS-9 equipped circuit breakers and attendant loss of vital loads possibly in more than one train.

The inspector reviewed the licensee's actions to address the concerns associated with the RMS-9 trip devices. The following six 480V safety-related circuit breakers were equipped with the RMS-9 devices:

Bus 8

Breaker 88 (Bus 8 supply breaker)
Motor Control Center 8A feeder
Motor Control Center 8B feeder
Motor Control Center 8C feeder

Bus 9

Motor Control Center 9B feeder
Motor Control Center 9C feeder

The licensee replaced these circuit breakers with safety-related circuit breakers containing EC trip devices. Discussions with the licensee indicate that although the trip band for the EC devices is not as precise as the trip band for the RMS-9 devices, protection device coordination is still maintained for the circuits that were modified. In addition to the safety-related circuit breakers, Vermont Yankee performed a review of the other circuit breakers equipped with the RMS-9 devices to determine if any other circuit breakers need to be replaced to prevent unnecessary operational transients. Consequently, Vermont Yankee intends to replace the feeder breakers to the following nonsafety-related Motor Control Centers (MCCs) prior to plant startup:

- MCC 6A
- MCC 7A
- MCC 11B

The inspector had no further concerns regarding the RMS-9 trip devices and found the licensee's actions appropriate.

5.0 UNRESOLVED ITEMS

Unresolved items are matters about which additional information is necessary to determine whether they are acceptable, a deviation or a violation. Two unresolved items were identified during this inspection and are discussed in Sections 2.3 and 2.4 of this report.

6.0 EXIT MEETING

The inspector met with the licensee's personnel denoted in Attachment 1 of this report at the conclusion of the onsite inspection period on October 14, 1993. At this time, the scope of the inspection and the inspection results were summarized. Additionally, during this meeting the licensee confirmed their commitment described in Section 2.3, and they acknowledged the inspection findings as detailed in this report. Follow-up discussions were conducted with the licensee regarding the post-maintenance testing performed and associated failure of the EDG air-start distributor. This information was summarized during a December 1, 1993, telephone conversation with Mr. Wanczyk and other licensee personnel denoted on Attachment 1.

ATTACHMENT 1

Persons Contacted

Vermont Yankee Nuclear Power Corporation

J. Apostle	Mechanical Maintenance Technician
G. Benedict	Quality Assurance
M. Garland	Lead Mechanical Maintenance Technician
* R. Grippardi	Quality Assurance Supervisor
J. Lazar	Mechanical Maintenance Engineer
* W. Limberger	Materials Manager
D. Metevier	Lead Mechanical Maintenance Technician
*+ S. Naeck	Mechanical Maintenance Engineer
* C. Nichols	Production Supervisor
* R. Pagodin	Operations Superintendent
+ S. Primavera	Production Supervisor
N. Prokovich	Mechanical Maintenance Technician
E. Rogers	Documentation and Administrative Services Supervisor
G. Short	Mechanical Maintenance Instructor
*+ R. Wanczyk	Plant Manager
+ T. Watson	Maintenance Manager

Coltec Industries

G. Bilek	Diesel Technician
W. Castagnetta	Diesel Technician
R. Crary	Diesel Technician
F. DeGregory	Diesel Technician
V. Derveloy	Diesel Technician
B. Gragg	Diesel Technician

NPS Energy Services

R. Voetsch	Mechanical Maintenance Technician
B. Wood	Mechanical Maintenance Technician
W. Wyman	Mechanical Maintenance Technician

U.S. Nuclear Regulatory Commission

*+ P. Harris	Resident Inspector, Vermont Yankee
G. Kelly	Section Chief, Section 3A, Region I
W. Ruland	Section Chief, Electrical Section, Region I
J. Shedlosky	Acting Senior Resident Inspector, Vermont Yankee

- * Denotes those present at the exit meeting held at Vermont Yankee, October 14, 1993.
- + Denotes those who participated in the December 1, 1993, conference call.