

U. S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF INSPECTION AND ENFORCEMENT  
REGION IV

Report No. 99900300/79-01

Program No. 51400

Company: Colt Industries  
Fairbanks Morse Engine Division  
701 Lawton Avenue  
Beloit, Wisconsin 53511

Inspection Conducted: April 2-5, 1979

Inspector: W. E. Foster 4/25/79  
W. E. Foster, Contractor Inspector, Vendor  
Inspection Branch Date

Approved by: D. M. Hunnicutt 4/25/79  
D. M. Hunnicutt, Chief, Components Section II  
Vendor Inspection Branch Date

Summary

Inspection on April 2-5, 1979 (99900300/79-01).

Area Inspected: Implementation of 10 CFR Part 21 requirements regarding Part 21 Report on Fuel Injection Pump Failures, Exhaust Rocker Arm Failures, Lubricating Oil Header Failure, and Fuel Line Fabrication (flaring) problems. The inspection involved twenty-seven (27) inspector-hours on site.

Results: In the area inspected, no apparent deviations were identified; the following unresolved items were identified:

Unresolved Items:

1. The number of fuel injection pumps that had been rerun following rework could not be determined due to lack of agreement between quality assurance and sales correspondence.
2. No documentation was available to verify that exhaust rocker arms had been removed, nondestructively examined and reworked, as necessary for two (2) diesel generators.

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3. No documentation was available to verify that the one and one-quarter inch fuel lines on two (2) diesel generators had been replaced with lines with acceptable flares. Also, process documents had not been revised to require inspection of fuel line flares.

A letter dated April 18, 1979, from Colt Industries, Fairbanks Morse Engine Division, to the U. S. Nuclear Regulatory Commission, Arlington, Texas, transmitted process documents that had been revised to require inspection of fuel line flares.

DETAILS SECTION

A. Persons Contacted

- \*C. A. Ankrum, Manager, Quality Assurance
- \*R. H. Beadle, Vice President, Engineering
- \*G. Davis, Vice President, Manufacturing
- \*W. T. Hailey, Vice President, Sales
- \*J. F. Morgan, President, Fairbanks Morse Engine Division
- \*J. M. Moriarty, Manager, Utility Sales
- C. L. Newton, Manager, Development Engineering
- G. W. Olson, Supervisor, Contract Administration

\*Attended exit interview.

B. Part 21 Report Follow-up

1. Objectives

The objectives of this area of the inspection were to verify that:

- a. The reports accurately described the defect or failure to comply and satisfied the reporting requirement with respect to information provided and timing of submittal.
- b. The defect or failure to comply had been evaluated as required by Part 21 and reporting organization procedures, stated safety hazard is a logical conclusion, factual and complete data had been used, generic implication had been assessed.
- c. The stated corrective action is appropriate and adequate, implemented or planned, and will prevent recurrence.

2. Methods of Accomplishment

The preceding objectives were accomplished by:

- a. Review of Standard Practice Number 714.00, dated December, 1977 to verify a procedure had been established to identify reporting requirements.
- b. Review of Part 21 Reports on Fuel Injection Pump Failures, Exhaust Rocker Arm Failures, Lubricating Oil Header Failure, and Fuel Line Flaring Problems, to verify that the reports met the requirements of Standard Practice Number 714.00 and 10 CFR Part 21.

- c. Review of correspondence between the manufacturer and customers to verify reporting/acknowledgement and corrective action effort.
- d. Review of corrective actions and preventive measures to verify adequacy thereof, as represented by:
  - (1) Establishment of new and stricter inspection criteria; e.g., surface finish, material usage, non-destructive examination,
  - (2) New and revised drawings, test procedures, tests, hardware redesign; e.g., Drawing Numbers P12610697 dated January 2, 1979; 03750028, Revision 8 dated October 19, 1978; 03750027, Revision 7 dated March 13, 1979; Test Procedures Numbers 11874478 dated November 8, 1978; 11874751 dated November 17, 1978; Test Report No. R-5.66-501 dated October 23, 1978.

3. Findings

a. Deviations

None.

b. Unresolved Items

- (1) The inspector was unable to determine the number of fuel injection pumps that had been rerun on the Northeast Utilities contract following rework of the fuel pumps. The uncertainty resulted from lack of agreement between quality assurance and sales correspondence.
- (2) The inspector was unable to determine that exhaust rocker arms had been removed, nondestructively examined and reworked as necessary, for Northeast Utilities diesel generator No. 2 and Duquesne Light Company diesel generator No. 2. This condition existed because there were no documents to indicate accomplishment of nondestructive examination, rework and inspection.
- (3) The inspector was unable to determine that one and one-quarter (1-1/4) inch fuel lines on diesel generators No. 1 for Northeast Utilities and No. 2 for Duquesne Light Company had been replaced with lines that exhibited satisfactory flares. This condition existed because there were no records to indicate accomplishment.

Additionally, process documents had not been revised to require inspection of fuel line flares.

A letter dated April 18, 1979, from Colt Industries, Fairbanks Morse Engine Division to the J. S. Nuclear Regulatory Commission, Arlington, Texas, transmitted process documents that had been revised to require inspection of fuel line flares.

c. Comments

- (1) Part 21 Report on Fuel Injection Pump Failures during the 300-start qualification test, several barrel to plunger seizures occurred. These failures appear to have been caused by improper design/manufacturing and result in the associated fuel pump becoming inoperable.

The inspector verified the initial and follow-up reports accurately described the defect, and evaluation of the defect had been accomplished with an assessment of generic implications. Available records indicated new inspection criteria had been established and implemented and fuel injection pumps had been run-in for a minimum of forty-eight (48) hours before they were considered to be operational.

Letters from Colt Industries, Fairbanks Morse Engine Division to the U. S. Nuclear Regulatory Commission at Glen Ellyn, Illinois, dated March 22, 1979, and March 23, 1979, regarding Northeast Utilities, Duquesne Light Company and South Carolina Electric and Gas Company, respectively, state in part, "No further action is contemplated and both units are ready to go into service." However, timing adjustment had not been made on the following diesel generators: (1) One (1) for Northeast Utilities, (2) Two (2) for Duquesne Light Company, and (3) Two (2) for South Carolina Electric and Gas Company. The inspector was informed accomplishment of this task had been postponed to ensure against disturbing the preservative and would occur during preparation of the diesel generator for operation. The letter addressing Northeast Utilities indicates one pump from each unit was rerun while quality assurance correspondence indicates one pump was run (See paragraph 3.b.(1) above.)

Measures to prevent recurrence of barrel to plunger seizures include: (1) Assignment of new part numbers and creating new drawings for the Plunger and Barrel

Assembly, and Injection Fuel Pump Assemblies for the PC-2 and PC-2.5 Model diesel generators for the purpose of separating commercial and nuclear hardware, (2) change of the material for the plunger, (3) stricter quality requirements, (4) establishment of run-in requirements, and (5) revising other applicable drawings.

- (2) Part 21 Report on Exhaust Rocker arm failures. During the 300-start qualification test, one exhaust rocker arm failed due to manufacturing error, leaving the diesel engine inoperable. The inspector verified that the initial and follow-up reports accurately described the defect, and evaluation of the defect had been accomplished with an assessment of generic implications. Available records indicated all rocker arms from all affected diesel generators had been removed, subjected to non-destructive examination, reworked or replaced as necessary, and reinstalled. The inspector was unable to determine that adequate corrective action had been taken with respect to diesel generators No. 2 for Northeast Utilities and Duquesne Light Company because there were no records to indicate performance of nondestructive examination, rework or replacement; however, there were some disjointed statements that the task had been done.

Valve clearances had not been set on the following diesel generators due to the risk of disturbing the preservative: No. 2 for Northeast Utilities; Nos. 1 and 2 for Duquesne Light Company; and Nos. 1 and 2 for South Carolina. The inspector was informed this task would be accomplished during preparation of the units for operation. (See paragraph 3.b.(2) above.)

Measures to prevent recurrence of exhaust rocker arm failures due to manufacturing errors include: (1) Revised drawings, (2) Additional critical inspections, (3) establishment of defect removal criteria, (4) construction of special handling containers, and (5) use of protective sleeves on all three arms of the rocker arm.

- (3) Part 21 Report on Lubricating Oil Header failure. The contractor had not completed activities associated with this report. However, the inspector verified that the initial report accurately described the defect, and evaluation of the defect had been accomplished with an assessment of generic implications.

Records indicated that all lubricating oil headers of the old design had been scrapped and replaced with redesigned hardware.

The inspector observed that redesigned hardware had been installed on the diesel generators for Northeast Utilities, Duquesne Light Company, Public Service of New Hampshire and Union Electric. Completion of the flushing operation of the Lubrication Oil Headers is scheduled for May 14, 1979, for the following: Duquesne Light Company (2); and Northeast Utilities (1). These units are in storage at the contractor's facility in Beloit, Wisconsin. The Lubricating Oil Headers at South Carolina were returned to Colt at Beloit; flushed, sealed and returned to South Carolina Electric and Gas Company. The inspector was informed that the Lubricating Oil Headers would be installed during preparation of the diesel generators for operation.

Measures to prevent recurrence of this type of fracture in the lubricating oil headers included: (1) Redesign of the Lubricating Oil Headers, (2) increased hydrostatic test pressure requirements, and (3) application of design control measures.

- (4) Part 21 Report on one and one-quarter inch (1-1/4") Fuel Lines. Available records indicated all 1-1/4 inch fuel lines had been replaced on the diesel generators at South Carolina Electric and Gas Company and those located at the contractor's facility in Beloit. However, there were no records to indicate inspection of flares and replacement of the fuel lines for diesel generators No. 1 for Northeast Utilities and No. 2 for Duquesne Light Company. The inspector was informed that pressure test of the fuel lines at South Carolina would be accomplished during preparation of the units for operation.

The two (2) defective flaring tools had been scrapped. Procedures had been initiated for use of the replacement flaring tool and for forming flares. Process documents had not been revised to require inspection of fuel line flares. (See paragraph 3.b.(3) above.)

A letter dated April 18, 1979, from Colt Industries, Fairbanks Morse Engine Division to the U. S. Nuclear Regulatory Commission, Arlington, Texas, transmitted process documents that had been revised to require inspection of fuel line flares.

C. Exit Interview

1. The inspector met with management representatives denoted in paragraph A at the conclusion of the inspection on April 5, 1979.
2. The following subjects were discussed:
  - a. Area inspected.
  - b. Unresolved items identified.
  - c. Substantiating documents.
3. Management representatives acknowledged the comments made by the inspector.