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SUBJECT: Forwards App E-1 of draft engineering rept text,describing results of tensile tests,as suppl to interim ltrs dtd 970930,1218 & 980303 re progress on root cause investigation & corrective/preventive actions re part 21 file 97-002.

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INTERIM LETTER

SUPPLEMENT NO.: 97-002-03

To: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC. 20555

From: Coltec Industries – Fairbanks Morse Engine Division (FMED)

Date: 29 April 1998

Subject: Weldments on Opposed Piston and Coltec-Pielstick Emergency Stand-By Diesel Gen-Set Lube-Oil and Jacket Water Piping Systems

This is a supplement to the Interim Letter dated September 30, 1997, and to previous supplements 97-002-01 and 97-002-02 dated December 18, 1997 and March 3, 1998 respectively. It is intended to inform the U.S. Nuclear Regulatory Commission, and the affected nuclear utilities on the progress of the root cause investigation, and corrective/preventative actions associated with the Coltec-FMED Part 21 File No. 97-002.

Supplement 97-002-02 stated that the metallurgical portion of the investigation and review of customer contract requirements would be completed by the end of April 1998. However, due to limited resources, only the tensile tests of the piping have been completed at this time. The metallurgical examination of the welds joints and review of customer contract requirements will be completed by the end of May 1998. At the completion of these items the final notification will be submitted.

The tensile tests of the pipe joint welds were satisfactorily conducted and found to be of adequate strength for the application. The yield strength for the samples ranged from 35,000 psi to 68,000 psi, which is a factor of 20 more than the maximum stress seen by the piping when in service. This further supports the initial conclusion that the welding of the joints is adequate for the intended service.

Previously submitted with Supplement 97-002-02 was a draft copy of the engineering report text including appendices A and B. Enclosed is a copy of Appendix E-1 describing the results of the tensile test. Appendix E-2 will describe the results of the metallurgical examination of the weld joints when completed. Appendix C exhibits photos of the sections of the section of the piping as received. Appendix D exhibits photos of the test section after completion of the burst testing. These three appendices (C, D, and E-2) are not included in this supplement. They will be included the final notification.

Sincerely,

James Golding

James C. Golding
Senior Quality Assurance Engineer

/for

Paul Danyluk
Vice President, Engineering

Cc: M. Armfield
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1/1

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This Appendix reports the results of the tensile testing conducted on sections of the piping under investigations. Tensile test coupons were cut out of longitudinal sections of the piping where sufficient length of pipe was provided beyond what was required for the burst testing samples. Not all sections of the piping was adequate for both burst test samples and tensile test coupons. The following piping did not yield tensile test coupons: A, C, D, H, S, T, U, V, W and Y. (There were no samples marked I, O or Q.)

The tensile test coupons, generally three per joint/pipe, were made by cutting a longitudinal section from the pipe or tube material approximately 0.75 inches wide by 6 inches long. The coupon was then milled to a width of approximately 0.500 inches in way of the center section. The width and the wall thickness were measured and the values for these are shown on the accompanying table. The coupons were then subjected to a tensile test and the loads at the yield point and at the ultimate strength point were determined, along with the elongation of the sample after test. The results of these tests are shown on the accompanying table on page 2.

It should be noted that samples with a wall thickness of more than .125 inches are pipe, rather than mechanical tubing. These pipe samples are not of FMED manufacture but were tested for comparative purposes.

All tensile test results are deemed to indicate that all pipe and tube samples were of adequate strength and met the design criteria in effect at the time these sections of piping were manufactured. The yield strength of these samples came out between 35,000 and 68,000 psi. The maximum stress (combined hoop and longitudinal) for lube oil piping (at maximum design pressure of 100 psig) on 4 inch pipe (the maximum pipe size used in the lube oil system) is 1,789 psi. The maximum stress for jacket water piping (at maximum design pressure of 50 psig) on 5 inch pipe (the maximum pipe size used in the jacket water system) is 1,120 psi. All smaller pipe sizes have less stress at these same pressures. The intercooler water system uses 4 inch pipe but is at an even lower pressure (30 psig).

TABLE OF TENSILE TEST RESULTS:

Sample	Dimension - Width			Wall	Area	Yield Strength		Ultimate Strength		Elong
ID	Top	Bottom	Avg	Thick	Sq.In.	Load lbs	Stress psi	Load lbs	Stress psi	%
B-1	0.513	0.504	0.5085	0.265	0.1348	6,510	48,311	9,470	70,277	26.0
B-2	0.516	0.508	0.5120	0.255	0.1306	6,000	45,956	9,442	72,319	28.0
B-3	0.511	0.511	0.5110	0.263	0.1344	6,400	47,622	9,150	68,084	28.0
E-1	0.506	0.499	0.5025	0.222	0.1116	4,100	36,753	6,290	56,385	33.0
E-2	0.512	0.511	0.5115	0.231	0.1182	4,190	35,461	6,638	56,180	32.0
F-1	0.504	0.501	0.5025	0.113	0.0568	3,050	53,714	3,433	60,459	25.5
F-2	0.494	0.494	0.4940	0.115	0.0568	3,000	52,808	3,353	59,021	26.5
F-3	0.495	0.494	0.4945	0.115	0.0569	3,860	67,877	4,083	71,798	16.0
G-1	0.497	0.493	0.4950	0.115	0.0569	2,380	41,809	2,990	52,525	36.0
G-2	0.502	0.500	0.5010	0.115	0.0576	2,450	42,524	3,044	52,833	38.0
G-3	0.494	0.489	0.4915	0.115	0.0565	2,650	46,884	3,003	53,129	37.5
J-1			0.5070	0.242	0.1227	5,520	44,990	9,126	74,380	31.5
J-2	0.508	0.507	0.5075	0.224	0.1137	5,130	45,127	8,481	74,604	30.0
J-3	0.504	0.502	0.5030	0.230	0.1157	5,520	47,714	8,784	75,927	25.0
K-1			0.5120	0.245	0.1254	6,000	47,832	8,054	64,206	27.5
K-2	0.516	0.513	0.5145	0.243	0.1250	6,160	49,271	8,098	64,772	30.5
K-3	0.505	0.503	0.5040	0.260	0.1310	6,480	49,451	9,375	71,543	30.5
L-1			0.5010	0.116	0.0581	2,450	42,157	3,029	52,120	39.5
L-2			0.5010	0.116	0.0581	2,350	40,436	2,973	51,156	40.0
L-3			0.4740	0.118	0.0559	2,580	46,127	2,927	52,331	35.0
M-1	0.485	0.487	0.4860	0.114	0.0554	2,950	53,245	3,340	60,284	26.0
M-2	0.487	0.486	0.4865	0.116	0.0564	3,250	57,589	3,533	62,604	19.0
M-3			0.4740	0.115	0.0545	2,930	53,752	3,255	59,714	22.0
N-1	0.488	0.485	0.4865	0.113	0.0550	2,320	42,201	2,797	50,878	35.5
N-2	0.503	0.500	0.5015	0.114	0.0572	2,500	43,728	2,860	50,025	35.5
N-3	0.508	0.494	0.5010	0.111	0.0556	2,210	39,740	2,788	50,134	31.5
P-1			0.5090	0.120	0.0611	2,700	44,204	3,267	53,487	37.0
P-2	0.492	0.491	0.4915	0.121	0.0595	2,800	47,081	3,095	52,042	35.5
P-3			0.5100	0.120	0.0612	2,820	46,078	3,200	52,288	35.5
R-1			0.5060	0.112	0.0567	3,180	56,112	3,662	64,617	26.0
R-2	0.501	0.496	0.4985	0.110	0.0548	3,170	57,810	3,452	62,952	22.5
R-3	0.478	0.475	0.4765	0.112	0.0534	2,700	50,592	3,315	62,116	30.0
X-1			0.5090	0.115	0.0585	3,150	53,814	3,529	60,289	25.5
X-2	0.513	0.511	0.5120	0.115	0.0589	3,120	52,989	3,491	59,290	24.0
X-3	0.505	0.502	0.5035	0.116	0.0584	3,200	54,789	3,527	60,388	23.5

Where the average value only is given, only one measurement of the coupon width was made or the measurement was the same on both ends.