

RELATED CORRESPONDENCE

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

DOCKETED
USNRC

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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In the Matter of)	
)	Docket Nos. 50-445 O L
TEXAS UTILITIES ELECTRIC)	50-446 O L
COMPANY, et al.)	
)	(Application for
(Comanche Peak Steam Electric)	Operating Licenses)
Station, Units 1 and 2))	

APPLICANTS' RESPONSE TO JUNE 15, 1984
BOARD REQUEST FOR ADDITIONAL INFORMATION
CONCERNING TDI DIESEL GENERATORS

1. Introduction

The Board has previously requested that Applicants provide information concerning the adequacy of the quality assurance program at Comanche Peak in relation to the Transamerica Delaval, Inc. ("TDI") diesel generators.¹ Applicants responded on May 11, 1984 by filing the information requested.²

Subsequent to this response the Board issued a "clarification" of its information request. Specifically, the Board stated:

What we are looking for is something in the nature of a table, which set[s] forth each specific deficiency in the generators, discusses whether they are design or construction deficiencies, analyzes what the problem was, and sets forth how it was resolved. And then, after

¹ Memorandum (Adequacy of Record: Delaval Diesel Generators), January 31, 1984.

² "Applicants' Response to January 31, 1984 Board Memorandum Requesting Information Concerning Delaval Diesel Generators," May 11, 1984.

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that's done so that the information available to the applicants is set forth in a clear fashion, we'd like some kind of an analysis as to whether or not, [given] the information [available] to the applicants, some general problem should have risen in their minds, concerning the [adequacy] of the Delaval diesels. . . . The question is at what point in the history of the Delaval diesels do you reach a point that there are enough individual questions that you say, we better go to the Delaval plant and find out in more detail whether they are doing things adequately. Now, we don't know the answer to that question. But, given the history of the Delaval diesels, we want that addressed, in terms of the adequacy record on QA, QC.³

To address this clarification and request for additional information, Applicants provide this further response. Applicants note that the Board has recognized the limitations of the issues to be addressed in this response. As the Board has stated, with respect to the question of the adequacy of the Comanche Peak diesel generators to assure public health and safety:

Applicants need not address that particular question right now. It will be addressed only if we find that the design and construction QA oversight . . . were inadequate. If we don't find that they are inadequate, we will trust that particular question to the staff. We would agree with applicants that it would require us to declare a sua sponte issue for us to go into that matter.⁴

For the record, Applicants continue to maintain that because this matter was not raised by the Intervenor, the Board should not have initiated sua sponte, its own inquiry into it. See

³ Conference call of the Board and Parties, June 15, 1984, Tr. 14,054-55.

⁴ Id. at 14,056.

"Applicants' Response to January 31, 1984 Board Memorandum Requesting Information Concerning Delaval Diesel Generators," at 2-9. Nonetheless, in an effort to expedite the timely conclusion of this proceeding, Applicants provide additional information to address the two questions from the Board's January 31 Order concerning (1) the adequacy of Applicants' QA program to detect design or construction problems in TDI diesel generators, and (2) the frequency and seriousness of problems with the Comanche Peak diesel generators. In providing this further response, Applicants interpret the Board's request for information concerning "construction problems" to mean those related to the manufacture of the diesel generators.

2. QA Activities Conducted By TUGCO

A chronology of audit and inspection activities performed by or on behalf of TUGCO has been assembled and is appended as Attachment 1. This chronology demonstrates the operation of the TUGCO QA program in the periods prior to award of the contract to TDI, during the manufacture of the diesel generators and auxiliary systems, assemblies and components, and once the diesel engine, generator, auxiliary systems, assemblies, and components were received on-site at Comanche Peak.

Prior to contract issuance and the placing of the orders for the diesel generators with TDI, a pre-award survey was conducted on behalf of TUGCO by the Architect/Engineer (A/E), Gibbs and Hill. This pre-award survey was conducted October 1-3, 1975 and covered compliance with 10 C.F.R. Part 50, Appendix B, and ANSI

Standards N45.2.9, N45.2.11, and N45.2.13 (subsets of N45.2). Several programmatic deficiencies were found, and TDI made commitments to correct the deficiencies. Subsequently, on January 26, 1976, in a response to Gibbs and Hill, TDI addressed all deficiencies. This pre-award activity was followed by an audit conducted by TUGCO on May 11-12, 1976. This audit addressed compliance of the TDI QA program with 10 C.F.R. Part 50, Appendix B, and ANSI Standard N45.2. This audit verified the implementation of corrective action on deficiencies identified during the pre-award survey and no new deficiencies were identified. The purchase order was issued April 8, 1976.

During the period from the purchase order issuance until the Unit 1, Train A⁵ diesel engine and generator were delivered to the Comanche Peak site on November 11, 1977, TUGCO engaged in six documented inspections. Prior to shipment of the engine, generator, and associated equipment for the Unit 1, Train A machine, TUGCO conducted a release inspection October 24-27, 1977. Subsequent to this activity, a release inspection for the major components of Unit 1, Train B was conducted November 29, 1977. The Unit 1, Train B diesel engine and generator were received on-site December 19, 1977. The major components (engine and generator) were installed on their foundations ("landed") September 13, 1978 (Unit 1, Train B) and September 16, 1978 (Unit

⁵ Each unit has two diesel generators, denoted Train A and Train B.

1, Train A). Additional Unit 1, Train A and B equipment was inspected and released for shipment throughout the period from December, 1977 to July, 1979.

This process was repeated for the diesel generators for Unit 2. Performance tests for the Unit 2, Train A engine were witnessed July 22, 1979. The Unit 2, Train B performance tests were witnessed August 22-25, 1979 and found acceptable. The Unit 2, Train A engine was released for shipment August 31, 1979 and received on-site September 21, 1979. This engine was subsequently landed on its foundation September 27, 1979. The Unit 2, Train B engine release inspection was held September 17-21, 1979. The engine for Unit 2, Train B was received on-site on October 9, 1979 and landed October 10, 1979. Again, as for Unit 1, the diesel generator components and assemblies for the Unit 2 systems were fabricated, tested, inspected, and shipped separately.

Following the inspection, release, shipment, receipt, and installation of the diesel generator major components, other components continued to be fabricated and shipped. These components were subjected to inspection and testing during the period up until August, 1982, when preparations for preoperational testing were being made. The Unit 1 engines were first run in September, 1982. The Unit 2 engines have not yet been completely assembled and run.

The chain of events detailed above indicates the time lag that occurred between the time the engines were manufactured and delivered on-site and the time at which testing was initiated. Numerous QA activities were undertaken by TUGCO during this period. Because the diesel generator systems were not yet fully assembled, TUGCO relied upon the TDI QA program and TUGCO witnessing of shop tests of components and assemblies to assure compliance with 10 C.F.R. Part 50, Appendix B. After the Unit 1 machines were assembled on-site and preparations for preoperational testing began, deficiencies were noted, which were documented by Nonconformance Reports ("NCRs"). Deficiencies detected during preparation for and conduct of preoperational testing were documented in Test Deficiency Reports ("TDRs"). The deficiencies detected are discussed in the next section.

3. Analysis of Deficiencies

The NCRs, TDRs, vendor 10 C.F.R. Part 21 reports, and 10 C.F.R. Part 50.55(e) reports have been examined for the Unit 1, Trains A and B diesel generator systems. The Unit 1 diesel generators were chosen because they have been completely assembled on-site at Comanche Peak and have been run for extended periods. The Unit 2 machines are not fully assembled and have not yet been run on-site. Therefore, only the Unit 1 diesel generators provide an accurate picture of the extent and nature of deficiencies encountered in the TDI diesel generators at Comanche Peak.

The deficiencies are tabulated in Attachment 2. The table indicates in which Train the deficiency occurred, provides a brief description of it, categorizes it (design, manufacture, installation, documentation, qualified commercially-procured component,⁶ shipping, storage, or a combination in cases of uncertainty), provides its significance (high, moderate or low), provides the date and document in which reported, indicates the detecting organization and time in the procurement and testing process, and the resolution of the deficiency.

There are a total of 42 deficiencies documented by NCRs. Of these 42, the deficiencies in 12 were initially reported to TUGCO by TDI using 10 C.F.R. Part 21 reports. As a result of receiving the 10 C.F.R. Part 21 reports, TUGCO documented the potential deficiencies using NCRs. Also, of the 42 NCRs, only 17 occurred prior to 1982 (the period during which the vast majority of diesel generator assemblies and components were fabricated and shipped to the Comanche Peak site). At that juncture virtually all of the design, fabrication and installation activities had taken place. Five NCRs documented in 1984 are included in the list, although these have occurred after the Shoreham crankshaft failure and the formation of the TDI Owners' Group.

There were 27 deficiencies documented by TDRs. All but two of the TDRs occurred in preparation for, or conduct of, the preoperational testing of the Train A and B diesel generators.

⁶ Some components are commercially procured and qualified as, for instance, many electrical components and systems. These are normally qualified by actual testing.

Two occurred during subsequent testing. The number of TDRs is not very large when it is considered that a very complex piece of equipment was being prepared for service.

The deficiencies can be broadly classified as follows: (a) turbocharger and governor lube oil systems -- 3; (b) pumps and governor -- 3; (c) brackets, supports and piping -- 12; (d) miscellaneous mechanical items -- 12; (e) electrical wiring, marking and motors -- 20; (f) instrumentation -- 7; (g) instrument and electrical equipment calibration -- 9; (h) pushrods -- 1; and (i) documentation -- 2. Although there were several instrument calibration and electrical deficiencies reported, their number and type are not unusual for the complexity of the systems involved, recognizing that the components were not brought together until their assembly at the site.⁷

None of the above deficiencies was of sufficient significance or repetitive nature to cause concern for the adequacy of the TDI QA program with the exception of the welding on and material selection of the auxiliary skid and its supports. The Board has already been made aware of this matter.⁸ As explained in the previous section, the major elements of

⁷ See Affidavit of Edward J. Kreh, Jr., (Attachment 4) at p.4, a quality assurance expert retained by Applicants to assist in the preparation of this response.

⁸ The Board cited this particular issue in its January 31, 1984, Order.

procurement and delivery of the diesel generators for both Units 1 and 2 were completed prior to the initial detection of this particular deficiency.

Attachment 3 includes a tabulation of the deficiencies detected as a result of TUGCO activities following the crankshaft failure at Shoreham in August, 1983. These deficiencies are not included in the count above because they occurred after industry had been alerted to potential problems at TDI. With respect to the findings of the recent disassembly and inspection of the Unit 1 Train A and B diesel generators, there were several deficiencies in components which have engendered reservations as to the implementation of the TDI QA program. However, the nature of the detected deficiencies was such that they would not have been observable by TUGCO without disassembling the engine and in many cases would not have been revealed until after a significant number of hours of operation. Such disassembly would not normally occur other than during a planned maintenance outage. However, as with the earlier auxiliary skid deficiency, these results became known to TUGCO well after the major elements of the design, fabrication and assembly of these machines had been completed.

Based on the examination of deficiencies outlined above, it is apparent that neither the number nor nature of deficiencies (other than the lone case of the deficiencies in the auxiliary skid) was indicative of potential problems in the TDI QA program. Furthermore, the time sequence between procurement and testing

was such as to foreclose such a concern being raised any earlier than July, 1980, well after delivery of the major components. As for the deficiencies detected during the test and inspection program, these were detected as a result of industry reaction to the Shoreham crankshaft failure in August, 1983, and were not known to TUGCO at a time in which remedial QA action could be taken. It should be noted that TUGCO is participating in the TDI Owners' Group effort, which is rigorously addressing and resolving deficiencies in the TDI diesel generators. Furthermore, TUGCO has included its QA oversight of TDI. This has included increased NDE requirements and the witnessing of all required NDE and shop testing of replacement parts and inspection of individual components.

4. Summary

In an effort to be fully responsive to the Board's information request, Applicants retained the services of Edward J. Kreh, Jr., an expert on vendor QA programs. Mr. Kreh's affidavit is appended as Attachment 4. Mr. Kreh examined nonconformance reports, test deficiency reports, TDI 10 CFR Part 21 reports, disassembly and inspection reports, and other documents. He discussed the deficiencies contained therein with cognizant TUGCO employees. Mr. Kreh also examined audit and inspection reports and discussed them with QA personnel. Based upon this objective assessment, the following has been demonstrated:

1. TUGCO, through its A/E Gibbs and Hill, conducted pre-award evaluations of TDI; deficiencies were found; TDI committed to implement a QA program in compliance with 10 C.F.R. Part 50, Appendix B and proceeded to undertake corrective action. TUGCO's actions comported with industry practice and were in compliance with 10 C.F.R. Part 50, Appendix B (Kreh Affidavit, pp. 2-3).
2. TDI was placed on the Approved Vendors List ("AVL"), awarded the contract for the diesel generators, and the order for the diesels was placed with TDI. TUGCO was justified in placing TDI on the AVL and procuring the diesel generators from TDI based upon their source evaluation of TDI capability in accordance with ANSI Standard N45.2.12 and the vendor's commitments to implement an adequate QA program. Again, such action by TUGCO comported with 10 C.F.R Part 50, Appendix B. (Id.)
3. TUGCO audited the implementation of TDI's QA program over the period from contract award to the shipment of the diesel generator assemblies and components; four audits and approximately 35 inspections were conducted at vendor sites. Among these activities were the witnessing by TUGCO of shop testing by vendors of components and assemblies. (Id., p. 3.)
4. TUGCO relied upon their audit and inspection verification of the adequacy of the TDI QA program for the design and manufacture of the diesel generators; TUGCO witnessed shop

tests of components and assemblies followed by testing of the fully assembled diesel generators at the plant site. Such a means of verifying the design and manufacture of the machines comports with 10 C.F.R. Part 50, Appendix B and applicable industry standards to which TUGCO has committed. (Id., pp. 3-4.)

5. The record of audits and inspections indicates that TUGCO took corrective action when the need arose. This included refusal to release equipment for shipment and communications between TUGCO's management and TDI's management to address discrepancies. (Id., p. 5.)
6. During the period from the time the diesel generators were ordered until the major components were received on-site, there were no indications that the TDI QA program was not acceptable. (Id.) This comported with industry experience with TDI (Id., pp. 4-5), wherein no major deficiencies were found and no concerns about the TDI QA Program raised until the occurrence of the cracked crankshaft at Shoreham.
7. The vast majority of deficiencies were detected only after the engines had been received on-site, stored, assembled, and preparations were made for preoperational testing. (Id., p. 6.)

8. With the exception of the auxiliary skid and support deficiencies, the deficiencies detected during the period prior to preoperational testing and during preoperational testing did not indicate a breakdown in TDI QA. (Id., p. 5.)
9. The types and quantity of deficiencies (other than the auxiliary skid) were minor and lacked the significance and repetitive nature to suggest that there was a QA breakdown at TDI. (Id., pp. 5-6.)
10. The deficiencies discovered during the disassembly and inspection of the Unit 1 diesels suggest that the TDI QA program may have been inadequate (Id. p.6). This was widely recognized by industry in the formation of the TDI Owners' Group.

5. Conclusion

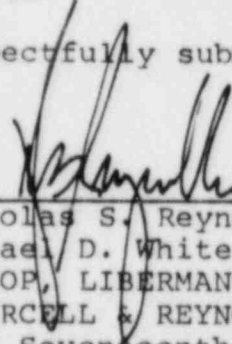
From the foregoing, the Board should conclude that at all pertinent times during the design, fabrication and delivery of the major elements of the diesel generators, there was no indication that the TDI QA program was inadequate. With the exception of the auxiliary skids, the frequency and seriousness of the deficiencies were not sufficient to have warranted a determination that TDI's QA program was inadequate.⁹ The types of deficiencies detected during the preparation for and conduct

⁹ It should be noted that TUGCO spent considerable time and resources in resolving the deficiencies in the auxiliary skids. (Kreh Affidavit, p. 5.)

of preoperational testing were minor and of the kind to be expected. These deficiencies were not sufficiently numerous to cause concern that the TDI QA program was inadequate.

With respect to the auxiliary skid deficiencies and the deficiencies detected during the disassembly and inspection of the Unit 1 diesels, the major components of the diesel generators had been manufactured and delivered well in advance of TUGCO becoming aware of these deficiencies.

Respectfully submitted,



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CHRONOLOGY OF TUGCO QA ACTIVITY
RELATED TO TDI DIESEL GENERATORS
AT COMANCHE PEAK

<u>Date</u>	<u>Organization</u>	<u>Activity</u>
10/1-3/75	Gibbs and Hill (on behalf of TUGCO)	Pre-award survey of TDI; 10 CFR 50, App. B, ANSI N45.2.9, N45.2.11, N45.2.13
1/26/76	TDI	All deficiencies detected in pre-award survey addressed
4/8/76	TUGCO QA	Purchase order for diesel generators placed with TDI
5/11-12/76	TUGCO QA	Audit of TDI addressing 10 CFR 50, App. B, ANSI N45.2; pre-award commitments by TDI met; no new deficiencies found
1/77-10/77	TUGCO QA	Inspections of engine and generator components and witnessing of shop tests
10/24-27/77	TUGCO QA	Release inspection of Unit 1; Train A at TDI
11/11/77	TUGCO Receiving	Unit 1, Train A delivered to Comanche Peak site
11/29/77	TUGCO QA	Release inspection of Unit 1, Train B at TDI
12/19/77	TUGCO Receiving	Unit 1, Train B delivered to Comanche Peak site

<u>Date</u>	<u>Organization</u>	<u>Activity</u>
12/77-9/78	TUGCO QA	Inspections of auxiliary and additional miscellaneous equipment
9/13/78	TUGCO Engineering	Unit 1, Train B placed on foundation ("landed")
9/16/78	TUGCO Engineering	Unit 1, Train A landed
10/10/78	TUGCO QA	Audit of TDI designated TDT-1; no deficiencies found
9/78-7/79	TUGCO Receiving	Receipt inspection of auxiliary equipment, air-start skids, crankcase fans, water jacket heaters, pedestal bearing, fuel oil day tanks, airstart receiver tanks, tubing, connectors, heat exchangers, gauges, brushes, brush holders, thermostats, exhaust system expansion joint, current transformers
12/78-7/79	TUGCO QA	Inspections of control boards, fuel oil transfer pumps, jacket water piping brackets, heat exchangers, grounding resistors, control panels, fuel oil tanks
7/21-22/79	TUGCO QA	Witness performance test of Unit 2, Train A
8/22-25/79	TUGCO QA	Witness performance test of Unit 2, Train B
8/31/79	TUGCO QA	Release of Unit 2, Train A for shipment
9/17-21/79	TUGCO QA	Release inspection of Unit 2, Train B

<u>Date</u>	<u>Organization</u>	<u>Activity</u>
9/21/79	TUGCO Receiving	Unit 2, Train A received on-site at Comanche Peak
9/27/79	TUGCO Engineering	Unit 2, Train A landed
10/9/79	TUGCO Receiving	Unit 2, Train B received on-site at Comanche Peak
10/10/79	TUGCO Engineering	Unit 2, Train B landed
9/79-7/80	TUGCO Receiving	Receipt inspection of control panels, miscellaneous components, generator rotor, air dryers, pipes, supports, gaskets, couplings, nuts, flywheels, jacket water pump, and gauges
10/79-7/80	TUGCO QA	Release inspections of flywheel, auxiliary skids, miscellaneous components, generator stator, valves, plugs, water jacket cooler, lube oil cooler, jacket water standpipe, electric motors, pumps, strainers, control panels, and grounding resistors
3/10-12/80	TUGCO QA	Audit of TDI - TDT-2
7/17/80	TUGCO Engineering	Improper fabrication of auxiliary skids, Unit 1, Trains A & B detected
7/80-9/82	TUGCO Receiving	Receipt inspection of gaskets, valves, auxiliary water pump, jacket water pump, gaskets, nuts, supports, capscrews, tubes, pipes, flanges, heater strip, relief valve, air inlet pipe, flywheel guard, tape, enamel insulated wire, and expansion joints

<u>Date</u>	<u>Organization</u>	<u>Activity</u>
7/80-9/82	TUGCO QA	Release inspections of valves, jacket water pumps, expansion joints
4/30/82	TUGCO QA	Reinspection of auxiliary skids and support brackets to evaluate acceptability of repair welds
9/16/82	TUGCO Startup	First run of Unit 1, Train B
9/29/82	TUGCO Startup	First run of Unit 1, Train A
11/23/82	TUGCO Startup	First preoperational test run of Unit 1, Train A
11/29/82	TUGCO Startup	First preoperational test run of Unit 1, Train B
3/15-16/83	TUGCO QA	Audit of TDI - TDT-3
3/29/83	TUGCO Startup	Last preoperational test run, last run prior to disassembly, Unit 1, Train A
3/31/83	TUGCO Startup	Last preoperational test run, Unit 1, Train B
5/31/83	TUGCO Startup	Last run of engine prior to disassembly, Unit 1, Train B

OPSES UNIT 1 DIESEL GENERATOR DEFICIENCIES REPORTED BY NCRS AND TDRS

TRAIN	DESCRIPTION (CLASSIFICATION)	CATEGORY (SIGNIFICANCE)	DATE AND DOCUMENT	DETECTING ORGANIZATION	RESOLUTION
A&B	Turbocharger lube oil system potential defect (lube oil system)	Design (M)	1/9/81 NCR M-81-0000 R.1	TDI - Issued 10 C.F.R. 21 Report 12/16/80	Corrected by use of parts and designs provided by TDI
A&B	Turbocharger lube oil system potential defect (lube oil system)	Design (M)	3/28/84 NCR M-84-009575	TDI - Issued 10 C.F.R. 21 Report 2/15/84	System modified in accordance with TDI recommendations
B	Boost control rack on fuel injection pump 7L (pump)	Manufacture/Installation (L)	9/7/82 NCR M-82-013655	TU - Detected during preparation for pre-op. testing by startup operations as reported on TDR 279 dated 9/6/82	Replaced with new rack
A	Fuel oil drip pump frozen (pump)	Manufacture/Storage/Installation (L)	9/16/81 NCR M-81-01238 R.1	TU - Detected during preparation for pre-op. testing by engineering	Pump cleaned and reinstalled
A&B	Woodward Governor possibly improperly refurbished by Woodward (Governor)	Manufacture (L)	8/23/83 NCR M-83-022645 R.1	TDI - Issued 10 C.F.R. 21 Report 8/13/83	Investigation and Tests indicated refurbishment satisfactory
A	Instrument tubing span lengths exceed seismic allowables (brackets, supports)	Design (L)	6/16/83 NCR 1-83-01672-5	TU - I&C detected during installation of tubing	Supports reworked
A&B	Governor lube oil cooler located too low (lube oil system)	Design (L)	7/12/82 NCR M-82-009125	TDI - Issued 10 C.F.R. 21 Report 12/9/81	Relocated per TDI drawing

NOTE: Significance: Low (L), Moderate (M), High (H)

TRN#	DESCRIPTION (CLASSIFICATION)	CATEGORY (SIGNIFICANCE)	DATE AND DOCUMENT	DETECTING ORGANIZATION	RESOLUTION
A	Inadequate certificate of compliance for detectors (documentation)	Documentation (L)	9/10/82 NCR M-82-82-014185	TU - Engineering detected during receipt inspection	Vendor supplied correct certificate of compliance
A	Starting air compressor and storage check valves leaked during seismic testing (mech. - valves)	Design (M)	11/20/81 NCR M-8136 R.1	TDI - Issued 10 C.F.R. 21 Report 11/5/81	Replace with new valves
A	Lube oil keep warm relief valve leaked (mech. - valves)	Manufacture (L)	5/13/83 NCR M-6987-5	TU - Engineering detected following prep- testing	Repaired by TUGCO maintenance
A&B	Airstart valve capscrews too long (mech. - valves)	Design (M)	6/15/82 NCR M-82-007765 R.1	TDI Issued 10 C.F.R. 21 Report 5/13/82	Capscrews modified to fit properly
B	Aux. lube oil pump suction flange support misfabricated (bracket, flange)	Manufacture (M)	7/27/81 NCR M-81-00804 R.1	TU - QA Detected during Installation	Evaluation indicated acceptable as fabricated
B	Component support fabricated with groove weld rather than fillet weld (brackets, supports)	Manufacture (L)	8/18/81 NCR M-81-00995	TU - QA Detected during Installation	Evaluation indicated acceptable as fabricated
A&B	Lube oil warm filter bracket "PK" misfabricated (bracket)	Manufacture (L)	6/23/81 NCR M-81-00330 R.1	TU - QA Detected during Installation	Evaluation indicated acceptable as fabricated
A	Excessive weld bead width on aux. lube oil pump supports (brackets)	Manufacture (L)	7/7/81 NCR M-81-00416	TU - QA Detected during Installation	Bead removed and rewelded
A	Heat shield support "W" misfabricated (brackets, supports)	Manufacture (L)	8/20/81 NCR M-81-01000 R.1	TU - QA detected during Installation	Refabricated in proper orientation

NOTE: Significance: Low (L), Moderate (M), High (H)

ITEM#	DESCRIPTION (CLASSIFICATION)	CATEGORY (SIGNIFICANCE)	DATE AND DOCUMENT	DETECTING ORGANIZATION	RESOLUTION
A/B	Linear indications in welds between ball and roller pushrods (probab.)	Design/Manufacture (M)	1/13/84 NCR M-84-001085	TU - Engineering as Result of owner's group activity; reported to NRC by 10 C.F.R. 50.55(a) letter 2/8/84	Replaced with new design pushrods
B	Air intake manifold elbow cracked (piping - elbows)	Manufacture/Installation (L)	2/26/79 NCR M-79-1357 R.1	BBR - QA Detected during Installation	Replaced with new elbow
A/B	Aux. shield and support brackets not fabricated to NF (brackets)	Manufacture (M)	7/17/80 NCR M-80-00009	TU - Engineering detected during Installation; As to supports TU reported orally to NRC 9/26/80; 9/26/80; 10 C.F.R. 50.55(a) letter submitted 10/21/80.	Reworked to acceptable standard
A	Broken leg on crane-case vacuum fan housing (elec. mech.)	Manufacture/Installation/ Test (L)	5/20/83 NCR M-83-27215	BBR - QA detected following prep. Testing	Replaced with new fan
A/B	Excessive spacing between lift rod bushing & pins (elec. mech.)	Manufacture (M)	12/16/80 NCR M-80-00220	TDI - Issued 10 C.F.R. 21 Report 9/19/80	Inspected, evaluated and found acceptable
B	Misfabricated support for aux. lube oil pump (brac. affs, supports)	Manufacture (L)	10/6/81 M-81-01308	TU - QA detected during Installation	Inspected, evaluated and found acceptable
A/B	Aux. shield piping support deviation from drawing (brackets)	Manufacture (L)	1/21/82 NCR M-82-000655, M-82-000665	TU - QA detected during Installation	Inspected, evaluated and found acceptable
B	#8 Crankshaft bearing thrust collar has excessive clearance (elec. mech.)	Manufacture (L)	7/26/82 M-82-010565	TU - Startup detected during preparation for prep. Testing	Thrust clearances reset
A/B	Governor coupling insert verified questionable (elec. mech.)	Design (M)	8/17/82 NCR M-82-012305	TDI - Issued 10 C.F.R. 21 Report 6/23/82	New coupling ordered with insert; material changed to neoprene

NOTE: Significance: Low (L), Moderate (M), High (H)

TRAIN	DESCRIPTION (CLASSIFICATION)	CATEGORY (SIGNIFICANCE)	DATE AND DOCUMENT	DETECTING ORGANIZATION	RESOLUTION
A	Turbocharger adaptor Incorrectly installed (misc. mech.)	Manufacture (L)	9/30/82 NCR M-82-016045	TU - Startup detected during preparation for preop. testing	Reassembled with new seal rings
A&B	Flexible drive coupling hub loose on shaft (misc. mech.)	Manufacture (M)	1/27/84 NCR M-84-003085 R.1	TDI - Issued 10 C.F.R. 21 Report 1/9/84	Coupling reworked per TDI instructions
A&B	Piston pin retaining rings Improperly listed on docu- mentation (documentation)	Documentation (L)	4/25/84 NCR M-84-01257 R.1	TU - QA detected during receipt inspection	Documentation corrected
A&B	Fuel oil supply tubing not adequately clamped (brackets)	Manufacture (M)	2/28/84 NCR M-84-00683 R.1	TDI - Issued 10 C.F.R. 21 Report 9/21/83	Inspected and additional clamps added as necessary; shrouded tubing scheduled to replace original tubing
A&B	Booster and transfer pumps and motors interchanged (electrical - motors)	Manufacture/Installation (L)	7/22/81 NCR M-80-00006 R.3	TU - Engineering detected during Installation	Pump motors transferred to correspond with correct numbers
A&B	Control panel wires numbered incorrectly (electrical)	Manufacture (L)	5/21/81, 6/1/81 NCR E-81-00168, E-81-00183	TU - QA detected during installation	Lugs changed and wires properly identified
A	Control panel has 3 lugs on one terminal (electrical)	Manufacture (L)	5/29/81 NCR E-81-00176	TU - QA detected during installation	Terminal reworked
A&B	Vendor wiring numbers do not match drawing (electrical)	Manufacture (L)	8/14/81 NCR E-81-00973	TU - QA detected during installation	Inspected, evaluated and found acceptable
B	Cable minimum bend radius violated (electrical)	Manufacture (L)	12/10/81 NCR E-81-01699 R.1	TU - QA detected during installation	Replaced cable and reworked raceway
B	Outboard bearing thermo- couple of wrong type (Instrumentation)	Manufacture (L)	3/17/82 NCR E-82-002535	TU - Startup detected during preparation for preop. testing	Replaced with correct thermocouple
A&B	Control panel wiring not in accordance with drawing on Train A (electrical)	Manufacture (L)	4/8/82 NCR E-82-003585	TU - QA detected during preop. checkout	Revised both train A&B control panels

NOTE: Significance: Low (L), Moderate (M), High (H)

TRAIN	DESCRIPTION (CLASSIFICATION)	CATEGORY (SIGNIFICANCE)	DATE AND DOCUMENT	DETECTING ORGANIZATION	RESOLUTION
A&B	Questionable seismic qualification of valve in air start line and sizing of line orifice (mech. - valve)	Design (M)	4/21/82 NCR I-82-004265 R.2	TDI - Issued 10 C.F.R. 21 Report 3/19/82	Affected line seismically qualified by TU
A&B	Thermocouple wiring conduit improperly supported (electrical)	Design (L)	4/22/82 NCR E-82-00415 R.1	TU - Startup detected during preparation for preop. testing	Proper supports added
A	Defective field current meter and excitation relay (electrical)	Manufacture/Installation (L)	5/4/82 NCR E-82-005335 R.1	TU - Startup detected during preparation for preop. testing	Replaced defective elements
A&B	Inadequate marking of terminal blocks and devices (electrical)	Manufacture (L)	7/22/82 NCR E-82-010275	TU - QA detected during preparation for preop. testing	Wires reidentified
A&B	Pneumatic devices with improper spring characteristics (instrumentation)	Design (L)	9/14/83 NCR I-82-014575 R.1	TU - Startup detected during preparation for preop. testing	Stiffer spring installed
A&B	Nonqualified commercial wire used in engine tachometer relay magnetic pickup and Governor circuits (instrumentation)	Design (M)	11/16/82 NCR E-82-020335	TDI - Issued service memo 11/4/82, followed by 9/27/83 10 C.F.R. 21 report	Replaced with qualified wire
A	Engine tachometer would not calibrate (calibration)	Commercial (L)	6/30/82, TDR 220	TU - Startup detected during preparation for preop. testing	Replaced tachometer

NOTE: Significance: Low (L), Moderate (M), High (H)

TRAIN	DESCRIPTION (CLASSIFICATION)	CATEGORY (SIGNIFICANCE)	DATE AND DOCUMENT	DETECTING ORGANIZATION	RESOLUTION
A&B	Fuel oil suction pressure, strainer inlet pressure, booster pump discharge pressure, lube oil duplex outlet pressure gauges would not calibrate and jacket water outlet thermo-couple defective (calibration)	Commercial (L)	7/13/82, TDR 224	TU - Startup detected during preparation for preop. testing.	Replaced gauges and thermocouples
A	Open primary winding on potential transformer No. 2 (electrical)	Commercial (H)	7/21/82, TDR 229	TU - Startup detected during preparation for preop. testing	Transformer replaced
A	Undervoltage relay 27-2 would not calibrate (calibration)	Commercial (L)	7/30/82, TDR 242	TU - Startup detected during preparation for preop. testing	Relay replaced
B	Field current DC ammeter would not calibrate (calibration)	Commercial (L)	8/2/82, TDR 243	TU - Startup detected during preparation for preop. testing	Replaced ammeter
B	Generator stator temp. indicator would not calibrate (calibration)	Commercial (L)	8/10/82, TDR 251	TU - Startup detected during preparation for preop. testing	Replaced indicator
B	Shorted diode in power supply voltage regulator (electrical)	Commercial (L)	8/12/82, TDR 254	TU - Startup detected during preparation for preop. testing	Replaced diode
B	High temp. bearing trip device damaged (Instrumentation)	Installation (L)	8/13/82, TDR 255	TU - Startup detected during preparation for preop. testing	Replaced trip device
A	Two duplex filter pressure gauges would not calibrate (calibration)	Commercial (L)	8/23/82, TDR 264	TU - Startup detected during preparation for preop. testing	Replaced gauges

NOTE: Significance: Low (L), Moderate (M), High (H)

TRAIN	DESCRIPTION (CLASSIFICATION)	CATEGORY (SIGNIFICANCE)	DATE AND DOCUMENT	DETECTING ORGANIZATION	RESOLUTION
B	Generator pedestal bearing dust seal damages (misc. mech.)	Manufacture/Installation (L)	9/2/82, TDR 276	TU - Startup detected during preparation for preop. testing	Replaced dust seal
A	Over and under frequency alarm relay would not calibrate (calibration)	Commercial (L)	9/13/82, TDR 291	TU - Startup detected during preparation for preop. testing	Replaced relay
A	Undervoltage DC relay would not calibrate (calibration)	Commercial (L)	9/13/82, TDR 292	TU - Startup detected during preparation for preop. testing	Replaced relay
A	Undervoltage relay would not calibrate (calibration)	Commercial (L)	9/27/82, TDR 319	TU - Startup detected during preparation for preop. testing	Replaced relay
A	Pneumatic logic device has cracked O-ring (instrumentation)	Commercial (L)	9/27/82, TDR 321	TU - Startup detected during preparation for preop. testing	Replaced relay
B	Lube oil pump does not supply sufficient pressure (misc. mech.)	Manufacture (L)	9/30/82, TDR 323	TU - Startup detected during engine start tests	New pump installed correctly
B	Voltage regulator relay has open coil (electrical)	Commercial (L)	10/21/82, TDR 370	TU - Startup detected during engine start tests	Replaced relay
A&B	Max.-Min. excitation limiters would not operate (electrical)	Commercial (L)	10/29/82, TDR 386	TU - Startup detected during engine start tests	Replaced defective components
A	Pressure Indicator gauge failed to operate (instrumentation)	Commercial (L)	11/16/82, TDR 424	TU - Startup detected during engine start tests	Replaced pressure gauge
A	Erratic operation of frequency meter (instrumentation)	Commercial (L)	11/29/82, TDR 457	TU - Startup detected during preop. testing	Meter repaired

NOTE: Significance: Low (L), Moderate (M), High (H)

TRAIN	DESCRIPTION (CLASSIFICATION)	CATEGORY (SIGNIFICANCE)	DATE AND DOCUMENT	DETECTING ORGANIZATION	RESOLUTION
B	Power fuses blow due to light bulb failure (electrical)	Commercial (L)	11/29/82, TDR 450	TU - Startup detected during preop. testing	Bulb and fuses replaced; circuit modified
A	Engine tripped due to ground relay circuit defect (electrical)	Design (L)	1/11/83, TDR 547 3/25/83, TDR 827	TU - Startup detected during preop. testing	Circuit modified
B	Annunciator horn does not operate (electrical)	Commercial (L)	2/16/83, TDR 631	TU - Startup detected during preop. testing	Replaced horn
B	Tachometer relay power supply failed (electrical)	Commercial (L)	3/8/83, TDR 728	TU - Startup detected during preop. testing	Power supply replaced
A	Annunciator horn does not operate (electrical)	Commercial (L)	3/9/83, TDR 733	TU - Startup detected during preop. testing	Replaced horn
B	Failed motor space heater on fuel oil booster pump (electrical)	Commercial (L)	11/18/83, TDR 2331	TU - Startup detected during engine start tests	Replaced space heater
B	Right bank # 8 air intake elbow did not fit to be leak-tight (piping elbows)	Manufacture (L)	11/15/83, TDR 2321	TU - Startup detected during engine start tests	Bolt holes slotted to permit correct alignment
B	Jacket water keep warm pump overheating (electrical - motor)	Manufacture/Storage/Shipping (L)	6/14/82, TDR 208	TU - Startup detected during preparation for preop. testing	Replaced pump

NOTE: Significance: Low (L), Moderate (M), High (H)

CPSES UNIT 1 DIESEL GENERATOR DEFICIENCIES DETECTED
DURING DISASSEMBLY AND INSPECTION PROGRAM

TRAIN	DESCRIPTION	CATEGORY	DATE AND DOCUMENT	DETECTING ORGANIZATION	RESOLUTION
A	Damaged turbocharger blades and bearings; shafts out of tolerance	Operation/Manufacture	6/7/84, QR-10-MP022/3	TU - Maintenance detected during disassembly and inspection	Rotor assemblies and bearings replaced; shafts refurbished
B	Turbocharger rotor blades nicked, one blade missing, bearings and shaft scored	Operation/Manufacture	6/29/84, QR-10-MP022/3	TU - Maintenance detected during disassembly and inspection	One turbocharger replaced; rotor assemblies and bearings replaced, both banks
A	Linear indications on main bearing saddles	Operation/Manufacture	6/7/84, QR-10-02-305A	TU - Maintenance detected during disassembly and inspection	Evaluated as acceptable other than saddle no. 3; conditionally released for testing
B	One-inch linear indication, bearing cap 8	Operation/Manufacture	6/29/84, QR-10-02-305A	TU - Maintenance detected during disassembly and inspection	Indication in non-structural area and acceptable
A&B	Linear indications in crankshaft bearing shells	Operation/Manufacture	6/7/84, 6/29/84; QR-10-02-310B	TU - Maintenance detected during disassembly and inspection	Bearing shells on affected bearings replaced
A&B	Linear indications found in cylinder block	Manufacture	6/7/84, 6/29/84; QR-10-02-315A	TU - Maintenance detected during disassembly and inspection	Final disposition pending based on TDI owners' group recommendation

TRAIN	DESCRIPTION	CATEGORY	DATE AND DOCUMENT	DETECTING ORGANIZATION	RESOLUTION
A&B	Casting flaw in cylinder liners	Manufacture	6/7/84, 6/29/84; QR-10-02-315C	TU - Maintenance detected during disassembly and inspection	Replaced affected liners
B	2 connecting rod bushings scored; gauling on link pin	Operation/Manufacture	6/29/84, QR-10-02-340A	TU - Maintenance detected during disassembly and inspection	Replaced bushings and pins
A&B	Linear indications in connecting rod bearing shells	Manufacture	6/7/84, 6/29/84 QR-10-02-340B	TU - Maintenance detected during disassembly and inspection	Replaced affected shell halves
A&B	Cylinder heads susceptible to cracking and incorrect fire deck thickness	Design/Manufacture	6/7/84; 6/29/84 QR-10-02-360A	TU - Maintenance detected during disassembly and inspection	Replaced cylinder heads
A&B	Scuffing and scoring of valves	Manufacture	6/7/84; 6/29/84 QR-10-02-360B	TU - Maintenance detected during disassembly and inspection	Replaced selected valves
A&B	Linear indications in cylinder head covers	Manufacture	6/7/84; 6/29/84 QR-10-02-362A	TU - Maintenance detected during disassembly and inspection	Replaced selected covers
A&B	Broken corner on intake manifold elbow flange	Manufacture/Operation/ Installation	6/7/84; 6/29/84 QR-10-02-375	TU - Maintenance detected during disassembly and inspection	Replaced elbows

TRAIN	DESCRIPTION	CATEGORY	DATE AND DOCUMENT	DETECTING ORGANIZATION	RESOLUTION
A&B	Exhaust manifold bolts, Incorrect length on some bolts	Manufacture	6/7/84; 6/29/84 QR-10-02-380B	TU - Maintenance detected during disassembly and inspection	Selected bolts replaced
A	Linear indications in intake rocker arms	Manufacture	6/7/84, QR-10-02-390A	TU - Maintenance detected during disassembly and inspection	Replaced or refurbished affected rocker arms
A&B	Rocker arm and pushrod lifters did not pass leak-down test	Manufacture/Operation	6/7/84; 6/29/84 QR-10-02-390F	TU - Maintenance detected during disassembly and inspection	Leaking lifters replaced
A	Overspeed trip coupling spider nicked	Manufacture	6/7/84, QR-10-02-410C	TU - Maintenance detected during disassembly and inspection	Spider replaced
A	Excessive wear on jacket water pump shaft; loose impeller	Operation	6/7/84, QR-10-02-425A	TU - Maintenance detected during disassembly and inspection	Pump replaced
B	Deformed jacket water pump backplate	Manufacture/Maintenance	6/29/84, QR-10-02-442A	TU - Maintenance detected during disassembly and inspection	Replaced impeller and backplate
A	Excessive wear in starting air distributor assemblies	Operation	6/7/84, QR-10-02-442A	TU - Maintenance detected during disassembly and inspection	Replaced assemblies
A&B	Turbocharger bracket bolts without marking	Manufacture	6/7/84; 6/29/84 QR-10-02-475D	TU - Maintenance detected during disassembly and inspection	Replaced bolts