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February 7, 1984

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
7920 Norfolk Avenue, Room P-404A
Bethesda, Maryland 20814

Re: Long Island Lighting Company;
Shoreham Nuclear Power Station,
Unit 1; Docket No. 50-322-OL

Dear Mr. Denton:

I refer to my letter to you of February 3, 1984. Yesterday we obtained copies of the enclosed NRC Vendor Inspection Program Reports, Nos. 9990034/83-02 and 83-03. The NRC Region IV inspectors found numerous nonconformances in the implementation of TDI's Quality Assurance program relating to production of the replacement cylinder heads at Shoreham.

The January 17, 1984 transmittal letter to TDI of the inspection reports from NRC Region IV states:

> It is apparent from the results of these and prior inspections that serious deficiencies have existed in the implementation of your committed quality assurance program for manufacture of emergency diesel generators. What concerns us greatly is that certain of these findings are of a nature which brings into question both the adequacy of existing manufacturing process controls and the level of compliance by manufacturing and quality control personnel. When reviewed in the context of the numerous deficiencies which have been identified to the NRC in 10 CFR Part 21 and 10 CFR Part 50.55(e) reports, we believe that significant concern is warranted with respect to the existing assurance that as

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furnished emergency diesel generators will reliably perform their intended safety function.

This information underscores the significance of the matters raised in my February 3 letter and the need for an immediate NRC Staff inspection of each of the cylinder heads at Shoreham.

Very truly yours,

Alan Roy Dynner

ARD/dv
Enclosures

cc: Service List
Edward G. Greenman

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE SUITE 1000
ARLINGTON TEXAS 76011

January 17, 1984

Docket No. 99900334/83-02 and 83-03

Transamerica Delaval, Incorporated
Engine and Compressor Division
ATTN: Mr. C. Mathews
Vice President and General Manager
550 85th Avenue
Oakland, California 94621

Gentlemen:

This refers to the inspections conducted by Mr. J. W. Sutton of this office on September 6-15 and October 17-21, 1983, of your facility at Oakland, California, and to the discussions of our findings with you and members of your staff at the conclusion of the inspections.

These inspections were made at the request of NRC Headquarters and Regional Offices as a result of the identification of numerous deficiencies in emergency diesel generators that have been furnished to various nuclear sites.

Areas examined during the inspections and our findings are discussed in the enclosed reports. Within these areas, the inspections consisted of an examination of procedures and representative records, interviews with personnel, and observations by the inspector.

During the inspections it was found that the implementation of your QA program failed to meet certain NRC requirements. The specific findings and references to the pertinent requirements are identified in the enclosures to this letter.

Please provide us within 30 days from the date of this letter a written statement containing: (1) a description of steps that have been or will be taken to correct these items; (2) a description of steps that have been or will be taken to prevent recurrence; and (3) the dates your corrective actions and preventive measures were or will be completed. Consideration may be given to extending your response time for good cause shown.

The responses requested by this letter are not subject to the clearance procedures of the Office of Management and Budget as required by the Paperwork Reduction Act of 1980, PL 96-511.

It is apparent from the results of these and prior inspections that serious deficiencies have existed in the implementation of your committed quality assurance program for manufacture of emergency diesel generators. What concerns us greatly is that certain of these findings are of a nature which brings into question both the adequacy of existing manufacturing process controls and the level of compliance by manufacturing and quality control personnel. When reviewed in the context of the numerous deficiencies which have been identified to the NRC in 10 CFR Part 21 and 10 CFR Part 50.55(e)

reports, we believe that significant concern is warranted with respect to the existing assurance that as furnished emergency diesel generators will reliably perform their intended safety function. Accordingly, this matter is being referred to the NRC Headquarters staff for consideration of generic actions required to produce a necessary level of confidence in this equipment.

In accordance with 10 CFR 2.790 of the Commission's regulations, a copy of this letter and the enclosed inspection reports will be placed in the NRC's Public Document Room. If this report contains any information that you believe to be exempt from disclosure under 10 CFR 9.5(a)(4), it is necessary that you (a) notify this office by telephone within 10 days from the date of this letter of your intention to file a request for withholding; and (b) submit within 25 days from the date of this letter a written application to this office to withhold such information. If your receipt of this letter has been delayed such that less than 7 days are available for your review, please notify this office promptly so that a new due date may be established. Consistent with Section 2.790(b)(1), any such application must be accompanied by an affidavit executed by the owner of the information which identifies the document or part sought to be withheld, and which contains a full statement of the reasons on the basis which it is claimed that the information should be withheld from public disclosure. This section further requires the statement to address with specificity the considerations listed in 10 CFR 2.790(b)(4). The information sought to be withheld shall be incorporated as far as possible into a separate part of the affidavit. If we do not hear from you in this regard within the specified periods noted above, the report will be placed in the Public Document Room.

Should you have any questions concerning these inspections, we will be pleased to discuss them with you.

Sincerely,

Original Signed By:
Uldis Potapovs
Uldis Potapovs, Chief
Vendor Program Branch

Enclosures:
1. Appendix A - Notice of Nonconformance (83-02)
2. Appendix B - Inspection Report No. 99900334/83-02
3. Appendix C - Inspection Data Sheets (11 pages) 83-02
4. Appendix D - Notice of Nonconformance (83-03)
5. Appendix E - Inspection Report No. 99900334/83-03
6. Appendix F - Inspection Data Sheets (7 pages) 83-03

APPENDIX A

Transamerica Delaval, Incorporated
Engine and Compressor Division
Docket No. 99900334/83-02

NOTICE OF NONCONFORMANCE

Based on the results of an NRC inspection conducted on September 6-15, 1983, it appears that certain of your activities were not conducted in accordance with NRC requirements as indicated below:

Criterion V of Appendix B to 10 CFR Part 50 states: "Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Instructions, procedures, or drawings shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished."

Nonconformances with these requirements are as follows:

A. Paragraph 2:06.10 in Perry Specification No. SP-750-4549-00 dated August 30, 1973, states, in part, "Exhaust System . . . This system is safety related but not ASME Section III." Paragraph 1:02.2 states, "The requirements of this Specification are mandatory and shall be imposed by the Vendor on all Subvendors furnishing safety related items or services." Paragraph 1:06.4 in Specification No. SP-706-4549-00 states, in part, ". . . 3. Procurement documents shall require suppliers to provide, as necessary, a QA program consistent with this Specification. 4. Procurement documents shall include provision for the following as applicable: a. Define the level of QA program development required for the Subvendors . . . ."

Contrary to the above, a QA program was not imposed by Transamerica Delaval, Incorporated (TDI) on the manufacture of exhaust silencers for emergency diesel generators (EDGs) furnished to Perry, Units 1 and 2.

B. Paragraph 10.3.2 in Section 10 of the Quality Assurance Manual (QAM), Revision 2, states, in part, "Evidence of inspection acceptance of normal manufactured parts is indicated by affixing the inspection stamp and date to the manufacturing processing sheet during process and after final acceptance . . . ." Paragraph 10.2.6 states, in part, "Parts, components and/or assemblies are inspected prior to shipment and after performance test completion . . . ."

Contrary to the above, inspection stamps and dates on process sheets did not, necessarily, provide evidence of performance of inspection or inspection acceptance as illustrated by the following examples:

1. Operation 550 (i.e., dowel cam gear rocker arm hold down bolt installation) in the assembly route sheets (RSs) for Shoreham Nuclear Power Station (SNPS) EDG Serial Nos. 74011, 74012, and 74013 was stamped off as complete by the QC inspector. A subsequent inspection at the SNPS site discovered, however, that the bolts had not been installed.

2. A Certificate of Compliance was signed for 23 reworked pistons on March 4, 1982, and shipment made to the San Onofre Nuclear Generating Station, Unit 1, on the following day. Review of inspection dates on the RSs for these pistons indicated, however, that QC inspectors accepted the various RS operations in the time period of March 22-26, 1982.

C. Paragraph 8.1.3 in Section 8 of the QAM states, in part, "A processing package is issued with each part or group of parts at the beginning of the manufacturing cycle. The manufacturing cycle is controlled by the processing package which includes a Manufacturing Engineering Route Sheet, Inventory Job Card, Engineering drawings and a Manufacturing Engineering Tool and Fixture Card."

Paragraph 4.17.1 in Bechtel Specification 9645-M-018-0, Revision 4, states, with respect to Grand Gulf EDGs, "Records shall be maintained to furnish documentary evidence of activities affecting quality. The records shall include the results of inspections, test, audits, monitoring of work performance and material analyses as specified."

Contrary to the above:

1. Rework was performed on 92 pistons from SNPS and Grand Gulf EDGs without issue and use of RSs.

2. Records of activities affecting quality were not maintained with respect to rework operations performed on 66 pistons from Grand Gulf.

D. Paragraphs 2.2, 2.2.3, 2.3, 2.3.2, and 2.4 in Engineering Operating Procedure 6 dated July 21, 1978, require that results of testing/analysis be: (1) reviewed by the analyst, (2) reviewed and approved by the Manager of Applied Mechanics, and (3) reviewed and certified by the staff Registered Professional Engineer (RPE).

Contrary to the above, jacket water pump analyses dated September 24 and October 4, 1982, and July 15, 1983, for SNPS had not been certified by the staff RPE.

E. Paragraph 6.4 and its subparagraphs in Section 6.0 dated January 25, 1983, of the Foundry Quality Control Manual state, in part, "Non-destructive

Testing shall be performed per the following Process Specifications (sic) . . . . Magnetic Particle . . . 600-30 . . . Ultrasonic . . . 600-50 . . . ." These documents, in turn, require that test reports of acceptable inspections be initiated.

Paragraph 10.1 in Quality Control Procedure (QCP) 600-20 dated October 6, 1976, states, "A report of acceptable Liquid Penetrant Inspection shall be issued and the shop order signed off on areas or pieces found acceptable."

Contrary to the above, the following was noted with respect to replacement cylinder head assemblies for SNPS (Long Island Lighting Company [LILCO] Purchase Order [PO] No. 310552-23):

1. Test reports had not been initiated to confirm performance of magnetic particle and ultrasonic examination of castings. Examples by serial and heat number are G83/381J; H-60/519J; H-56/512J; H-66, 67/5335; and H-89/586J.

2. Liquid penetrant inspection reports had not been issued in regard to acceptance of valve seats of cylinder heads.

F. Paragraph 9.3.5 in Section 9 of the QAM states, in part, "Personnel performing nondestructive examinations will be certified . . . ."

Contrary to the above, certain personnel performing nondestructive examinations of replacement cylinder head assemblies for SNPS had not been certified as evidenced by the application of QC Stamp Nos. 3, 8, and 10 (i.e., unqualified personnel) at nondestructive operations on RSs for Part No. 03-360-03-0F. Examples by serial numbers are G-53, H-11, E-71, H-50, and G-83.

G. Paragraph 4.4.2 in QCP I.P.600 dated April 1, 1981, states, "Examinations shall be in accordance with SNT-TC-1A Recommended Practices 1975 Edition. Attachement (sic) 'B' indicates the designated (minimum) number of questions to be answered for each certification level and discipline." Attachment B states, in part, ". . . Ten different checkpoints of test variables and Transamerica Delavals NDE procedural requirements shall be a part of the practical examination." Paragraph 4.6.1 in QCP I.P.600 states, "Certification shall be renewed at a minimum of every three years. Recertification shall be by re-examination."

Contrary to the above, review of certification records for current TDI nondestructive examination personnel revealed that practical examination records did not indicate the use of ten checkpoints by the examiner. It was additionally noted that the Level II radiographer was certified on August 20, 1979, but not recertified until June 2, 1983.

H. Paragraphs 2.4.1, 8.1.2, and 8.1.3 in QCP I.P.300 dated April 1, 1981, stipulate that: (1) the inspector stamp and date the particular operation of the RS for acceptable parts, (2) use of a signature or initial is prohibited except where specifically requested or dictated, and (3) a

surrendered inspection stamp must not be reissued for a minimum of 6 months.

Contrary to the above, regarding cylinder heads for SNPS:

1. The inspector had not stamped and dated RSs in the appropriate space for acceptable parts. This was evidenced by: (a) more stamps than dates, and (b) limited stamps and dates joined by a line. Examples by serial numbers are E-71, H-11, G-50, H-34, and G-4.

2. Initials had been used as acceptable evidence of inprocess inspection on RSs. Examples by serial numbers are G-50, H-11, G-19, E-71, H-89, and H-60.

3. A surrendered inspection stamp (QC 30) had been reissued prior to expiration of the minimum 6-month period. Records indicate that the previous holder left the company on September 10, 1982; however, as an example, the RS for cylinder head G-50 reflects its usage at Operation No. 170 on November 10, 1982.

I. Paragraph 7.5.8.1 in Section 7.0 dated January 25, 1983, of the Foundry Quality Control Manual states that weld machines are calibrated in accordance with QCP I.P.100.

Paragraph 2.6.1 and its subparagraphs in QCP I.P.100 dated February 12, 1982, require that gages and equipment subject to periodic calibration and inspection display a calibration sticker which indicates when the item was: (1) calibrated and (2) due for calibration. Paragraph 3.1.2 addresses a list which contains welding machines, heat treat furnaces, and numerous other items along with respective calibration frequencies and other information.

Contrary to the above:

1. Welding Machine No. 41 in Weld Area No. 3 (Foundry) had not been calibrated in accordance with the required 12-month frequency as evidenced by its displaying three calibration stickers which exhibited due dates of August 30, 1980.

2. Heat Treat Furnace No. 5 had not been calibrated in accordance with the required 6-month frequency as evidenced by the meters and recorder displaying calibration stickers which exhibited due dates of March 13, 1983.

J. Paragraph 2.2.3.2 in Section 2 dated February 27, 1981, of the QAM states, "It is the responsibility of the Manufacturing Manager to assure that specified processes are adhered to and that the product conforms to the specification in both processing components and the ultimate assembly."

Contrary to the above, the Manufacturing Manager had not assured adherence to the specified process identified at Operation No. 90 of the RSs for

SNPS replacement cylinder head assemblies. The operation (hard facing of valve seats) required welding in accordance with Specification No. 100-W-17. The NRC inspector was informed that the material reflected in that specification was no longer used; consequently, a new specification (100-W-17A) was being used.

K. Paragraph 16.2.1 in Section 16 dated February 27, 1981, of the QAM states, "Manufacturing and assembly Route Sheets are used as records of in-process inspection of parts, components and assemblies. All Route Sheets are retained by Quality Control as objective evidence of inspection acceptance."

Contrary to the above, assembly RSs for the cylinder head assemblies furnished for SNPS on LILCO PO No. 310552-23 had not been retained by Quality Control.

L. LILCO PO No. 310552-23 dated May 24, 1983, states, in part, "Certificate of Compliance to SHI-89 required."

Lines 65.4 through 65.12 of Revision 1 to Specification No. SHI-89 states, in part, "The Seller shall state, in writing, to the Purchaser, at the conclusion of his design, procurement, and engineering phase and prior to shipment, that all referenced specifications, codes, and procedures have been complied with to the best of his knowledge and belief . . . . All statements of compliance shall be notarized."

Contrary to the above, the Certificate of Compliance dated June 28, 1983, for the cylinder head assemblies furnished for SNPS on LILCO PO No. 310552-23 had not been notarized.

ORGANIZATION: TRANSAMERICA DELAVAL, INCORPORATED
ENGINE AND COMPRESSOR DIVISION
OAKLAND, CALIFORNIA

REPORT NO.: 99900334/83-02	INSPECTION DATE(S): 9/6-15/83	INSPECTION ON-SITE HOURS: 114

CORRESPONDENCE ADDRESS: Transamerica Delaval, Incorporated
Engine and Compressor Division
ATTN: Mr. C. Matthews, Vice President and General Mgr.
550 85th Avenue
Oakland, California 94261

ORGANIZATIONAL CONTACT: Mr. R. E. Boyer, Manager, Quality Assurance
TELEPHONE NUMBER: (415) 577-7422

PRINCIPAL PRODUCT: Emergency diesel generators.

NUCLEAR INDUSTRY ACTIVITY: Transamerica Delaval, Incorporated (TDI) has one inprocess contract for domestic nuclear emergency diesel generators.

ASSIGNED INSPECTOR: I. Barnes for J. W. Sutton, Special Projects Section — Date: 1-16-84

OTHER INSPECTOR(S): W. E. Foster, Reactive Inspection Section (RIS)
I. Barnes, RIS

APPROVED BY: I. Barnes, Chief, RIS — Date: 1-16-84

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 21 and 10 CFR Part 50, Appendix B.

B. SCOPE: This inspection was made at the request of both NRC Headquarters and Regional Offices as a result of the identification of numerous deficiencies in emergency diesel generators (EDGs) that have been furnished to various sites. Subjects addressed during this inspection included: (1) rocker arm capscrew failure, (2) seismic qualification of
(cont. on next page)

PLANT SITE APPLICABILITY:
Rocker arm capscrew failure, missing timing gear bolts, cracked cylinder heads leaking lube oil cooler tubes: 50-322. Jacket water pump shaft failure: 50-322, 50-312, 50-458/459. Seismic qualification of mufflers/silencers: 50-329/330, 50-312, 50-440/441. Piston head rework: 50-206, 50-322, 50-416/417.

ORGANIZATION: TRANSAMERICA DELAVAL, INCORPORATED
ENGINE AND COMPRESSOR DIVISION
OAKLAND, CALIFORNIA

REPORT NO.: 99900334/83-02	INSPECTION RESULTS:	PAGE 2 of 10

SCOPE: (cont.)
diesel mufflers/silencers, (3) missing cam gear bolts, (4) leaking lube oil cooler tubes, (5) piston head rework, (6) field service activities, (7) cracked cylinder heads, and (8) jacket water pump shaft failure.

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50, paragraphs 1:02.2 and 2:06.10 in Perry Specification No. SP-750-454-9-00 and paragraph 1:06.4 in Perry Specification No. SP-706-454-9-00, a QA program was not imposed by TDI on the manufacturer of exhaust silencers for EDGs furnished to Perry, Units 1 and 2.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraphs 10.2.6 and 10.3.2 in Section 10 of the Quality Assurance Manual (QAM), inspection stamps and dates on process sheets did not, necessarily, provide evidence of performance of inspection or inspection acceptance as illustrated by the following examples:

   a. Operation 550 (i.e., dowel cam gear rocker arm hold down bolt installation) in the assembly route sheets (RSs) for Shoreham Nuclear Power Station (SNPS) EDG Serial Nos. 74011, 74012, and 74013 was stampted off as complete by the QC inspector. A subsequent inspection at the SNPS site discovered, however, that the bolts had not been installed.

   b. A Certificate of Compliance was signed on March 4, 1982, for 23 reworked pistons and shipment made to the San Onofre Nuclear Generating Station, Unit 1, on the following day. Review of inspection dates on RSs for these pistons indicated, however, that QC inspectors accepted the various RS operations in the time period of March 22-26, 1982.

3. Contrary to Criterion V of Appendix B to 10 CFR Part 50, paragraph 8.1.3 in Section 8 of the QAM and paragraph 4.17.1 in Bechtel Specification 9645-M-018-0, Revision 4:

   a. Rework was performed on 92 pistons from SNPS and Grand Gulf EDGs without issue and use of RSs.

b. Records of activities affecting quality were not maintained with respect to rework operations performed on 66 pistons from Grand Gulf.

4. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraphs 2.2, 2.2.3, 2.3, 2.3.2, and 2.4 in Engineering Operating Procedure 6 dated July 21, 1978, jacket water pump analyses dated September 24 and October 4, 1982, and July 15, 1983, for the SNPS had not been certified by the staff Registered Professional Engineer (RPE).

5. Contrary to Criterion V of Appendix B to 10 CFR Part 50, paragraph 6.4 in Section 6.0 of the Foundry Quality Control Manual and paragraph 10.1 in Quality Control Procedure (QCP) I.P.600-20, the following was noted with respect to replacement cylinder head assemblies for SNPS (Long Island Lighting Company [LILCO] Purchase Order [PO] No. 310552-23):

   a. Test reports had not been initiated to confirm performance of magnetic particle and ultrasonic examination of castings. Examples by serial and heat number are G83/381J, H-60/519J, H-56/512J, H-66, 67/533J, and H-89/586J.

   b. Liquid penetrant inspection reports had not been issued in regard to dye check of valve seats of cylinder heads.

6. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 9.3.5 and its subparagraphs in Section 9 dated February 27, 1981, of the QAM, certain personnel performing nondestructive examinations of cylinder heads for SNPS on LILCO PO No. 310552-23 had not been certified. This was evidenced by the application of QC Stamp Nos. 3, 8, and 10 (i.e., unqualified personnel) at nondestructive operations on RSs for Part No. 03-360-03-0F. Examples by serial number are G-53, H-11, E-71, H-50, and G-83.

7. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraphs 4.4.2 and 4.6.1 in QCP I.P.600, review of certification records for current TDI nondestructive examination personnel revealed that practical examination records did not indicate the use of ten checkpoints by the examiner. It was additionally noted with respect to the 3-year recertification requirement that the Level II radiographer was certified on August 20, 1979, but not recertified until June 2, 1983.

8. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraphs 2.4.1, 8.1.2, and 8.1.3 of QCP I.P.300 dated April 1, 1981, regarding previously identified cylinder heads:

   a. The inspector had not stamped and dated RSs in the appropriate space for acceptable parts. This was evidenced by: (1) more stamps than dates and (2) limited stamps and dates joined by a line. Examples by serial number are: E-71, H-11, G-50, H-34, and G-4.

   b. Initials had been used as acceptable evidence of in-process inspection on RSs. Examples by serial number are: G-50, H-11, G-19, E-71, H-89, and H-60.

   c. A surrendered inspection stamp (QC 30) had been reissued prior to expiration of the minimum 6-month period. Records indicate that the previous holder left the company on September 10, 1982; however, as an example, the RS for Cylinder Head G-50 reflects its usage at Operation No. 170 on November 10, 1982.

9. Contrary to Criterion V of Appendix B to 10 CFR Part 50, paragraph 7.5.8.1 in Section 7.0 dated January 25, 1983, of the Foundry QC Manual and paragraph 2.6.1 and its subparagraphs and paragraph 3.1.2 in QCP I.P.100 dated February 12, 1982:

   a. Welding Machine No. 41 in Weld Area No. 3 (Foundry) had not been calibrated in accordance with the required 12-month frequency as evidenced by its displaying three calibration stickers which exhibited due dates of August 30, 1980.

   b. Heat Treat Furnace No. 5 had not been calibrated in accordance with the required 6-month frequency as evidenced by the meters and recorders displaying calibration stickers which exhibited due dates of March 13, 1983.

10. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 2.2.3.2 in Section 2 of the QAM, the Manufacturing Manager had not assured adherence to the specified process identified at Operation No. 90 of the RSs for SNPS replacement cylinder head assemblies. The operation (hardfacing of valve seats) required welding in accordance with Specification No. 100-W-17. The NRC inspector was informed that the material reflected in that specification was no longer used and, consequently, a new specification (100-W-17A) was being used.

11. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 16.2.1 in Section 16 of the QAM dated February 27, 1981, assembly RSs for the cylinder head assemblies furnished for SNPS on LILCO PO. No. 310552-23 had not been retained by Quality Control.

12. Contrary to Criterion V of Appendix B to 10 CFR Part 50, LILCO PO No. 310552-23 dated May 24, 1983, and Revision 1 to Specification No. SH1-89, the Certificate of Compliance dated June 28, 1983, for the cylinder head assemblies furnished for SNPS on LILCO PO No. 310552-23 had not been notarized.

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

The findings contained in the report of the previous inspection (99900334/83-01) were not issued prior to the start of the current inspection and, accordingly, will be reviewed during a subsequent inspection.

E. OTHER FINDINGS OR COMMENTS:

1. Failed Rocker Arm Capscrew: A 10 CFR Part 50.55(e) report was made by LILCO on May 4, 1983, to NRC, Region I, which stated that a sudden change in engine sound was noted by the operator during testing of EDG 103. After shutdown of the engine to determine the reason for the condition, it was ascertained by removal of the No. 1 cylinder valve cover that the intermediate intake rocker arm assembly hold down capscrew had failed. Examination by the NRC inspector of documentation pertaining to TDI failure analysis indicated that the failure had been attributed to a fatigue mechanism. Review by TDI on July 18, 1983, with respect to reportability under the provisions of 10 CFR Part 21, concluded that the condition was not reportable in that the failure was considered an isolated case and was the result of improper torqueing. The NRC inspector was informed that this capscrew is torqued in the field as well as at the manufacturing facility. Examination of Appendix IV to the TDI Instruction Manual indicated that a torque value of 365 ft. lb. was specified for the capscrew. It was additionally noted that TDI had issued a Service Information Memo (SIM) on July 26, 1974, which indicated the importance of compliance with specified torque values. Reissuance of this SIM was identified to the NRC inspector as being under consideration.

The NRC inspector established that the capscrews had been purchased as commercial items and had been installed in all TDI engines. LILCO was stated to have opted for installation of a new type of capscrew in the SNPS engines. After review of the available documentation, the NRC inspector concluded that the failure cause had been identified and that the generic potential could only be assessed by direct verification of applied capscrew torque in supplied engines.

2. Seismic Qualification of Diesel Silencers and Exhaust Systems:

a. During the Atomic Safety and Licensing Board hearing on July 29, 1983, for the Consumers Power Company Midland Plant, it was identified in testimony that the mufflers/silencers furnished by TDI to Midland and other sites were not seismically qualified.

b. The NRC inspector reviewed the applicable Bechtel requirements which had been imposed on TDI for silencers and established that the specifications did not include a seismic qualification requirement. TDI was requested to furnish an in line residential type Burgess Manning Model ACA or approved equal silencer with multicompartment construction to limit noise level to NEMA requirements at 160 feet from the exhaust port. Connecting piping for air and exhaust systems is supplied and installed by site personnel. TDI does provide, however, a seismic report which includes silencers and supports even when not required by customer specification.

c. The NRC inspector reviewed Perry Specification No. SP-750-4549-00 and associated specifications and identified that exhaust systems had been classified as safety-related and Seismic Category 1. Documentation review at TDI indicated that the required seismic analysis had been performed. One nonconformance (see paragraph B.1) was identified with respect to the failure to impose a QA program on the silencer manufacturer as stipulated by the customer specification. In this phase of the inspection, the NRC inspector reviewed the Gilbert Associates 10 CFR Part 21 report dated July 27, 1983, concerning elevation of engine back pressure. TDI personnel stated that exhaust piping was not designed by TDI and was installed by site personnel. From the available information, it would appear that the installed piping design may have a bearing on the high exhaust pressure. This problem is not considered to have generic aspects in that each nuclear site has different criteria for installation of exhaust piping.

d. The NRC inspector additionally reviewed specification requirements and documentation pertaining to seismic evaluation of silencers that had been furnished with EDGs to the River Bend and Rancho Seco facilities. The inspection established that TDI had complied with seismic qualification requirements.

3. Missing Cam Gear Bolts: The NRC inspector reviewed LILCO Deficiency Report No. 654 and the assembly and testing RSs for the SNPS engines. Operation 550 was noted as having been stamped off as complete by the QC inspector for the bolt installation. Subsequent examination at SNPS established, however, that the bolts had not been installed.

One nonconformance was identified as a result of this deficiency (see paragraph B.2.a).

4. Leaking Lube Oil Cooler Tubes Due to Improper Rolling: Review of available documentation indicated that the lube oil cooler had been purchased from an ASME Certificate Holder and had passed the required hydrostatic test and had been accepted by an authorized nuclear inspector. Examination of SNPS TDI Field Service Reports in regard to this deficiency identified an opinion that the leaking tubes may have resulted from a thermal shock imposed on the cooler during site EDG testing. The absence of site operational records precluded evaluation at TDI whether this opinion was based on actual knowledge that the EDG had been operated in a manner which could result in thermal shock to the lube oil cooler; e.g., operation for a period of time without coolant flow through the cooler resulting in heating of the component and followed by a sudden resumption of coolant flow.

5. Piston Head Rework: The NRC inspector reviewed available documentation pertaining to rework activities that were performed on returned pistons from SNPS, Grand Gulf, and San Onofre as a result of issue of SIM 324, Revision 2. As a result of review of this documentation (i.e., POs, customer specifications, external correspondence, and available RSs), the NRC inspector ascertained that RSs were not prepared for control of rework operations on the 92 pistons received from SNPS and Grand Gulf. It was additionally noted that Bechtel Specification No. 9645-M-018-0, Revision 4, required that records of operations, monitoring, etc., be retained for the rework of the Grand Gulf pistons. Review of Stone and Webster Specification No. SH1-89, which is applicable to the SNPS engines, revealed that Certificates of Compliance were required to be notarized. The failures to utilize RSs and retain required records

in regard to piston rework operations have been identified as a nonconformance (see paragraph B.3). The failure to have the Certificate of Compliance notarized for the SNPS piston rework has been reflected in an additional nonconformance (see paragraph B.12).

Records examination confirmed that RSs had been prepared for control of rework operations on the San Onofre pistons. It was noted, however, that the QC operation acceptance dates on the RSs occurred after issue of the Certificate of Compliance and shipping of the reworked pistons to San Onofre (see paragraph B.2.b).

The above deficiencies are considered indicative of a direct failure of the QA/QC function to both enforce committed quality assurance program provisions with respect to manufacturing process control and to assure appropriate manufacturing compliance with the engineering requirements stipulated for this activity.

6. Field Service Reports and Personnel Qualifications: The NRC inspector reviewed field service reports that had been generated from 1977 to 1983 with respect to the SNPS EDGs. The reports were found to contain adequate information and a description of the corrective action taken to correct a specific problem. A review was additionally made of job descriptions for field service representatives and supervisory personnel to ascertain qualification and experience requirements. It was noted from this review that prior field experience is a requirement for these positions. During the inspection, a discussion was held with TDI management in regard to use of a formalized procedure for reporting to QA/QC of those field identified problems which related to performance of QA/QC activities during manufacturing.

7. Jacket Water Pump Shaft Failure: During a Vendor Program Branch inspection which was conducted July 11-15, 1983, the NRC inspector observed a memorandum addressing jacket water pumps installed on EDGs that had been furnished to LILCO, Gulf States Utilities Company, and a foreign customer. Requested information regarding susceptibility of the jacket water pumps to failure and nonincorporation of the SNPS modification at the River Bend Station (RBS) was not provided. Consequently, this issue remained open. Subsequent to the inspection, it was revealed that EDGs of the same model had also been furnished to the Sacramento Municipal Utility District.

As a result of the query, an analysis was performed and a memorandum initiated. The memorandum is not in agreement with the failure analysis report (FAR) regarding the cause of the problem. The conclusion of the FAR states, "Failure of the shaft was due to a fatigue crack starting at the small keyway radius. The cause of the keyway radius crack was cyclic movement on an improperly tightened impeller hub nut." The memorandum states, in part, "The cause of the jacket water pump failure at LILCO was attributed to be caused by a high amplitude torsional excitation of the water pump close to the pumps natural frequency." One of the actions to preclude recurrence was to change the impeller material from red brass to ductile iron. According to a memorandum on the redesign analysis of the jacket water pump, "the change to ductile iron . . . increases the shaft-impeller natural frequency away from the pump 4th order resonance . . . ." Another action to preclude recurrence was elimination of the impeller key.

The analysis resulted in a "Comparison of R-48 Engine Front End Amplitude of 4th Order at 450 RPM." The comparison accounted for SNPS and RBS but did not account for the units at the Rancho Seco Nuclear Generating Station (RSNGS). The NRC inspector was informed that the data for RBS would also apply to RSNGS inasmuch as the units were essentially the same.

It appears that adequate engineering attention has been provided, but a similar level of manufacturing attention does not appear to have been provided. Regarding the jacket water pumps, the NRC inspector has not determined that: (a) different assemblers performed assembly tasks, and (b) inspections have been performed at RSNGS and RBS to ensure that assembly is correct. This will be reviewed during a future inspection.

During this area of the inspection, it was determined that the contract required the jacket water pump to be tested and/or analyzed. An engineering operating procedure stated that contractually required analysis and/or test would be reviewed, approved, and certified. The NRC inspector observed that certain calculations associated with the jacket water pump had not been certified; consequently, the nonconformance detailed in paragraph B.4 was identified.

ORGANIZATION: TRANSAMERICA DELAVAL, INCORPORATED
ENGINE AND COMPRESSOR DIVISION
OAKLAND, CALIFORNIA

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8. Cracked Cylinder Heads: LILCO filed a 10 CFR Part 50.55(e) report on April 15, 1983, with the Nuclear Regulatory Commission, Region I. The report addressed "apparent cracking in cylinder heads" in EDGs that had been furnished to SNPS.

The NRC inspector was informed that the only castings that are not produced in the onsite foundry are the housings for the fuel oil, lube oil, fuel injection, and jacket water pumps; also, no aluminum castings. Castings are not categorized as critical or noncritical. It was noted that all cylinder head castings are produced for stock.

The replacement cylinder head assemblies furnished to SNPS on LILCO PO No. 310552-23 were selected for review of process control requirements and implementation of requirements during foundry, machining, and assembling activities. Process controls appear to be adequately documented; however, implementation is less than adequate. Casting certifications attested to the acceptability of magnetic particle and ultrasonic inspections; however, the necessary reports had not been initiated. Additionally, in some instances, the inspection checkoff list (reverse side of the Shipping Copy of the Foundry RS and Production Order) had not been annotated regarding accomplishment of magnetic particle and ultrasonic inspections. The RSs for machining activity exhibited: (a) uncertified/unqualified QC personnel conducting nondestructive examinations, and (b) inspection stamps that had been obliterated by correction fluid and application of a different inspection stamp. In the latter situation, reports of acceptable liquid penetrant inspection had not been issued for the dye checks; consequently, it could not be determined whether the: (a) examinations were performed, or (b) obliterated stamps were simply restamped. Also, there were instances where initials were used where inspection stamps were required. RSs for assembly of the selected hardware had not been retained. Nonconformances identified during this area of the inspection are detailed in paragraphs B.5 through B.11.

In an effort to assess the effectiveness of process controls, the following areas were evaluated: (a) change control, (b) manufacturing process control, and (c) records. This area of the inspection was accomplished by evaluating the following documents for requirements and/or implementation of requirements: 12 drawings, 15 specifications, 8 procedures, 2 quality manuals, 1 PO, 5 memoranda, 1 letter, and numerous other documents identified as: calculations, failure analysis report, casting certification, production RSs, foundry RSs, inspection checkoff sheets, and documents for packaging/shipping. The findings are indicated at other locations of this report.

PERSONS CONTACTED

mpany TRANSAMERICA DELAVAL INC
Engine and Compressor Div.

Dates September 6-15-1983

cket/Report No. 99900334/83-02

Inspector J.W. SUTTON.

E(Please Print)	TITLE(Please Print)	ORGANIZATION(Please Print)
W. SUTTON.	Reactor Inspector	USNRC-
WARD DOBREC	FOUNDRY MGR	T.D.I.
.L. MILLS	MGR. - QUALITY ENGR.	T.D.I.
E BOYER	MGR, Q.C	TDI
E. TRUSSELL	MGR ENGR	TDI
S. MATNEWS	V.P. & GEN MGR	TDI
D. WULF	Customer Service Engineer	TDI
I. HILL	QC SUPERVISOR	TDI
D. BECK	APPLied Mech. Eng Dept	TDI
← Attended Exit INTERVIEW -		

J.W. Sutton

Scope/Module Follow up Regional Requests. DOCUMENTS EXAMINED

1	2	TITLE/SUBJECT	3	4
			—	—
1	8	IDCFR Part 21 meeting - 7-18-83. Cap Screw. Rocker arm.	7-26-74.	
2	8	Sowie Information Memo - Rocker arm Cap Screws.	8-6-74	
3	8	" " " " " "	3-22-73	
4	8	" " " " " "	5-10-72	
5	8	" " " " " "	4-6-83	
6	1	Drawing release notice - Part # 02-390-01-05	4-8-83	
7	6	Engineering Memo - Parts change list - Cap Screw.	5-5-83	Rev A
8	5	P.O 13935 - 02-390-A-05. new Cap Screw -	6-26-79	
9	8	Receiving Record - 92223.		
10	1	Drawing - 02-390-06-AA		
11	5	P.O 11273 - Hargood + Romaine -	11-19-82	
12	8	Material test report - new Bolt.	1-26-83	
13	5	P.O. 12107 - 122-82 - Test Rpt. new Bolt	8-30-83	
14	8	Approved Suppliers List Procedure.		
15	4	QA Manual - Section 4. P. 4.4.		
16	8	Failure Analysis - Cap Screw -	5-4-83	
17	7	Silco to NRC 50.55e Rpt.	11-22-76	
18	8.	Assembly Test Route Sheet - 02645		

Document Types:
1. Drawing
2. Specification
3. Procedure
4. QA Manual
5. Purchas Order
6. Internal Memo
7. Letter
8. Other (Specify-if necessary)

Columns:
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Scope/Module Follow up Reg. Request. DOCUMENTS EXAMINED

1	2	TITLE/SUBJECT	3	4
			8-30-83	
19.	8	Approved Supplier's List Procedure-		
20	1	Rocker arm + Push Rod ass. Hyd Lifters - 03-390-03.	3-6-83	
21	1.	Commercial cap Screw - 02-390-01-06-A.	9-15-83	
22	6	Failure analysis Rpt - Service Case Western Res. Univ.	6-24-83	
23	6	Failure analysis #153 - Rocker arm - SN74010-12-1284	3-30-83	
24.	8	10 CFR 50.55(e) Rocker arm Hold Down Capscrew-	3-6-73	A
25	1	02-390-01-06-C Cap Screw -	3-3-80	
26	1	03-390-03		
27	8	27396. Cert of Compliance		
28	8	Aller mfg Co - Cat. N068C -	9-11-80	
29	8	Vendor Survey - Hoosnot + Romaine -		
30	8	Service - field notes. 101 - 1977 - 1983 Southern -		
31	1.	Camshaft & Gear assy - 03-350-03.	3-17-82	
32	8	Deficiency Rpt - LiCo - 0654	10-28-75	
33	8	Assembly Route Sheet - JOB 2605		
34	8	Final inspection LiCo 74010 & - Eng 2604		
35	8	TDI Employee Qual - mgr. Customer Service.		
36	8	" " " Supervisor Customer Service		

Document Types:
1. Drawing
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3. Procedure
4. QA Manual
5. Purchas Order
6. Internal Memo
7. Letter
8. Other (Specify-if necessary)

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Scope/Module Followup Request Report

DOCUMENTS EXAMINED

1	2	TITLE/SUBJECT	3	4
37.	8	TDI. Customer Service Engineer "B" + "C"		
38	8	" Supervisor, Field Service Dept		
39	8	" Field Service Representatives. Mullen Specialist		
40	8	" Field Service Representatives.		
41	5	So CAL - PO 56100008 - Rework Pistons	3-1-82	
42	8	SIM - 324 - Piston Skirt. TDI.	11-10-80	
43	8	C of C. Pistons.	3-4-82	
44	8	Supplier Release	3-4-82	
45	8	Sales Order N2 7693		
46	8	Production Routing Sheet - JOB 69824. (23) Pistons	3-1-82	
47	8	Supplier QA. release - SCE -	3-7-82	
48	8	Packing Slip - N 27693		
49	8	Customers Property. Copter Reassembly.		
50	8	" " (Before Disassembly	11-13-81	Rev 21
51	5	P.O. 9645 - F - 60662 - Sales order 28618 - Miss Pistons	11-23-81.	~~Rev 21~~
52	2	Test. Specification 9645 - M - 018.0 66 Pistons - Shipped	11-25-81	
53	8	DOC form G 321 - C - GG 10 - Grand Grief.	11-23-81	
54	8	C of C.		

Document Types:
1. Drawing
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3. Procedure
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7. Letter
8. Other (Specify-if necessary)

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cope/Module Follow up Regional Request.

DOCUMENTS EXAMINED

1	2	TITLE/SUBJECT	3	4
55	6	Insp rept - TDI - Schumacher - Loose Bolts on Pistons	11-25-81	
56	8	Bechtel Quality Surveillance Rept - (metal visit) victoria plants.	9-23-76	B
57	1.	03-341-02-AE	5-11-82	
58	5	PO 50783 - Honeywell Romeine.	6-18-82	
59.	8	Cof C.	4-20-83 6-24-83	
60	8	mill certs - Honeywell Romeine	3-11-82	
61	5	P.O. 49833 - Stud -	11-9-73	Rev 4.
62	2	Bechtel Spec - Appendix C - TDI 9645 4.17 QA Records.	11-2-81	
63	5.	P.O. Bechtel Power Corp - 9645-F-60002 Rework	11-25-81.	
64	9	Nuclear Exchange Shipping Notification 81-782-74034		
65	8	LILCO - Rework Piston C of C -	June 24-81	Rev 1
66	2	Spec. S #1.89. 65.6		
67	3	IP-300	1-4-82	Rev 1
68	8	C of C - TDI. PO. 310552 - Specification 310552 -	1-5-82	
69	8	TDI. C of. - LILCO		
70	8	Pistons after Reassembly - Inspection		
71.	8	Pistons Before Disassembly:	12-4-81	
72	7.	Street Webster - TDI. Seavis - TDI-V 11600.a.		

Document Types:
1. Drawing
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3. Procedure
4. QA Manual
5. Purchas Order
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7. Letter
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Scope/Module Followup. Regional Request

DOCUMENTS EXAMINED

1	2	TITLE/SUBJECT	3	4
73	7	TDI- Piston Crown Studs- S/M 324A.	4-16-81	
74.	2	S+W Spec- Pg. 11600.2.-556 d- Pgs 1-49-1-50-1-73	5-?-81	
75	8	Shop. TDI. Rept for Gen. S+W. -1-74.		
76	7.	TDI.- S+W. C of C.	3-4-81.	
77.	8	C of C- 3 Gen Sets- 31 0552-	5-9-77.	
78	8	S.I.M. 324-	11-10-80	
79.	6	Memo- NRC- Aug 31-83- to Potaorn from Warnick Reg III	8-31-83	
80	6	Memo NRC. J Harrison Reg III from R Cook. Sub.[illegible]	8-10-83	
81.	8	Midland. FSAR- Sheet 35-36	6-81-	Rev 34-
82	7	Letter Jordon- Hood - Potential Part 21- Mufflers.	8-9-83	
83	8	Transcript - Hearings - Pages 19535-32.	7-29-83-	
84.	7	Letter Consumers Power Co- to NRC- Region III	9-12-83	
85	8.	Rept. 82-22-08. NOV item - Violation NRC-		
86	8	Non Conf Rept C.P. M01-9-3-158	5-12-83	
87.	7.	Isham- Lincoln - Beale - Letter Re. qualification-	8-12-83	
88	8	Amendment #6- Attachment A - PSAR-	12-26-69	
89.	8	Midland FSAR- Attachment B- 9.5-29-31	6-78	Rev 10
90	8	" " " C 3.2-1 - 3. Table 3.2.1	8-81 8-82	35 36 43

Document Types:
1. Drawing
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3. Procedure
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5. Purchas Order
6. Internal Memo
7. Letter
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DOCUMENTS EXAMINED

1	2	TITLE/SUBJECT	3	4
91	7	TDI to Bechtel - Rec definition - Safety related.	8-2-83	
92	6	TDI - Reference letter above -	3-23-83	
93	7	Bechtel - to TDI. Safety related equipment -	3-14-83	
94	8	TWX. to Bechtel - TDI. Price Repair.	2-24-83.	
95	7	Bechtel - to TDI. Requirements. Emergency Gen.	2-14-83	
96	7.	TDI - Bechtel - Safety related equipment -	2-4-80	
97	1	D702036-020 -CN-E12-36.	2-22-75. 10-24-79	Rev S 8
98	5	7220-F-390169 -	6-11-8:	
99	8	Report - Exhaust Gas Silencer - Final Rept Rust Bond.	7-81	
100	2	M17-02-1 Rancho Seco - Stud.	3-15-75	Rev 11
101	2	SP-562-4549-00.	9-7-78	final.
			10-13-76	
102	2	Spec. SP 562-4549-00.	10-5-76	
103	5	TDI 62643 - for Silencer -		
104	5	TDI 62645	4-27-78	D
105	2	Pur. Mat Spec - 75051. - 123. Expansion Joint.	10-21-76	C
106	8	Quality Doc. - Perry.		
107	8	Bid Request M17-02-01		

Document Types:
1. Drawing
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8. Other (Specify-if necessary)

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Scope/Module Followup on Region Requests

DOCUMENTS EXAMINED

1	2	TITLE/SUBJECT	3	4
			6/29/79	B
1	1	No. 03-425-09-AF - Shaft, Water Pump	2/10/81	C
2		- 03-425-10-AD - Impeller, 10 1/8" Dia. R.H. CCW	6/19/80	1
3		- 03-425-09-09 - Pump, Centrifugal - J.U. Eng Drun	6/16/82	H
4		- 03-310-03-0A - Crankshaft, 8 Cyl	9/1/81	H
5		- 03-310-05-AC - ~ ~	9/14/81	
6		- 03-310-05-08 - Crankshaft w/25" Dia X 21" Wide Webs ...	11/12/82	A
7		- 03-310-05-Ak - Crankshaft, 8 Cyl	3/28/75	
8		- 03-310-05-01 - Crankshaft w/25" Dia X 21" Wide Webs ...	3/22/83	Ak
9		- 03-360-03-0F - Cyl Hd, 4 Vlvs	10/15/82	3
10		- 1A-6446 - Head & Valve Assy ... Non Nuclear & Nuclear	10/15/82	2
11		- 1A-6447 - Head Assy ...	6/4/80	
12	1	- 1A-6879 - ~ ~ ...	10/6/82	
13	2	- RL019-000 - Impeller, Mod. 9E - R.H. ...	5/1/81	
14		Engine Spec for Eng S/No 79039/40 - Mod DSR-48	6/27/82	
15		~ ~ ~ ~ ~ 81015/16 - ~ ~ ~	1/10/83	A
16	2	No. RL 017-000 - Impeller, Mod. B6 JR BL		

Document Types:
1. Drawing
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DOCUMENTS EXAMINED

1	2	TITLE/SUBJECT	3	4
17	2	No. 600-30 Add. A - Magnetic Particle Spec.	12/11/81	1
18		-1400-2- Processing of Catna ... Production Orders	2/13/80	Ø
19		-1400-2A-	2/13/80	Ø
20		-100-W-51- Welding Procedure Spec	10/26/81	Ø
21		-9010-03-360-03-0F- ... Foundry Practice Procedure	4/15/83	3
22		-7- Low Carbon Manganese Steel	7/2/80	7
23		-100-41-N- ... Manual Metallic Arc Welding of ASME Carbon Steel Catgs	9/19/72	1
24		-100-1-D- ... Manual Shielded Metal Arc Welding of Mild Steel Castings	6/24/83	3
25		-600-3- ... Normalizing of Carbon and Low Alloy Steel Catgs	2/10/81	3
26		-600-5- ... Tempering Steel Catgs	7/15/83	4
27	2	-600-20- Liquid Penetrant Examination General	10/6/76	2
28	3	E0P 6- Analysis By the Applied Mechanics Group	7/21/78	
29	3	No. 600-50- Ultrasonic Examination	11/12/75	Ø
30	|	-600-20- Liquid Penetrant Examination	10/6/76	2
31	|	-600-10- Visual Inspection	9/22/75	1
32	3	-600-30- Magnetic Particle Particle Examination	10/6/76	1

Document Types:
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DOCUMENTS EXAMINED

1	2	TITLE/SUBJECT	3	
			5/5/81	
33	3	No. I.P. 600 - Non-Destructive Examination	1/15/81	
34	|	Sect IV of the Manufacturing Engineering Procedures Manual	2/12/82	1
35	3	No. I.P. 100 -		
36	4	Foundry QC Manual, Sects 7.0; 11.0		
37	4	QA Manual, Sects. 5, 9	5/24/83	
38	5	LILCO No. 310552-23	2/12/82	
39	6	To: Durbin, Fm: W.V. Dilworth - LILCO S.O. #74010/12, S.O. Instrctn #14	7/15/83	
40	|	To: G.E. Tanswell, Fm: W.C. McHugh - Nucl R-48 Jkt Wtr Pmps	3/1/83	
41	|	To: Staff, Fm: R. Nimmo - Memo for Foundry Programs	6/4/82	
42	|	To: Inspectors, Fm: K. Kropf - Inspection Stamp Assignments	10/18/82	
43	6	To: G.E. Tanswell, Fm: D.P. Ulf - ... Jkt Wtr Pmp Redesign Analysis	2/11/82	
44	7	To: Stone & Webster Engineering Corp - Shoreham Nuclear Plant ...	7/15/83	
45	8	Engine Calcs - R-48 Front End Amplitude Due to 4th Order	9/24/82	
46	|	~ ~ - Shaft, H_2O Pmp P/N 03-426-08-AA-R48 & LILCO Eng ...	10/4/82	
47	|	~ ~	9/22/82	
48	8	Failure Analysis Rpt #146-1A-6786 S.W. Pump		

Document Types:
1. Drawing
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4. QA Manual
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Inspector W. E. Foster

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Scope/Module Followup on Region Requests

DOCUMENTS EXAMINED

1	2	TITLE/SUBJECT	3	4
49	8	19 Casting Certs for Cyl Hd Assys on LILCO P O # 310552-23	Various	
59		Inspctn Check Off Shts for 8 Cyl Hd Sdgs on ~ ~ ~ ~	~	
60		19 Production Rtng Shts for Cyl Hd Assy above	~	
61		3 Foundry Rte Shts for Cyl Hd, P/N 03-360-03-0F	7/8/83	
62		Inventory Cntl Form for Cyl Hd Assy P/N 1A-6446	No Date	
63		List of 5 Cyl Hd Assys - Machined Thickness Cents	6/28/83	
64	8	Nucl Pkg/Shpng Notification # 83-412 & Supporting documents		

Document Types:
1. Drawing
2. Specification
3. Procedure
4. QA Manual
5. Purchase Order
6. Internal Memo
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APPENDIX D

Transamerica Delaval, Incorporated
Engine and Compressor Division
Docket No. 99900334/83-03

NOTICE OF NONCONFORMANCE

Based on the results of an NRC inspection conducted on October 17-21, 1983, it appears that certain of your activities were not conducted in accordance with NRC requirements.

Criterion V of Appendix B to 10 CFR Part 50 states: "Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Instructions, procedures, or drawings shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished."

Nonconformances with these requirements are as follows:

A. Paragraph 4.1, subparagraph 4.1.1.2, in Section 4 of the Quality Assurance Manual (QAM) states, "Engineering specification sheets and/or wings describe in detail the physical, chemical, and dimensional requirements of the process, part, subassembly, or assembly. The specification sheets and/or drawings reference the appropriate codes and standards."

Contrary to the above, the engineering specification sheets (i.e., purchased material specifications) which were utilized for procurement of engine mounted electrical control cables required only commercial grades of cable and did not include the IEEE standards that were invoked by customer specifications.

B. Paragraph 5.3, subparagraph 5.3.2, in Section 5 of the QAM states, "Instructions defining the applicable processes are issued to Manufacturing by use of route sheets, tooling sheets, numerical control readouts, and special written instructions and sketches."
Subparagraph 5.3.3 states, "All instructions from Manufacturing Engineering to Manufacturing and Assembly will be in writing and will contain a mechanism for approval, revision and review."
Subparagraph 5.3.4 states, "Provisions are made for the indication of inspection acceptance of the completed process by comparing the results of the process with the specification requirements."

Paragraph 2.1, subparagraph 2.1.2, in Quality Control (QC) Procedure I.P.300, Section II states, in part, "In the absence of specific weld procedures being called out on the drawing or shop route sheets, the Weld Shop Supervisor will designate the qualified weld procedure to be

used, and indicate the procedure to be used on the Welding Report form . . . ." Subparagraph 2.1.5 states, in part, "The Quality Control Weld Inspector shall monitor and insure all elements of the Weld Procedure are followed. The Weld Inspector will document this activity on the Welding Report . . . ."

Contrary to the above requirements:

1. Written instructions and provisions for indication of inspection acceptance were not provided to Manufacturing by Manufacturing Engineering with respect to welding of Shearon Harris emergency diesel generator (EDG) fuel oil line clamps/brackets.

2. A Welding Report was not made available for the fuel oil line clamps/brackets which would allow confirmation that monitoring by a weld inspector had been performed and that a qualified procedure and welding operator had been used.

C. Paragraph 3.4 in Section 3 of QC Manual I.P.500 states, "Vendor audits will be performed by a representative of quality control for compliance with ASME, Section III, Class 3. Frequency of vendor audits for ASME, Section III. Class 3, materials or services shall not exceed 12 months. A list of approved vendors will be maintained by the Quality Control Department and the Purchasing Department."

Contrary to the above:

1. There was no evidence to indicate that materials which were used to fabricate EDG ASME Section III Code Class 3 component supports (Midland) and fuel oil systems (Midland and Grand Gulf) were procured from vendors who were either identified on the list of approved suppliers or had been subject to audits by a quality control representative.

2. Prior to 1982, ASME Section III Code Class 3 fasteners were procured from vendors for which there was no evidence to indicate that either audits had been performed by a quality control representative or that the vendors were identified on the approved suppliers list as being approved for supply of this product.

D. Paragraph 3.6.4 in Section 3 of QC Manual I.P.500 states, "All material certifications, dimensional certifications and nondestructive test certifications are reviewed by the Receiving Inspector to assure compliance with the purchase order and engineering drawing."

Contrary to the above, review by the Receiving Inspector of material certifications for ASME Section III Code fasteners did not assure compliance with the purchase order as evidenced by acceptance of certifications with: (1) identified chemical composition not conforming to material specification requirements, (2) incomplete mechanical test

data, and (3) material heat treatment not reported as required by paragraph NCA-3867.4 in Section III of the ASME Code.

E. Paragraph NCA-3867.4(e) in Section III of the ASME Code states, in part, "The Material Manufacturer who certifies material made from stock produced by a manufacturer whose Quality System Program has not been qualified under NCA-3800 may accept the certification of the requirements of the material specification which must be performed during the melting and of the heat analysis from the manufacturer of the stock provided . . . (1) . . . The Material Manufacturer performs or subcontracts all other requirements of the material specification on each piece of stock material. Alternatively, the Material Manufacturer may perform or subcontract all other requirements of the material specification on each heat and lot of material, provided traceability has been established by his Program or the Program of the Certificate Holder who uses the material . . . (2) The Material Manufacturer performs or subcontracts a product analysis to verify the chemical composition of each piece of stock material furnished by the stock material manufacturer . . . ."

Contrary to the above, Transamerica Delaval, Incorporated accepted and subsequently certified stock materials (i.e., materials procured from manufacturers without specification that the material be produced using a Quality System Program that had been verified by survey to be in accordance with the requirements of Article NCA-3800 in Section III of the ASME Code) as being in compliance with Section III of the ASME Code. Material specification requirements other than those applicable during melting had, however, not been performed on either a piece or heat basis and product analysis was not performed on each piece of stock material.

F. Paragraph 9.2 in Section 9 of QC Manual I.P.500 states, in part, "All material will be identified in accordance with ASME Section III, Subsection NA3766-6 by Receiving Inspection . . . . The material will be maintained in a separate storage area identified as containing only ASME Section III, Class 3 material . . . . Material received into and issued from the storage area must be recorded on Material Control Record Form No. P-316."

Paragraph 4.2.2 in Section 4 states, in part, "The production route sheet (Exhibit 3) is the method used by Industrial Engineering to translate the drawing requirements to Manufacturing . . . ."

Page 2 of Exhibit 3 is a form called the Material Verification Sheet (MVS). The MVS is used to record the identity of items and their heat numbers used in the construction of various subassemblies. The MVS is signed off by the Authorized Nuclear Inspector, and upon completion of fabrication, the data is transferred to the ASME Code Manufacturers Data Report.

Contrary to the above, a comparison between 45 MVSs and the Material Control Records (MCRs) for material issued for use in the fabrication of

piping systems component supports on Midland Diesel Engine S/N 77002 revealed 11 discrepancies in material identity.

There were ten cases where the MCRs showed various heat numbers being issued for particular production orders; however, different heat numbers were recorded on the applicable MVSs as being used for those production orders. There was one case where, for the same production order, two pieces from the same heat number were recorded on the MVS as being used; however, the MCR showed that just one piece from that heat number had actually been issued.

G. Paragraph 5.1, subparagraph 5.1.2, in Section 5 of the QAM states, "The parts list and component drawings released by Engineering constitute the final instructions to Manufacturing and Assembly defining the acceptance criteria to which the components and assemblies must conform."

Contrary to the above, prior to October 1981, manufacture of piston skirt castings did not comply with engineering component drawing instructions with respect to performance of specified stress relief heat treatment.

ORGANIZATION: TRANSAMERICA DELAVAL, INCORPORATED
ENGINE AND COMPRESSOR DIVISION
OAKLAND, CALIFORNIA

REPORT NO.: 99900334/83-03	INSPECTION DATE(S): 10/17-21-83	INSPECTION ON-SITE HOURS: 102

CORRESPONDENCE ADDRESS: Transamerica Delaval, Incorporated
Engine and Compressor Division
ATTN: Mr. C. Matthews, Vice President and General Mgr.
550 85th Avenue
Oakland, California 94261

ORGANIZATIONAL CONTACT: Mr. R. E. Boyer, Manager, Quality Assurance
TELEPHONE NUMBER: (415) 577-7422

PRINCIPAL PRODUCT: Emergency diesel generators.

NUCLEAR INDUSTRY ACTIVITY: Transamerica Delaval, Incorporated (TDI) has one inprocess contract for domestic nuclear emergency diesel generators.

ASSIGNED INSPECTOR: I. Barnes for J. W. Sutton, Special Projects Section — 1-16-84 Date

OTHER INSPECTOR(S): L. E. Ellershaw, Reactive Inspection Section (RIS)
I. Barnes, RIS

APPROVED BY: I. Barnes — 1-16-84 Date
I. Barnes, Chief, RIS

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 21 and 10 CFR Part 50, Appendix B.

B. SCOPE: This inspection was made at the request of both NRC Headquarters and Regional Offices as a result of the identification of numerous deficiencies in emergency diesel generators (EDGs) that have been furnished to various sites. Reactive inspection subjects addressed during this inspection included: (1) failure of engine mounted fuel oil
(cont. on next page)

PLANT SITE APPLICABILITY:
Engine mounted fuel oil line failure: 50-416/417. Use of commercial cable in 1E systems: 50-416/417, 50-424/425. Failure of cylinder head exhaust bolts: 50-322, 50-312, 50-458, Exhaust pipe flange capscrew bottoming out: 50-322, 50-416/417, 50-458/459, 50-400, 50-413/414, 50-206, 50-440/441,
(cont. on next page)

ORGANIZATION: TRANSAMERICA DELAVAL, INCORPORATED
ENGINE AND COMPRESSOR DIVISION
OAKLAND, CALIFORNIA

REPORT NO.: 99900334/83-03	INSPECTION RESULTS:	PAGE 2 of 12

SCOPE: (cont.)
line, (2) use of commercial cable in 1E systems, (3) failure of cylinder head exhaust bolts, (4) leakage of starting air check valve during seismic test, (5) bottoming out of exhaust pipe flange capscrew, (6) potential bottoming out of starting air valve capscrews, (7) crankshaft failure at Shoreham Nuclear Power Station (SNPS), and (8) potential failure of piston skirt castings. The inspection additionally included a review of procurement control and material identification and control.

PLANT SITE APPLICABILITY: (cont.)
50-438/439, 50-460/513, 50-445/446, 50-424/425, 50-329/330, 50-518/519/520/521, 50-553/554. Leakage of starting air check valve: 50-440/441, 50-553/554, 50-518/519/520/521, 50-329/330, 50-438/439, 50-445/446.

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 4.1, subparagraph 4.1.1.2 in Section 4 of the Quality Assurance Manual (QAM), the engineering specification sheets (i.e., purchased material specifications) which were utilized for procurement of engine mounted electrical control cables required only commercial grades of cable and did not include the IEEE standards that were invoked by customer specifications.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50, paragraph 5.3 in Section 5 of the QAM and paragraph 2.1 in Section II of QC Procedure I.P.300:

   a. Written instructions and provisions for indication of inspection acceptance were not provided to Manufacturing by Manufacturing Engineering with respect to welding of Shearon Harris EDG fuel oil line clamps/brackets.

   b. A Welding Report was not made available for the fuel oil line clamps/brackets which would allow confirmation that monitoring by a weld inspector had been performed and that a qualified procedure and welding operator had been used.

3. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 3.4 in Section 3 of Quality Control (QC) Manual I.P.500:

a. There was no evidence to indicate that materials which were used to fabricate EDG ASME Section III Code Class 3 component supports (Midland) and fuel oil systems (Midland and Grand Gulf) were procured from vendors who were either identified on the list of approved suppliers or had been subject to audits by a quality control representative.

b. Prior to 1982, ASME Section III Code Class 3 fasteners were procured from vendors for which there was no evidence to indicate that either audits had been performed by a quality control representative or that the vendors were identified on the approved suppliers list (ASL) as being approved for supply of this product.

4. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 3.6.4 in Section 3 of QC Manual I.P.500, review by the Receiving Inspector of material certifications for ASME Section III Code fasteners did not assure compliance with the purchase order as evidenced by acceptance of certifications with: (a) identified chemical composition not conforming to material specification requirements, (b) incomplete mechanical test data, and (c) material heat treatment not reported as required by paragraph NCA-3867.4 in Section III of the ASME Code.

5. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph NCA-3867.4(e) in Section III of the ASME Code, TDI accepted and subsequently certified stock materials (i.e., materials procured from manufacturers without specification that the material be produced using a Quality System Program that had been verified by survey to be in accordance with the requirements of Article NCA-3800 in Section III of the ASME Code) as being in compliance with Section III of the ASME Code. Material specification requirements other than those applicable during melting had, however, not been performed on either a piece or heat basis and product analysis was not performed on each piece of stock material.

6. Contrary to Criterion V of Appendix B to 10 CFR Part 50, paragraph 4.2.2 in Section 4 and paragraph 9.2 in Section 9 of QC Manual I.P.500, a comparison between 45 Material Verification Sheets (MVSs) and the Material Control Records (MCRs) for material issued for use in the fabrication of piping systems component supports on Midland Diesel Engine S/N 77002 revealed 11 discrepancies in material identity.

There were ten cases where the MCRs showed various heat numbers being issued for particular production orders; however, different heat numbers were recorded on the applicable MVSs as being used for those production orders. There was one case where, for the same production order, two pieces from the same heat number were recorded on the MVS as being used; however, the MCR showed that just one piece from that heat number had actually been issued.

7. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph 5.1.2 in Section 5 of the QAM, prior to October 1981, manufacture of piston skirt castings did not comply with engineering component drawing instructions with respect to performance of specified stress relief heat treatment.

C. UNRESOLVED ITEMS:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

The findings contained in Inspection Report No. 99900334/83-01 were not reviewed during this inspection because of issuance of the report immediately prior to this inspection and correspondence, accordingly, being incomplete.

E. OTHER FINDINGS OR COMMENTS:

1. Failure of Engine Mounted Fuel Oil Line: TDI issued a 10 CFR Part 21 report on September 21, 1983, as a result of an evaluation performed in regard to a fuel oil line failure at Grand Gulf. The failure occurred at a "swagelock" fitting in the fuel oil line between the engine mounted fuel transfer pump and the engine fuel oil header and has been ascribed to have resulted from excessive line vibration.

   Documentation review by the NRC inspector established that the failed fuel oil line did not have the installed line supports that are required by TDI Drawing No. 02-450-13. It was additionally reported that required line supports had not been installed by TDI on the other EDG at Grand Gulf, Unit 1. Examination of the assembly drawing confirmed that support clamps/brackets were required at three different locations on the fuel oil line and were to be attached to the engine using 1/4 inch fillet welds. As a result of this failure to comply with TDI engineering drawing requirements, the NRC inspector reviewed the inprocess Shearon Harris EDG contract with

respect to fuel oil line clamp installation. From this review, it was ascertained that this operation was not included as a route sheet operation and, accordingly, documented provisions were not made for inspection acceptance. Welding records were requested by the NRC inspector for the installed clamps/brackets in order that a verification could be made of both the use of a qualified welding procedure and qualified welding personnel, and also to ascertain whether a weld inspector had monitored the welding operations and inspected the welds. Records were not made available by TDI to allow confirmation that clamp/bracket installation was an operation that was controlled in accordance with QA program requirements.

As a result of the NRC inspector findings, one nonconformance was identified (see paragraph B.2 above). From this inspection, the NRC inspector ascertained that the absence of required process controls for clamp/bracket installation was applicable to all TDI furnished EDGs that were referenced in their 10 CFR Part 21 report dated September 21, 1983, and, thus, assurance does not currently exist with respect to both accomplishment of clamp/bracket installation and adequacy of attachment welds.

2. Use of Commercial Cable in 1E Systems:

a. TDI issued a 10 CFR Part 21 report on September 27, 1983, and a supplement on October 20, 1983, in regard to the potential exceeding of the manufacturer's temperature rating for engine mounted control cable insulation at operating temperatures. The 10 CFR Part 21 report identified that replacement cable with a higher insulation temperature rating would be furnished to each affected nuclear facility. This condition was identified during a review performed during August and September 1983 in regard to the EDGs furnished to the Alvin W. Vogtle Station.

During review of this subject by the NRC inspector, it was ascertained that TDI had procured and installed commercial grades of cable and had not invoked various customer requirements (e.g., IEEE Standards, IPCEA Standards) in their procurement specifications. The NRC inspector confirmed that appropriate revisions had been made to TDI purchased material specifications to require supply of cable both in accordance with IEEE Standard requirements and manufacture to have utilized a quality assurance program which was in accordance with 10 CFR Part 50, Appendix B.

b. Mississippi Power and Light Company (MP&L) notified NRC, Region II, on December 14, 1982, in regard to receipt of TDI Service Information Memorandum (SIM) No. 361 dated October 21, 1982, at Grand Gulf Station, Units 1 and 2, which recommended replacement of EDG panel circuit cable that had been established to have failed an IEEE-383 flame test. MP&L made a final 10 CFR Part 50.55(e) report on this subject on January 13, 1983, for Unit 2, with Unit 1 being reported under the provisions of 10 CFR Part 21.

Review of correspondence by the NRC inspector identified a TDI letter to Bechtel Power Corporation Los Angeles Power Division dated November 4, 1982, which indicated that TDI had handled the IEEE-383 flame test failure as a SIM, rather than as a 10 CFR Part 21 report, because it was believed that loss of the cables would not adversely affect the ability of the engines to perform their specified function. Review of various TDI customer specifications by the NRC inspector confirmed that the control cables should have been procured invoking a QA program that had been accepted as complying with 10 CFR Part 50, Appendix B and requiring proven flame test properties.

As a result of the inspection findings, one nonconformance was identified (see paragraph R.1 above).

3. Failure of Cylinder Head Exhaust Bolts: Review of the subject problem which occurred at SNPS indicates that bolting failures resulted from thermal expansion and limited clearances in the exhaust manifold area. The problem has been established to apply only to the Model DSR 48 engines and has been corrected at SNPS. This item will be further reviewed during a subsequent inspection to verify that this problem has been reviewed with respect to the other sites that have received Model DSR 48 EDGs; i.e., River Bend and Rancho Seco.

4. Leakage of Starting Air Check Valve During Seismic Test: This inspection was a followup to previous inspections on this subject which were documented in Inspection Report Nos. 99900334/82-01 and 99900334/82-02. The NRC inspector verified that all customers had now been notified and that corrective actions were under way, with some customers obtaining replacement kits and others returning the valve to TDI for repair. Inspection of this subject is now considered complete.

5. Bottoming Out of Exhaust Pipe Flange Capscrews: This problem was reported by SNPS and answered by a letter dated February 3, 1983, to Long Island Lighting Company. TDI engineering review confirmed that the finished flange thickness used for the SNPS engines (i.e., 3/4 inch) could allow a "bottoming out" condition to occur. This review also established that this condition pertained only to the Model DSR 48 engine and only to SNPS in that category. TDI engineering issued a change order on February 9, 1977, which increased the finished flange thickness to 7/8 inch from 3/4 inch. This action precluded a similar "bottoming out" condition in the Model DSR-48 engines furnished to the River Bend and Rancho Seco sites. The NRC inspector additionally confirmed that appropriate length bolting had been supplied to SNPS to eliminate this condition.

   Within this area of inspection, no nonconformances were identified.

6. Potential Bottoming Out of Starting Air Valve Capscrews: TDI issued a 10 CFR Part 21 report to the NRC on May 13, 1982, pertaining to the potential "bottoming out" of the capscrew which holds the starting air valve assembly in the cylinder head. "Bottoming out" of a capscrew in the tapped hole in the cylinder head prior to proper seating of the assembly will result in an erroneous applied torque reading and could lead to failure of the assembly capscrew. NRC inspector review confirmed that customers had received the 10 CFR Part 21 notification and that TDI engineering had issued a change order on May 13, 1982, which appropriately modified the length of the capscrew to eliminate the potential for this condition.

7. Procurement Control:

   a. Materials Used in Component Supports and Fuel Oil Lines - A review of available audit records for vendors who supplied materials used in the fabrication of ASME Section III Code component supports and fuel oil lines revealed the following:

      (1) Pacific Pipe Company - Records were not available to substantiate any audit activity by TDI. This vendor had, however, been placed on all ASLs dating back to December 22, 1975. Numerous items had been supplied by Pacific Pipe which were subsequently certified by TDI as meeting ASME Section III Code Class 3 requirements.

(2) Key Pipe and Supply Company - The only available records denoting qualification of this vendor were two, one page Vendor Quality Program Surveys dated, respectively, March 31, 1975, and March 22, 1982, and which were vendor self evaluation forms. The first survey form was completed by the Key Pipe and Supply General Manager. It was noted that the General Manager had checked off that there was no QC Manual and that his quality program had no written procedures for: drawing, specification and contract change control; calibration of gages and tools; control of purchased and subcontracted material; and indication of inspection status. The General Manager had additionally checked off "No" to the following: "Do you maintain raw material control procedures which include:

i Certification of raw material composition by your suppliers?
ii Periodic laboratory verification of raw material certification?
iii Segregated storage of raw materials?
iv Lot control of raw material, traceable to the item?"

The second survey form was completed by a Key Pipe and Supply Sales Department employee and was received on March 22, 1982, by TDI. The TDI QA Manager had made the following written notations on this form, "Not acceptable for Code or Non Code Safety Related Material." This vendor was placed on the TDI ASL as early as December 7, 1977, and had supplied numerous items which were subsequently certified by TDI as meeting ASME Section III Code Class 3 requirements.

(3) Braman Dow and Company - The only available record denoting qualification of this vendor was a one page Vendor Quality Program Survey (self evaluation) form which was dated October 12, 1976. Braman Dow was placed on the TDI ASL dated December 7, 1977. Numerous orders for material were placed with Braman Dow prior to their inclusion in the ASL and which were subsequently certified by TDI as meeting ASME Section III Code Class 3 requirements.

(4) E. M. Jorgensen Company - TDI approved this vendor on the basis of a one page Vendor Quality Program Survey (self evaluation) form which was dated March 2, 1976. In this self evaluation form, Jorgensen stated that their program was in compliance with MIL-Q-9858A.

b. Fastener Materials - A review of available audit records and material certification for a sample of ASME Section III Code fastener procurement revealed the following.

(1) Prior to 1982, no vendors were identified on the ASL as being specifically approved for the supply of ASME Section III Code fasteners. Review of purchase orders established that ASME Section III Code fasteners had been procured from Sargent Nut and Bolt since 1977. This company was stated by TDI personnel to be an individual who was acting as an agent for fastener suppliers. No survey records were made available with respect to this company. From the sample of purchase orders examined, it appeared that the majority of ASME Section III Code fasteners ordered prior to 1980 from Sargent Nut and Bolt were supplied by Cardinal Industrial Products Corporation. The only available record seen with respect to qualification of this vendor was a Vendor Quality Program Survey (self evaluation) form which was approved by TDI QC on January 24, 1980. Subsequent to early 1980, ASME Section III Code fasteners ordered from Sargent Nut and Bolt were supplied by Power and Engineered Product Company (PEPCO) which holds an ASME Quality System Certificate. The TDI QA program permits approval of ASME Certificate Holders without survey.

(2) Review of Cardinal Industrial Products Corporation certified material test reports (CMTRs) which were furnished to TDI indicated various anomalies. No information was seen that would indicate TDI personnel had questioned or rejected the CMTRs on receipt. Examples noted included rejectable composition values; e.g., (a) carbon content of 1-8 nuts, Purchase Order 87613, Item 2; (b) carbon and sulfur contents of 3/4-10 nuts, Purchase Order 87046, Item 3; and (c) rejectable phosphorus and sulfur contents and missing carbon content for 1-8 nuts, Purchase Order 85747, Item 2. Examples of other anomalies noted included missing hardness data (Purchase

Order 87631, Item 8, 1 1/4 x 2 3/4 hex capcrews), failure to identify proof loads used (e.g., Purchase Order 85747, Items 1, 4, and 5; Purchase Order 14434, Items 1 and 2) and no reference to use of a QA program in production of materials furnished prior to 1979. Numerous CMTRs furnished by Cardinal Industrial Products Corporation and some furnished by PEPCO material manufacturers were also observed to not comply with the requirements of NCA-3867.4 in Section III of the ASME Code with respect to reporting of material heat treatment.

As a result of the inspection findings in 7.a and 7.b above, nonconformances B.3, B.4, and B.5 were identified.

8. Material Identity and Control: A review of MCRs and MVSs which were associated with 45 specific production orders related to component supports fabricated for use on Midland Diesel Engine, S/N 77002, revealed 11 discrepancies in material identity. The MVS, a document used to record the heat numbers of specific items in a production order, was signed off by the Authorized Nuclear Inspector just prior to the attachment of the NPT symbol. The MCR is established for each heat number and each size of material as it is received. When material is to be issued for use in fabrication, the quantity and production order numbers are entered; thus, maintaining a running account for inventory purposes.

   It was during a comparison between the MVSs and MCRs that nonconformance B.6 was identified.

9. Potential Failure of Piston Skirt Castings: An initial review of this subject was made during the July 11-15, 1983, inspection of TDI which is documented in NRC Inspection Report No. 99900334/83-01. An additional review was performed during this inspection to more fully identify the circumstances pertaining to this problem and to ascertain what requirements had been imposed by TDI Engineering for production of the piston skirt castings. Piston skirt, P/N 03-341-02-AN, was released for production on April 21, 1978. This piston design utilized a Belleville washer system and was introduced to replace a previous spherical washer system which had produced piston crown separation problems.

   The material specified by TDI Engineering for the piston skirt was an 80,000 psi tensile strength nodular iron. The indicated required hardness range was, however, equivalent to a 100,000 psi tensile

strength. This was noted by the TDI Foundry in December 1978 and TDI Engineering was stated to have opted for the 100,000 psi tensile strength to reconcile the specified mechanical properties. To accomplish this, the TDI Foundry introduced fan cooling of the castings from the normalizing range. Review by the NRC inspector of TDI information indicated that a total of 45 piston skirt failures have occurred between April 1980 and May 1983 with the Belleville washer design. Failures have been attributed by TDI personnel to have resulted from a combination of operation stresses and residual stesses introduced by the fan cooling method.

A stress relief range heat treatment was initiated by TDI for the piston skirt castings in October 1981 which was stated to have resulted from a machining study. Recommended corrective actions for fan cooled piston skirt castings produced prior to October 1981 included stress relieving and nondestructive examination. Review by the NRC inspector of piston skirt engineering drawings for various designs indicated, however, that all the drawings contained a note requiring that the castings be stress relieved. The failure of the TDI Foundry to comply with this requirement prior to October 1981 has been identified as nonconformance B.7. The specific heat treatment practices used prior to introduction of fan cooling could not be verified as a result of the unavailability of previous revisions of heat treatment procedures.

A design change was also made on August 10, 1982 (P/N C3-341-04-AE) to a half stack Belleville washer system which was stated to increase the thickness in the area where most cracking problems have occurred. The identities of which nuclear engines have the type "-AN" and which have the type "-AE" piston design were not determined during the inspection.

10. Shoreham Crankshaft Failure: A review was performed of TDI 1975 design data for the torsional dynamic response of the original 13 x 11 crankshaft utilized in the SNPS engines. This review was made as a result of the receipt of preliminary information from the Failure Analysis Associates investigation of the crankshaft failure which indicated that the 13 x 11 crankshaft did not satisfy Diesel Engine Manufacturers Association (DEMA) recommendations with respect to induced superimposed stresses resulting from torsional vibratory conditions. The design data indicated a nominal stress of approximately 2600 psi for the most significant order of vibration (i.e., 4th order harmonic) which is considerably below the DEMA recommended limit of 5000 psi. In discussion, it was established

that an improved analytical technique was introduced subsequent to shipment of the SNPS engines which was used for all remaining nuclear application diesel engines furnished by TDI. Of the engines furnished, only SNPS and San Onofre, Unit 1, were analyzed by the original approach.

The SNPS engines were stated to have not been reanalyzed using the revised approach until August 1983; i.e., subsequent to the SNPS crankshaft failure. Review of this data showed that the nominal stress for the 4th order harmonic had increased to approximately 5300 psi which is marginally above the DEMA recommended limit. The NRC inspector additionally examined the torsional design data from the current analytical method for the SNPS replacement 13 x 12 crankshafts. This data indicated a 4th order harmonic torsional stress of approximately 3000 psi which is considerably below the DEMA limit. Review of similar data for the other TDI furnished nuclear application engines did not indicate any harmonic torsional stress values that were in the vicinity of the DEMA recommended limit of 5000 psi. The San Onofre, Unit 1, analysis which used the original approach will be subject to further review in order to assure design adequacy.

During the exit meeting, TDI management informed the NRC inspector that they had no prior experience of crankshaft failures in eight cylinder diesel engines. It was additionally indicated that torsiograph measurements made on the SNPS engines during plant performance testing showed satisfactory results.

PERSONS CONTACTED

Company TRANSAMERICA DELAVAL INCorporated

Docket/Report No. 99900334/83-03

Dates 10-21-83

Inspector J. W. Sutton

Page 1 of 1

NAME(Please Print)	TITLE(Please Print)	ORGANIZATION(Please Print)
J.W. SUTTON	Reactor Insp.	USNRC -
L.L. WILLS *	MGR-QUALITY ENGR.	TDI
E. DOBREC *	" FOUNDRY	" " "
G.C. Berggren *	Materials Manager	" " "
C.E. TROSSELL *	MGR ENG & C.S.	TDI
R.E. BOYER *	MGR QA	TDI
C.S. MATHEWS *	VP & Gen Mgr	TDI
W.L. McHugh	Engineer, Customer Service	TDI
D. PESONT	CONTROLS DEPT	TDI
D. Wulf	Engineer - Customer Service	TDI.
I. HILL	QC Supervisor.	TDI.

* Attended Exit Interview.

INSPECTOR _____

SCOPE 92716B

DOCUMENTS EXAMINED

DOCKET NO. 9960334-

REPORT NO. 83 - 03

ITEM NO.	TYPE	DOCUMENT NO.	REV	DATE	TITLE / SUBJECT
1	LTR	—	—	8-22-83 10-20-83	Part 21 - report to NRC - Mississippi Power & Light Co — Engine mounted electrical cable. Engine mounted fuel oil lines.
2	LTR.	—	—	10-11-83	Letter to Carolina Power & Light Co - Cleveland Electric Co - Re: Cable.
3	LTR.	X7BG03.	—	8-23-83.	Bechtel to Southern Company Servis - Re. Vogtle Unit 1-2 - Elec. Cable.
4.	LTR.	GLV-NS-852	—	8-30-83	Vogtle to TDI. QA Re: Bechtel Evaluation -
5.	LTR.	—	—	9-28-83	TDI to Southern Company Servis Inc. Re. Ele Cable. Part 21.
6	DWG	09688-76001	H.	10-23-79.	Engine and Day Skid Elect. Diagram + Schematic.
7.	INM.			8-23-83	Affected nuclear Sites - Part 21
8	INM			8-10-82.	TDI. Nuclear qualified Cable. Part 21
9	INM			9-B-83.	TDI. Commercial grade Cables installed in Nuclear Power Eng's Plan
10	Spec	Bechtel. X4AK01-Bechtel 344	6	8-19-83	Appendix : Vogtle.
11.	Spec.	1971-PA1-2.	—		Seismic Qualifications.
12	Spec.	Electric Appendix N.	0	—	Job 9645 - G.G.
13	Spec	9645M-018.0	10	—	Codes -
14	Spec	9645M-E 091.0	0	—	Technical - Seismic qualifications.
15.	Spec.	74033-36 9645M-018.0	16	—	Spec. general requirements -

TYPE OF DOC:

DWG - DRAWING

LTR - LETTER

INSPECTOR J.W. Sutton

SCOPE 92716 B

DOCUMENTS EXAMINED

DOCKET NO. 99900334

REPORT NO. 83 - 03

ITEM NO.	TYPE DOC.	DOC. NO.	REV.	DATE	TITLE / SUBJECT
16	spec	KYAK-01-App Q	4 6	2-1-74 8-16-83	CAT equipment Seismic Qualification-
17.	P.O.	W-32790		8-31-83 4-20-83	WWPS - new Cable qualified to IEEE.
18	P.O	W31710		5-17-83	Gulf State Utilities - new cables - qualified to IEEE
19	P.O	F-509-231 Job 1419. Part #		1-24-68.	Elect. Cable.
20	spe-	F-509-229/229		6-17-80	Type SD - 1TT wire - SDN. Cable. Elect.
21	P.O	48517.		6-22-82.	shielded Cable.
22	QCD. Receiving -	31432 Part #		5-21-82 3-10-82.	Cable - electric - inspection
23	Spec.	F-509-491/498.		12-17-81	BIW Cable, Electric.
24	Misc-	5-31074.		2-12-82	BIW Cable. Syst. Cert of Compliance-
25	QCD.		5	5-25-82 1-8-81	Part list - 02-688 for 76021.
26.	LTR			9-21-83	Part 21 - Fuel Oil Erie Faibanx.
27.	P.O.	W-33366		10-17-83	Fuel oil Tubing & Clamps.
28.	DWG	02-450-13	D.	2-12-82 6-5-76	Header assembly. Fuel Oil
29.	Misc.			9-19-83	Review of TDI Part 21 meeting Notes -
30.	Ltr.			9-30-83	Letter to all Customers. Part 21.

TYPE OF DOC.

DWG - DRAWING

LTR - LETTER

INSPECTOR T.W. Sullivan

SCOPE 92716 B, -92705 B.

DOCUMENTS EXAMINED

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REPORT NO. 83 - 03

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ITEM NO.	TYPE DOC.	IDENTIFICATION	REV.	DATE	TITLE / SUBJECT
31	Mis.	seismic Rpt		Sept 12-18-	- Seismic Rpt from G.G. Nuclear Station -
32	INM.			Sept 9, 1983	meeting with Middel South Energy. Sept 13, 83.
33	QAM.	Section 4-		4-30-81	Inspection Section - Insp. Responsibility -
34	QAM	Section 9		4-30-81	Welding - Weld Procedure.
35	LTR			1-13-83	Mississippi Power & Light Co to Region II. Flame test -
36	LTR			11-8-82	TDI TO Mississippi Power & Light Co - Flame test.
37.	LTR.			11-4-82	TDI To Bechtel-Power Corp - Flame test.
38.	Misc.			1-31-83 -	TDI Trip rept to Lilco - Broken cap screws - Exhaust He
39.	P.O	Job # 15914		2-8-83.	Part # 1A6446. cap screw
40	Dwg -	03-360-03 OF 03	A1.	2-23-83	Exhaust System.
41	List.			10-18-83	Status of Valves - Seismic qualificate Air Supply
42.	LTR.			12-9-83	- Carolina Power & Light Co - Check Valve Problem
43	LTR	5783-2.			Returned material Report - C.P.L.
44.	LTR.			6-8-82.	TUA - Starting air Valve - Part 21 Rpt.
45	Eng.	02-359-03-04		5-13-82	Air Start Valve change order (Engr).

TYPE OF DOC:

DWG - DRAWING
SPEC - SPECIFICATION
PROC - PROCEDURE
QAM - QA MANUAL

LTR - LETTER
___ - _____
___ - _____
___ - _____

INSPECTOR T.W. Sutton

SCOPE

DOCUMENTS EXAMINED

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ITEM NO.	TYPE	DOCUMENT NO.	REV.	DATE	TITLE / SUBJECT
46.	MISC.			1-1-8-31 1983.	Rwi Band - TDI Semi reports.
47	IMN.	SN 74a0/12		2-8-83.	Meeting - Semi Dept - Lilco.
48	Ltr.			2-3-83.	TDI to Long Island Lighting Co.
49.	DWG.	03-380-02 OB-	E.	2-8-77	Exhaust manifold Flange Thickness
50	DWR.	03-380-02 OB.	B	2-9-77	Change Notice Exhaust manifold Flange Thickness.
51.	DWR.	03-380-08 AD	D	5-24-82	Exhaust Pipe - 4 valve head cyl. 4.

TYPE OF DOC:

DW - DRAWING

[illegible] - SPECIFICATION

[illegible] - PROCEDURE

[illegible] - CALCULATION

LTR - LETTER

INSPECTOR L Ellershaw

SCOPE 992705B

DOCUMENTS EXAMINED

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ITEM NO.	TYPE OF DOCUMENT	DOCUMENT NO.	REV.	DATE	TITLE / SUBJECT
1	QAM	I.P. 500	0	4-28-75	QC Manual
2	P.O	-	33	9-29-83	Bechtel Power Corp. P.O. No. 7220-M-18-AC
3	Spec		9	9-6-83	Bechtel Technical Specification No. 7220-M-18 (Q)
4	Spec.	-	5	8-9-74	Bechtel Specification No. 7220-G-23
5	MCR	-	-	-	Thirteen, related to component supports
6	MVS	-	-	-	Forty-five, related to component supports
7	TP	-	-	-	Eleven, pertaining to component supports
8	PO	-	27	10-23-82	Bechtel P.O. No. 9645-M-018.0
9	Spec	-	21	10-14-82	Bechtel Design Spec. No. 9645-M-018.0
10	Spec	-	4	11-19-73	Appendix C - No. 9645-G-QA-1 (Bechtel)
11	RS	-	-	-	Ten, pertaining to component supports
12	PP	-	-	-	Five TDI Procurement Packages
13	VAF	-	-	-	Five Vendor Audit Files
14	AVL	-	-	12-22-75 thru 8-24-78	Approved Vendors List

TYPE OF DOC:

DWG - DRAWING
SPEC - SPECIFICATION
PRO - PROCEDURE
QAM - QA MANUAL
QCD - QC DOCUMENT
LTR - LETTER
MCR - Material Control Records
MVS - Mat'l Verification sheets
TP - Traveler Packages
RS - Routine Sheets
AVL - Appd Vendor Lists

INSPECTOR T. BARNES

SCOPE 2927058

DOCUMENTS EXAMINED

DOCKET NO. 7990033-4

REPORT NO. 83 - 03

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ITEM NO.	TYPE OF DOCUMENT	DOCUMENT NO.	REV.	DATE	TITLE / SUBJECT
1	ASL	-	-	1980 thru 1983	Approved Supplier List
2	PRO	-	-	8/30/83	Approved Supplier List Procedure
3	QAM		3	9/1/82	qc Manual, Section 5, "Control and Inspection of Sub-Contracted Mate...
4	PP	-	-	-	15 Procurest Packages for ASME Section III Code features.
5	QAM	I.P. 500		4/28/75 and 12/31/79	Section 3, "Procurement Control,"
6	SPEC	No. 93	4	9/10/81	"Nodular Iron - Grade 100/70/03 and Grade 120/90/02"
7	SPEC	600-5	4	7/15/83	"Heat Treat Procedure Specification For Tempering Steel Castings"
8	SPEC	600-3	3	2/10/81	"Heat Treat Procedure Specification For Normalizing Of Carbon And Low Alloy Steel...
9	QCD	Q.C. 3	-	1/23/83	Foundry QC Manual
10	DWG	C3-341-02-AN	all revs	-	Piston skirt
11	DWG	C3-341-04-A	all revs		Piston skirt
12	DD	-	-	-	Torsional design data for nuclear application engines

TYPE OF DOC:

DWG - DRAWING
SPEC - SPECIFICATION
PRO - PROCEDURE
QAM - QA MANUAL

LTR - LETTER
ASL - Approved Supplier List
PP - Procurement Package
DD - Design data