

ORGANIZATION: TERRY CORPORATION
WINDSOR, CONNECTICUT

REPORT NO.: 99900720/85-01	INSPECTION DATE(S): 2/4-5/85	INSPECTION ON-SITE HOURS: 23
CORRESPONDENCE ADDRESS: Terry Corporation ATTN: Mr. David W. Fitch Manager, Quality Assurance Lamberton Road, Post Office Box 555 Windsor, Connecticut 06095		
ORGANIZATIONAL CONTACT: Mr. Russell T. Hebert, Product Manager, Nuclear TELEPHONE NUMBER: (203) 688-6211		
PRINCIPAL PRODUCT: Steam turbines and reduction gears. NUCLEAR INDUSTRY ACTIVITY: 1%.		
ASSIGNED INSPECTOR: <u>N. J. Miegel</u> <u>4/11/85</u> N. J. Miegel, Reactive Inspection Section (RIS) Date		
OTHER INSPECTOR(S): T. Burns, BNL		
APPROVED BY: <u>E. W. Merschoff</u> <u>4/11/85</u> E. W. Merschoff, Chief, RIS, Vendor Program Branch Date		
INSPECTION BASES AND SCOPE: A. BASES: 10 CFR Part 21. B. SCOPE: The purpose of this inspection was to review 10 CFR Part 21 and 50.55(e) reports pertaining to Terry Corporation products.		
PLANT SITE APPLICABILITY: Allens Creek 1 (50-466), Vogtle (50-425), Arkansas 1 (50-313), Bailly (50-367), Beaver Valley 1 & 2 (50-334, 412), Black Fox 1 & 2 (50-556, 557), Browns Ferry 1, 2, & 3 (50-259, 260, 296),		

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PLANT SITE APPLICABILITY: (continued)

Brunswick 1 & 2 (50-325, 324), Callaway 1 (50-483), Calvert Cliffs 1 & 2, (50-317, 318), Catawba 1 & 2 (40-413, 414), Clinton 1 & 2 (50-461, 462), Comanche Peak 1 & 2 (50-445, 446), Cooper (50-298), Crystal River 3 (50-302), Davis-Besse 1 (50-346), Diablo Canyon 1 & 2 (50-275, 323), D.C. Cook 1 & 2 (50-315, 316), Duane Arnold (50-331), Edwin I. Hatch 1 & 2 (50-321, 366), Enrico Fermi (50-016), Grand Gulf 1 & 2 (50-416, 417), Hope Creek 1 & 2 (50-354, 355), James A. Fitzpatrick (50-333), Joseph M. Farley (50-348), Kewaunee (50-305), LaSalle 1 & 2 (50-373, 374), Laguna Verde 1 & 2 (50-468, 512), Limerick 1 & 2 (50-352, 353), Midland 1 & 2 (50-329, 330), Millstone 2 & 3 (50-336, 423), Monticello (50-263) Nine Mile Point 2 (50-410), North Anna 3 & 4 (50-404, 405), Palo Verde 1, 2, & 3 (50-528, 529, 530), Peach Bottom 2 & 3 (50-277, 278), Perry 1 & 2 (50-440, 441), Pilgrim (50-293), Point Beach (50-266), Prairie Island (50-282), Quad Cities 1 & 2 (50-254, 265), Rancho Seco (50-312), River Bend 1 (50-458), Salem 1 & 2 (50-272, 311), San Onofre 2 & 3 (50-361, 362), Seabrook 1 & 2 (50-443, 444), Shearon Harris 1 & 2 (50-400, 401), Shoreham (50-322), South Texas (50-498), St. Lucie 2 (50-389), Surry 1 & 2 (50-280, 281), Susquehanna 1 & 2 (50-387, 388), Trojan (50-344), Turkey Point (50-250), Vermont Yankee (50-271), Virgil C. Summer (50-395), WPPSS 1, 3, 4, & 5 (50-460, 508, 513, 509), Waterford 3 (50-382), Watts Bar 1 & 2 (50-390, 391), William B. McGuire 1 & 2 (50-369, 370), William H. Zimmer 1 (50-358), Wolf Creek (50-482), and Zion 1 & 2 (50-295, 304).

A. INSPECTION ISSUES:

1. Potential for the inboard babbit-lined bearing of Terry Corporation (TC) turbines to rotate in its bearing mount due to the failure to install an anti-rotation pin during assembly.
2. Potential for TC turbines to fail to start due to oil being temporarily captured under the main speed piston of the governor after each shutdown.
3. Potential for the Gimpel trip and throttle (T&T) valve to fail to close fully under certain conditions.
4. Potential for the governor valve to fail to close fully due to an oversized valve stem bushing.

B. INSPECTION FINDINGS:

The following findings were made during the inspection of the Terry Corporation (TC) facility in Windsor, Connecticut.

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1. Followup item from Inspection Report No. 99900720/82-01.
 - a. Summary of Issue - The Tennessee Valley Authority (TVA) issued a 10 CFR Part 21 report to the NRC on February 3, 1982, in regard to the rotation of the inboard bearing of a TC turbine installed at Browns Ferry. TVA attributed the rotation of the bearing to the lack of an anti-rotation pin. TC agreed to notify all purchasers of the turbines and advise them to check their turbine bearing for installation of the antirotation pin.
 - b. Inspection Findings - All customers were notified by either TC directly or through General Electric (GE). GE notified all affected BWR owners of the problem by means of Service Information Letter (SIL) No. 393 dated April 1983. TC notified all affected non-BWR owners by letter dated January 28, 1983.
2. TC letter dated February 27, 1979, to the NRC.
 - a. Summary of Issue - TC notified the NRC of a problem discovered with turbines equipped with the PG-PL Woodward governor and using a ramp bushing for quick start. It was found that oil could be temporarily captured under the main speed piston within the governor after each shutdown operation.
 - b. Inspection Findings - TC notified all affected customers of the problem (12 utilities) and recommended procedures to ensure proper bleedoff of the entrapped oil.
3. TC letter of February 22, 1984, to the NRC.
 - a. Summary of Issue - TC notified the NRC that the 4" Gimpel trip and throttle (T&T) valve in Terry auxiliary feedwater pump drive turbines did not fully close when inlet pressure was high and steam flow was low.
 - b. Inspection Findings - The problem was attributed to insufficient spring load in the closing direction to overcome valve stem unbalance when the pressure below the valve seat exceeds approximately 700 psig. TC notified non-BWR customers of the problem by letter dated February 3, 1984, and replacement springs with installation instructions were made available by Gimpel through TC. TC notified GE on February 19, 1983. Failure to report to all users at the same time was due to the fact that TC had originally concluded the condition was not a safety hazard.

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4. TC Part 21 report dated April 9, 1984.

- a. Summary of Issue - A valve stem guide loosened, preventing the governor valve from fully closing due to jamming between the inner and outer valve spring seats.
- b. Inspection Findings - The defect was discovered in-house by TC as a result of daily inspection activities and final test procedures. Due to a machining error, the inside diameter of the valve stem bushing was enlarged beyond allowable tolerances. All affected customers were notified by phone on April 6, 1984, and by letter on April 9, 1984.

TC determined that all of the parts in question had been manufactured to fill orders for spare parts, and that none had actually been installed in machines under construction or in operation. TC requested its customers to return the defective parts to ensure that they would not be inadvertently installed. Records were being maintained by TC to verify when the defective parts were returned and when the replacements were shipped. It could not be verified that 4 of the 8 affected plants had returned the parts (LaSalle 1 & 2, Hanford, Salem 1 & 2, and Wolf Creek).

C. SUPPLEMENTARY INFORMATION:

1. 10 CFR Part 21

Terry Corporation procedure SOM No. 6.1.111 Rev. 1, dated 4/30/81 titled "Reporting of Defects and Noncompliance, 10 CFR 21 (Part 21 of Title 10 of the Code of Federal Regulations) for Nuclear Turbines" was reviewed. The inspector verified that the procedures were adequate and in compliance with Part 21. Twenty-three potential safety hazard evaluations (10 CFR 21) made by Terry Corporation from 1977 to the present were also reviewed. During the review, particular attention was given to the engineering evaluations and resultant conclusions in regard to the potential safety issues.

One of the twenty-three potential safety hazards was determined to be reportable, and a Part 21 report was made to the NRC on April 9, 1984 (see A.4 above). The following six reports were discussed with TC personnel during the inspection in regard to the appropriateness of the conclusion that they were not reportable safety hazards:

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<u>Report Number</u>	<u>Date</u>	<u>Subject</u>
5	12/21/77	Oil Circulating System
9	12/27/77	EGM Control Box
11	10/13/78	AIRPAX Tachometer Module
12	10/23/78	Overspeed Balls
13	10/23/78	Ramp Start Switch
15	4/14/80	Limiter Operator

For each of the reports listed above, the potential existed for a failure to occur which would jeopardize the operation of the turbine. In several cases, retrofit work was undertaken and modifications made to preclude the subject failures. However, sufficient technical evidence to support the evaluation that the items were not reportable was not provided. These items should be reviewed during a future inspection at TC.

2. Nonconforming Material and Corrective Action

Section 15, "Control of Non-Conforming Items" and Section 16, "Corrective Action" of the Terry Corporation Nuclear Quality Assurance Program Manual (QAM) were reviewed. A "Quality Control Report" (QCR) is used as the controlling document for all non-conforming items, materials, parts, or assemblies. Fifteen QCRs issued between December 27, 1984, and January 28, 1985, were also reviewed. The inspector verified that the fifteen reports had been completed in accordance with the QAM requirements. Seven Corrective Action Requests dated from April 26, 1984, to January 30, 1985, were examined and were also found to be in accordance with manual requirements.

D. PERSONS CONTACTED:

- *H. Wainscott, Corporate QC Manager, Terry Corporation
- D. Fitch, Manager, QA, Terry Corporation
- *R. Hebert, Product Manager, Nuclear, Terry Corporation
- *K. Wheeler, Manager, Nuclear Engineering Services, Terry Corporation
- C. Montefort, Supervisor, Overhaul & Repair, Terry Corporation
- R. Theroux, Service Manager, Terry Corporation
- *H. Smith, QC Supervisor, Terry Corporation

*Denotes attendance at exit meeting.

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E. DOCUMENTS EXAMINED:

1. Part 21 Report issued by TVA re: problem with Terry turbines at Browns Ferry, dated 2/3/82.
2. Letters to turbine customers from Terry re: turbine problems and corrective action.
3. Letter from R. T. Herbert (TC) to M. K. Wise (GE), dated 7/7/83.
4. Letter from F. E. Welch & Associates to GE, dated 2/18/83.
5. GE SIL titled "RCIC Turbine Journal Bearing Locating Pin," dated 4/83.
6. Correspondence between TC and 8 turbine customers re: Part 21.
7. 23 Reports of Potential Safety Hazards issued by TC, dated 1977-1984.
8. TC file re: Reset procedures for PGPL governor equipped with ramp bushing, file included: (1) letter to all utilities affected, dtd 6/29/77; (2) letter to NRC dated 2/27/79; (3) reset procedures; and (4) sample of letter to customers.
9. Terry Nuclear Quality Assurance Program, dated 3/1/84.
10. "Quality Control Report Procedure," dated 1/22/81.
11. QA records for Clinton Station #1, RCIC turbine documents reviewed included: suppliers certification, material certification, drawings, chemical analysis report, forging certs, shop traveller, photos of product, nonconforming material reports, inspection reports.
12. "Reporting of defects and noncompliance, 10 CFR 21 (Part 21 of Title 10 of the Code of Federal Regulations), for Nuclear Turbines" dated 4/30/81.
13. 15 Quality Control Reports, dated 12/84 - 1/85.
14. 7 Corrective Action Requests, dated 4/84 - 1/85.
15. Report of Potential Safety Hazard, Valve Stem Bushing, dated 4/1/84.
16. Report of Potential Safety Hazard, Trip and Throttle Valve Guide Upper Valve Stem, dated 4/7/83.

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17. Reporting of "Defects and Non-Compliance - 10 CFR 21 Spring/Stem Guide," dated 4/6/84.
18. Installation instructions for replacement of two pieces.
19. Procedure for Reporting of Defects and Noncompliance - 10 CFR 21, dated 4/30/81.
20. Control of Nonconforming Items, dated 3/1/84.
21. Corrective Action (of those items or conditions adverse to quality), dated 3/1/84.
22. Part 21 Posting in Company Work Areas.
23. Report of Potential Safety Hazard, Limitorque Motor Operator, dated 4/14/80.
24. Report of Potential Safety Hazard, Ramp Start Switch/Sealed Contacts, dated 10/23/78.
25. Report of Potential Safety Hazard, Chipped Overspeed Balls, dated 10/23/78.
26. Report of Potential Safety Hazard, AIRPAX tachometer module, dated 10/13/78.
27. Report of Potential Safety Hazard, Electronic Governor, dated 12/27/77.
28. Report of Potential Safety Hazard, Oil circulating system, dated 12/21/77.