DUKE POWER COMPANY
P.O. BOX 33189
CHARLOTTE, N.C. 28242

HAL B. TUCKER
VICE PRESIDENT
NUCLEAR PRODUCTION

TELEPHONE
(704) 373-4531

June 21, 1985

Mr. Harold Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Ms. E. G. Adensam, Chief
Licensing Branch No. 4

Subject: Catawba Nuclear Station
Docket Nos. 50-413 and 50-414

Dear Mr. Denton:

Duke Power Company has reviewed the TDI Generator Owners Group Design Review/Quality Revalidation Report (DR/QR) for the Catawba TDI Diesel Generators. The Owners Group report covered 137 separate items or equipment on the Catawba TDI diesel generators. For these 137 items, the Owners Group has made 350 recommendations pertaining to preventive maintenance schedules, design improvements and quality revalidation tests and inspections.

We have reviewed the 350 recommendations tendered by the Owners Group in terms of the action which Duke Power Company has taken or intends to take. Our conclusions as a result of this review are as follows:

1. Through already completed requalification testings, design modifications, and preventive maintenance schedules, 210 of the Owners Group recommendations have been accomplished.

2. Through changes to our preventive maintenance schedules or design changes which will be accomplished by the end of the first refueling outage of the plant, another 63 of the Owners Group recommendations will be accomplished.

3. We are in the process of reviewing three design modifications proposed by the Owners Group. These have to do with design modifications to the exhaust manifold (Part No. 02-380A) and the jacket water manifold piping (Part No. 02-317A). Action on these items will not be taken until this review is completed. The review will be completed well in advance of the first refueling outage so that sufficient time is allowed for appropriate action.

4. The remaining 74 Owners Group recommendations will not be accomplished in complete accordance with their instructions.

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Attachment 1 to this letter outlines the Owners Group recommendations which Duke Power intends to amend and provides detailed explanations for the Duke Power Company position on each of these items. It provides the rationale for modification of time interval for inspections, substitution of inspection or maintenance procedures, or the decision to not comply with specific recommendations as appropriate to the specific item involved.

Attachment 2 to this letter contains a summary of all the Owners Group design review, maintenance, design modification, and quality revalidation recommendations for the Catawba Unit 1 diesels. This summary, which is listed by part number and is given in the same order as the Owners Group DR/QR report, provides the status of the Duke Power response to the all Owners Group recommendations. Attachment 1 has been developed from this document.

Attachment 3 to this letter contains a summary of the 10 CFR Part 21 reports by TDI which were applicable to the Catawba diesels. Also included is the disposition of each report.

This letter completes the Duke Power Review of the TDI Owners Group DR/QR report and the information contained in the attached documents are considered to be in compliance with the Nuclear Regulatory Commission requirements for quality verification of the Catawba Unit 1 as given in the NRC Facility Operating License No. NPF-3, paragraph 2.C.(21), Transamerica Delaval Inc. Diesel Generators (Section 8.3.2, SSER #4).

We are in the process of completing the implementation of this program as for the Unit 1 diesel generators. Duke will complete implementing the Owners Group DR/QR recommendations as explained in this letter by the conclusion of the first Unit 1 refueling. Similar action is being taken on Catawba Unit 2 diesel generators on a similar schedule.

Sincerely,

Hal B. Tucker

Hal B. Tucker

HBT:RPM:smk

Enclosure

Attachments

xc: Dr. J. Nelson Grace, Regional Administrator
U.S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

NRC Resident Inspector
Catawba Nuclear Station

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Robert Guild, Esq.
P.O. Box 12097
Charleston, South Carolina 29412

Palmetto Alliance
2135 1/2 Devine Street
Columbia, South Carolina 29205

Mr. Jesse L. Riley
Carolina Environmental Study Group
854 Henley Place
Charlotte, North Carolina 28207

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Attachment 1

Conflicts Between Duke Power and the TDI Owners Group

1. Overview

The purpose of the TDI Owners Group Design Review/Quality Revalidation Program was to demonstrate the reliability of the diesel generators manufactured by Transamerica Delavel, Inc., for service as backup power sources in nuclear power facilities. To this end, the Owners Group directed their efforts toward four specific areas:

- o The design of several parts of the diesel was reviewed in detail to establish their adequacy for service in a nuclear safety related system. (Design Reviews, (D/R))
- o The as-built condition of the Unit 1 diesel generators were inspected after an endurance run of the engine equivalent to approximately 10 years of normal nuclear service. The Unit 1 diesel generator endurance runs qualified all Catawba TDI diesel generators. Hence, Unit 2 diesel generators have not undergone endurance runs. However, the as-built condition of the Unit 2 diesels is now being inspected. Parts which are found to be worn or defective are replaced at the time of inspection. (Quality Revalidation, (Q/R)).
- o As a result of the inspections and the design reviews, several modification recommendations were made by the Owners Group. (Design Modifications, (D/M))
- o To ensure continued reliable service from the engines, several preventive maintenance recommendations were made in addition to

those procedures normally recommended by the diesel manufacturer. (Preventive Maintenance Modifications, (P/M))

This document outlines the areas where the Duke Power Company differs with Owners Group recommendations or findings in the above mentioned four areas for the diesel engines installed at the Catawba Nuclear Station, Unit 1 and Unit 2.

2. General Comments

The amendments that Duke Power Company proposes to the Owners Group recommendations fall into four categories. These categories are the frequency of preventive maintenance inspections, additional quality revalidations, design modifications, and areas where our engines do not have the particular part or component. A brief discussion of these categories is as follows:

a. Preventive Maintenance Schedule

The Catawba Unit 1 engines underwent an endurance run before quality evaluations were begun. On the 1A engine, greater than 800 hours of operation and 120 engine starts occurred before inspections. On the 1B engine, approximately 750 hours of operation and greater than 200 starts occurred before inspection. At the conclusion of both engines endurance runs, the engines were operable and could have provided emergency power. During the inspection, the parts that were found to be worn or damaged were replaced, parts of defective design were replaced with improved versions, and the engine was reassembled after inspection in essentially new condition.

During normal operation, it is expected that the engine will be started about 25 times and accumulate about 50 hours per 18 month fuel cycle. Using these facts, the following is a breakdown of major preventive maintenance occurrences with the cumulative scheduled starts and scheduled hours on the engine given first followed by our estimate of potential total starts and hours.

Maintenance Occurrence	Starts	Hours
Refueling Outage (18 months)	25/30	50/70
Alternate Outage	50/60	100/140
5 year inspection	81/97	161/225
10 year inspection	162/194	312/437

As can be seen, the condition that the Unit 1 engines were found in after the endurance run envelopes the expected condition after more than ten years of normal use.

The preventive maintenance recommendations made by the TDI Owners Group are generally based on very conservative time intervals. The general thrust of their program is to essentially inspect the engine every refueling outage or at about 50 hours of operation. Replacement of expendable parts such as filters, gaskets and seals by the Owners Group are scheduled for fixed time intervals in most cases, with no regard for the condition of the part being replaced. This philosophy is one of failure prevention by time directed rework or replacement at life limit intervals. The Duke preventive maintenance program is directed more at condition directed replacement schedules and failure

finding inspections at short term intervals with detailed inspections at an interval corresponding with general engine overhaul. The inspections and intervals used in the Duke Power preventive maintenance program are based on experience of plant personnel, prior performance of the engine, manufacturer's recommendations and the results of the quality revalidation inspections. These differences in maintenance schedule are outlined in section 3 of this attachment.

b. Quality Revalidations

The Catawba engine quality revalidations were based on the quality revalidations conducted at Shoreham. The Owners Group report has listed several new quality revalidation requirements that the Catawba Unit 1 engines were not inspected to. Where it is believed that our quality revalidation inspections have shown that the part or component is satisfactory for continued service we have not elected to accomplish the new owners group requirement. Where our quality revalidation inspections were deficient in terms of the new inspection, we will accomplish the inspection either as part of our preventive maintenance schedule (Unit 1) or the quality revalidation (Unit 2). The above is noted in section 3 of this attachment.

c. Design Modifications

While the majority of Owners Group design modifications will be incorporated into the Catawba diesels, there are several that Duke Power takes exception to. These are explained in section 3.

d. Parts or Components Not Applicable to Catawba

Where Owners Group recommendations include parts or components which the Catawba engines do not have, this is noted in section 3.

3. Detailed Amendments to the TDI Owners Group Recommendations

This section describes the inspections and maintenance procedures where Duke Power Company actions differ with the Owners Group recommendation. The differences are listed in the order that they appear in the DR/QR report. The amendments first state what the Owners Group has recommended. Secondly, they provide information on the action Duke Power intends to take. Finally, an explanation is provided for the Duke Power action.

Part No. CN-121

Part Name: Flex Connections

TDI OG Recommendation: 1. Visually inspect the part during alternate outages (P/M)

Duke Power Action: 1. Visually inspect every five years (P/M)

Explanation: This is a new part which was installed after the endurance run on Unit 1 and installed as a design modification on Unit 2. Although it has not seen service, it is considered that sufficient service will not be seen by the part to warrant inspections at a more frequent interval, than 5 years. At 5 years the engine will have run approximately 160 hours with about 80 start-stops.

Part No. F-068

Part Name: Intercooler

TDI OG Recommendation:
1. Disassemble and clean each outage (P/M)
2. Check outlet plenum drain daily (P/M)

Duke Power Action:
1. Take a heat balance every outage and disassemble and clean every ten years (P/M)
2. Check outlet plenum drain during operation (P/M)

Explanation:

1. The intercoolers are cooled with treated jacket water. This reduces the chances of corrosion in the system. A heat balance will be taken at refueling outages to ascertain heat exchanger performance. Intercoolers will be disassembled at 10 years for cleaning if heat balance results do not indicate a more frequent cleaning to be necessary.
2. The outlet plenum drain is open to atmosphere. Hence it will be inspected during operation of the engine where the presence of air escaping indicates that the drain is open. In addition, daily inspections of the engine for leakage and the jacket water standpipe will indicate whether the heat exchanger is intact.

Part No. MP-022/23

Part Name: Turbocharger

TDI OG Recommendation: 1. Inspect rotor axial clearance per outage (P/M)

Duke Power Action: 1. Inspect rotor axial clearance every 5 years. (P/M)

Explanation: The turbochargers currently installed both on Unit 1 and 2 are new. The turbochargers lube oil system incorporate a modified thrust bearing lubrication system. The 1A engine turbochargers will be checked during the first refueling outage to assure that the lubrication system is adequately lubricating the thrust bearings. This along with the modification in operational testing to decrease the number of non-prelubricated starts will make more frequent inspections than every five years unnecessary. Vibration monitoring of the turbochargers at 6 month intervals also provide adequate indication of unexpected failure.

Part No. 02-380A

Part Name: Exhaust Manifold

TDI OG Recommendation: 1. Visually inspect welds each alternate outage and magnetic particle test welds per alternate outage (P/M)

2. Remove slip joints and add flanges to stiffen the piping (D/M)

Duke Power Action: 1. Inspect welds every 10 years (P/M)

2. Slip joint modification under review (D/M)

Explanation:

1. The exhaust manifold flange welds were inspected on the diesels as part of the quality revalidation program with no sign of cracks. In light of the performance of this part with over 750 hours and 120 start-stops, it is considered adequate for extended service. We will visually inspect the exhaust manifold welds at 10 years where the engine will have approximately 310 hours of operation and 160 start-stops.
2. The modification recommendation indicates that the slip joints should be removed and replaced with flanged connections. We are in the process of reviewing Owners Group analytical data for this recommendation.

Part No. 02-475 A/D

Part Name: Turbo Bracket: Bolts and Gaskets

TDI 06 Recommendation: 1. Check capscrew preload every month for first three months (P/M)

Duke Power Action: 1. Use turbocharger vibration measurements to detect loosening of bolts (P/M)

Explanation:

These bolts were the subject of a quality revalidation inspection on the Catawba diesels. As a result of this, the bolts were replaced with Grade 8 material. We believe that vibration measurements taken on the turbochargers will indicate whether these bolts have loosened. Accordingly, we will not check torques of the bolts over the first three months. If vibration measurements are satisfactory, we will check torques

on the bolts during the first refueling outage and assure that the torques meet Owners Group requirements. Following this we will adjust the preventive maintenance schedule (i.e., outage, alternate outage, etc.) to assure that the bolts remain tight.

Part No. 02-475B

Part Name: Air Butterfly Valve

TDI OG Recommendation: 1. Check valve link locks monthly (P/M)

2. Inspect hardness of shaft (Q/R)

Duke Power Action: 1. Check torque of bolts per outage (P/M)

2. Will not accomplish (Q/R)

Explanation:

1. This part was inspected after the endurance run with no sign of looseness. Jam nuts are torqued during installation. As the jam nuts have not loosened during service, jam nut torques will be checked at each outage.

2. The recommendation to inspect the hardness of the shaft is considered unnecessary in light of favorable inspections during quality revalidation. Shafts were visually inspected with no signs of distress.

Part No. CN-109

Part Name: Before and After Lube Oil Pump

TDI OG Recommendation: 1. Check alignment and vibration each outage (P/M)

Duke Power Action: 1. Align only when disassembled for other service (P/M)

Explanation: Routine alignment of this pump is considered unnecessary and will only be done when other maintenance require pump disassembly. A spare pump is kept in stock and replacement can be affected in less than 72 hours should the need arise.

Part No. CN-110

Part Name: Full Flow Lube Oil Filter

TDI OG Recommendation: 1. Replace filter each outage (P/M)

2. Drain and inspect every month (P/M)

Duke Power Action: 1. Replace filter at DP=20 psi (P/M)

2. Drain and inspect when filter replaced (P/M)

Explanation: The Owners Group recommendations are based on specific time limits where the Catawba actions are based on performance requirements. Catawba is considered to be in full compliance with the intent of the Owners Group recommendations.

Part No. CN-111

Part Name: Lube Oil Heat Exchanger

TDI OG Recommendation:
1. Inspect tubes and tube sheet each outage (P/M)
2. Replace tube sheet packing at reassembly after each inspection (P/M)

Duke Power Action:
1. Perform heat balance at each outage and inspect tubes and tube sheet every 10 years (P/M)
2. Replace tube sheet packing when necessary (P/M)

Explanation: This component has performed well in service and all inspections were within normal limits. The water in the heat exchanger is treated to reduce the probability of corrosion, and this treated water continuously circulates through the system, greatly reducing corrosion. Accordingly, a heat balance will be run on the heat exchanger at each outage. If the heat balance does not require inspection of the heat exchanger, then the heat exchanger will be routinely inspected at 10 years. During the heat exhanger inspection, tube sheet packing will be replaced.

Part No. CN-122

Part Name: Oil Prelube Filter

TDI OG Recommendation: 1. Change filter each outage (P/M)

Duke Power Action: 1. Change filter at DP=10 psid (P/M)

Explanation: The preventive maintenance program proposed by Catawba complies with the intent of the Owners Group recommendation.

Part No. CN-131

Part Name: Lube Oil Keep Warm Strainer

TDI OG Recommendation: 1. Inspect DP daily (P/M)

Duke Power Action: 1. Inspect DP weekly (P/M)

Explanation: Catawba procedure OMP 2-19 will be modified to require a check of the lube oil keep warm strainer weekly. If required maintenance indicates that this period should be shortened to daily it will be.

Part No. SE-025

Part Name: Lube Oil Full Pressure Strainer

TDI OG Recommendation: 1. Inspect and clean every outage (P/M)

Duke Power Action: 1. Inspect and clean based on DP ((P/M)

Explanation: Catawba procedure PT/1/A/4350/10 will be modified to require recording DP during operation. This preventive maintenance program complies with the intent of the Owners Group recommendation.

Part No. 00-420

Part Name: Lube Oil Pressure Regulating Valve

TDI OG Recommendation: 1. Disassemble and clean each outage (P/M)

Duke Power Action: 1. Disassemble and clean every 10 years (P/M)

Explanation: This part performed well during the over 750 hours of operation. Problems with this valve will become evident by oil pressure readings. For these reasons, more frequent inspections then 10 years are considered unnecessary.

Part No. 02-307B

Part Name: Lube Oil Tubing and Fittings

TDI OG Recommendation: 1. Inspect tubing each outage (P/M)

2. Check gear sprays each outage (P/M)

Duke Power Action: 1. Inspect tubing every 10 years (P/M)

2. Inspect gear sprays every alternate outage (P/M)

Explanation:

1. Lube oil tubing has performed well during the 750 hour extended run, with no signs of distress. Accordingly, it will be inspected every 10 years.
2. No signs of lube oil contamination has been experienced of the Catawba diesels. Hence gear sprays should remain clean and functional. Therefore, gear sprays will be inspected every alternate outage which is approximately after 100 hours of operation.

Part No. 02-540D

Part Name: Lube Oil Sump Tank Heater

TDI OG Recommendation: 1. Measure insulation resistance each outage (P/M)

2. Inspect and clean each outage (P/M)

Duke Power Action: These inspections will not be performed. (P/M)

Explanation: This part is easily replaceable within 72 hours and a spare part is in stock. The performance of this part is monitored by lube oil temperature, so potential failure of the part can be predicted. For these reasons, the above inspections will not be performed.

Part No. 02-305

Part Name: Main Bearing Bases

TDI OG Recommendation: 1. Inspect nut pockets each outage (P/M)

2. Verify material of main bearing studs and nuts (Q/R)

Duke Power Action: 1. Inspect nut pockets every ten years (P/M)

2. Will not accomplish (Q/R)

Explanation:

1. These nut pockets were inspected after the 750 hour endurance run of the engine with satisfactory results. The results of these inspections indicate that more frequent inspections than 10 years are unnecessary. (P/M)
2. All results of quality revalidation inspections of main bearings, main bearing caps, nut breakaway torques and visual examination of nuts were satisfactory. The Catawba main bearings, when mounted with the main bearing studs and nuts, are behaving satisfactory. Hence, we will not verify the material of the studs and nuts. (Q/R)

Part No. 02-310A

Part Name: Crankshaft

TDI OG Recommendation: 1. Measure journal diameter each alternate outage (P/M)

Duke Power Action: 1. Measure bearing shell thickness and visually inspect journals every ten years (P/M)

Explanation: Crankshaft web deflections are to be performed every outage. These inspections will predict crankshaft misalignment that could eventually lead to journal wear. In addition, analysis of the lube oil for wear material will demonstrate any unusual wear of either the crankshaft journals or the bearings. Visual inspection of crankshaft journals and measurement of the shell thickness every ten years will provide sufficient documentation that the crankshaft is not experiencing significant wear.

Part No. 02-310C

Part Name: Crankshaft Thrust Bearing Ring

TDI OG Recommendation: 1. Inspect for wear each alternate outage (P/M)

Duke Power Action: 1. This will not be done. (P/M)

Explanation: The crankshaft is inspected for thrust clearance every outage. This gives a direct indication of the wear of the thrust bearing ring, and makes the inspection above unnecessary.

Part No. 02-315C

Part Name: Cylinder Liners

TDI OG Recommendation: 1. Inspect cylinder liners each outage (P/M)

Duke Power Action: 1. Inspect four liners at the first refueling outage, all 16 after ten years (P/M)

Explanation: This part was inspected extensively after the extended run, and all inspections were within normal limits. For this reason, more frequent inspections than a sample of 4 liners at the first refueling outage and all cylinder liners at 10 years is considered unnecessary.

Part No. 02-315F

Part Name: Cylinder Head Nuts

TDI OG Recommendation: 1. Inspect cylinder head nuts (Q/R)

Duke Power Action: 1. Inspect 4 cylinder heads first outage, all 16 after 10 years

Explanation: The quality revalidation of the cylinder head nuts is a new inspection for Catawba. This will be accomplished on Unit 2 during revalidation. On Unit 1, cylinder head breakaway torques where measured after the endurance run. All breakaway torques were within normal limits attesting to the fact that the nuts were fine. Accordingly, a sample inspection of four cylinders will be accomplished during the first refueling outage and all cylinder head nuts will be inspected at 10 years.

Part No. 02-359

Part Name: Air Start Valve

TDI OG REcommendation: 1. Inspect and clean each outage (P/M)

2. Verify material of cap screws (Q/R)

Duke Power Action: 1. Inspect and clean each alternate outage (P/M)

2. Will not accomplish (Q/R)

Explanation:

1. As the air start valves were extensively inspected after the endurance run with no adverse findings, we will remove, clean and inspect the air start valves every other outage when the engine will have approximately 50 starts on it.
2. Breakaway torques of the air starting valve capscrews were measured following the endurance run with satisfactory results. Capscrew lengths were measured during the quality revalidation of the engine with satisfactory results. Accordingly it is believed that the capscrews are correct for the intended service and additional material tests will not be performed.

Part No. 02-441A

Part Name: Start Air Manifold Piping

TDI OG Recommendation: 1. Check vent is open every month (P/M)

Duke Power Action: 1. Check vent every outage (P/M)

Explanation: The starting air system is clean as inspections of the strainers showed no debris. In addition, the starting air valves are tight. Hence, we have seen no plugging of the crossover vents which are always open to atmosphere. Finally, there are two vents installed giving redundancy to venting the manifold downstream of the solenoid valves. Hence, more frequent inspections are considered unnecessary.

Part No. 02-441B

Part Name: Start Air Manifold Valves and Filters

TDI OG REcommendation:
1. Inspect, clean and replace O-rings in admission and shuttle valves each outage (P/M)
2. Test valves for tightness each outage (P/M)
3. Blow out strainer every day (P/M)
4. Inspect strainer every month (P/M)

Duke Power Action:
1. Inspect and clean every 5 years (P/M)
2. Test every 5 years (P/M)
3. Comply (P/M)
4. Inspect every outage (P/M)

Explanation:

1. Catawba has not seen any O-ring leakage problems. Hence the preventive maintenance schedule will inspect, clean and replace O-rings on the admission and shuttle valves every five years.
2. To date, Catawba air start manifold valves have been tight with no signs of leakage. Hence this preventive maintenance inspection will be accomplished at 5 year intervals.
3. The Catawba air start strainers have no blowdown points. The air banks, however, are blown down daily at a point immediately upstream of the strainers. We believe that this action complies with the Owners Group recommendation.
4. To date, Catawba has not seen any debris in the air start strainers. Accordingly, the strainers will be cleaned out every outage.

Part No. 02-441C

Part Name: Start Air Distributor

TDI OG Recommendation: 1. Inspect valves and cams each outage (P/M)

Duke Power Action: 1. Inspect valves and cams every 10 years (P/M)

Explanation: The air start distributor was inspected after the extended run and the results of all inspections were satisfactory. For this reason, more frequent inspections then 10 years (approximately 160 starts) are considered unnecessary.

Part No. 02-340A

Part Name: Connecting Rods and Bushings

TDI OG Recommendation: 1. Check link rod and pin clearance (Q/R)

2. ECT on all rod box threads (Q/R)

Duke Power Action: 1. Will check four connecting rods at the first refueling outage (Q/R)

2. Accomplished on diesel 1A (Q/R)

Explanation:

1. Clearance of the link rod bushing and link rod pin were determined during the quality revalidation inspection by measurements. All clearances were within manufacturer recommendations. In addition visual inspection of pins and bushing indicated no distress. Owners Group requirements indicate that this inspection now must be done with the parts mated and a bolt torque applied. Since all clearances on Unit 1 were within manufacturers recommendation and the parts successfully passed visual inspections, the Owners Group further inspection will be performed on a sample basis of four connecting rods removed from the engine at the first refueling outage. In addition, preventive maintenance schedule will be modified to accomplish this on all Unit 1 rods at 10 years. Unit 2 rods will be checked during quality revalidation.
2. Based on successful eddy current tests of Unit 1A and the fact that on Unit 1B connecting rod bolt visual inspections, bolt magnetic particle inspections and bolt torques were all satisfactory, eddy

current tests of the unit 1B and Unit 2 rod box female threads are not accomplished. Based on connecting rod bolt inspection results for all engines, it is believed that eddy current tests of the rod box female threads would not provide any new information.

Part No. 02-340B

Part Name: Connecting Rod Bearing Shells

TDI OG Recommendation: 1. Inspect for wear each outage (P/M)

2. Eddy current inspect bearing shells (Q/R)

Duke Power Action: 1. Inspect for wear every 10 years (P/M)

2. This inspection will not be done. (Q/R)

Explanation:

1. The bearing shells performed well throughout the extended run and bearing thickness measurements made at the end of the endurance run were within manufacturers recommendations. Premature bearing wear will be indicated by such tests as web deflection readings and analysis of the engine oil for wear material. For these reasons, more frequent inspections then 10 years are considered unnecessary.
2. The bearings were inspected during the quality revalidation by liquid penetrant techniques and radiography. All shells passed the liquid penetrant examination. Several shells did not meet the radiography acceptance standards and were replaced. It is considered that the eddy current inspections will not add any new information based on the results of liquid penetrant and radiography inspections. Accordingly, eddy current inspections will not be accomplished.

Part No. 02-341C

Part Name: Piston Pins

TDI OG Recommendation: 1. Inspect rolled in oil plugs (Q/R)

2. Install new snap rings (D/M)

Duke Power Action: 1. Will be inspected as pistons are removed for maintenance (Q/R)

2. Will not do (D/M)

Explanation:

1. The piston pins have performed well during the extended run with no signs of loss of lubrication which would arise if an oil plug were loose. Hence, inspections of the oil plugs will be done when the pistons are removed from the engine for other maintenance on Unit 1. This inspection will be accomplished on Unit 2 as part of quality revalidation.
2. The current procedure for securing the retaining rings is to use Locktite during assembly. At disassembly after the extended run, this bond was secure and intact and the retaining ring had to be broken loose. It is considered that the current retaining rings, locked in place are satisfactory and replacement with a new snap rings is unnecessary.

Part No. 02-350A

Part Name: Camshaft Assembly

TDI OG Recommendation: 1. Inspect lobes for wear each outage (P/M)

Duke Power Action: 1. Inspect lobes every 5 years (P/M)

Explanation: This part was inspected after the extended run and all inspections were considered within normal limits. For this reason,

inspections at a more frequent interval than 5 years are considered unnecessary.

Part No. 02-350C

Part Name: Camshaft Gear

TDI OG Recommendation:
1. Increase torque on bolts (D/M)
2. Verify torque (Q/R)
3. Inspect gears each outage (P/M)

Duke Power Action:
1. Will accomplish if the gear is removed for maintenance (D/M)
2. Will accomplish during other maintenance of gears (Q/R)
3. Inspect the gear every five years and measure backlash (P/M)

Explanation:

1. On Unit 1 the gears were visually inspected and their backlash measured after the extended run with satisfactory results. This would indicate that the bolts are properly retaining the gear. In addition, the nuts on the bolts have cotter pin locking devices which will prevent the bolts from untorquing. Hence, as the parts have performed well in service, no modifications are considered necessary at this time with respect to the bolt torque.
2. On Unit 1 if the cam gear is removed for other maintenance, the bolts will be retorqued to the Owners Group specifications. On Unit 2 bolt torques will be measured and retorqued as part of the quality revalidation.

3. As the gears performed well during the extended run, inspections more frequent than every five years are considered unnecessary. In addition, gear sprays will be checked at alternate outages to assure proper lubrication. At these checks, the gear in immediate proximity to the spray nozzle will be visually inspected.

Part No: 02-390C/D

Part Name: Pushrods

TDI OG Recommendation: 1. Specify destructive verification of pushrod welds for replacements (P/M)

Duke Power Action: 1. Liquid penetrant welds upon receipt (P/M)

Explanation: The Owners Group recommends specifying a destructive verification to be accomplished on one pushrod of each lot ordered of replacement friction welded pushrods. The friction welded pushrods installed on the Catawba diesels have been liquid penetrant inspected upon receipt at Catawba. Further, the lead friction welded pushrods which were installed on both unit 1A and 1B for their endurance runs were liquid penetrant inspected following each endurance run. Accordingly, we believe that using the liquid penetrant inspection at receipt of a pushrod provides ample indication that the friction welding process is under control. Hence, we will not destructively verify the friction weld soundness.

Part No. 02-630D

Part Name: Pyrometer Thermocouples

TDI OG Recommendation: 1. Clean thermocouple shields each alternate outage (P/M)

Duke Power Action: 1. Clean shields when the thermocouples indicate an inconsistent temperature (P/M)

Explanation: As the thermocouples are used to monitor diesel engine performance and do not prevent the diesel from starting or continuing to run, it is believed that cleaning the shields when temperatures become inconsistent is adequate maintenance.

Part No. 02-410A

Part Name: Overspeed Trip Governor

TDI OG Recommendation: 1. Mark trip settings after setting the governor (P/M)

Duke Power Action: 1. Locktite Jam nuts during setting (P/M)

Explanation: The procedure proposed by the Owners Group is intended to indicate inadvertent resetting of the governor. The assembly procedure used by Duke is intended to prevent any resetting as well as indicate resetting. Accordingly, we believe that we are in compliance with the Owner's Group recommendation.

Part No. 02-410B

Part Name: Overspeed Trip Drive

TDI OG Recommendation: 1. Inspect shaft dimensions (Q/R)

Duke Power Action: 1. Will not do (Q/R)

Explanation: This part was subject to numerous inspections as part of the quality revalidation following the endurance run. Inspection included visual, liquid penetrant, and material tests. The results of the visual tests indicated that there was no excessive wear in the bearing areas, no cracking at geometric discontinuities, no enlargement of taper pin holes or other signs of relative motion. Liquid penetrant tests were also satisfactory. Accordingly, it is believed that the shaft is behaving properly and that there is no need to measure shaft dimensions.

Part No. 02-410C

Part Name: Overspeed Trip Couplings

TDI OG Recommendation:
1. Replace coupling spider and check coupling tightness each outage (P/M)
2. Modify coupling so that interference with shaft is less than .0005" and accomplish SIM 363 (D/M)

Duke Power Action:
1. Replace couping spider and inspect coupling tightness every 5 years (P/M)
2. Will not modify couplings (D/M)

Explanation:

1. Experience on diesels which are run continuously indicates that coupling spiders under prolonged exposure (approximately 15,000 hours) to hot oil (approximately 150°F) become brittle and fail. The majority of the time, the Catawba diesel will be in standby. Under standby conditions, while gears will be sprayed by 140°F oil, the fact

the engine is not running would indicate that the couplings would not be splashed by the oil. Hence, we believe that this service condition is different than the service conditions mentioned above. Accordingly, the couplings spider will be replaced and couplings checked for tightness every five years.

2. SIM 363 deals with assuring that couplings are mechanically tight and provides a procedure for using Loctite to assure that the coupling to shaft remains tight in service. This SIM was accomplished on diesel 1A during quality revalidation inspections and on 1B, 2A and 2B as a 10CFR21 action. The Owners Group recommendation requires the installation of new couplings which are machined to provide a maximum interference of .0005". After this is done, SIM 363 should be accomplished. As we have already inspected our coupling to the provisions of SIM 363, we will not replace the couplings as recommended by the Owners Group.

Part No. 02-411A

Part Name: Governor Drive Gear and Shaft

TDI OG REcommendation: 1. Visually inspect drive gear and shaft each outage (P/M)

Duke Power Action: 1. Visually inspect drive gear and shaft every 5 years (P/M)

Explanation: These parts were inspected after the endurance run with no signs of distress. Accordingly, it is considered that the preventive maintenance schedule should be accomplished every 5 years.

Part No. 02-413A

Part Name: Governor Linkage

TDI OG Recommendation: 1. Inspect for loose parts every month (P/M)

2. Lubricate every month (P/M)

Duke Power Action: 1. Inspect every outage (P/M)

2. Lubricate every 6 months (P/M)

Explanation:

1. No loose parts were found on either engine after the extended runs. Since vibration will cause parts to loosen, it is considered that this inspection should be accomplished at each outage where the engine will have about 50 hours of operation.

2. On inspection following the endurance run there were no signs of inadequate lubrication. Duke Power preventive maintenance calls for lubrication every 6 months. As the part appears adequately lubricated with this interval the preventive maintenance schedule will not be changed.

Part No. 02-415A

Part Name: Speed Reducing Governor

TDI OG Recommendation: 1. Refurbish accuator every 5 years (P/M)

Duke Power Action: 1. Replace accuator every 10 years (P/M)

Explanation: This part has performed well in service and all inspections after the extended run of over 750 hours were within normal limits. In

addition, technical specification tests of the engine monthly and at each outage will assure that the governor is controlling within specifications. Accordingly, it is intended to replace the governor every 10 years rather than refurbish it at 5 years.

Part No. 02-695B

Part Name: Shutdown Valves and Switches

TDI OG Recommendation: 1. Replace elastomeric parts in the pressure regulator and valves each outage (P/M)

Duke Power Action: 1. Elastomeric parts will be replaced as required. (P/M)

Explanation: The elastomeric parts will be replaced if required by functional testing. These tests consist of the 18 month technical specification testing and the calibration testing done per outage.

Part No. 02-695C

Part Name: Shutdown Trip Switches

TDI OG Recommendation: 1. Replace elastomeric parts every 5 years (P/M)

Duke Power Action: 1. Replace elastomeric parts if required. (P/M)

Explanation: The elastomeric parts will be replaced if required by the 18 month technical specification testing or if required based on calibration tests which are done per outage.

Part No. CN-120

Part Name: Jacket Water Heat Exchanger

TDI OG Recommendation: 1. Inspect tubes and tube sheet each outage (P/M)

Duke Power Action: 1. Perform heat balance each outage. Inspect tubes for corrosion every alternate outage. (P/M)

Explanation: The jacket water heat exchanger heat transfer surface is made of admiralty brass. The heat exchanger uses lake water on the shell side and jacket water on the tube side. The jacket water is treated wtih corrosion inhibitor. Historically, copper alloyed heat exchangers have not been a corrosion problem with lake water in the Duke Power Company system. Hence, the probability of corrosion damage on both the shell and tube side is low. Accordingly, the tubes will be inspected for corrosion every alternate outage (about 3 years). Following the second corrosion inspection (at about 6 years) the time interval for corrosion inspection will be assessed. To check for fouling in the heat exchanger, a heat balance will be performed at each outage. This heat balance will be compared to base line data to ascertain whether the heat exchanger has to be opened up for cleaning at the outage.

Part No. CN-128

Part Name: Jacket Water Heater

TDI OG Recommendation: 1. Meggar test insulation each outage (P/M)

2. Clean heater elements each outage (P/M)

Duke Power Action: 1,2. Will not accomplish Owners Group recommendations (P/M)

Explanation: The performance of this part is monitored daily by instrumentation. This part is easily replaceable within 72 hours and a spare is kept in stock. If poor performance warrants, this part will be replaced.

Part No. CN-136/40

Part Name: Thermostatic Valve

TDI OG Recommendation: 1. Replace thermal power element every 3-5 years (P/M)

Duke Power Action: 1. Replace thermal power element if performance warrants. (P/M)

Explanation: The function of this part is monitored daily by instrumentation and the part will be replaced if found defective.

Part No. 02-425A

Part Name: Jacket Water Pump

TDI OG Recommendation: 1. Inspect gear for wear each outage (P/M)

Duke Power Action: 1. Inspect gear every 10 years (P/M)

Explanation: This part performed well during the extended run and all inspections of the gear and spline were within normal limits. In light of the results of the quality revalidation, inspections at an interval more frequent than every ten years are considered unnecessary.

Part No. 02-362A

Part Name: Subcovers

TDI OG Recommendation: 1. Liquid penetrant inspect rocker arm pedestals every 5 years (P/M)

Duke Power Action 1. Liquid penetrant inspect a sample of four subcovers for cracks on one diesel at the first outage, and all subcovers every 10 years. (P/M)

Explanation: Cracks found on inspections after the extended runs did not impair engine performance. The cracks were found to be resultant of improper installation of the subcovers, and improved installation procedures should prevent further occurrence of this problem. In light of this information, it is intended to accomplish a sample inspection at the first refueling outage and all subcovers at 10 years.

Part No. 02-365A

Part Name: Fuel Injection Pump

TDI OG Recommendation: 1. Check bleed screws each outage (P/M)

Duke Power Action: 1. Check bleed screw on the pump disassembled for overhaul every alternate outage (P/M)

Explanation: This part is subject to a general visual inspection during operation that will check for leakage from the bleed screws. This part performed well during the extended run and all inspections performed as part of the quality revalidation were within normal limits. In light of the above information, the bleed screw will be checked on the fuel injection pump disassembled every alternate outage.

Part No. 02-317A

Part Name: Jacket Water Manifold Piping

TDI OG Recommendation: 1. Install dresser elbow coupling (D/M)

2. Reinforce piping supports (D/M)

Duke Power Action: 1.2. Under review

Explanation: The Owners Group recommendations will be reviewed with Duke Power Design personnel to determine Duke's action on this recommendation.

Part No. 02-371A

Part Name: Fuel Pump Control Shaft

TDI OG Recommendation: 1. Grease fuel pump every month (P/M)

Duke Power Action: 1. Will not accomplish Owners Group recommendation (P/M)

Explanation: There are no grease fittings installed on the fuel pumps at the Catawba station.

Part No. 02-455A

Part Name: Fuel Oil Filters

TDI OG Recommendation: 1. Inspect canister gaskets each outage (P/M)

Duke Power Action: 1. Inspect canister gaskets at filter replacement. (P/M)

Explanation: Filter replacement is based on differential pressure at which time gaskets are inspected or replaced. A general visual inspection for leakage is done during engine operation which will assure that the gaskets are not leaking.

Part No. 02-385A

Part Name: Crankcase Relief Valves

TDI OG Recommendation: 1. Clean flame arrestors each outage (P/M)

Duke Power Action: 1. Clean flame arrestors every alternate outage (P/M)

Explanation: These parts were inspected after the extended run and found to be clean. The crankcase pressure is monitored during operation and any malfunction in this part will be easily detected. For the above reasons, more frequent inspections than every alternate outage are considered unnecessary.

Part No. 02-355A/B

Part Name: Crankcase Pump Drive Gear/Idler Gear Assembly

TDI OG Recommendation: 1. Inspect gears each outage (P/M)

Duke Power Action: 1. Inspect gears every five years (P/M)

Explanation: These parts performed well during the extended run and all inspections performed as part of the quality revalidation were satisfactory. As with the cam shafts gears (02-350C), it is considered that inspecting the crank case pump drive gear and idler gear assembly at five year intervals should suffice to forewarn of wear.

Part No. 02-550

Part Name: Foundation Bolts and Anchors

TDI OG Recommendation: 1. Inspect foundation each outage (P/M)

Duke Power Action: 1. Inspect foundation every ten years. (P/M)

Explanation: The foundation was inspected after the extended run and was found in satisfactory condition. The crankcase web deflections taken

per outage and general vibration monitoring taken at six months will demonstrate any abnormal conditions that will be indicative of damage to the foundation. For these reasons, inspections at a more frequent interval are considered unnecessary.

Part No. 02-500C

Part Name: Circuit Breakers

TDI OG Recommendation: 1. Trip check circuit breakers each outage (P/M)

Duke Power Action: 1. Trip check circuit breakers every alternate outage and relay checks every outage (P/M)

Explanation: This component performed well during the extended run of the engine with over 750 hours and over 120 start/stops. Accordingly, it is intended to accomplish the Duke Power preventive maintenance schedule which requires relay checks per outage and trip checks of the circuit breakers every alternate outage.

Part No. 02-387A

Part Name: Crankcase Vacuum Fan

TDI OG Recommendation: 1. Inspect fan each alternate outage (P/M)

2. Inspect bearings each alternate outage (P/M)

Duke Power Action: 1,2. These inspections will not be accomplished. (P/M)

Explanation: This part is not installed on the TDI DSRV-16 diesels at Catawba.

Part No. 02-525C

Part Name: Barring Device Air Filter

TDI OG Recommendation: 1. Replace filters each outage (P/M)

2. Drain air filter during operation (P/M)

Duke Power Action: 1,2. These inspections will not be accomplished. (P/M)

Explanation: This part is not installed on the TDI DSRV-16 diesels at Catawba.