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July 16, 1984

Mr. Harold R. 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

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

Dear Mr. Denton:

The purpose of this letter is to submit Duke Power Company's plans for the periodic maintenance, inspection and surveillance of the Catawba 1A and 1B diesel engines. The plan is based on an engineering evaluation of the results of the Catawba 1A diesel engine post extended operating test inspections (reference 1), TDI Owner's Group recommendations, and NRC comments regarding diesel engine maintenance, inspection, and surveillance (reference 2). Inspection of the Catawba 1B diesel, following its extended operating test has just begun; if shown to be necessary by these inspections, changes will be developed to the maintenance, inspection and surveillance plan contained herein and submitted to the NRC.

A. Planned Program

Planned maintenance, inspection, and surveillance of the Catawba diesels is outlined in the attached Table 1, except that diesel engine periodic testing required by technical specifications is not shown since it is thoroughly described in the Catawba technical specifications (reference 3). It is considered that the maintenance, inspection and surveillance required by Table 1 satisfactorily addresses:

- The intent of NRC comments in reference 2.
- Periodic maintenance recommended by TDI in their technical manual.
- Results of inspections of the Catawba 1A diesel and other TDI diesels in nuclear service.

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B. NRC Comments

The NRC comments of reference 2 relative to items warranting special attention in the periodic maintenance, inspection and surveillance of nuclear plant diesels, and how Duke Power plans to resolve these comments, are discussed below.

B.1 Cylinder Heads

a. NRC Comment. Following engine shutdown, the engine should be rolled over with air pressure after four hours (during cooldown) with the indicator cocks open. Subsequent to cooldown, engines should be air rolled every 24 hours. Any cylinder heads discovered leaking must be replaced. The utility should confirm that written procedures are adequate to ensure that the cocks are closed following each air roll.

b. Discussion. All cylinder head leaks in Catawba diesels have been associated with welded-in repair plugs. Inspections have been performed of the Catawba 1A diesel, and will be performed of the 1B diesel, to identify and replace any cylinder heads with such welded-in repair plugs. Elimination of heads with welded-in repair plugs is expected to minimize the potential for future cylinder head leakage problems. In this regard, it should be noted that no cracks were noted in the Catawba 1A cylinder heads of the type which would be expected to lead to leakage of cooling water into the cylinders (cracks associated with welded-in plugs lead to leaks into the fuel injector cavities, not into the cylinders). The types of cracks which could lead to water leakage into the cylinders include radial cracks in the fire deck emanating from valve seats; this type of crack was not detected in diesel 1A.

Because of the absence of any history of water leakage into Catawba diesel cylinders, it is considered that daily air rolling of the diesels is not warranted. In addition, air rolling involves placing diesels out of service a significant amount of time, approaching an hour per day, which is undesirable. Moreover, if any difficulty should arise with the air roll operation, it is likely to cause the one hour time limit on having a diesel out of operation to be approached; because of technical specification requirements (reference 3), this would require an unnecessary start of the other diesel.

c. Duke Power Planned Action. The engines will be rolled within 4 hours after shutdown and weekly thereafter with indicator cocks open to check for water leakage into the cylinders. Air rolling of the diesels is also performed prior to routine engine starts. The operating procedures covering air rolling require that the cocks be closed after each roll.

B.2 Engine Block and Base

a. NRC Comment. Inspect the engine block and base every month or 24 hours of operation, whichever comes first. The inspection should be an external visual inspection requiring no disassembly. No other special maintenance is required if any defects found are "non-critical." Non-critical indications are defined as not causing oil or water leakage; not propagating; and not adversely affecting cylinder liners or stud holes.

b. Duke Power Planned Action Visual inspections of the block and base, as well as numerous other areas will be performed routinely during engine operation, i.e., every month or more often. These inspections will be directed at detecting signs of water or oil leakage at joints and similar areas, and at verifying that dangerous cracks are not propagating from stud holes in the block. The inspections will be performed and documented by operations personnel as part of normal operational checks and will be limited to those inspections which can be performed without disassembly of any parts.

B.3 Connecting Rods

a. NRC Comment. After each interval of 25 starts, 50 hours of operation or 6 months, whichever occurs first, all connecting rods should be visually inspected and all connecting rod bolts should be retorqued and the results recorded.

b. Discussion. Inspection of the Catawba 1A diesel connecting rods after over 800 hours of operation and 120 starts showed no signs of degradation and showed that the torques of the 1 1/2" connecting rod bolts had not relaxed. Accordingly, checks of bolt torques after 24 hours of operation or 25 starts appears to be excessively conservative. The NRC suggestion of a time period of 6 months for bolt preload checks appears to have no relation to processes which might cause bolt relaxation and is not warranted. In addition, inspection at 6 month intervals would result in significant loss of diesel availability, which is undesirable, and would require several additional starts of the other engine.

Checks of connecting rod bolt torques by ultrasonic length measurements have recently been completed for diesel 1A, and are considered to be a superior method of checking the preload in these bolts, as compared to use of torque measurements.

It should be noted that, if no significant loss of preload of these bolts occurs, then there is no chance of the joint degrading and no need to visually inspect the bolts. As noted above, relaxation of these bolts has not been experienced at Catawba, nor have the bolts experienced damage.

c. Duke Power Planned Action. All the 1 1/2" connecting rod bolt preloads will be checked at the first refueling outage. It is expected that about 25 starts and 50 hours of operation will have been accumulated at that time and that the maximum would be 50 starts and 200 hours of operation.

B.4 Lube Oil Checks

a. NRC Comment. The lube oil should be checked for water following pre-operational testing and then weekly and after each 24 hours of operation, whichever comes first. It should also be checked on a monthly basis for particulates and chemical contaminants associated with wear of bushings and bearings. Also, at intervals of one month, a sample should be collected from the bottom of the sump to check for water. All filters and strainers should also be checked monthly.

b. Discussion. The clean lube oil tank and the sump tank are checked for water on a monthly basis. No problems with water accumulation have been noted. Performing this check on a weekly basis is not warranted considering that the diesels are operated on a monthly basis and considering the lack of problems in this area.

A monthly check of lube oil for particulates and chemical contaminants associated with wear of bushings and bearings is not considered warranted since the diesel will accumulate only about 1 hour of operation per month. Accordingly, this type of check is planned to be performed each 6 months.

c. Duke Power Planned Actions.

- The lube oil will be checked for water following pre-operational testing and then monthly or after 24 hours of operation, whichever comes first.
- A sample will be collected from the bottom of the lube oil sump tank and checked for water each month.
- The lube oil will be checked by ferrographic and spectrographic means every 6 months to check for contaminants and particulates.
- The differential pressures across all filters and strainers will be checked during diesel operation, and filters and strainers will be cleaned or replaced as necessary.

B.5 Cylinder Head Studs, Rocker Arm Cap Screws, Air Start Valve Capscrews

a. NRC Comment. Each month 25% of the capscrews should be spot checked or torqued.

b. Discussion. Results of the Catawba 1A post extended operation test inspection reported in reference 1 showed that no problems with loss of bolt torque occurred in over 800 hours of operation. Subsequent to completion of pre-operational tests, only about 1 or 2 hours of operation are expected to be accumulated each month, which is not considered to be significant in regard to causing bolt preload relaxation. In addition, it should be noted that performance of preload checks would involve making the engine inoperable for extensive periods of time while the covers, subcovers and push rods are removed to provide access.

c. Duke Power Planned Action. Twenty-five percent of the head studs, rocker arm capscrews, and air start valve capscrews will be checked for preload relaxation during each refueling outage. The preloads checks will be performed either by torque measurements or by ultrasonic length measurements.

B.6 Push Rods

a. NRC Comment. Following pre-operational testing and then subsequently after each 24 hours of operation, cams, tappets, pushrods, etc. should be visually checked. This can be done at a time with the engine shutdown but without affecting its availability for service.

b. Discussion. Inspection of these parts requires removal of top covers and side covers and this involves having the diesel inoperable for extended periods of time. Accordingly, this inspection should be performed during an outage. Duke Power has friction welded push rods that have seen over 890 hours of operation and 1.2 x 10^7 cycles with no evidence of cracking.

c. Duke Power Planned Action. All cams, tappets, push rods, and rocker arms will be visually checked each refueling outage.

B.7 Lube Oil Filter Pressure Drop

a. NRC Comment. During standby, the lube oil pressure drop should be checked daily.

b. Discussion. During standby, the diesel lube oil system is in a steady state condition with a low flow rate. Since the diesel is not operating, production and release of particulates is minimal. Accordingly, weekly checks provide fully satisfactory monitoring of filter pressure drop.

c. Duke Power Planned Action. The prelube oil filter pressure drop will be checked on a weekly basis.

B.8 Crankshaft Deflection Tests

a. NRC Comment. Perform hot and cold crankshaft deflection checks every 6 months with the hot deflection tests performed within 15 minutes of engine shutdown.

b. Discussion. Hot and cold deflection tests performed to date up to over 810 hours of operation for diesel 1A have revealed no problems. Performance of these checks every 6 months, i.e. every 6 to 12 hours of operation, is not considered warranted. In addition, it would involve making the diesels inoperable for significant periods of time, which is not desirable.

Performing hot deflection tests within 15 minutes of shutdown is not permissible because of the need to let possibly explosive vapors escape from the crankcase. TDI indicates that hot deflection checks may be performed up to 4 hours after shutdown.

c. Duke Power Planned Action. Hot and cold web deflection tests will be performed at least once each refueling cycle. The hot deflection tests will be performed as expeditiously as possible and within the time period specified by the manufacturer, i.e., within 4 hours of engine shutdown.

B.9 Monitoring of Temperatures, Pressures and Vibrations

a. NRC Comment. During engine operation, the exhaust temperature for each cylinder should be monitored continuously by the operator and recorded on a log at hourly intervals, as should the temperatures entering and exiting the turbocharger. Other temperature and pressure readings for which the engine is instrumented should also be monitored continuously, and recorded hourly, or more frequently if specified by the manufacturer. These should at least include lube oil, jacket water, intercooler temperature, and air pressure. If the engine is equipped with an accelerometer on the main bearings and turbocharger, these should also be monitored continuously and recorded at hourly intervals. If the engine is not equipped with an accelerometer at these points, main bearing oil temperature should be monitored continuously and recorded hourly. Also, lube oil filter pressure should be monitored daily during engine operation.

b. Discussion. During diesel operation the following parameters are monitored:

- Cylinder Exhaust Temp.*
- Generator Stator Temp.
- Turbocharger Inlet Air Temp. (at Intercooler Inlet)*
- Turbocharger Outlet Air Temp. (at Intercooler Outlet)*

- Engine Lube Oil Temp.*
- Crankcase Vacuum
- Lube Oil Filter Delta P
- Lube Oil Pressure
- Lube Oil Tank Level
- Fuel Oil Filter Delta P
- Fuel Oil Pressure
- Fuel Oil Tank Level
- Jacket Cooling Water Temp.*
- Jacket Cooling Water Pressure
- Jacket Cooling Tank Level
- Control Air Pressure
- Lube Oil Pressure at Turbocharger Inlet
- Manifold Air Pressure
- Starting Air Pressure

The parameters marked with asterisks are continuously recorded as well as monitored.

The following parameters are recorded hourly on operating logs:

- Load - Watt Meter
- Power Factor
- Generator Volts
- Generator Amps
- Stator Temp.
- Lube Oil Pressure
- Lube Oil Filter D/P
- RB Turbo Oil Pressure
- LB Turbo Oil Pressure

- Fuel Oil Pressure
- Fuel Oil Filter D/P
- Jacket Water Pressure
- R&L Intake Manifold Pressure
- Lube Tank Level
- Cylinder Exhaust Temps.

Vibration switches located on the turbocharger are set to trip if excessive vibration levels are encountered. Vibration levels are also measured at various locations on the diesels on a semi-annual basis using hand-held probes.

It is considered that monitoring and recording the above parameters as discussed above provides a fully satisfactory program for monitoring the condition of the diesels.

c. Duke Power Planned Action. Pertinent diesel operating parameters will be monitored and recorded during diesel operation as described above.

C. Significant Features of Planned Program

C.1 Piston Skirt Inspection

The plan in Table 1 includes inspection of all piston skirts after about 10 years of operation to verify the absence of cracking at stud bosses and internal reinforcing rib - wrist pin boss junctions. This inspection would require extensive disassembly, which would not be warranted by the expected number of hours of operation. Accordingly, it is intended to monitor the performance of AE pistons in other TDI diesels during the next 10 years. If the accumulated experience provides confidence, as expected, that AE pistons are not subject to serious cracking concerns, then this inspection may be deleted or changed to a sample basis inspection.

C.2 Bearing Inspections

The plan in Table 1 is based on not disassembling connecting rods or main bearings for inspection until 10 years unless this is indicated to be prudent by ferrographic or spectrographic analyses of lube oil. At that time, a sample of the bearings will be inspected. The bases for this approach are as follows:

- TDI recommends bearing inspections be performed about every 5,000 hours (connecting rod bearings) to 10,000 hours (main bearings) of diesel operation. It is expected that, in 40 years, the Catawba diesels will accumulate less hours than TDI's recommended inspection periods of 5,000 and 10,000 hours.

- Ferrographic and spectrographic analyses provide a reliable method of ensuring that unusual or excessive bearing wear is not occurring.

- Extensive disassembly of the diesel exposes the engine to factors which can reduce reliability.

D. Summary Observations and Comments

D.1 The maintenance and inspections recommended by TDI for various time periods are based on the assumption that the diesels will accumulate hours at the rates normal for marine or utility diesels, e.g., 5,000 hours per year. However, in fact, the Catawba diesels are expected to accumulate less than 50 hours per year. Accordingly, the TDI recommendations are excessively conservative for the Catawba diesels. For this reason, TDI's recommended schedule has been relaxed in Table 1 for some items; however, the schedule in Table 1 still calls for much more frequent inspection and maintenance than would be required by the hours of operation.

D.2 The maintenance, inspection, and surveillance program of Table 1 applies to both the Catawba 1A and the 1B diesels.

D.3 The TDI Owners Group is preparing a recommended maintenance, inspection, and surveillance program. When it is issued, the Catawba program will be re-evaluated and revised as appropriate.

D.4 The enhanced inspections requested by the NRC regarding bolt preload checks require extensive amounts of work and appear to be not warranted based on there being no observed loss of preload in the Catawba 1A diesel after over 800 hours of operation. Accordingly, if initial preload checks after continued operation continue to show no loss of preload, Duke Power may request relaxation or elimination of these enhanced requirements.

D.5 The routine periodic maintenance, inspection, and surveillance covered in Table 1 should be considered preliminary and subject to change. As experience is gained with diesel operation, maintenance and test, these requirements may be adjusted. However, any changes to the enhanced requirements discussed in Section B above will be transmitted to the NRC prior to being implemented.

E. References

References used in this letter are listed below:

1. Duke Power Company report, Catawba Nuclear Station, Diesel Engine 1A Component Revalidation Inspection, Final Report, June 29, 1984.

2. NRC letter dated April 25, 1984, Docket No. 50-416, NRC Evaluation of the TDI Diesel Generator Reliability for Power Operation at Grand Gulf Nuclear Station, Unit 1.

3. Catawba Nuclear Station Technical Specifications

We trust that the information provided herein satisfies NRC needs regarding planned maintenance, inspection, and surveillance of the Catawba diesel engines. Please call me if I can be of any further service.

Very truly yours,

Hal. B. Tucker, Vice President
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HBT:JG:rmm

Enclosures

cc: Mr. James P. O'Reilly, Regional Administrator
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Table 1

Catawba 1A and 1B Diesel Engines

Periodic Inspection, Maintenance and Surveillance Schedule

Planned periodic inspection, maintenance, and surveillance for the Catawba 1A and 1B diesel engines is described in this table. It should be noted that additional inspection, maintenance, and surveillance will be performed on an as-required basis to correct or investigate actual or potential problems and as required by the plant technical specifications.

The periodic inspection, maintenance, and surveillance program is based on the plant following an 18 month refueling cycle. The anticipated operation of the diesels is as follows:

1 to 2 hours of operation per month of plant operation.

1 start per month of plant operation.

1 non prelube start per year.

The planned periodic maintenance, inspection, and surveillance is categorized below by the planned frequency of the work.

SCHEDULE

DURING OPERATION

PART NO.	PART NAME	REMARKS
--	TOTAL DIESEL AND SUPPORT SYSTEMS INCLUDING ENGINE BLOCK & BASE	GENERAL VISUAL CHECKS FOR LEAKAGE AND CHECKS OF COMPONENT PERFORMANCE PARAMETERS
02-500B	CONTROL PANEL ANNUNCIATORS	TEST ANNUNCIATOR LIGHTS VIA TEST BUTTON
02-500I	CONTROL PANEL PYROMETERS	CONTINUOUSLY MONITORED, CALIBRATED AS REQUIRED
--	STARTING AIR SYSTEM	DRAIN LOW POINTS, STRAINERS AND TANKS
--	LUBE OIL SYSTEM	CHECK LEVELS IN SUMP TANK, GOVERNOR AND PEDESTAL BEARING
02-371A	FUEL OIL PUMP RACK	CHECK FREEDOM OF PUMP RACK

WEEKLY

PART NO.	PART NAME	REMARKS
02-361	INDICATING COCKS	CHECK FOR WATER LEAKAGE, AND WITHIN 4 HRS OF SHUTDOWN
CN-115	BATTERY CHARGER	VERIFY BATTERY VOLTAGE

MONTHLY

PART NO.	PART NAME	REMARKS
CN-119	GENERATOR	MEGGAR TEST ROTOR AND STATOR
--	LUBE OIL SYSTEM	CHECK SYSTEM AND SUMP TANK FOR WATER, PARTICULATES, NEUTRALIZATION, AND SIMILAR CHARACTERISTICS
--	JACKET WATER SYSTEM	CHECK pH
CN-110	FULL FLOW LUBE OIL FILTER	DRAIN WATER & SLUDGE
--	SPACE HEATERS	CHECK OPERATION OF SPACE HEATERS IN CABINET

SEMI-ANNUAL

PART NO.	PART NAME	REMARKS
02-371A	FUEL RACK LINKAGE AND CONTROL SHAFT	LUBRICATE BEARINGS ON CONTROL SHAFT
--	LUBE OIL SYSTEM	CHECK LUBE OIL BY SPECTROGRAPHIC AND FERROGRAPHIC MEANS
--	DIESEL	VIBRATION MONITORING USING MANUAL PROBES

EACH REFUELING

PART NO.	PART NAME	REMARKS
—	LUBE OIL JETS	CHECK FOR PLUGGED OR BROKEN LINES
—	CYLINDERS	MEASURE COLD COMPRESSION & FIRING PRESSURE
00-700D	JACKET WATER STANDPIPE GAUGES	PER STATION CALIBRATION SCHEDULE
00-700E	JACKET WATER STANDPIPE SWITCHES	PER STATION CALIBRATE TEST SCHEDULE
02-310A	CRANKSHAFT	HOT AND COLD WEB DEFLECTION MEASUREMENTS
02-310C	CRANKSHAFT THRUST BEARING RING	MEASURE THRUST BEARING RING CLEARANCE
02-311A	CRANKCASE ASSEMBLY	REMOVE DOORS AND EXAMINE ENGINE
02-315E	CYLINDER HEAD STUDS	CHECK PRELOAD OF 25% OF STUDS
02-340A	CONNECTING RODS AND BUSHINGS	CHECK PRELOAD OF BOLTS
02-345A	INTAKE TAPPETS	VISUAL & PERFORM MEASUREMENT/ADJUSTMENT
02-345B	FUEL TAPPETS	VISUAL & PERFORM MEASUREMENT/ADJUSTMENT
02-350A	CAMSHAFT ASSEMBLY	VISUAL INSPECTION OF CAM LOBES
02-359	AIR START VALVE (BOLTING)	VERIFY TORQUE OF 25% OF BOLTS
02-365B	FUEL INJECTION TIPS	REMOVE, CLEAN, RESET, & REINSTALL
02-390G	ROCKER ARM BOLTING	VERIFY TORQUE
02-410A	GOVENOR OVERSPEED TRIP	PERFORMANCE TEST AND RECALIBRATE
02-411A	GOVENOR DRIVE GEAR AND SHAFT	VISUAL INSPECTION WHERE ACCESSABLE W/ELASTOMER REPLACEMENT
02-411B	GOVENOR DRIVE COUPLING	REPLACE ELASTOMER IN COUPLING
02-413A	GOVENOR LINKAGE	INSPECT FOR LOOSE PARTS ON LINKAGE
02-415A	SPEED REGULATING GOVENOR	CHANGE OIL, VERIFY SETTINGS
02-475B	TURBOCHARGER AIR BUTTERFLY VALVE	PERFORMANCE TEST, MAINTAIN AS REQUIRED
02-500D	CONTROL PANEL PRESSURE GAUGES	CALIBRATE PER STATION PROCEDURE
02-500F	CONTROL AIR ACCUMULATOR	PRESSURE TEST PER STATION CALIBRATION PROCEDURE
02-500G	CONTROL AIR SYSTEM VALVES	PRESSURE TEST PER STATION CALIBRATION PROCEDURE
02-500H	CONTROL AIR SYSTEM PRESSURE SWITCHES	CALIBRATE PER STATION PROCEDURE
02-500J	CONTROL SYSTEM RELAYS	TEST PER STATION SYSTEM PROCEDURE
02-500K	CONTROL SYSTEM SOLENOID VALVES	CALIBRATE PER STATION SYSTEM PROCEDURES
02-500L	CONTROL PANEL TACHOMETER	CALIBRATE PER STATION PROCEDURE
02-540D	LUBE OIL SUMP TANK HEATER	SET THERMOSTATS PER STATION PROCEDURE
02-630D	INSTRUMENTATION THERMOCOUPLES	FUNCTIONALLY TEST
02-689	OFF ENG. SAFETY ALARM SENSORS-WIRING	FUNCTIONALLY TEST
02-690	ENGINE ALARM SENSORS	FUNCTIONALLY TEST & CALIBRATE
02-691A	OFF ENG. SAFETY ALARM SENSORS-SWITCHES	FUNCTIONALLY TEST AND CALIBRATE PER STATION PROCEDURE
02-695B	ENG SHUTDOWN VALVES,REGULATOR ORIFICES	SET OR CALIBRATE PER STATION SYSTEM PROCEDURE
02-695C	ENGINE SHUTDOWN TRIP SWITCHES	TEST PER STATION SYSTEM PROCEDURE
CN-115	BATTERY CHARGER	TEST CAPACITANCE
CN-117/8	GENERATOR CONTROL	TEST AND ALIGN SEQUENCER PER STATION PROCEDURE
CN-128	MISC. EQUIP.-HEATER, JACKET WATER	SET THERMOSTATS PER STATION PROCEDURE
CN-119A	GENERATOR SHAFT AND BEARINGS	CHANGE LUBE OIL

EVERY OTHER REFUELING

PART NO.	PART NAME	REMARKS
02-365A	FUEL INJECTION PUMP	DISASSEMBLE & CLEAN, INSPECT ONE REPRESENTATIVE PUMP

EVERY FIVE YEARS

PART NO.	PART NAME	REMARKS
00-491B	TURBO INLET ADPTR-MTG HDWE & FLEX CONN	GENERAL VISUAL INSPECTION W/TURBO DISASSEMBLY
02-350C	CAMSHAFT SUPPORTS, BOLTING AND GEAR	VISUALLY INSPECT GEAR, MEASURE BACKLASH
02-355A	IDLER GEAR ASSEMBLY (CRANK TO PUMP)	VISUALLY INSPECT GEAR, MEASURE BACKLASH
02-355B	IDLER GEAR ASSEMBLY	VISUALLY INSPECT GEAR, MEASURE BACKLASH
02-410C	OVERSPEED TRIP COUPLING	REPLACE ELASTOMER, INSPECT FOR LOOSENESS ON SHAFT WHILE ASSEM.
MP22/23	TURBOCHARGER	CLEAN & POLISH SNAIL & VANES, MEASURE THRUST CLEARANCE

EVERY TEN YEARS

PART NO.	PART NAME	REMARKS
02-305A	MAIN BEARING CAP BASE ASSEMBLY	PT OR MT OF TWO SADDLES
02-305D	MAIN BEARING CAPS	GENERAL VISUAL INSPECTION W/ DISASSEMBLY (TWO CAPS)
02-305F	MAIN BEARING CAP SEALS, GASKETS, & COVER	GENERAL VISUAL INSPECTION W/DISASSEMBLY (TWO CAPS)
02-307A	LUBE OIL INTERNAL HEADERS	GENERAL VISUAL INSPECTION W/DISASSEMBLY
02-307B	LUBE OIL TUBING AND FITTINGS	GENERAL VISUAL INSPECTION W/DISASSEMBLY
02-307C	LUBE OIL INTERNAL SEALS	GENERAL VISUAL INSPECTION W/DISASSEMBLY
02-307D	LUBE OIL LINE SUPPORTS	GENERAL VISUAL INSPECTION W/DISASSEMBLY
02-310B	CRANKSHAFT BEARING SHELLS	VISUAL & RT OF SAMPLE IN CONJUNCTION WITH DISASSEMBLY
02-315A	CYLINDER BLOCK	PT ACCESSABLE AREAS W/CYL HEAD DISSASSEMBLY
02-315C	CYLINDER LINER	VISUAL INSPECTION IN CONJUNCTION WITH DISASSEMBLY
02-340B	CONNECTING ROD BEARING SHELLS	DIMENSIONAL, VISUAL, & RT OF BEARING SHELLS
02-341A	PISTONS	VISUAL AND MT INSPECTIONS
02-341B	PISTON RINGS	REPLACEMENT RINGS INSTALLED DURING REASSEMBLY
02-341C	PISTON PIN ASSEMBLY	VISUAL INSPECTION OF CHROME PLATING
02-359	AIR START VALVE	REMOVE, CLEAN & VISUALLY INSPECT W/DISASSEMBLY
02-360A	CYLINDER HEAD	PT SELECTED AREAS OF FIRE DECK
02-360B	INTAKE AND EXHAUST VALVES	VISUALLY INSPECT SEATS & CHROME PLATING
02-360D	VALVE SPRINGS	VISUAL INSPECTION W/DISASSEMBLY
02-380B	EXHAUST MANIFOLD BOLTING	5X VISUAL INSPECTION W/TURBO DISASSEMBLY
02-390A	ROCKER ARM ASSEMBLY	VISUAL INSPECTION OF SOCKETS
02-390B	EXHAUST ROCKER ARM ASSEMBLY	VISUAL INSPECTION OF SOCKETS
02-390C	PUSHRODS	VISUAL INSPECTION OF WELDS
02-390D	CONNECTOR PUSHROD	VISUAL INSPECTION OF WELDS
02-390E	ROCKER ARM BUSHING	VISUAL INSPECTION WHERE ACCESSABLE
02-442A	STARTING AIR DISTRIBUTOR ASSEMBLY	VISUALLY INSPECT POPPET VALVES SPOOL END & TIMING CAM
02-550	FOUNDATION BOLTS AND ANCHORS	VERIFY TORQUE, CHECK FOUNDATION BOND
CN-111	LUBE OIL HEAT EXCHANGER	INSPECT FOR FOULING, EROSION, ETC.
CN-120	JACKET WATER HEAT EXCHANGER	INSPECT FOR FOULING, EROSION, ETC.
F-068	INTERCOOLER	VISUAL INSPECTION OF WATER SIDE

AS REQUIRED

PART NO.	PART NAME	REMARKS
02-387D	CRANKCASE VENTILATORS & FLUID MANOMETER	MONITOR DURING OPERATION AND CALIBRATE AS REQUIRED
02-441B	START AIR STRAINERS AND FILTERS	CLEANING/REPLACEMENT GOVERNED BY D/P
02-455A	FUEL OIL FILTERS	REPLACEMENT GOVERNED BY D/P
02-455B	FUEL OIL STRAINERS	REPLACEMENT GOVERNED BY D/P
02-540A	LUBE OIL SUMP TANK	BASED ON OIL CHANGE REQUIREMENT
02-825D	FUEL OIL DUPLEX STRAINER	CLEANING GOVERNED BY D/P
02-835A	AIR DRYER	CHANGE DESSICANT
CN-106	INTAKE AIR FILTER	REPLACEMENT GOVERNED BY D/P
CN-110	FULL FLOW LUBE OIL FILTER	REPLACEMENT GOVERNED BY D/P
CN-122	OIL PRELUBE FILTER	CHANGE GOVERNED BY D/P
CN-131	LUBE OIL KEEPWARM STRAINER	CLEANING GOVERNED BY D/P
SE-025	LUBE OIL FULL PRESSURE STRAINER	CLEANING GOVERNED BY D/P

INSPECTION, MAINTENANCE AND SURVEILLANCE PLAN NOTES

Note 1: Time intervals listed should be understood as meaning the indicated period +/- 50% for time intervals shorter than a refueling interval.

Note 2: Items requiring 5 and 10 year inspections may be performed at the refueling either before or after the indicated period.