

746  
RELATED CORRESPONDENCE

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of )

DUKE POWER COMPANY, et al. )

(Catawba Nuclear Station )  
Units 1 and 2) )

Docket No. 50-413  
50-414

DOCKETED  
USING

'84 AGO -3 A11:20

APPLICANTS RESPONSE TO PALMETTO ALLIANCE  
AND CAROLINA ENVIRONMENTAL STUDY GROUP  
INTERROGATORIES FOR WHICH THE BOARD  
HAS GRANTED INTERVENORS' MOTION TO COMPEL

On July 16, 1984, during the conference call of the Board and Parties, the Board granted the Intervenor's Motion to Compel with respect to seven interrogatories, as modified by the Board, and denied the Motion with respect to the remaining interrogatories. Pursuant to this partial grant of the Motion to Compel, Applicants hereby submit their responses to the compelled interrogatories.

Applicants' Responses to Interrogatories as Modified by the Board

The responses are provided below. The initials of these individuals providing basic information incorporated in the responses appear next to the answers. Intervenor's should make advance arrangements with A. V. Carr, Counsel for Duke Power, if they desire to inspect the documents indicated in these responses. The documents will be available for inspection and copying at the Duke Power Company offices located at 422 South Church Street, Charlotte, North Carolina.

15. Produce for inspection and copying all documentation required by Applicants from TDI regarding the Catawba diesel generators, including but not limited to those summarized in Attachment 12-1 to Applicants February 22, 1984 response to the NRC Staff.

The documents requested have been made available for inspection and copying. The documents are listed in Attachment 1.

(JOB, JDH)

16. Identify in detail, and make available for inspection and copying any and all records of Applicants' surveillance performed at TDI with respect to the Catawba diesel generators.

The documents requested have been made available for inspection and copying. The documents are listed in Attachment 2. (JMC)

17. Identify in detail all records in your possession, not previously given to Intervenor, reflecting shop testing or qualification testing with respect to the Catawba diesel generators, including but not limited to the testing identified in attachment 6-2 to the above-referenced submittal. Make available such records for inspection and copying.

The requested records are identified in Attachment 3. These records have been made available for inspection and copying.

(JDH)

18. Identify in detail, and make available for inspection and copying any records of inspections of the Catawba diesel generators at TDI as well as after receipt at Catawba.

The requested inspection reports are identified in Attachment 4. These reports have been made available for inspection and copying. (HLA, EEB)

19. Identify any components of the Catawba diesel engines in your possession not manufactured by TDI and describe in detail the surveillance and inspection records applicable to each component. Please make available such records for inspection and copying.

Applicants, in their original response, interpreted the question to be directed to major components of the diesel engines. The only major components of the engine which were not manufactured by TDI are the turbochargers and fuel injection pumps. Other components which were not manufactured by TDI are identified in Attachment 5. (JOB)

Direct surveillance at United Technologies/Elliott Corporation was performed by the Duke Power QA Vendors Division on 3/15/84, 3/29/84 and 6/4/84 on repair work on the Duke turbochargers. These surveillance reports are contained in Attachment 2. Subvendor procurement by TDI is regularly reviewed during surveillance visits and reevaluations of the TDI QA Program. (JMC)

21. What failures or deficiencies have Applicants or the NRC Staff identified in the Catawba engines in procurement, vendor surveillance, or receiving inspection programs? For other DSRV-16 engines?

The failures or deficiencies identified during the period from procurement to receipt inspection are identified in Attachment 6. These deficiencies relate only to the Catawba diesel engines. Applicants are unaware of deficiencies in other DSRV-16 engines, and believe that this question is directed to the NRC Staff. Documents have been made available for inspection and copying.  
(HLA, JMC, JOB)

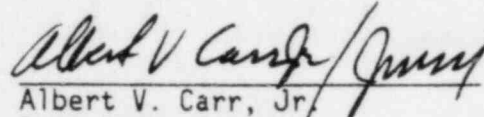
- 35A. Describe in detail the Catawba maintenance and testing program for emergency diesel generators.

Information as to the Catawba maintenance and testing program is included in the Duke submittal to the NRC dated June 29, 1984 entitled "Catawba Nuclear Station Diesel Engine 1A Component Revalidation Inspection". This public document was served on Intervenor. Additional information on the subject is in the letter to Harold R. Denton from Hal B. Tucker, dated July 16, 1984, stating Duke Power Company's plans for the periodic maintenance, inspection, and surveillance of the Catawba 1A



and 1B diesel engines. This letter was served on Intervenor,  
but not on the Board. Therefore, a copy of this letter is  
provided as Attachment 7. (RPM)

Respectfully submitted,



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August 1, 1984

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

Docket Nos. 50-413  
50-414

I hereby certify that "Applicants Response To Palmetto Alliance And Carolina Environmental Study Group Interrogatories For Which The Board Has Granted Intervenors' Motion To Compel" in the above captioned matter have been served upon the following by deposit in the United States mail this 1st day of August, 1984.

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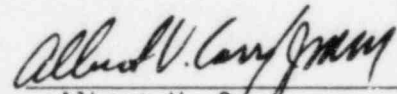
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Albert V. Campbell

Original TDI Diesel Engine Documentation

Shipment No.	Description	Part or Serial No.	930.1	Data Report
4	Master Engine Book for Job #2761, Engine #75017 (Catawba Engine 1B)			
10A	Master Engine Book for Job #2762, Engine #75018 (Catawba Engine 1A)			
29	Capscrews & Hexnuts	Various P/N's	X	
32	Roll Pins	GC-001-182	X	
35	Fuel Oil Pumps	980018-1 980018-2 980018-3 980018-4		X X X X
38	Misc. Parts	Various P/N's	X	
39	Misc. Parts	Various P/N's	X	
41	Fuel Oil Pumps (See Shipment #35)	980018-1 980018-2 980018-3 980018-4		X X X X
67	Screws, Nuts, Bolts	Various P/N's	X	
68	Bearings, Springs, Bolts	Various P/N's	X	
70	Capscrews, Nuts, Pins	Various P/N's	X	
73	Gaskets, Springs, Rings	Various P/N's	X	
92A	Cylinder Head Cover Nuts & Washers	1A-5530 Various P/N's	X X	
117	Hex Hd. Caps & Nuts for Engine 75017-2761 & 75018-2762	GB-001-121 GB-034-006	X X	
122	Gaskets, Capscrews, Nuts	Various P/N's	X	
131	Capscrews	GB-001-121	X	
200	Ferrule, Back	CE-014-127	X	
241	Piston Skirts for 75018-2762	03-341-02-AN	X	

Attachment 1  
Response to PA/CESG Interrogatory 15  
Page 2

Shipment No.	Description	Part or Serial No.	930.1	Data Repor
242	Gasket, Rings, Hex Nuts, Washers	Various P/N's	X	
243	Studs, O-Rings, Pins, Washers	Various P/N's	X	
244	Piston Skirts for Engine 75017-2761	03-341-02-AN	X	
245	Dowel, Stud, Washers	Various P/N's	X	
246	Piston Skirts for Engine 75017-2761	03-341-02-AN		X
298	Push Rods Connector	02-390-06-AB 02-390-07-AG	X X	
355	Turbochargers	A-609063-3 A-809202-3 A-809202-2 A-809201-4	X	

TDI Replacement Parts Documentation

<u>Part Description</u>	<u>Documentation</u>
Connecting Rod Bearing Shell Upper & Lower	<sup>1</sup> 930, C of C, QA-505D, QA-605A <sup>2</sup> X-Ray test reports, G-1A <sup>3</sup> <sup>4</sup>
Piston Skirts	930, C of C, QA-505D, QA-605A, G-1A, MT Reports, Heat Treat Reports, PT Reports, Hardness Reports
Push Rods, Connector Rods	930, C of C, QA-505D, QA-605A, G-1A(Hold), Heat Treat Reports, Hardness Reports, PT Test (Partial)
Subcovers	930, C of C, QA-505D, QA-605A, PT Tests Reports, G-1A
Connecting Rod Bushings	930, C of C, QA-505D, QA-605A, G-1A
Cylinder Head Assy.	930, C of C, G-1A, MT, UT Reports, Hydrostatic Test Reports
Exhaust Valves	QA-505D, QA-605A, G-1A, Visual Inspection
Piston Ring Sets	930, C of C, QA-605A, G-1A
Roll Pins	930, C of C, G-1A

Notes:

1. Vendor Quality Assurance Certification
2. Certificate of Compliance from Vendor
3. Duke Augmented Receipt Inspection Requirement
4. Duke Vendor Release
5. Duke Receipt Inspection Report



CATAWBA NUCLEAR STATION  
DRAWINGS & DOCUMENTS WHICH  
APPLY TO THE DIESEL ENGINES

CNM1301.00-0001	Diesel Generator Installation Drawing
0002	D/G Foundation Drawing
0003	Concrete Foundation Detail With Engine Erection & Installation Note
0004	Diesel Engine Mounting Detail Drawing
0005	Consideration For Mounting Diesel Engine
0007	D/G Jacket Water Schematic
0031	Engine Schematic
0061	Governor Wiring Diagram
0071	Plant Wiring Diagram, Governor
0072	Outline EGA Control Box
0073	Outline Governor Servo Booster Motor
0074-1	Potentiometer Assembly, Motor Operated
-2	Potentiometer Assembly, Motor Operated
0075	Governor O/L EGB35
0076	5 Ohm Resistor Box
0122	Instructions/Motor Operated Potentiometer
0135	Anchor Bolts
0160	Exhaust Intake & Crankcase Piping Schematic
0161-1	Engine Electric Diagram & Schematic
0161-2	Engine Electric Diagram & Schematic
0173	Seismic Qualification Procedure
0175	Engine Connection Nozzle Loads
0185	Load Application Schedule - LOCA
0186	Load Application Schedule - Blackout
0189	Operation and Maintenance
0212-1	Assembly & Inspection Procedure
-2	Assembly & Inspection Procedure
-3	Assembly & Inspection Procedure
-4	Assembly & Inspection Procedure
-5	Assembly & Inspection Procedure
0237-1	D/G Instruction Manual, Volume 1
-2	D/G Instruction Manual, Volume 2
-3	D/G Instruction Manual, Volume 3
0247	Engine Qualification Test Report
0251	Platform Support Bracket/S.A. Manifold Interference Mod
0271	Platform Support Bracket, Engine 1A
0284	D/G Technical Specification
0285-1	Seismic Qualification Reports For D/G Units
0285-2	Seismic Qualification Reprots For D/G Units
0285-3	Seismic Qualification Reports For D/G Units
0298	D/G Service Information Memos
0299	Engine Test Manual
0300	Engine Test Manual
0301	Engine Test Manual

CATAWBA NUCLEAR STATION  
DRAWINGS & DOCUMENTS WHICH  
APPLY TO THE DIESEL ENGINES

0302	Engine Test Manual
CNM1301.00-0303	Seismic Qualification Report On Magnetic Pickup
0306	Outline Governor Drive Assembly
0307	D/G Governor Overspeed Trip Assembly
0312	Assembly Drawing D/G Turbocharger Lube Oil Fittings
0314	Assembly Drawing D/G Fuel Oil Header
0315	Assembly Drawing D/G Turbo Water Piping
0316	Assembly Drawing D/G Water Discharge Manifold
0319	Assembly Drawing D/G Internal Lube Oil Lines
0322	Assembly Drawing D/G Exhaust Manifold
0323	Assembly Drawing D/G Water Inlet
0324	Assembly Drawing D/G Cylinder Block & Liners
0326	D/G Engine Pneumatic Schematic
0332	Outline TWO PC Piston Stud For D/G
0333	Outline Piston Assembly For D/G

DUKE POWER COMPANY QA ACTIVITY  
Transamerican Delaval  
Oakland, California

Date of Activity	Type Activity	Activity Accomplished
6/19-20/84	Surveillance	Witness MT exams of piston skirts.
5/16-17/84	Surveillance	Investigate documentation for heat treating cylinder skirts.
5/7/84	Surveillance	Perform surveillance on parts prior to shipment.
3/29/84	Surveillance	Delaval and Elliott on turbochargers.
3/15/84	Surveillance	Verify QA Program - Elliott turbochargers.
2/10/84	Surveillance	Review documentation and details on push rods.
2/9/84	Surveillance	Review fastener order.
2/9/84	Surveillance	Review parts - turbo-charger.
2/7-10/84	Surveillance	Reworking of piston skirts.
11/21-22/83	Audit	N45.2 - 11 Criteria
11/18/83	Evaluation	Review of the QA Program status in conjunction with ASME Authorization.
5/17/83	Surveillance	Witnessed magnetic particle examination of returned piston skirts. Reviewed procedures, NDE qualifications.
2/28 & 3/1 '83	Surveillance	Witnessed rework of re-turned piston skirts from Catawba consisting of heat treating, non-destructive testing and dimensional verification.

**DUKE POWER COMPANY QA ACTIVITY**  
**Transamerican Delaval**  
**Oakland, California**

Date of Activity	Type Activity	Activity Accomplished
2/7-10/83	Surveillance	Witnessed rework of eleven returned piston skirts, consisting of heat treating, nondestructive testing & dimensions.
4/21-22/82	Survey	N45.2, 18 Point Criteria. This survey performed due to the nonconformances written on Delaval piping at the Catawba site.
10/5/81	Program Eval.	Review of the QA Program status in conjunction with ASME authorization.
6/17/80	Program Evaluation	Review of the QA Program status in conjunction with ASME authorization.
12/11-17/79	Surveillance	Witness DEMA test on engine S/N 75019. Witnessed assembling operations of engine S/N 75020, witnessed testing of control panels for S/N 75017 and S/N 75020. Reviewed available documentation.
4/9-12/79	Surveillance	Witness qualification testing of engine S/N 75018 & generator S/N 175035-200. Reviewed available documentation for engine S/N 75017 & auxiliary equipment.
2/21-3/1 '79	Surveillance	Witness testing of engine S/N 75017 & assembling of engine S/N 75018. Reviewed process sheets.

DUKE POWER COMPANY QA ACTIVITY  
 Transamerican DeLaval  
 Oakland, California

Date of Activity	Type Activity	Activity Accomplished
1/29-2/1 '79	Surveillance	Witness hydrostatic testing of cylinder block. Witness liquid penetrant on main bearing saddle. Witness bluing-in of base prior to assembling bearings and crankshaft. Witness torqueing of bearing caps. Engine S/N 75017 Reviewed process sheets.
10/17-18/78	Survey	N45.2, 18 Point Criteria
1/17/77	Surveillance	Reviewed documentation for Unit 1 & 2 embedment equipment.
9/21-23/76	Survey	N45.2, 18 Point Criteria
6/10-11/76	Surveillance	Reviewed documentation ie; manuals and procedures.
9/30&10/1 '74	Survey	N45.2, 18 Point Criteria
2/17/72	Survey	Reviewed: Manufacturing Engineering, Quality Control, Records, Testing, Subcontractors, Seismic Testing & Reliability Testing.

CATAWBA NUCLEAR STATION  
DRAWINGS & DOCUMENTS WHICH  
APPLY TO THE DIESEL ENGINES

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0002	D/G Foundation Drawing
0003	Concrete Foundation Detail With Engine Erection & Installation Note
0004	Diesel Engine Mounting Detail Drawing
0005	Consideration For Mounting Diesel Engine
0007	D/G Jacket Water Schematic
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0302	Engine Test Manual



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0326	D/G Engine Pneumatic Schematic
0332	Outline TWO PC Piston Stud For D/G
0333	Outline Piston Assembly For D/G

TDI Diesel Engine 1A Inspection Records  
(After receipt at Catawba)

Description of various forms included:

<u>Form</u>	<u>Description of Form</u>
P-1A	Receiving Inspection Report
930.1C	DPCo QA Dept. Supplier QA Cert.
CP-350	Diesel Generator Doweling Record
L-71H	Equipment Lubrication Record
M-5A(&attachments)	Structural Grouting Inspection
M-9D(&attachments)	Process Control Sheet for Installation of Rotating and Non-Rotating Equipment
M-10A	Process Control & Inspection of Torque (or tension) to Bolts and Studs
M-9B	Equipment Release Document for the Installation of Rotating and Non-Rotating Equipment
M-22A	Equipment Disassembly and Reassembly Process Control
M-4A	Weld Process Control Sheet
F-10A(&attachments)	Alteration/Repair Process Control
Q-1A(&attachments)	Non-Conforming Item Report
Work Request 785 (&attachments)	Nuclear Station Work Requests
F-14A	Release For On-site Vendor Work
Q-1D	Reportability Evaluation Request
Miscellaneous Instrument Calibration Records	
M-4J	Temporary Weld Check-off List
R-2A	Inspection Discrepancies

Complete Listing of Inspection Records:

930.1C	Engine S/N 75018
CP-350	Engine Doweling Record S/N 2762-75018
L-71H	Diesel Engine 1A-Governor
M-5A, CP-377	Carter-Waters Corporation Grouting Records
M-9D	Diesel Engine 1A
M-10A	Joint EPQ-1609-011-AB Rev.0
M-10A	Joint EPQ-1609-011-FWB Rev. 0
M-9B	ID Number 2762-75018
M-9D(7 shts./4 attachs.)	ID Number 2762-75018
Miscellaneous Instrument Calibration Records (18 pages)	
M-10A	Joint EPQ-1609-011-VG5 Rev. 0
P-1A	Engine S/N 2762 70518

<u>Form</u>	<u>Description of Form</u>
M-10A	Joint EPQ-1609-011-VG6 Rev. 0
M-10A	Joint EPQ-1609-011-VG7 Rev. 0
M-10A	Joint EPQ-1609-011-VG8 Rev. 0
M-10A	Joint EPQ-1609-011-VG9 Rev. 0
M-10A	Joint EPQ-1609-011-VG10 Rev. 0
M-10A	Joint EPQ-1609-011-VG11 Rev. 0
M-10A	Joint EPQ-1609-011-VG12 Rev. 0
M-10A	Joint EPQ-1609-011-VG13 Rev. 0
M-10A	Joint EPQ-1609-011-VG14 Rev. 0
M-10A	Joint EPQ-1609-011-VG16 Rev. 0
M-10A	Joint EPQ-1609-011-VG17 Rev. 0
M-10A	Joint EPQ-1609-011-VG18 Rev. 0
M-10A	Joint EPQ-1609-001-VG104 Rev. 0
M-10A	Joint EPQ-1609-001-VG105 Rev. 0
M-10A	Joint EPQ-1609-001-VG107 Rev. 0
M-10A	Joint EPQ-1609-001-VG106 Rev. 0
M-22A	CN: 1609-001, SN: 3 sheet 1.
M-9A	Sheet 1 of 1, Rev. 0, EPQ-FD-1A
M-10A	Joint EPQ-1609-001-FD1 Rev. 0
M-10A	Joint EPQ-1609-001-FD2 Rev. 0
M-4A	Weld No. FDRR1A1-1
M-4A	Weld No. FDRR1A1-2
F-10A	Serial No. 741
M-4A	Weld No. FDRR1A1-3
M-4A	Weld No. FDRR1A1-4
M-4A	Weld No. FDRR1A1-5
F-10A	Serial No. 742
M-4A	Weld No. FDRR1A2-1
M-4A	Weld No. FDRR1A2-2
M-4A	Weld No. FDRR1A2-3
M-4A	Weld No. FDRR1A2-4
M-4A	Weld No. FDRR1A2-5
F-10A (2 Pages)	Serial No. 505
M-4J	Unit No. 1A
R-2A	Serial No. PC-4877
F-10A (2 Pages)	Serial No. 485
M-4J	Unit No. 1

<u>Form</u>	<u>Description of Form</u>
M-22A	CN: 1609-0011, SN: 3 Sheet 1
M-10A	Joint EPQ-1609-001-KD1 Rev. 1
M-10A	Joint EPQ-1609-001-KD1 Rev. 0
M-10A	Joint EPQ-1609-001-KD1 Rev. 1
M-10A	Joint EPQ-1609-001-KD2 Rev. 0
M-10A	Joint EPQ-1609-001-KD2 Rev. 1
M-10A	Joint EPQ-1609-001-KD3 Rev. 0
M-10A	Joint EPQ-1609-001-KD3 Rev. 1
M-10A	Joint EPQ-1609-001-KD4 Rev. 0
M-10A	Joint EPQ-1609-001-KD4 Rev. 1
M-10A	Joint EPQ-1609-001-KD5 Rev. 1
M-10A	Joint EPQ-1609-001-KD5 Rev. 1
M-10A	Joint EPQ-1609-001-KD5 Rev. 0
M-10A	Joint EPQ-1609-001-KD6 Rev. 1
M-10A	Joint EPQ-1609-001-KD6 Rev. 0
M-10A	Joint EPQ-1609-001-KD6 Rev. 1
M-10A	Joint EPQ-1609-001-KD7 Rev. 0
M-10A	Joint EPQ-1609-001-KD8 Rev. 0
M-10A	Joint EPQ-1609-002-KD9 Rev. 0
M-10A	Joint EPQ-1609-002-KD10 Rev. 0
M-10A	Joint EPQ-1609-002-KD11 Rev. 0
M-10A	Joint EPQ-1609-002-KD12 Rev. 0
M-10A	Joint VN1AIMA-1 Rev. 0
M-10A	Joint VN1AIMA-2 Rev. 0
M-10A	Joint VN1AIMA-3 Rev. 0
M-22A	CN-1609-001, F-13A #2484 Rev. 0
M-10A	Joint EPQ-1609-001-EQA Rev. 0
M-10A	Joint EPQ-1609-011-ALA Rev. 0
M-9D	Serial No. 75018-2762 Rev. 0
Q-1A	Serial No. 15497
M-10A	Joint EPQ-1609-001-LD1 Rev. 0
M-22A	CN-2609-001 Rev. 0
M-10A	Joint EPQ-1609-011-LOPB Rev. 0
M-10A	Joint EPQ-1609-011-LCB Rev. 0
M-22A	Serial No. 75018 Rev. 0
M-22A	Serial No. 75018-2762 Rev. 0

<u>Form</u>	<u>Description of Form</u>
M-22A	609-00 (2 pages) Rev. 0
Q-1A	Serial No. 16035
F-14A	Work Scheduled Jan. 24, 1983
M-10A	Joint EPQ-1609-011-VG15 Rev. 0

TDI Diesel Engine 1B Inspection Records  
(After Receipt at Catawba)

Description of various forms included:

<u>Form</u>	<u>Description of Form</u>
P-1A	Receiving Inspection Report
M-22A	Equipment Disassembly and Reassembly Process Control
M-10A	Process Control and Inspection of Torque (& Tension) to Bolts and Studs
M-9D	Process Control Sheet for Installation of Rotating and Non-Rotating Equipment
M-5A	Structural Grouting Inspection
CP-350	Diesel Generator Doweling Record
F-10A	Alteration/Repair Process Control
M-4A	Weld Process Control Sheet
Q-1A	Non-Conforming Item Report
M-4I	Piping Surface Check
F-9B	Detailed Process Control Sheet
R-2A	Inspection Discrepancies
R-3A	Variation Notice
F-14A	Release For On-Site Vendor Work
Work Request 784 (&attachments)	Nuclear Station Work Request
930.1C	DPCo QA Dept. Supplier QA Cert.

Complete Listing of Inspection Records:

P-1A	Engine S/N 2761-75017
P-1A	4 pieces "N" Stamp Piping Parts for 75017
M-22A	Serial No. G89A 417J
M-10A	Joint EPQ-1609-012-LCB
M-10A	Joint EPQ-1609-012-AB
M-10A	Joint EPQ-1609-012-FWB
M-9D	Revision 1 for 75017-2761 (14 pages)
M-9D	Revision 0 for 75017-2761 (2 pages)
M-5A	CN-1609-012 (3 pages)
CP-350	Serial No. 75017-2761
M-10A	Joint EPQ-1609-002-LD1 Rev. 0
M-10A	Joint EPQ-1609-002-KD9 Rev. 0
M-10A	Joint EPQ-1609-002-KD10 Rev. 0
M-10A	Joint EPQ-1609-002-KD11 Rev. 0
M-10A	Joint EPQ-1609-002-KD12 Rev. 0



<u>Form</u>	<u>Description of Form</u>
M-10A	Joint EPQ-1609-002-KD13 Rev. 0
M-10A	Joint EPQ-1609-002-KD14 Rev. 0
M-10A	Joint EPQ-1609-002-KD15 Rev. 0
M-10A	Joint EPQ-1609-002-KD16 Rev. 0
M-9D	EPQ-FD-1B
M-10A	EPQ-1609-002-FD2 Rev. 0
M-10A	EPQ-1609-002-FD1 Rev. 0
F-10A	Serial No. 743
M-4A	Weld FDRR1B1-1
M-4A	Weld FDRR1B1-2
M-4A	Weld FDRR1B1-3
M-4A	Weld FDRR1B1-4
M-4A	Weld FDRR1B1-5
M-4A	Weld FDRR1B1-4A
Q-1A	Serial No. 15751
F-9B	Weld No. FDRR1B1-4A
M-4A	Weld FDRR1B2-1
M-4A	Weld FDRR1B2-2
M-4A	Weld FDRR1B2-3
M-4A	Weld FDRR1B2-4
M-4A	Weld FDRR1B2-5
M-22A	Rev. 0 for Serial No. 75017
F-10A	Serial No. 744
R-2A	Serial No. W-172
M-10A	Joint EPQ-1609-012-VG1 Rev. 0
M-10A	Joint EPQ-1609-012-VG2 Rev. 0
M-10A	Joint EPQ-1609-012-VG2 Rev. 1
M-10A	Joint EPQ-1609-012-VG3 Rev. 0
M-10A	Joint EPQ-1609-012-VG4 Rev. 0
M-10A	Joint EPQ-1609-012-VG4 Rev. 1
M-10A	Joint EPQ-1609-012-VG5 Rev. 0
M-10A	Joint EPQ-1609-012-VG6 Rev. 0
M-10A	Joint EPQ-1609-012-VG7 Rev. 0
M-10A	Joint EPQ-1609-012-VG8 Rev. 0
M-10A	Joint EPQ-1609-012-VG9 Rev. 0
M-10A	Joint EPQ-1609-012-VG10 Rev. 0
M-10A	Joint EPQ-1609-002-VG10 Rev. 1
930.1C	Engine S/N 75017

<u>Form</u>	<u>Description of Form</u>
M-10A	Joint EPQ-1609-012-VG13 Rev. 0
M-10A	Joint EPQ-1609-012-VG14 Rev. 0
M-10A	Joint EPQ-1609-012-VG15 Rev. 0
M-10A	Joint EPQ-1609-012-VG16 Rev. 0
M-10A	Joint EPQ-1609-012-VG17 Rev. 0
M-10A	Joint EPQ-1609-012-VG18 Rev. 0
M-10A	Joint EPQ-1609-002-VG19 Rev. 0
M-10A	Joint EPQ-1609-002-VG19 Rev. 1
M-10A	Joint EPQ-1609-002-VG104 Rev. 0
M-10A	Joint EPQ-1609-002-VG105 Rev. 0
M-10A	Joint EPQ-1609-002-VG106 Rev. 0
M-10A	Joint EPQ-1609-002-VG107 Rev. 0
M-22A	Unit 1-B, System EPQ
M-22A	SN2 Sheet 1, CN: 1609-012
M-9D	CN-1609-002 Rev. 0
R-3A	Serial No. 40952
M-10A	Joint VN1BIMB-1 Rev. 1
M-10A	Joint VN1BIMB-2 Rev. 1
M-10A	Joint VN1BIMB-3 Rev. 1
M-22A	CN-1609-002 Rev. 1
M-10A	Joint EPQ-1609-012-AIA Rev. 0
M-10A	Joint EPQ-1609-012-EQA Rev. 0
M-22A	CN: 1609-002 Rev. 0
M-22A	CN: 1609-002 Rev. 0, Ref. F-13A #1698
Q-1A	Serial No. 16035 (21 pages)
F-14A	Work Scheduled Jan. 24, 1983
Work Request No. 784 and Supplements (384 pages)	

Diesel Engine 1A & 1B Turbocharger  
(& Associated Components) Repair Documentation

Description of various forms included:

<u>Form</u>	<u>Description of Form</u>
P-1A	Receiving Inspection Report
M-22A	Equipment Disassembly & Reassembly Process Control
M-10A	Process Control & Inspection of Torque or Tension to Bolts & Studs
R-3A	Variation Notice
930.1C	DPCo QA Dept. Supplier QA Certification

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Complete Listing of Inspection Records:

P-1A	Engine 2764-75020
M-22A	Diesel Engine 75019-2763
M-10A	Joint EQC-2609-002 KD2 Rev. 0
M-22A	Process Control, Diesel Engine 2764-75020
P-1A	Turbochargers S/N A609063-3, A809202-3, A809202-2 & 1 Rotor
M-22A	Diesel Engine 2763-75019
P-1A	Turbochargers P/N MP-022-000 & MP-023-000
M-22A	Diesel Engine 2763-75019
M-10A	Joint EQC-2609-001-KD2 Rev. 0
R-3A	Serial No. 43087
P-1A	Diesel Engine 2763 75019
930.1C	Diesel Engine 75019-2763

Components in Catawba TDI Engines Not Manufactured by TDI

- Turbochargers - manufactured by United Technologies/Elliott Corporation
- Air Intercooler - manufactured by Young Radiator
- Intake and Exhaust Valves - manufactured by TRW, Inc. or Wells Valve Co.
- Valve Springs - manufactured by Betts Spring Co.
- Cylinder Head Gaskets - manufactured by Flexitallic or Bay Seal Co.
- Large Gears - manufactured by Bay City Iron Works
- Fuel Pumps and Injectors - manufactured by Bendix Scintilla Division, Allied Corporation
- Governor - manufactured by Woodward Governor Co.
- Tube Fittings - manufactured by Swagelok Division of Crawford Fittings Co.
- Lube Oil Filter - manufactured by Commercial Filters Div., Carborundum Corp.
- Fuel Oil Filter - manufactured by Air Maze Div., Incom International
- Flexible Pipe Couplings - manufactured by Dresser Industries
- Special Fasteners - manufactured by Horspool and Romaine
- Pushrods and Connector Rods - manufactured by Weber Machine Co.
- Overspeed Trip Mechanism - manufactured by Woodward Governor
- Fuel Oil Booster Pump - manufactured by Roper Pump Co.
- Jacket Water Pump (Volute and Impeller Only) - manufactured by Pacific Pump Co.
- Lube Oil Pump Cartridge Assembly - manufactured by TDI IMO Pump Division

In addition, numerous small items such as seals and fasteners were manufactured by various suppliers. Also, raw components were supplied to TDI for machining and other final manufacturing operations. Some examples of this are:

- Bearing Castings - Alcoa Aluminum
- Cam Forgings - TDI Texas Forge Division
- Connecting Rod Forgings - Kropp Forge Co.
- Crankshaft Forgings - Ellwood City Forge Co.

Direct surveillance at United Technologies/Elliot Corporation was performed by the Duke Power QA Vendors Division on 3/15/84, 3/29/84 and 6/4/84 on repair work on the Duke turbochargers these surveillance reports are contained in the listing. In addition, Duke Power QA Vendors Division has approved the QA Programs of Woodward Governor, Swagelok, Pacific Pump and TDI Imo Pumps Division for other purchases other than those related to the diesel engines.

Subvendor procurement by TDI is regularly reviewed during surveillance visits and reevaluations of the TDI QA Program.

**DEFICIENCIES IDENTIFIED DURING PROCUREMENT AND  
SURVEILLANCE OF TDI DIESEL ENGINES**

4/21-22/82 - ORGANIZATIONAL CHART IN QUALITY ASSURANCE MANUAL INCORRECT.

2/8-10/84 - TWO NONCONFORMANCES CONSIST OF 54 OBSERVATIONS OF THE ASSEMBLY ROUTE SHEETS. ROUTE SHEETS WERE NOT PROPERLY PREPARED.

11/21-22/83 - THE INDEX FOR WELDING PROCEDURE SPECIFICATIONS STATED A HIGHER REVISION NUMBER FOR WPS 100-W-1A THAN THE ACTUAL WPS SHOWED IN THE PROCEDURES MANUAL.

2/28 & 3/1 '83 - DRAWING DID NOT STIPULATE THE PROPER REVISION LEVEL.

4/21-22/82 - QUALITY ASSURANCE MANUAL DOES NOT SHOW REVISION STATUS.

NO DOCUMENTED EVIDENCE THAT ASME CODE ADDENDAS HAVE BEEN REVIEWED FOR IMPACT ON QUALITY ASSURANCE MANUAL.

10/17-18/78 - NO TIME INTERVAL NOTED FOR THE REISSUE OF INSPECTOR AND WELDER STAMPS AFTER THE STAMP HAS BEEN TURNED IN.

MILL TEST REPORT PREPARED BY DELAVAL DOES NOT STATE THE SIZE FOR ELONGATION TESTING (2"-8").

9/30 & 10/1 '74 - QUALITY CONTROL IS NOT INVOLVED IN THE REVIEW AND APPROVAL FOR DOCUMENT CHANGES.

11/21-22/83 - APPROVED VENDORS LIST DOES NOT SHOW THE ADDRESS OF SUPPLIERS.

PURCHASE ORDERS SHOULD STATE APPROVED LOCATION OF SUPPLIERS.

4/21-22/82 - PURCHASE ORDER 37579 NOT REVIEWED BY QUALITY ASSURANCE PERSONNEL.

9/30 & 10/1 '74 - NO WRITTEN FORMALIZED PROCEDURES FOR REVIEW OF THE COMPONENT SYSTEM DESIGN AS REQUIRED BY ASME.

QUALITY CONTROL IS NOT INCLUDED IN DESIGN REVIEW AND DESIGN CHANGES.

11/21-22/83 - QUALITY ASSURANCE MANUAL DOES NOT CONTAIN ANY PROVISIONS FOR REPAIR OR REWORK OF CUSTOMER RETURNED MATERIAL.

QUALITY ASSURANCE MANUAL DOES NOT CONTAIN ANY PROVISIONS FOR WORK PERFORMED BY DELAVAL AT CUSTOMER NUCLEAR SITES.

4/21-22/82 - TRAINING RECORDS WERE NOT AVAILABLE FOR THE QUALITY ENGINEERING MANAGER.



11/21-22/83 - TWO VENDORS ON THE APPROVED VENDORS LIST WERE PAST DUE FOR EVALUATION. BUFFALO FORGE EXPIRED AUGUST 1983 AND CROSBY VALVE EXPIRED SEPTEMBER 1983. FURTHERMORE, THE APPROVED VENDORS LIST WAS REVISED AND ISSUED ON NOVEMBER 18, 1983.

4/21-22/82 - BETHLEHEM STEEL WAS SURVEYED 5/80, HOWEVER, NO AUDIT HAS BEEN PERFORMED SINCE.

APPROVED VENDORS LIST DOES NOT STATE HOW VENDORS ARE APPROVED.

ASME CERTIFICATION FOR BONNEY PRODUCTS HAVE EXPIRED, HOWEVER, THEY REMAIN ON THE APPROVED VENDORS LIST.

SURVEYS PERFORMED ON ASSOCIATED SPRING AND D M KEMP WERE INADEQUATE.

CALIBRATION SERVICE SUPPLIERS ARE NOT ON THE APPROVED VENDORS LIST.

4/9-12/79 - GENERATOR CONTROL PANEL IN USE FOR TESTING ENGINE 75018 HAS MISSING PARTS.

10/17-18/78 - VENDOR USED THAT DID NOT APPEAR ON THE APPROVED VENDORS LIST (POWER CONVERSION PRODUCTS). THERE WERE NO RECORDS AS HOW THEY WERE APPROVED.

6/10-11/76 - DESIGN CONSULTING SERVICES WERE NOT INCLUDED IN THE VENDOR AUDIT PROGRAM.

11/21-22/83 - NEITHER THE ROUTE SHEET OR DRAWING SPECIFY THE WELDING PROCEDURE REQUIRED FOR WELDING OPERATION ON NUCLEAR SAFETY-RELATED WORK.

4/21-22/82 - WELDING PROCEDURE 100-W-18A REVISION 2 NOT SIGNED OFF ON WELDING SPECIFICATION SHEET.

NEITHER THE DRAWING OR ROUTE SHEET SPECIFY THE WELDING PROCEDURE REQUIRED FOR NON-CODE FABRICATION.

2/8-10/84 - TWO NONCONFORMANCES CONSISTED OF 10 OBSERVATIONS CONCERNING SEQUENTIAL SIGN OFFS BY INSPECTORS.

2/21 & 3/1 '79 - INSPECTION POINTS NOT SIGNED OFF ON TRAVELER.

3/15/84 - Lack of implementation of TDI QA Program at United Technologies/Elliott Corporation.

5/7/84 - Traceability not clear on some parts.

5/16-17/84 - Lack of heat treatment on 1 piston skirt on 1B engine.

6/19-20/84 - Lack of 100% MT testing each piston skirt.

Projects Division NCI's From Receipt Inspection Of  
Catawba Diesel Engines

<u>#</u>	<u>Date</u>	<u>Description</u>
664	11/16/76	No documentation received for foundation equipment
665	11/16/76	No documentation received for foundation equipment
666	11/16/76	Rust of foundation bolts and anchors (at receipt)
835	01/04/77	No legible heat number on foundation bolts
836	01/04/77	Heat number of part does not match documentation
887	01/20/77	No documentation received for foundation bolts
5789	06/04/79	One jacket water cooler had loose bolts on capped end
5887	06/14/79	Two jacket water keepwarm pumps did not have national board number
5896	06/15/79	No national board number on two 3-way valve assemblies
7184	11/29/79	No national board numbers on 3 lube oil pumps and 4 fuel oil booster pumps
7338	12/20/79	No national board numbers on 2 waterjacket keepwarm pumps

Operations Division NCI's on Replacement Parts  
For Catawba Diesel Engines

<u>#</u>	<u>Date</u>	<u>Description</u>
099	06/21/84	MT indication on piston skirt
119	07/30/84	MT indication on link rod bolt
120	07/30/84	X-ray indications on two connecting rod bearing shells

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

HAL B. TUCKER  
VICE PRESIDENT  
NUCLEAR PRODUCTION

TELEPHONE  
(704) 373-4531

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.

## 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  $1.2 \times 10^7$  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.

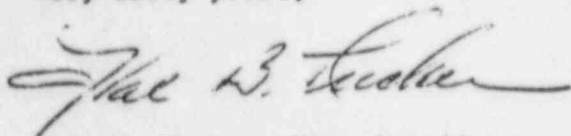
E. References

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  
Nuclear Production

HBT:JG:rmm

Enclosures

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Table 1

Catawba 1A and 1B Diesel EnginesPeriodic 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.

SCHEDULEDURING 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, NEUTRALI- ZATION, AND SIMILAR CHARACTERIS- TICS
--	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	GOVERNOR OVERSPEED TRIP	PERFORMANCE TEST AND RECALIBRATE
02-411A	GOVERNOR DRIVE GEAR AND SHAFT	VISUAL INSPECTION WHERE ACCESSABLE W/ELASTOMER REPLACEMENT
02-411B	GOVERNOR DRIVE COUPLING	REPLACE ELASTOMER IN COUPLING
02-413A	GOVERNOR LINKAGE	INSPECT FOR LOOSE PARTS ON LINKAGE
02-415A	SPEED REGULATING GOVERNOR	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, REGULATORS, 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
00-401B	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 ASSE
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 DISASSEMBLY
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	SK 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 COVERED BY D/P
CN-131	LUBE OIL KEEP WARM 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  $\pm 50\%$  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.

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

Docket No. 50-413  
50-414

Jesse O. Barbours

Jo Ann D. Bowman  
Notary Public

My Commission expires: 7-12-88

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

Docket No. 50-413  
50-414

J-malcolm Custer

Jo Ann D. Bowman  
Notary Public

My Commission expires: 7-12-88

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

Docket No. 50-413  
50-414

J David Huffer

Jo Ann D. Bowman  
Notary Public

My Commission expires: 7-12-88

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of )

DUKE POWER COMPANY, et al. )

(Catawba Nuclear Station  
Units 1 and 2) )

Docket No. 50-412  
50-414

AFFIDAVIT

I, E. E. Barels, being duly sworn, hereby state that I am employed by Duke Power Company as Assistant Field Engineer, Construction Department. address for Duke Power Company is 422 South Church Street, Charlotte, North Carolina.

I have been responsible for furnishing the basic information used in providing responses to those Interrogatories by Palmetto Alliance and Carolina Environmental Study Group concerning the diesel generator contention admitted by the Atomic Safety and Licensing Board by which my initials appear. Those responses are true and correct to the best of my knowledge and belief.

Edward E. Barels

Subscribed and sworn to before  
me this 1<sup>st</sup> day of August  
1984

Sherrice D. Williams  
Notary Public

My Commission expires: March 7, 1993



UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of )

DUKE POWER COMPANY, et al. )

(Catawba Nuclear Station  
Units 1 and 2) )

Docket No. 50-413  
50-414

AFFIDAVIT

I, H. L. Atkins, being duly sworn, hereby state that I am employed by Duke Power Company as Quality Assurance Engineer. The business address for Duke Power Company is 422 South Church Street, Charlotte, North Carolina.

I have been responsible for furnishing the basic information used in providing responses to those Interrogatories by Palmetto Alliance and Carolina Environmental Study Group concerning the diesel generator contention admitted by the Atomic Safety and Licensing Board by which my initials appear. Those responses are true and correct to the best of my knowledge and belief.

H. L. Atkins

Subscribed and sworn to before  
me this 13<sup>th</sup> day of August  
1984.

Sperric S. Williams  
Notary Public

My Commission expires: March 7, 1993