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DUKE POWER

April 29, 1993

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555

Subject: Catawba Nuclear Station, Units 1 and 2
Docket Nos: 50-413 and 50-414
Operating License Amendments
Emergency Diesel Generator Maintenance and Surveillance

Gentlemen:

Attached are proposed amendments to the Catawba Nuclear Station Facility Operating Licenses for Units 1 and 2, NPF-35 and NPF-52, respectively.

The attachment outlines proposed amendments that would remove licensing conditions for the Emergency Diesel Generators (EDGs) imposed as a result of NUREG-1216, Safety Evaluation Report Related to the Operability and Reliability of Emergency Diesel Generators Manufactured by Transamerica Delaval, Inc. These licensing conditions require that the engines be torn down in order to perform inspections which, as noted in the attachment, degrades the reliability and availability of the EDGs. The inspections that have been performed to date have not shown any significant wear patterns or problems that could not have been detected by other means (e.g., trending operational parameters).

The TDI Owners Group docketed its generic submittal concerning this issue in a letter from J.B. George and C.W. Hendrix to the NRC Document Control Desk on December 8, 1992 and it is currently being reviewed by the ONRR's Electrical Branch. The generic submittal and this Catawba-specific request together provide the basis for the Catawba license amendment. The reviews of these two submittals should therefore be performed concurrently.

Unit 1's next refueling outage is currently scheduled to begin on October 8, 1993. It is requested that this amendment be approved by September 30, 1993 in order to avoid teardown of the Unit 1 engines.

Pursuant to 10CFR50.91(b)(1), the appropriate South Carolina state official is being provided a copy of this amendment request.

A001

If you have any questions pertaining to this amendment request, please call L.J. Rudy at (803) 831-3084.

Very truly yours,

M.J. Tuckman

M.S. Tuckman

LJR/s

Attachment

xc: S.D. Ebneter, Regional Administrator
Region II

W.T. Orders, Senior Resident Inspector

R.E. Martin
ONRR

Heyward Shealy, Chief
Bureau of Radiological Health, SCDHEC

American Nuclear Insurers

M&M Nuclear Consultants

INPO Records Center

M.S. Tuckman, being duly sworn, states that he is Vice President of Duke Power Company, Catawba Nuclear Site; that he is authorized on the part of said Company to sign and file with the Nuclear Regulatory Commission this revision to the Catawba Nuclear Station Facility Operating Licenses, License Nos. NPF-35 and NPF-52; and that all statements and matters set forth therein are true and correct to the best of his knowledge.

M.S. Tuckman

M.S. Tuckman, Vice President

Subscribed and sworn to before me this 29th day of April, 1993.

Notary Public

My commission expires:

Nov. 21, 2000

ATTACHMENT

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION, UNITS 1 AND 2

Proposed License Amendments To

Facility Operating Licenses NPF-35 And NPF-52

"TDI Diesel Engines Requirements"

Requested Amendments

Remove Facility Operating License NPF-35 (Unit 1) License Condition 20 which reads as denoted in Attachment A to this request.

Remove Facility Operating License NPF-52 (Unit 2) License Condition 11 which reads as denoted in Attachment A to this request.

BACKGROUND

The TDI Owners Group was formed in late 1983 following the crankshaft failure of an Enterprise emergency diesel generator (EDG) at the Shoreham Nuclear Plant. This Owners Group developed a detailed Program Plan to provide for design review and quality revalidation (DR/QR) of the Enterprise EDG. This plan was reviewed and approved by the NRC in a Safety Evaluation Report dated August 13, 1984. Following issuance of the SER, the Owners Group member utilities developed and implemented the DR/QR in response to and in accordance with the Program Plan. The specific details of the DR/QR were submitted to the NRC for review and the results of this review were documented in NUREG-1216. NUREG-1216 outlines specific provisions that were incorporated as conditions of license for Catawba. It is these specific conditions of license that Catawba is requesting be deleted. The conditions of license were required for Catawba since little operating history of these engines was available at the time of the DR/QR review. Since that time, the industry has collected over 9000 hours of operation of these engines. The inspections required by the license conditions for Catawba and other nuclear units with TDI EDGs have shown no problems from operation of the engines, and many utilities find that more damage is being imposed during the inspection/teardown procedure than from operation. The basis for these statements is documented in the generic submittal of the TDI Owners Group entitled, Generic Licensing Submittal for Emergency Diesel Generators, Conditions of License for Utilities with Enterprise Engines, dated December 8, 1992 in a letter from J.B. George and C.W. Hendrix to the NRC Document Control Desk (hereinafter referred to as "generic submittal"). This document is incorporated by reference to this request for license amendment and is the basis under which deletion of the conditions of license identified above is sought.

The pertinent license condition history for the Catawba engines is delineated in the following three license amendments:

1. Amendment 16 to NPF-35 (Unit 1) issued on October 21, 1986 incorporated the recommendations and conclusions contained in the NRC SER on operability/reliability

of TDI diesel generators, published as NUREG-1216.

2. Amendment 18 to NPF-52 (Unit 2) issued on May 26, 1987 changed the Unit 2 license conditions to make them identical to the Unit 1 license conditions with the exception of the inspection of main bearing No. 7 of diesel generator 2B.

3. Amendment 53 to NPF-52 (Unit 2) issued on February 15, 1989 revised the license conditions to delete the requirement for special inspections of diesel generator 2B main bearing No. 7.

The proposed amendment will remove those conditions that are no longer necessary to ensure reliable operation based on the inspection history of Enterprise engines at Catawba and the inspection history of all Enterprise engines in nuclear service. This combined history demonstrates that the Enterprise engine has achieved a level of reliability in nuclear service similar to that of other manufacturers and that special inspection requirements included in the plant's operating license are no longer warranted.

DISCUSSION

The primary function of the EDGs is to provide emergency AC power to the vital buses upon a loss of offsite power. Providing necessary maintenance to the EDGs is important to assure their continued reliability and availability. Sections 4.0 and 5.0 of the Owners Group generic submittal provide the unavailability and unreliability of all Enterprise engines identified in that document. The Catawba engines 1A, 1B, 2A, and 2B are represented by Engine 9, 10, 11, and 12, respectively, of those tables. These tables include data through June 1992. It should be noted that the most recent data available (through December 1992) shows considerable improvement in reliability and availability for Catawba's EDGs. This most recent data is not included in the generic submittal which was provided to the NRC. It should also be noted that a portion of the unavailability and unreliability of the Catawba EDGs results from causes other than teardowns. However, the data indicates that reliability and availability can be expected to improve by eliminating engine teardowns.

The following is an item-by-item discussion of the conditions of license provided in Attachment A:

Item 1 - Changes to Maintenance/Surveillance Program and Frequency of Engine Overhauls

This item discusses the process for controlling changes to the maintenance/surveillance program for the EDGs. It also specifies conditions governing the frequency of major engine overhauls. The requirements of 10CFR50.59 are already a legal and binding commitment for Catawba. Catawba has a program in existence to define when and how a review under 10CFR50.59 is

conducted and when this review is needed. Maintenance practices and changes to maintenance programs for all equipment including the EDGs are subject to the provisions of the existing program. Should a maintenance item be judged to have an impact on nuclear safety, the provisions of this program would be invoked. Having another license requirement to utilize an existing program covered under other requirements is redundant and unnecessary and Catawba is requesting that this requirement be deleted as a license condition.

In order to be treated as other EDGs, Catawba should have the freedom to change its program as necessary to incorporate enhancements that will increase availability and reliability. This includes the overhaul frequency. Engine overhaul frequency is discussed in Section 3.1 of the generic submittal. Recent studies performed for the NRC (NUREG/CR-5057, Aging Mitigation and Improved Programs for Nuclear Service Diesel Generators and PNL-6397, Aging of Nuclear Station Diesel Generators: Evaluation of Operability and Expert Experience) indicate that for approximately two years following a major engine overhaul, EDGs, regardless of their manufacturer, exhibit increased unreliability. This increase is attributed to several reasons. One reason is that during disassembly there is a high potential to introduce dirt and other substances that may harm the engine. Another is that disturbing a precision fit system that "wears in" to seat mating surfaces (e.g., rings and liners, crankshafts and bearings, connecting rods and bearings) can result in alteration of wear patterns that may increase wear or actually cause wear to start and decrease the life of the component. The period following overhaul is a "shakedown" period that is required to produce a smooth running reliable engine.

The results of the five-year "mini" overhauls at Catawba have shown minimal or no wear on major engine components and very few other component related problems. Performance of a complete engine overhaul on a time-based frequency is not appropriate and can lead to reduced reliability and availability. An overhaul should be performed based on condition monitoring and trending analysis and thus a pre-specified interval should not be determined. Based upon this, Catawba is requesting that the requirement to specify an overhaul frequency on a time-dependent basis be deleted as a license condition. It should be noted that deleting this requirement will also be consistent with the implementation of the Maintenance Rule, as the EDG maintenance and surveillance program will become more performance-based and will focus more directly on results.

Item 2 - Inspection of Connecting Rod Assemblies

This item discusses the provisions for inspection of the connecting rod assemblies. This item is addressed in the generic submittal in Section 3.52. The data contained in Appendix B of the generic submittal includes the results of the Catawba inspections. As noted in the generic submittal, there have been no major problems with this component since completion of the DR/QR effort at Catawba or at other utilities.

The reason for problems with the connecting rods during early operations dealt with inadequate bolt preload. The results presented in the generic submittal note that many hundreds of checks have been made on connecting rod bolts to determine if any relaxation of preload has occurred during operation. The results show that relaxation has not occurred and the design changes

implemented during DR/QR have been effective in dealing with the concerns of this component. Based on the information presented in the generic submittal, Catawba is requesting that this license condition be deleted.

Item 3 - Inspection of Cylinder Blocks

This licensing condition deals with cylinder blocks. It is noted that a thorough design review of this component was completed during the initial DR/QR review. A finite element structural model revealed certain block areas that are subjected to higher stresses than other areas. A fracture mechanics analysis revealed that crack initiation is possible in certain circumstances; however, these cracks were shown to arrest and not to propagate. These potential cracks were found to be in areas that would produce a flow path for water to the block exterior and would be evident by a visual check. It was also shown that some of the block castings made during the construction periods for the Enterprise engines may contain Widmanstaetten graphite which is an inclusion that weakens a grey cast iron casting.

Catawba has tested for Widmanstaetten graphite inclusions and has found no evidence of any of this material in any of the four blocks on Enterprise engines. Catawba has also performed inspections for the block areas exposed during the five-year "mini" overhauls and has found no indications of cracking in the block.

The original design and quality review for this component was noted to be conservative by the TDI Owners Group. In addition, PNL-5600, Review of Resolution of Known Problems in Engine Components for Transamerica Delaval, Inc. Emergency Diesel Generators, noted, "If cumulative results of these inspections over several power plant fuel cycles show that one or more of the inspections reveal nothing of significance, the scope and frequency of the inspections could be reconsidered." As a result of the previous inspections and the fact that no Widmanstaetten graphite is present, the design review has indeed shown the analysis to be conservative and that future time-based inspections are not warranted Future maintenance programs will consider inspections any time the block top surface is exposed for other reasons. This position is supported by the generic submittal, Section 3.10. Catawba is therefore requesting that this license condition be deleted.

Item 4 - Performance of Air-Roll Tests

This item discusses and requires the operation of air rolling the engine prior to any planned start with the cylinder stopcocks open. The purpose of this requirement is to prevent damage to the engine should a leak occur that would allow fluid into a cylinder creating high hydraulic loads should a start be attempted with this fluid present in the cylinder. Catawba believes this practice is valuable and has no intention of deleting this item from its operational procedures. However, since the merits of performing this action are well known and understood, it should not be a condition of license. Reliability and availability goals are positive incentives for continuing this procedure. These incentives are recognized by other utilities and provide sufficient justification for their continued practice of this procedure without a formal licensing commitment. Catawba

requests that this requirement be deleted as a license condition.

Section 3.12 of the generic submittal addresses concerns related to the Group I, II, and III heads. Catawba has had no major problems with heads in operation and still has in service both Group I and II heads. As a result of the positive operational experience, Catawba concludes that the above position regarding air rolling of the engine is justified.

Item 5 - Inspection of Turbochargers

This item discusses periodic inspections of the turbochargers. This item is discussed in detail in Section 3.16 of the generic submittal. The major issues dealing with turbochargers pertain to lubrication and fatigue of stationary vanes in the turbocharger casing.

Regarding the stationary vanes, there has been a total of four cases experienced at other plants and reported to the TDI Owners Group where missing vanes have been found and these missing vanes have passed through the rotating vane group without degradation of the turbocharger performing its design function. On January 20, 1989, Catawba EDG 1A experienced a similar event with no degradation of the turbocharger. Based upon this operational history, Catawba believes that future inspection for this item as a condition of license is unwarranted. Following the deletion of this license condition, Catawba will continue to monitor turbocharger performance using non-disassembly techniques.

Regarding lubrication and bearing wear, the TDI Owners Group recommended design modifications to provide a lube oil system to enable the turbocharger bearings to be prelubricated prior to any planned start. This enhancement has been implemented at Catawba and has led to increased bearing life. This modification, along with the positive inspection results noted above, provides the basis for removal of this license condition. Catawba is therefore requesting that this license condition be deleted.

SAFETY ANALYSIS

The primary function of the EDGs is to provide emergency AC power in the event of a loss of offsite power. The conditions of license discussed previously are for maintenance related activities for this equipment. These maintenance activities affect the reliability and availability of the equipment.

The basis of the TDI surveillance matrix (refer to Appendix A of the generic submittal) deals with preventative maintenance, monitoring, and inspections. Inspections are by far the largest contributor to the significant out-of-service time experienced during outages. In addition, the requirement to perform a complete overhaul every ten years adds to this unavailability, and as discussed above, also adds to unreliability. Elimination of the licensing conditions will actually

increase availability and reliability by reducing the number of engine teardowns and inspections. Monitoring of the system health will continue under a program of monitoring and trending similar to the one currently in place. Increasing EDG reliability and availability will serve to reduce the probability of core melt and therefore this amendment request does not involve any adverse safety considerations.

ANALYSIS OF NO SIGNIFICANT HAZARDS CONSIDERATION

10CFR50.92 states that a proposed amendment involves no significant hazards consideration if operation in accordance with the proposed amendment would not:

(1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or

(2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or

(3) Involve a significant reduction in a margin of safety.

In 48FR14870, the Commission has listed several examples of license amendments that are considered not likely to involve significant hazards considerations. Example iv describes an amendment that grants relief upon demonstration of acceptable operation from an operating restriction that was imposed because acceptable operation was not yet demonstrated.

The proposed amendment is similar to Example iv in that the license conditions requiring teardown and inspection of the TDI engines were imposed because safe and reliable operation of these engines had not yet been demonstrated.

The proposed amendment would not involve a significant increase in the probability or consequences of an accident previously evaluated. Eliminating the required teardowns and inspections has no effect on the probability of an accident occurring, because the diesel generators are not accident initiating equipment. Eliminating the teardowns and inspections would actually decrease the consequences of an accident, because the availability and reliability of the engines would increase as a result of the less frequent teardowns (i.e., the engines would be available more often during outages and the detrimental effects of a teardown on subsequent engine operation would be minimized).

The proposed amendment would not create the possibility of a new or different kind of accident from any accident previously evaluated. The proposed amendment will not cause any physical changes to the plant and the design and operation of the units will not be affected.

The proposed amendment would not involve a significant reduction in a margin of safety. The

proposed amendment will increase the reliability and availability of the EDGs and therefore will not result in a decrease in a margin of safety at Catawba.

ENVIRONMENTAL IMPACT STATEMENT

The proposed amendment has been reviewed against the criteria of 10CFR51.22 for environmental considerations. As shown above, the proposed amendment does not involve any significant hazards consideration, nor does it increase the types and amounts of effluents that may be released offsite, nor does it increase the individual or cumulative occupational radiation exposures. Based upon this, the proposed amendment meets the criteria given in 10CFR51.22(c)(9) for categorical exclusion from the requirement for an Environmental Impact Statement.

ATTACHMENT A

CURRENT LICENSE CONDITIONS PERTAINING TO TDI DIESEL ENGINES FOR CATAWBA UNITS 1 AND 2

NPF-35 License Condition 20 and NPF-52 License Condition 11 are as follows:

1. Changes to the maintenance/surveillance program for the TDI diesel engines, as identified in the licensee's submittals of August 1 and September 11, 1986, shall be subject to the provisions of 10 CFR 50.59. The frequency of the major engine overhauls referred to in the license conditions below shall be consistent with Section IV.1. "Overhaul Frequency," in Revision 2 of Appendix II of the Design Review/Quality Revalidation Report which was transmitted by letter dated May 1, 1986, from J.B. George, Owners Group, to H.R. Denton, NRC.

2. Connecting rod assemblies shall be subjected to the following inspections at each major engine overhaul:

   (a) The surfaces of the rack teeth should be inspected for signs of fretting. If fretting has occurred, it should be subject to an engineering evaluation for appropriate corrective action.

   (b) All connecting rod bolts should be lubricated in accordance with the engine manufacturer's instructions and torqued to the specifications of the manufacturer. The lengths of the two pairs of bolts above the crankpin should be measured ultrasonically before and after tensioning.

   (c) The lengths of the two pairs of bolts above the crankpin should be remeasured ultrasonically before detensioning and disassembly of the bolts. If bolt tension is less than 93% of the value at installation, the cause should be determined, appropriate corrective action should be taken, and the interval between checks of bolt tension should be reevaluated.

   (d) All connecting rod bolts should be visually inspected for thread damage (e.g., galling), and the two pairs of connecting rod bolts above the crankpin should be inspected

by magnetic particle testing to verify the continued absence of cracking. All washers used with the bolts should be examined visually for signs of galling or cracking, and replaced if damaged.

(e) A visual inspection should be performed of all external surfaces of the link rod box to verify the absence of any signs of service-induced stress.

(f) All of the bolt holes in the link rod box should be inspected for thread damage (e.g., galling) or other signs of abnormalities. In addition, the bolt holes subject to the highest stresses (e.g., the pair immediately above the crankpin) should be examined with an appropriate non-destructive method to verify the continued absence of cracking. Any indications should be recorded for engineering evaluation and appropriate corrective action.

3. (a) Cylinder blocks shall be inspected for "ligament" cracks, "stud-to-stud" cracks and "stud-to-end" cracks as defined in a report by Failure Analysis Associates, Inc. (FaAA) entitled "Design Review of TDI R-4 and RV-4 Series Emergency Diesel Generator Cylinder Blocks" (FaAA report no. FaAA-84-9-11.1) and dated December 1984. (Note that the FaAA report specifies additional inspections to be performed for blocks with "known" or "assumed" ligament cracks.) The inspection intervals (i.e., frequency) shall not exceed the intervals calculated using the cumulative damage index model in the subject FaAA report. In addition, inspection methods shall be consistent with or equivalent to those identified in the subject FaAA report.

(b) In addition to inspections specified in the aforementioned FaAA report, blocks with "known" or "assumed" ligament cracks (as defined in the FaAA report) should be inspected at each refueling outage to determine whether or not cracks have initiated on the top surface, which was exposed because of the removal of two or more cylinder heads. This process should be repeated over several refueling outages until the entire block has been inspected. Liquid penetrant testing or a similarly sensitive non-destructive testing technique should be used to detect cracking, and eddy current testing should be used as appropriate to determine the depth of any cracks discovered.

(c) If inspection reveals cracks in the cylinder blocks between stud holes of adjacent cylinders ("stud-to-stud" cracks) or "stud-to-end" cracks, this condition shall be reported promptly to the NRC staff and the affected engine shall be considered inoperable. The engine shall not be restored to "operable status" until the proposed disposition and/or corrective actions have been approved by the NRC staff.

4. The following air-roll test shall be performed as specified below, except when the plant is already in an Action Statement of Technical Specification 3/4.8.1, "Electric Power Systems, A.C. Sources":

The engines shall be rolled over with the airstart system and with the cylinder stopcocks open before each planned start, unless that start occurs within 4 hours of a shutdown. The engines shall also be rolled over with the airstart system and with the cylinder stopcocks open after 4 hours, but no more than 8 hours, after engine shutdown and then rolled over once again approximately 24 hours after each shutdown. (If an engine is removed from service for any reason other than the rolling-over procedure before expiration of the 8-hour or 24-hour periods noted above, that engine need not be rolled over while it is out of service. The licensee shall air-roll the engine over with the stopcocks open at the time it is returned to service.) The origin of any water detected in the cylinder must be determined, and any cylinder head that leaks because of a crack shall be replaced. The above air-roll test may be discontinued following the first refueling outage subject to the following conditions:

(a) All cylinder heads are Group III heads (i.e., cast after September 1980).

(b) Quality revalidation inspections, as identified in the Design Review/Quality Revalidation report, have been completed for all cylinder heads.

(c) Group III heads continue to demonstrate leak-free performance. This should be confirmed with TDI before air-roll tests are discontinued.

5. Periodic inspections of the turbochargers shall include the following:

(a) The turbocharger thrust bearings should be visually inspected for excessive wear after 40 nonprelubed starts since the previous visual inspection.

(b) Turbocharger rotor axial clearance should be measured at each refueling outage to verify compliance with TDI/Elliott specifications. In addition, thrust bearing measurements should be compared with measurements taken previously to determine a need for further inspection or corrective action.

(c) Spectrographic and ferrographic engine oil analysis shall be performed quarterly to provide early evidence of bearing degradation. Particular attention should be paid to copper level and particulate size, which could signify thrust bearing degradation.

(d) The nozzle ring components and inlet guide vanes should be visually inspected at each refueling outage for missing parts or parts showing distress on a one-turbocharger-per refueling-outage basis. In addition, these inspections should be performed for all turbochargers at each turbocharger overhaul (i.e., at approximately 5-year intervals). If any missing parts or distress is noted, the entire ring assembly should be replaced and the subject turbocharger should be reinspected at the next refueling outage.