UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

FEB 25 1986

Docket Nos.: 50-445
and 50-446

APPLICANT: Texas Utilities Generating Company (TUGCO)

FACILITY: Comanche Peak Steam Electric Station, Units 1 and 2 (CPSES)

SUBJECT: SUMMARY OF MEETING BETWEEN NRC STAFF AND TUGCO TO AUDIT THE COMANCHE PEAK, TDI DIESEL GENERATOR RELIABILTIY PROGRAM

A meeting open to the public between the NRC staff and TUGCO was held on Monday afternoon and Tuesday, July 1 and 2, 1985, in the Visitor's Center/ Nuclear Operations Support Facility at the Comanche Peak Steam Electric Station. The purpose of the meeting was to audit the design review/quality revalidation (DR/QR) program conducted for the Comanche Peak diesel generators manufactured by Transamerica Delaval, Inc (TDI), a part of Phase 2 of the TDI Owners Group Program.

The NRC staff's earlier review of the Comanche Peak Diesel Generator Reliability Program was documented in Section 9.5.9 of SSER #6, issued in November, 1984. That review identified numerous items to be completed before licensing or before NRC final approval of the diesel generator reliability program. Since SSER #6 was issued the TDI Owners Group and the applicant had submitted additional information to the NRC staff, and conducted additional inspections and tests. At the meeting, the applicant and staff discussed the numerous items and the efforts, status and results of bringing these items to an acceptable conclusion. On a majority of the items, the staff's review of the referenced material resulted in a conclusion that the guidance action item was resolved. On those items remaining, the staff gave additional guidance on actions required for resolution.

At the start of the meeting the staff stated that this audit was generic to the TDI V-16 diesels; i.e. that staff conclusions would be appropriate for all TDI V-16 diesels and that staff conclusions of a generic nature would be given in a forthcoming Safety Evaluation Report specific to this diesel model. In that respect, this meeting was similar to an audit meeting held at Shoreham for the TDI eight-cylinder diesels.

The meeting started with an audit of the "Questions Raised in CPSES DR/QR Audit Review," included in the meeting notice (Enclosure 1). The applicant responded with a 17 page handout entitled "CPSES DR/QR Audit Review" (Enclosure 2). All of the questions and responses were discussed. Of these, more in depth discussions were held on the following points:

1) The staff questioned the use of Glyptol lacquer to monitor fastener movement rather than the used of a device which provides a locking grip; i.e., double lock nuts or a bonding agent such as LOCTITE 217. The applicant committed to provide surveillance of the Glyptol for movement. Should the Glyptol show movement, the applicant will examine whether the junction should be modified.

2) The staff questioned the need to provide forced ventilation in the control cabinet. The applicant advised that it intends to implement forced ventilation at the first refueling outage. That decision is based on a belief that it would enhance reliability, but that it is not necessary. The applicant committed to monitor temperature within the cabinet with temperature indicator tape or other temperature measuring devices on resumption of testing.

3) The staff also questioned why 15 incidents related to fuse and relay failure which had been designated random failures by the Owners Group, were not evaluated by the applicant. The applicant stated that those incidents, were reviewed by the CPSES startup group and other applicant groups which concluded they were unique and unrelated. The evaluation of the failures in search of common causes was described.

The staff indicated tentative acceptance of the above responses and commitments. The remaining items and responses on Enclosures 1 and 2 were given tentative approval after brief discussions.

The second part of the meeting consisted of a discussion of maintenance and surveillance activities, in particular to any differences between the CPSES recommendations, and those given in the Owners Group DR/QR report. A portion of the exceptions taken to the Appendix 2 maintenance and surveillance program in the applicant's letter (TXX-4501 dated June 27, 1985) served as the agenda for this portion of the meeting and is provided as Enclosure 3 for ease of reference. The applicant stated that it was in basic agreement with the guidance on maintenance and surveillance activities as documented in Appendix 2 of the Owners Group DR/QR reports as modified by its letter TXX-4501 dated June 27, 1985. The staff acknowledged that the list of maintenance and surveillance requirements given on page 9-8 and in Appendix I of SSER 6 was intended as preliminary guidance, and that the final maintenance and surveillance requirements have been evolving since Appendix I was written.

It should be noted that the staff and the applicant did obtain the Owners Group concurrence during the meeting regarding only those modifications proposed by the applicant to the original Owners Group Appendix 2 maintenance and surveillance recommendations which were discussed at the meeting. This is important because a large number of future changes, including those not discussed during this meeting which will be proposed by any utility to the Owners Group maintenance and surveillance program will be reviewed and approved by the Owners Group.

Of the items listed on attachment TXX-4501 which were reviewed and discussed at the meeting, the staff indicated tentative acceptance of the proposed changes to the Owners Group recommendations for which owners group concurrence was given.

NOTE: The applicant submitted a revised description of its modifications to the maintenance and surveillance activities, (i.e. updating Enclosure 3) in a letter (TXX-4556) dated October 4, 1985. This latest letter included modifications in response to staff comments on July 2, 1985.

This portion of the meeting closed with a discussion on how the applicant could make changes to the maintenance procedures in the future as part of their continuing diesel reliability program. The applicant proposed using the same procedures described in the technical specifications for changing its procedures for the diesel maintenance. The staff was not ready to address this proposal, but advised that it would have a definite policy in the near future which would apply to all TDI OG utilities wishing to make a small number of future modifications to their maintenance and surveillance requirements.

The meeting attendance is listed in Enclosure 4.

Spottswood B. Burwell, Project Manager
PWR Project Directorate #5
Division of PWR Licensing-A

Enclosure:
1. Meeting Notice, dated June 25, 1985
2. CPSES DR/QR Audit Plan
3. Letter to V.S. Noonan from J.W. Beck
   re: Design Review/Quality Revalidation (DR/QR) Report on the CPSES TDI Diesel Generators, dated June 27, 1985.
4. Meeting Attendance

cc: See next page

OFC	:PD#5	:PD#5	:PD#5	:DIR/PD#5	:	:
NAME	:SBurwell	:CBerlinger	:AVietti-Cook	:CTrammell	:VSNoonan	:
DATE	:2/24/86	:2/24/86	:2/24/86	:2/24/86	:2/ /86	:

OFFICIAL RECORD COPY

Of the items listed on attachment TXX-4501 which were reviewed and discussed at the meeting, the staff indicated tentative acceptance of the proposed changes to the Owners Group recommendations for which owners group concurrence was given.

NOTE: The applicant submitted a revised description of its modifications to the maintenance and surveillance activities, (i.e. updating Enclosure 3) in a letter (TXX-4556) dated October 4, 1985. This latest letter included modifications in response to staff comments on July 2, 1985.

This portion of the meeting closed with a discussion on how the applicant could make changes to the maintenance procedures in the future as part of their continuing diesel reliability program. The applicant proposed using the same procedures described in the technical specifications for changing its procedures for the diesel maintenance. The staff was not ready to address this proposal, but advised that it would have a definite policy in the near future which would apply to all TDI OG utilities wishing to make a small number of future modifications to their maintenance and surveillance requirements.

The meeting attendance is listed in Enclosure 4.

Spottswood B. Burwell, Project Manager
PWR Project Directorate #5
Division of PWR Licensing-A

Enclosure:
1. Meeting Notice, dated June 25, 1985
2. CPSES DR/QR Audit Plan
3. Letter to V.S. Noonan from J.W. Beck
   re: Design Review/Quality Revalidation (DR/QR) Report on the CPSES TDI Diesel Generators, dated June 27, 1985.
4. Meeting Attendance

cc: See next page

W. G. Counsil
Texas Utilities Generating Company

Comanche Peak Steam Electric Station
Units 1 and 2

cc:
Nicholas S. Reynolds, Esq.
Bishop, Liberman, Cook,
Purcell & Reynolds
1200 Seventeenth Street, N. W.
Washington, D. C. 20036

Robert A. Wooldridge, Esq.
Worsham, Forsythe, Sampels &
Wooldridge
2001 Bryan Tower, Suite 2500
Dallas, Texas

Mr. Robert E. Ballard, Jr.
Director of Projects
Gibbs and Hill, Inc.
11 Pen Plaza
New York, New York 10001

Mr. R. S. Howard
Westinghouse Electirc Corporation
P.O. Box 355
Pittsburgh, Pennsylvania 15230

Renea Hicks, Esq.
Assistant Attorney General
Environmental Protection Division
P.O. Box 12548, Capitol Station
Austin, Texas 78711

Mrs. Juanita Ellis, President
Citizens Association for Sound Energy
1426 South Polk
Dallas, Texas 75224

Ms. Nancy H. Williams
CYGNA
101 California Street
San Francisco, California 94111

Resident Inspector/Comanche Peak
Nuclear Power Station
c/o U. S. Nuclear Regulatroy Commission
P. O. Box 38
Glen Rose, Texas 76043

Regional Administrator, Region IV
U. S. Nuclear Regulatory Commission
611 Ryan Plaza Drive Suite 1000
Arlington, Texas 76011

Lanny A. Sinkin
Christic Institute
1324 North Capitol Street
Washington, D. C. 20002

Ms. Billie Pirner Garde
Citizens Clinic Director
Government Accountability Project
1901 Que Street, N. W.
Washington, D. C. 20009

David R. Pigott, Esq.
Orrick, Herrington, & Sutcliffe
600 Montgomery Street
San Francisco, California 94111

Anthony Z. Roisman, Esq.
Trial Lawyers for Public Justice
2000 P Street, N. W.
Suite 611
Washington, D. C. 20036

Nancy E. Wiegers
Spiegel & McDiarmed
1350 New York Avenue, N. W.
Washington, D. C. 20005-4798

Robert P. Lessy, Jr.
Morgan, Lewis & Bokius
1800 M Street, N. W.
Suite 700, North Tower
Washington, D. C. 20036

cc:
Resident Inspector - Comanche Peak
c/o U. S. Nuclear Regulatory Commission
P.O. Box 1029
Granbury, Texas 76048

Mr. John W. Beck
Vice President
Texas Utilities Electric Company
Skyway Tower
400 North Olive Street, L. B. 81
Dallas, Texas 75201

Mr. Jack Redding
Licensing
Texas Utilities Generating Company
4901 Fairmont Avenue
Bethesda, Maryland 20814

William A. Burchette, Esq.
Heron, Burchette, Ruckert & Rothwell
Suite 700
1025 Thomas Jefferson Street, N. W.
Washington, D. C. 20007

Mr. James McGaughy
Southern Engineering Company of Georgia
1800 Peachtree Street, N. W.
Atlanta, Georgia 30367-8301

Administrative Judge Peter Bloch
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Elizabeth B. Johnson
Administrative Judge
Oak Ridge National Laboratory
P.O. Box X, Building 3500
Oak Ridge, Tennesse 37830

Dr. Kenneth A. McCollom, Dean
Division of Engineering, Architecture
and Technology
Oklahoma State University
Stillwater, Oklahoma 74074

Dr. Walter H. Jordan
881 Outer Drive
Oak Ridge, Tennesse 37830

FEB 25 1986

Meeting Summary Distribution

Docket or Central File
NRC PDR
Local PDR
PD#5 Reading File
J. Partlow (Emergency Preparedness only)
V. Noonan
Project Manager S. Burwell
OELD
E. Jordan
B. Grimes
ACRS (10)
M. Rushbrook

NRC Participants
C. H. Berlinger
D. Persinko
S. Burwell
E. L. Murphy

cc: Licensee and Plant Service List

ENCLOSURE 1

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JUN 2 5 1985

Docket Nos.: 50-445
and 50-446

MEMORANDUM FOR: Vincent S. Noonan, Director
for Comanche Peak Project, DL

FROM: S. B. Burwell, Project Manager
Licensing Branch No. 1, DL

SUBJECT: FORTHCOMING MEETING WITH TEXAS UTILITIES TO AUDIT THE COMANCHE PEAK DIESEL GENERATOR RELIABILITY PROGRAM

DATE & TIME: Monday, July 1, 1985 1:00 p.m. - 5:00 p.m.
Tuesday, July 2, 1985 8:30 a.m. - 4:00 p.m.

LOCATION: Visitors Center/Nuclear Operations Support Facility
Comanche Peak Steam Electric Station, F. M. 201
Glen Rose, Texas

PURPOSE: Audit the design review/quality revalidation (DR/QR) program for the Comanche Peak diesel generators manufactured by Transamerica Delaval, Inc. (TDI), a part of Phase 2 of the TDI Owners Group Prgram. The enclosed questions will be used as an agenda. Open issues identified in SSER No. 6 Section 9.5.9 may be discussed.

PARTICIPANTS:

NRC

S. Burwell
C. Berlinger
D. Persinko

APPLICANT

D. Woodlan
R. Haskovec
C. Ray, et. al.

NRC Consultants

D. Dingee
H. Hardy
P. Louzecky
A. Wendell

S B Burwell

S. B. Burwell, Project Manager
Licensing Branch No. 1
Division of Licensing

Enclosure: As stated

cc: See next page

8507050256 6pp.

ENCLOSURE

QUESTIONS RAISED IN CPSES DR/QR AUDIT REVIEW

CP102 - Generator Controls

In the opinion of the PNL reviewers, the analysis reported for the generator controls does not meet the objective of the DR/QR effort, primarily because the methodology followed was too limited in scope. It addresses only four of the generators control components and leaves many out that are critical to system reliability.

Design/Quality Concerns

Generally most voltage regulator and exciter failure modes are considered critical to the overall reliability of the diesel generator, especially those involving common mode effects. Comments pertinent to the results and conclusions of the Comanche Peak DR/QR report are:

- Diodes and SCRs -- States that current ratings are adequate subject to proper cooling. Does not address voltage ratings. At least four failure incidents listed in the EDOCTS are unexplained as to probable failure modes. One failure related to out-of-phase paralleling, it may have been caused by the sustained overvoltage conditions prevalent in such events. The temperature monitoring provisions of Attachment 4 would not preclude the occurrence of a failure during an emergency operating condition. It is recommended that tests be implemented to positively identify over-temperature conditions and permanent corrective actions taken as required. This effort should be accomplished by TUGCO as soon as practical.

- Field flashing relay voltage specifications in Attachment 1 may not be adequate. A nominal voltage rating equal to or lower than the lowest expected battery voltage should be specified to insure relay pick-up. A dropping resistor by-passed by a normally closed relay contact should be use to prevent coil damage when energized at higher voltage levels. This is standard practice and is needed to insure relay pick-up under low voltage conditions and to preclude relay coil overheating under maximum voltage conditions.

- Rather than relying only on a device such as Glyptol lacquer to monitor fastener tightness, positive actions should be taken to insure such tightness. Fastener locking devices such as the use of double nuts or a bonding agent such as LOCTITE 271 (Loctite Corporation, Newington, Connecticut 06111) are more positive.

- Substitution of lockable potentiometers may be preferred to monitoring by use of Glyptol lacquer.

- Cabinet ventilation -- forced ventilation can create new reliability problems by sucking-in large quantities of lint and dirt if the cabinet is on the suction side of the fan(s). The presence of vent filters would not help if other openings such as enclosure joints, unused fastener holes, or openings around cable penetrations bypass the filters. These problems require much attention to detail and can be avoided by installing the fans so they discharge into the cabinet through filters or with filters on the

suction cabinet through filters or with filters on the suction side. Or perhaps forced ventilation could be avoided by relocating temperature-critical components to the bottom of the enclosure where air temperatures are lower.

- Power Supply Bypassing -- The recommendations for power supply bypassing were made without an apparent knowledge of the energy levels of transient overvoltages to be suppressed. The EDGCTS shows incidents involving large voltage spikes. An investigation should be made to assess such energy levels to insure adequate semiconductor protection. TUGCO should give this a high priority for resolution.

- Current Feedback Signal — The need for this recommendation is not apparent from available performance data.

- The status remarks of the EDGCTS designated fifteen incidents as random failures having no relevance to Comanche Peak reliability. These random failures include four fuseholder failures and seven relay or relay contact failures representing discernible failure patterns which should be investigated. No effort appears to have been made to identify and document all probable failure modes on other listed incidents. Most of these incidents caused outage of the emergency generator, therefore their impact should have been considered critical to reliability.

F-068 - Intercooler

The report did not confirm that the heat rejection capacity of the cooler is adequate for the application. In the case of the turbocharger this was done via test logs. A related concern is whether the cooler will function adequately if it were 10% (example) fouled.

00-420 - Lube Oil Pressure Regulatory Valve

The QR inspection reports apparently were not available to the Owners' Group Review Team. Does the conclusion regarding adequacy of the component still remain an open question?

00-621A - Fuel Oil Drip Tank

Can TUGCO confirm that fuel return entry is not by means of an open funnel which also can admit dirt?

02-310B - Crankshaft Bearing Shells

The minimum oil film thickness of 147 microinches is about 10% below the expected minimum value for the level of filtration pertaining to CPSES. Moreover, if a 10 micron filter is used it will pass dirt that is twice the size of the oil film thickness.

Normally, bearing shell crush (radial interference) and side location, and details of the design of oil holes and grooves are considered in a design review because these are fundamental to strength, lubrication and cooling of the bearing. Why was this not done?

The QR makes no direct reference to hardware checks (inspections). Was anything done in this regard?

02-310C - Crankshaft Thrust Bearing Rings

The DR did not address axial vibration as a source of thrust bearing loading. This can be a significant force. Please explain.

The QR makes no reference to inspections. Were any done?

02-335B - Front Gear Gasket/Bolting

The QR does not confirm that bolts were torqued to 60 ft-lbs. Was this confirmed?

02-341C - Piston Pin Assembly

The QR indicates a complete inspection of piston pins on EDG-01 with unsatisfactory results. EDG-02 was inspected on all right bank pins with satisfactory results. In view of the unsatisfactory findings on EDG-01 and similar unsatisfactory results on other TDI engines (e.g., River Bend)? Can TUGCO explain why all pins were not inspected on EDG-02?

The application of chrome plating can reduce the fatigue strength of steels. Was this considered in the DR?

02-380B - Exhaust Manifold Bolting and Gaskets

There have been a number of instances of fires caused by impingement of oil on hot engine parts. The exhaust manifold elbow is not insulated from the cylinder head to a point inside of the exhaust manifold shield. It is considered important that TUGCO confirm that lube oil or fuel oil cannot spray on the hot exhaust elbows. In particular all piping joints should be checked to insure that spray could not impinge on hot surfaces if a leak developed. Possible use of shrouded joints should be considered.

02-420 - Engine Driven Lube Oil Pump

It is noted that the pump body and nozzle are made of cast iron; presumably the mounting flanges are also of cast iron. Did the DR confirm these parts can withstand seismic load?

02-540A,B,C - Lube Oil Sump Tank - Strainer Assembly

The DR did not address accessibility for maintenance to verify that the strainer and the lube oil heater can be removed and reinstalled with high probability of maintaining system cleanliness and tightness. Can TUGCO comment on this?

02-689 - Off-Engine Alarm Sensors - Wiring

The QR did not confirm that wiring (items 2, 3, and 4) meet IEEE 383 requirements.

02-7170,H,I - Auxiliary Subbase Gaskets, Bolting, Fittings

The QR did not include a walkdown to confirm the absence of low spots that could trap sludge or foreign matter. Can TUGCO confirm this?

02-810A - Misc. Equipment - Aux. Jacket Water Pump

The DR makes no mention of the capacity of the auxiliary (or engine driven) jacket water pumps. Are they adequate?

02-810C - Jacket Water Heat Exchanger

There is no indication that the heat exchanger performance will be adequate under the extremes of temperature that might prevail at TUGCO. The review does not correlate the performance of the various components of the system such as the jacket water pump, strainers and thermostats. Are they all compatible?

02-810E - Jacket Water Standpipe Heater

Problems with the component were encountered at Shoreham. Can TUGCO confirm that there is no similarity between the Shoreham and CPSES installations?

02-820B - Auxiliary Lube Oil Pump

The DR does not state that the capacity and pressure of this pump is equal to that of the engine driven pump. TUGCO should verify this.

02-8200,E - Lube Oil Keepwarm Strainer/Filter

The DR did not verify that the strainer or filter flow capacity is equal to or greater than that of the prelube oil pump (90 GPM). TUGCO should confirm this.

Note also that a plot of filter dp versus time would be a useful maintenance tool.

02-820F - Fuel Flow Lube Oil Filters

TUGCO should verify that the filter capacity is sufficient for the engine driven lube oil pump (600 GPM). Also, there is no indication as to whether a relief valve and bypass around the filter is provided. If it is, the valve should be installed at the top of the filter to prevent the passage of dirt and sludge into the engine if the valve lifts. If the engine is required to start when the lube oil heater is inoperative, it may be necessary to have a bypass in order to insure that the engine will be lubricated adequately under this cold start condition. In any case, the pressure drop should be checked and recorded at regular intervals so as to anticipate the necessity for a filter change. Appendix C indicates a number of instances of excessive pressure drop across filters which indicates that filter elements are not always changed when they should be.

02-820G - Lube Oil Heat Exchanger

If the cooling water is too cold, sludge in the oil will deposit on the fins and reduce the heat exchanger capacity. Was this considered in the DR/QR?

02-820H - Lube Oil Fuel Pressure Strainer

TUGCO should confirm that the capacity is greater than or equal to that of the engine driven lube oil pump (600 GPM).

02-825A - Fuel Oil Day Tank

There is no indication in the DR/QR that there is adequate means of removing water from the fuel oil to insure that the fuel injection pumps are protected. A drain line at the bottom of the day tank would be useful in view of the intermittent operation of the engine. However, even if the engine runs continuously for several hours at full load, there will be insufficient time for water to settle in the day tank. TUGCO should verify that there is means for stripping or filtering water from the fuel oil.

02-835A - Starting Air Skid Base, Tank Relief Valve, Float Trap and Tank

TUGCO should verify that there is adequate accessibility to the air valves and float traps for maintenance. In addition, it is noted that the starging air relief valve capacity is slightly greater than the compressor capacity. TUGCO should verify that it is not possible to connect more then one compressor to each air tank.

ENCLOSURE 2

CPSES DR/QR AUDIT REVIEW

CP102 - Generator Controls

NRC Comment: In the opinion of the PNL reviewers, the analysis reported for the generator controls does not meet the objective of the DR/QR effort, primarily because the methodology followed was too limited in scope. It addresses only four of the generator control components and leaves many out that are critical to system reliability.

CPSES Response: PNL indicates that only four components were reviewed. The review considered six components: (1) the diode bridge assembly and diverter SCRs; (2) the voltage regulators; (3) the SCR firing circuits; (4) the PTs, CTs and linear reactors; (5) the field flashing circuit; and (6) the min-max excitation circuit.

These components were selected by reviewing failure patterns reported in the EDGCTS. The assessment of the critical components is inconsistent with the scope of work and charter assigned by the Owner's Group.

Design/Quality Concerns

NRC Comment: Generally most voltage regulator and exciter failure modes are considered critical to the overall reliability of the diesel generator, especially those involving common mode effects. Comments pertinent to the results and conclusions of the Comanche Peak DR/QR report are:

Diodes and SCRs - States that current ratings are adequate subject to proper cooling. Does not address voltage ratings. At least four failure incidents listed in the EDGCTS are unexplained as to probable failure modes. One failure related to out-of-phase paralleling, it may have been caused by the sustained overvoltage conditions prevalent in such events. The temperature monitoring provisions of Attachment 1 would not preclude the occurence of a failure during an emergency operating condition. It is recommended that tests be implemented to positively identify over-temperature conditions and permanent corrective actions taken as required. This effort should be accomplished by TUGCO as soon as practical.

CPSES Response: The voltage ratings of the diodes and SCRs were verified and found to be adequate. The DR/QR report discussion of voltage rating was omitted for that reason.

PNL suggests that sustained overvoltages due to out-of-phase paralleling is a cause of diode failure. Out-of-phase paralleling is a result of an operator error or failure in other equipment. Protection from such events is provided by transient suppressor CR-8 which is rated at 950 volts. The isolated incident mentioned by the consultant did not involve equiment manufacturered by TDI/PORTEC.

Thermal analysis showed that the diode mounting represented a potential diode over-temperature problem if the diode case to heat sink thermal resistance increased due to loosening of the diode. The loosening problem is one that is expected to develop gradually over a period of time, rather than on any one start. Thus detection of the onset of a problem would be possible with the method suggested. The concern about the mounting method is further supported by the diode manufacturer's installation recommendations.

NRC Comment: Field flashing relay voltage specificatiors in Attachment 1 may not be adequate. A nominal voltage rating equal to or lower than the lowest expected battery voltage should be specified to insure relay pick-up. A dropping resistor by-passed by a normally closed relay contact should be used to prevent coil damage when energized at higher voltage levels. This is standard practice and is needed to insure relay pick-up under low voltage conditions and to preclude relay coil overheating under maximum voltage conditions.

CPSES Response: Apparently the consultant has misinterpreted the relay specification as stated in the DR/QR report. The relay is to be selected so that the coil operates over the full supply range of 90 through 140V. Discussions with the manufacturer of the existing relay suggest that such a relay is available. The consultant's solution would require substantial requalification of the design.

NRC Comment: Rather than relying only on a device such as Glyptol lacquer to monitor fastener tightness, positive actions should be taken to insure such tightness. Fastener locking devices such as the use of doube nuts or a bonding agent such as LOCTITE 271 (Loctite Corporation, Newington, Connecticut 06111) are more positive.

CPSES Response: The intent of the recommendation in the DR/QR report is to use Glyptol as an agent for monitoring the tightness of bolted electrical connections. Use of a bonding agent which may flow on mating conducting surfaces would adversely affect the electrical perfo/mance of the connections, and no visual indication of loosening would be present.

NRC Comment: Substitution of lockable potentiometers may be preferred to monitoring by use of Glyptol lacquer.

CPSES Response: The Glyptol Lacquer is recommended in Attachment 1 of the DR/QR report for immediate use. The consultant's recommendation would require requalification of the PC board because of the mechanical design changes required to accommodate the lockable potentiometers. Further, the use of Glyptol would still be recommended to provide positive indication of any adjustment change.

Long term recommendations in Attachment 3 of the DR/QR report suggest MIL style, sealed, multiturn potentiometers. The intent of the recommendation is to improve the long term stability of the adjustments. Glyptol monitoring is recommended with these potentiometers as well.

NRC Comment: Cabinet ventilation - forced ventilation can create new reliability problems by sucking-in large quantities of lint and dirt if the cabinet is on the suction side of the fan(s). The presence of vent filters would not help if other openings such as enclosure joints, unused fasteners holes, or openings around cable penetrations bypass the filters. These problems require much attention to detail and can be avoided by installing the fans so they discharge into the cabinet through filters or with filters on the suction side. Or perhaps forced ventilation could be avoided by relocating temperature-critical components to the bottom of the

enclosure where air temperatures are lower.

CPSES Response: Positive pressure ventilation of the generator controls is recommended by PNL. The need for adequate cooling is the focus of the DR/QR recommendation for ventilation, rather than the details of the implementation. However, since positive pressure ventilation may be simpler to implement while still assuring cabinet cleanliness, it may be preferred.

NRC Comment: Power Supply Bypassing - The recommendations for power supply bypassing were made without an apparent knowledge of the energy levels of transient overvoltages to be suppressed. The EDGCTS shows incidents involving large voltage spikes. An investigation should be made to assess such energy levels to insure adequate semiconductor protection. TUGCO should give this a high priority for resolution.

CPSES Response: The purpose of the power supply bypassing is to prevent AC noise voltage generated outside the voltage regulator circuit from interfering with its operation and to prevent voltages generated by the circuit itself from propagating in the circuit. There are no recorded cases of transient voltages within the generator control equipment, since no instrumentation is provided for monitoring short-term transients. This was presented as a long term recommendation to be implemented at the discretion of TUGCO

NRC Comment: Current Feedback Signal - The need for this recommendation is not apparent from available performance data.

CPSES Response: It is well known that voltage and current sensing circuits should utilize 3-phase or 6-phase rectification so that the smoothing filter may have a small time constant relative to that of the rest of the system. By so doing, the adjustment of the gain and damping is less critical to the desired level of stability. This was presented as a long term recommendation to be implemented at the discretion of TUGCO

NRC Comment: The status remarks of the EDGCTS designated fifteen incidents as random failures having no relevance to Comanche Peak reliability.

These random failures include four fuseholder failures and seven relay or relay contact failures representing discernible failure patterns which should be investigated. No effort appears to have been made to identify and document all probable failure modes on other listed incidents. Most of these incidents caused outage of the emergency generator, therefore their impact should have been considered critical to reliability.

CPSES Response: The four fuseholder failures were not in TDI/PORTEC equipment. Three failures were due to loose fuse clips or holders, but because they did not involve TDI/PORTEC equipment they were not studied further. The fourth fuse failure was due to a blown fuse in the measuring PT circuit, which was an isolated occurance.

Seven relay failures have been mentioned by the consultant. None of these were in TDI/PORTEC equipment. Two failures were in the K-1 relay of the Basler voltage regulators at Zion Units 1 and 2. These two failures have no relevance to the TDI/PORTEC equipment because the K-1 relay in the Basler voltage regulator is used in an entirely different way than the K-1 relay in the TDI/PORTEC equipment.

One failure was due to sticky and damaged auxiliary contacts Trojan Unit 1. This was considered a random event because no similar failure was identified in TDI/PORTEC equipment.

Three failures (two at Arkansas NUC Unit 1 and one at Brunswick Unit 2) were related to the malfunction of protective relays which were not considered part of the generator controls for the review.

The CTS had insufficient information about the relay failure at Kuwanee and therefore was not anaiyzed.

F-068 - Intercooler

NRC Comment: The report did not confirm that the heat rejection capacity of the cooler is adequate for the application. In the case of the turbocharger this was done via test logs. A related concern is whether the cooler will

function adequately if it were 10% (example) fouled.

CPSES Response: The TDI Owners Group found the intercooler to be adequately sized based on:

- successful TDI tests
- successful site check-out
- successful present operation
- the intercooler cooling water is treated engine jacket water.

Furthermore, there is a lack of identified problem experience with shell side fouling, and CPSES has agreed to inspect the tube side after every refueling outage.

00-420 - Lube Oil Pressure Regulating Valve

NRC Comment: The QR inspection reports apparently were not available to the Owner's Group Review Team. Does the conclusion regarding adequacy of the component still remain on open question?

CPSES Response: The adequacy of the component is not an open question. The TDI Owners Group found the component adequate based on:

- No reported incidents of TDI related failure due to valve design.
- The valve is identical to the SNPS valve which was found adequate.
- Successful continuous operation.
- CPSES has agreed to periodically disassemble and clean the valve.

00-621A - Fuel Oil Drip Tank

NRC Comment: Can TUGCO confirm that fuel return entry is not by means of an open funnel which also can admit dirt?

CPSES Response: The return to the Fuel Oil Drip Tank is by hard pipe with no open funnel.

02-310B - Crankshaft Bearing Shells

NRC Comment: The minimum oil film thickness of 147 micro-inches is about 10% below the expected mini-

mum value for the level of filtration pertaining to CPSES. Moreover, if a 10 micron filter is used it will pass dirt that is twice the size of the oil film thickness.

Normally, bearing shell crush (radial interference) and side location, and details of the design of oil holes and grooves are considered in a design review because these are fundamental to strength, lubrication and cooling of the bearing. Why was this not done?

The QR makes no direct reference to hardware checks (inspections). Was anything done in this regard?

CPSES Response: The successful operating history of the main bearing shells, indicated by the absence of any designed-related deficiencies in the component tracking system, demonstrates the acceptability of this component. In reviewing the specific geometric design features of the main bearing shells, the effect of crush on radial clearance, side location, 360 degree grooving and oil supply were considered (Reference 1 of the DR/QR report) and found to conform with accepted practice.

The analysis of crankshaft main bearing shells also considered the effects on bearing performance of particles which pass the 10 micron oil filter, and which are larger than the minimum oil film thickness (Reference 1 of the DR/QR report). The babbitt layer has sufficient thickness and embedability to allow such particles to pass between the journal and the bearing or to be rendered harmless by embedment in the babbitt layer. The recommended inspections at alternate fuel outages will disclose any harmful wear that could adversely affect bearing performance and reliability.

The QR report and TER 10-029 together with NRC 84-0080 were reviewed to evaluate the results of hardware inspections which were performed. The unsatisfactory results reported were due to scratches disclosed in the visual inspection. These scratches were attributed to foreign particles in the engine which passed through the bearings before they were trapped in the lube oil filter. The nature and severity of the scratches were

evaluated and the bearings were judged acceptable for continued use.

02-310C - Crankshaft Thrust Bearing Rings

NRC Comment: The DR did not address axial vibration as a source of thrust bearing loading. This can be a significant force. Please explain.

The QR makes no reference to inspections. Were any done?

CPSES Response: Axial vibration of the crankshaft is driven primarily by variations with time in the axial component of the gear force. The DR considered the peak axial gear force, and thus, in a conservative way, accounted for the peak thrust bearing ring load. In the absence of resonant axial vibration of the crankshaft, the peak thrust bearing ring load will be less than or equal to the sum of the peak axial gear force and the other axial loads. There is no evidence of resonant vibration of the crankshaft on TDI diesel engines, and the EDG component tracking system had not reported any problems with thrust bearing rings on TDI engines.

QR inspections of the thrust rings were not required and none were performed.

02-335B - Front Gear Gasket/Bolting

NRC Comment: The QR does not confirm that bolts were torqued to 60 ft-lbs. Was this confirmed?

CPSES Response: All external bolts on the front gear case of DG-01 and DG-02 were verified to be torqued to the proper value per MAR 85-0095 and 85-0097. No loose bolts were found. Internal bolts, which require equipment disassembly, will be inspected at the next scheduled maintenance period per OGTP-672-0-404.

02-341C - Piston Pin Assembly

NRC Comment: The QR indicates a complete inspection of piston pins of EDG-01 with unsatisfactory results. EDG-02 was inspected on all right bank pins with satisfactory results. In view of the unsatisfactory findings on EDG-01 and similar unsatisfactory results on other TDI

engineees (e.g., River Bend)? Can TUGCO explain why all pins were not inspected on EDG-02?

The application of chrome plating can reduce the fatigue strength of steels. Was this considered in the DR?

CPSES Response:

Wrist Pin Inspection. Inspection results in TER 10-080, noted in the DR/QR Report for Component 02-341-C shows that visual inspection was performed on all wrist pins in DG CPI-MEDEGEE-02. Results were satisfactory except for pin 4L which "shows some slight evidence of scoring. Scoring does not penetrate the chrome plating". The Maintenance Engineering Evaluation MEE #84-037 determined that pin 4L was acceptable for use because the damage noted did not penetrate the chrome plating.

The information in TER 10-078 for component 02-3408, which includes inspection results for connecting rod bushings from EDG-01 and EDG-02, was received. The results showed that the adverse conditions found on pins from EDG-01 did not cause detectable damage on the bushings. The results were also satisfactory for all bushings from EDG-02.

Fatigue Strength - Effect of Chrome Plating. It is known that the cracks normally present in electroplated hard chromium can act as stress raisers and thus reduce the fatigue strength of the underlying steel. A compressive residual stress in the surface is often used to offset this effect. Such surface compressive stress can be produced by shot peening or appropriate heat treatment (1). The piston pins are case carburized and hardened, which produces a residual compressive stress in the case hardened surface and near sub-surface material. The beneficial effect of the case hardened surface was considered in the analysis of piston pin fatigue strength. No adjustment was made for the effect of chrome plating. The very conservative fatigue analysis indicates a sufficient margin to tolerate a reduction of fatigue strength by as much as 40% because of the hard chromium plating.

The component tracking system disclosed no evidence of fatigue damage or failures for piston pins in nuclear or non-nuclear

service. The successful operating history of the piston pins provides confirmation of component acceptability.

02-380B - Exhaust Manifold Bolting and Gaskets

NRC Comment: There have been a number of instances of fires caused by impingement of oil on hot engine parts. The exhaust manifold elbow is not insulated from the cylinder head to a point inside of the exhaust mainfold shield. It is considered important that TUGCO confirm that lube oil or fuel oil cannot spray on the hot exhaust elbows. In particular all piping joints should be checked to insure that spray could not impinge on hot surfaces if a leak developed. Possible use of shrouded joints should be considered.

CPSES Response: The TDI Owners Group does not believe that fire caused by impingement of oil on hot engine parts is a concern at CPSES. The basis for this belief is given below:

- There is a drip collection system installed on the diesel.
- The fuel oil lines have been seismically qualified.
- The high pressure fuel oil lines are shrouded and are the only oil lines in the area of the unshrouded exhaust manifold elbow.
- Shrouding the exhaust manifold elbow is physically impossible because of thermal growth and physical constraints
- Engine configuration prevents oil build-up in the area (as described in the DR/QR).

02-420 - Engine Driven Lube Oil Pump

NRC Comment: It is noted that the pump body and nozzle are made of cast iron; presumably the mounting flanges are also of cast iron. Did the DR confirm these parts can withstand seismic load?

CPSES Response: The mounting flanges for this pump have been seismically qualified, and as delineated in

the DR/QR, its qualification may be found in Stone & Webster Engineering Corp. calculation No. 11600.60NM(B)-001-C2C-040.

02-540A, B, C Lube Oil Sump Tank-Strainer Assembly

NRC Comment: The DR did not address accessibility for maintenance to verify that the strainer and the lube oil heater can be removed and reinstalled with high probability of maintaining system cleanliness and tightness. Can TUGCO comment on this?

CPSES Response: Using the appropriate procedural precautions to ensure cleanliness control, TUGCO has demonstrated the ability to enter the lube oil sump without introducing contaminates to the system. The sump was entered several times during initial system flush and once when replacing a foot valve with no adverse effects.

02-689 - Off-Engine Alarm Sensors - Wiring

NRC Comment: The QR did not confirm that wiring (items 2, 3, and 4) meet IEEE 383 requirements.

CPSES Response: It was not the intent of the DR/QR to determine if the wiring complied with IEEE-383. The intent was to determine if the wiring system was adequate for its application.

Item 2 (of the DR/QR) was found acceptable based on the following:

- The wire was run in conduit. The conduit will make it difficult for a fire to be initiated, and it will limit and contain combustion of the insulation should it occur, and prevent fire from spreading to other components.

- This wire (a thermocouple extension wire) is not safety related. The engine will continue to operated satisfactorily during a LOOP/LOCA without these wires being intact.

Items 3 and 4 (of the DR/QR) were found acceptable based on the following:

- The insulation of this wire is composed primarily of non-organic materials which should not support combustion.

- These wires (thermocouple wires) are not safety related. Engine will operate satisfactorily during a LOOP/LOCA without these wires being intact.

02-717G, H, I - Auxiliary Subbase Gaskets, Bolting, Fittings

NRC Comment: The QR did not include a walkdown to confirm the absence of low spots that could trap sludge or foreign matter. Can TUGCO confirm this?

CPSES Response: It is stated correctly that the QR did not perform a walkdown to confirm the absence of "low spots" that could possibly trap sludge or foreign matter. However, "low spots" are not a problem because the diesels are equipped with sufficient filters and strainers (all of which have been requalified) to preclude engine damage or the entrapment of sludge or foreign matter into any possible "low spots." Therefore, a walkdown was not required nor performed. In addition the lube oil is sampled monthly to check for chemical and particulate contamination.

02-810A-Misc. Equipment - Aux. Jacketwater Pump

NRC Comment: The DR makes no mention of the capacity of the auxiliary (or engine driven) jacket water pumps. Are they adequate?

CPSES Response: The auxiliary jacket water pump capacity is adequate for its intended design function. Its adequacy is based on the following:

- The pumps have operated successfully at CPSES and have been circulating adequate quantities of water to achieve the desired results throughout the diesels' operational history.

- There have not been reported incidents related to TDI diesels, regarding the

inadequacy of the auxiliary jacket water cooling pump capacity.

02-810C - Jacket Water Heat Exchanger

NRC Comment: There is no indication that the heat exchanger performance will be adequate under the extremes of temperature that might prevail at TUGCO. The review does not correlate the performance of the various components of the system such as the jacket water pump, strainers and thermostats. Are they all compatible?

CPSES Response: The jacket water heat exchanger performance is adequate for the temperature conditions that exist at CPSES. This assessment is made on the basis of the following:

- The jacket water heat exchanger found at CPSES is the same manufacturer as that for SNPS. (The heat exchanger is a non-TDI fabricated component). The manufacturer's heat exchange design at SNPS was given an exhaustive review, and revealed nothing but acceptable design practices. Therefore, if a manufacturer can properly design a heat exchanger for one site (SNPS), it is sound reasoning that the manufacturer can properly design a heat exchanger for another site (CPSES).

- The jacket water heat exchanger has not been an operational concern at SNPS or CPSES. Also, the only concerns that could occur would be poor water chemistry which cannot be used to discredit the jacket water heat exchanger design.

- The jacket water heat exchanger performance has been acceptable through its operating history.

02-810E - Jacket Water Standpipe Heater

NRC Comment: Problems with the component were encountered at Shoreham. Can TUGCO confirm that there is

no similarity between the Shoreham and CPSES installations?

CPSES Response: The CPSES jacketwater standpipe heater is unlike the one found at SNPS. The CPSES unit has one immersion heater and has proper circulation to prevent stagnant water around the element.

02-820B - Auxiliary Lube Oil Pump

NRC Comment: The DR does not state that the capacity and pressure of this pump is equal to that of the engine driven pump. TUGCO should verify this.

CPSES Response: It was not the intent of the DR/QR to determine if the auxiliary lube oil pump was equal in capacity and pressure to the engine driven lube oil pump. Rather, it was to assess the adequacy of the auxiliary pump for its intended design function.

The acceptability of the auxiliary lube oil pump is established based on the pumps proven ability to satisfactorily maintain the required system pressure. Furthermore, the auxiliary lube oil pump maintains a lube oil system-pressure that exceeds that of the engine driven lube oil pump.

Finally, many of the TDI diesels operating in nuclear stand-by service do not have these pumps. As stated, the pump is an "auxiliary", which is not required, and is not "standard equipment" on the engine.

02-820D,E - Lube Oil Keepwarm Strainer/Filter

NRC Comment: The DR did not verify that the strainer or filter flow capacity is equal to or greater than that of the prelube oil pump (90 GPM). TUGCO should confirm this.

Note also that a plot of filter dp versus time would be a useful maintenance tool.

CPSES Response: A review of the TDI Manual, Volume III, confirms the flow capacity of the strainer/filter as being equal to the prelube oil pump (90 GPM).

02-820F - Full Flow Lube Oil Filters

NRC Comment: TUGCO should verify that the filter capacity is sufficient for the engine driven lube oil pump (600 GPM). Also, there is no indication as to whether a relief valve and bypass around the filter is provided. If it is, the valve should be installed at the top of the filter to prevent the passage of dirt and sludge into the engine if the valve lifts. If the engine is required to start when the lube oil heater is inoperative, it may be necessary to have a bypass in order to insure that the engine will be lubricated adequately under this cold start condition. In any case, the pressure drop should be checked and recorded at regular intervals so as to anticipate the necessity for a filter change. Appendix C indicates a number of instances of excessive pressure drop across filters which indicates that filter elements are not always changed when they should be.

CPSES Response: Verification of equipment capacity is not required. The engine driven positive displacement lube oil pump, maintains system pressure at 50 psi by incorporating a pressure regulating valve and recirculation line back to the pump. The performance curve of a positive displacement curve is relatively flat and will maintain the required system pressure over a range of flow rates.

It should be noted that lube oil system pressure control feedback is from a point downstream of the subject equipment. This being the case, plus successful system/engine operation, the pump and downstream equipment of the system, correlate the performance of the system component as being compatible and adequate.

There is no relief valve and bypass around the subject equipment. The concerns raised regarding this component are not related to the attributes to be verified.

The pressure boundary, nozzle loads, pressure drop, and particle retention size were the attributes to be verified and all were found acceptable.

02-820G - Lube Oil Heat Exchanger

NRC Comment: If the cooling water is too cold, sludge in the oil will deposit on the fins and reduce the heat exchanger capacity. Was this considered in the DR/QR?

CPSES Response: Excessively cold cooling water causing oil sludge to deposit on tube fins was not and should not be considered in the DR/QR based on the following:

- During engine operation, warm jacket water is used as cooling water.
- During engine standby, jacket water is heated and assists in maintaining proper lube oil temperature.
- The diesels are equipped with sufficient filters and strainers to preclude oil sludge.

02-820H - Lube Oil Full Pressure Strainer

NRC Comment: TUGCO should confirm that the capacity is greater than or equal to that of the engine driven lube oil pump (600 GPM).

CPSES Response: Refer to 02-820F.

02-825A - Fuel Oil Day Tank

NRC Comment: There is no indication in the DR/QR that there is adequate means of removing water from the fuel oil to insure that the fuel injection pumps are protected. A drain line at the bottom of the day tank would be useful in view of the intermittent operation of the engine. However, even if the engine runs continuously for several hours at full load, there will be insufficient time for water to settle in the day tank. TUGCO should verify that there is means for stripping or filtering water from the fuel oil.

CPSES Response: At least once per 92 days, the fuel oil storage tanks are checked for any accumulated water. At least once per 31 days and after each operation equal to or greater than 1 hour, the day tank is also checked for accumulated water. This is done per procedure OPT-214A by taking a sample at the fuel oil pump

suction strainer. This prevents any water from entering the Fuel Oil System and if any water is found it is removed.

02-8356A - Starting Air Skid Base, Tank Relief Valve, Float Trap and Tank

NRC Comment: TUGCO should verify that there is adequate accessibility to the air valves and float traps for maintenance. In addition, it is noted that the starging air relief valve capacity is slightly greater than the compressor capacity. TUGCO should verify that it is not possible to connect more than one compressor to each air tank.

CPSES Response: Accessibility to the air valves and float traps is adequate for the required maintenence.

It is not possible to connect more than one compressor to an air tank.

ENCLOSURE 3

Log # TXX-4501
File # 10010

TEXAS UTILITIES GENERATING COMPANY
SKYWAY TOWER * 400 NORTH OLIVE STREET, L.B. 81 * DALLAS, TEXAS 75201

JOHN W. BECK
VICE PRESIDENT

June 27, 1985

Director of Nuclear Reactor Regulation
Attention: Mr. Vince S. Noonan, Director
Comanche Peak Project
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)
DOCKET NO. 50-445
DESIGN REVIEW/QUALITY REVALIDATION (DR/QR)
REPORT ON THE CPSES TDI DIESEL GENERATORS

REF: 1) J. B. George letter TXX-4377 to H. R. Denton
dated December 17, 1984

2) J. W. Beck letter TXX-4430 to H. R. Denton
dated March 1, 1985

Dear Mr. Noonan:

Reference 1 provided the NRC with the CPSES evaluation results of the TDI Diesel Generator Owners' Group DR/QR report. Enclosure 2 to the letter specifically provided the CPSES position on the DR/QR report maintenance and surveillance activities. Based on Revision 1 to the DR/QR report (Reference 2) and on plant specific implementation of the report recommendations at CPSES, attached is an update to Enclosure 2.

Sincerely,

John W. Beck

John W. Beck

RWH/grr
Attachment

8507020273 8pp.

Attachment to TXX-4501
dated June 27, 1985

Enclosure 2

Results of Texas Utilities' Evaluation of the CPSES DR/QR Recommendations Regarding Maintenance and Surveillance Activities

Texas Utilities concurs with all Owners' Group recommended maintenance and surveillance activities as stated in the revised CPSES DR/QR component reports and revised maintenance matrix, with the following proposed modifications and/or clarifications:

1) Component F-068, Intercoolers

Item 2 in the revised maintenance matrix recommends cleaning and inspection of intercooler shell and tube sides after every refueling outage. Texas Utilities concurs with the inspection interval for the tube side, however, it is proposed that the shell side be comparably inspected at a five (5) year interval, based on a lack of identified problem experience for the shell side.

2) Component MP-022/23 Turbochargers

Item 2 in the revised maintenance matrix recommends cleaning of the turbocharger impeller and diffuser at every refueling outage. Texas Utilities proposes as a more practical maintenance approach that the impellers and diffusers be inspected every refueling outage and cleaned if necessary.

A supplementary Phase I report on turbocharger nozzle ring assemblies has also been issued by the Owners' Group (Reference 7) which contains the following additional Utility recommendations:

a. At any turbocharger disassembly there should be a visual inspection of nozzle ring components for any apparent damage, failure or apparent mispositioning of vanes. Replace all affected nozzle ring components. During reassembly ensure that capscrews are properly installed with recommended pretorque.

b. Monitor engine operation to ensure exhaust gas temperatures do not exceed those specified.

Texas Utilities will comply with the utility recommendation a) above during all turbocharger disassemblies and will perform pre-turbine exhaust temperature monitoring on a monthly basis.

3) Component 00-420, Lube Oil Pressure Regulating Valve

Item 1 in the revised maintenance matrix recommends valve disassembly and cleaning at every outage. Texas Utilities concurs, but proposes that the interval be changed to alternate refueling outages based on satisfactory industry experience with this valve.

4) Component 02-307B, Lube Oil Fittings, Internal

Texas Utilities concurs with the recommendation in Item 1 to check tubing for dents or crimps at every refueling outage, however, this will be performed on accessible tubing only.

5) Component 02-310A, Crankshaft

Item 2 in the revised maintenance matrix recommends that all crank journal diameters be measured at alternate outages. Texas Utilities proposes that a sample of main journals be measured at alternate refueling outages in order to be compatible with the established sampling frequency for the main bearing shells (see component 02-310B).

6) Component 02-310B, Main Bearing Shells

Item 1 in the revised maintenance matrix recommends visual and dimensional inspection of all main bearing shells for evidence of wear or misalignment at the first refueling outage and at alternate outages thereafter. Texas Utilities believes that the minimal problems encountered with the CPSES Unit 1 DG main bearing shells do not warrant inspection to the degree recommended by the Owners' Group. This position is in agreement with the assessment by NRC and PNL of CPSES main bearing shell experience, as stated on pages 5.12 and 5.13 of PNL-5234 (enclosure to Reference 5). As recommended by NRC and PNL, Texas Utilities will perform a sample inspection of two (2) highly loaded bearings per engine (bearings 5 and 6) at alternate refueling outages. Associated caps and saddles will also be checked. The need for additional inspection will be determined by the results of the initial sample inspection. Due to accessibility restrictions, inspection of bearings 1, 9, and 10 are to be performed only during an engine teardown (every 5 years).

7) Component 02-310C, Thrust Bearing Ring

Item 2 in the revised maintenance matrix recommends a visual inspection of the thrust bearing for signs of wear or degradation concurrently with visual and dimensional main bearing shell inspections as recommended above. However, the main bearing shell inspection frequency has been modified as stated above. Texas Utilities proposes that the recommended visual inspection would be adequate if performed at a five (5) year interval (i.e., at overhauls) since a "bump check" for thrust bearing clearance will be performed at every refueling outage.

8) Component 02-315A, Cylinder Blocks

Item 1 in the revised maintenance matrix recommends a visual inspection of the cylinder block and eddy-current inspection for stud-to-stud cracks between cylinder heads and for cracks between the block edge and studs at the block ends. The recommended frequency for the inspection is prior to returning the engine to standby service after any period of operation above 50% load.

Texas Utilities agrees that surveillance of the block top surfaces to ensure the absence of stud-to-stud cracks and stud-to-edge cracks is appropriate for the first cycle of operation at CPSES Unit 1, until such time as the indications found on Train A, cylinders 4R and 5R and on Train B, cylinders 1R and 4R are reinspected at the first refueling outage. Future inspection requirements should be based on the results of the above inspections and on any additional information provided by the Owners' Group. This position is in agreement with PNL's position in PNL-5234. Texas Utilities proposes at this time, however, that a visual and boroscopic examination be substituted for the eddy-current technique at the same frequency of performance. Texas Utilities believes that the use of visual/boroscopic examination will result in greater engine availability and is justifiable based on the stated conservatism in the Owners' Group assessment of the CPSES block indications as "ligament cracks" and on the absence of Widmanstaetten graphite in the CPSES cylinder blocks.

The indications in the Train A right bank cylinder block are the largest found at CPSES, but the Owners' Group has concluded that they were casting induced not service induced. The smaller indications in the Train B right bank cylinder block were also determined to be casting defects (by TUGCO) and are less than 0.050 inches in depth. All of these indications are in lower stress regions of the block top than ligament cracks and are all smaller than ligament cracks.

Widmanstaetten graphite is a degenerate microstructure that reduces the strength and fatigue resistance of grey cast iron. The Owners' Group has determined that there is no Widmanstaetten graphite present in the CPSES Unit 1 cylinder blocks.

The Owners' Group has stated in the latest Phase I report (reference 8) that blocks which have or are assumed to have ligament cracks and which have no Widmanstaetten graphite are capable of withstanding a LOOP/LOCA event with sufficient margin, provided no stud-to-stud or stud-to-edge cracks exist. Furthermore, engines with such cracks can still be returned to standby service provided these cracks are less than 1½ inches in depth from the block top. Because initiation of stud-to-stud or stud-to-end cracks occurs at the block top surface and because they propagate downward, visual surface inspection of the block top will be adequate to assure the absence of such cracks.

As required in Reference 5, Texas Utilities will also perform routine daily visual inspections of the block and external surfaces during operating periods, with a more thorough monthly inspection under strong lighting (also with the engine operating). As stated above, block indications are to be reinspected for propagation at the first refueling outage.

To ensure engine availability after surveillance testing above 50% load, Texas Utilities will maintain the engine in standby service and perform the required surface inspection of the block top within 48 hours.

9) Component 02-340A, Connecting Rods

CPSES is in agreement with the revised DR/QR report.

10) Component 02-340B, Connecting Rod Bearing Shells

Item 1 in the revised maintenance matrix recommends that visual and dimensional inspection of all bearing shells be performed at the outage which precedes 500 hours of operation by at least the sum of hours of operation in a LOOP/LOCA plus the expected hours of operation between outages.

In place of the above scheme, Texas Utilities will perform a visual and liquid penetrant examination of connecting rod bearing shells for 2 sets of pistons per engine, during the first refueling outage. Lube oil analysis for contamination will be performed on a monthly basis, and bearing clearance will be measured by "bump check" at every refueling outage.

11) Component 02-341A, Pistons

CPSES is in agreement with the revised DR/QR report.

12) Component 02-350A, Cam Shaft Assembly

CPSES is in agreement with the revised DR/QR report.

13) Component 02-380A, Exhaust Manifold

Item 1 in the revised maintenance matrix recommends magnetic particle examination of a sample of circumferential pipe welds and corresponding heat affected zones at the first refueling outage and at alternate refueling outages thereafter.

Texas Utilities proposes to visually examine all accessible welds at the frequency given above, instead of a sample of magnetic particle tests. It is felt that this procedure would provide a more practical approach with broader weld inspection coverage.

14) Component 02-387A, Crankcase Vacuum Fan

Item 1 in the revised maintenance matrix recommends cleaning and inspection of the fan at alternate outages. Texas Utilities proposes, as a more practical approach, that the fan be inspected at alternate refueling outages with cleaning as necessary.

15) Component 02-390E, Rocker Arm Bushings

Item 1 in the revised maintenance matrix recommends visual and dimensional inspection of intake rocker arm bushings at the outage which precedes 2300 hours of operation by at least the sum of expected hours of operation in a LOOP/LOCA plus the expected hours of operation between outages. However, NRC has concurred in Reference 5 with Texas Utilities earlier proposal to visually inspect rocker arms at each refueling outage.

Based on the above, Texas Utilities will perform a visual inspection of the intake rocker arms at every refueling outage, and will measure them every 5 years during overhauls.

16) Component 02-410A, Overspeed Trip Governor

CPSES is in agreement with the revised DR/QR report.

17) Component 02-410C, Overspeed Trip Drive Couplings

Item 1 in the maintenance matrix recommends that the present L-110 Lovejoy couplings be replaced with new units at the next outage, per TDI Service Information Memo (SIM) 363. Texas Utilities does not intend to replace these couplings at the first refueling outage because they were already replaced per SIM 363 instructions.

18) Component 02-413A, Governor Linkage

Texas Utilities will install lockwire on all fasteners designed for use with lockwire. Other locking hardware will be installed where specified.

19) Component 02-415A, Woodward Governor

Recommended settings will be reviewed to ensure compatibility with the Texas Utilities grid system requirements, and may be adjusted accordingly.

20) Component 02-441B, Air Filter to Starting Air Distributor

Item 6 in the revised maintenance matrix recommends that air start strainers be cleaned and inspected monthly. Fouling of these strainers is not expected because this portion of the system contains air which has been dried and filtered by the air dryer. Texas Utilities proposes cleaning and inspecting the strainers every outage and will blowdown the strainers at the drip legs assembly daily.

21) Component 02-500C, Breakers & Contact Blocks

Item 3 in the revised maintenance matrix recommends that circuit breakers be trip-checked at each outage. Texas Utilities believes that breakers of the molded case type should not be tested at frequent intervals and proposes to perform this test every 5 years for this type of breaker. Other types of breakers would be tested at each refueling outage as recommended.

22) Components 02-525B, C, Barring Device Controls & Filter

Because the barring device is not required during engine operation, the Owners' Group recommendations for the associated components may not necessarily be incorporated by Texas Utilities, but will be taken into consideration.

23) Component 02-717C, Jacket Water Piping, Couplings, Fittings, Orifices & Y-Strainers

The DR/QR component report recommends that flanges be torqued per the general torque tables in the TDI Instruction Manual. Texas Utilities flange torquing procedure provides for greater torque than the general torque tables and will provide adequate load transfer to attaching supports.

24) Component 02-717G, K, Lube Oil Valves and Fuel Oil Valves

Item 1 in the original maintenance matrix recommended disassembly, inspection and refurbishment of fuel oil valves on a 5 year interval, while the revised matrix specifies an interval of every outage. Based on satisfactory experience with these valves, Texas Utilities will comply with the original recommendation for those valves which have identified deficiencies. This is consistent with the TDI Maintenance Manual and the DR/QR Component report.

25) Component 02-810E, Jacket Water Heaters

The Owners' Group recommends in the revised maintenance matrix that the following be performed at each outage: 1) measure heater insulation resistance, 2) inspect and clean heater elements, and 3) check calibration and inspect thermostat. However, this recommendation appears to be arbitrary in that it is not based on either a design review or on adverse component experience according to the component report. Texas Utilities believes that the activities recommended above would be adequate if performed at alternate refueling outages and intends to implement that interval.

26) Component 02-820A, Lube Oil Sump Tank Heaters

The Owners' Group recommends that heater insulation resistance be measured and that thermostats be checked and calibrated at every outage. Based on satisfactory experience with these heaters, however, Texas Utilities proposes that these activities be performed at alternate refueling outages. The heater elements will be inspected at every refueling outage in conjunction with the tank inspection, as recommended.

27) Component CP-102, Generator Controls

CPSES is in agreement with the revised DR/QR report.

The DR/QR maintenance and surveillance activities recommended by the Owners' Group are to be incorporated into the CPSES Unit 1 diesel generator preventive maintenance and surveillance program, as modified and/or clarified above, as follows:

Monthly and daily surveillance and maintenance items are to be incorporated into the surveillance or maintenance programs prior

to exceeding 5% power at CPSES Unit 1. Items based on number of engine starts or hours of operation, as well as 18 month surveillance items, are included in this category.

Surveillance and maintenance items which are to be accomplished on a refueling outage or longer basis will be incorporated into the appropriate programs prior to the first refueling outage.

It should be noted, however, that evolution of the maintenance and surveillance program can be expected to occur based on implementation feedback, inspection results and on additional input from NRC, the Owners' Group, TDI or other applicable sources. Also, variations in the methods of achieving the intent of the recommendations may be necessary upon implementation in order to provide a practical approach to maintenance. NRC is hereby requested to provide guidance on the subject of possible future changes (both major and minor) to the programs for the reasons stated above, particularly regarding NRC notification of prospective changes.

Finally, the TDI inspection and maintenance forms referenced in the "Comments" section of the maintenance matrix may or may not be used in the performance of the recommended activities. Maintenance instructions and procedures will specify which forms are to be used, if any, for a specified activity.

ENCLOSURE 4

MEETING ATTENDANCE

COMANCHE PEAK TDI DIESEL GENERATOR
RELIABILITY PROGRAM AUDIT

Monday and Tuesday, July 1 and 2, 1985

Texas Utilities

J. B. George
J. C. Kuykendall
R. D. Caler
G. Mullens
K. B. Becker
D. A. London
J. P. Shrewsbury
J. R. Green
D. Reimer
F. W. Madden
D. R. Woodlan
R. W. Haskoree
R. G. Cockrel

Texas Utilities Consultants

K. T. Fitzpatrick, SWEC (Owners Group)
J. C. Kammeyer, SWEC (Owners Group)
C. L. Ray, Duke Power Co. (Owners Group)
A. Kusko, FaAA
W. Littman, FaAA

NRC Staff

C. H. Berlinger
D. Persinko
S. B. Burwell

NRC Consultants

D. Dingee
A. H. Wendel
H. M. Hardy
N. N. Rivera
P. S. Louzecky

Oboserser

D. L. Dill, Carolina Power and Light Co.