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AN ELECTRIC SYSTEM SERVING THE HEART OF CALIFORNIA

January 4, 1988

AGM/TA 87-297

U. S. Nuclear Regulatory Commission
Attention: Frank J. Miraglia, Jr.
Associate Director for Projects
Philips Building
7920 Norfolk Avenue
Bethesda, MD 20014

DOCKET 50-312
RANCHO SECO NUCLEAR GENEPATING STATION UNIT #1
DR/QR INFORMATION ON TDI DIESEL GENERATORS

Dear Mr. Miraglia:

The District's July 8, 1987 letter (GCA 87-330) provided Engineering Summary Reports for the sixteen Phase I diesel generator components. These reports contained detailed information on the Design Review/Quality Revalidation (DR/QR) Program for the Rancho Seco TDI Diesel Generators. All of these Engineering Summary Reports were final except for the turbocharger report. This report had been marked "preliminary" due to vibration problems with the turbocharger support bracket. These problems have been resolved and the final Engineering Summary Report for the turbocharger is attached. Engineering Summary Reports have also been included for those components which have 10CFR Part 21 notifications or NRC IE Notices associated with them.

The attached Engineering Summary Reports replace the corresponding reports in the District's June 12, 1985 submittal (RJR 85-260). Each summary report addresses line item by line item each DR/QR issue. The summary report also provides the District's resolution to concerns identified in NUREG 1216 and in 10CFR Part 21 notifications.

This submittal completes documentation of the actions for Phase I diesel generator components in NUREG-1216 for qualification of the Rancho Seco TDI Diesel Generators. This submittal also includes and completes the District's response to the remaining questions in the NRC's January 31, 1984 request for additional information.

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Please contact me if you have any questions. Members of your staff requiring additional information or clarification may contact Mr. Jerry Delezenski at (209) 333-2935, extension 4919.

Sincerely,

George Coward
Assistant General Manager
Technical and Administrative Services

Attachments

cc: A. D'Angelo, NRC, Rancho Seco
G. Kalman, NRC, Bethesda (2)
J. B. Martin, Walnut Creek

NUC.REG

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015
Engine Train A

Part Description: TURBOCHARGER
Part Number: MP-020

REFERENCES: CIDR MC172-002
NDE Report Number: UST-PT-118-85
Associated Reports: NCRs S-4224, 4326, 4332, 6106, 6133; IMs QC-19-20-85, 19-19-85, 19-4-85, 19-3-84, 19-2-84, 19-1-84, 86-009; FPR 7, 17, 32, 279; SFR 153-86

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

a. Perform visual inspection of the bearings and nozzle ring. Additionally the maintenance matrix specifies inspection of nozzle ring components (stationary ring and capscrews) after 100 hours of run time or at first refueling outage.

b. Determine the end clearances (rotor float).

c. Verify that the proper number of bolts on the turbine inlet casing are installed.

d. Verify that the proper torque loads are applied to the bolts of the turbine inlet casing.

e. Perform LP test on stationary nozzle ring (on one engine only, unless results are unsatisfactory).

f. Verify that SIM 300 has been implemented and perform an LP test on welds retaining the core (hub nut). Also verify that the core plug is staked.

g. Verify that nozzle ring capscrews are properly torqued.

h. Verify adequacy of full flow pre-lube system by inspecting a thrust bearing. This inspection should be performed on a thrust bearing during or after implementation of the full flow pre-lube system modification and following an initial 100 engine starts or at the closest plant refueling outage but not to exceed 130 starts. (Refer to subsection V for discussion of the modification).

Evaluated By: James C. Fischer Date: 12/15/87

Reviewed By: J F Kaminski Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81015 Part No. MP-020

Engineering Evaluation and Recommendation (Continued):

II. ACCEPTANCE CRITERIA

a. Absence of excessive wear on the bearings. Nozzle ring components have no damage, mispositioned vanes, or missing nozzle ring capscrews.

b. Rotor float clearance criteria 0.008" - 0.020".

c. There should be 12 bolts installed in turbine inlet casing.

d. Torque turbine inlet casing bolts to 55-60 ft.-lbs.

e. Absence of adverse wear and relevant indications as defined in procedure No. UST-PT-2.

f. Implementation of SIM 300; LP acceptance criteria - absence of adverse wear and relevant indications as defined in procedure No. QCI 101; Also, the hub nut shall be staked.

g. Torque nozzle ring capscrews to 18-22 ft.-lbs.

h. Absence of excessive wear.

III. INSPECTION FINDINGS

a. Following 100 hours of startup testing, both turbocharger bearings exhibited excessive wear. Nozzle ring components (stationary ring and capscrews) were all found satisfactory.

b. Preservice inspection indicated rotor end float to be .005". Evaluation by the Elliott service representative indicated that although the clearance was not within specifications it was acceptable. Following 100 hours of startup testing, reinspection revealed a clearance of .0065". Re-evaluation by the Elliott factory indicated this time that the clearance dimension was unacceptable.

c. Turbine inlet casing bolts (piece #57 in vendor manual) were installed and lockwired after reassembly of the turbocharger. (Ref: Quality Surveillance Report, Form PSQ 221, dated 12/19/86)

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81015 Part No. MP-020

Engineering Evaluation and Recommendation (Continued):

d. Torque of turbine inlet casing bolts (piece #57) was verified upon reassembly of turbocharger. (Ref: Quality Surveillance Report, Form PSQ 221, dated 12/19/86)

e. LP examination of nozzle ring performed during preservice inspection revealed seven minor casting blemishes on the outer edge of nozzle ring hub. These were evaluated as acceptable. Following 100 hours of startup testing, the nozzle ring was once again satisfactorily LP examined.

f. SIM 300 has been implemented. The as-found condition of the turbocharger revealed that a thick steel plate was welded in place in lieu of a hub nut. LP examination of the weld performed during preservice inspection revealed indications which were evaluated to be acceptable. The steel plate was found welded all around its perimeter, firmly securing it to the nose piece (#51, in vendor manual).

g. Torquing and lockwiring of all eight capscrews (piece #62 in vendor manual) was verified. (Ref: Quality Surveillance Report, Form PSQ 221, dated 12/19/87)

h. Visual inspection of thrust bearings was performed following 100 hours of startup testing. Results are included with item a, above.

i. The following additional finding was reported by Q.C. during removal of the turbocharger:

- Turbocharger intake and exhaust transition bolting was found to be without any grade markings on the heads.

IV. CORRECTIVE ACTIONS

a. The bearing wear was attributed to high vibration of the turbocharger during startup testing. The turbocharger was sent to the Elliott factory for a complete checkout and rework as necessary. The following summarizes the problems revealed during disassembly:

- Rotor was found to be out of balance - (determined at factory)

- Both bearings exhibited excessive wear: Blower end bearing indicated smooth but excessive wear on thrust and journal surfaces. Turbine end bearing revealed smooth but excessive wear pattern on journal surface only. (determined at Rancho Seco)

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81015 Part No. 4P-020

Engineering Evaluation and Recommendation (Continued):

c. Rotor end float dimension too tight - (determined at Rancho Seco and confirmed at factory).

Corrective Actions taken were as follows:

- o Rotor shaft was rebalanced.
- o New bearings and new oil seals were installed.
- o Intermediate casing was lightly machined at factory to achieve proper rotor clearance. Final "as-left" clearance measurements was .011".
- o Additional supports were designed and installed to bring turbocharger vibration within acceptable levels. Subsequent vibration testing and turbocharger bearing inspections have demonstrated the adequacy of these supports.

b. Rotor end float - see Corrective Action under a, above.

c. None required.

d. None required.

e. None required.

f. None required.

g. None required.

h. Bearing inspection - see Corrective Action under a, above.

i. Bolts were replaced with higher strength material.

V. MODIFICATIONS

The TDI Owners Group has recommended modifications to the turbochargers and their operational procedures. The elements of these recommendations are:

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81015 Part No. MP-020

Engineering Evaluation and Recommendation (Continued):

- The temperature of exhaust gas entering the turbine shall be monitored to ensure that it does not exceed 1200 degrees F. An acceptable method of determining this is to ensure that cylinder exhaust temperatures do not exceed 1050 degrees F. (Cylinder exhaust temperatures during pre-operational testing were below 1050 degrees F.)

- TDI's recommended bypass valve addition to the existing drip system should be implemented to provide full flow to the turbocharger prior to non-emergency starts. Increased flow rates of the drip system up to 0.35 gph are also recommended by the Owners Group. Rancho Seco implemented this modification prior to running the diesel generator.

- Once the full flow system is installed, operating procedures should be revised to use the bypass valve. Rancho Seco has included steps and precautionary statements in startup test procedures. Although the maintenance and surveillance procedures for this equipment have not yet been issued, they will address the use of the bypass valve for turbocharger bearing lubrication.

VI. ADDITIONAL CONCERNS

The District was also made aware of similar concerns with this component from a 10CFR Part 21 notification on turbocharger bearing lubrication and NRC NUREG-1216. The DR/QR inspections and the corrective actions described above have resolved the concerns of the 10CFR Part 21 notification and those in NUREG-1216.

NRC NUREG-1216 has also indicated that spectrochemical and ferrographic oil analyses should be performed quarterly to provide evidence of bearing degradation. Although the maintenance and surveillance procedures for this equipment have not been issued, they will include the above analyses on at least a quarterly basis.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the inspections made, corrective actions taken, and the actions taken to address the above additional concerns, the turbocharger is acceptable for its intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016
Engine Train B

Part Description: TURBOCHARGER
Part Number: MP-020

REFERENCES: CIDR MC172-002
NOE Report Number: NONE
Associated Reports: NCR S-6152; FPRs 23, 27, 29, 32, 279; SFR 137-86, 153-86

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

a. Perform visual inspection of the bearings and nozzle ring. Additionally the maintenance matrix specifies inspection of nozzle ring components (stationary ring and capscrews) after 100 hours of run time or at first refueling outage.

b. Determine the end clearances (rotor float).

c. Verify that the proper number of bolts on the turbine inlet casing are installed.

d. Verify that the proper torque loads are applied to the bolts of the turbine inlet casing.

e. Perform LP test on stationary nozzle ring (on one engine only, unless results are unsatisfactory).

f. Verify that SIM 300 has been implemented and perform an LP test on welds retaining the core (hub nut). Also verify that the core plug is staked.

g. Verify that nozzle ring capscrews are properly torqued.

h. Verify adequacy of full flow pre-lube system by inspecting a thrust bearing. This inspection should be performed on a thrust bearing during or after implementation of the full flow pre-lube system modification and following an initial 100 engine starts or at the closest plant refueling outage but not to exceed 130 starts. (Refer to subsection V for discussion of the modification).

Evaluated By: James C. Fischer Date: 12/15/87

Reviewed By: J T Kenney Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81016 Part No. MP-020

Engineering Evaluation and Recommendation (Continued):

II. ACCEPTANCE CRITERIA

a. Absence of excessive wear on the bearings. Nozzle ring components have no damage, mispositioned vanes, or missing nozzle ring capscrews.

b. Rotor float clearance criteria 0.008" - 0.020".

c. There should be 12 bolts installed in turbine inlet casing.

d. Torque turbine inlet casing bolts to 55-60 ft.-lbs.

e. Absence of adverse wear and relevant indications as defined in procedure No. UST-PT-2.

f. Implementation of SIM 300; LP acceptance criteria - absence of adverse wear and relevant indications as defined in procedure No. QCI 101; Also, the hub nut shall be staked.

g. Torque nozzle ring capscrews to 18-22 ft. lbs.

h. Absence of excessive wear.

III. INSPECTION FINDINGS

a. Following 100 hours of startup testing both turbocharger bearings exhibited excessive wear. Nozzle ring components (stationary ring and capscrews) were all found to be satisfactory.

b. Rotor end float was measured to be .010" which is within specifications and therefore satisfactory.

c. Turbine inlet casing bolts (piece #57 in vendor manual) were installed and lockwired after reassembly of the turbocharger. (Ref: Quality Surveillance Report, Form PSQ 221, dated 12/24/86)

d. Torque of turbine inlet casing bolts (piece #57) was verified upon reassembly of turbocharger. (Ref: Quality Surveillance Report, Form PSQ 221, dated 12/24/86)

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81016 Part No. MP-020

Engineering Evaluation and Recommendation (Continued):

e. Following 100 hours of startup testing, the nozzle ring was LP examined with satisfactory results.

f. SIM 300 has been implemented. The as-found condition of the turbocharger revealed that a thick steel plate was welded in place in lieu of a hub nut. LP inspection of the weld revealed one rounded indication which was evaluated to be acceptable. The steel plate was found welded all around its perimeter, firmly securing it to the nose piece (piece #51 in the vendor manual).

g. Torquing and lockwiring of all eight capscrews (piece no. 62 in the vendor manual) was verified. (Ref. Quality Surveillance Report, Form PSQ 221, dated 12/24/86)

h. Visual inspection of thrust bearings was performed following 100 hours of startup testing. Results are included with a, above.

IV. CORRECTIVE ACTIONS

a. The bearing wear was attributed to high vibration experienced during startup testing, and foreign material within the turbocharger. The turbocharger was sent to Elliott factory for a complete checkout and rework as necessary. The following summarizes the problems revealed during disassembly:

- Rotor was found to be out of balance - (determined at factory).
- Both bearings exhibited excessive wear: Blower end bearing revealed scoring on thrust and journal surfaces. Also thrust collar had scoring: The turbine-end bearing revealed scoring and pitting - (determined at Rancho Seco and factory).
- Rotor shaft exhibited scoring at areas of bearing contact - (determined at Rancho Seco and factory).
- Oil seals revealed signs of wear.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81016 Part No. MP-020

Engineering Evaluation and Recommendation (Continued):

Corrective Actions taken were as follows:

- o New rotor shaft was installed and rotor assembly was balanced.
- o New bearings, thrust collar, and oil seals were installed to replace damaged parts. Also as a precaution, eight new nozzle ring capscrews were installed.
- o Additional supports were designed and installed to bring turbocharger vibration within acceptable levels. Subsequent vibration testing and turbocharger bearing inspections have demonstrated the adequacy of these supports.

b. None required.

c. None required.

d. None required.

e. None required.

f. None required.

g. None required.

h. Visual inspection of thrust bearings was performed following 100 hours of startup testing. Results are included with a, above.

V. MODIFICATIONS

The TDI Owners Group has recommended modifications to the turbochargers and their operational procedures. The elements of these recommendations are:

- o The temperature of exhaust gas entering the turbine shall be monitored to ensure that it does not exceed 1200 degrees F. An acceptable method of determining this is to ensure that cylinder exhaust temperatures do not exceed 1050 degrees F. (Cylinder exhaust temperatures during pre-operational testing were below 1050 degrees F.)

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81016 Part No. MP-020

Engineering Evaluation and Recommendation (Continued):

- TDI's recommended bypass valve addition to the existing drip system should be implemented to provide full flow to the turbocharger prior to non-emergency starts. Increased flow rates of the drip system up to 0.35 gph are also recommended by the Owners Group. Rancho Seco implemented this modification prior to running the diesel generator.

- Once the full flow system is installed, operating procedures should be revised to use the bypass valve. Rancho Seco has included steps and precautionary statements in startup test procedures. Although the maintenance and surveillance procedures for this equipment have not yet been issued, they will address the use of the bypass valve for turbocharger bearing lubrication.

VI. ADDITIONAL CONCERNS

The District was also made aware of similar concerns with this component from a 10CFR Part 21 notification on turbocharger bearing lubrication and NRC NUREG-1216. The DR/QR inspections and the corrective actions described above have resolved the concerns of the 10CFR Part 21 notification and those in NUREG-1216.

NRC NUREG-1216 has also indicated that spectrochemical and ferrographic oil analyses should be performed quarterly to provide evidence of bearing degradation. Although the maintenance and surveillance procedures for this equipment have not been issued, they will include the above analyses on at least a quarterly basis.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the inspections made, corrective actions taken, and the actions taken to address the above additional concerns, the turbocharger is acceptable for its intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015
Engine Train A

Part Description: VALVE SPRINGS & RETAINERS
Part Number: 03-360D

REFERENCES: CIDR MC172-042
NDE Report Number: NONE
Associated Reports: IM-QC-16-7-84

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

Valve spring color code.

II. ACCEPTANCE CRITERIA

Absence of grey springs with brown stripe.

III. INSPECTION FINDINGS

All springs had white stripe.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required.

Evaluated By: James G. Fiorelli Date: 12/18/87

Reviewed By: J. Kaminski Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015 Part No. 03-360D

Engineering Evaluation and Recommendation (Continued):

VI. ADDITIONAL CONCERNS

The District was also made aware of similar concerns from 10CFR Part 21 Notifications of July 13, 1984 and of November 6, 1985. The DR/QR inspections above revealed that the springs had a white stripe indicating they were manufactured by Betts Spring Company. These springs are the subject of the 10CFR Part 21 Notifications above in that there is a possibility that they may be improperly shot penned. IMO Delaval recommends changing all Betts valve springs to ensure their maximum possible integrity. The District will replace these springs prior to the end of the next refueling outage. The currently installed springs are suitable until that time because of the isolated incidence of failure of springs by this manufacturer plus the fact that the District has logged in excess of 300 hours of run time on each engine with no failure to date.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the inspections performed, and the actions taken to address the above additional concerns, the valve springs and retainers are acceptable for their intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016
Engine Train B

Part Description: VALVE SPRINGS & RETAINERS
Part Number: 03-360D

REFERENCES: CIDR MC172-042
NDE Report Number: NONE
Associated Reports: IM-QC-16-7-84

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

Valve spring color code.

II. ACCEPTANCE CRITERIA

Absence of grey springs with brown stripe.

III. INSPECTION FINDINGS

All springs had white stripe.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required.

Evaluated By: James C. Fisher Date: 12/15/87

Reviewed By: J T Kammerer Date: 12-15-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016 Part No. 03-360D

Engineering Evaluation and Recommendation (Continued):

VI. ADDITIONAL CONCERNS

The District was also made aware of similar concerns from 10CFR Part 21 Notifications of July 13, 1984 and of November 6, 1985. The DR/QR inspections above revealed that the springs had a white stripe indicating they were manufactured by Betts Spring Company. These springs are the subject of the 10CFR Part 21 Notifications above in that there is a possibility that they may be improperly shot penned. IMO Delaval recommends changing all Betts valve springs to ensure their maximum possible integrity. The District will replace these springs prior to the end of the next refueling outage. The currently installed springs are suitable until that time because of the isolated incidence of failure of springs by this manufacturer plus the fact that the District has logged in excess of 300 hours of run time on each engine with no failure to date.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the inspections performed, and the actions taken to address the above additional concerns, the valve springs and retainers are acceptable for their intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015
Engine Train A

Part Description: FUEL INJECTION PUMP
Part Number: 03-365A

REFERENCES: CIDR MC172-107, MC172-210; TDI SIM-345
NDE Report Number: NONE
Associated Reports: NCR S-6001, NCR S-6145; IM QC-16-85, QC-17-12-84

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

Quality revalidation is not required.

II. ACCEPTANCE CRITERIA

None required.

III. INSPECTION FINDINGS

Not applicable.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

In response to a product improvement recommendation from TDI, Rancho Seco has replaced the orifice and fitting in each fuel oil pump bypass return line to ensure that the orifice can not work loose and enter the pump body.

Evaluated By: James C. Fischer Date: 12/18/87

Reviewed By: J. F. Kaminski Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015 Part No. 03-365A

Engineering Evaluation and Recommendation (Continued):

VI. ADDITIONAL CONCERNS

The District was also made aware of other concerns with this component from a 10CFR Part 21 notification on a defect in the bore of the fuel injection pump delivery valve holder. The District performed a boroscopic inspection on each pump's delivery valve holder, including spares, and found a notch in the pump for the #3 cylinder. The defective pumps were returned to manufacturer and replaced with spares.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the modifications implemented, and the actions taken to address the above additional concerns, the fuel injection pumps are acceptable for their intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016
Engine Train B

Part Description: FUEL INJECTION PUMP
Part Number: 03-365A

REFERENCES: CIDR MC172-107, MC172-210; TDI SIM-345
NDE Report Number: NONE
Associated Reports: NCR S-6001, NCR S-6145, NCR S-6050

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

Quality revalidation is not required.

II. ACCEPTANCE CRITERIA

None required.

III. INSPECTION FINDINGS

Not applicable.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

In response to a product improvement recommendation from TDI, Rancho Seco has replaced the orifice and fitting in each fuel oil pump bypass return line to ensure that the orifice can not work loose and enter the pump body.

Evaluated By: James C. Fischer Date: 12/18/87

Reviewed By: J F Kaminski Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016 Part No. 03-365A

Engineering Evaluation and Recommendation (continued):

VI. ADDITIONAL CONCERNS

The District was also made aware of other concerns with this component from a 10CFR Part 21 notification on a defect in the bore of the fuel injection pump delivery valve holder. The District performed a boroscopic inspection on each pump's delivery valve holder, including spares, and found a notch in the pump for the #3 cylinder. The defective pumps were returned to manufacturer and replaced with spares.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the modifications implemented, and the actions taken to address the above additional concerns, the fuel injection pumps are acceptable for their intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015
Engine Train A

Part Description: FUEL PUMP LINKAGE - CONTROL SHAFT, LINKAGE ASSY, & BEARINGS
Part Number: 03-371A/B

REFERENCES: CIDR MC172-045, CIDR MC172-046, CIDR MC172-061
NCE Report Number: NONE
Associated Reports: NCR S-4221; IM QC-15-23-85, QC-15-3-84

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

a. Hardness of the shaft (one engine only).

b. Visual inspection of linkage and bearings to evaluate freedom of movement.

II. ACCEPTANCE CRITERIA

a. Hardness to be 190-230 Brinnell.

b. All linkage moves freely and the bearings show evidence of lubrication.

III. INSPECTION FINDINGS

a. Hardness was found to be acceptable.

b. The linkage and bearings are acceptable.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required.

Evaluated By: James C. Fischer Date: 12/18/87

Reviewed By: J F Kaminski Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81015 Part No. 03-371A/B

Engineering Evaluation and Recommendation (Continued):

VI. ADDITIONAL CONCERNS

The District was also made aware of other concerns with this component from a 10CFR Part 21 notification dated 10-2-84 where the fuel pump linkage levers could rotate about the shaft if not properly torqued and pinned. The District found that the fuel levers had not been pinned, so the needed holes were drilled and pins were lockwired in place. Furthermore, the District torqued the lever capscrews to 12 ft.-lbs. These actions have resolved this concern.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the inspections made and the actions taken to address the above additional concerns, the fuel pump control shaft, linkage and bearings are acceptable for their intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016
Engine Train B

Part Description: FUEL PUMP LINKAGE - CONTROL SHAFT, LINKAGE ASSY, & BEARINGS
Part Number: 03-371A/B

REFERENCES: CIDR MC172-045, CIDR MC172-046, CIDR MC172-061
NDE Report Number: NONE
Associated Reports: NCR S-4220; IM QC-15-23-85, QC-15-3-84

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

a. Hardness of the shaft (one engine only).

b. Visual inspection of linkage and bearings to evaluate freedom of movement.

II. ACCEPTANCE CRITERIA

a. Hardness to be 190-230 Brinnell.

b. All linkage moves freely and the bearings show evidence of lubrication.

III. INSPECTION FINDINGS

a. Engine "A" tested.

b. The linkage and bearings are acceptable.

IV. CORRRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required.

Evaluated By: James C. Fischer Date: 12/8/87

Reviewed By: T J Kaminski Date: 12-13-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81016 Part No. 03-371A/B

Engineering Evaluation and Recommendation (Continued):

VI. ADDITIONAL CONCERNS

The District was also made aware of other concerns with this component from a 10CFR Part 21 notification dated 10-2-84 where the fuel pump linkage levers could rotate about the shaft if not properly torqued and pinned. The District found that the fuel levers had not been pinned, so the needed holes were drilled and pins were lockwired in place. Furthermore, the District torqued the lever capscrews to 12 ft.-lbs. These actions have resolved this concern.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the inspections made and the actions taken to address the above additional concerns the fuel pump control shaft, linkage and bearings are acceptable for their intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015
Engine Train A

Part Description: GOVERNOR DRIVE COUPLINGS, PINS & KEYS
Part Number: 03-402B

REFERENCES: CIDR MC172-057
NDE Report Number: NONE
Associated Reports: NCR S-6140

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

a. Documentation of coupling elastomeric insert (spider) material.

b. Set screw and drive pin installation.

II. ACCEPTANCE CRITERIA

a. Neoprene.

b. Set screws have loctite and one spot stake. Drive pins are installed and appear tight.

III. INSPECTION FINDINGS

a. Material was labeled neoprene.

b. The setscrews were not installed with loctite and were not staked.

IV. CORRECTIVE ACTIONS

a. None required.

b. The District reinstalled the setscrews with loctite and spot staked them to maintain their tightness.

Evaluated By: James C. Fischer Date: 12/15/87

Reviewed By: J F Kaminski Date: 12-15-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81015 Part No. 03-402B

Engineering Evaluation and Recommendation (Continued):

V. MODIFICATIONS

None, however this DR/QR required replacement of the neoprene elastomeric insert prior to placing the engines in emergency standby service. Although revision 2 to the maintenance matrix has deleted this requirement, the District has replaced the insert to ensure its maximum available life.

VI. ADDITIONAL CONCERNS

The District was also made aware of similar concerns with this component from a 10CFR Part 21 notification which identified a material problem with the elastomeric insert (spider) of the governor coupling. The DR/QR inspections above have resolved this concern.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the inspections made, and corrective actions taken, the governor drive couplings, pins and keys are acceptable for their intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016
Engine Train B

Part Description: GOVERNOR DRIVE COUPLINGS, PINS & KEYS
Part Number: 03-402B

REFERENCES: CIDR MC172-057
NDE Report Number: NONE
Associated Reports: NCR/IM NONE

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

a. Documentation of coupling elastomeric insert (spider) material.

b. Set screw and drive pin installation.

II. ACCEPTANCE CRITERIA

a. Neoprene.

b. Set screws have loctite and one spot stake. Drive pins are installed and appear tight.

III. INSPECTION FINDINGS

a. Material was labeled neoprene.

b. The coupling tightness was satisfactory.

IV. CORRECTIVE ACTIONS

None required.

Evaluated By: James C. Fisher Date: 12/15/87

Reviewed By: J. L. Kennedy Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81016 Part No. 03-402B

Engineering Evaluation and Recommendation (Continued):

V. MODIFICATIONS

None, however this DR/QR required replacement of the neoprene elastomeric insert prior to placing the engines in emergency standby service. Although revision 2 to the maintenance matrix has deleted this requirement, the District has replaced the insert to ensure its maximum available life.

VI. ADDITIONAL CONCERNS

The District was also made aware of similar concerns with this component from a 10CFR Part 21 notification which identified a material problem with the elastomeric insert (spider) of the governor coupling. The DR/QR inspections above have resolved this concern.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report and the inspections made, the governor drive couplings, pins and keys are acceptable for their intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015
Engine Train A

Part Description: OVERSPEED TRIP COUPLING
Part Number: 03-410C

REFERENCES: CIDR MC172-060; CIDR MC172-204
NDE Report Number: NONE
Associated Reports: NCRs S-6149, S-6155; FPRs 18, 21, 22, 44

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

Visual inspection of coupling.

II. ACCEPTANCE CRITERIA

Absence of wear, deterioration, and other discontinuities.

III. INSPECTION FINDINGS

Two minor gouges were found on one coupling half (attached to the accessory drive gear shaft).

IV. CORRECTIVE ACTIONS

The gouges were smoothed by light hand polishing since the elastomeric insert (spider) was found in excellent condition. However, the District also replaced the elastomeric insert to ensure the maximum available life for the spider insert.

Furthermore, the other coupling halves were replaced as a result of damage to them during the performance of other DR/QR inspections.

Evaluated By: James C. Fischer Date: 12/18/87

Reviewed By: J F Kaminski Date: 12-19-87
Requalification Project Engineer

Rancho Seco Diesel Generator Requalification

Engineering Summary Report

Continuation

Diesel Engine Serial Number 81015 Part No. 03-410C

Engineering Evaluation and Recommendation (Continued):

V. MODIFICATIONS

None required.

VI. ADDITIONAL CONCERNS

The District was also made aware of other concerns with this component from a 10CFR Part 21 notification, which indicated that due to coupling looseness the fuel transfer pump may stop turning and render the engine inoperable. The recommended corrective action was to perform TDI SIM-363. During the implementation of this SIM the District observed that the coupling setscrews were missing. It was determined that they had never been put in, so setscrews were installed per the guidance in SIM-363.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report the inspections made, the corrective actions taken, and the actions taken to address the above additional concerns, the overspeed trip coupling is acceptable for its intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016
Engine Train B

Part Description: OVERSPEED TRIP COUPLING
Part Number: 03-410C

REFERENCES: CIDR MC172-60; CIDR MC172-204
NDE Report Number: NONE
Associated Reports: NCR S-6228; FPR 50

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

Visual inspection of coupling.

II. ACCEPTANCE CRITERIA

Absence of wear, deterioration, and other discontinuities.

III. INSPECTION FINDINGS

The coupling was satisfactory.

IV. CORRECTIVE ACTIONS

None required. However, although the elastomeric insert (spider) was found in excellent condition, the District replaced it to ensure the maximum available life for the spider insert.

V. MODIFICATIONS

None required.

Evaluated By: James C. Fischer Date: 12/18/87

Reviewed By: J F Kaminski Date: 12-19-87
Requalification Project Engineer

Rancho Seco Diesel Generator Requalification

Engineering Summary Report

Continuation

Diesel Engine Serial Number 81016 Part No. 03-410C

Engineering Evaluation and Recommendation (Continued):

VI. ADDITIONAL CONCERNS

The District was also made aware of other concerns with this component from a 10CFR Part 21 notification, which indicated that due to the coupling looseness the fuel transfer pump may stop turning and render the engine inoperable. The recommended corrective action was to perform TDI SIM-363. During the implementation of this SIM the District observed that the separation between the coupling hub faces was 3/32 inches greater than the specified 7/8 inches, and that the total indicated runout (TIR) for angular alignment of the coupling was .0015 inches greater than the specified .006 inches. These conditions were evaluated by TDI and accepted as is because of the excellent condition of the elastomeric insert after more than 100 hours of pre-operational testing. Nevertheless, the District will replace the coupling hub faces with new parts to obtain the correct component separation measurements.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the inspections made, the corrective actions taken, and the actions taken to address the above additional concerns, the overspeed trip coupling is acceptable for its intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015
Engine Train A

Part Description: GOVERNOR LINKAGE
Part Number: 03-413

REFERENCES: CIDR MC172-061
NDE Report Number: NONE
Associated Reports: IM QC-19-34-85, M-024-86

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

Visual inspection of linkage assembly for signs of corrosion or wear.

II. ACCEPTANCE CRITERIA

Lack of pitting and discoloration.

III. INSPECTION FINDINGS

The linkage assembly is acceptable.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required, although the TDI Owners Group recommended the addition of lockwire to the linkage bolts and roll pins as a maintenance item. The District has implemented this recommendation as described in the engineering summary for part no. 03-371A/B.

VI. ADDITIONAL CONCERNS

The District was also made aware of similar concerns with this component from a 10CFR Part 21 notification dated 10/2/84. These concerns and the District's response to them are addressed in the engineering summary for part no. 03-371A/B.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the governor linkage is suitable for its intended use at Rancho Seco.

Evaluated By: James L. Fischer Date: 12/18/87

Reviewed By: G J Kaminski Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016
Engine Train B

Part Description: GOVERNOR LINKAGE
Part Number: 03-413

REFERENCES: CIDR MC172-061
NDE Report Number: NONE
Associated Reports: IM QC-19-34-85, M-024-86

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

Visual inspection of linkage assembly for signs of corrosion or wear.

II. ACCEPTANCE CRITERIA

Lack of pitting and discoloration.

III. INSPECTION FINDINGS

The linkage assembly is acceptable.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required, although the TDI Owners Group recommended the addition of lockwire to the linkage bolts and roll pins as a maintenance item. The District has implemented this recommendation as described in the engineering summary for part no. 03-371A/B

VI. ADDITIONAL CONCERNS

The District was also made aware of similar concerns with this component from a 10CFR Part 21 notification dated 10/2/84. These concerns and the District's response to them are addressed in the engineering summary for part no. 03-371A/B.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the governor linkage is suitable for its intended use at Rancho Seco.

Evaluated By: James C. Fisher Date: 12/18/87

Reviewed By: J J Kaminski Date: 12-23-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015
Engine Train A

Part Description: GOVERNOR ASSEMBLY: WOODWARD GOVERNOR
Part Number: 03-415A

REFERENCES: NO CIDR
NDE Report Number: NONE
Associated Reports: NCR/IM NONE

I. ATTRIBUTES TO BE VERIFIED

Quality revalidation is not required.

II ACCEPTANCE CRITERIA

None required.

III. INSPECTION FINDINGS

Not applicable.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required.

Evaluated By: James C. Fisher Date: 12/18/87

Reviewed By: J7 Kaminski Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81015 Part No. 03-415A

Engineering Evaluation and Recommendation (Continued):

VI. ADDITIONAL CONCERNS

The District was also made aware of other concerns with this component from a 10CFR Part 21 notification, and an IE Information Notice. The 10CFR Part 21 notification, dated August 10, 1983, informed the U. S. Nuclear Regulatory Commission that the governor had been assembled incorrectly at the factory. The governor was rebuilt correctly by the manufacturer, prior to preoperational testing. IE Information Notice No. 86-07 stated that an inadequate inventory of oil in the governor following preventive maintenance activities had allowed an engine to overspeed. The TDI Instruction Manual, Volume I, Section 6, has been revised to provide detailed procedures to vent air from a newly filled governing system, thereby ensuring that the quantity of oil in the governor is correct. These revised procedures were followed during the preoperational testing. Although the maintenance and surveillance procedures for this equipment have not yet been issued, they will address the proper venting technique.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report and the actions taken to address the above additional concerns, the Woodward governor is acceptable for its intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016
Engine Train B

Part Description: GOVERNOR ASSEMBLY: WOODWARD GOVERNOR
Part Number: 03-415A

REFERENCES: NO CIDR
NDE Report Number: NONE
Associated Reports: NCR/IM NONE

I. ATTRIBUTES TO BE VERIFIED

Quality revalidation is not required.

II. ACCEPTANCE CRITERIA

None required.

III. INSPECTION FINDINGS

Not applicable.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required.

Evaluated By: James A. Fisher Date: 12/15/87

Reviewed By: J F Kominski Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81016 Part No. 03-415A

Engineering Evaluation and Recommendation (Continued):

VI. ADDITIONAL CONCERNS

The District was also made aware of other concerns with this component from a 10CFR Part 21 notification, and an IE Information Notice. The 10CFR Part 21 notification, dated August 10, 1983, informed the U. S. Nuclear Regulatory Commission that the governor had been assembled incorrectly at the factory. The governor was rebuilt correctly by the manufacturer, prior to preoperational testing. IE Information Notice No. 86-07 stated that an inadequate inventory of oil in the governor following preventive maintenance activities had allowed an engine to overspeed. The TDI Instruction Manual, Volume I, Section 6, has been revised to provide detailed procedures to vent air from a newly filled governing system, thereby ensuring that the quantity of oil in the governor is correct. These revised procedures were followed during the preoperational testing. Although the maintenance and surveillance procedures for this equipment have not been issued, they will address the proper venting technique.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report and the actions taken to address the above additional concerns, the Woodward governor is acceptable for its intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015
Engine Train A

Part Description: GOVERNOR ASSEMBLY HEAT EXCHANGER
Part Number: 03-415C

REFERENCES: CIDR MC172-111
NDE Report Number: NONE
Associated Reports: NCR/IM NONE

I. ATTRIBUTES TO BE VERIFIED

Visually inspect the governor cooler mounting configuration.

II. ACCEPTANCE CRITERIA

Cooler is mounted below the governor oil level.

III. INSPECTION FINDINGS

The cooler location is acceptable.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required.

VI. ADDITIONAL CONCERNS

The District was also made aware of similar concerns with this component from a 10CFR Part 21 notification on cooler elevation. The DR/QR inspections described above have resolved this concern.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report and the inspections made, the governor assembly heat exchanger is acceptable for its intended use at Rancho Seco.

Evaluated By: James C. Fischer Date: 12/15/87

Reviewed By: J. Kaminski Date: 12-15-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016
Engine Train B

Part Description: GOVERNOR ASSEMBLY HEAT EXCHANGER
Part Number: 03-415C

REFERENCES: CIDR MC172-111
NDE Report Number: NONE
Associated Reports: NCR/IM NONE

I. ATTRIBUTES TO BE VERIFIED

Visually inspect the governor cooler mounting configuration.

II. ACCEPTANCE CRITERIA

Cooler is mounted below the governor oil level.

III. INSPECTION FINDINGS

The cooler location is acceptable.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required.

VI. ADDITIONAL CONCERNS

The District was also made aware of similar concerns with this component from a 10CFR Part 21 notification on cooler elevation. The DR/QR inspections described above have resolved this concern.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report and the inspections made, the governor assembly heat exchanger is acceptable for its intended use at Rancho Seco.

Evaluated By: James A. Fischer Date: 12/18/87

Reviewed By: J F Kaminski Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015
Engine Train A

Part Description: ENGINE DRIVEN FUEL OIL BOOSTER PUMP
Part Number: 03-445

REFERENCES: NO CIDR
NDE Report Number: NONE
Associated Reports: NCR/IM NONE

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

Qualify revalidation is not required.

II. ACCEPTANCE CRITERIA

None required.

III. INSPECTION FINDINGS

Not applicable

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required.

VI. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, this component is acceptable for its intended use at Rancho Seco.

Evaluated By: James C. Fisher Date: 12/18/87

Reviewed By: JF Kaminski Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016
Engine Train B

Part Description: ENGINE DRIVEN FUEL OIL BOOSTER PUMP
Part Number: 03-445

REFERENCES: NO CIDR
NDE Report Number: NONE
Associated Reports: FPR 52

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

Qualify revalidation is not required.

II. ACCEPTANCE CRITERIA

None required.

III. INSPECTION FINDINGS

Not applicable

IV. CORRECTIVE ACTIONS

None required. However, during the performance of other DR/QR inspections, the District observed that the shaft of the pump did not turn freely. Foreign material had entered the pump resulting in impeller/casing binding. The District replaced the pump and verified the cleanliness of the associated components during reassembly.

V. MODIFICATIONS

None required.

VI. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, and the corrective actions taken, this component is acceptable for its intended use at Rancho Seco.

Evaluated By: James L. Fischer Date: 12/18/87

Reviewed By: JJ Kanish Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015
Engine Train A

Part Description: FUEL OIL HEADER PIPING & TUBING
Part Number: 03-450B

REFERENCES: CIDR MC172-073
NDE Report Number: NONE
Associated Reports: IM QC-17-49-85

I. ATTRIBUTES TO BE VERIFIED

Quality revalidation is not required.

II. ACCEPTANCE CRITERIA

None required.

III. INSPECTION FINDINGS

Not applicable.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required.

Evaluated By: James C. Fiskin Date: 12/18/87

Reviewed By: J.F Kominek Date: 12-18-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015 Part No. 03-450B

Engineering Evaluation and Recommendation (Continued):

VI. ADDITIONAL CONCERNS

The District was also made aware of other concerns with this component from a 10CFR Part 21 notification dated 9/21/83, and from IE Bulletin 86-73.

The IE Bulletin identified a fuel system relief valve induced vibration problem which caused failure of a fuel line by its rubbing of another process line on a Cooper-Bessemer diesel. The Rancho Seco TDI engines have a different configuration which avoids this particular problem.

The 10CFR Part 21 notification indicated that excessive fuel header supply line vibration may result in its failure. A subsequent letter (TDI to SMUD dated 10/27/87) provided the following site specific recommendations:

1. Compare the as-built configuration of fuel oil lines with the TDI design for compliance.

2. Monitor the fuel lines for excessive vibration, adding additional clamps where necessary.

3. Maintain proper engine balance.

4. Add a means of preventing spray from a broken fuel oil line from reaching the turbocharger exhaust gas inlet area.

The District has reviewed these 10CFR Part 21 concerns and has addressed them as follows:

1. The as-built configuration was reviewed and accepted by the TDI Owners Group after a field walkdown was performed.

2. The District has obtained vibration measurements of the fuel oil piping, has replaced the plastic inserts of the supports with an elastomeric compound, and has added two supports to this line.

3. Although the maintenance and surveillance procedures for the diesel have not yet been issued, they will address the concern of maintaining proper engine balance, as required by the TDI Owners Group Maintenance Matrix (Rev. 2) and by NRC NUREG-1216.

4. The District has added a spray shield to the fuel oil header supply line.

Furthermore, in response to a product improvement recommendation from TDI, Rancho Seco has installed flexible fuel lines for the "supply header to injection pump" and "injection pump to circulating header." This modification reduces vibration, reduces fuel oil leaks at the connections, and incorporates a flame resistant firesleeve to shield fuel oil spray in the event of a failure.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015 Part No. 03-450B

Engineering Evaluation and Recommendation (Continued):

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report and the actions taken to address the above additional concerns, the fuel oil header piping and tubing is acceptable for its intended use at Rancho Seco during testing and interim operations.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016
Engine Train B

Part Description: FUEL OIL HEADER PIPING & TUBING
Part Number: 03-450B

REFERENCES: CIDR MC172-073
NDE Report Number: NONE
Associated Reports: IM QC-16-40-85

I. ATTRIBUTES TO BE VERIFIED

Quality revalidation is not required.

II. ACCEPTANCE CRITERIA

None required.

III. INSPECTION FINDINGS

Not applicable.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required.

Evaluated By: James A Richardson Date: 12/18/87

Reviewed By: J F Kaminski Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016 Part No. 03-450B

Engineering Evaluation and Recommendation (Continued):

VI. ADDITIONAL CONCERNS

The District was also made aware of other concerns with this component from a 10CFR Part 21 notification dated 9/21/83, and from IE Bulletin 86-73.

The IE Bulletin identified a fuel system relief valve induced vibration problem which caused failure of a fuel line by its rubbing of another process line on a Cooper-Bessemer diesel. The Rancho Seco TDI engines have a different configuration which avoids this particular problem.

The 10CFR Part 21 notification indicated that excessive fuel header supply line vibration may result in its failure. A subsequent letter (TDI to SMUD dated 10/27/87) provided the following site specific recommendations:

1. Compare the as-built configuration of fuel oil lines with the TDI design for compliance.

2. Monitor the fuel lines for excessive vibration, adding additional clamps where necessary.

3. Maintain proper engine balance.

4. Add a means of preventing spray from a broken fuel oil line from reaching the turbocharger exhaust gas inlet area.

The District has reviewed these 10CFR Part 21 concerns and has addressed them as follows:

1. The as-built configuration was reviewed and accepted by the TDI Owners Group after a field walkdown was performed.

2. The District has obtained vibration measurements of the fuel oil piping, has replaced the plastic inserts of the supports with an elastomeric compound, and has added two supports to this line.

3. Although the maintenance and surveillance procedures for the diesel have not yet been issued, they will address the concern of maintaining proper engine balance, as required by the TDI Owners Group Maintenance Matrix (Rev. 2) and by NRC NUREG-1216.

4. The District has added a spray shield to the fuel oil header supply line.

Furthermore, in response to a product improvement recommendation from TDI, Rancho Seco has installed flexible fuel lines for the "supply header to injection pump" and "injection pump to circulating header." This modification reduces vibration, reduces fuel oil leaks at the connections, and incorporates a flame resistant firesleeve to shield fuel oil spray in the event of a failure.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016 Part No. 03-450B

Engineering Evaluation and Recommendation (Continued):

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report and the actions taken to address the above additional concerns, the fuel oil header piping and tubing is acceptable for its intended use at Rancho Seco during testing and interim operations.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015
Engine Train A

Part Description: FUEL OIL HEADER SUPPORTS
Part Number: 03-450D

REFERENCES: CIDR MC172-074
NDE Report Number: NONE
Associated Reports: IM QC-17-49-85; ERPT-M0024

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

Quality revalidation is not required.

II. ACCEPTANCE CRITERIA

None required.

III. INSPECTION FINDINGS

Not applicable.

IV. CORRECTIVE ACTIONS

None required.

Evaluated By: James C. Fischer Date: 12/15/87

Reviewed By: J7 Kaminski Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81015 Part No. 03-450D

Engineering Evaluation and Recommendation (Continued):

V. MODIFICATIONS

The TDI Owners Group recommends:

a. One drain header U-bolt type restraint be modified to three-directional type.

b. The other drain header 3/16-inch U-bolts be changed to 3/8-inch with locking devices.

c. Add a two-directional lateral restraint on each 1-inch ejector tube.

d. For both fuel oil to day tank return lines, a two-directional lateral restraint should be added.

The District has reviewed these recommended modifications and takes exception to their implementation at Rancho Seco. The District has calculations which demonstrate that the associated generic evaluations performed by the Owners Group are extremely conservative with respect to the as-built condition and plant-specific seismic spectra for the TDI diesels at Rancho Seco. These calculations also provide justification that the existing configuration is acceptable without modification.

VI. ADDITIONAL CONCERNS

The District was also made aware of other concerns with this component from a 10CFR Part 21 notification dated 9/21/83. These concerns and the District's response to them are addressed in the engineering summary for P/N 03-450B.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the justifications concerning the proposed modifications, and the actions taken to address the above additional concerns, the fuel oil header supports are acceptable for their intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016
Engine Train B

Part Description: FUEL OIL HEADER SUPPORTS
Part Number: 03-450D

REFERENCES: CIDR MC172-074
NDE Report Number: NONE
Associated Reports: IM QC-16-40-85; ERPT-M0024

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

Quality revalidation is not required.

II. ACCEPTANCE CRITERIA

None required.

III. INSPECTION FINDINGS

Not applicable.

IV. CORRECTIVE ACTIONS

None required.

Evaluated By: James C. Fischer Date: 12/18/87

Reviewed By: G J Kaminski Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81016 Part No. 03-450D

Engineering Evaluation and Recommendation (Continued):

V. MODIFICATIONS

The TDI Owners Group recommends:

a. One drain header U-bolt type restraint be modified to three-directional type.

b. The other drain header 3/16-inch U-bolts be changed to 3/8-inch with locking devices.

c. Modify the 1-inch ejector tubing restraint located between the ejector assembly and the fuel oil header.

d. For both fuel oil to day tank return lines, a two-directional lateral restraint should be added.

The District has reviewed these recommended modifications and takes exception to their implementation at Rancho Seco. The District has calculations which demonstrate that the associated generic evaluations performed by the Owners Group are extremely conservative with respect to the as-built condition and plant-specific seismic spectra for the TDI diesels at Rancho Seco. These calculations also provide justification that the existing configuration is acceptable without modification.

VI. ADDITIONAL CONCERNS

The District was also made aware of other concerns with this component from a 10CFR Part 21 notification dated 9/21/83. These concerns and the District's response to them are addressed in the engineering summary for P/N 03-450B.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the justifications concerning the proposed modifications, and the actions taken to address the above additional concerns, the fuel oil header supports are acceptable for their intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015
Engine Train A

Part Description: CONTROL PANEL ASSEMBLY
Part Number: 03-500A

REFERENCES: NO CIDR
NDE Report Number: NONE
Associated Reports: NCR/IM NONE

I. ATTRIBUTES TO BE VERIFIED

Quality revalidation is not required.

II. ACCEPTANCE CRITERIA

None required.

III. INSPECTION FINDINGS

Not applicable.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required.

VI. ADDITIONAL CONCERNS

The District was also made aware of other concerns with this component from NRC IE Bulletin 83-17 concerning the loss of starting air during a shutdown time delay period on GMC type diesels. Rancho Seco TDI engine have a different design of control logic which avoids the problem of wasted air identified in this bulletin.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the control panel assembly is acceptable for its intended use at Rancho Seco.

Evaluated By: James C. Fisher Date: 12/18/87

Reviewed By: J F Kaminski Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016
Engine Train B

Part Description: CONTROL PANEL ASSEMBLY
Part Number: 03-500A

REFERENCES: NO CIDR
NDE Report Number: NONE
Associated Reports: NCR/IM NONE

I. ATTRIBUTES TO BE VERIFIED

Quality revalidation is not required.

II. ACCEPTANCE CRITERIA

None required.

III. INSPECTION FINDINGS

Not applicable.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required.

VI. ADDITIONAL CONCERNS

The District was also made aware of other concerns with this component from NRC IE Bulletin 83-17 concerning the loss of starting air during a shutdown time delay period on GMC type diesels. Rancho Seco TDI engine have a different design of control logic which avoids the problem of wasted air identified in this bulletin.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the control panel assembly is acceptable for its intended use at Rancho Seco.

Evaluated By: James C. Fischer Date: 12/-5/87

Reviewed By: J7 Kaminski Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015
Engine Train A

Part Description: CONTROL PANEL RELAYS
Part Number: 03-500J

REFERENCES: NO CIDR
NDE Report Number: NONE
Associated Reports: NCR S-5020

I. ATTRIBUTES TO BE VERIFIED

Quality revalidation is not required.

II. ACCEPTANCE CRITERIA

None required.

III. INSPECTION FINDINGS

Not applicable.

IV. CORRECTIVE ACTIONS

None required. However, during the performance of startup testing, the District observed erratic operation of two time delay relays. Investigation revealed several areas of poor internal design:

- the bottom of an internal lamp hits the relay
- the internal wiring is large with bulky insulation
- the flat spot for the adjustment potentiometer is subject to excessive wearing
- one internal solder joint had no solder

The District inspected the other relays for similar problems. All problems were repaired to support the diesel test program, and the affected relays have been replaced prior to release to operations. Both the District and TDI have initiated 10CFR Part 21 investigations on these components.

Evaluated By: James D. Moore Date: 12/17/87

Reviewed By: J F Kowalski Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015 Part No. 03-500J

Engineering Evaluation and Recommendation (Continued)

V. MODIFICATIONS

None required.

VI. ADDITIONAL CONCERNS

The District was also made aware of another concern with this component from NRC Information Notice IE 82-04 on Agastat E-7000 time delay relays. This problem does not apply to Rancho Seco because the panel design does not use these relays.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report and the corrective actions taken, the control panel relays are acceptable for their intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016
Engine Train B

Part Description: CONTROL PANEL RELAYS
Part Number: 03-500J

REFERENCES: NO CIDR
NDE Report Number: NONE
Associated Reports: NCR S-5020

I. ATTRIBUTES TO BE VERIFIED

Quality revalidation is not required.

II. ACCEPTANCE CRITERIA

None required.

III. INSPECTION FINDINGS

Not applicable.

IV. CORRECTIVE ACTIONS

None required. However, during the performance of startup testing, the District observed erratic operation of two time delay relays. Investigation revealed several areas of poor internal design:

- the bottom of an internal lamp hits the relay
- the internal wiring is large with bulky insulation
- the flat spot for the adjustment potentiometer is subject to excessive wearing
- one internal solder joint had no solder

The District inspected the other relays for similar problems. All problems were repaired to support the diesel test program, and the affected relays have been replaced prior to release to operations. Both the District and TDI have initiated 10CFR Part 21 investigations on these components.

Evaluated By: Gerard P. Mangan Date: 12/17/87

Reviewed By: J.F. Kaminski Date: 12-17-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016 Part No. 03-500J

Engineering Evaluation and Recommendation (Continued)

V. MODIFICATIONS

None required.

VI. ADDITIONAL CONCERNS

The District was also made aware of another concern with this component from NRC Information Notice IE 82-04 on Agastat E-7000 time delay relays. This problem does not apply to Rancho Seco because the panel design does not use these relays.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report and the corrective actions taken, the control panel relays are acceptable for their intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015
Engine Train A

Part Description: CONTROL PANEL PIPING, TUBING & FITTINGS
Part Number: 03-500M

REFERENCES: MC172-209, -214
NDE Report Number: NONE
Associated Reports: NCR/IM NONE

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

Quality revalidation is not required.

II. ACCEPTANCE CRITERIA

None required.

III. INSPECTION FINDINGS

None required.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required.

Evaluated By: James C. Fisher Date: 12/18/87

Reviewed By: J F Kaminski Date: 12-18-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015 Part No. 03-500M

Engineering Evaluation and Recommendation (Continued)

VI. ADDITIONAL CONCERNS

The District was made aware of other concerns with this component from 10CFR Part 21 notifications, of 1/22/85 and 5/28/87, which indicated material problems with the bowl of the Engine Control Panel air filter. The District determined the bowl to be made of metal, not plastic, which resolves one concern, and the date code to be correct, which resolved the concern of an improper gasket seating surface.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report and the actions taken to address the above additional concerns, the control panel piping, tubing and fittings are acceptable for their intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016
Engine Train B

Part Description: CONTROL PANEL PIPING, TUBING & FITTINGS
Part Number: 03-500M

REFERENCES: MC172-209, -214
NDE Report Number: NONE
Associated Reports: NCR/IM NONE

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

Quality revalidation is not required.

II. ACCEPTANCE CRITERIA

None required.

III. INSPECTION FINDINGS

None required.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required.

Evaluated By: James C. Fisher Date: 12/15/87

Reviewed By: J F Kaminski Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016 Part No. 03-500M

Engineering Evaluation and Recommendation (Continued)

VI. ADDITIONAL CONCERNS

The District was made aware of other concerns with this component from 10CFR Part 21 notifications, of 1/22/85 and 5/28/87, which indicated material problems with the bowl of the Engine Control Panel air filter. The District determined the bowl to be made of metal, not plastic, which resolves one concern, and the date code to be correct, which resolved the concern of an improper gasket seating surface.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report and the actions taken to address the above additional concerns, the control panel piping, tubing and fittings are acceptable for their intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015
Engine Train A

Part Description: EMERGENCY DIESEL GENERATOR
Part Number: 03-650A

REFERENCES: NO CIDR
NDE Report Number: NONE
Associated Reports: NCR/IM NONE

I. ATTRIBUTES TO BE VERIFIED

Quality revalidation is not required.

II. ACCEPTANCE CRITERIA

None required.

III. INSPECTION FINDINGS

Not applicable.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required.

VI. ADDITIONAL CONCERNS

The District was also made aware of other concerns with this component from NRC IE Notice 85-68 concerning cracked interpolar connecting bars. This problem does not apply to Rancho Seco, which is of a different design.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the emergency diesel generator is acceptable for its intended use at Rancho Seco.

Evaluated By: James D. Mecerna Date: 12/16/87

Reviewed By: J F Kaminski Date: 12-17-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016
Engine Train B

Part Description: EMERGENCY DIESEL GENERATOR
Part Number: 03-650A

REFERENCES: NO CIDR
NDE Report Number: NONE
Associated Reports: NCR/IM NONE

I. ATTRIBUTES TO BE VERIFIED

Quality revalidation is not required.

II. ACCEPTANCE CRITERIA

None required.

III. INSPECTION FINDINGS

Not applicable.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required.

VI. ADDITIONAL CONCERNS

The District was also made aware of other concerns with this component from NRC IE Notice 85-68 concerning cracked interpolar connecting bars. This problem does not apply to Rancho Seco, which is of a different design.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the emergency diesel generator is acceptable for its intended use at Rancho Seco.

Evaluated By: James D. Mearns Date: 12/16/87

Reviewed By: J. T. Kenney Date: 12-19-87

Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015
Engine Train A

Part Description: GENERATOR CONTROLS
Part Number: 03-650B

REFERENCES: CIDR MC172-108
NDE Report Number: NONE
Associated Reports: NCR/IM NONE

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

a. Type of current transformer installed.

b. Terminal block manufacturer and manufacture date.

c. Temperature range of IC's installed.

d. Field flashing circuit design.

II. ACCEPTANCE CRITERIA

a. Absence of Westinghouse type ECT-5 current transformer.

b. Absence of Multi-Amp States Division terminal blocks manufactured between 1974 and 1976.

c. Military temperature range (-55 to 125 C).

d. No potential for overheating of field flashing resistor or nearby components.

III. INSPECTION FINDINGS

a. Current transformers are acceptable (Westinghouse type KIN).

b. Terminal blocks are acceptable (General Electric type EB).

Evaluated By: James P. Moore Date: 12/21/87

Reviewed By: J F Kominski Date: 12-22-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81015 Part No. 03-650B

Engineering Evaluation and Recommendation (Continued):

c. IC's are acceptable (qualified to MIL-M-38510).

d. The District has reviewed the relay logic of the FF circuit on the resistors. For the original circuit, under all generator starts (other than emergency start) in which an unsuccessful start develops due to an abnormal condition, the field flash circuit is only closed for 4 seconds. No prolonged field flashing resistor energization exists. A logic modification is not required. However, the District has modified this circuit to deenergize the field flash about ten seconds following any start.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

The TDI Owners Group has recommended tha the following modifications be implemented prior to placing the engines in standby nuclear service.

a. The installation on each diode of a temperature sensitive label which permanently blackens when 300 deg. F is reached or exceeded in order to monitor the maximum temperature attained.

b. The installation on each SCR of a temperature sensitive label which permanently blackens when 220 deg. F is reached or exceeded in order to monitor the maximum temperature attained.

c. The coating of the side of the lugs and mounting bolt of each diode and SCR with a Glyptol-type lacquer to detect any relative motion.

d. Ventilation of the left-front control cabinet so that the cabinet internal temperature does not exceed 104 deg. F.

e. The coating of the adjustment screw of the five potentiometers on the voltage regulator circuit board with a Glyptol-type lacquer to detect any relative motion.

f. Replacement of the field flashing relay with one which meets the required electrical ratings.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81015 Part No. 03-6508

Engineering Evaluation and Recommendation (Continued):

g. Ventilation of the left-rear and center-rear control cabinets so that the cabinet internal temperature does not exceed 104 deg. F.

h. Remounting of the linear reactor so that the cooling slots are vertical or supply cold air to the linear reactors so that the internal temperature of the left-rear and center-rear control cabinets does not exceed 104 deg. F.

The District has reviewed these modifications and has addressed them as follows:

a. The temperature labels have been installed.

b. The temperature labels have been installed.

c. The Glyptol-type lacquer has been applied.

d. The District has added a 660 CFM fan to the left-front control cabinet to reduce internal temperatures as recommended by a 10CFR Part 21 notification (described below in the "Additional Concerns" section). The District has performed preoperational tests to assure that the cabinet internal air temperature does not exceed 61.7°C under any operating conditions, as required by the TDI Owners Group. Tests for the "A" panel have been successful, with the "B" panel to be retested because of instrumentation errors during the test.

e. The Glyptol-type lacquer has been applied.

f. The District takes exception to the relay replacement because a justification has been developed to demonstrate that the existing relay is acceptable with the installation of a timer circuit. The timer will isolate the relay during an emergency start (ESFAS or LOOPS) to prevent exceeding the contact rating should the engine fail to start. This modification has been installed and tested satisfactorily, and submitted to the TDI Owners Group for concurrence.

g. The District has added a 660 CFM fan to both the left-rear and center-rear control cabinets to reduce internal temperatures as recommended by a 10CFR Part 21 notification (described below in the "Additional Concerns" section). District's position on internal cabinet temperature is described in paragraph d. above.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81015 Part No. 03-650B

Engineering Evaluation and Recommendation (Continued):

h. The District takes exception to remounting the linear reactors because of the site specific conditions at Rancho Seco. The linear reactors utilized at Rancho Seco, P/N CD-1257, have Class F insulation as verified by the manufacturer. This insulation class is rated for a maximum temperature of 155°C (total), with an ambient temperature not exceeding 65°C. After the installation of fans (2 on left/right rear doors, where the linear reactors are located, as described in paragraph g above) for panel cooling, preoperational tests at Rancho Seco have shown that the panel internal temperature does not exceed 61.7°C under any operating conditions. Remounting of the linear reactors is therefore not required.

The TDI Owners Group has recommended that the following modifications be implemented at the first refueling outage (or earlier) to eliminate several maintenance inspections.

i. Mount the diodes to the heatsinks using drilled holes, lockwashers, nuts, and the proper torque.

j. Mount the SCRs to the heatsinks using drilled holes, lockwashers, nuts, and the proper torque.

k. Redesign the bolted-on lug arrangement so there are not more than two lugs on each bolt.

l. Remove the heatsink anodizing in the contact areas of all bolts and bus bar studs.

The District has reviewed these modifications and has addressed them as follows:

i. The diodes will be remounted at the first refueling outage following tie-in of the TDI diesel generators.

j. The SCRs will be remounted at the first refueling outage following tie-in of the TDI diesel generators.

k. The bolted-on lug arrangement will be redesigned by NEI Peebles Electric Products and will be reworked during the first refueling outage following tie-in of the TDI diesel generators.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81015 Part No. 03-650B

Engineering Evaluation and Recommendation (Continued):

1. The District takes exception to the removal of heatsink anodizing because the anodizing is 100% conductive and prevents longterm oxidation and degradation of the thermal interface. The manufacturer concurs with not removing the anodizing and December 10, 1987 correspondence from the TDI Owners Group also indicates agreement. A new, separate recommendation of applying electrical joint compound has been provided by the TDI Owners Group in this letter, which is presently being reviewed by the District.

The TDI Owners Group has recommended that the following modifications be implemented at the discretion of the District to enhance the longterm reliability and performance of the voltage regulator.

m. The addition of power supply bypass capacitors to the integrated circuits (ICs) of the voltage regulator.

n. The use of shielded signal leads for connections between the motor-driven potentiometer and the voltage regulator.

o. The addition of a high frequency bypass capacitor to the feedback loop of the voltage regulator.

p. The rerouting of SCR gate signal leads in bundles separate from the current carrying leads.

q. The use of a three-phase current sensing circuit instead of a single-phase circuit and reduction of feedback signal filtering.

r. The direct soldering of ICs to the printed circuit board to replace sockets.

s. The replacement of the potentiometers with MIL style, sealed, multi-turn potentiometers.

t. The use of double sided printed circuit boards instead of single sided boards.

u. The addition of a conformal coating to the printed circuit boards.

v. The direct soldering of components to the printed circuit board and the use of retaining mechanisms on all remaining sockets.

The District will evaluate the usefulness and practicality of these long term improvement modifications after the first refueling outage following tie-in of the TDI diesel generators.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81015 Part No. 03-650B

Engineering Evaluation and Recommendation (Continued):

VI. ADDITIONAL CONCERNS

The District was also made aware of other concerns with this component from several sources which include 10CFR Part 21 notifications and IE notices. The concerns and the District's response to them are addressed individually below.

NRC Information Notice 82-54 indicated that Westinghouse type NBFD relays require special inspection and test procedures. Rancho Seco's TDI diesels do not use this component.

NRC Information Notice 82-55 indicated that Westinghouse type AR relays with ARMLA latch mechanisms are not qualified for use in Seismic I systems. Rancho Seco's TDI TDI diesels do not use this component.

A letter form General Electric Co. dated 7/12/82 advised that Century Series relays (12HFA173K-A) manufactured between 10/77 and 2/81 may be defective. Rancho Seco's TDI diesels do not use this component.

A 10CFR Part 21 notification dated 8/9/82 identified a failure of a Magnecraft W88LCPX-12 switching relay on a TDI diesel generator. Rancho Seco's TDI diesels do not use this component.

A 10CFR Part 21 notification dated 8/18/83 indicated that some multiple conductor cable from Champlain Cable Corporation may contain unauthorized cable splices. Rancho Seco's TDI diesels do not use Champlain cable.

A 10CFR Part 50.55(e) notification dated 12/17/82 indicated that the silver plated contacts of a starting circuit relay from Potter Brumfield stuck due to oxidation. Rancho Seco's TDI diesel use Allen Bradley relays with solid silver contacts, which is a superior design not prone to sticking.

A letter from General Electric Co. dated 12/21/82 indicated that type SBM switches with date codes of HU, JU, or KU could be defective. An inspection at Rancho Seco has verified acceptable date codes for the SBM switches on the TDI diesel generators.

A 10CFR Part 21 notification dated 5/17/85 identified a potential overheating problem with this component. The DR/QR actions described above have resolved this concern.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81015 Part No. 03-650B

Engineering Evaluation and Recommendation (Continued):

A General Electric Advice Bulletin 721-PSM-167.1 indicated that certain protective relays may fail because they contain a defective telephone relay from the Liberty Control Company. The date codes on the relays at Rancho Seco indicate that this problem is not applicable.

A 10CFR Part 21 notification dated 8/7/85 identified a cracking insulation problem in some multi-conductor wire when petroleum fumes are present. Rancho Seco's TDI engines do not have this problem because the control room is separate from the engine room, hence there are no fumes which could cause insulation cracking.

NRC Information Notice 85-82 stated that a differential protection relay (GE model 12CFD) was not seismically qualified for its intended service in an emergency diesel generator. Rancho Seco's TDI diesels do not use this component and its differential relays (Westinghouse model CA) are seismically qualified.

During pre-operational testing at Rancho Seco (8/85), several relays manufactured by Syracuse Electronics were found to be defective in various ways. The District has replaced the defective relays and inspected the other relays to ensure their acceptability. A 10CFR Part 21 notification was also initiated by the District.

A 10CFR Part 21 notification dated 4/24/86 indicated that GE type NGA15AG3 relays may be damaged by a wiring error. The District has corrected the wiring error. Relays with burnt resistors were replaced with new ones, others were repaired, retested and re-installed in the control panels.

A 10CFR Part 21 notification dated 3/11/87 described a design problem with the reset circuitry of the static exciter voltage regulator. The District has revised the static exciter voltage regulator reset circuitry and performed preoperational testing successfully.

A 10CFR Part 21 notification dated 3/31/87 described a design problem with the engine shutdown circuitry which prevented restarting until manually reset. The District has modified the circuit to eliminate this problem.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the inspections performed, the modifications made, and the actions taken to address the additional concerns, the generator controls are acceptable for their intended use at Rancho Seco during testing and interim operations.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016
Engine Train B

Part Description: GENERATOR CONTROLS
Part Number: 03-650B

REFERENCES: CIDR MC172-108
NDE Report Number: NONE
Associated Reports: NCR/IM NONE

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

a. Type of current transformer installed.

b. Terminal block manufacturer and manufacture date.

c. Temperature range of IC's installed.

d. Field flashing circuit design.

II. ACCEPTANCE CRITERIA

a. Absence of Westinghouse type ECT-5 current transformer.

b. Absence of Multi-Amp States Division terminal blocks manufactured between 1974 and 1976.

c. Military temperature range (-55 to 125 C).

d. No potential for overheating of field flashing resistor or nearby components.

III. INSPECTION FINDINGS

a. Current transformers are acceptable (Westinghouse type KIN).

b. Terminal blocks are acceptable (General Electric type EB).

Evaluated By: James D. Meares Date: 12/22/87

Reviewed By: J.F. Kaminski Date: 3-22-88
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81016 Part No. 03-6508

Engineering Evaluation and Recommendation (Continued):

c. IC's are acceptable (qualified to MIL-M-38510).

d. The District has reviewed the relay logic of the FF circuit on the resistors. For the original circuit, under all generator starts (other than emergency start) in which an unsuccessful start develops due to an abnormal condition, the field flash circuit is only closed for 4 seconds. No prolonged field flashing resistor energization exists. A logic modification is not required. However, the District has modified this circuit to deenergize the field flash about ten seconds following any start.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

A discussion of the modifications recommended by the TDI Owners Group for this component can be found in the Engine "A" summary.

VI. ADDITIONAL CONCERNS

A discussion of other concerns with this component can be found in the Engine "A" summary.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the inspections performed, the modifications made, and the actions taken to address the additional concerns, the generator controls are acceptable for their intended use at Rancho Seco during testing and interim operations.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015
Engine Train A

Part Description: AUX. SUB BASE LUBE OIL: VALVES
Part Number: 03-717I

REFERENCES: CIDR MC172-109
NDE Report Number: NONE
Associated Reports: ASME Section III, [illegible]3, Paragraph ND-7141; SMUD-TDI 9/23/85, TDI Memo 11/7/85

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

Verify proper installation of relief valves.

II. ACCEPTANCE CRITERIA

Installed in accordance with manufacturer's recommendations (i.e. vertical installation).

III. INSPECTION FINDINGS

The District takes exception to this requirement based on generally accepted industry standards which allow these valves to be installed in the horizontal position and a TDI memo (dated 11/7/85). According to TDI the PCV is the primary controller of pressure in the lube oil system; the relief valves are backups to the PCV (as a carryover from an earlier design) and therefore are not actually required. Furthermore, the reliefs are Crosby guided poppet type valves which keep themselves in alignment regardless of their orientation. This, plus the fact that they are continually lubricated by oil, makes them suitable for orientation in the horizontal position. The TDI Owners Group has agreed that the Rancho Seco configuration is acceptable as is.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required.

Evaluated By: James C. Fischer Date: 12/18/87

Reviewed By: J7 Kuminski Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015 Part No. 03-717I

Engineering Evaluation and Recommendation (Continued)

VI. ADDITIONAL CONCERNS

The District was made aware of another concern by a 10CFR Part 21 notification where the lube oil check valve liner and seat material deteriorated. The District replaced these valves with new valves with the proper seat material (Buna N).

Another concern regarding the Lube Oil Sump Tank Foot Valve was brought to the District's attention in 10CFR Part 21 notification of March 10, 1986. This concern does not apply to Rancho Seco based on subsequent information supplied in TDI letters of May 8, 1986 and May 12, 1986.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DP/QR report and the actions taken to address the above additional concerns, this component is acceptable for its intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016
Engine Train B

Part Description: AUX. SUB BASE LUBE OIL: VALVES
Part Number: 03-717I

REFERENCES: CIDR MC172-109
NDE Report Number: NONE
Associated Reports: ASME Section III, Class 3, Paragraph ND-7141; SMUD-TDI 9/23/85, TDI Memo 11/7/85

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

Verify proper installation of relief valves.

II. ACCEPTANCE CRITERIA

Installed in accordance with manufacturer's recommendations (i.e. vertical installation).

III. INSPECTION FINDINGS

The District takes exception to this requirement based on generally accepted industry standards which allow these valves to be installed in the horizontal position and a TDI memo (dated 11/7/85). According to TDI the PCV is the primary controller of pressure in the lube oil system; the relief valves are backups to the PCV (as a carryover from an earlier design) and therefore are not actually required. Furthermore, the reliefs are Crosby guided poppet type valves which keep themselves in alignment regardless of their orientation. This, plus the fact that they are continually lubricated by oil, makes them suitable for orientation in the horizontal position. The TDI Owners Group has agreed that the Rancho Seco configuration is acceptable as is.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required.

Evaluated By: James C. Fischer Date: 12/15/87

Reviewed By: J F Kominski Date: 12-17-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016 Part No. 03-717I

Engineering Evaluation and Recommendation (Continued)

VI. ADDITIONAL CONCERNS

The District was made aware of another concern by a 10CFR Part 21 notification where the lube oil check valve liner and seat material deteriorated. The District replaced these valves with new valves with the proper seat material (Buna N).

Another concern regarding the Lube Oil Sump Tank Foot Valve was brought to the District's attention in 10CFR Part 21 notification of March 10, 1986. This concern does not apply to Rancho Seco based on subsequent information supplied in TDI letters of May 8, 1986 and May 12, 1986.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report and the actions taken to address the above additional concerns, this component is acceptable for its intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015
Engine Train A

Part Description: JACKET WATER THERMOSTATIC VALVE
Part Number: 03-799A

REFERENCES: CIDR MC172-113
NDE Report Number: NONE
Associated Reports: NCR/IM NONE

I. ATTRIBUTES TO BE VERIFIED

Valve body material.

II. ACCEPTANCE CRITERIA

Cast steel, not bronze.

III. INSPECTION FINDINGS

Valve body material is acceptable.

IV. CORRECTIVE ACTIONS

None to date.

V. MODIFICATIONS

None required.

VI. ADDITIONAL CONCERNS

The District was also made aware of other concerns with this component from IE Notice 82-56 which identified possible setpoint changes due to nut movement and possible sticking operation due to the O-ring problems. The District disassembled the valve and confirmed the temperature operation of the power pills, the use of a castellated nut and cotter pin, and the absence of an O-ring for bypass leakage. These inspections fully address the concerns of the IE Notice. However, during these inspections the District also observed that a long (11-1/4 inch) spring was installed instead of a short one (7-1/8 inch) which the TDI Manual (Robertshaw section) recommended for inverted operation. The District has replaced the spring with a short one.

Evaluated By: James C. Fisher Date: 12/18/87

Reviewed By: G7 Kominsky Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81015 Part No. 03-799A

Engineering Evaluation and Recommendation (Continued):

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the inspections made, and the actions taken to address the above additional concerns, this valve is acceptable for its intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016
Engine Train B

Part Description: JACKET WATER THERMOSTATIC VALVE
Part Number: 03-799A

REFERENCES: CIDR MC172-113
NDE Report Number: NONE
Associated Reports: NCR/IM NONE

I. ATTRIBUTES TO BE VERIFIED

Valve body material.

II. ACCEPTANCE CRITERIA

Cast steel, not bronze.

III. INSPECTION FINDINGS

Valve body material is acceptable.

IV. CORRECTIVE ACTIONS

None to date.

V. MODIFICATIONS

None required.

VI. ADDITIONAL CONCERNS

The District was also made aware of other concerns with this component from IE Notice 82-56 which identified possible setpoint changes due to nut movement and possible sticking operation due to the O-ring problems. The District disassembled the valve and confirmed the temperature operation of the power pills, the use of a castellated nut and cotter pin, and the absence of an O-ring for bypass leakage. These inspections fully address the concerns of the IE Notice. However, during these inspections the District also observed that a long (11-1/4 inch) spring was installed instead of a short one (7-1/8 inch) which the TDI Manual (Robertshaw section) recommended for inverted operation. The District has replaced the spring with a short one.

Evaluated By: James C. Fisher Date: 12/18/87

Reviewed By: J. J. Kaminski Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81016 Part No. 03-799A

Engineering Evaluation and Recommendation (Continued):

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the inspections made, and the actions taken to address the above additional concerns, this valve is acceptable for its intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015
Engine Train A

Part Description: INTAKE AIR SILENCER
Part Number: 03-805C

REFERENCES: CIDR MC172-211
NDE Report Number: NONE
Associated Reports: NCR/IM NONE

I. ATTRIBUTES TO BE VERIFIED

Quality revalidation is not required.

II. ACCEPTANCE CRITERIA

None required.

III. INSPECTION FINDINGS

None required.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required.

VI. ADDITIONAL CONCERNS

The District was made aware of a concern with this component in a 10CFR Part 21 notification, which indicated a possibility that the intake silencer had an internal part not welded in place. The District verified that the end caps were welded in place (not friction fitted).

Evaluated By: James L. Fischer Date: 12/15/87

Reviewed By: J. F. Kanuch Date: 12-15-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81015 Part No. 03-805C

Engineering Evaluation and Recommendation (Continued):

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report and the actions taken to address the above additional concern, the intake air silencer is acceptable for its intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016
Engine Train B

Part Description: INTAKE AIR SILENCER
Part Number: 03-805C

REFERENCES: CADR MC172-211
NDE Report Number: NONE
Associated Reports: NCR/IM NONE

I. ATTRIBUTES TO BE VERIFIED

Quality revalidation is not required.

II. ACCEPTANCE CRITERIA

None required.

III. INSPECTION FINDINGS

None required.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required.

VI. ADDITIONAL CONCERNS

The District was made aware of a concern with this component in a 10CFR Part 21 notification, which indicated a possibility that the intake silencer had an internal part not welded in place. The District verified that the end caps were welded in place (not friction fitted).

Evaluated By: James C. Fischer Date: 12/13/87

Reviewed By: J F Kaminski Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81016 Part No. 03-805C

Engineering Evaluation and Recommendation (Continued):

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report and the actions taken to address the above additional concern, the intake air silencer is acceptable for its intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015
Engine Train A

Part Description: LUBE OIL HEAT EXCHANGER
Part Number: 03-820D

REFERENCES: NO CIDR
NDE Report Number: NONE
Associated Reports: NCR/IM NONE

I. ATTRIBUTES TO BE VERIFIED

Quality revalidation is not required.

II. ACCEPTANCE CRITERIA

None required.

III. INSPECTION FINDINGS

Not applicable.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required.

VI. ADDITIONAL CONCERNS

The District was also made aware of other concerns with this component from IE Notice 79-23, however it pertained to an inadequate design of another manufacturer and another type of diesel. The DR/QR review of the TDI Owners group has established the adequacy of the heat exchanger at Rancho Seco.

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the lube oil heat exchanger is acceptable for its intended use at Rancho Seco.

Evaluated By: James L. Fischer Date: 12/18/87

Reviewed By: T. T. Kaminski Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81016
Engine Train B

Part Description: LUBE OIL HEAT EXCHANGER
Part Number: 03-820D

REFERENCES: CIDR MC172-208
NDE Report Number: NONE
Associated Reports: NCR S-5022

I. ATTRIBUTES TO BE VERIFIED

Quality revalidation is not required.

II. ACCEPTANCE CRITERIA

None required.

III. INSPECTION FINDINGS

Not applicable, however, an excessive amount of loose metal particles were found in the heat exchanger during startup inspections.

IV. CORRECTIVE ACTIONS

The heat exchanger was disassembled, steam cleaned, and reinspected for cleanliness.

V. MODIFICATIONS

None required.

VI. ADDITIONAL CONCERNS

The District was also made aware of other concerns with this component from IE Notice 79-23, however it pertained to an inadequate design of another manufacturer and another type of diesel. The DR/QR review of the TDI Owners group has established the adequacy of the heat exchanger at Rancho Seco.

Evaluated By: James E. Fischer Date: 12/18/87

Reviewed By: J F Kaminski Date: 12-19-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81016 Part No. 03-820D

Engineering Evaluation and Recommendation (Continued):

VII. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the lube oil heat exchanger is acceptable for its intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015
Engine Train A

Part Description: FUEL OIL DUPLEX STRAINER
Part Number: SC-042B / 03-825E

REFERENCES: CIDR MC172-004
NDE Report Number: NONE
Associated Reports: NCR/IM NONE

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

Strainer mesh size.

II. ACCEPTANCE CRITERIA

Mesh size of 0.055 inches.

III. INSPECTION FINDINGS

Mesh size is 0.055 inches.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

None required.

VI. ADDITIONAL CONCERNS

The District was also made aware of another concern from IE Information Notice No. 87-04 where the strainer could become fouled by contaminated fuel oil. At Rancho Seco this strainer is a duplex style with a differential pressure gauge mounted across it with an alarm set point of 5 PSID. The strainer can be switched from one side to the other when the Delta P reaches 5 PSID. One basket can be cleaned while the other is in use during engine operations. The maintenance matrix requires monitoring of the Delta P during monthly surveillance testing and requires cleaning of the element if the Delta P exceeds 5 PSID. Further, the District has undertaken a rigorous fuel oil testing program which will preclude the possibility of fuel oil contamination.

Evaluated By: James L. Fischer Date: 1/15/87

Reviewed By: J. T. Kominek Date: 2/19/87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81015 Part No. SC-0428/03-825E

Engineering Evaluation and Recommendation (Continued):

VI. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the inspections performed, and the actions taken to address the above additional concerns, the fuel oil strainer is acceptable for its intended use at Rancho Seco.

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

Diesel Engine Serial Number 81015
Engine Train B

Part Description: FUEL OIL DUPLEX STRAINER
Part Number: SC-042B / 03-825E

REFERENCES: CIDR MC172-004
NDE Report Number: NONE
Associated Reports: NCR/IM NONE

Engineering Evaluation and Recommendation:

I. ATTRIBUTES TO BE VERIFIED

Strainer mesh size.

II. ACCEPTANCE CRITERIA

Mesh size of 0.055 inches.

III. INSPECTION FINDINGS

Mesh size is 0.055 inches.

IV. CORRECTIVE ACTIONS

None required.

V. MODIFICATIONS

Non required.

VI. ADDITIONAL CONCERNS

The District was also made aware of another concern from IE Information Notice No. 87-04 where the strainer could become fouled by contaminated fuel oil. At Rancho Seco this strainer is a duplex style with a differential pressure gauge mounted across it with an alarm set point of 5 PSID. The strainer can be switched from one side to the other when the Delta P reaches 5 PSID. One basket can be cleaned while the other is in use during engine operations. The maintenance matrix requires monitoring of the Delta P during monthly surveillance testing and requires cleaning of the element if the Delta P exceeds 5 PSID. Further, the District has undertaken a rigorous fuel oil testing program which will preclude the possibility of fuel oil contamination.

Evaluated By: James C. Fiedler Date: 12/17/87

Reviewed By: J. F. Kaminski Date: 12-17-87
Requalification Project Engineer

RANCHO SECO DIESEL GENERATOR REQUALIFICATION

ENGINEERING SUMMARY REPORT

CONTINUATION

Diesel Engine Serial Number 81015 Part No. SC-042B/03-825E

Engineering Evaluation and Recommendation (Continued):

VI. RESULTS AND CONCLUSIONS

Based upon the evaluation made by the TDI Owners Group in this DR/QR report, the inspections performed, and the actions taken to address the above additional concerns, the fuel oil strainer is acceptable for its intended use at Rancho Seco.

RANCHO SECO NUCLEAR GENERATING STATION
DELAVAL DIESEL GENERATOR TESTING/OPERATING HISTORY

In response to an NRC request for TDI diesel testing information (ref. NRC letter dated January 31, 1984; Enclosure #2, questions 7 and 8) the District is providing the following response as a synopsis of diesel testing.

The following pages provide a detailed summary of the testing and operating history of Rancho Seco's 3500 KW Transamerica Delaval diesel generators. These generators were installed in 1984 when it became evident that, due to plant safety upgrades, more emergency power was needed to operate additional safety related equipment and systems. The subject engines are 8 cylinder, model DSR-48 diesels with serial numbers of 81015-3057 and 81016-3058. These diesels drive 3500 KW (nameplate) N.E.I. Parsons-Peebles synchronous generators at a rated speed of 450 RPM.

As a result of a Transamerica Delaval diesel generator crankshaft failure at the Shoreham Nuclear Power Station and other subsequent engine quality problems, the utility industry organized a TDI Owners Group to address TDI diesel reliability. This group, after extensive review, developed a corrective action program to be implemented prior to and after placing the TDI diesels into nuclear service. A site implementation plan was developed to implement this program at Rancho Seco in three basic phases. Phase "A" involved a pre-run engine tear down. Phase "I" involved preliminary diesel engine runs and tests (prior to Phase "B") and later, preoperational testing (after Phase "B"). The third phase was Phase "B" which involved additional engine teardowns for wear and clearance inspections, etc., after preliminary engine runs.

Phase "A" engine inspections and part replacements were performed prior to initial engine runs to ensure that conditions and materials were satisfactory to prevent possible engine damage. This phase of the test program addressed the 16 known generic problem areas identified by the Owners Group program along with various other areas of concern. These areas were addressed using the District's Construction Inspection Data Report (CIDR) format. The Phase "A" teardown occurred from November 1984 to February 1985. As a result of these Phase "A" inspections, all engine piston skirts were replaced along with various bolting hardware on the turbocharger, flywheel and engine. Several engine bearing shells were replaced due to their not meeting minimum radiographic acceptance criteria. Rust and dirt were removed from the turbocharger during a disassembly inspection. Full details of the Phase "A" engine work are contained in the partial Rancho Seco final Design Review/ Quality Revalidation (DR/QR) report submitted to the NRC on July 8, 1987.

Following the completion of Phase "A" teardown work, testing of the individual diesel support systems (jacket water, fuel oil, starting air) was performed on piping, mechanical, electrical and instrumentation components. Initial electrical checks were performed on MCC's and distribution panels, along with testing of component motors and the diesel control panels. Mechanical testing was performed on individual components, and all diesel piping systems were cleaned and flushed. Instrumentation and control logic checks and calibrations were also done during this time period (March 1985 through July 1986).

This testing was all a prerequisite to initial engine runs under Special Test Procedure (STP) 195A & B. The main purposes of STP 195A & B were as follows:

1) Demonstrate automatic operation of the diesel generator system pumps, fans and heaters.

2) Demonstrate the automatic operation of the diesel starting air system and satisfactory engine and component operating temperatures and pressures.

3) Verify all system alarms and diesel trips and verify the capability of each air receiver tank to provide enough air for 5 consecutive cold starts.

4) Demonstrate that the generator can be manually synchronized and paralled with a temporary load transformer and that rated voltage is maintained during load shedding with no engine overspeeds.

5) Obtain a minimum of 100 hrs run time at >50% load (>1750KW) and demonstrate satisfactory operation of the diesels at 110% nameplate load (3850 KW) for 2 hours and 100% load (3500 KW) for 22 hours during a continuous 24 hour run.

6) Perform torsiograph and vibration testing of the diesel generators and associated piping and components for baseline information.

These test objectives were met as documented with the final STP 195A/B test results. Testing was performed from October 1986 through December 1986. After initial engine operations, the TDI Owners Group Maintenance Matrix (from the DR/QR report) was placed into effect. Also, periodic lube oil testing was begun which included ferrographic analysis.

The following major problems were discovered and addressed as a result of STP 195A/B testing:

1) Slow response time on the Woodward Governor allowed overspeed trips when switching between electrical control and mechanical governor control. This was resolved by changing the governor oil from Mobilgard 412 to Delvac Special 20-40 which has a broader temperature range for operation.

2) Lube oil pump noise and vibration on the "A" engine was initially thought to be caused by out of specification lubricating oil. Oil samples were tested by TDI Delaval, Herguth Laboratories, and Mobil Oil Corporation, and found to meet all specification requirements. During investigation a nut was found lodged in the engine driven L. O. pump suction foot valve which did not allow the valve to be fully open during operation. This was removed, resulting in a reduced level of noise and vibration, and engine testing continued.

3) During testing the engine vibration baseline and torsiograph test were performed, as required by the TDI Owners Group. The torsiograph testing results were analyzed, resulting in a proposed qualified load of 3300 KW. However, various piping vibration problems and turbocharger vibration problems were uncovered. How these problems were addressed is detailed in a separate report entitled "Report of the Resolutions to Vibration Related Concerns on the TDI Emergency Diesel Generators." This report will be submitted to the NRC when all vibration concerns have been resolved.

After completion of initial diesel testing under STP 195A/B, the Phase "B" engine teardown was performed. The purpose of this teardown was to verify proper engine part clearances and to inspect for adverse wear after 100 plus hours of loaded operation. This teardown occurred from December 1986 through February 1987. The highlights are listed below.

1) Due to excessive vibration, the turbochargers were disassembled to inspect for bearing wear, etc. Inspection revealed unsatisfactory bearing wear and the units were returned to Elliot for rework. It was discovered that the rotors were out of balance, which was corrected prior to reinstallation. Additional details are contained in the District's final DR/QR report submittal for this component (MP-020).

2) Several fuel injection pumps were replaced due to internal discontinuities and stuck rack extension arms.

3) The engine driven fuel oil pump was replaced due to excessive casing wear caused by an internal alignment problem.

4) Several rocker arm assemblies were replaced due to push rod cup holder bores being out of tolerance.

5) Major design improvements were added to the fuel oil system by installing double walled high pressure injection tubing with a visible leak and detection system from the pump outlets to the injectors. Also, high temperature/pressure flex lines were installed from the fuel oil header to the injection pump inlet and from the pump excess flow port to the by-pass return line. These modifications improved system pressure boundary integrity.

Full details of Phase "B" teardown results are documented in the Rancho Seco final DR/QR report submitted to the NRC.

In parallel with the Phase "B" teardown, numerous piping and component vibration problems were addressed by support redesign and installation. These concerns are addressed in detail in the "Report of the Resolution to Vibration Related Concerns on the TDI Emergency Diesel Generators". As required in NUREG-1216, an alarm circuit designed to notify Control Room operators when the diesel generators exceed "qualified load" was designed and installed during this time period. Also, engine base metal samples were analyzed for graphite and found to meet TDI Owners Group recommendations.

Following Phase "B" teardown and new support installations for vibration attenuation, final preoperational testing was performed under STP 1009A/B. The main purposes of these tests were as follows:

1) Demonstrate diesel generator reliability by successfully completing 35 valid test starts per engine.

2) Demonstrate that diesel generator maintains rated voltage after rejection of 3000 KW and that no engine overspeed trip occurs.

3) Perform a 24 hour diesel generator run at 3000 KW.

4) Verify that diesel generator control panel internal temperatures do not exceed design parameters while at 3000 KW for 24 hours.

5) Demonstrate diesel operation, including voltage and frequency control, from the remote controls in the Main Control Room.

6) Demonstrate that the diesel automatically starts after the receipt of a simulated Engineered Safety Features Actuation System (ESFAS) signal, generates rated voltage and frequency, and is ready to accept load, within 10 seconds.

7) Demonstrate the diesel capability to operate for a period of time with no load, and then assume full load without shutdown or adverse effects.

8) Demonstrate that diesel generators can be manually synchronized and paralleled with the associated preferred offsite power supply through the associated Class 1E 4160 V bus, and can be loaded.

These test objectives were met as documented with the final STP 1009A/B test results. Testing was performed from April 1987 through August 1987. The following major problems were discovered and addressed as a result of this testing.

1) Woodward governor response time and stability continued to be a problem. Governor hydraulic oil was switched to Automatic Transmission Fluid (ATF) to alleviate this problem. During this changeout excessive metal filings and dirt were found in the governor internals. The units were removed and shipped to the governor vendor (Woodward Governor Co.) for cleaning, inspection, and repair as required. Also, the servoboosters were inspected and cleaned along with the governor heat exchangers. Upon their return from the vendor, the governor components were verified by the District to be clean prior to installation and ATF was used as hydraulic oil. The governors performed satisfactorily during continued testing both in response time and sensitivity.

2) After a 24 hour loaded diesel run, a simulated ESFAS signal was generated, but the diesel did not start for approximately 90 to 120 seconds. This was due to the inherent design of the TDI pneumatic controls, which required an approximate 2 minute air bleed off time prior to restarting the engine. It was initially concluded that 90 seconds would be considered as "immediate" for a fast restart from an ESFAS signal, but the District later decided to implement a TDI (vendor supplied) design change to the controls. This design change allows for an immediate restart instead of waiting 90 seconds, and it was installed and tested satisfactorily.

3) The retest of various piping and components indicated that some modifications to resolve vibration concerns were successful while others were inadequate. Once again, these are detailed in "Report of the Resolutions to Vibration Related Concerns on the TDI Emergency Diesel Generators" which will be submitted separately.

Automatic starts and load sequencing testing will be documented in the integrated Loss of Offsite Power Test (STP-961). A number of test items previously performed in STP 1009A/B will be retested in STP 1134A/B. This test will also document starting air system air loss rates during diesel operations and lube oil consumption rates. The intent of this testing is to address all open test items from previous testing and bring the TDI diesel test program to a satisfactory completion.

Continued diesel generator reliability will be improved due to the adherence to the TDI Owners Group enhanced Maintenance Matrix Program and a detailed Surveillance Test Program. These programs, coupled with the extensive requalification test effort, will ensure reliable TDI diesel generator operations at Rancho Seco in support of plant power operations.

DGHISTORY