

WATTS BAR NUCLEAR PLANT
SURVEILLANCE INSTRUCTION
 SI-8.23
DIESEL GENERATOR BATTERY
INSPECTION AND CHARGER TEST

UNIT 1 OR 2

SEE ESPECIALLY
 STEP 6.1, PAGE 2

CURRENT REVISION LEVEL: 2

Prepared By John T. Maddux

Revised By Frank Tuck

Submitted By J. M. DeJongh
 Supervisor

PORC Review Date 11/31/85

Approved By E. J. Smith
 Plant Manager

Date Approved 11/31/85

8503270441 850323
 PDR ADOCK 05000390
 E PDR

- 1C Doc Control Unit, 1520 CS72-C
- NRC
- 1C NERS, 249 A HSB-2
- 1C Plant Master File
- Plant Manager
- Supt (QA)
- Supt (Maint)
- Plant Adm Svs Supv
- ASE Duty Station
- Building Services Supv
- Chem Lab
- Chem Unit Supv
- Chief, Nuclear Safety Staff
- 1C Chief, Nuclear Training Branch
- Chief, Operations QA Branch, 401 UBB-C
- Compliance Unit
- Component Engg & Svs Group
- DPSO-WBN
- Dwg & Vendor Manual Supv
- 1C Elect Maint Supv
- Engg Group Supv
- 1C Engg Section Supv
- Health Physicist
- Health Physics Lab
- Instr Maint Supv
- Instr Shop
- Materials Unit Supv
- Mech Maint Supv
- Mech Unit Supv
- 1C Modifications Manager
- Operating Instruction Coordinator
- 1C Operations Supv
- Operator Training Classroom
- 1C&1U P&S Supv
- 1C Plant QA Supv
- Plant Training Officer
- 1U Plant Training Shift Engr
- Power Stores Unit Supv
- Preop Test Supv
- Public Safety
- Reactor Unit Supv
- Safety Engr
- 1C Shift Engr's Office
- Support Svs Supv
- Tech Support Center
- 1C Unit 1 Control Rm
- 1C Unit 2 Control Rm
- 1C John Raulston, NEB, W10A63 C-K
- Site Director
- Site Svs Manager
- Design Svs Manager
- Plant Manager, BLN

HISTORY OF REVISION/REVIEW

<u>REV. NO.</u>	<u>DATE</u>	<u>REVISED PAGES</u>	<u>REASON FOR CURRENT REVISION (INCLUDE ALL TEMPORARY CHANGE NUMBERS)</u>
0	08/10/82	All	New instruction.
1	09/25/84	All; Delete Punchlist	General revision; 2-year review.
2	1-31-85	All	TC-85-1 and to delete internal strap measurements on each battery on TC-85-77.

1.0 PURPOSE

This instruction provides for an inspection and check of the 125-volt diesel generator batteries. This instruction provides visual inspection of the battery cells, terminals, and plates. This instruction shall be done at least every 18 months.

This instruction is for the following listed D/G batteries:

- 125V Diesel Generator 1A-A Battery.
- 125V Diesel Generator 1B-B Battery.
- 125V Diesel Generator 2A-A Battery.
- 125V Diesel Generator 2B-B Battery.

This instruction meets the conditions imposed by the following Surveillance Requirements:

<u>Surveillance Requirement</u>	<u>Applicable Mode</u>
4.8.1.1.3.c	1, 2, 3, 4

NOTE: Those steps preceded by the symbol "#" will require documentation in the data package.

2.0 REFERENCES

2.1 Source Documents

2.1.1 Technical Specification 3/4.8.1.

2.2 Other Documents

2.2.1 For general information on batteries and battery maintenance use ESL 5.1, Scheduled Battery Maintenance.

2.2.2 TVA contract 83090 - C & D Batteries Model 3-DCU9, Section 9910.05.

3.0 PREREQUISITES

#3.1 Obtain approval of the SRO or his designated representative to perform this instruction.

3.2 Obtain the necessary clearances for the performance of the instruction.

3.3 Review ESL 5.1 before proceeding with this instruction.

3.4 Notify QC for Holdpoint verifications.

4.0 PRECAUTIONS

4.1 Personnel performing this instruction should be aware of working in the vicinity of energized equipment such as the battery charger and the batteries, and they should be aware of the proper safety equipment, as explained in ESL 5.1.

- 4.2 Personnel performing this instruction should be aware of the location of the eyewash station in each battery room. If found inoperable, notify foreman before proceeding with this instruction.
- 4.3 Smoking, open flames, or welding is prohibited in the battery rooms as a precaution against ignition of any hydrogen present.
- 4.4 Keep battery terminals and straps clear of all tools and other foreign objects. If tools are used on the battery terminals they should have insulated handles.
- 4.5 Discharge all static electricity from the body before touching a cell or cell post by touching a grounded surface.
- 4.6 Ensure proper polarity is observed while making all test connections.
- 5.0 PREPARATION FOR WORK
 - #5.1 Obtain two calibrated micro-ohmmeters with an accuracy of no less than ± 2 percent for checking terminal connections in this instruction.
 - #5.2 Obtain two calibrated torque wrenches capable of handling torques from 5 in-lbs to 150 in-lbs.
 - 5.3 Have baking soda available for neutralizing acid spills.
 - 5.4 Obtain an approved face shield, apron, and rubber gloves.
 - 5.5 Obtain an approved no-oxide grease.
- 6.0 PERFORMANCE OF WORK

NOTE: Two craftsmen shall independently perform this instruction and initial each step when a space is provided to verify that it was properly completed. Both craftsmen shall sign and date each data sheet as it is completed, to verify that it was properly done. Only one battery bank is to be worked on at a time.

Use only micro-ohmmeter #1 and torque wrench #1 on Train A.

Use only micro-ohmmeter #2 and torque wrench #2 on Train B.

#6.1 Visually inspect battery racks for loose bolts, distorted members, or any abnormal deterioration.

#6.2 Visually inspect the cells and cell plates for an indication of physical damage or abnormal deterioration, using the following guidelines.

- a. The general overall color of the top layer of sediment in the bottom of the cell indicates the battery charge condition within the last 6 to 12 months. A whitish-gray background indicates an undercharge condition.

A brownish-chocolate background indicates an overcharge condition.

DATA on
← PP 6, 12



- b. Charge condition of the battery in accordance with plate color:

Fully Charged

Positive plate - Chocolate brown color
Negative - Light to medium gray color

Discharged

Medium gray color
Medium gray color

When the positive plates are a medium gray in color, this indicates the battery is partially discharged.

- c. Grid fractures, discoloration of the plates or electrolyte, plate buckling, plate growth, and cell cracks or leaks should be noted.
- d. Scale (small slivers or pieces of plate material which have peeled from the plate surface) shorts sometimes occur between adjacent plates at the top of the plate structure. These shorts turn white when electrically connected and can usually be broken or dislodged by extending a rubber hose or the hydrometer tube near the area and forcing air through the hose to agitate the electrolyte in the vicinity of the short. DO NOT USE COMPRESSED AIR FOR THIS PURPOSE.

NOTE: The positive plates of lead-calcium batteries normally swell or "grow" with age and use. Most manufacturers claim that 10 percent growth is the expected maximum limit during the life of the battery. Most manufacturers make the plate separators 10 percent larger than the plates so that when the plates "grow" to the dimensions of the separators, normally the battery is nearing the end of its useful life. Therefore, if any plate appears to have dropped lower than the other plates, or if bucking or warping of the plates is evident, or if an excessive amount of sediment appears in the bottom of the cell (more than the average), notify the General Foreman.

#6.3 Visually inspect the cell to cell and terminal connections for cleanliness, or corrosion, and note any abnormalities in the data sheets.

#6.4 Read the intercell connection resistance of each cell with a micro-ohmmeter and record each value on the appropriate data sheet. (Measurement to be taken between bus bar and cell as close as possible to bolted connection.)

#6.4.1 ACCEPTANCE CRITERIA: All connections must be $\leq 150 \times 10^{-6}$ ohms.

NOTE: Steps 6.5 thru 6.7 are to be worked only if 6.4.1 is not acceptable.

#6.5 Torque the high reading connection(s) to 75 in-lbs (for stainless steel terminal connectors).

#6.6 Reread and record the questionable connection resistance to see if torquing the connection has improved the micro-ohmmeter reading. QC inspector to verify torque if resistance is acceptable.

- 6.7 If torquing has not improved the reading, check the post and the connector for corrosion. If it is necessary to break a terminal connection, have operations remove the battery from service.
- 6.7.1 If the terminal connector and the battery terminal are corroded, the connector should be removed and the terminal and the connector should be cleaned with a brass suede brush or fine sand paper.
- 6.7.1.1 Clean batteries if needed with a solution of bicarbonate of soda (one pound of soda per gallon of water). Wipe the water off with a clean dry rag.
- 6.7.2 Apply no-oxide grease to the clean battery terminal and connector and reinstall it. (A thin film over all metal surfaces.)
- #6.7.3 Torque the bolted connection to 75 in/lbs.

QC HOLD POINT:

- #6.7.4 Reread the newly installed connector resistance and record the reading. If the connection is still above 150×10^{-6} ohms, notify the maintenance supervisor. Note the action to be taken under "Remarks" section of the Data Cover Sheet. QC Inspector to verify torque if resistance is acceptable.
- #6.8 Visually inspect all battery terminals and connectors and apply no-oxide grease to the battery terminals and connectors if needed.
- #6.9 SRO notified upon completion of this SI.

7.0 ACCEPTANCE CRITERIA

- #7.1 The cells, cell plates, and battery racks show no visual indication of physical damage or abnormal deterioration.
- #7.2 The cell-to-cell and terminal connections are clean, and coated with anti-corrosion materials.
- #7.3 The resistance of cell-to-terminal connection is less than or equal to 150×10^{-6} ohms.

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APPENDIX A

DATA PACKAGE COVER SHEET

TITLE DIESEL GENERATOR BATTERY INSPECTION AND CHARGER TEST UNIT _____

Performed by _____ Date _____
Electrician

_____ Date _____
Electrician

This data package contains 14 pages. If any pages were removed from or added to the data package as supplied by the Planning and Scheduling Section, indicate by checkmark. If checked, explain: _____

Were Technical Specification criteria satisfied? _____ Yes _____ No

If criteria were not satisfied, notify the SRO who will complete the following:

Was a limiting condition for operation violated?

_____ Yes (explain in remarks) _____ No (explain in remarks)

Verified by SRO _____ Date _____

Reason for test:

_____ Required by schedule

_____ Maintenance complete on MR#, WP#, MI#, etc. _____

_____ Another system (_____) inoperable

_____ Plant condition (explain) _____

_____ Other (explain) _____

Reviewed: _____

Electrical Engineer _____ Date _____

Cognizant Engineer _____ Date _____

Rescheduled _____

P&S Section _____ Date _____

Remarks: _____

PQA Review _____ Date _____

125-VOLT D.C. D/G BATTERY BANK NO. 1A-A

TVA TAG # / CAL. DUE DATE

Microhmeter #1 _____

Torque Wrench #1 _____

INITIALS

Craftsman I

Craftsman II

Approved to perform this instruction _____ / _____
SRO Date

6.1 Battery rack physical appearance
/___/ Acceptable /___/ Unacceptable

NOTES: _____

6.2 Plate color and growth, cell condition
/___/ Acceptable /___/ Unacceptable

NOTES: _____

6.3 Cell and cell terminal connections
/___/ Acceptable /___/ Unacceptable

NOTES: _____

6.8 Cell post and connectors are coated with
corrosion-inhibiting grease
/___/ Acceptable /___/ Unacceptable

NOTES: _____

6.9 SRO notified instruction complete _____ / _____
Date

Data Taken By _____ / _____
Craftsman Date

Verified By _____ / _____
Craftsman Date

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125-VOLT D.C. D/G BATTERY BANK NO. 1A-A
 Sheet 1 of 2

READINGS TAKEN BY _____ / _____
 Craftsman Date

VERIFIED BY _____ / _____
 Craftsman Date

Connection At Cell Nos.	6.4 Resistance $\mu\Omega$	6.6 (If applicable) Resistance $\mu\Omega$ After Torque Only	6.5 75 in lbs. QC to Verify Torque	6.7.4 (If applicable) Resistance $\mu\Omega$ After Removed and Cleaned	6.7.3 75 in lbs. QC to Verify Torque
Cable & 1(+)					
3 (-)					
4(+)					
6(-)					
7(+)					
9(-)					
10(+)					
12(-)					
13(+)					
15(-)					
16(+)					
18(-)					
19(+)					
21(-)					
22(+)					
24(-)					
25(+)					
Cable & 27(-)					

125-VOLT D.C. D/G BATTERY BANK NO. 1A-A
 Sheet 2 of 2

READINGS TAKEN BY _____ / _____
 Craftsman Date

VERIFIED BY _____ / _____
 Craftsman Date

Connection At Cell Nos.	6.4 Resistance $\mu\Omega$	6.6 (If applicable) Resistance $\mu\Omega$ After Torque Only	6.5 75 in lbs. QC to Verify Torque	6.7.4 (If applicable) Resistance $\mu\Omega$ After Removed and Cleaned	6.7.3 75 in lbs. QC to Verify Torque
Cable & 31(+)					
33(-)					
34(+)					
36(-)					
37(+)					
39(-)					
40(+)					
42(-)					
43(+)					
45(-)					
46(+)					
48(-)					
49(+)					
51(-)					
52(+)					
54(-)					
55(+)					
57(-)					
58(+)					
Cable & 60(-)					

6.4.1 All connections <150 microhms. Acceptable Unacceptable

 Craftsman #1

 Craftsman #2

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125-VOLT D.C. D/G BATTERY BANK NO. 1B-B
 Sheet 1 of 2

READINGS TAKEN BY _____ / _____
 Craftsman Date

VERIFIED BY _____ / _____
 Craftsman Date

Connection At Cell Nos.	6.4 Resistance $\mu\Omega$	6.6 (If applicable) Resistance $\mu\Omega$ After Torque Only	6.5 75 in lbs. QC to Verify Torque	6.7.4 (If applicable) Resistance $\mu\Omega$ After Removed and Cleaned	6.7.3 75 in lbs. QC to Verify Torque
Cable & 1 (+)					
3 (-)					
4(+)					
6(-)					
7(+)					
9(-)					
10(+)					
12(-)					
13(+)					
15(-)					
16(+)					
18(-)					
19(+)					
21(-)					
22(+)					
24(-)					
25(+)					
Cable & 27(-)					

125-VOLT D.C. D/G BATTERY BANK NO. 1B-B
 Sheet 2 of 2

READINGS TAKEN BY _____ /
 Craftsman Date

VERIFIED BY _____ /
 Craftsman Date

Connection At Cell Nos.	6.4 Resistance $\mu\Omega$	6.6 (If applicable) Resistance $\mu\Omega$ After Torque Only	6.5 75 in lbs. QC to Verify Torque	6.7.4 (If applicable) Resistance $\mu\Omega$ After Removed and Cleaned	6.7.3 75 in lbs. QC to Verify Torque
Cable & 31(+)					
33(-)					
34(+)					
36(-)					
37(+)					
39(-)					
40(+)					
42(-)					
43(+)					
45(-)					
46(+)					
48(-)					
49(+)					
51(-)					
52(+)					
54(-)					
55(+)					
57(-)					
58(+)					
Cable & 60(-)					

6.4.1 All connections <150 microhms. Acceptable Unacceptable

 Craftsman #1

 Craftsman #2

125-VOLT D/G BATTERY NO. 2A-A

TVA TAG # _____ CAL. DUE DATE _____

Microhmeter #1 _____

Torque Wrench #1 _____

INITIALS

Craftsman

Craftsman II

Approval to perform this instruction _____ / _____ Date

6.1 Battery rack physical appearance
/___/ Acceptable /___/ Unacceptable

NOTES: _____

6.2 Plate color and growth, cell condition
/___/ Acceptable /___/ Unacceptable

NOTES: _____

6.3 Cell and cell terminal connections
/___/ Acceptable /___/ Unacceptable

NOTES: _____

6.8 Cell post and connectors are coated with
corrosion-inhibiting grease
/___/ Acceptable /___/ Unacceptable

NOTES: _____

6.9 SRO notified instruction complete _____ / _____ Date

Data Taken By _____ / _____ Date
Craftsman

Verified By _____ / _____ Date
Craftsman

125-VOLT D.C. D/G BATTERY BANK NO. 2A-A
 Sheet 1 of 2

READINGS TAKEN BY _____ / _____
 Craftsman Date

VERIFIED BY _____ / _____
 Craftsman Date

Connection At Cell Nos.	6.4 Resistance $\mu\Omega$	6.6 (If applicable) Resistance $\mu\Omega$ After Torque Only	6.5 75 in lbs. QC to Verify Torque	6.7.4 (If applicable) Resistance $\mu\Omega$ After Removed and Cleaned	6.7.3 75 in lbs. QC to Verify Torque
Cable & 1 (+)					
3 (-)					
4(+)					
6(-)					
7(+)					
9(-)					
10(+)					
12(-)					
13(+)					
15(-)					
16(+)					
18(-)					
19(+)					
21(-)					
22(+)					
24(-)					
25(+)					
Cable & 27(-)					

125-VOLT D.C. D/G BATTERY BANK NO. 2A-A
 Sheet 2 of 2

READINGS TAKEN BY _____ / _____
 Craftsman Date

VERIFIED BY _____ / _____
 Craftsman Date

Connection At Cell Nos.	6.4 Resistance $\mu\Omega$	6.6 (If applicable) Resistance $\mu\Omega$ After Torque Only	6.5 75 lbs. QC to Verify Torque	6.7.4 (If applicable) Resistance $\mu\Omega$ After Removed and Cleaned	6.7.3 75 lbs. QC to Verify Torque
Cable & 31(+)					
33(-)					
34(+)					
36(-)					
37(+)					
39(-)					
40(+)					
42(-)					
43(+)					
45(-)					
46(+)					
48(-)					
49(+)					
51(-)					
52(+)					
54(-)					
55(+)					
57(-)					
58(+)					
Cable & 60(-)					

6.4.1 All connections <150 microhms. Acceptable Unacceptable

 Craftsman #1

 Craftsman #2

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125-VOLT D.C. D/G BATTERY BANK NO. 2B-B
 Sheet 1 of 2

READINGS TAKEN BY _____ /
 Craftsman _____ Date _____

VERIFIED BY _____ /
 Craftsman _____ Date _____

Connection At Cell Nos.	6.4 Resistance $\mu\Omega$	6.6 (If applicable) Resistance $\mu\Omega$ After Torque Only	6.5 75 in lbs. QC to Verify Torque	6.7.4 (If applicable) Resistance $\mu\Omega$ After Removed and Cleaned	6.7.3 75 in lbs. QC to Verify Torque
Cable & 1 (+)					
3 (-)					
4(+)					
6(-)					
7(+)					
9(-)					
10(+)					
12(-)					
13(+)					
15(-)					
16(+)					
18(-)					
19(+)					
21(-)					
22(+)					
24(-)					
25(+)					
Cable & 27(-)					

125-VOLT D.C. D/G BATTERY BANK NO. 2B-B
 Sheet 2 of 2

READINGS TAKEN BY _____ / _____
 Craftsman Date

VERIFIED BY _____ / _____
 Craftsman Date

Connection At Cell Nos.	6.4 Resistance $\mu\Omega$	6.6 (If applicable) Resistance $\mu\Omega$ After Torque Only	6.5 75 in lbs. QC to Verify Torque	6.7.4 (If applicable) Resistance $\mu\Omega$ After Removed and Cleaned	6.7.3 75 in lbs. QC to Verify Torque
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42(-)					
43(+)					
45(-)					
46(+)					
48(-)					
49(+)					
51(-)					
52(+)					
54(-)					
55(+)					
57(-)					
58(+)					
Cable & 60(-)					

6.4.1 All connections <150 microhms. Acceptable Unacceptable

 Craftsman #1

 Craftsman #2

6.10 Shift engineer notified of completion.

_____/_____
Craftsman Date

ACCEPTANCE CRITERIA:

7.1, 7.2, 7.3 All acceptance blanks are checked with none unacceptable.

Craftsman #1 Craftsman #2

If not acceptable notify foreman immediately.