

Submitted: \_\_\_\_\_

Approved: \_\_\_\_\_

(Plant Manager)

MC-1

SP Number 34.315.01

Revision 2

Date Eff. 11/23/81

TPC \_\_\_\_\_

TPC \_\_\_\_\_

TPC \_\_\_\_\_

## QUARTERLY STATION BATTERY CHECK - VOLTAGE AND DENSITY - 125V DC

### 1.0 PURPOSE

To provide detailed instruction for station personnel to perform checks on 125V batteries. This procedure meets the requirements of Reference 11.4, and is performed approximately seven days after completion of any equalizing charge.

### 2.0 RESPONSIBILITY

The Maintenance Engineer shall be responsible for the proper implementation of this procedure.

PPF1021.300-6.421

INFORMATION COPY

NOV 19 1981

8303300251 830317  
PDR ADOCK 05000322  
A PDR

### 3.0 DISCUSSION

- 3.1 In the 125V DC system there are three separate safety related subsystems consisting of battery charger, batteries and loads. The batteries are power station type pasted plate, lead-calcium, 60 cell, rated at 2550 ampere hours (8 hour discharge rate). The ampere-hour capacity of each 125 volt DC battery is suitable for supplying all emergency loads for a minimum of 2 hours without the use of battery chargers.
- 3.2 This procedure shall be performed quarterly and approximately 7 days after an equalizing charge.
- 3.3 The following topics are contained in this procedure:
- |               |  |             |
|---------------|--|-------------|
| 8.1           | Test Preparation                           | <u>Page</u> |
| 8.2           | System Measurements                        | 3           |
| 8.3           | Individual Cell Measurements               | 3           |
| 8.4           | Calculations                               | 3           |
|               |  | 4           |
| Appendix 12.1 | Quarterly Station Battery Check Data Sheet |             |
| Appendix 12.2 | Specific Gravity Correction Factors        |             |

### 4.0 PRECAUTIONS

- 4.1 Ensure the battery ventilation system is operable. If ventilation system is inoperable, area shall be checked with a portable hydrogen analyzer per Reference 11.3. No entry should be made into area where hydrogen concentration is greater than 2%.
- 4.2 There shall be no smoking, sparks or open flames permitted in any of the battery rooms. Hydrogen released by the battery is extremely flammable and may explode.
- 4.3 If electrolyte comes in contact with skin or clothing, immediately wash with water and neutralize with a solution of baking soda and water (1 lb./gal.). If the electrolyte comes in contact with the eyes flush with large amounts of clean water, and secure medical treatment immediately.
- 4.4 Promptly neutralize and remove any electrolyte spilled. Use a baking soda/water solution (1 lb./gal.).
- 4.5 Face shield, acid proof gloves and apron shall be worn when working with battery electrolyte.

### 5.0 PREREQUISITES

- 5.1 Local eyewash and shower stations operable
- 5.2 Battery on normal float charge
- 5.3 Test equipment requiring calibration shall not have exceeded its calibration due date

5.4 Float voltage reading 130 Volts minimum

5.5 The Watch Engineer's permission shall be obtained prior to performing this procedure in accordance with Reference 11.2

5.6 Battery temperature and electrolyte measuring equipment shall be clean

#### 6.0 LIMITATIONS AND ACTIONS

6.1 If individual cell temperatures are not within 5' of one another heating and ventilation system shall be adjusted to compensate for imbalance. Temperatures should be rechecked in two hours and if within limits steps 8.2 and 8.3 should be repeated.

#### 7.0 TEST EQUIPMENT

7.1 Voltmeter

7.2 Hydrometer

7.3 Thermometer

7.4 Goggles or Face Shield

7.5 Acid Proof Gloves

7.6 Protective Apron

7.7 Non Metallic Ruler

7.8 Battery Test Lead Extensions (8 ft.)

#### 8.0 PROCEDURE

INITIAL

8.1 Test Preparation

8.1.1 The prerequisites of section 5.0 have been met and the appropriate materials or test equipment in section 7.0 are available.

8.2 System Measurements

Perform and record the following readings on Appendix 12.1

8.2.1 Battery Float Voltage

8.2.2 Battery Charger Current

8.2.3 Battery Room Ambient Temperature

8.3 Individual Cell Measurements

Perform and record the following reading on Appendix 12.1

8.3.1 Electrolyte level of each cell in inches above or below high level mark

8.3.2 Temperature of every sixth cell

8.3.3 Specific gravity of each cell

8.3.4 Voltage of each cell (including intercell connectors)

#### 8.4 Calculations

Calculate the following and record results on Appendix 12.1

8.4.1 Correct individual cell specific gravities by performing the following operations:

8.4.1.1 Determine the applicable specific gravity correction factor from Appendix 12.2 and record on SPF34.315.01-1.

8.4.1.2 Add or subtract the correction factor, as applicable, to determine the corrected specific gravity for each cell and record on SPF34.315.01-1.

8.4.2 Average cell temperature

8.4.3 Average specific gravity

8.4.4 Average cell voltage

#### 9.0 ACCEPTANCE CRITERIA

9.1 Individual cell temperatures within 5°F of one another.

9.2 The Operating Engineer shall be notified that the battery float voltage must be adjusted if any individual cell voltage is less than 2.17 volts or greater than 2.25 volts, or total battery float voltage is less than 130 volts or greater than 135 volts.

9.3 The Operating Engineer shall be notified that an Equalizing Charge must be performed if any one of the following acceptance criteria has not been met:

9.3.1 The corrected specific gravity of each cell is greater than 1.195.

9.3.2 The average corrected specific gravity is no more than .010 below the acceptance test value of (Later).

- 9.3.3 The corrected specific gravity of any cell is no more than .010 below the battery average specific gravity at the time of the inspection.
- 9.3.4 The float voltage for any cell is at least 2.13 volts.
- 9.3.5 The float voltage for any cell is no more than .04 volts above or below the battery average voltage.

#### 10.0 FINAL CONDITONS

- 10.1 All vent covers installed.
- 10.2 All electrolyte test equipment cleaned.
- 10.3 Procedure and data sheets submitted for approval in accordance with Reference 11.2.

#### 11.0 REFERENCES

- 11.1 Gould Company; Lead Acid Storage Batteries; Instruction Manual; File Code G019.180.02.
- 11.2 SP12.016.01 Surveillance Program.
- 11.3 SP27.410.01 HVAC Battery Rooms - Hydrogen Concentration Test
- 11.4 Technical Specifications 5/19/76 4.8.2.3.2b

#### 12.0 APPENDICES

- 12.1 Data Sheet-Quarterly Station Battery Check
- 12.2 Specific Gravity Correction Factors

# DATA SHEET

BATTERY TERMINAL VOLTAGE \_\_\_\_\_

BATTERY FLOAT VOLTAGE \_\_\_\_\_

CURRENT \_\_\_\_\_

41

DATE \_\_\_\_\_ COMPONENT I.D. NUMBER \_\_\_\_\_

CELL NO.	CELL VOLTAGE	UNCORR. SPECIFIC GRAVITY	CELL TEMP. & CORR. FACTOR		CELL LEVEL & CORR. FACTOR		CORRECTED SPECIFIC GRAVITY	CELL NO.	CELL VOLTAGE	UNCORR. SPECIFIC GRAVITY	CELL TEMP. & CORR. FACTOR		CELL LEVEL & CORR. FACTOR		CORRECTED SPECIFIC GRAVITY
			Temp	CF	Level	CF					Temp	CF	Level	CF	
1								31							
2								32							
3								33							
4								34							
5								35							
6								36							
7								37							
8								38							
9								39							
10								40							
11								41							
12								42							
13								43							
14								44							
15								45							
16								46							
17								47							
18								48							
19								49							
20								50							
21								51							
22								52							
23								53							
24								54							
25								55							
26								56							
27								57							
28								58							
29								59							
30								60							

AVERAGE CELL TEMPERATURE \_\_\_\_\_  
 AVERAGE SPECIFIC GRAVITY \_\_\_\_\_  
 AVERAGE CELL VOLTAGE \_\_\_\_\_

COMMENTS: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

THERMOMETER NO. \_\_\_\_\_  
 HYDROMETER NO. \_\_\_\_\_  
 VOLTMETER NO. \_\_\_\_\_

CONDUCTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

MAINTENANCE ENGINEER REVIEW: \_\_\_\_\_ DATE: \_\_\_\_\_



SPECIFIC GRAVITY CORRECTION FACTORS

Cell Temperature (°F)	Specific Gravity Correction Factor
46-48	-.010
49-51	-.009
52-54	-.008
55-57	-.007
58-60	-.006
61-63	-.005
64-66	-.004
67-69	-.003
70-72	-.002
73-75	-.001
76-78	-----
79-81	+.001
82-84	+.002
85-87	+.003
88-90	+.004
91-93	+.005
94-96	+.006
97-99	+.007
100-102	+.008
103-105	+.009
106-108	+.010

Cell Level	Specific Gravity Correction Factors
+1/2	+.012
+15/32	+.011
+7/16	+.011
+13/32	+.010
+3/8	+.009
+11/32	+.008
+5/16	+.008
+9/32	+.007
+1/4	+.006
+7/32	+.005
+3/16	+.005
+5/32	+.004
+1/8	+.003
+3/32	+.002
+1/16	+.002
+1/32	+.001
-----	-----
-1/32	-.001
-1/16	-.002
-3/32	-.002
-1/8	-.003
-5/32	-.004
-3/16	-.005
-7/32	-.005
-1/4	-.006

Cell Level	Specific Gravity Correction Factor
-9/32	-.007
-5/16	-.008
-11/32	-.008
-3/8	-.009
-13/32	-.010
-7/16	-.011
-15/32	-.011
-1/2	-.012
-17/32	-.013
-9/16	-.014
-19/32	-.014
-5/8	-.015
-21/32	-.016
-11/16	-.017
-23/32	-.017
-3/4	-.018
-25/32	-.019
-13/16	-.020
-27/32	-.020
-7/8	-.021
-29/32	-.022
-15/16	-.023
-31/32	-.023
-1	-.024

Enclosure 2  
SNPS SCHEDULED ACTIVITY WORKSHEET  
SURVEILLANCE

Appendix 12.2

\*\*\*\*\*  
\*\*\*\*\*  
NPA37720  
SBRSTS03

ION RE REACTOR ENG

ACTIVITY NO. 4.1.1.A

PROCEDURE NO. 54.001.01

A/I 1

EQUIPMENT NAME REACTIVITY CONTROL SYSTEMS/SHUTDOWN MARGIN LOCATION

ACTIVITY DESCRIPTION SHUTDOWN MARGIN DEMONSTRATION (BY MEASUREMENT)-PRIOR TO OR  
DURING THE FIRST STARTUP AFTER EACH REFUELING

RELATED ACTIVITIES

REFERENCES LCO 3.1.1-SPEC 4.0.2

FREQUENCY R LAST PERFORMED / / DUE / / EXTENSION / /

EST MAY HOURS .0 SKILL

REQUIRED IN CONDITIONS 1 2 3 4 5

MNR REQ'D X NO YES, NO.

RWP REQ'D X NO YES, NO.

PERFORMED IN CONDITIONS 2

SPECIAL REQUIREMENTS WITH SHUTDOWN MARGIN LESS THAN SPECIFIED SEE ACTION STATEM  
ENTS OF LCO 3.1.1

REMARKS THE PROVISIONS OF SPEC 4.0.2 ARE NOT APPLICABLE TO THIS ACTIVITY

TERM TIME, DATE / / W.E. AUTH.

TR ACTION TIME, DATE , / /

COMPLETION INFORMATION

LEADMAN, TIME, DATE , / / TOTAL MANHOURS EXPENDED .

... ACTIVITY COMPLETED BEFORE EXTENSION DATE (CODE 0)  
... ACTIVITY DEFERRED (CODE 1) DEFERRED UNTIL / / CODE -  
... ACTIVITY COMPLETED AFTER EXTENSION DATE (CODE 2)  
... OTHER, DESCRIBE BELOW (CODE 3)

PROBLEMS/COMMENTS

MNR INITIATED, NUMBER

LDR INITIATED, NUMBER

WATCH ENGINEER REVIEW

ACTIVITY RESULTS

ACCEPTABLE

UNACCEPTABLE

SECTION HEAD REVIEW

COMPLIANCE ENGINEER REVIEW

DATA PROCESSING COMPLETE

571.100-6.413

10/26/82



## SNPS SCHEDULE ACTIVITY WORKSHEET

SECTION \_\_\_\_\_

ACTIVITY \_\_\_\_\_

PRIORITY \_\_\_\_\_

ACTIVITY NO. \_\_\_\_\_

PROCEDURE NO. \_\_\_\_\_

EQUIPMENT NAME \_\_\_\_\_

LOCATION \_\_\_\_\_

ACTIVITY DESCRIPTION \_\_\_\_\_

RELATED ACTIVITIES \_\_\_\_\_

REFERENCES \_\_\_\_\_

FREQUENCY \_\_\_\_\_

LAST PERFORMED / /

DUE / /

EXTENSION / /

EST. MAN HOURS \_\_\_\_\_

SKILL \_\_\_\_\_

CONDITION CODES , , , , ,

MWR REQ'D \_\_\_\_\_

NO. \_\_\_\_\_

RWP REQ'D \_\_\_\_\_

NO. \_\_\_\_\_

W.E. AUTH REQ'D \_\_\_\_\_

SPECIAL REQUIREMENTS \_\_\_\_\_

MWR TIME, DATE / /

W.E. AUTH / /

COMPLETION INFORMATION

LEADMAN, TIME, DATE / /

TOTAL MANHOURS EXPENDED \_\_\_\_\_

... ACTIVITY COMPLETED, EQUIPMENT RETURNED TO NORMAL (CODE 0)

CODE \_\_\_\_\_

... ACTIVITY DEFERRED (CODE 1)

DEFERRED UNTIL / /

... ACTIVITY INCOMPLETE, DESCRIBE REASON (CODE 2)

... ACTIVITY ADVANCED (CODE 3)

ADVANCED TO / /

COMMENTS \_\_\_\_\_

MWR INITIATED, NUMBER \_\_\_\_\_

LDR INITIATED, NUMBER \_\_\_\_\_

WATCH ENGINEER REVIEW / /

SECTION HEAD REVIEW / /

DATA PROCESSING COMPLETE / /

12.015.01-1

DRAFT

# ELECTRICAL POWER SYSTEMS

## 3/4.8.2 D.C. SOURCES

### D.C. SOURCES - OPERATING

#### LIMITING CONDITION FOR OPERATION

3.8.2.1 As a minimum, the following D.C. electrical power sources shall be OPERABLE:

- a. Division 1, consisting of:
  1. 125 volt battery A1.
  2. 125 volt full capacity charger.
- b. Division 2, consisting of:
  1. 125 volt battery B1.
  2. 125 volt full capacity charger.
- c. Division 3, consisting of:
  1. 125 volt battery C1.
  2. 125 volt full capacity charger.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2 and 3.

#### ACTION:

With either Division 1 battery, Division 2 or Division 3 battery and/or charger of the above required D.C. electrical power sources inoperable, restore the inoperable division battery to OPERABLE status within 2 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

#### SURVEILLANCE REQUIREMENTS

4.8.2.1 Each of the above required 125-volt batteries and chargers shall be demonstrated OPERABLE:

- a. At least once per 7 days by verifying that:
  1. The parameters in Table 4.8.2.1-1 meet the Category A limits, and
  2. Total battery terminal voltage is greater than or equal to 129-volts on float charge.
- b. At least once per 92 days and within 7 days after a battery discharge with battery terminal voltage below 110-volts, or battery overcharge with battery terminal voltage above 150-volts, by verifying that:
  1. The parameters in Table 4.8.2.1-1 meet the Category B limits,
  2. There is no visible corrosion at either terminals or connectors, or the connection resistance of these items is less than  $150 \times 10^{-6}$  ohms, and
  3. The average electrolyte temperature of at least ten of connected cells is above 60 F.

## SURVEILLANCE REQUIREMENTS (Continued)

- c. At least once per 18 months by verifying that:
1. The cells, cell plates and battery racks show no visual indication of physical damage or abnormal deterioration,
  2. The cell-to-cell and terminal connections are clean, tight, free of corrosion and coated with anti-corrosion material,
  3. The resistance of each cell-to-cell and terminal connection is less than or equal to  $150 \times 10^{-6}$  ohms, and
  4. The battery charger will supply at least 300 amperes at a minimum of 130 volts for at least 4 hours.
- d. At least once per 18 months, during shutdown, by verifying that either:
1. The battery capacity is adequate to supply and maintain in OPERABLE status all of the actual emergency loads for the design duty cycle when the battery is subjected to a battery service test, or
  2. The battery capacity is adequate to supply a dummy load of the following profile while maintaining the following battery terminal voltage for the indicated time:

Battery	Amperes	Voltage	Time (Minutes)
A1	>700	>114	0-1
	>340	>114	1-119
	>440	>113	119-120
B1	>1074	>113	0-1
	>96	>109.5	1-119
	>213	>109.5	119-120
C1	>740	>107.5	0-1
	>560	>107.5	1-120

- e. At least once per 60 months during shutdown by verifying that the battery capacity is at least 80% of the manufacturer's rating when subjected to a performance discharge test. At this once per 60 month interval, this performance discharge test may be performed in lieu of the battery service test.
- f. At least once per 18 months during shutdown performance discharge tests of battery capacity shall be given to any battery that shows signs of degradation or has reached 85% of the service life expected for the application. Degradation is indicated when the battery capacity drops more than 10% of rated capacity from its average on previous performance tests, or is below 90% of the manufacturer's rating.

TABLE 4.8.2.1-1

## BATTERY SURVEILLANCE REQUIREMENTS

Parameter	CATEGORY A <sup>(1)</sup>	CATEGORY B <sup>(2)</sup>	
	Limits for each designated pilot cell	Limits for each connected cell	Allowable <sup>(3)</sup> value of each connected cell
Electrolyte Level	>Minimum level indication mark, and $\leq \frac{1}{4}$ " above maximum level indication mark	>Minimum level indication mark, and $\leq \frac{1}{4}$ " above maximum level indication mark	Above top of plates, and not overflowing
Float Voltage	$\geq 2.13$ volts	$\geq 2.13^{(c)}$	$> 2.07$ volts
Specific Gravity <sup>(a)</sup>	$\geq 1.200^{(b)}$	$\geq 1.195$ Average of all connected cells $> 1.205$	Not more than 0.020 below the average of all connected cells Average of all connected cells $\geq 1.195^{(b)}$

(a) Corrected for electrolyte temperature and level.

(b) Or battery charging current is less than 2 amperes when on float charge.

(c) May be corrected for average electrolyte temperature.

(1) For any Category A parameter(s) outside the limit(s) shown, the battery may be considered OPERABLE provided that within 24 hours all the Category B measurements are taken and found to be within their allowable values, and provided all Category A and B parameter(s) are restored to within limits within the next 6 days.

(2) For any Category B parameter(s) outside the limit(s) shown, the battery may be considered OPERABLE provided that the Category B parameters are within their allowable values and provided the Category B parameter(s) are restored to within limits within 7 days.

(3) Any Category B parameter not within its allowable value indicates an inoperable battery.

C. SOURCES - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.8.2.2- As a minimum, two of the following three divisions of the D.C. electrical power sources system shall be OPERABLE with:

- a. Division 1, consisting of:
  - 1. 125 volt battery A1.
  - 2. 125 volt charger.
- b. Division 2, consisting of:
  - 1. 125 volt battery B1.
  - 2. 125 volt charger.
- c. Division 3, consisting of:
  - 1. 125 volt battery C1.
  - 2. 125 volt charger C1.

APPLICABILITY: OPERATIONAL CONDITIONS 4, 5 and \*.

ACTION:

- a. With two or more of the Division 1, Division 2 and Division 3 batteries and/or chargers of the above required D.C. electrical power sources inoperable, suspend CORE ALTERATIONS, handling of irradiated fuel in the secondary containment and operations with a potential for draining the reactor vessel.
- b. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.8.2.2 At least the above required 125 volt batteries and charger shall be demonstrated OPERABLE per Surveillance Requirement 4.8.2.1.

\*When handling irradiated fuel in the secondary containment.