FPL.

APR 3 0 2012

L-2012-191
10 CFR 50.90

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555-0001

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Responses to Requests for Additional Information Related to LAR 210, DC Sources

References:

1) Florida Power & Light Company to U.S. Nuclear Regulatory Commission, "Proposed Change to Turkey Point Technical Specifications Regarding D.C. Sources Surveillance Requirements Revised License Amendment Request (LAR) No. 210," dated August 10, 2011 (NRC Accession No. ML11227A006).
2) E-Mail U.S. Nuclear Regulatory Commission (J. Paige) to Florida Power & Light Company (B. Tomonto, O. Hanek), "Turkey Point Units 3 and 4 - DC Sources LAR - Request for Additional Information (ME6859/60)," dated March 5, 2012 (NRC Accession No. ML12065A296).

By letter dated August 10, 2011 (Reference 1), Florida Power & Light Company requested a License Amendment to Renewed Facility Operating Licenses DPR-31 and DPR-41 for Turkey Point Units 3 and 4. The proposed License Amendment would revise the Turkey Point Units 3 and 4 Technical Specification Surveillance Requirement 4.8.2.1 pertaining to periodic verification of battery bank capacity and intercell and connection resistance. By Reference 2 the NRC requested additional information related to the review of this proposed License Amendment. The response to this request is provided in the Enclosure to this letter.

The response does not alter the conclusion of the No Significant Hazards Consideration or environmental assessment as provided in Reference 1.

This response does not contain any new commitments and does not revise any existing commitments.

A001
NRR

Florida Power & Light Company

9760 SW 344th St., Homestead, FL 33035

If you have any questions, please contact Mr. Robert Tomonto, Licensing Manager, at (305) 426-7327.

I declare under the penalty of perjury that the foregoing is true and correct.

Executed April / 30 / 2012.

Very truly yours,

Michael W. Kiley
Vice President, Turkey Point Nuclear Generating Station

Enclosure

cc: Regional Administrator, Region II, USNRC
USNRC Project Manager, Turkey Point Nuclear Plant
Senior Resident Inspector, USNRC, Turkey Point Nuclear Plant
Mr. W. A. Passetti, Florida Department of Health

ENCLOSURE

Response to Request for Additional Information
Related to LAR 210, DC Sources

NRC RAI No. 1

In the license amendment request (LAR), the licensee stated that each battery is sized to provide power to its loads for two hours during a design basis accident concurrent with a Loss of Offsite Power (LOOP) without terminal voltage falling below the required voltage. The capability of the safety-related batteries to provide required power is demonstrated by the performance of 30 minute service and 2 hours performance tests. The 30 minute service testing time is based on the time required to manually load a charger during a station blackout event.

According to NRC Standard TS NUREG-1431, Section 3.8.4, the service test should cover the design duty cycle. Since, the battery is sized for two hours duration to ensure continued operation of equipment following a design basis accident concurrent with a LOOP, the staff position is that the service test is required to be performed for two hours to demonstrate that the design duty cycle can be met consistent with the intent of the TS. The licensee should either demonstrate that 30 minute station blackout duty cycle loads are more conservative than the two hours design basis duty cycle loads or modify the service test duration to two hours to the meet the intent of the TS. The modification should include revision to the UFSAR [Updated Final Safety Analysis Report] and TS Bases.

FPL Response:

Turkey Point Units 3 and 4 are not licensed to NRC Standard Technical Specification NUREG-1431. The current Turkey Point Units 3 and 4 battery Technical Specifications (TS) do not include a stated / specified service testing time period requirement. The service testing time of 30 minutes was conservatively based on the time require to load a battery charger during a station blackout (SBO) event. The SBO loading is basically the same as would be seen during the first 30 minutes of the two hour loading period. SBO is the only design basis accident condition in which operating on the battery for any length of time is a requirement. For all other design basis accident conditions redundancy and single failure criteria ensures that a battery charger is available to power the DC busses. For a Loss of Offsite Power event, battery chargers are loaded onto the Emergency Diesel Generators within 16.5 seconds and considering any single failure. By design, the batteries are only supplying the load for 16.5 seconds. Thus, the SBO 30 minute time period is the longest period the batteries would be required to support mitigation activities for a design basis accident.

The capability of the vital AC/DC system to provide power to at least one Auxiliary Feedwater Pump System pump train for at least two hours during loss of all offsite and onsite AC power is the result of a response to a post-TMI item (Florida Power & Light Company to U.S. Nuclear Regulatory Commission, Letter L-79-354, "Auxiliary Feedwater System," dated December 20, 1979). This was a requirement to perform an analysis only, since it was not associated with or required by any design basis accident scenario. Thus, the 30 minute SBO battery service test validates the battery's capability for the longest required battery operating period to support a design basis accident scenario.

NRC RAI No. 2

In the LAR, the licensee stated that the requested TS SR revised battery cell connection resistance values are based on past battery surveillances measured resistance values for clean, tight battery cell connections plus a small margin (5 to 7 micro-ohms, approximately 20%). Provide the results of at least two past battery surveillances showing the measured resistance values.

FPL Response:

Attachment 3 of Procedure 0-SME-003.04 provides the as found measured resistance values for recent surveillances of safety related Batteries 4B, 3B, 4A and 3A. Attachment 2 of Procedure 0-SME-003.04 identifies the acceptance criteria and is also provided. All measured resistance values are within the acceptance criteria. (See Attachment 1 of this Enclosure)

Battery	Work Order	Date	Surveillance
4B (4D03)	40058622-1	10/06/2011	0-SME-003.04 Attachment 3
3B (3D24)	40084961-1	10/25/2011	0-SME-003.04 Attachment 3
4A (4D24)	39005472-1	2/08/2010	0-SME-003.04 Attachment 3
3A (3D03)	40081837-1	6/21/2010	0-SME-003.04 Attachment 3

NRC RAI No. 3

In the LAR, the licensee stated that the TS SR total battery connection resistance limit, derived from the summation of the individual battery inter-cell and transition connections resistance values for the respective battery, is enveloped by the battery load and voltage calculation.

Provide the excerpt from the battery load and voltage calculation which shows the total battery connection resistance limit considered in the calculation.

FPL Response:

The following excerpt is from Calculation PTN-BFJE-94-002 Rev. 7 Pages 5 and 6 which shows the total battery connection resistance limit is considered in the calculation

"3.2.5 Battery Inter-cell Connections

The battery vendor (GNB) performance data (fan curves) accounts for inter-cell connector resistance (i.e. cells are connected in series during testing), but the inter-cell connector resistance is not recorded during the testing (Ref, CR 2008-26488). This calculation conservatively assumes that the vendor inter-cell connections during testing are equivalent to the baseline resistance value for a new, clean, just torque connection established in PTN battery Procedures 0-SME-003.3 and 003.15. Thus only the margin in the Maintenance Limit Allowable Value that is above the baseline inter-cell connection values are considered not accounted for by the battery performance data fan curves and are being included in the calculation.

Battery Inter-cell Connection additional resistance included in the calculation:

NCN-17 Baseline Connections	5 μ-ohms
NCN-17 Transverse Brace	5 μ-ohms
Cable Transition Connections (2)	125 μ-ohms
57 x 5 μ-ohms + 2 x 125 μ-ohms =	535 μ-ohms

540 μ-ohms of resistance added for battery Inter-cell connections

NCN-25/27 Baseline (40)	6 μ-ohms
NCN-25/27 Transverse Brace (16)	7 μ-ohms
Cable Transition Connections (3)	125 μ-ohms

40x 6 μ-ohms + 16 x7 μ-ohms + 3 μ-ohms x 125 = 727 μ-ohms

730 μ-ohms of resistance added for battery Inter-cell connections"

NRC RAI No. 4

In the LAR, the licensee stated that the vendor's typical expected battery life curve indicates a 100% battery capacity over the initial 14 years.

Provide the basis and any supporting documents to confirm the above statement.

FPL Response:

The "Typical Expected Battery Life" curve provided by Gould Inc. in 1975 (Attachment 3 to calculation PTN-BFJE-94-002 Rev.5 (See Attachment 2 of this Enclosure)) shows a battery capacity of 100% up to 14 years. From the 14 year mark the capacity of the batteries drop off steadily to approximately 80% capacity at the 20 year mark. Therefore, if a battery is expected to operate for a 20 year time period, then the battery would be designed with an Aging Factor of 1.25 (1 / 1.25 = .80) which would ensure that the battery would still cover 100% of the load after 20 years.

Note: The Aging Factor essentially sizes the battery a percentage higher than the required load of the system. Therefore, a 1.25 Aging Factor will initially size the battery to 120% of the required load.

NRC RAI No. 5

In the LAR, the licensee stated that an aging factor of 1.15 (115%) essentially reduces the battery service life to 18.6 years during which time the battery would have sufficient capacity to provide 100% of the power requirements for the design load.

Provide the basis and summary of the supporting calculation to confirm the above statement.

FPL Response:

With an Aging Factor of 1.15 (1 / 1.15 = .867) the battery would degrade to 100% of the load after 18.6 years. This can also be seen on the "Typical Expected Battery Life" graph. With 100% of the designed load being at 86.7% of the battery capacity, the battery will only be able to supply the full load for 18.6 years. After this time period the capacity of the battery would no longer be capable of providing 100% of the load. (See Attachment 2 of this Enclosure)

Note: The ETAP program permits entry of an Aging Factor other than 1.25 into the analysis. Therefore, when performing the calculation the Aging Factor can be reduced. For a given Aging Factor the program will calculate the required positive plates for the design load. The program then determines the battery discharge voltages based on the battery's end of life capacity (100% design load / 18.6 years). (Page 15 and 16 of Calculation PTN-BFJE-94-002 Rev.7) (See Attachment 3 of this Enclosure)

ATTACHMENT 1

Battery Surveillances Showing the Measured Resistance Values
(11 pages)

FPL	TURKEY POINT PLANT SURVEILLANCE MAINTENANCE PROCEDURE SAFETY RELATED REFERENCE USE	Procedure No. 0-SME-003.04 Revision No. 0

Title:

125VDC STATION BATTERY REFUELING INTERVAL MAINTENANCE

Responsible Department: **ELECTRICAL MAINTENANCE**

Special Considerations:

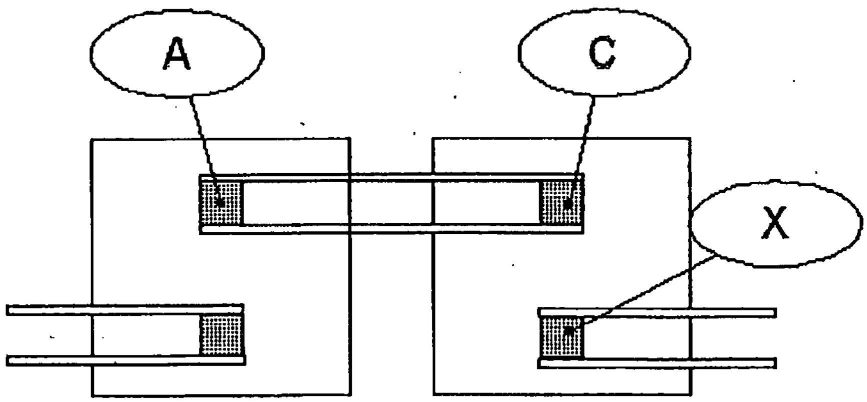
> This is an Upgraded Procedure. Initial use should include increased awareness because of potential technical and/or sequential changes to the procedure. After initial use of this procedure, provide comments back to the Procedure Upgrade Project.

FOR INFORMATION ONLY
Before use, verify revision and change documentation (if applicable) with a controlled index or document.
DATE VERIFIED 10/4/2011 INITIAL [signature]
10/4/2011 [initials]

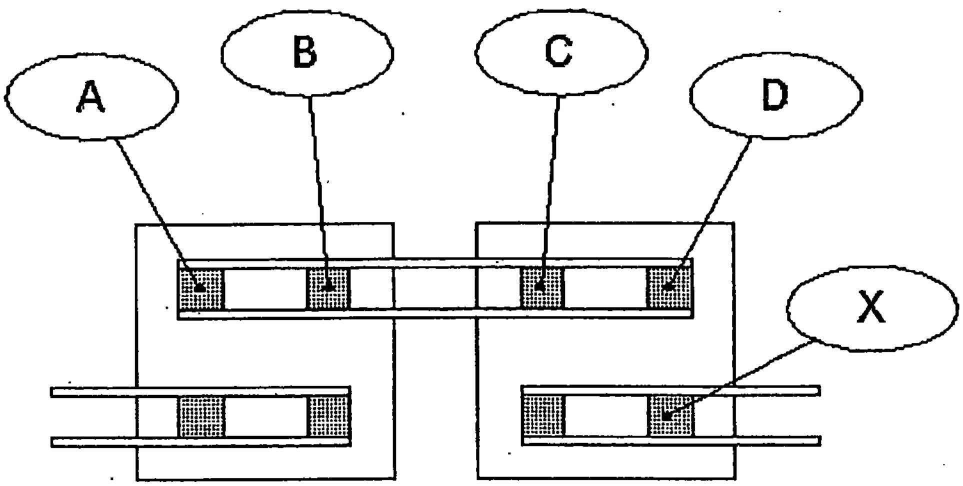
Revision	Approved By	Approval Date		
			UNIT #	
			DATE	
			DOCT	PROCEDURE
0	Lanny Smith	07/26/11	DOCN	0-SME-003.04
			SYS	
			STATUS	COMPLETED
			REV	0
			# OF PGS	

REVISION NO.: 0	PROCEDURE TITLE: 125VDC STATION BATTERY REFUELING INTERVAL MAINTENANCE	PAGE: 76 of 114
PROCEDURE NO.: 0-SME-003.04	TURKEY POINT PLANT	

ATTACHMENT 2
Cell Interconnection Resistance And Voltage Readings
(Page 1 of 2)



2 Post Batteries
Measure and record voltage from A to X
Measure and record resistance from A to C.



4 post batteries
Measure and record voltage from A to X OR B to X
Measure and record resistance from A to C.
Measure and record resistance from B to D.

ATTACHMENT 2
Cell Interconnection Resistance And Voltage Readings
(Page 2 of 2)

Base line is resistance expected on new, clean, just torqued, connections.

Maintenance limit is based on plus 20% or plus 5 μ-ohms, which ever is greater.

NOTE

- The transverse braces run front to back on the lower tier of two level racks. To accommodate this brace, longer intercell connectors are used at these locations.
- Transition Cables - cables that run between racks or tiers to connect cells.

Maintenance Level Acceptance Criteria for intercell connectors.

Application	Construction	Baseline	Maintenance Limit Acceptance Criteria
NCN-17	2-1/4" x 7.88" OR 4-1/8" x 7.88"	19 to 24	29
NCN-17 Transverse brace	2-1/4" x 8.38"	20 to 25	30
NCN-25/27	2-1/4" x 7.88"	24 to 29	35
NCN-25/27 Transverse brace	2-1/4" x 8.38"	28 to 33	40
NCN-17/25/27 Transition Cables	N/A	N/A	125

All readings are μ-ohms

Letter L-2012-191
Attachment 1
Page 4 of 11

EC 275971 Rev. 0
PTN-ENG-SEES-12-019 Rev 0
Attachment 1
Page 4 of 11

Facility	:	PTN TURKEY POINT
Planner	:	BXV02T7 VIDAL BRIAN A
Task Title	:	T.S. 4B BATT. SERVICE FACTOR TEST
Task Dspln	:	ELEC
Priority	:	D

UNIT 04

Work Order Package
40058622 01
DUPLICATE

Ref :
Page : 1

W/O Title : T.S. 4B BATT. 18MO SERVICE FACTOR P003E169

W/O Dspln : ELEC W/O Type: PM

4005862201

PM Frequency	:	72W
PM UOM	:	
PM Due Date	:	07/12/11
Scheduled Date	:	10/05/11
PM Credit	:	Y
Compliance Credit	:	Y

FPL

Report : TIPMC11
Date Printed : 10/04/11

Work Order Task Written To

Facility : PTN Unit : 04 Sys/Cls : 003 Job Type : PM
Equipment : BA 4D03 Component :
Name : 125 VDC 1800 AMP/HR (4B) STATION BATTERY
Equip Tag : 4D03 Alt :
Work Item : Eqt. List :
UTC : Catalog Id : UCR : ALL
TPFS 4003-BB03 Outage : Work Week :
Bldg: Rm: Elev: Location: 346 - BATTERY ROOM
CC: Activity: %: 100 Acct: 5400100 Project: 006030001012

Critical Aspects

FID - 1 **SUB-FID - N1PNO1** **WARM - MED**

WO COLOR - GREEN

Unit 4

EOOS ENTRY 003
SYS#

Authorization/Approval ***Signature/DateTime***

Supv Approval to Start Work	[signature]	10/4/11	0900
SRO Approval to Start Work	[signature]	10/04/11	1236
Supv Review of Work Compl	[signature]	10/14/11	1000
PMT Complete	[signature]	10/14/11	1700
SRO Approval of Completion	[signature]	10/14/11	1806

REVISION NO.: 0	PROCEDURE TITLE: 125VDC STATION BATTERY REFUELING INTERVAL MAINTENANCE	PAGE: 78 of 114
PROCEDURE NO.: 0-SME-003.04	TURKEY POINT PLANT	

ATTACHMENT 3
Connection Resistance Data
(Page 1 of 1)

INTERCELL CONNECT ID	Less Than Maintenance Limit	INTERCELL CONNECT ID	Less Than Maintenance Limit
Bus-1	11	30-31	47 CABLE
1-2	22	31-32	21
2-3	22	32-33	20
3-4	21	33-34	21
4-5	20	34-35	20
5-6	21	35-36	19
6-7	20	36-37	19
7-8	20	37-38	19
8-9	22	38-39	20
9-10	23	39-40	18
10-11	21	40-41	18
11-12	21	41-42	15
12-13	19	42-43	19
13-14	21	43-44	17
14-15	22	44-45	19
15-16	57 CABLE	45-46	51 CABLE
16-17	21	46-47	18
17-18	19	47-48	19
18-19	17	48-49	17
19-20	18	49-50	19
20-21	18	50-51	16
21-22	17	51-52	16
22-23	18	52-53	17
23-24	17	53-54	18
24-25	19	54-55	14
25-26	20	55-56	18
26-27	19	56-57	17
27-28	19	57-58	15
28-29	17	58-59	15
29-30	19	59-60	18
		60 Bus	6

Date 10/6/2011

Battery ID 4B

NCN-25

Facility	: PTN TURKEY POINT
Planner	: N363809 BAUGHER DANIEL A
Task Title	: T.S. 3D24 3B BATT. SERVICE FACTOR TEST
Task Dspln	: ELEC
Priority	: C

UNIT 03

Work Order Package
40084961 01
MASTER

Ref :
Page : 1

W/O Title : T.S. 3B BATT. 18MO SERVICE FACTOR TEST

W/O Dspln : ELEC W/O Type: PM

4008496101

PM Frequency	: 72W
PM UOM	:
PM Due Date	: 11/25/11
Scheduled Date	: 10/26/11
PM Credit	: Y
Compliance Credit	: Y

FPL

Report : TIPMC11
Date Printed : 09/29/11

Work Order Task Written To

Facility : PTN	Unit : 03	Sys/Cls : 003	Job Type : TS
Equipment : BA	3D24	Component :	
Name : 125 VDC 1200 AMP/HR (3B) STATION BATTERY			
Equip Tag : 3D24		Alt :	
Work Item :		Eqt. List :	
UTC :		Catalog Id :	UCR : ALL
TPFS 3003-BB24		Outage :	Work Week :
Bldg: Rm:	Elev:	Location: 347 - CONTROL ROOM INVERTER	
CC:	Activity:	%: 100 Acct: 5400100	Project: 006030001012

ECO: 3-ONLINE 2011
3-003-3B BATT PM

Critical Aspects

TECH SPEC **FID - 1** **SUB-FID - N1PNO1**

Unit 3

EOOS ENTRY 03 SYS#

Authorization/Approval ***Signature/DateTime***

Supv Approval to Start Work	[signature] 10-24-11 @ 0930
SRO Approval to Start Work	[signature] 10/25/11 1824
Supv Review of Work Compl	(1) [signature] 11/2/11 1200
PMT Complete	[signature] 11/2/11 1200
SRO Approval of Completion	[signature] 11/3/11 1241

Note (1) - Work accomplished under W/O 40079103-01. [initials] 11-2-11

REVISION NO.: 0	PROCEDURE TITLE: 125VDC STATION BATTERY REFUELING INTERVAL MAINTENANCE	PAGE: 78 of 114
PROCEDURE NO.: 0-SME-003.04	TURKEY POINT PLANT	

ATTACHMENT 3
Connection Resistance Data
(Page 1 of 1)

INTERCELL CONNECT ID	Less Than Maintenance Limit	INTERCELL CONNECT ID	Less Than Maintenance Limit
Bus-1	22 u	30-31	20 u
1-2	24 u	31-32	22 u
2-3	23 u	32-33	20 u
3-4	22 u	33-34	22 u
4-5	24 u	34-35	24 u
5-6	20 u	35-36	28 u
6-7	21 u	36-37	21 u
7-8	20 u	37-38	28 u
8-9	19 u	38-39	20 u
9-10	19 u	39-40	19 u
10-11	21 u	CA 40-41	104 u
11-12	20 u	41-42	27 u
12-13	23 u	42-43	23 u
13-14	22 u	43-44	20 u
14-15	28 u	44-45	25 u
15-16	20 u	45-46	18 u
16-17	23 u	46-47	21 u
17-18	23 u	47-48	23 u
18-19	24 u	48-49	21 u
19-20	27 u	49-50	22 u
CA 20-21	115 u	50-51	19 u
21-22	29 u	51-52	18 u
22-23	22 u	52-53	17 u
23-24	22 u	53-54	29 u
24-25	23 u	54-55	15 u
25-26	23 u	55-56	19 u
26-27	19 u	56-57	19 u
27-28	24 u	57-58	19 u
28-29	25 u	58-59	21 u
29-30	22 u	59-60	23 u
		60 Bus	16 u

Date 10/25/11

Battery ID 3B

NCN-17

Component: 4D24 Sys: 003 Train: A
Associate: Assign Priority: D
Name: 125 VDC 1200 AMP/HR (4A) STATIO Work Type: 7
N BATTERY
Location: CONTROL ROOM INVERTER ROOM LMD 3

Defect/Request: T.S. 4A BATT. 18MO SERVICE FACTOR T
EST

Fac: PTN Unit: 04
MASTER
WORK ORDER TASK

39005472 01

ER/PWO: 64 / 8228
Chg Loc: 914
PAGE 1 of 5

Detailed Explanation:
PM ID: P003E175
DUE BY DT: 09/21/09 EARLY DT: / / LATE DT: / /

More:

Work Request: Def Tag: Loc:
Trbl/Brkdown: LCO: Unit Cond Req:
NPRDS: Y Fail Date: Time: Det: Stat: Symp:
Originator: Date: Dept:
Approve By: Date:

Task Determination Data:		STP NUMBER	: STP0355		
IST Required	: N	NCR/CR	: N/A	Safety Class	: SR
PMT Required	: Y	PCM	:	Q Group	: N/A
10 CFR 50.49	: N	EQ Doc Pkg	: N/A	Assign To	: 2
Reg Guide 1.97	: N	Seismic Cat	: N	Est M/H	: 94.00
ASME XI(ISI) Reqd	: N	Work/Rig Scaf	: N	Crew Qty	: 2
Security Clearance	: N	Fire Prot Req	: Y	Insul/Coat	: N
Clearance Required	: Y	Clearance No	: 4-10-01-007	Tech Spec	: Y
RWP Required: N RWP No:		RCA M/H: L1:		L2:	L3:

QC Requirements: QC Required : E

More: Y

Work Order Task Description:

PERMISSION FOR PRE-STAGING, SHOP WORK, PRE-FAB AND PARTS PROCUREMENT ONLY! Pre-clearance Inspections only!

NPS/SRO DESIGNEE	DATE/TIME
[signature]	2/1/10 0910

EOOS ENTRY 003 SYS #

SEE PAGE 2 FOR TASK DESCRIPTION.

More:

Planned By : HRC0QT9 CHICUEN H Date: 07/20/09
Pkg Appr By : MWG0W16 Goostree M W Date: 07/20/09 Time: 08:15
QC Approval : QC REVIEW NOT REQUIRED Date: ________

********************** OPERATIONS APPROVAL TO START **********************
* NPS Start Permission: [signature] 2/3/10 LCO(Y/N): N *
* Start Date/Time : 2/9/10 / 0301 *
* EOOS Entry(Y/N): Y Sys #: 003 *
****

Reviewed for operability SAT 2/15/10 2110

NPS Completion Notif: [signature] Major Failure: ____
Compl. Date/Time: 2100 Major Action : ____
Deficiency Tag Removed (Y/N) ____ EOOS Signed Complete-initial-: [initials]

Procedure No.:	Procedure Title:	Page:
0-SME-003.4	125VDC Station Battery Refueling Interval Maintenance	93
		Approval Date: 6/16/09

NCH-17

ATTACHMENT 10
(Page 4 of 30)

DATA SHEET

Date 02-08-10
Battery ID 4D24
4A

Table 3

INTERCELL CONNECT ID	Less Than Maintenance Limit (Att. 4, Pg 2) As Found 6.3.2	INTERCELL CONNECT ID	Less Than Maintenance Limit (Att. 4, Pg 2) As Found 6.3.2
Bus-1	13	30-31	24
1-2	25	31-32	25
2-3	26	32-33	26
3-4	26	33-34	27
4-5	25	34-35	25
5-6	28	35-36	25
6-7	27	36-37	25
7-8	25	37-38	24
8-9	26	38-39	24
9-10	26	39-40	26
10-11	24	40-41	105
11-12	25	41-42	23
12-13	25	42-43	27
13-14	28	43-44	24
14-15	24	44-45	19
15-16	25	45-46	26
16-17	24	46-47	26
17-18	24	47-48	28
18-19	25	48-49	23
19-20	27	49-50	25
20-21	112	50-51	24
21-22	25	51-52	26
22-23	25	52-53	24
23-24	26	53-54	25
24-25	25	54-55	26
25-26	26	55-56	23
26-27	25	56-57	26
27-28	25	57-58	24
28-29	24	58-59	17
29-30	25	59-60	26
		60 Bus	18

Taken By: R. E. Esteva Date: Feb. 8, 2010

Facility	: PTN TURKEY POINT
Planner	: N363809 BAUGHER DANIEL A
Task Title	: T.S. 3A BATT. SERVICE FACTOR TEST
Task Dspln	: ELEC
Priority	: D

UNIT 03

Work Order Package
40081837 01
DUPLICATE
Ref :
Page : 1

W/O Title : T.S. 3A BATT. 18MO SERVICE FACTOR TEST

W/O Dspln : ELEC **W/O Type:** PM

4008183701

PM Frequency	: 72W
PM UOM	:
PM Due Date	: 11/08/11
Scheduled Date	: 01/10/12
PM Credit	: Y
Compliance Credit	: Y

FPL

Report : TIPMC11
Date Printed : 01/09/12

Work Order Task Written To

Facility : PTN **Unit** : 03 **Sys/Cls** : 003 **Job Type** : PM
Equipment : BA 3D03 **Component** :
Name : 125 VDC 1800 AMP/HR (3A) STATION BATTERY
Equip Tag : 3D03 **Alt** :
Work Item : **Eqt. List** : 1600008501 000
UTC : **Catalog Id** : **UCR** : ALL
TPFS 3003-AB03 **Outage** : **Work Week** :
Bldg: **Rm:** **Elev:** **Location:** 346 - BATTERY ROOM
CC: **Activity:** **%:** 100 **Acct:** 5400100 **Project:** 006030001012

Unit 3

Critical Aspects

FID - 1 **SUB-FID - N1PNO1** **WO COLOR - GREEN**

Authorization/Approval ***Signature/DateTime***

Supv Approval to Start Work	[signature] 1.9.12 11:35
SRO Approval to Start Work	[signature] 1/9/12 1241
Supv Review of Work Compl	[signature] 2/18/12 1230
PMT Complete	[signature] 2/18/12 1230
SRO Approval of Completion	[signature] 2/18/12 1710

REVISION NO.: 0	PROCEDURE TITLE:	PAGE:
PROCEDURE NO.: 0-SME-003.04	125VDC STATION BATTERY REFUELING INTERVAL MAINTENANCE TURKEY POINT PLANT	78 of 114

NCP-25

ATTACHMENT 3
Connection Resistance Data
(Page 1 of 1)

INTERCELL CONNECT ID	Less Than Maintenance Limit	INTERCELL CONNECT ID	Less Than Maintenance Limit
Bus-1	13 μ	30-31	26 μ
1-2	24 μ	31-32	25 μ
2-3	24 μ	32-33	26 μ
3-4	26 μ	33-34	26 μ
4-5	26	34-35	23 μ
5-6	24	35-36	28 μ
6-7	23	36-37	24 μ
7-8	26	37-38	24 μ
8-9	28	38-39	25 μ
9-10	26	39-40	23 μ
10-11	27	40-41	25 μ
11-12	25	41-42	26 μ
12-13	27	42-43	25 μ
13-14	26	43-44	22 μ
14-15	28	44-45	25 μ
15-16	63 μ CABLE	45-46	64 μ CABLE
16-17	28	46-47	22 μ
17-18	27	47-48	23 μ
18-19	29	48-49	26 μ
19-20	25	49-50	26 μ
20-21	28	50-51	21 μ
21-22	26	51-52	22 μ
22-23	27	52-53	27 μ
23-24	27	53-54	25 μ
24-25	24	54-55	21 μ
25-26	25	55-56	27 μ
26-27	28	56-57	25 μ
27-28	26	57-58	25 μ
28-29	27	58-59	21 μ
29-30	29	59-60	23 μ
		60 Bus	12 μ

Date 1/9/12

Battery ID 3A

See Note (1) page 63

A-C

ATTACHMENT 2

Gould Battery Graph - Percent Capacity verses Years
(1 page)

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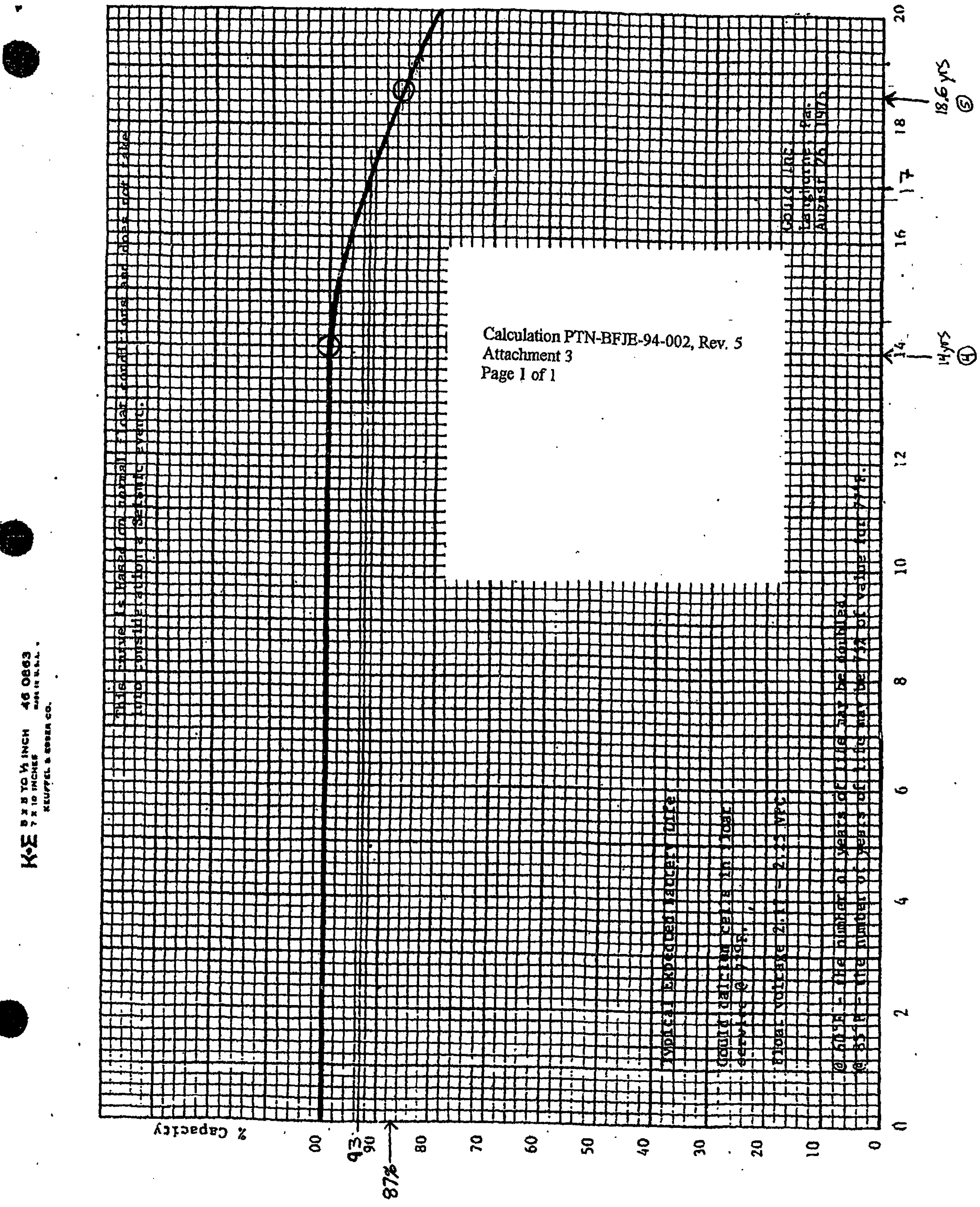

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ATTACHMENT 3

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(2 pages)

5. Analytical Calculation

All Battery Sizing and Discharge computations for this calculation have been performed by the ETAP program. The results are contained in Attachments 7 through 18.

5.1. Battery Sizing

5.1.1. Normal Battery with 60 Cells

Battery sizes were computed for each of the Safety-Related batteries with 60 cells. See Attachments 7 through 10 for ETAP calculations.

Battery	Computed Uncorrected Positive Plates	Aging Factor	Computed Correction Factor	Total Required Positive Plates	Acceptance Criteria (Pos Plates)
3A	7.458	1.25	1.438	10.724	12
3B	4.436	1.25	1.438	6.378	8
4A	4.872	1.25	1.438	7.005	8
4B	8.703	1.19	1.369	11.913	12 *

Table 5.1.1

*Per Reference 2.24, an Aging Factor of 1.19 corresponds to approximately 19.2 years of cell life.

5.1.2. Spare Battery with 60 Cells

Battery sizes were computed for the Safety-Related spare battery when feeding each of the Safety-Related 125V buses (each bus fed individually). See Attachments 15 through 18 for ETAP calculations.

Battery	Computed Uncorrected Positive Plates	Aging Factor	Computed Correction Factor	Total Required Positive Plates	Acceptance Criteria (Pos Plates)
3A	8.388	1.25	1.450	12.162	13
3B	5.177	1.25	1.450	7.505	13
4A	6.582	1.25	1.450	9.542	13
4B	9.563	1.15	1.334	12.756	13 *

Table 5.1.3

*Per Reference 2.24, an Aging Factor of 1.15 corresponds to approximately 18.6 years of cell life.

5.2. Battery Discharge

5.2.1. Normal Battery with 60 Cells

Battery Discharge voltages for each Safety-Related battery with 60 cells are given below. The table includes the calculated minimum battery terminal voltage and the worst-case inverter terminal voltage. The time in which the voltage occurred is identified in minutes after event initiation. See Attachments 11 through 14 for the discharge data.

Device	Voltage	Minute	Acceptance Criteria	Notes
Battery 3A	108.3	119	≥ 105V	Aging factor of 1.25
INV 3Y01	105.4	1	≥ 103V	Aging factor of 1.25
Battery 3B	109.2	1	≥ 105.6V	Aging factor of 1.25
INV 4Y05	105.7	1	≥ 103V	Aging factor of 1.25
Battery 4A	107.0	1	≥ 105V	Aging factor of 1.25
INV 3Y07	104.2	1	≥ 103V	Aging factor of 1.25
Battery 4B	105.3	119	≥ 105V	Aging factor of 1.19
INV 4Y02	103.3	119	≥ 103V	Aging factor of 1.19

Table 5.2.1

5.2.2. Spare Battery with 60 Cells

Battery Discharge voltages for the Spare Battery connected to each of the Safety-Related buses with 60 cells are given below. The table includes the calculated minimum battery terminal voltage and the worst-case inverter terminal voltage. The time at which the voltage occurred is identified in minutes after event initiation. See Attachments 11 through 14 for discharge data.

Device	Voltage	Minute	Acceptance Criteria	Notes
Spare for Batt 3A	108.9	1	≥ 108.6V	Aging factor of 1.25
INV 3Y01	104.4	1	≥ 103V	Aging factor of 1.25
Spare for Batt 3B	113.3	1	≥ 108.6V	Aging factor of 1.25
INV 4Y05	109.2	1	≥ 103V	Aging factor of 1.25
Spare for Batt 4A	111.2	1	≥ 108.6V	Aging factor of 1.25
INV 3Y07	107.1	1	≥ 103V	Aging factor of 1.25
Spare for Batt 4B	108.7	119	≥ 108.6V	Aging factor of 1.15
INV 4Y02	105.7	1	≥ 103V	Aging factor of 1.15

Table 5.2.3

5.3. Battery Charger Sizing

There are two battery chargers per Safety-Related bus. The current rating of each battery charger supporting buses 3D01/3D01A (Battery 3A) and 4D01/4D01A (Battery 4B) is 400A (Reference 2.6.9). Each battery charger supporting buses 3D23/3D23A (Battery 3B) and 4D23/4D23A (Battery 4A) has a rating of 300A. For the 400A chargers, each bus will be analyzed separately. For the 300A chargers, an enveloping battery charger analysis is completed.

5.3.1. Chargers supporting 3D01/3D01A (Battery 3A)

Load current values for each time period are taken from Attachment 5. Attachment 5 values are used in lieu of the ETAP output reports in Attachment 7, as ETAP-computed currents contain adjustments for voltage. This load profile will be used to evaluate the two 400A battery chargers (Reference 2.6.9) connected to 3D01/3D01A.

Based on the load profile in Attachment 5, the AH are calculated as follows: