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THREE MILE ISLAND NUCLEAR STATION

UNIT #2 SURVEILLANCE PROCEDURE 2301-W1

WEEKLY SURVEILLANCE CHECKS

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Unit 1 Staff Recommends Approval

Approval _____ Date _____
Cognizant Dept. Head

Unit 2 Staff Recommends Approval

Approval _____ Date _____
Cognizant Dept. Head

Unit 1 PORC Recommends Approval

_____ Date _____
Chairman of PORC

Unit 2 PORC Recommends Approval

J F Hilbish Date 12/21/78
V. Chairman of PORC

Unit 1 Superintendent Approval

_____ Date _____

Unit 2 Superintendent Approval

J B Logan Date 12/23/78

Manager Generation Quality Assurance Approval _____ Date _____

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THREE MILE ISLAND NUCLEAR STATION

UNIT #2 SURVEILLANCE PROCEDURE 2301-W1

WEEKLY SURVEILLANCE CHECKS

1.0 PURPOSE

1.1 To perform the required WEEKLY Surveillance Checks in compliance with the TMI Unit 2 Technical Specifications.

2.0 MODE/FREQUENCY REQUIREMENTS

2.1 Refer to applicable attachment Mode requirements for a given surveillance item.

3.0 LIMITS AND PRECAUTIONS

3.1 Surveillance requirements are listed with the appropriate items on data sheet attachments to to this procedure. Follow up each item not meeting requirements by referring to applicable Tech Spec ACTION number.

5.0 ATTACHMENTS

5.1 Enclosures:

1. ONSITE/OFFSITE DISTRIBUTION SYSTEM LINEUP.
2. 4160/480 VOLT BUS LINEUP.
3. 120 VAC VITAL BUS LINEUP.
4. 250/125 VDC BUS LINEUP.
5. REACTIVITY CONTROL SYSTEM CHECKS.
6. RB PURGE AND EXHAUST ISOLATION SYSTEM TEST.

5.2 Appendix

A. Incore Monitoring Instrumentation Weekly Checks.

5.3 Figures

1. Boric Acid mix tank - Level/Vol. vs. Boron concentration.
2. Minimum BA Tank Vol. vs. concentration.

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6.0 PROCEDURE:

6.1 Refer to the MODE applicability on each enclosure data sheet when recording data and implementing Tech Spec ACTION requirement.

6.2 Record required data, verifying Tech Spec compliances, per attached enclosure data sheets at least once each seven (7) days.

6.3 Perform Channel Check of Incore Monitoring Instrumentation per Appendix A, (Incore Monitoring Instrumentation Weekly Checks), when Unit is in Mode 1 and >15% RTP.

6.4 Shift Supervisor/Shift Foreman shall review and sign data sheets upon completion of required entries, ensuring compliance of required Tech Spec items.

7.0 ACCEPTANCE CRITERIA

7.1 Readings are acceptable if within normal expected range for various plant conditions.

7.2 Breakers are positioned as required per appropriate data sheets for the applicable Unit Mode.

7.3 Entries are made in the Control Room Operators log of all non-compliance items identifying subsequent followup action.

7.4 All data sheets are completed, as applicable, by the data taken and approved by the Shift Supervisor/Shift Foreman.

ENCLOSURE 1

ONSITE/OFFSITE DISTRIBUTION SYSTEM LINEUP

SURVEILLANCE REQUIREMENT: MODES 5 & 6: One Ckt between the offsite Transmission network and the onsite class 1E Dist. Sys.

MODES 1,2,3,4: All Data Listed

BUSS	BREAKER POS/IND.		AS REQUIRED	AS FOUND
230 KV SUBSTATION BUS #4	2A-1E2	OPEN/GREEN & WHITE	YES	*
	2A-2E2	CLOSED/RED	YES	*
	G22-2E2	CLOSED/RED	YES	
	G22-12	OPEN/GREEN	YES	

BUSS	READING ACTUAL	READING REQ'D
230KV BUS #4 (KV)		≥219

* If any * is No, then all * items (2A-1E2, 2A-2E2, 2B-2E2, and 2B-1E2) must be No to meet Tech Spec in Modes 1,2,3,&4.

PRESENT MODE:

BUSS	BREAKER POS/IND.		AS REQUIRED	AS FOUND
230 KV SUBSTATION BUS #8	2B-1E2	CLOSED/RED	YES	*
	2B-2E2	OPEN/GREEN & WHITE	YES	*
	G2-1E2	CLOSED/RED	YES	*
	G2-12	OPEN/GREEN	YES	

BUSS	READING ACTUAL	READING REQ'D
230 KV BUS #8 (KV)		≥219

3.8.1.1	MODES 1-4 Cond. as Required?	YES - No Followup Action. NO - Followup per T.S. Action No. (YES/NO)	
3.8.1.2	MODES 5,6 Cond. as Required?	YES - No Followup Action NO - Followup per T.S. Action No. (YES/NO)	

Performed By:	Date:	Time:	Approved By:

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ENCLOSURE 2

4160/480 VOLT BUS LINEUP

SURVEILLANCE REQUIREMENT:

Modes 5 & 6: One 4160V EM BUS and one 480V EM BUS. (Left column or Right column).
Modes 1,2,3,4: All Data Listed

PRESENT MODE:

BUSS	BREAKER	POS/IND.	AS REQUIRED	AS FOUND
4160V EM BUS 2-1E & 2-3E	2B-1E2	CLOSED/RED	YES	*
	2A-1E2	WHITE & OPEN/GREEN	YES	*
	T1E-2E2	OPEN/GREEN	YES	
	T1E-3E2	CLOSED/RED	YES	
	T3E-4E2	PTL/GREEN	YES	
	BUS 2-1E Volts		ACTUAL	REQ'D >3675 VAC
	BUS 2-3E Volts			>3675 VAC
480V EM BUS 2-11E, 2-12E & 2-31E	1E-11E2	CLOSED/RED	YES	
	11E-1E2	CLOSED/RED	YES	
	1E-12E2	CLOSED/RED	YES	
	12E-1E2	CLOSED/RED	YES	
	3E-31E2	CLOSED/RED	YES	
	31E-3E2	CLOSED/RED	YES	
	T11E-21E2	PTL/ NO LIGHT	YES	
	T12E-22E2	PTL/ NO LIGHT	YES	
	T31E-41E2	PTL/ NO LIGHT	YES	
	POWER LIGHTS ON:			
	BUS 2-11E		YES	
	BUS 2-12E		YES	
	BUS 2-31E		YES	

*If any * is No, then all * items (2A-1E2, 2A-2E2, WB-1E2, and 2B-2E2) Must be No to meet Tech Spec in Modes 1, 2, 3, and 4.

BUSS	BREAKER	POS/IND.	AS REQUIRED	AS FOUND
4160V EM BUS 2-2E & 2-4E	2B-2E2	WHITE & OPEN/GREEN	YES	*
	2A-2E2	CLOSED/RED	YES	*
	T2E-1E2	OPEN/GREEN	YES	
	T2E-4E2	CLOSED/RED	YES	
	T4E-3E2	PTL/GREEN	YES	
	BUS 2-2E Volts		ACTUAL	REQ'D >3675 VAC
	BUS 2-4E Volts			>3675 VAC
480V EM BUS 2-12E, 2-22E & 2-41E	2E-21E2	CLOSED/RED	YES	
	21E-2E2	CLOSED/RED	YES	
	2E-22E2	CLOSED/RED	YES	
	22E-2E2	CLOSED/RED	YES	
	4E-41E2	CLOSED/RED	YES	
	41E-4E2	CLOSED/RED	YES	
	T21E-11E2	PTL/ NO LIGHT	YES	
	T22E-12E2	PTL/ NO LIGHT	YES	
	T41E-31E2	PTL/ NO LIGHT	YES	
	POWER LIGHTS ON:			
	BUS 2-21E		YES	
	BUS 2-22E		YES	
	BUS 2-41E		YES	

3.8.2.1 Mode 1-4 Cond. as Required?	YES - No Followup Action NO - Followup per T.S. Action No.	(YES/NO)
3.8.2.2 Mode 5&6 Cond. as Required?	YES - No Followup Action NO - Followup per T.S. Action No.	188 332 (YES/NO)

ENCLOSURE 3

120 VAC VITAL BUS LINEUP

SURVEILLANCE REQUIREMENT: MODES 5 & 6: Two 120 VAC VITAL BUSSES (2-1V & 2-3V or 2-2V & 2-4V)
MODES 1,2,3,4: All Data Listed

BUSS	BREAKER POS/IND.	AS REQUIRED	AS FOUND
120 VAC VITAL BUS 2-1V	Inverter 2-1 CLOSED/RED	YES	
	Reg Xfmr 2-1R OPEN/GREEN	YES	
	1DC-VP1 CLOSED/RED	YES	
	Static Sw 2-1V NORMAL	YES	
120 VAC VITAL BUS 2-3V	Inverter 2-3 CLOSED/RED	YES	
	Reg Xfmr 2-3R OPEN/GREEN	YES	
	1DC-VP3 CLOSED/RED	YES	
	Static Sw 2-3V NORMAL	YES	

PRESENT MODE:

BUSS	BREAKER POS/IND.	AS REQUIRED	AS FOUND
120 VAC VITAL BUS 2-2V	Inverter 2-2 CLOSED/RED	YES	
	Reg Xfmr 2-2R OPEN/GREEN	YES	
	2DC-VP2 CLOSED/RED	YES	
	Static Sw 2-2V NORMAL	YES	
120 VAC VITAL BUS 2-4V	Inverter 2-4 CLOSED/RED	YES	
	Reg Xfmr 2-4R OPEN/GREEN	YES	
	2DC-VP4 CLOSED/RED	YES	
	Static Sw 2-4V NORMAL	YES	

3.8.2.1 MODE 1-4 Cond. As Required?	YES - No Followup Action. NO - Follow up Per T.S. ACTION No.	(YES/NO)	
3.8.2.2 MODE 5,6 Cond. As Required?	YES - No Followup Action. NO - Followup per T.S. ACTION No.	(YES/NO)	
PERFORMED BY:	DATE:	TIME:	APPROVED BY:

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ENCLOSURE 4

250/125 VDC BUS LINEUP

SURVEILLANCE REQUIREMENT: MODES 5 & 6: One 250/125 VDC BUS and one 250/125 VDC Battery Bank & Charger.
MODES 1,2,3,4: All Data Listed

BUSS	BREAKER POS/IND.	AS REQUIRED	AS FOUND
	1DC-SB1 CLOSED/RED	YES	
	1DC-12E CLOSED/RED	YES	
	BUS TIE 1DC/2DC OPEN/GREEN	YES	

BUSS	READING ACTUAL	READING REQ'D
2-1DC P-PN (VDC)		≥125
2-1DC PN-N (VDC)		≥125

PRESENT MODE:

BUSS	BREAKER POS/IND.	AS REQUIRED	AS FOUND
	2DC-SB2 CLOSED/RED	YES	
	2DC-22E CLOSED/RED	YES	
	BUS TIE 2DC/1DC OPEN/GREEN	YES	

BUSS	READING ACTUAL	READING REQ'D
2-2DC P-PN (VDC)		≥125
2-2DC PN-N (VDC)		≥125

3.8.2.3	MODE 1-4 Cond. As Required?	YES - No Followup Action. NO - Followup per T.S. ACTION No. (YES/NO)	
3.8.2.4	MODE 5,6 Cond. As Required?	YES - No Followup Action. NO - Followup per T.S. ACTION No. (YES/NO)	

PERFORMED BY:	DATE:	TIME:	APPROVED BY:

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ENCLOSURE 4

250/125 VDC BUS LINEUP

SURVEILLANCE REQUIREMENT: MODES 5 & 6: One 250/125 VDC BUS and one 250/125 VDC Battery Bank & Charger.
MODES 1,2,3,4: All Data Listed

BUSS	BREAKER POS/IND.	AS REQUIRED	AS FOUND
	1DC-SB1 CLOSED/RED	YES	
	1DC-12E CLOSED/RED	YES	
	BUS TIE 1DC/2DC OPEN/GREEN	YES	
	BUSS	READING ACTUAL	READING REQ'D
	2-1DC P-PN (VDC)		≥125
	2-1DC PN-N (VDC)		≥125

PRESENT MODE:

BUSS	BREAKER POS/IND.	AS REQUIRED	AS FOUND
	2DC-SB2 CLOSED/RED	YES	
	2DC-22E CLOSED/RED	YES	
	BUS TIE 2DC/1DC OPEN/GREEN	YES	
	BUSS	READING ACTUAL	READING REQ'D
	2-2DC P-PN (VDC)		≥125
	2-2DC PN-N (VDC)		≥125

3.8.2.3	MODE 1-4 Cond. As Required?	YES - No Followup Action. NO - Followup per T.S. ACTION No. (YES/NO)	
3.8.2.4	MODE 5,6 Cond. As Required?	YES - No Followup Action. NO - Followup per T.S. ACTION No. (YES/NO)	

PERFORMED BY:	DATE:	TIME:	APPROVED BY:

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ENCLOSURE 5
REACTIVITY CONTROL SYSTEM CHECKS

SURVEILLANCE REQUIRED:
MODES 5 & 6: Record either BWST, BAMT, or RBAT Data.
MODES 1,2,3,4: Record BWST and BAMT or RBAT Data.
NOTE: To determine whether the BAMT or RBAT is being used as a source of Boron, see 2301-M2. NA the tank not being used.

TS ACTION #	DESCRIPTION	BORATED WATER STORAGE TANK ACTUAL	BORATED WATER STORAGE TANK REQUIRED	BORIC ACID MIX TANK ACTUAL	BORIC ACID MIX TANK REQUIRED	PRESENT MODE: RECLAIMED BORIC ACID TANK ACTUAL	RECLAIMED BORIC ACID TANK REQUIRED
3.1.2.1 3.1.2.2	Heat traced pipe		Energized		Energized		Energized
3.1.2.8 3.1.2.9 3.5.4	Most recent Chemistry Boron sample		Modes 5, 6 & >2270 ppmb Modes 1, 2, 3, 4: between 2270 and 2370 ppmb		Modes 1,2, 3,4,5, & 6 between 7875 and 13,125ppmb		Modes 1,2,3,4, 5 and 6: between 7875 and 13,125 ppmb
	Tank volume (level, ft.)		Modes 5, 6: ≥ 8.7 feet Modes 1, 2, 3, 4: between 53.5' and 56'		per attached figure 1&2		per attached figure 5
3.1.2.8 3.1.2.9	Tank solution temp (°F)		≤ 40°F		≥ 105°F		≥ 105°F

Above surveillance checks are as required? (Yes/No)

SURVEILLANCE REQUIRED DURING MODES 1 & 2		PRESENT MODE:	
T.S. ACTION No.	DESCRIPTION	ACTUAL	REQUIRED
3.1.3.8	CRD PATCH PANELS ARE LOCKED? (YES/NO) YES - No followup required. NO - Followup per T.S. ACTION No.		YES

MODE	T.S. ACTION No.	DESCRIPTION	PRESENT MODE: ACTUAL	REQUIRED
1 >15%	3.2.4	Quadrant Pwr Tilt (Computer Operable) Full Incore Sys. Group 55		<2.30
ALL	3.9.11	SF STG Pool Water Level (when irradiated fuel is in STG Pool)		<344.5 ft. Over fuel

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FIGURE 1

Boric Acid Mix Tank

Level vs. Volume vs. Required Boron Concentration

Level (in.)	Volume (Gal.)	Level (in.)	Volume (Gal.)	Level (in.)	Volume (Gal.)
0	670*	20	1643	40	2617
1	719	21	1692	41	2665
2	768	22	1741	42	2713
3	816	23	1789	43	2762
4	865	24	1838	44	2811
5	914	25	1887	45	2859
6	962	26	1935	46	2908
7	1011	27	1984	47	2957
8	1059	28	2033	48	3005
9	1108	29	2081	49	3054
10	1157	30	2130	50	3102
11	1205	31	2178	51	3151
12	1254	32	2227	52	3200
13	1303	33	2276	53	3248
14	1351	34	2325	54	3297
15	1400	35	2373	55	3346
16	1449	36	2422	56	3394
17	1497	37	2471	57	3443
18	1546	38	2519	58	3492
19	1595	39	2568	59	3540

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Boric Acid Mix Tank

Level vs. Volume vs. Required Boron Concentration (Cont'd)

Level (in.)	Volume (Gal.)	Tech. Spec. Min. Boron (ppm)	Conc. Boron Source Max. Boron (ppm)
60	3589		
61	3638		
62	3686	NOT ENOUGH	
63	3735		
64	3784	VOLUME FOR	
65	3832		
66	3881		
67	3930	TECH SPEC USE	
68	3978		
69	4027		
70	4076	13,359	13,125
71	4124	12,907	13,125
72	4173	12,755	13,125
73	4222	12,607	13,125
74	4270	12,465	13,125
75	4319	12,324	13,125
76	4368	12,186	13,125
77	4416	12,053	13,125
78	4465	11,921	13,125
79	4514	11,791	13,125

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Boric Acid Mix Tank

Level vs. Volume vs. Required Boron Concentration (cont'd)

Level (in.)	Volume (Gal.)	Tech. Spec. Min. Boron (ppm)	Conc. Boron Source Max. Boron (ppm)
80	4562	11,667	13,125
81	4611	11,543	13,125
82	4660	11,422	13,125
83	4708	11,306	13,125
84	4757	11,189	13,125
85	4805	11,077	13,125
86	4854	10,966	13,125
87	4903	10,856	13,125
88	4951	10,751	13,125
89	5000	10,645	13,125
90	5049	10,542	13,125
91	5097	10,443	13,125
92	5146	10,343	13,125
93	5195	10,246	13,125
94	5243	10,152	13,125
95	5292	10,058	13,125
96	5341	9,966	13,125
97	5389	9,877	13,125
98	5438	9,788	13,125
99	5487	9,701	13,125

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Boric Acid Mix Tank

Level vs. Volume vs. Required Boron Concentration (Cont'd)

Level (in.)	Volume (Gal.)	Tech. Spec. Min. Boron (ppm)	Conc. Boron Source Max. Boron (ppm)
100	5535	9,616	13,125
101	5584	9,532	13,125
102	5633	9,449	13,125
103	5681	9,369	13,125
104	5730	9,289	13,125
105	5779	9,210	13,125
106	5827	9,135	13,125
107	5876	9,058	13,125
108	5925	8,984	13,125
109	5973	8,911	13,125
110	6022	8,839	13,125
111	6071	8,767	13.125
112	6119	8,699	13.125
113	6168	8,630	13,125
114	6217	8,562	13,125
115	6265	8,496	13,125
116	6314	8,430	13,125
117	6363	8,365	13,125
118	6411	8,303	13,125
119	6460	8,240	13,125

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Boric Acid Mix Tank

Level vs. Volume vs. Required Boron Concentration (Cont'd)

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Level (in.)	Volume (Gal.	Tech. Spec. Min. Boron (ppm)	Conc. Boron Source Max. Boron (ppm)
120	6508	8179	13,125
121	6557	8118	13,125
122	6606	8057	13,125
123	6654	7999	13,125
124	6703	7941	13,125
125	6752	7883	13,125
126	6800	7875	13,125
127	6849	7875	13,125
128	6898	7875	13,125
129	6946	7875	13,125
130	6995	7875	13,125

CAUTION: Straight wall of Tank ends at approximately 130". Do not exceed this level.

*Bottom of Tank to level transmitters holds 670 gallons.

NOTES

1. Straight wall section of tank holds 48.65749 gallons per inch.
2. The product of volume in gallons and Boron in ppm must exceed 53,225,000 to qualify for Tech. Spec. source of conc. Boric Acid.
3. 1,750 ppm Boron = 1% Boric Acid.

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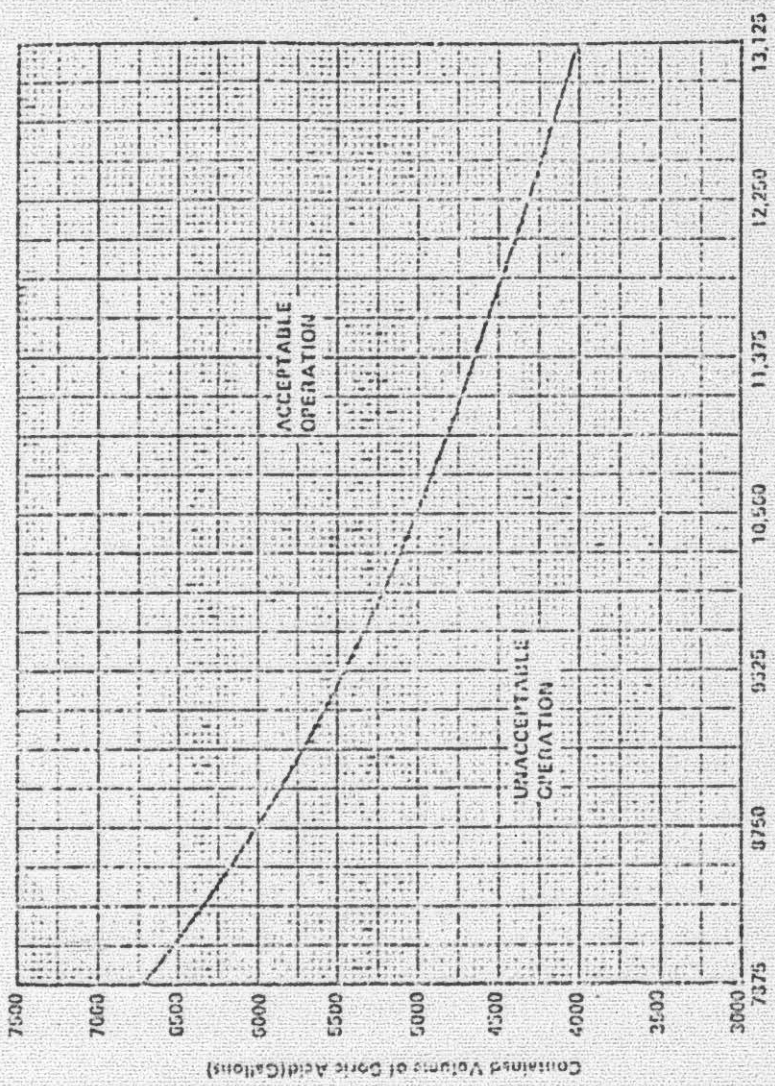

Figure 2 Minimum Boric Acid Tank Contained Volume as a Function of Stored Boric Acid Concentration

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APPENDIX A

INCORE MONITORING INSTRUMENTATION WEEKLY CHECKS

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Table of Contents

1.0 PURPOSE

2.0 APPLICABLE SURVEILLANCE FREQUENCY AND MODES

3.0 LIMITS AND PRECAUTIONS

4.0 LOCATION OF SYSTEM/ASSEMBLIES

5.0 EQUIPMENT REQUIRED

6.0 PROCEDURE

7.0 ACCEPTANCE CRITERIA

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1.0 PURPOSE

1.1 To meet the surveillance requirements of TMI-2 Technical Specification 4.3.3.2(a) which states:

"The Incore Detector System shall be demonstrated operable by performance of a CHANNEL CHECK within 7 days prior to its use for measurement of the AXIAL POWER IMBALANCE or the QUADRANT POWER TILT".

2.0 APPLICABLE SURVEILLANCE FREQUENCY AND MODES

2.1 Frequency: At least once per 7 days (W).

2.2 Modes: One (1) above 15% of rated thermal power.

3.0 LIMITS AND PRECAUTIONS

3.1 Wait at least 10 minutes (or for obvious equilibrium) after a power change prior to performing this check.

3.2 Restrict power level changes to + or - 2 percent during data acquisition.

4.0 LOCATION OF SYSTEM/ASSEMBLIES

4.1 The Bailey 855 Computer is located in the Control Room.

4.2 The Back Up Recorders are located on Panel #14 in the Control Room.

5.0 EQUIPMENT REQUIRED

5.1 Plant Computer.

6.0 PROCEDURE

6.1 Obtain Group 45 printout of Uncorrected SPND signals for each of the seven (7) levels.

6.2 Examine the seven Group 45 printouts to determine which incores are inoperable. List any inoperable incores on Data Sheet 1.

NOTE: Most inoperable detectors print out either negative or zero values.

6.3 From the list of inoperable incore detectors determine if any detectors are symmetrical. This can be accomplished by checking Figure 6 for the

symmetric locations. If none of symmetrics are inoperable then the incores satisfy tech specs. However, if any symmetric is determined to be inoperable, then contact the Nuclear Engineer for determination of tech spec status.

6.4 Determine if any of the incore detector inputs identified as inoperable on Data Sheet 1 also inputs to the back up recorders. This can be accomplished by comparing Data Sheet 1 to the back-up identification sheet in 2103-1.11(Table 1), "Hand Calculation of Tilt and Imbalance".

NOTE: An identification sheet for the back-up recorder is attached to Panel 14 below the recorders.

6.5 List any inoperable back-up recorder input on Data Sheet 2.

6.6 Send xerox copy of Data Sheets 1 and 2 and Group 45 printouts to the Nuclear Engineer.

7.0 ACCEPTANCE CRITERIA

7.1 For AXIAL POWER IMBALANCE measurements, the incore detector inputs not identified as inoperable shall meet the following minimum requirements;

7.1.1 Three detectors, one in each of 3 strings, shall lie in the same axial plane with 1 plane in each axial core half.

7.1.2 The axial planes in each core half shall be symmetrical about the core mid-plane.

7.1.3 The detector strings shall not have radial symmetry.

NOTE: Figure 3 shows a typical set of detectors meeting the above requirements.

7.2 For QUADRANT POWER TILT measurements, the incore detector inputs not identified as inoperable shall meet the following minimum requirements:

7.2.1 Two sets of 4 detectors shall lie in each core half. Each set of detectors shall lie in the same axial plane. The two sets in the same core half may lie in the same axial plane.

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7.2.2 Detectors in the same plane shall have quarter core radial symmetry.

NOTE: Figure 4 shows a typical set of detectors meeting the above requirements.

NOTE: If the minimum requirements identified in 7.1 and 7.2 are not met, follow the action statement of 3.3.3.2 of the Technical Specification.

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DATA SHEET 1

Paragraph 6.2

Inoperable Incore Detectors

Detector Number	Core Location/Level

NOTE: See Figure for Core location of detectors.

Performed By: _____ Date: _____

Approved By: _____ Date: _____

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DATA SHEET 2

Paragraph 6.5

Inoperable Back-Up Incore Detectors

Detector Number	Core Location/Level

NOTE: See Figure for Core location of detectors.

Performed By: _____ Date: _____

Approved By: _____ Date: _____

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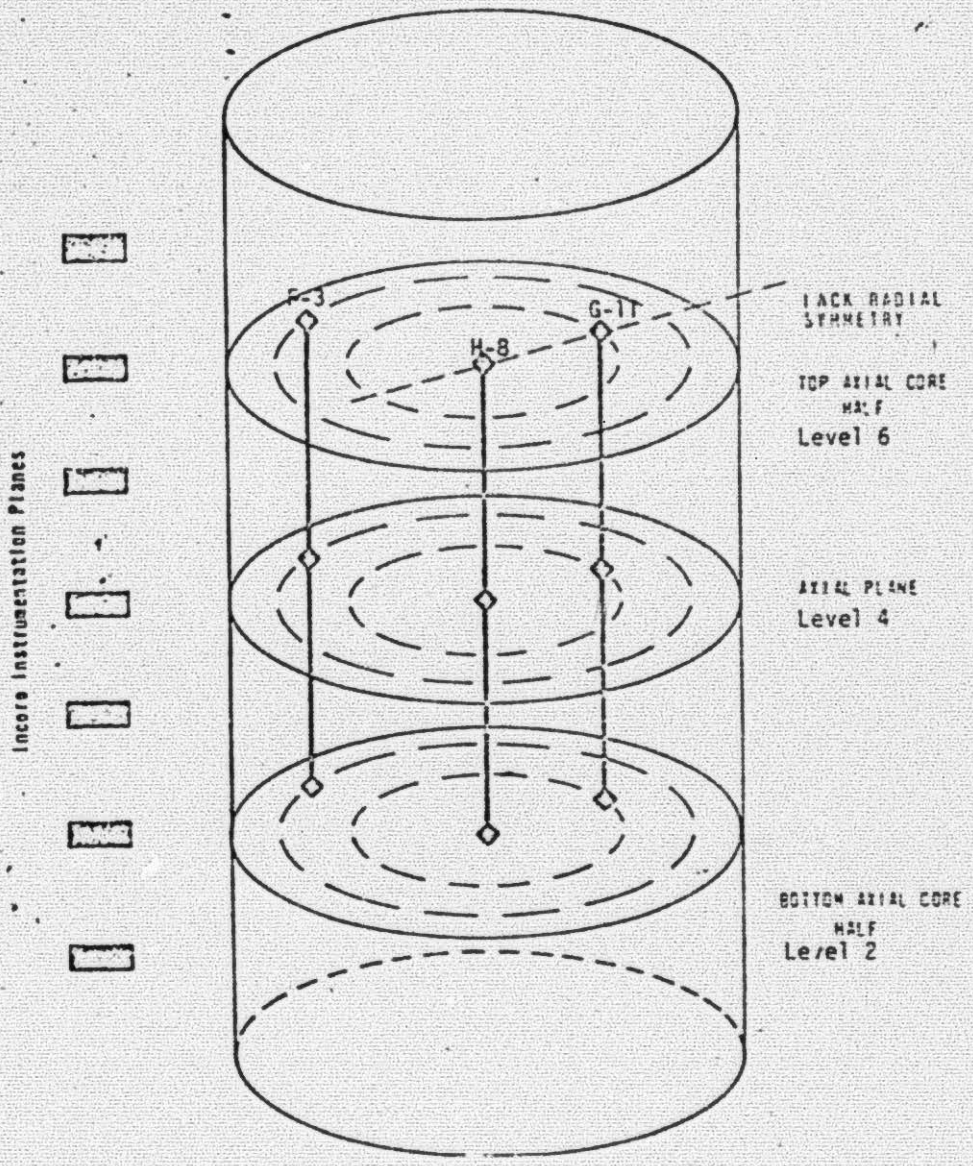

Figure 3 - Typical Set of Incore Detectors Meeting Minimum Requirements for Imbalance Measurement

20.0

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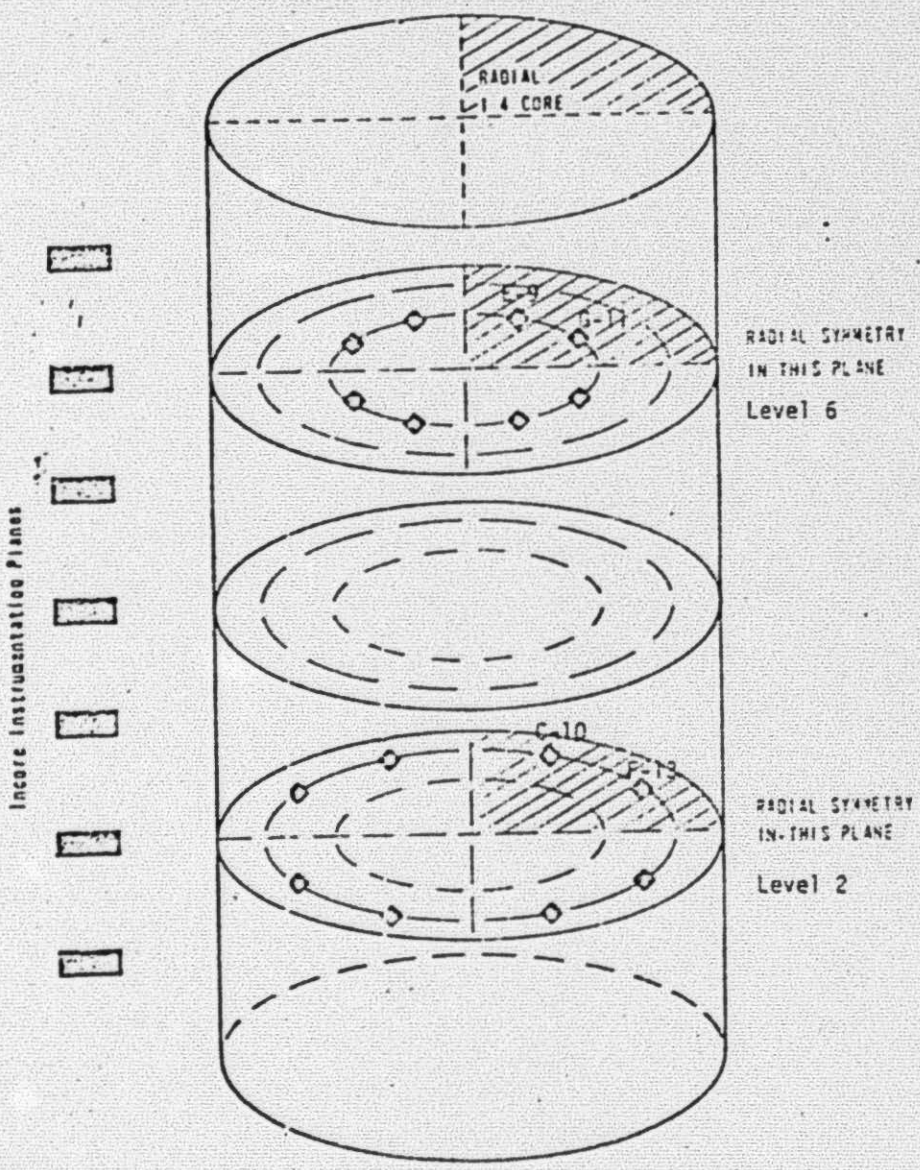

Figure 4 - Typical Set of Incore Detectors
Meeting Minimum Requirements
for Quadrant Tilt Measurement

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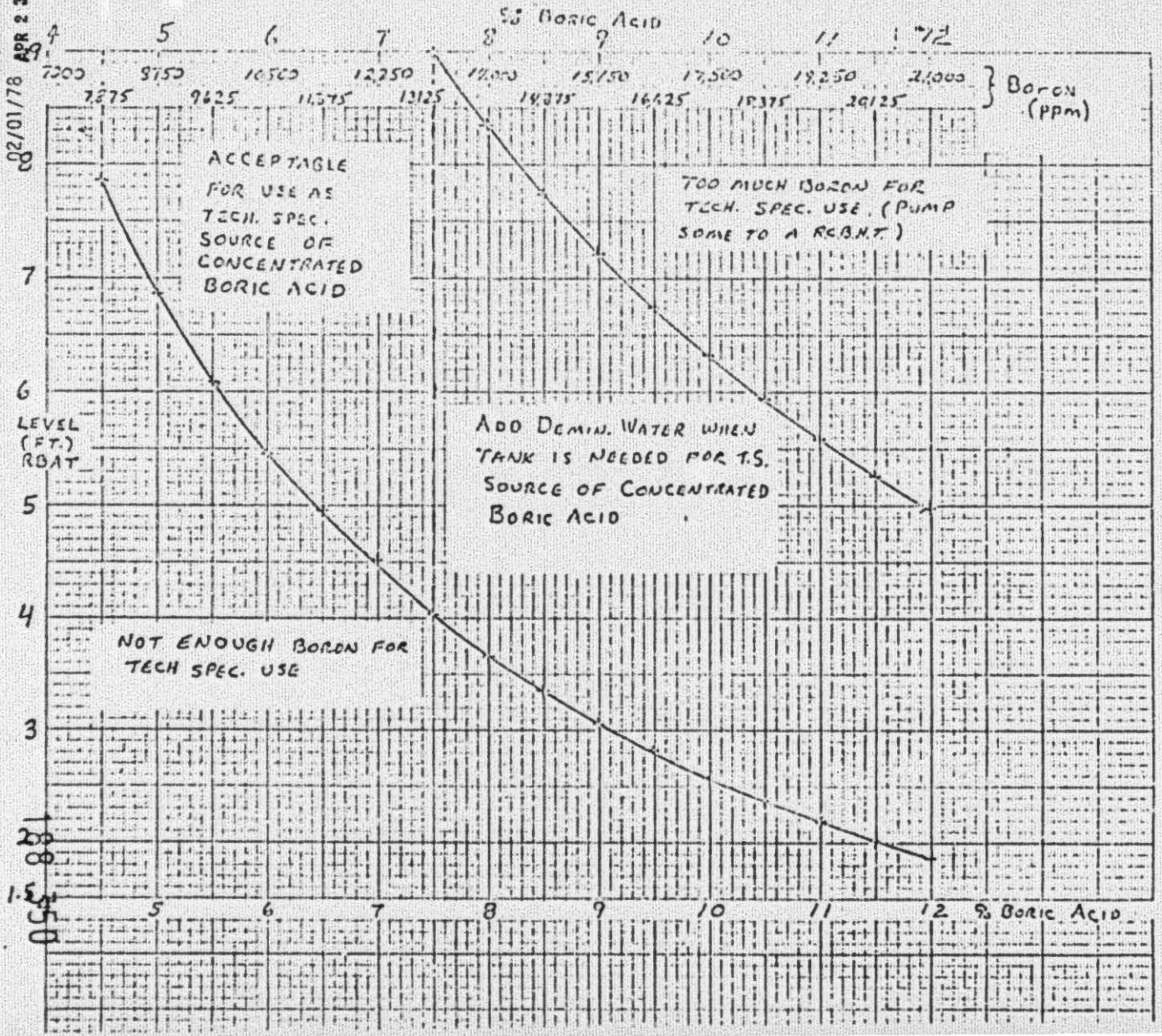
2301-W1
Revision 3
02/01/78

APR 23 1979

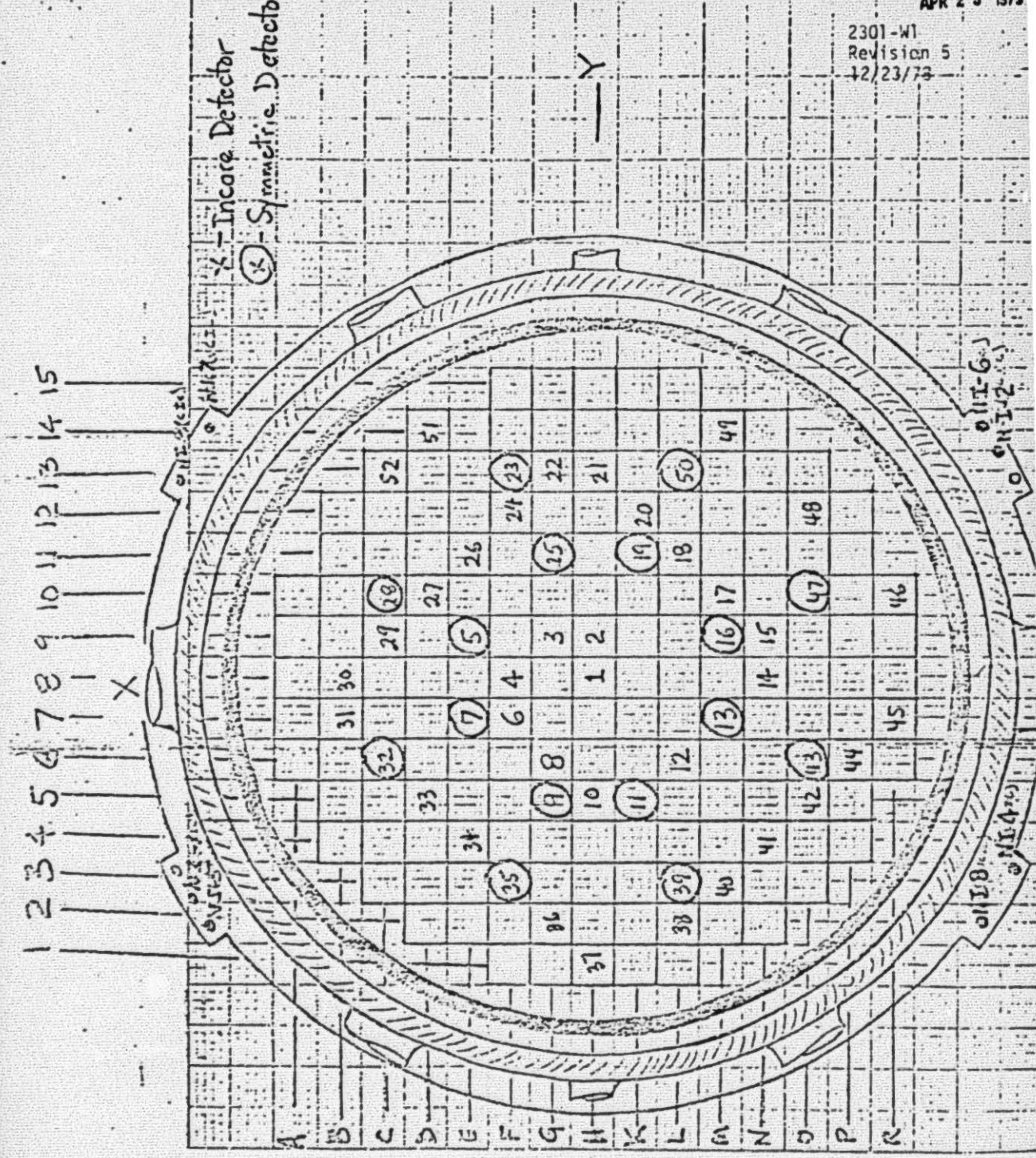


22.0

FIGURE 6: UNIT 2: DETECTOR SYSTEM

APR 2 3 1979

2301-W1
Revision 5
12/23/73



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TMI DOCUMENTS

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