

AP 1001

Form 1001-B

Three Mile Island Nuclear Station  
Special Operating Procedure

SIDE 1

SOP No. 3-29  
(From SOP Log Index)

NOTE: Instructions and guidelines in AP 1001 must be followed when completing this form.

Unit No. 2  
Date 4-3-79

1. Title FILLING BORIC ACID MIX TANK

Per Table 1.5.16 of 2104-1/2

2. Purpose (include purpose of SOP)

TO FILL BMT WITH TECH SPEC <sup>DOSED</sup> A CONCENTRATION FROM HALL-BURTON SUPPLIED TRUCK.

3. Attach procedure to this form written according to the following format.

A. Limitations and Precautions

- 1. Nuclear Safety
- 2. Environmental Safety
- 3. Personnel Safety
- 4. Equipment Protection

SEE ATTACHED

B. Prerequisites

C. Procedure

**ORC**  
CONTROL ROOM  
FILE COPY

4. Generated by R WARREN Date 4/2/79

5. Duration of SOP - Shall be no longer than 90 days from the effective date of the SOP or (a) or (b) below - whichever occurs first.

(a) SOP will be cancelled by incorporation into existing or new permanent procedure submitted by \_\_\_\_\_

(b) SOP is not valid after COMPLETION   
(fill in circumstances which will result in SOP being cancelled)

6. (a) Is the procedure Nuclear Safety Related?

If "yes", complete Nuclear Safety Evaluation. (Side 2 of this Form) Yes  No

(b) Does the procedure affect Environmental Protection?

If "yes", complete Environmental Evaluation. (Side 2 of this Form) Yes  No

(c) Does the procedure affect radiation exposure to personnel? Yes  No

NOTE: If all answers are "no", the change may be approved by the Shift Supervisor. If any questions are answered "yes", the change must be approved by the Unit Superintendent.

7. Review and Approval

Approved - Shift Supervisor [Signature] 4/3/79

Reviewed - List members of PORC contacted [Signature] 4/3/79 Date

[Signature] 4/3/79 Date

[Signature] 4/3/79 Date

[Signature] 4/3/79 Date

[Signature] 4/3/79 Date

Approved - Unit Superintendent [Signature] 4/3/79 Date

ORC  
KAW  
4/2/79  
4/2/79

Shift Supervisor/Shift Foreman

Date

REV. 0  
4-3-79

## A. Limits &amp; Precautions

1. Nuclear safety - RWP Required, per HPP-1618.
2. Environmental Safety
  - a. Avoid spilling large quantities of boric acid solution on the ground.
3. Personnel safety
  - a. Wear protective clothing when handling boric acid solution.
  - b. Take care to avoid getting boron solution into eyes or injected.
  - c. Monitor for high radiation levels when running temporary hose in the Aux Bldg.
4. Equipment Protection
  - a. Avoid overfilling BMT. Monitor computer point JJ1 for BMT water level while filling BMT.
  - b. Flush hose prior to use.
  - c. Discharge hose to be of suitable temperature and pressure for pumping approximately 150 degrees F Boric acid solution at approximately 120 psi. (ie High press, 300 degrees F rated, chemical hose).

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## B. Prerequisites

1. Verify temporary hose from Halliburton truck to the top of the BAMT. Hose is to be installed in BAMT manway and securely fastened.
2. Verify installation of temporary heat exchanger connected to suitable supplies of demin. Water and aux steam (ie. connect demin water to connection downstream of DW-V158 and aux steam downstream of AS-V238 and AS-V239).
3. Verify hose has been flushed prior to installation.

## C. Procedure

1. Line up demin water through the heat exchanger to the Halliburton mix truck. Initiate demin water flow by opening DW-V158 and the temporary valve to the heat exchanger and flush for approx. 10 minutes at full flow prior to putting in mix truck.

NOTE: Hose end must be secured such that max level in tank does not reach open end of hose to cause siphon.

2. Initiate aux steam flow by opening AS-V238 and AS-V239. Adjust flow to obtain maximum heat transfer to demin water (ie. Demin water temp should read approximately 135-140 degrees F) But not to exceed 190 degrees F.
3. Add boric acid and water to Halliburton mix truck using guidelines provided in 2104-1.12 to calculate amount of boric acid required.\* (ie. It should take approximately 1300 lbs. of boric acid for 2000 gal of demin water). Recirc mixture and sample solution. One (1) or more batches may be required.

\* For = 7% B.A. solution per Fig. 1.5.12 of 2104-1.12

4. Inject approximately 3000 gal of solution into BAMT to fill tank. When the proper solution concentration is obtained in the Halliburton mix tank.
5. Obtain Boric Acid mix tank level (computer pt .331) after each addition. When sample concentrations are within T.S. limits, \* remove temporary hose from tank and heat exchanger. Drain water from hose to ground

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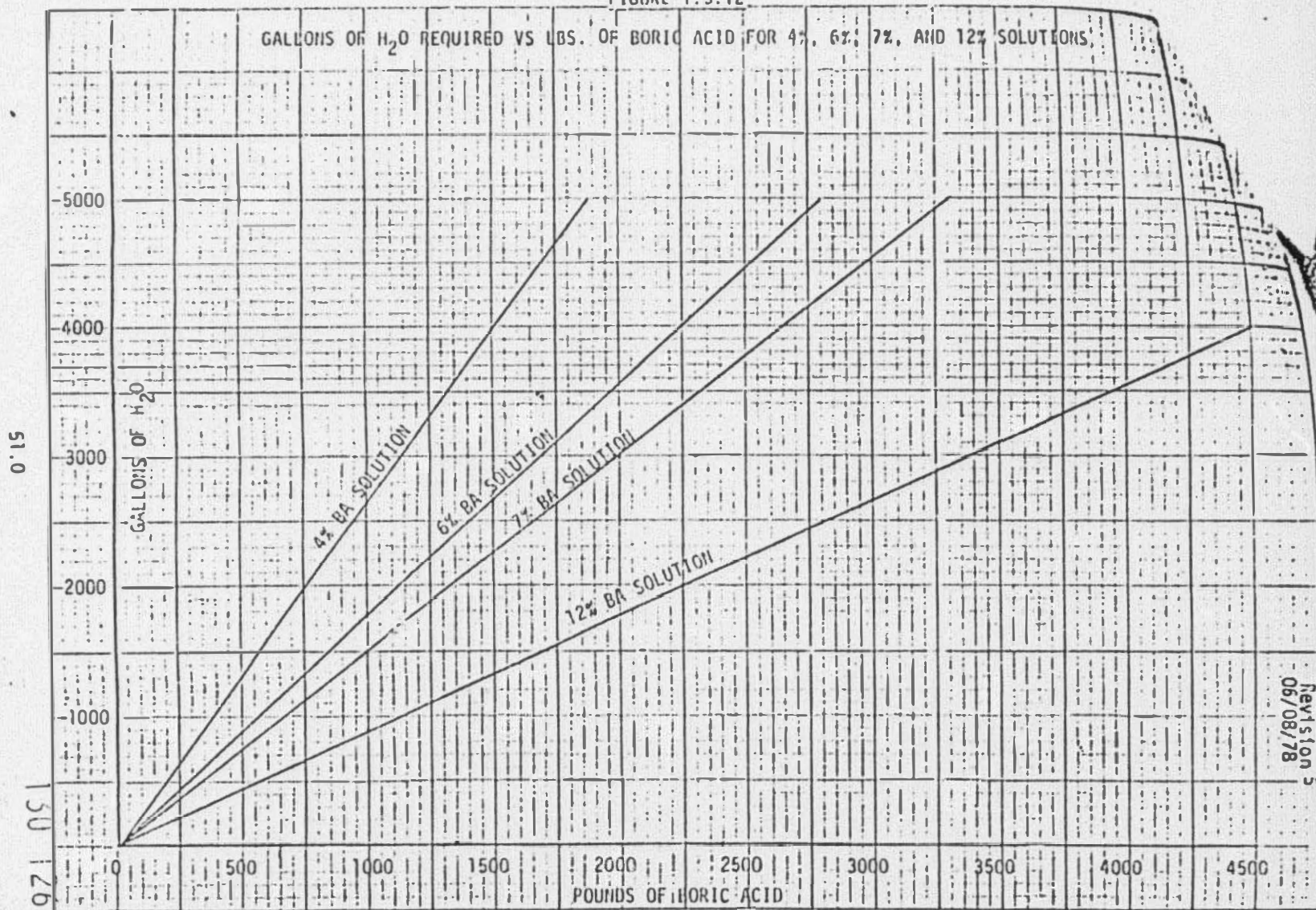
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\*Figure 1.15.16 of 2104-1.12. Flush out hose to BMT with = 100 gal. demin water from Halliburton truck to insure all acid is transferred to tank and to minimize excess acid which would remain in hose.

6. Reinstall BMT manway flanges.

FIGURE 1.5.12

GALLONS OF H<sub>2</sub>O REQUIRED VS LBS. OF BORIC ACID FOR 4%, 6%, 7%, AND 12% SOLUTIONS



Revision 5  
06/08/78

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Table 1.5.16

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

Boric Acid Mix Tank  
Level vs. Volume vs. Required Boron Concentration (Cont'd.)

Level (in.)	Volume (Gal.)	Test Spec.	Conc. Boron Source
		Min. Boron (ppm)	Max. Boron (ppm)
60	3589		
61	3638	NOT ENOUGH	
62	3686		
63	3735	VOLUME FOR	
64	3784		
65	3832		
66	3881		
67	3930	TECH SPEC USE	
68	3978		
69	4027		
70	4076	13,059	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

Boric Acid Mix Tank

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

Level (in.)	Volume (Gal.)	Test Spec.	Conc. Boron Source
		Min. Boron (ppm)	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



## Boric Acid Mix Tank

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

Level (in.)	Volume (Gal.)	Tech. Spec.	Conc. Boron Source
		Min. Boron (ppm)	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	5022	8839	13,125
111	6071	8767	13,125
112	6119	8699	13,125
113	6158	8630	13,125
114	6217	8562	13,125
115	6265	8496	13,125
116	6314	8430	13,125
117	6363	8365	13,125
118	6411	8303	13,125
119	6460	8240	13,125

## Boric Acid Mix Tank

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

Level (in.)	Volume (Gal.)	Tech. Spec.	Conc. Boron Source
		Min. Boron (ppm)	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 transmitter 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.