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CONNECTICUT YANKEE ATOMIC POWER COMPANY

BERLIN, CONNECTICUT
P. O. BOX 270 HARTFORD, CONNECTICUT 06101

TELEPHONE
203-666-6911

August 24, 1979

Docket No. 50-213

Mr. Boyce H. Grier, Director
Region I
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

Reference: (1) B. H. Grier letter to W. G. Counsil dated July 26, 1979, forwarding I&E Bulletin #79-17.

Gentlemen:

Haddam Neck Plant
Pipe Cracks in Stagnant Borated Water Systems at PWR Plants

I&E Bulletin No. 79-17, Reference (1), requested that Connecticut Yankee Atomic Power Company (CYAPCO) conduct a review of safety-related stainless steel piping systems to identify systems and portions of systems which contain stagnant oxygenated borated water. In addition, the NRC Staff requested that CYAPCO provide specific information regarding these systems within 30 days of the date of the Bulletin. Accordingly, CYAPCO hereby provides the attached responses to Items 1(a) - 1(d) of Reference (1).

CYAPCO has performed a review of safety-related stainless steel piping to determine which systems contain stagnant oxygenated borated water. CYAPCO has defined any piping not flushed at least once per month as stagnant. This definition is based on the following:

(1) no cracks were found in the high-pressure injection lines at Three Mile Island, Unit No. 1 (TMI-1) which were occasionally flushed;

(2) this definition allows a large enough sample of welds to produce a statistically meaningful test;

(3) the piping to be tested should contain the worst case welds as the fluid is motionless for the longest period of time.

In addition, examinations will be limited to Type 304 stainless steel piping based upon the fact that cracks detected at TMI-1 were in Type 304 piping systems and testing performed under Contract by the Electric Power Research Institute (EPRI) (GE Report NEDO-21000) has shown Type 304 stainless steel to be far more susceptible to intergranular stress corrosion cracking (IGSCC) than other types such as Types 316, 316L, and 304L.

Based on the above, the following systems and portions of systems are considered to contain stagnant oxygenated borated water:

(1) Residual Heat Removal System -- portions which are not recirculated.

(2) Low Pressure Safety Injection Systems -- portions downstream of LPSI pumps.

(3) Chemical and Volume Control System -- dead legs only.

CYAPCO wishes to note that the examination to verify system integrity outlined in Item 2(a) of the Bulietin has been defined as a visual examination at service pressure of normally accessible welds. Guidance for this visual examination of welds will be drawn from IWA-5240 which states that insulation will be removed only if evidence of leakage is found at a low point or under a pipe. This definition was chosen as it more appropriately addresses the intent of the inspection.

CYAPCO trusts that this information is responsive to NRC Staff's requests and concerns.

Very truly yours,

CONNECTICUT YANKEE ATOMIC POWER COMPANY

W. G. Counsil
Vice President

Attachment

DOCKET NO. 50-213

ATTACHMENT

HADDAM NECK PLANT

I&E BULLETIN NO. 79-17
RESPONSE TO ITEMS 1(a) - 1(d)

AUGUST, 1979

Question 1(a)

Provide the extent and dates of the hydrotests, visual and volumetric examinations performed per 10CFR50.55a(g) (Re: IE Circular 76-06 enclosed) of identified systems. Include a description of the non-destructive examination procedures, procedure qualifications and acceptance criteria, the sampling plan, results of the examinations, and any related corrective actions taken.

Response

No inservice inspection visual, volumetric examinations, or hydrotests have been performed on these systems. As described in the D. C. Switzer letter to A. Schwencer dated June 29, 1977, these piping systems are exempt from non-destructive examinations provided that the chemistry of the contained fluid is periodically sampled. This exemption is based on Subsection IWC-1220c of Section XI. The first ten-year hydrotest of these systems will be conducted during the 1980 refueling outage. Monthly ISI pump testing does serve to provide flow through portions of these systems at system pressure on a regular basis, and no abnormal leakages have been detected.

Question 1(b)

Provide a description of water chemistry controls, summary of chemistry data, any design changes and/or actions taken, such as periodic flushing of recirculation procedures to maintain required water chemistry with respect to pH, B, CL^-, F^-, O_2.

Response

The above described chemistry program is performed in accordance with the attached procedure 5.4-26, "Inservice Inspection Chemical Sampling Program". This procedure is presently under revision to incorporate additional elements and specific restrictions on the concentrations which are acceptable. The elements that will be analyzed and the acceptable concentrations are provided below:

pH . . . . . will vary with boron concentration.
Conductivity . . . . . will vary with boron and other constituents.
Fe . . . . . <1.0 mg/ℓ
Na . . . . . <0.1 mg/ℓ
Cr . . . . . <1.0 mg/ℓ
Mg . . . . . <0.05 mg/ℓ

Ca . . . . . < 0.05 mg/ℓ

Al . . . . . < 0.05 mg/ℓ

Li . . . . . < 0.7-2.2 mg/ℓ

Ni . . . . . < 1.0 mg/ℓ

Cl . . . . . < .15 mg/ℓ

Suspended solids . . . . < 1.0 mg/ℓ

A sample of the chemistry data taken during December, 1978 is also attached. Also, the monthly ISI pump tests mentioned above serve as a periodic flushing of certain portions of these systems.

Question 1(c)

Describe the preservice NDE performed on the weld joints of identified systems. The description is to include the applicable ASME Code sections and supplements (addenda) that were followed, and the acceptance criterion.

Response

The identified systems, which include portions of Low Pressure Safety Injection, Residual Heat Removal and Chemical Volume and Control System are designed to pressures less than 1000 psig and were fabricated to the requirements of the 1955 edition of the American Standard Code for Pressure Piping, ASA B31.1. As a minimum, 20% of the shop and field fusion-welded butt joints were 100% radiographically examined. Acceptance criteria was in accordance with B31.1.

Question 1(d)

Facilities having previously experienced cracking in identified systems, Item (1), are requested to identify (list) the new materials utilized in repair or replacement on a system-by-system basis. If a report of this information and that requested above has been previously submitted to the NRC, please reference the specific report(s) in response to this Bulletin.

Response

Two elbows on a boric acid pump suction line were observed to be cracked in April 1977 and subsequently repaired. The schedule 10 boric acid pump suction piping was completely replaced during the November, 1977 refueling outage with Type 304 Stainless Steel Schedule 40 piping. Additional information has been provided in LER 77-4/1T and the followup report, R. H. Graves letter to B. H. Grier dated March 26, 1979.

SDR 5.4-20
Original

JAN 26 1979

ATTACHME... A

December 1978 Results

ple Point	Date	Time	pH	Cond	Cl	Boron	Fe	Na	Cr	Mn	γ-Scan	Performed By
1	12/8/78	1000	4.4	7.7	<.03	2490	.14	.03	<.02	< .02	✓	LMD. JW, WL
2	12/19/78	0930	6.6	27	.08	650	.37	2.5	<.02	< .02	✓	LMD, JW, WL
3	12/7/78	1100	4.7	7.05	< .03	2376	.12	<.02	<.02	< .02	✓	LMD, JW, WL
4	12/8/78	0830	4.6	7.05	< .03	2436	.32	<.03	<.02	< .02	✓	LMD, JW, WL
5	12/8/78	1000	4.6	7.5	< .03	2449	.20	.03	<.02	< .02	✓	LMD, JW, WL
6	12/8/78	0730	5.1	10.3	.03	2274	.08	.10	<.02	< .02	✓	LMD, JW, WL
7	12/8/78	1000	5.2	16.7	.03	2346	.12	.10	<.02	< .02	✓	LMD, JW, WL
8	12/8/78	0830	6.45	15.5	< .03	403	.27	.04	<.02	< .02	✓	LMD, JW, WL
9				Unable to obtain sample								
10	12/8/78	1200	3.70	49	< .03	2376	1.57	.02	<.02	< .02	✓	LMD, JW, WL
11	12/8/78	0830	5.9	4.2	< .03	1023	.16	.02	<.02	< .02	✓	LMD, JW, WL
12				Unable to obtain sample								
13	12/8/78	1100	4.55	8.95	< .03	2418	.17	.03	< 02	< .02	✓	LMD, JW, WL
14	12/8/78	0900	6.6	16	< .03	470	.14	,03	<.02	< .02	✓	LMD, JW, WL
15	12/8/78	1000	5.45	40	.36	2315	.15	.03	<.02	< .02	✓	LMD, JW, WL

Connecticut Yankee
Surveillance Procedure No. SUR 5.4-26
Chemistry

INSERVICE INSPECTION CHEMICAL SAMPLING PROGRAM

1.0 PURPOSE

1.1 The purpose of this procedure is to establish an approved program for sampling frequency and tests to be done on systems as designated by the Connecticut Yankee ISI Coordinator.

2.0 APPLICABILITY

2.1 This procedure applies to but is not limited to the Systems Listed in Table I.

3.0 REFERENCES

3.1 PM 9.4-2.1, Ph Determination

3.2 PM 9.4-2.2, Conductivity Determination

3.3 PM 9.4-2.3, Chloride Determination by Mercuric Nitrate Method

3.4 PM 9.4-2.16, Boron Determination - Mannitol Titration

3.5 PM 9.4-2.25, Metal Determination by Atomic Absorption

3.6 CHDP 2.17, Total Iron Determination

3.7 PM 9.4-3.5, Liquid Radioactivity Determination of Liquid

4.0 RESPONSIBILITIES

4.1 It is the responsibility of the Chemistry Technician to follow this procedure.

4.2 It is the responsibility of the Chemist to review the results and report findings to the CY ISI Coordinator.

5.0 PROCEDURE

5.1 Frequency

5.1.1 The systems on Table I should be sampled and evaluated:

5.1.1.1 Approximately 6 months after refueling shutdown

5.1.1.2 One to two weeks before refueling shutdown.

5.1.1.3 Containment sump sampling done during refueling shutdown.

5.1.1.4 As requested by ISI Coordinator and Plant conditions.

5.2 A Ph determination should be done on the sample according to PM 9.4-2.1.

5.3 A conductivity determination should be done on the sample according to PM 9.4-2.2.

5.4 A chloride determination should be done on the sample according to PM 9.4-2.3.

5.5 A boron determination should be done on the sample according to PM 9.4-2.16.

5.6 An Iron determination should be done on the sample according to CHDP 2.17.

5.7 Sodium, Chromium and Manganese determination should be done on the sample according to PM 9.4-2.25.

5.8 A γ scan should be done on the sample according to PM 9.4-3.3.

5.9 Record the results on Attachment A.

TABLE I

SAMPLE POINT #	DESCRIPTION	LOCATION	FIG.
1	RWST	Purification Pump	3
2	Containment Sump	Containment Sump	3
3	Core Deluge	Cont. Lower Level Outer Annulus RH-V-805	3
4	HPSI Recirculation	HPSI Cubicle	3
5	LPSI from RWST to Reactor Vessel	PAB Pipe Trench	3
6	RHR Inlet	Sample Sink	1, 3
7	RHR Outlet	Sample Sink	1, 3
8	Chg. Pump Disch. and Loop Fill	Sample Sink	1, 3
9	Piping Between BAMT and Metering Pump	Boric Acid Strainer Behind BAMT	2
10	Piping Between BAMT and Chg pumps	Suction Boric Acid Pump Behind BAMT	2
11	Boric Acid Blender to RWST	Down Stream of Boric Acid Blender	2
12	Drain hdr. from Loops and Pz to VCT and PDT	Sample Sink	1, 2
13	Loop 1 RHR Return	Cont. Lower Level Outer Annulus RH-V-779	3
14	Reactor Containment Spray	Cont. Lower Level Outer Annulus RH-V-805	3
15	Containment Sump to RHR	"A" RHR Heat Exchanger Cubicle	3

SUR 5.4-26
Original

ATTACH A

JAN 2 6 1979

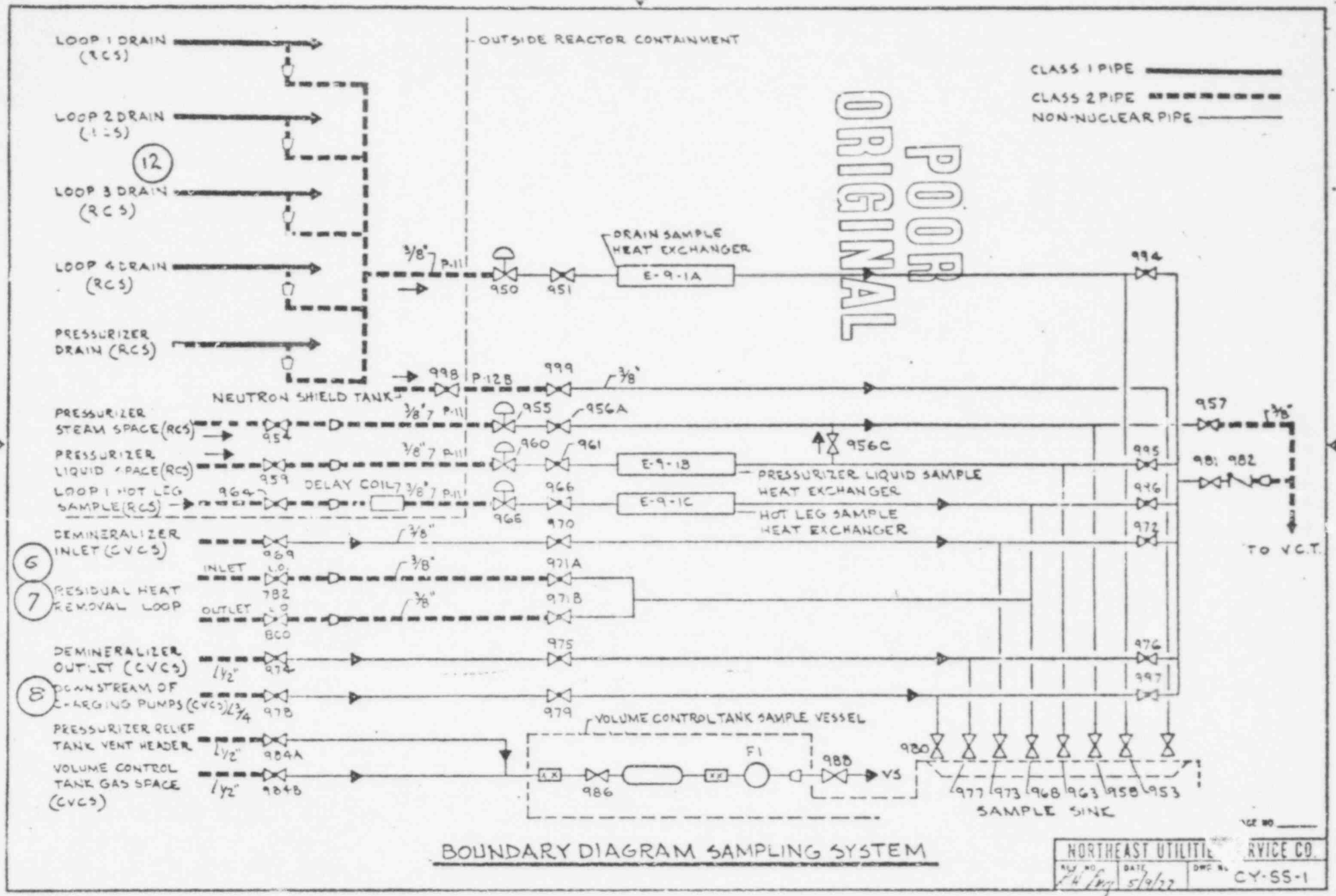
Sample Point	Date	Time	pH	Cond	Cl	Boron	Fe	Na	Cr	Mg	γ-Scan	Performed By
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												

Reviewed By _____

% COMPOSITION OF VARIOUS METALS

MATERIAL	B	C	Al	Si	P	Ti	Cr	Mn	Fe	Co	Ni	Cu	Zn	Nb	Mo	Ag	Cd	In	Sn	Sb	W	Pb
304 S.S.		0.08		1.00			19.0	2.00	69.0		9.00											
308 S.S.		0.08		1.00			20.0	2.00	66.0		11.0											
316 S.S.		0.08		1.00			17.0	2.00	63.5		12.00				2.5							
410 S.S.		0.15		1.00			12.0	1.00	86.0													
SA-302B Carbon Steel		0.20		0.20	0.01			1.35	97.8						0.48							
SA-336 Carbon Steel		0.24		0.27	0.01		0.34	0.62	97.3		0.70				0.60							
INCONEL - 600							15.8	0.20	7.20		76.0											
INCONEL - 718			0.60			0.80	19.0	0.20	18.0		52.5			5.20	3.00							
MALL COLMONOY #6	3.00	0.75		4.25			13.5		4.75		73.8											
MICRO BRAZE 50					10.0		15.0				75.0											
CONTROL ROD ALLOY																80.0	5.0	15.0				
ADMIRALITY												70.0	29.0						1.00	0.05		
MUNTZ METAL												60.0	40.0									
STELLITE #19		1.7		0.50			31.0		2.00	51.3	2.0										11.0	
COMMERCIAL LEADED BRONZE												89.0	9.25									1.75
MEDIUM LEADED BRASS												65.0	34.0									1.00

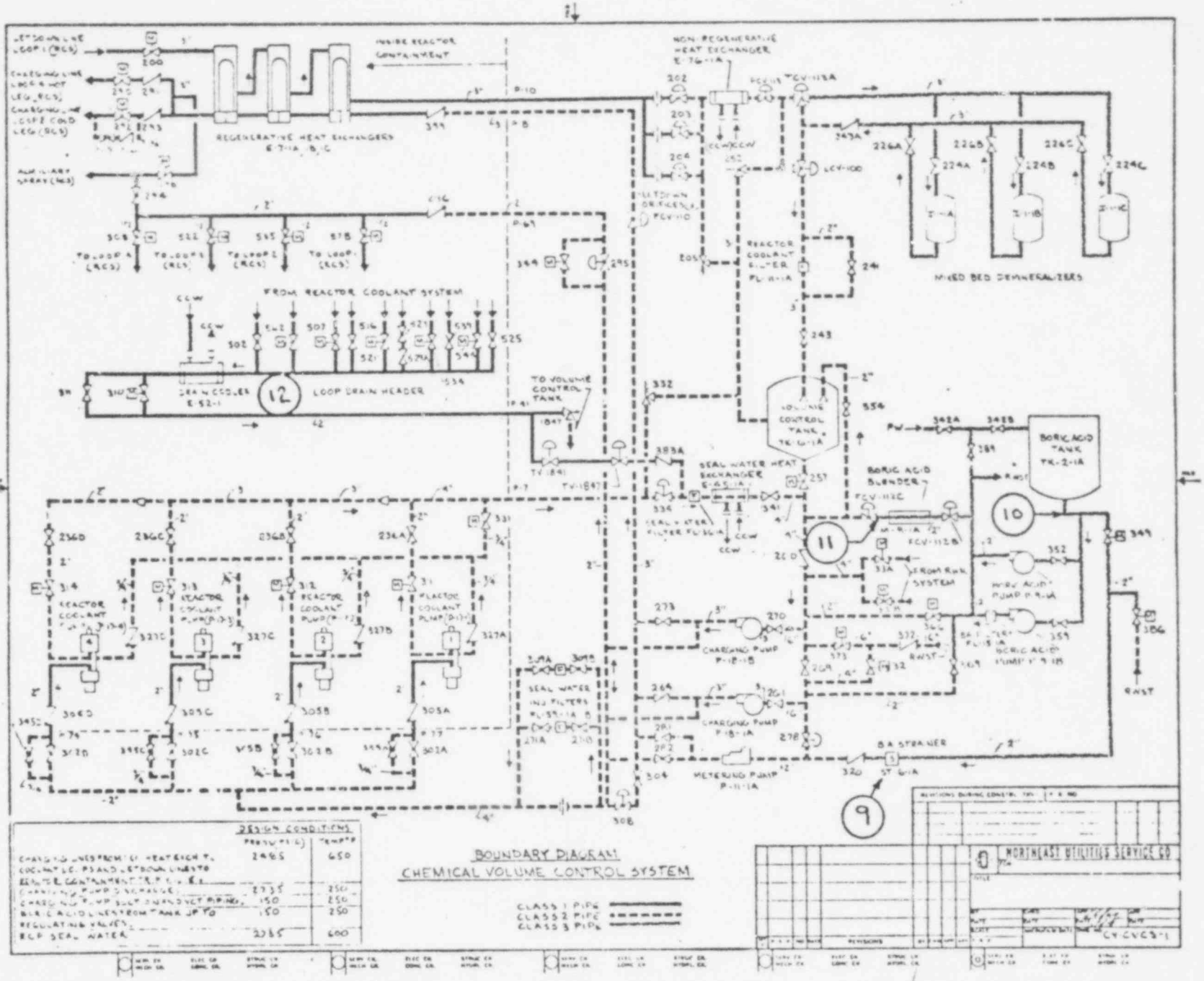
ATTACHMENT B



BOUNDARY DIAGRAM SAMPLING SYSTEM

NORTHEAST UTILITIES SERVICE CO.

DRW. NO. CY-SS-1 DATE 5/9/72



Inservice Inspection Chemical Sampling Program

Figure 3