CONNECTICUT YANKEE ATOMIC POWER COMPANY

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

TELEPHONE
203-666-6911

September 17, 1982

Docket No. 50-213
B10278

Director of Nuclear Reactor Regulation
Attn: Mr. Dennis M. Crutchfield, Chief
Operating Reactors Branch #5
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

References: (1) D. G. Eisenhut letter to All SEP Licensees, dated July 7, 1981.

(2) W. G. Counsil letter to D. G. Eisenhut, dated July 29, 1982.

(3) W. G. Counsil letter to D. M. Crutchfield, dated August 23, 1982.

(4) W. G. Counsil letter to D. L. Ziemann, dated February 7, 1980.

Gentlemen:

Haddam Neck Plant
SEP Topic III-5.A,
High Energy Break Inside Containment

Reference (1) requested the SEP Licensees to commit additional resources devoted to completion of the SEP. In Reference (2), Connecticut Yankee Atomic Power Company (CYAPCO) committed to develop Safety Assessment Reports (SARs) for certain SEP Topics which would be submitted for Staff review. CYAPCO committed in Reference (3) to provide the SAR for this topic by September 17, 1982. In accordance with this commitment, CYAPCO hereby provides the SAR for SEP Topic III-5.A, High Energy Pipe Break Inside Containment, which is included as Attachment 1.

CYAPCO had initiated a review of the effects of high energy pipe breaks inside containment and submitted an interim report dated January 1980 as an attachment to Reference (4). The January 1980 submittal has been revised, and supplemented by the final report included as Attachment 1 to this letter. The attachment is intended to stand alone as the SAR for this topic except for additional information pertaining to instrumentation required for safe shutdown which will be addressed during Integrated Assessment.

A035
1/40

We trust the Staff will find the attached information sufficient to resolve any concerns related to this SEP topic, with the exception of the item noted above which will be addressed during Integrated Assessment.

Very truly yours,

CONNECTICUT YANKEE ATOMIC POWER COMPANY

W. G. Counsil

W. G. Counsil
Senior Vice President

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Senior Vice President

Docket No. 50-213

Attachment 1

Safety Assessment Report

SEP Topic III-5.A,

High Energy Pipe Break Inside Containment

September, 1982

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ATTACHMENT 1

1.0 INTRODUCTION

As part of the Systematic Evaluation Program (SEP) Topic III-5.A, a detailed study of the effects of postulated breaks in high energy piping systems on other systems, structures, cables, and components necessary to place the plant in a safe shutdown condition is underway. This study includes the following.

1.1 Definition of the criteria and assumptions used in the study.

1.2 Identification of the high energy piping systems inside the containment.

1.3 A discussion of the independent methods of placing the plant in safe shutdown condition including the systems and components required to do so. Not all of these methods are necessarily available in the case of pipe break event.

1.4 A discussion of the effects of postulated ruptures in each of the high energy systems.

1.5 An evaluation of the ability to place the reactor in a safe shutdown condition following each postulated pipe break event.

1.6 A discussion of the approaches, under consideration, that will help mitigate the consequences of pipe breaks and place the plant in safe shutdown condition.

2.0 CRITERIA

This study has been based upon the intent of the criteria outlined in SRP 3.6.1, 3.6.2, and Regulatory Guide 1.46. Specific criteria adhered to are summarized below.

2.1 A high energy piping system is one which meets any of the following two conditions.

2.1.1 Design temperature is 200°F or greater.

2.1.2 Design pressure is 275 psig or greater.

2.2 A whipping pipe will be considered sufficient to rupture an impacted pipe of smaller nominal size and lighter wall thickness. A whipping pipe will be considered sufficient to cause a leakage crack in an impacted pipe of equal or larger nominal size and lighter wall thickness.

2.3 Pipe whip protection need not be provided when the energy associated with the whipping pipe is insufficient to impair the safety function of necessary structures, systems, or components.

2.4 Pipe whip protection need not be provided where piping is physically separated (or isolated) from other piping or components by protective barriers or restrained from whipping by plant design features such as concrete encasement.

2.5 Pipe break orientation:

2.5.1 Circumferential breaks are perpendicular to the pipe axis and the break area is equivalent to the internal cross-sectional area of the ruptured pipe.

2.5.2 Longitudinal breaks are parallel to the pipe axis at any point around the pipe circumference. The break area is equal to the sum of the effective cross-sectional flow areas upstream and downstream of the break location.

2.6 Pipe sizes subject to breaks:

2.6.1 Circumferential breaks will be postulated for all piping runs and branch runs above one inch (1") nominal size.

2.6.2 Longitudinal breaks will be postulated for all piping runs and branch runs four inches (4") nominal pipe size and larger.

2.7 Postulated pipe break locations: Either one of the following two approaches will be used to determine the postulated pipe break locations in each pipe run.

2.7.1 All terminal ends and all weld joints.

2.7.2 All locations that meet the requirements of Regulatory Guide 1.46, including the stress criteria stipulated therein, for ASME Section III, Classes 1, 2, and 3 piping.

3.0 HIGH ENERGY SYSTEMS

All piping systems or portions of systems inside containment that have a maximum operating temperature of 200°F or greater and/or a design pressure of 275 psig or greater during normal plant operation will be considered high energy systems in this study.

System & Designation	Design Temperature °F	Design Pressure psig
RC-2501R Reactor Coolant Main Loops, Loop Bypasses, Pressure Connections, etc.	650	2500
SI-2501R Safety Injection Lines to Check Valves at Coolant Loops	650	2500
CH-2501R Charging Lines	650	2500
CH-2501R High Pressure Temperature Coolant Pump Seal H_2O and Instrument	650	2500
CH-2502R Charging Pump Discharge Lines	650	2500
SI-2502R/SI-1501R Safety Injection Lines Within Containment	650	2500
SI-901R/SI-601R Safety Injection Pump Discharge Lines Up To Reactor Containment	200	1500
AC-601R/AC-2501R Residual Heat Removal	550	2500
RC-602R Pressurizer & Auxiliary Coolant System Relief Valve Discharge Lines	650	600
RC-151R Pressurizer Relief Tank Liquid Piping	400	150

System & Designation	Design Temperature °F	Design Pressure psig
CH-151R Charging Pump Suction Lines	400	150
DRH-2502 High Pressure Drains from Reactor Coolant Loops	550	2500
DRL-152/DRL-154/DL-154 Low Pressure Drains	350	150
RH-155D Reactor Containment Spray	300 300	150 150
WFPD-601 Steam Generator Feedwater	450	1210
WAPD-601 Auxiliary Steam Generator Feedwater Pump Discharge and Recirculating Through Last Shutoff Valve	100	1250
WGCB-601 Steam Generator Blowdown to Last Valve	545	985
SHP-601 Main Steam	650	985
RC-2501R Reactor and Pressurizer Head Vent	650	2500
SLPH-151 Auxiliary Heating Steam	330	100

4.0 PLANT SHUTDOWN METHODS

Three (3) independent methods of plant shutdown are available to bring the plant to a safe shutdown condition if a pipe break incident were to occur. Although Methods II and III are written as if the control room is available, these methods can be implemented both from the control room, or else manually if the control room is uninhabitable. Only Method I requires that the control room be available for functional activities.

4.1 Method 1: Motor Driven Steam Generator Feedwater Pumps

Prerequisites for Cooldown

1. Reactor tripped.
2. Normal sources of AC and DC power available.
3. Condenser air removal system available.
4. Condensate system available.
   (a) One condensate pump.
   (b) One gland pump seal.
5. Feedwater system available.
   (a) One steam generator feedwater pump.
   (b) Feedwater bypass flow control valves.
6. Circulating water system available.
   (a) Two circulating water pumps.
7. Main steam system available.
   (a) Steam dump flow control valves to condenser.
   (b) Atmospheric steam dump valve.
8. Service water system available.
   (a) Service water pump.
9. Component coolant water system available.
   (a) Component cooling water pumps.
   (b) Component cooling water heat exchangers.
10. Residual heat removal system available.
   (a) Residual heat removal pumps.
   (b) Residual heat removal heat exchangers.
11. Control air system available.
   (a) Control air compressors.

12. Turbine building closed cooling water system available.

13. Reactor coolant system available.

    (a) Reactor coolant pumps.

14. Charging and volume control system available.

    (a) Charging pumps.

15. Primary water system available.

    (a) Primary water pumps.

16. Boric acid system available.

    (a) Boric acid pump.

17. Adequate supply of secondary makeup water is available.

    (a) Demineralized water storage tank.
    (b) Primary water storage tank.

Procedure

Immediate Action

1. Verify reactor tripped.

2. Verify operation of reactor coolant pumps #3 or #4 for pressurizer spray capability.

    (a) If not available, use auxiliary spray from charging system.

Subsequent Action

1. Borate reactor coolant system to cold shutdown concentration.

    (a) One reactor coolant pump should be operating during boration for ideal mixing conditions.

2. Set up automatic makeup control for proper ratios of boric acid and primary water. Monitor volume control tank level during cooldown.

3. Deenergize all pressurizer heaters.

4. Commence cooldown of primary plant by initiation of steam dump to the condenser. Monitor cooldown rate.

5. Establish pressurizer spray to commence cooling of the pressurizer.

   (a) Monitor cooldown rate of pressurizer.

6. Monitor and adjust reactor coolant pump seal water supply flows during cooldown.

7. Monitor condenser hotwell level and demineralized water storage tank levels during cooldown to ensure adequate supply of steam generator makeup water.

8. When pressurizer steam phase temperature reaches 450°F, go solid in pressurizer, maintain approximately 500 psig in reactor coolant system, and continue using spray to further cool down the pressurizer.

9. When the pressurizer reaches 300°F, shut down the reactor coolant pump and place the residual heat removal system in operation.

10. Change over to atmospheric steam dump to continue the cooldown and decay heat removal.

11. Discontinue steam dump to condenser. Break vacuum and take out main steam.

12. Continue to cool down the primary system to less than 200°F using the residual heat removal system.

13. Shutdown the steam generator feedwater pump and continue to cool down the steam generators by feed and bleed using the condensate pump and two inch steam generator drain valves to the blowdown tank.

4.2 Method II: Emergency Steam Generator Feedwater Pumps (Steam Turbine Driven)

Prerequisites for Cooldown

1. Auxiliary steam generator feedwater system available.

(a) Demineralized water storage tank with adequate supply of water.

(b) Auxiliary steam driven feedwater pump.

(c) Feedwater line from discharge of auxiliary steam driven feedwater pumps through MOV-35, containment penetration to the main feedwater lines downstream of the main feedwater line check valves or from discharge of auxiliary steam driven feedwater pumps to the main feedwater bypass lines upstream of the bypass flow control valves.

2. Main feedwater system available.

(a) Inside the containment between check valves and steam generators.

(b) Inside the turbine building from the main feedwater header to the steam generators inside the containment.

3. Auxiliary steam generator feedwater pump steam supply lines.

4. Emergency diesel generators "A" or "B".

5. Emergency 4160 volt bus "8" or "9" associated with its corresponding diesel generator.

6. Emergency electrical buses and equipment associated with its corresponding diesel generator.

7. Charging system available.

(a) Charging pump associated with its corresponding diesel generator and 4160 volt bus.

Procedure

Immediate Action

1. Verify reactor tripped.

2. Verify diesel generator start and electric power supply restored to respective buses and equipment.

3. Push reactor trip buttons.

4. Verify reactor tripped by monitoring nuclear instrumentation.

Subsequent Action

1. Determine status of primary and secondary systems.

2. If pressurizer pressure and temperature have reached the core cooling set point, place high pressure or low pressure safety injection pumps in service (depending on system pressure) and restore pressurizer level.

3. Change over suction to charging pumps from volume control tank to refueling water storage tank.

4. Start charging pump and commence feeding reactor coolant system to maintain pressurizer level within observable ranges.

5. When control of pressurizer level has been achieved with the charging pump, shut down the safety injection pumps.

6. Using auxiliary steam driven feed pumps establish feed rate to steam generators to restore and maintain levels for heat removal.

7. Borate systems to cold shutdown concentration using boric acid transfer pumps and charging pump.

8. Commence or continue cool down of reactor coolant system to 250°F-300°F, using auxiliary steam driven feedwater pump for feed.

   (a) Allow the level in the steam generators to increase to 95%, then establish a feed and bleed through the two inch steam generator drain lines to the blowdown tank.

   (b) When feeding of steam generators cannot be maintained because of low steam pressure, close steam generator drain valves.

   (c) Steam pressure will rise as decay heat transfers from reactor coolant system to steam generator water and will provide a steam supply for operating the auxiliary feedwater pumps again. Reactor coolant system temperature will fluctuate between approximately 212°F and 250°F.

(d) When a source of power is available for a service water pump and residual heat removal pump, place residual heat removal system into operating and cool down reactor coolant system to less than 200°F.

4.3 Method III: Feeding of Cool Water Direct to the Reactor Coolant System Through the Emergency Core Cooling System

Prerequisites for Cool Down

1. Emergency diesel generators "A" or "B".
2. Emergency 4160 volt buses "8" or "9" associated with corresponding emergency diesel generator.
3. Emergency electrical fuses and associated equipment.
4. Emergency core cooling system equipment, piping, and valves.

Procedure

Immediate Action

1. Trip reactor.
2. Verify diesel generator starting and restoration of electrical power supply to emergency buses and equipment.
3. Monitor nuclear instrument action to verify reactor trip and shutdown.

Subsequent Action

1. Monitor instrumentation and determine status of primary and secondary systems.
2. Line up charging pump suction from the refueling water storage tank and isolate from the volume control tank.
3. Start a charging pump and control charging rate to maintain or restore pressurizer level to normal.

4. When reactor coolant system pressure falls below shutoff discharge pressure of the high pressure safety injection pumps, start the high pressure safety injection pump.

5. Shutdown the charging pump and control feed to the reactor coolant system via one or more loop safety injection MOV's to maintain pressurizer level and pressure as reactor coolant system temperature decreases due to natural circulation and lifting of secondary safety valves.

6. When reactor coolant system temperature and pressure decrease to discharge pressure of the low pressure safety injection pumps, start one low pressure safety injection pump.

7. Shutdown the high pressure safety injection pump and maintain a solid system at low pressure safety injection pump discharge pressure (295 psig) via core deluge connections.

Followup Action

1. If reactor coolant system temperature and pressure are above residual heat removal system limits, line up service water to the component cooling system to provide cooling to the nonregenerative heat exchanger, transfer charging pump suction to volume control tank, start a charging pump and commence feed and bleed of system via normal let-down and charging systems.

2. If or when reactor coolant system temperature and pressure is less than residual heat removal system limitations, line up service water to residual heat removal heat exchangers and place residual heat removal system in service and cool reactor coolant system to less than 200°F.

5.0 PIPE BREAK EFFECTS ON CONTAINMENT LINER

Since the containment liner is flush with the concrete containment shell and has a minimum thickness of 1/4", it is not considered credible that a whipping pipe or water or steam jet impinging on the steel liner could fail the material or degrade in any manner the liner's function as an environmental barrier.

6.0 INSTRUMENTATION

The minimum required instrumentation is listed in Table II in the Interaction Evaluation section. The necessary instrumentation is redundant and therefore, is not vulnerable unless a pipe break or jet impingement could wipe out more than one channel, transmitter, tubing, etc. Therefore, the instrumentation and tubing must be verified to have sufficient separation in order to assure protection from pipe break and jet impingement. Due to lack of sufficient information, the question of separation must be addressed at a later date after a system walk-down is performed or drawings are made available.

7.0 INTERACTION ANALYSIS

The purpose of this section of the report is to describe the effects of pipe whip and jet impingement resulting from postulated pipe breaks. Circumferential and longitudinal breaks were considered to be nonsimultaneous occurrences and the effects of these breaks were, therefore, analyzed independently.

7.1 Assumptions

The criteria of Section 2.0 along with the following assumptions form the basis for the interaction analysis.

7.1.1 Pipe whip was assumed to occur as a result of a circumferential rupture in a high energy system provided there was a significant reservoir of energy. Table I of this report lists these systems and their attendant energy reservoirs.

7.1.2 For circumferential breaks, the free end of a moving pipe will be assumed to move in only one direction parallel to its reaction force. This type of pipe break event will not cause dynamic instability (large amplitude oscillations) since the critical length required for this phenomena is substantially greater than any major pipes in the containment.

7.1.3 Impacted active equipment (e.g., valves and instruments) will be considered unable to perform its intended function unless it has been specifically designed to operate following such impact.

7.1.4 Impacted passive equipment (e.g., pipes, restraints, or structures) will be considered capable of continuing to perform their intended functions provided that the resulting strain levels due to the impact do not exceed defined allowables.

7.1.5 Valves which are not signaled to change state shall be assumed to fail in the position in which they were in prior to impact.

7.1.6 Plastic hinge formation due to pipe rupture was assumed to occur at system anchors or at other intermediate locations as dictated by the complexity of the particular system configuration. The hinges can form in either bending or torsional modes depending on the configuration.

7.1.7 Longitudinal breaks were assumed to cause a jet in the form of a cone with a twenty degree angle of divergence and were assumed to impair all components listed in Paragraphs 7.2.4 through 7.2.6 if they fell within the volume of the cone.

7.2 Interaction Consequences

The basis for evaluating the consequences of interactions between the high energy source system and the selected targets were as follows.

A whipping pipe was considered to have sufficient energy to cause damage to the following.

7.2.1 Pipes of smaller nominal size and lighter wall thickness.

7.2.2 Electric motor operators.

7.2.3 Electric conduit and cable trays.

A steam or water jet was assumed to have sufficient energy to cause damage to the following.

7.2.4 Electric cable trays and conduit.

7.2.5 Electric motor operators.

7.2.6 Instrumentation and instrument tubing.

7.3 Interaction Studies

This section is organized as follows. The Appendix index provides the reference to each high energy system. In the body of the Appendix is a boundary diagram, an isometric drawing showing the pipe break locations and an interaction matrix which indicates all potential interactions between the source for each postulated break location and the selected target due to pipe whip or jet impingement. Interactions are defined as follows.

7.3.1 (A) Acceptable: Interaction not possible or causes no damage.

7.3.2 (D) Damage Possible: Further evaluation required.

It should be noted that interactions falling within the last category, "D", does not mean that the occurring damage will impair the safety function of the target. Each interaction falling within this category will be evaluated individually, in the interaction evaluations, to assure that such possible damage does not prevent the safe shutdown of the reactor or that the damage does not impair the safety function of the target.

The single active failure criteria is considered in preparing the interaction evaluations.

TABLE I

PIPING SYSTEMS AND ENERGY RESERVOIRS

SYSTEM	ENERGY RESERVOIR
Reactor Coolant Loops	Reactor Vessel
Safety Injection	Reactor Vessel
Charging	Reactor Vessel
Residual Heat Removal	Reactor Vessel
Pressurizer Surge	Reactor Vessel
Feedwater	Steam Generator and Feedwater System Outside Containment
Main Steam	Steam Generator and Main Steam System Outside Containment
Heating Steam	Service Boiler
Reactor and Pressurizer Head Vent	Reactor Vessel

TABLE II

ACCIDENT MITIGATION AND SAFE SHUTDOWN EQUIPMENT

Component	Location
A. High Pressure Safety Injection System	
1. HPSI Pumps**	Primary Auxiliary Building
2. SI-MOV-861A, B, C, D**	Containment-Loop Area
3. Power Supply to Pumps**	Diesel Generator Building, Service Building, Primary Auxiliary Building
4. Power Supply to Valves 861A-D**	Diesel Generator Building, Service Building, Cable Vault, Containment
5. Associated Piping*	Primary Auxiliary Building Containment
B. Low Pressure Safety Injection System	
1. LPSI Pumps**	Primary Auxiliary Building
2. Core Deluge Valves** (MOV-871A,B)	Containment-Loop Area
3. Power Supply to Pumps**	Diesel Generator Building, Service Building, Primary Auxiliary Building
4. Power Supply to Valves 871A,B**	Service Building, Containment
5. Piping*	Primary Auxiliary Building, Containment
C. Charging System	
1. Charging Pumps**	Primary Auxiliary Building
2. CH-MOV-292B, C**	Containment-Outer Annulus
3. CH-MOV-32**	Primary Auxiliary Building

TABLE II (Page 2)

	Component	Location
4.	BA-MOV-373**	Primary Auxiliary Building
5.	LD-MOV-200**	Containment
6.	CH-MOV-257**	Primary Auxiliary Building
7.	CH-FCV-110, 110A**	Primary Auxiliary Building
8.	FH-FCV-295, 344**#	Primary Auxiliary Building
9.	FH-MOV-508, 522, 535, 578**#	Primary Auxiliary Building
10.	Power Supplies to Pumps	Diesel Generator Building, Service Building, Primary Auxiliary Building
11.	Power Supplies to Valves in Primary Auxiliary Building	Diesel Generator Building, Service Building, Primary Auxiliary Building
12.	Power Supplies to Valves in Containment	Diesel Generator Building, Service Building, Primary Auxiliary Building, Containment
13.	Associated Piping	Diesel Generator Building, Primary Auxiliary Building, Containment
D.	Residual Heat Removal System	
1.	RHR Pumps**	Primary Auxiliary Building
2.	RH-MOV-22**	Primary Auxiliary Building
3.	RH-MOV-33A,B**	Primary Auxiliary Building
4.	Power Supply to Pumps & Valves**	Diesel Generator Building, Service Building, Primary Auxiliary Building
5.	Associated Piping**	

TABLE II (Page 3)

Component	Location
E. Service Water System	
1. Service Water Pumps**	Screenwell
2. SW-MOV-1,2**	Turbine Building
3. SW-MOV-3,4,5,6**	Primary Auxiliary Building
4. Power Supply to Pumps**	Diesel Generator Building, Service Building, Screenwell
5. Power Supply to SW-MOV-1,2**	Diesel Generator Building, Turbine Building
6. Power Supply to SW-MOV-3,4,5,6**	Diesel Generator Building, Primary Auxiliary Building
7. Associated Piping*	Screenwell, Service Building, Turbine Building, Primary Auxiliary Building, Containment
F. Containment Heat Removal System	
1. Containment Air Recirculation Fan Motors**	Containment
2. Containment Air Recirculation Fan Dampers**	Containment
3. Power Supply to Fan Motors**	Diesel Generator Building, Service Building, Cable Vault, Containment
4. Power Supply to Fan Dampers**	Diesel Generator Building, Service Building, Cable Vault, Containment

TABLE II (Page 4)

Component	Location
G. Minimum Required Instrumentation	
1. Pressurizer Level (1 of 3 Channels)**	
2. Pressurizer Pressure (2 of 3 Channels)**##	
3. Steam Generator Level (1 of 3 Channels Each Generator)**	
4. Loop T_H or Core Exit Thermocouples**	
5. RWST Level**	
6. Volume Control Tank Level**	
7. Demineralized Water Storage Tank Level**	
8. Pressurizer Relief Valve Monitors**	
9. Containment Water Level**	
10. Containment High Range Radiation Detector**	
11. Associated Instrument Tubing and/or Cabling With All of the Above*	

KEY

*Passive Component

**Active Component

#Used in alternate charging, routed to RCS using fill header

##Safety Injection Actuation Signal (SIAS) based on 2 of 3 logic on pressurizer low pressure signals

APPENDIX

I.A RCS Hot Legs, Cold Legs and Cross-Over Legs

Small slots only...jet impingement effects.

Affected systems for break in:

Loop #1 RHR (10" AC-2501R-1) [III.B]

Return line; also RH-MOV-780

SI (4"-RC-2501R-39); also MOV-861A [I.B]
(3"-SI-1501R-9)

Loop #2 Charging (3"-CH-2501R-45); also MOV-292A [II.F]

RHR (10"-AC-1501R-9) supply line; also
RH-MOV-804 [III.A]

SI (4"-RC-2501R-40); also MOV861B [I.B]
(3"-SI-1501R-10)

Loop #3 SI (4" RC-2501R-41); also MOV-861C [I.B]
(3" SI-1501R-11)

Loop #4 SI (4" RC-2501R-42); also MOV-861D [I.B]
(3" SI-1501R-12)

Note cable routing to HPSI stop valves (shown on drawings 10899-FE-46C, 46D) is individually routed inside the reactor containment crane wall. Common mode failures of power supply to these valves (861A-D) is therefore not considered credible due to pipe whip or jet impingement effects in the RCS systems. A pipe break in a loop will therefore only potentially render inoperable the safety injection stop valve in that particular loop.

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I.B High Pressure SI Lines from RCS Loops Back to Isolation Valves 861A-D

Only a small portion of the piping is pressurized during normal operation (from the main loop piping to the isolation valves) and an energy source (RCS) only exists on the RCS side of a postulated guillotine break pipe. Any whip could only occur about an "anchor" at the RCS pipe to SI line junction. The resultant maximum length of whipping pipe would be less than four feet and would not interact with any susceptible system components.

I.C RCS Drain Header From Reactor Coolant Lines Back to Isolation Valves

The RCS drain lines normally are only pressurized from the junction with the RCS loop piping to the isolation valves. An energy source (RCS) only exists on one side (the RCS side) of a postulated break in this short length of pipe (approximately five feet maximum) in each loop and the attachments to the pressurizer surge and spray lines. No susceptible equipment or piping (based on size considerations [1½" pipe]) in this region is necessary for LOCA mitigation or safe shutdown.

I.D Reactor Coolant System Pressure Equalization Lines

All interactions with adjacent piping are acceptable based on size considerations (1½" pipe). Active adjacent equipment consists only of the high pressure safety injection isolation valve in the affected loop. Loss of the ability of this valve to perform its function (LOCA mitigation) would not create a problem due to the nature of the system routing (four lines to the individual loops).

I.E RCS Fill Header from RCS Loop Piping to Isolation Valves

No unacceptable interactions with piping based on size comparisons. Energy reservoir on one side of break only and length of piping normally pressurized is very small, about five feet. LOCA mitigation equipment not jeopardized by the break.

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I.F Reactor Coolant System Bypass Lines - 6"

Affected Systems for break in:

Loop #1 SI (4"-RC-2501R-39) and MOV-861A [I.B]
(3"-SI-1501R-9)

Loop #2 Charging (3" CH-2501R-45); also MOV-292A [I.B]

SI (4" RC-2501R-40); also MOV-861B
(3" SI-1501R-10)

Loop #3 SI (4" RC-2501R-41); also MOV-861C
(3" SI-1501R-11)

Loop #4 SI (4" RC-2501R-42); also MOV-861D
(3"-SI-1501R-12)

Break in any loop could affect one SI line--no problem due to routing configuration of the system since flow will remain available to the other three loops.

A break in Loop #2 causing failure of the charging supply to Loop #2 would also be acceptable due to the alternate routing through the loop fill lines (see Boundary Diagram in II.A).

Note that the charging pumps are not assumed to be available immediately following a LOCA event with coincident loss of off-site power (see EOP 3.1-4). The charging pumps do not have automatically routed power from the emergency diesel generators and have to be started manually later in the transient following a drop off in power demand. The safety analyses performed for the LOCA event therefore remains unaffected by this failure.

I.G Pressurizer Surge Line

The pressurizer surge line spans from the Loop #4 hot leg to the bottom of the pressurizer at elevation 19'4". The pressurizer itself is located between steam generator #3 and steam generator #4. Due to separation and shielding offered by a concrete wall between loops 3 and 4 (shown on drawing 10899-FM-2B) there are no unacceptable interactions shown in the matrices; ∴ safety analyses for LOCA remain unchanged.

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I.H Pressurizer Safety Relief Lines

Resulting depressurization of the RCS and LOCA. No unacceptable interactions indicated in the matrices; ∴ safety analysis unchanged. Pipe whip created due to energy reservoir on one side only (pressurizer side). Length of pipe which can whip is insufficient to impact targets.

I.I Pressurizer Spray Lines from Loops 3 and 4 to Pressurizer

No unacceptable interactions indicated in matrices. Same consequences as Paragraph I.H with regard to LOCA mitigation equipment.

I.J Pressurizer Auxiliary Spray Line from Charging System to Tee With Pressurizer Spray Line

The only interactions shown in the matrices are for pipe whip impacting the containment liner. It is not felt possible for any serious damage to the concrete to occur due to the thickness and high reinforcement. The liner plate is considered ductile enough to absorb any strains associated with pipe impact and resulting localized concrete crushing in the material backing up the liner plate (see Section 5.0) of the Discussion.

I.K Pressurizer Relief Lines to PORV's and Low Pressure Safety Relief Valves

Same as Paragraph I.H.

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II.A RCP Seal Injection Lines

Consequences of break: LOCA downstream of check valves near individual RCP's. No problems upstream of check valves. Only charging pump flow to containment. No unacceptable effects on mitigating equipment based on size and proximity considerations are shown in interaction matrices.

II.B Letdown Line from Loop 1 Cold Leg to Regenerative Heat Exchanger

Break locations 1-8 will result in an unisolable loss of coolant accident. Break locations 9-31 can be isolated using LD-MOV-200 (although a single failure of the valve to close would also result in an unisolable LOCA). The applicable interaction matrices show no unacceptable interactions with the LOCA mitigating systems due to separation or size considerations.

II.C Letdown Line from Inlet to Regenerative Heat Exchangers to Containment Penetration

Same as Paragram II.B (downstream of LD-MOV-200). Also, not needed for mitigating the LOCA. Containment liner interaction dismissed due to size, ductility, etc.

II.D Charging Line from Containment Penetration to the Inlet of the Regenerative Heat Exchangers (Tube Side)

Results in spill to containment of charging flow. No LOCA due to presence of check valve between RCS pressure boundary and this section of pipe.

Alternate charging path is available through loop fill lines with redundant valves inside containment (MOV's) available for new charging supply. This line-up would require manually opening valves 264 and 265 inside the primary auxiliary building as well as closing FCV-110 and 110A or MOV-20B and C. No interactions with other accident mitigating systems.

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II.E Charging Line from Regenerative Heat Exchanger E-7-1A to Junction With 3"-CH-2501R-95

Same as Paragraph II.D except interaction exists with 6"-WS-151 and 152 (service water to CAR fans). Will not be a problem, as can be seen in the flow diagram for the service water system (attached). The four CAR fans have separate supplies of service water to the individual fan motors and cooling coils. Should rupture of the charging line result in degradation of the service water line accessible (outside containment) hand operated valves are available to allow isolation of the affected train of service water to the CAR fans. Sufficient information exists to allow determination of the affected service water line should damage occur. Note that the loss of one CAR fan is not of concern due to the availability of the remaining three CAR fans.

II.F Charging from Junction with 3"-CH-2501R-74 to Loop #2 Cold Leg

Same as Paragraph II.E, except for reference to service water.

II.G Charging from Junction with 3" CH-2501R-95 to Loop #4 Hot Leg

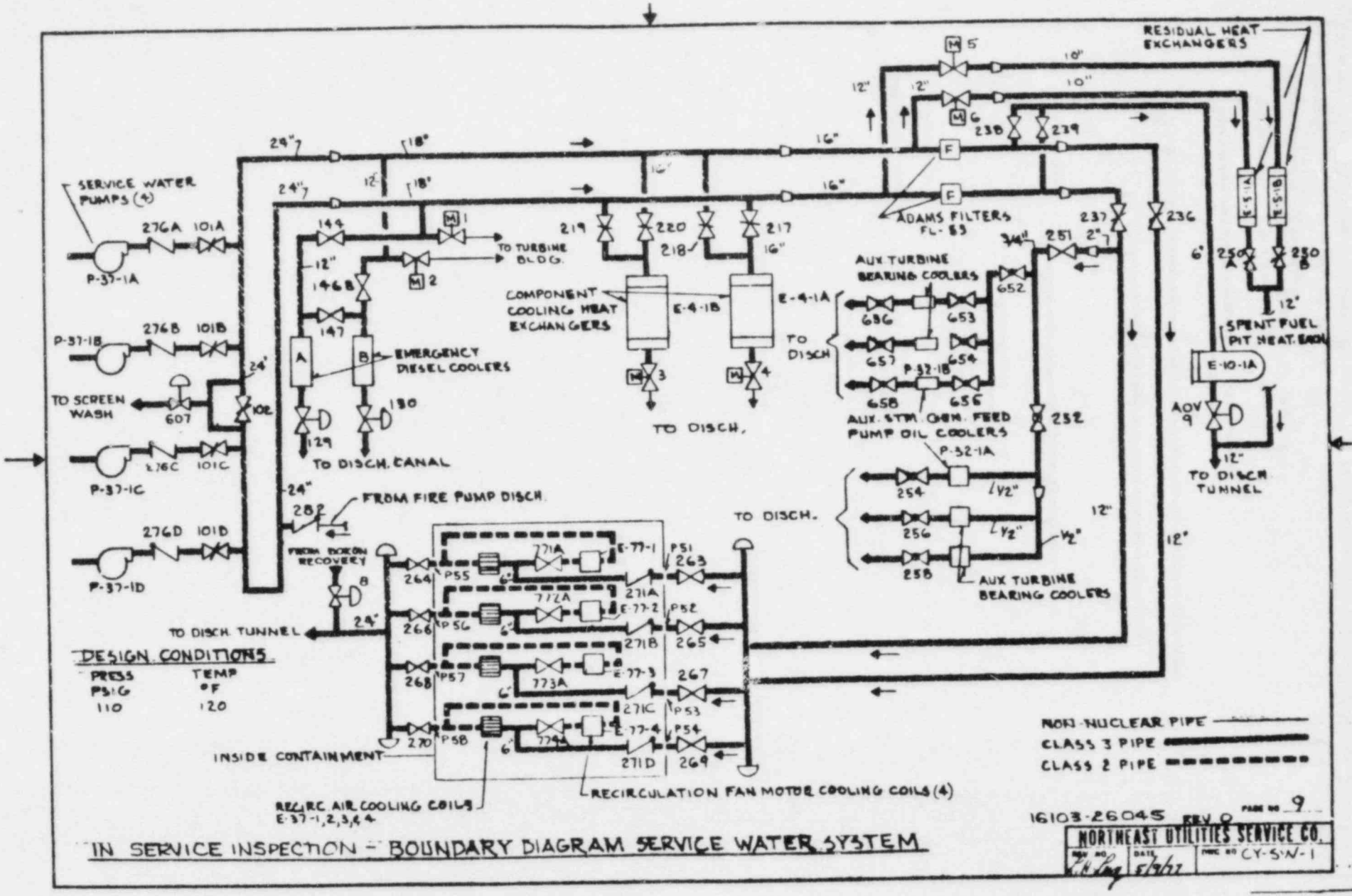
Same scenario as Paragraph II.E.

II.H Charging Line from Junction With 3" CH-2501R-74 to Auxiliary Spray FH-MOV-298

Same scenario as Pargraph II.D.

II.I Charging Return Lines from Reactor Coolant Pumps

No unacceptable interactions.



IN SERVICE INSPECTION - BOUNDARY DIAGRAM SERVICE WATER SYSTEM

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III.A Residual Heat Removal Return Line to Loop #2 Cold Leg

Interaction with charging line (3"-RC-2501R-45)(3"-CH-2501R-95) supply to Loop #2. Results in loss of charging coincident with LOCA. Charging can be isolated and rerouted through the loop fill lines as detailed previously in Section II.D. Pipe whip will only affect a limited area due to the short length of pipe which can whip (less than ten feet) with an energy source only on one side (reactor coolant system) of the postulated break.

III.B RHR Take-Off Line From Loop #1 Cold Leg

No interactions due to short length of whipping pipe (less than ten feet) with energy source only on RCS side of postulated break. Normal LOCA mitigation sequence.

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IV. Core Deluge Valves from Reactor Vessel Head to Isolation Valves 871A and 871B

A pipe break in the portion of piping between the RPV head and the isolation valves in either train of the core deluge system will result in a LOCA (up to a 30 square inch single ended break). Even though the interaction matrices do not indicate any damaging interactions with other systems, consideration of a single active failure in the unaffected core deluge isolation valve train will result in a total loss of core deluge supply to the RPV head. In this scenario since the single active failure is in the LPSI train, both HPSI pumps would be available and no ECCS flow losses will occur through the postulated break (the postulated break being higher than the hot and cold leg elevations) until the vessel is completely reflooded.

A comparison of the flow capabilities of two HPSI pumps versus one HPSI and one LPSI pump shows a maximum reduction of about 30% flow at low RCS pressures (one HPSI and one LPSI pump deliver 8900 gpm whereas two HPSI pumps yield 5300 gpm at 45 psig). The net flow loss would be smaller for higher RCS pressures.

The loss of both core deluge lines for the above described scenario would result in a total loss of LPSI in its normal line-up and also in the normal two-path recirculation mode of decay heat removal as described in Section 5.16 of Emergency Operating Procedure (EOP) 3.1-4.6. An alternate means of rerouting flow from the RHR heat exchangers to the HPSI pump(s) and the four RCS cold legs through MOV's 861A-D would be unaffected by this accident scenario. Setting up the alternate routing would involve unblocking MOV-874 (normally locked closed) and opening the valve and closing MOV-33A and 33B. This would supply flow from the downstream side of the RHR heat exchangers to the suction of the HPSI pumps through a 6" line. The flow could then be directed to the RCS through the normal HPSI flow path.

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V.A-D Steam Generator Feedwater From the Containment Penetration to Steam Generator Nozzles

Feedwater lines inside containment are unconnected except for the auxiliary feedwater lines (alternate routing to feedwater from auxiliary feed). Check valves in these lines would prevent any backflow from an intact feedwater line to a postulated break. Since normal routing of the auxiliary feedwater to the feedwater lines is totally outside containment, and no active feedwater valves are located inside containment, multiple losses within the feedwater/auxiliary feedwater systems due to a postulated break in any of the feedwater lines is not possible.

Although damaging interactions were previously indicated for the main steam lines due to a feedwater line break, these are not credible due to relative pipe size and wall thickness considerations. (The matrices have been modified to indicate such.) The main steam lines are 24" NPS and 0.969" wall thickness while the feedwater lines are 12" NPS and 0.688" wall thickness.

Damage could occur to the RCP motors as indicated in the matrices; however, these are not necessary for safe shutdown.

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VI. The portion of the auxiliary feedwater system located inside containment constitutes an alternate routing to the steam generators.

This portion of piping is not pressurized even during operation of the auxiliary feedwater system. Postulation of breaks in the auxiliary feedwater system inside containment is therefore not required.

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VII.A through VII.D Main Steam Lines Inside Containment

Interactions are shown with the RCP's, damage to the motor may result and affect operability; however, RCP operation is not required for safe shutdown. Damage to the pump casing or attached RCS piping is not considered credible based on size considerations.

Interaction matrices in previous versions of the report show potential damage to the other main steam lines for postulated main steam line breaks. This is not considered credible based on relative size considerations.

Interactions are shown with the feedwater lines in the matrices, a detailed review of the piping geometry in this region shows the following.

1. The main steam lines run in almost a straight line from the containment penetration anchor (10899-FP-1A) to the crane wall penetration. As such, the formation of a plastic hinge and the resulting pipe whip are not possible in this vicinity.

2. Inside the crane wall the main steam lines and feedwater lines run in horizontal planes at elevations 33'1" (main steam lines) and 40'0" (feedwater lines) until they approach the steam generator building which they are associated with. Postulated breaks in the main steam lines in this region will result in horizontal and/or downward motion of the main steam lines only, due to the geometry (see FP-1A, FP-1B). Pipe breaks in this region will therefore not affect the feedwater or auxiliary feedwater system.

3. Immediately before the individual main steam lines to steam generators 1 and 4 are connected to their respective steam generator, they each run vertically along the side of the steam generators, penetrate the operating floor, rise above the steam generators and connect to the top-center of each steam generator. Postulated pipe breaks in the main steam lines in this region at steam generators 1 and 4 could only potentially impact the feedwater line in that loop. The consequences of this event are not considered significantly more severe than the MSLB or FWLB, based on the following. The safety analysis performed for the MSLB is based on total loss of inventory in the affected steam generator within a very short period of time, as well as additional blowdown from the vaporization of auxiliary feedwater additions to the affected steam generator. The added failure of the feedwater

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line would not impact the mass lost during the blowdown of the initial inventory in the steam generator, only varying the rate of blowdown slightly. The assumed coincident failure of the feedwater line would preclude the addition of auxiliary feedwater to the affected steam generator and therefore prove to be less severe in terms of return to power or containment pressurization considerations.

4. The main steam lines to steam generators 2 and 3 also run vertically up the side of their respective steam generator, penetrate the operating floor, rise above the steam generator, and connect to the top-center of each steam generator. The feedwater lines to steam generators 1 and 4 run adjacent to the main steam lines feeding steam generators 2 and 3 respectively in this region. Due to the orientation of the main steam and feedwater lines in this region, pipe breaks in the main steam line in the vertical or horizontal runs of pipe adjacent to steam generator 2 (drawing 10899-FP-1A, 1B, 3L) or steam generator 3 (drawing 10899-FP-1A, 1B, 3M) will result in main steam line whip away from the feedwater lines, therefore this interaction is not considered credible. A pipe break at the steam generator to main steam line nozzle will result in main steam line whip in the upward vertical direction. Due to an offset in the vertical run of main steam piping (drawing 10899-FP-1B0 the main steam piping will contact the operating floor prior to impacting with the feedwater lines. An interaction with the feedwater lines due to a break at this location is therefore not credible.

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VIII.A-D Steam Generator Blowdown Lines

A break in the steam generator blowdown lines (2" NPS) inside containment constitutes an unisolable secondary side leak; i.e., saturated water leakage. Since no interactions are indicated in the matrices, this event will be less severe than a MSLB and be within the safety analyses for that event in terms of plant shutdown capabilities. Since the blowdown lines are individually routed to the containment penetrations, the ability to bleed saturated water from the steam generators described in Step B.2.h.1 of shutdown method II can be utilizied.

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IX. Reactor and Pressurizer Head Vents

The reactor and pressurizer head vent piping have no unacceptable interactions. Therefore the small line LOCA analysis may be used for these break locations.

X. Auxiliary Heating Steam

The auxiliary heating steam supplies the space heaters with steam in the outer annulus (see drawing 10899-FB-21A). This piping runs in the annulus pipe rack and has a potentially unacceptable interaction with the loop fill line. Since the loop fill is not necessary for safe shutdown and any damage to that line is isolable, this interaction presents only environmental concerns which are less severe than a main steam line break. Therefore, the interaction is acceptable.

8.0 CONCLUSIONS

The interaction matrices and evaluations lead to the following conclusions with regard to postulated ruptures of high energy piping systems inside containment of the Connecticut Yankee Atomic Power Plant.

8.1 For all postulated break locations, acceptable safe shutdown methods are available.

8.2 Containment integrity is maintained for all postulated pipe ruptures.

This statement is made with the assumption that the necessary instrumentation is available to arrive at and maintain a safe shutdown condition. As noted in Section 6.0, this information will be provided at a later date.

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Connecticut Yankee – High Energy Pipe Break Inside Containment
SEP Topic III – 5.A

System Description	Line Designation	System Max. Operating Pressure	System Max. Operating Temperature	Isometric # Page #	Interaction Matrix	Comments
I. Reactor Coolant System Pressure Boundary						
I.A) Hot Legs, Cold Legs, And Crossover Legs	27½" RC-2501R	2000 PSIG	585°F	CYW – 106 PG. A. 44	B.72 through B.75	1 Loop Shown, Other 3 Similar
I.B) High Pressure Safety Injection Lines From Rx. Coolant Lines Back To Isolation Valves 861 A Through 861 D	4" – RC-2501R 3" – SI-2501R	2000 PSIG	585°F	MKS-103AA (Loop 1) PG. A.29	B.54	The Remainder of the system is not normally pressurized.
				MKS-103AC (Loop 2) PG A. 36	B.61	
				MKS-103AB (Loop 3) PG. A. 53	B.84, B.85	
				MKS-103R (Loop 4) PG. A.49	B.66, B.77	
I.C) Reactor Coolant System Drain Header From Rx. Coolant Lines Back To Isolation Valves	1½" RC-2501R	2000 PSIG	585°F	CYW-1 PG. A.1 (Loop 1)	B.1	The Remainder of the system is not normally pressurized.
				CYW-2 PG. A.2 (Loop 2)	B.2 – B.4	
				CYW-3 PG A.3 (Loop 3)	B.5 – B.6	
				CYW-4 PG A.4 (Loop 4)	B.7 – B.9	
				CYW-5 PG A.5 (Surge & Spray)	B.10	

CONNECTICUT YANKEE - HIGH ENERGY PIPE BREAK INSIDE CONTAINMENT
SEP TOPIC III-5.A

SYSTEM DESCRIPTION	LINE DESIGNATION	SYSTEM MAX OPERATING PRESSURE	SYSTEM MAX OPERATING TEMPERATURE	ISOMETRIC # / PAGE #	INTERACTION MATRIX	COMMENTS
I.D) REACTOR COOLANT SYSTEM PRESSURE EQUALIZATION LINES	1½-RC-2501R	2000 psig	585 °F	CYW-14 PG. A.13 (LOOP 1)	B.29	
				CYW-15 PG. A.14 (LOOP 2)	B.30	
				CYW-16 PG. A.15 (LOOP 3)	B.31	
				CYW-17 PG. A.16 (LOOP 4)	B.32	
I.E) REACTOR COOLANT SYSTEM FILL HEADER FROM RX. COOLANT LINE BACK TO ISOLATION VALVES	1½-RC-2502R	2000 psig	585 °F	CYW-18 PG. A.17 (LOOP 1)	B.33, B.34	
				CYW-19 PG. A.18 (LOOP 2)	B.35, B.36	
				CYW-20 PG. A.19 (LOOP 3)	B.37, B.38	
				CYW-21 PG. A.20 (LOOP 4)	B.39, B.40	
				CYW-22 PG. A.21 (AUX. SPRAY)	B.41, B.42	
I.F) REACTOR COOLANT SYSTEM BYPASS LINES	6"-RC-2501R	2000 psig	585 °F	CYW-30 PG A.30 (LOOP 1)	B.55	
				CYW-34 PG. A.31 (LOOP 2)	B.56	
				CYW-36 PG. A.32 (LOOP 3)	B.57	
				CYW-40 PG. A.33 (LOOP 4)	B.58	

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CONNECTICUT YANKEE - HIGH ENERGY PIPE BREAK INSIDE CONTAINMENT
SEP TOPIC III - 5.A

SYSTEM DESCRIPTION	LINE DESIGNATION	SYSTEM MAX OPERATING PRESSURE	SYSTEM MAX OPERATING TEMPERATURE	ISOMETRIC # PAGE #	INTERACTION MATRIX	COMMENTS
I.G) PRESSURIZER SURGE LINE	10" RC-2501R	2000 psig	585 °F	CYW-38 Pg # A.39	B.65	
I.H) PRESSURIZER SAFETY RELIEF LINES FROM PZR. TO RELIEF VALVES	3" RC-2501R	2000 psig	585 °F	CYW-45 Pg # A.42	B.69	
I.I) PRESSURIZER SPRAY LINES LOOPS 3 AND 4 (COLD LEGS) TO PRESSURIZER	3" RC-2501R	2000 psig	585 °F	CYW-46 Pg. # A.43	B.70	
	2" RC-2501R			CYW-23 Pg.# A.22	B.43	
				CYW-24 Pg# A.23	B.44	
				CYW-25 Pg. # A.24	B.45, B.46	
I.J) PRESSURIZER AUXILIARY SPRAY LINE FROM TIE IN WITH 3" RC-2501R BACK TO ISOLATION VALVE - FH-MOV-298	1½" RC-2501R	2000 psig	585 °F	CYW-26 Pg # A.25	B.47, B.48, B.49	Break Locations 1-16
	2" RC-2501R					

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SEP TOPIC III - 5.A

SYSTEM DESCRIPTION	LINE DESIGNATION	SYSTEM MAX. OPERATING PRESSURE	SYSTEM MAX. OPERATING TEMPERATURE	ISOMETRIC # PAGE #	INTERACTION MATRIX	COMMENTS
I.K) PRESSURIZER RELIEF LINES FROM PZR. TO PORV's & LOW PRESSURE SAFETY RELIEF VALVES	3"-RC-2501R 2"-RC-2501R	2000 psig	585 °F	CYW-27 PG. A.27 CYW-27A PG. A.28	B.50, B.51, B.52	
II CHARGING SYSTEM (CVCS)				CYW-8 PG. A.8 (LOOP 1)	B.19	
II.A) REACTOR COOLANT PUMP SEAL INJECTION LINES	2"-CH-2502R			CYW-9 PG. A.9 (LOOP 2)	B.20	
				CYW-10 PG. A.10 (LOOP 3)	B.21	
				CYW-11 PG. A.11 (LOOP 4)	B.22	
				CYW-12 PG. A.12 (Containment Pen. to Crane wall)	B.23 through B.28	Individual Lines from cont. penetrations individual pumps.

CONNECTICUT YANKEE - HIGH ENERGY PIPE BREAK INSIDE CONTAINMENT
SEP TOPIC III-5.A

SYSTEM DESCRIPTION	LINE DESIGNATION	MAX. SYSTEM OPERATING PRESSURE	MAX. SYSTEM OPERATING TEMPERATURE	ISOMETRIC # PAGE #	INTERACTION MATRIX	COMMENTS
II.B) LETDOWN LINE FROM LOOP 1 COLD LEG TO REGENERATIVE HEAT EXCHANGER	3"RC-2501R 3"CH-2501R			CYW-31 PG A.34	B.59 B.60	
II.C) LETDOWN LINE THROUGH REGEN. HX'S (SHELL SIDE) TO CONTAINMENT PENETRATION	3"CH-2501R			MKS-103AE PG A.55 MKS-103AG PG A.57	B.87 B.89	
II.D) CHARGING LINE FROM CONTAINMENT PENETRATION TO REGENERATIVE HEAT EXCHANGER E-7-1A (TUBE SIDE)	3"CH-2502R			MKS-103AT PG A.71	T. L. (add'l)	
II.E) CHARGING LINE FROM REGENERATIVE HX. E-7-1A TO JUNCTION WITH 3"CH-2501R-95	3"CH-2501R			MKS-103AF PG A.56 MKS-103AJ PG A.58	B.88 B.92 (BREAK LOC. 31-37)	

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SEP Topic III – 5.A

System Description	Line Designation	System Max. Operating Pressure	System Max. Operating Temperature	Isometric # / Page #	Interaction Matrix	Comments
II.F) Charging Line From Junction With 3"CH-2501R-74 To Loop 2 Cold Leg	3"CH-2501R			MKS-103AS SH2 Pg. A.59 MKS-103 AS SH1 Pg. A.35	B.93, B.94 B.61	
II.G) Charging Line From Junction With 3"CH-2501R-95 To Loop 4 Hot Leg	3"CH-2501R			MKS-103 AJ Pg. A.58	B.90 B.91 (Break Locations 19-30)	
II.H) Charging Line From Junction With 3"CH-2501R-74 To Aux. Spray FH-MOV-29B	1½"CH-2501R 2"CH-2501R			CYW-26 Pg A.25	B.48 (Break Locations 17-31) B.49	
II.I) Charging Lines Return From Rx Coolant Pumps ...						

CONNECTICUT YANKEE - HIGH ENERGY PIPE BREAK INSIDE CONTAINMENT
SEP TOPIC III - 5.A

SYSTEM DESCRIPTION	LINE DESIGNATION	SYSTEM MAX. OPERATING PRESSURE	SYSTEM MAX. OPERATING TEMPERATURE	ISOMETRIC # PAGE #	INTERACTION MATRIX	COMMENTS
III.A) RESIDUAL HEAT REMOVAL SUPPLY LINE FROM LOOP 2 COLD LINE TO CONTAINMENT PENET.	10"RC-2501R	2000 PSIG	585 °F	CYW-2B MKS-103C PG A.24	B.53 Break Pts (1,2) only	Remainder of system not provided with PJ during normal operation
B) RESIDUAL HEAT REMOVAL RETURN LINE FROM LOOP 1 HOT LEG TO CONT. PENETRATION	10"RC-2501R	2000 PSIG	585 °F	CYW-35 PG. A.37 MKS-103A PG A.3B	B.64 Break Pts (1,2) only	Remainder of system not provided with PJ during normal op.
IV CORE DELUGE LINES FROM RPV HEAD TO ISOLATION VALVES 871 A & 871 B	?RC 6"SI-2501R 4"SI-2501R	2000 PSIG	585 °F	MKS-103S PG. A.65	B.102 Break Pt 1 only	Remainder of system is not provided with PJ during normal operation

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Connecticut Yankee - High Energy Pipe Break Inside Containment
SEP Topic III-5.A.

System Description	Line Designation	System max. Operating Pressure	System max. Operating Temperature	Isometric # Page #	Interaction Matrix	Comments
V) Feedwater System						
V.A) Feedwater Line From Containment Penetration To Steam Generator # 1	12" WFPD-601-7	910 PSIG	432 °F	MKS-102 Q CY-FW-1 Pg. A.45	B.76	
V.B) Feedwater Line From Containment Penetration To Steam Generator # 2	12" WFPD-601-8	910 PSIG	432 °F	MKS-102 R CY-FW-2 Pg. A.46	B.77	
V.C) Feedwater Line From Containment Penetration To Steam Generator # 3	12" WFPD-601-9	910 PSIG	432 °F	MKS-102 N CY-FW-4 Pg. A.48	B.79	

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SUBJECT _____ BY _____ DATE _____

CHKD. BY _____ DATE _____

CALC. NO. _____ REV. _____

SHEET NO. _____ OF _____

CONNECTICUT YANKEE - HIGH ENERGY PIPE BREAK INSIDE CONTAINMENT
SEP TOPIC III - 5.A

SYSTEM DESCRIPTION	LINE DESIGNATION	MAX. SYSTEM OPERATING PRESSURE	MIN. SYSTEM OPERATING TEMPERATURE	ISOMETRIC # PAGE #	INTERACTION MATRIX	COMMENTS
V D) FEEDWATER LINE FROM CONTAINMENT PENETRATION TO STEAM GENERATOR # 4	12" WFPD-601-10	910 PSIG	432 °F	MKS-102P CY-FW-3 Pg. A.47	B.78	
VI) AUXILIARY FEEDWATER LINES FROM FEEDWATER LINES BACK TO CHECK VALVES	1½" WAPD-601-21 1½" WAPD-601-7 1½" WAPD-601-10 1½" WAPD-601-9	910 PSIG	432 °F	MKS-102S Pg. A.53	B.84 BREAK LOC. (8-11), (14-17) only B.85 BREAK LOC. (20-23), (26-29)	
VII) MAIN STEAM SYSTEM						
VII A) MAIN STEAM LINE FROM CONTAINMENT PENETRATION TO STEAM GENERATOR # 1	24" SMP-601-1	910 PSIG	535 °F	MKS-101J CY-MS-1 Pg. A.49	B.80	

NORTHEAST UTILITIES SERVICE COMPANY

ED4297 5-80

SUBJECT _____ BY _____ DATE _____

CHKD. BY _____ DATE _____

CALC. NO. _____ REV. _____

SHEET NO. _____ OF _____

CONNECTICUT YANKEE - HIGH ENERGY PIPE BREAK INSIDE CONTAINMENT
SEP TOPIC III-5.A

SYSTEM DESCRIPTION	LINE DESIGNATION	MAX. SYSTEM OPERATING PRESSURE	MAX. SYSTEM OPERATING TEMPERATURE	ISOMETRIC # PAGE #	INTERACTION MATRIX	COMMENTS
V D) FEEDWATER LINE FROM CONTAINMENT PENETRATION TO STEAM GENERATOR # 4	12" WFPD-601-10	910 PSIG	432 °F	MKS-102P CY-FW-3 Pg. A.47	B.78	
VI) AUXILIARY FEEDWATER LINES FROM FEEDWATER LINE BACK TO CHECK VALVES	1½" WAPD-601-21 1½" WAPD-601-7 1½" WAPD-601-10 1½" WAPD-601-9	910 PSIG	432 °F	MKS-102S Pg. A.53	B.84 BREAK LOC. (8-11), (14-17) only B.85 BREAK LOC. (20-23), (26-29)	
VII) MAIN STEAM SYSTEM						
VII A) MAIN STEAM LINE FROM CONTAINMENT PENETRATION TO STEAM GENERATOR # 1	24" SMP-601-1	910 PSIG	535 °F	MKS-101J CY-MS-1 Pg. A.49	B.80	

ED4237 5-80

NORTHEAST UTILITIES SERVICE COMPANY

SUBJECT _____ BY _____ DATE _____

CHKD. BY _____ DATE _____

CALC. NO. _____ REV. _____

SHEET NO. _____ OF _____

CONNECTICUT YANKEE – HIGH ENERGY PIPE BREAK INSIDE CONTAINMENT
SEP TOPIC III – 5.A

SYSTEM DESCRIPTION	LINE DESIGNATION	MAX. SYSTEM OPERATING PRESSURE	MAX. SYSTEM OPERATING TEMPERATURE	ISOMETRIC # PAGE #	INTERACTION MATRIX	COMMENTS
VII .B) MAIN STEAM LINE FROM CONTAINMENT PENETRATION TO STEAM GENERATOR #2	24"SHP-601-2	910 PSIG	535 °F	MKS-101K CY-MS-2 Pg. A.50	B.81	
VII C) MAIN STEAM LINE FROM CONTAINMENT PENETRATION TO STEAM GENERATOR #3	24"SHP-601-3	910 PSIG	535 °F	MKS-101G CY-MS-3 Pg. A.51	B.82	
VII .D) MAIN STEAM LINE FROM CONTAINMENT PENETRATION TO STEAM GENERATOR #4	24"SHP-601-4	910 PSIG	535 °F	MKS-101H CY-MS-4 Pg. A.52	B.83	

CONNECTICUT YANKEE - HIGH ENERGY PIPE BREAK INSIDE CONTAINMENT
SEP TOPIC III - 5.A

SYSTEM DESCRIPTION	LINE DESIGNATION	MAX SYSTEM OPERATING PRESSURE	MAX SYSTEM OPERATING TEMPERATURE	ISOMETRIC # PAGE #	INTERACTION MATRIX	COMMENTS
VIII STEAM GENERATOR BLOWDOWN SYSTEM						
VIII.A) STEAM GENERATOR #1 BLOWDOWN FROM S.G. TO CONTAINMENT PENETRATION	2"-WGCB-601 1½"-WGCB-601	910 psig	535 °F	K-2 Sh 1,2 Pg. A.66, A67	B.103 - B.105	
VIII.B) STEAM GENERATOR #2 BLOWDOWN FROM S.G. TO CONTAINMENT PENETRATION	2"-WGCB-601	910 psig	535 °F	Sk-1 Pg A.68	B.106 - B.107	
VIII.C) STEAM GENERATOR #3 BLOWDOWN FROM S.G. TO CONTAINMENT PENETRATION	2"-WGCB-601	910 psig	535 °F	Sk-2 Pg A.69	B.108 - B.110	

NORTHEAST UTILITIES SERVICE COMPANY

SUBJECT _____ BY _____ DATE _____

CHKD. BY _____ DATE _____

CALC. NO. _____ REV. _____

SHEET NO. _____ OF _____

ED4297 5-80

ED4287 5-80

NORTHEAST UTILITIES SERVICE COMPANY

SUBJECT _____ BY _____ DATE _____

CHKD. BY _____ DATE _____

CALC. NO. _____ REV. _____

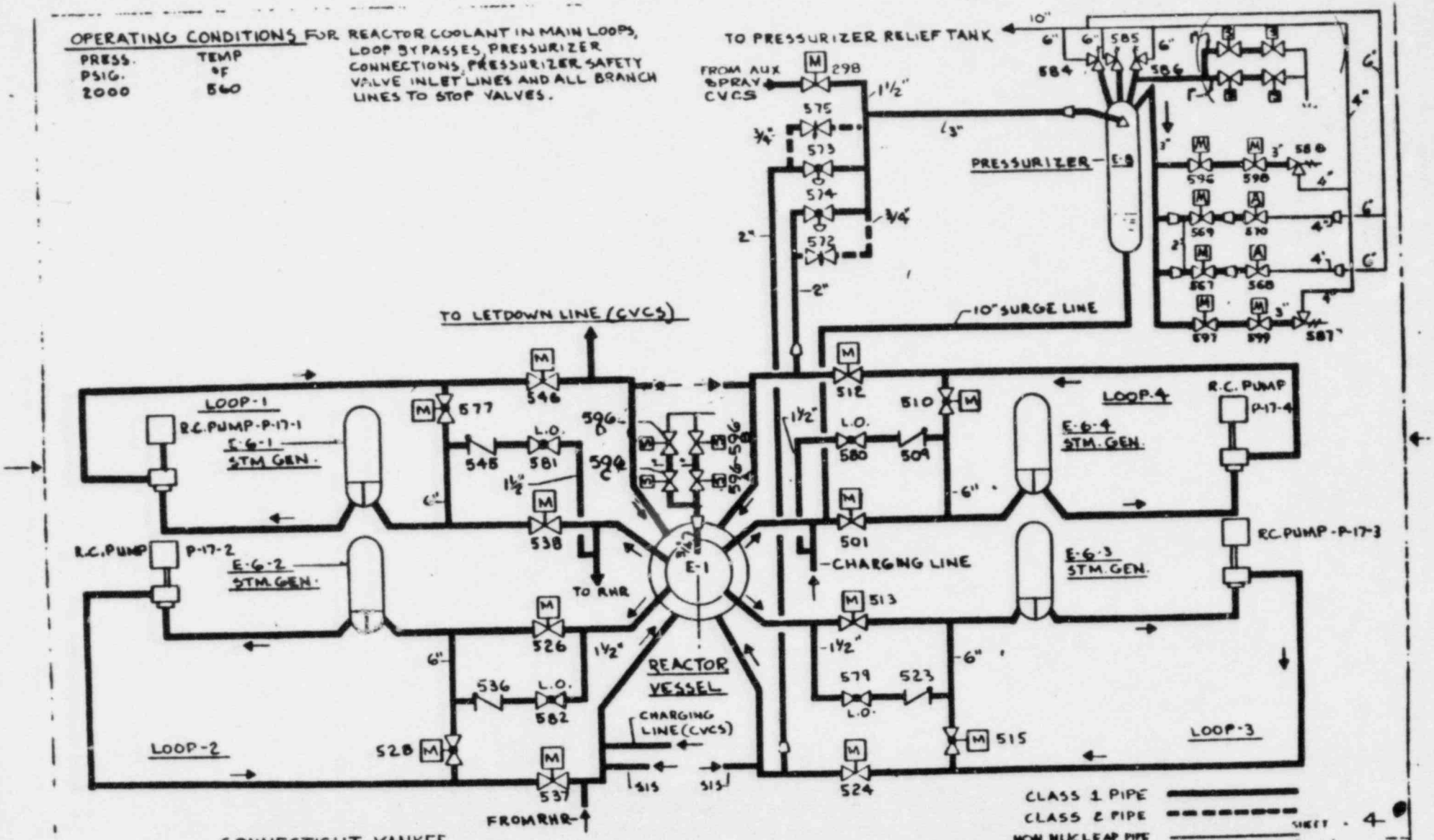
SHEET NO. _____ OF _____

CONNECTICUT YANKEE - HIGH ENERGY PIPE BREAK INSIDE CONTAINMENT
SEP TOPIC III - 5.A

SYSTEM DESCRIPTION	LINE DESIGNATION	SYSTEM OPERATING PRESSURE	SYSTEM OPERATING TEMPERATURE	ISOMETRIC # PAGE #	INTERACTION MATRIX	COMMENTS
VIII.D) STEAM GENERATOR #4 BLOWDOWN FROM S.G. TO CONTAINMENT PENETRATION	2"WCCB-601	910 psig	535 °F	Sk-4 Pg A-70	B.III-112	
IX Rx and Pzr. HEAD VENT PIPING FROM HEAD TO ISOLATION VALVES	1"RC250l	2000 psi	585°F			
X Auxiliary Heating Steam Lines to Spray Heaters	SLPH-151	100 psi	330°F			

OPERATING CONDITIONS FOR REACTOR COOLANT IN MAIN LOOPS, LOOP BYPASSES, PRESSURIZER CONNECTIONS, PRESSURIZER SAFETY VALVE INLET LINES AND ALL BRANCH LINES TO STOP VALVES.

PRESS. PSIG.	TEMP °F
2000	560



CONNECTICUT YANKEE

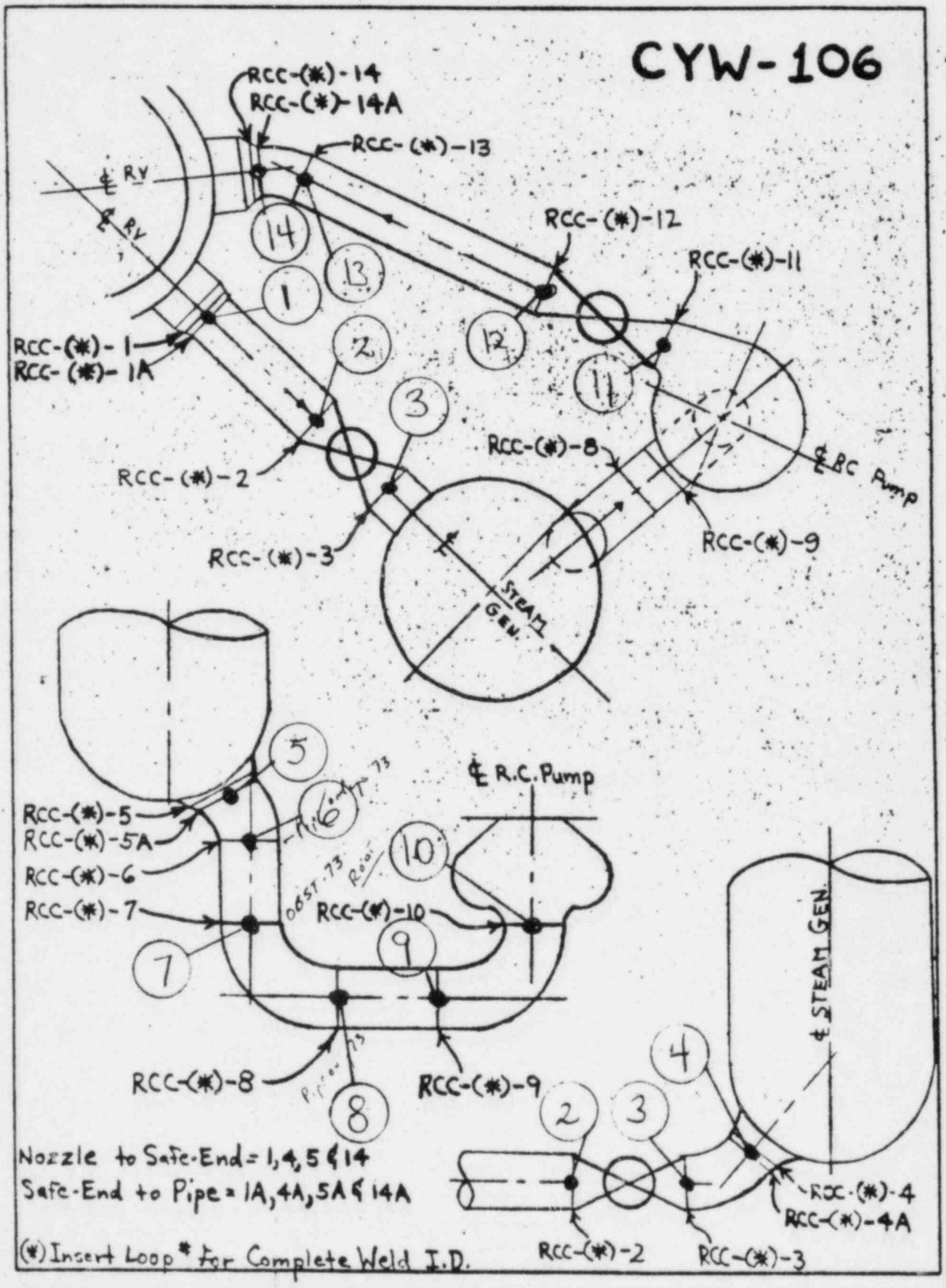
IN-SERVICE INSPECTION -- BOUNDARY DIAGRAM REACTOR COOLANT SYS.

SHEET 4 OF 10

16103-26045

SKETCH SHEET
FORM 28577

WESTINGHOUSE ELECTRIC CORPORATION



5-12

D = Damage Possible Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE													
	SYSTEM	REACTOR COOLANT												
	LINE	LOOP # 1												
	DRAWING	CYW-106												
	BREAK PT.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Reactor Coolant*		A	←	―	―	―	―	―	―	―	―	―	―	―	→ A
Main Steam*		A	←	―	―	―	―	―	―	―	―	―	―	―	→ A
Feedwater*		A	←	―	―	―	―	―	―	―	―	―	―	―	→ A
Charging*		A	←	―	―	―	―	―	―	―	―	―	―	―	→ A
Residual Heat Removal* 10-AC-2501R-1		D	←	―	―	―	―	―	―	―	―	―	―	―	→ D
Service Water*		A	←	―	―	―	―	―	―	―	―	―	―	―	→ A
Safety Injection 3-SI-1501R-9 MOV-862A		D	←	―	―	―	―	―	―	―	―	―	―	―	→ D
Containment Liner		A	←	―	―	―	―	―	―	―	―	―	―	―	→ A

*Minimum Required Safe Shutdown System

LEGEND

D = Damage Possible, Further Evaluation Required

A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE														
	SYSTEM	REACTOR COOLANT													
	LINE	LOOP #2													
	DRAWING	CY 40-106													
	BREAK PT.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Reactor Coolant*		A	←												→ A
Main Steam*		A	←												→ A
Feedwater*		A	←												→ A
Charging* 3-CH-2501R-45		D	←												→ D
Residual Heat Removal* 10-AC-2501R-9		D	←												→ D
Service Water*		A	←												→ A
Safety Injection 3-SI-1501R-10 MOV-8813		D	←												→ D
Containment Liner		A	←												→ A

*Minimum Required Safe Shutdown System

D = Damage Pos... Evaluation ...
A = Acceptable (da... not possible) or No Interaction

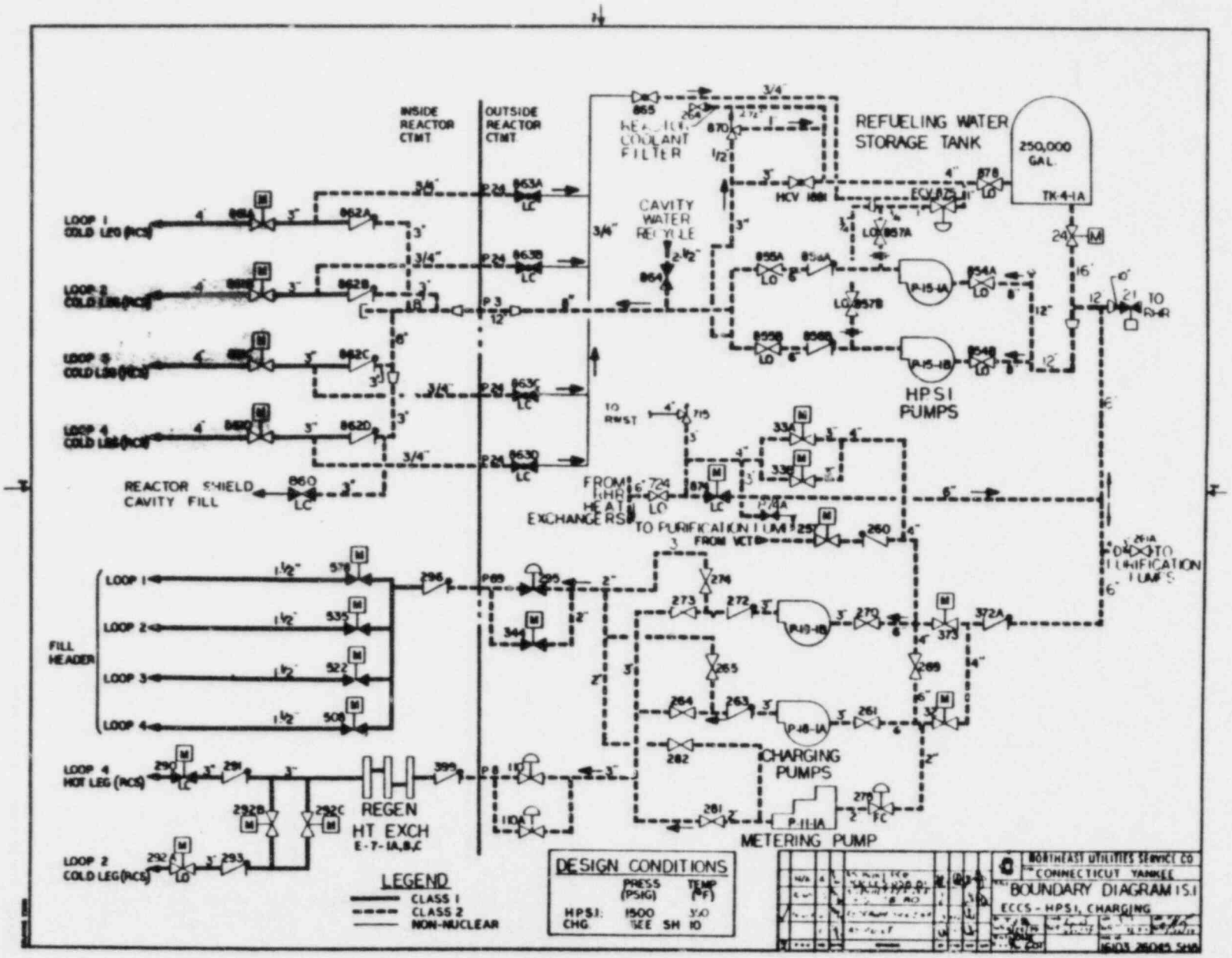
TARGET	SOURCE
SYSTEM	REACTOR COOLANT
LINE	LOOP #3
DRAWING	CYW-106
BREAK PT.	1 2 3 4 5 6 7 8 9 10 11 12 13 14
Reactor Coolant*	A ◄——————————► A
Main Steam*	A ◄——————————► A
Feedwater*	A ◄——————————► A
Charging*	A ◄——————————► A
Residual Heat Removal*	A ◄——————————► A
Service Water*	A ◄——————————► A
Safety Injection 3-SI-1501R-11 MOV-861C	D ◄——————————► D
Containment Liner	A ◄——————————► A

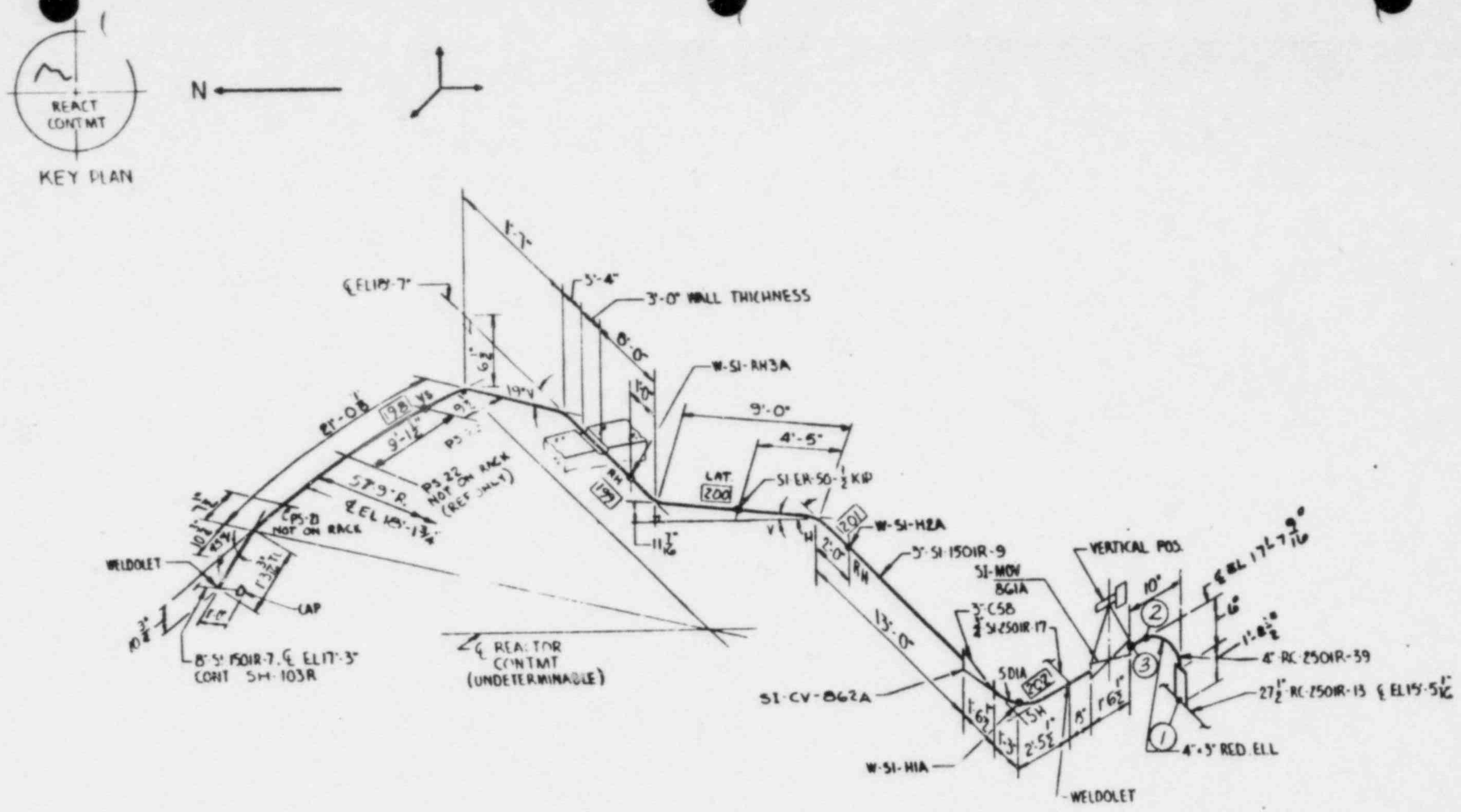
*Minimum Required Safe Shutdown ...stem

D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	REACTOR COOLANT
LINE	LOOP #4
DRAWING	CYW-106
BREAK PT.	1 2 3 4 5 6 7 8 9 10 11 12 13 14
Reactor Coolant*	A ◄——► A
Main Steam*	A ◄——► A
Feedwater*	A ◄——► A
Charging*	A ◄——► A
Residual Heat Removal*	A ◄——► A
Service Water*	A ◄——► A
Safety Injection (3"SI-1501R-12) MOV-861D	D ◄——► D
Containment Liner	A ◄——► A

*Minimum Required Safe Shutdown System


INSIDE REACTOR CTMT
OUTSIDE REACTOR CTMT
REACTOR COOLANT FILTER
REFUELING WATER STORAGE TANK
250,000 GAL.
TK-4-1A
CAVITY WATER RECYCLE
LOOP 1 COLD LEG (RCS)
LOOP 2 COLD LEG (RCS)
LOOP 3 COLD LEG (RCS)
LOOP 4 COLD LEG (RCS)
REACTOR SHIELD CAVITY FILL
HPSI PUMPS
P-15-1A
P-15-1B
TO RWST
FROM RHR HEAT EXCHANGERS
TO PURIFICATION LINES
FROM VCT
TO PURIFICATION LINES
FILL HEADER
LOOP 1
LOOP 2
LOOP 3
LOOP 4
CHARGING PUMPS
P-18-1A
P-18-1B
METERING PUMP
P-11-1A
LOOP 4 HOT LEG (RCS)
LOOP 2 COLD LEG (RCS)
REGEN HT EXCH
E-7-1A,B,C
LEGEND
CLASS 1
CLASS 2
NON-NUCLEAR
DESIGN CONDITIONS
PRESS (PSIG)
TEMP (°F)
HPSI
CHG
1500
SEE SH 10
350
NORTHEAST UTILITIES SERVICE CO.
"CONNECTICUT YANKEE"
BOUNDARY DIAGRAM 1S.1
ECCS - HPSI, CHARGING



REF DWG'S 16103-20011 SH-5, SH-7, SH-19

UNCONTROLLED

NO INSULATION

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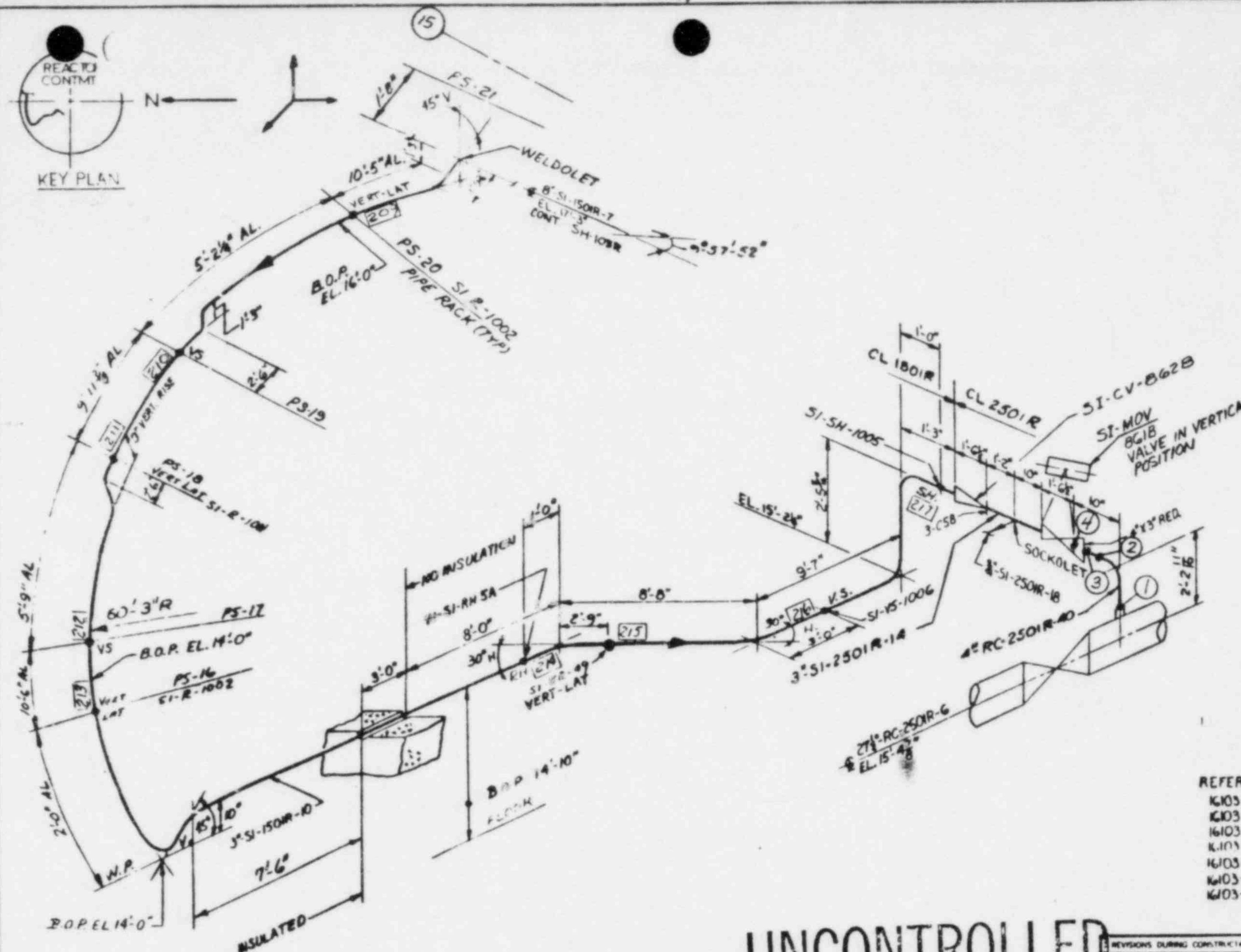
S&W DWG. NO.13429.01-MKS-103AA

REVISIONS DURING CONSTRUCTION	
NORTHEAST UTILITIES SERVICE CO	
CONNECTICUT YANKEE	
SAFETY INJECTION TO LOOP 1.	
16103	20231 SH-103AA



REFERENCE DWGS
16103-20011 SH. 3
16103-20011 SH. 5
16103-20011 SH. 19
16103-20011 SH 20
16103-20011 SH 21
16103-20079 SH 1
16103-20079 SH 2

UNCONTROLLED

INSULATION THICKNESS = 3" AS NOTED.

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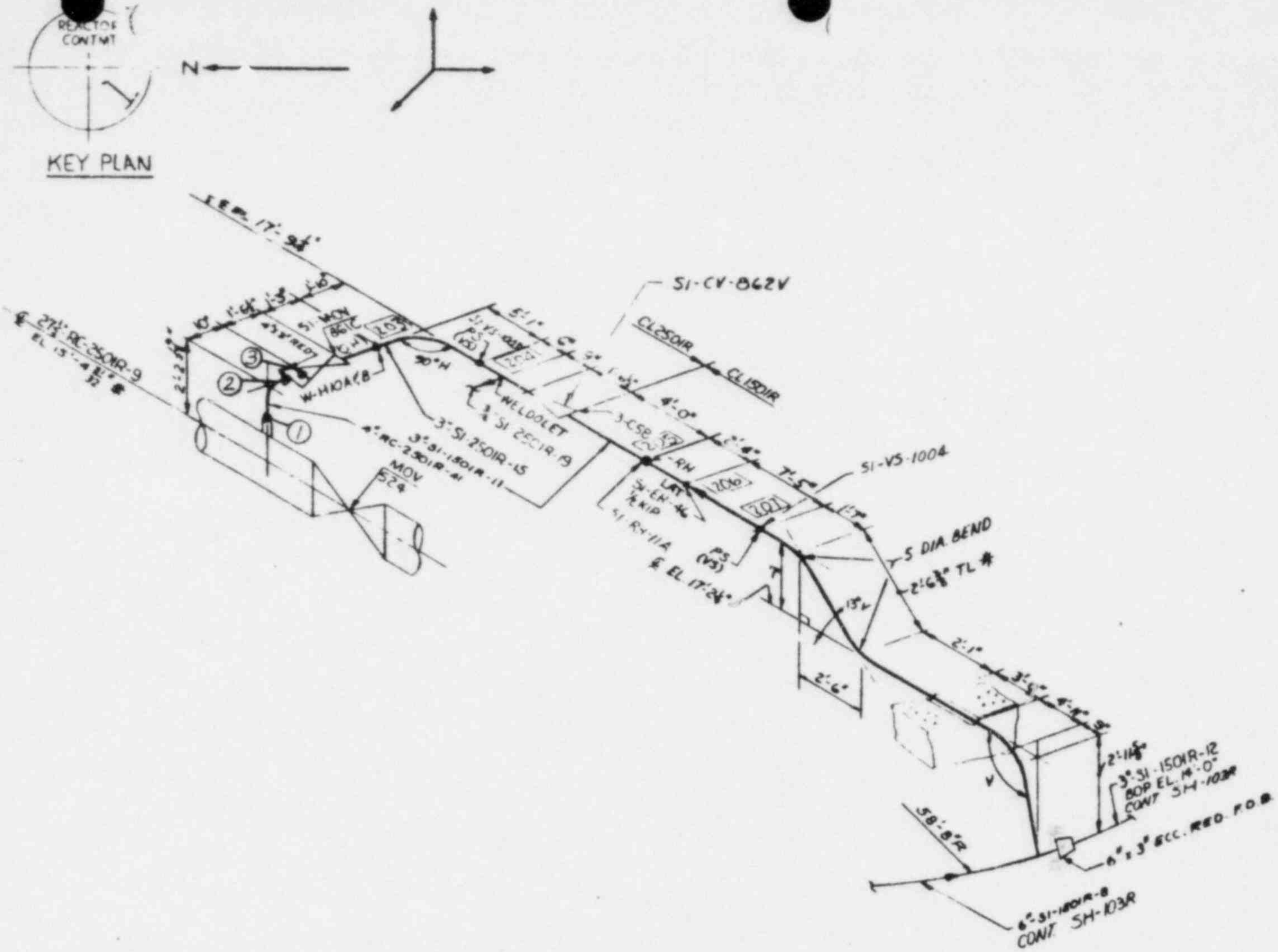
STONE & WEBSTER ENGINEERING CORPORATION
AND IS "AS BUILT" UNLESS OTHERWISE NOTED
S&W DWG. NO.13429.01-MKS-103AC-

REVISIONS DURING CONSTRUCTION

NORTHEAST UTILITIES SERVICE CO
FOR CONNECTICUT YANKEE
SAFETY INJECTION LINE 3" SI-1501R-10
TO LOOP - 2

MSJ 9-7-79
16103
20231-SH 103AC



REFERENCE DWGS
16103-20011-SH.4
16103-20011-SH.6
16103-20011-SH.15
16103-20011-SH.16
16103-20073 SH.1
16103-20073 SH.2

UNCONTROLLED

* NOT VERIFIED AS BUILT

NO INSUL.

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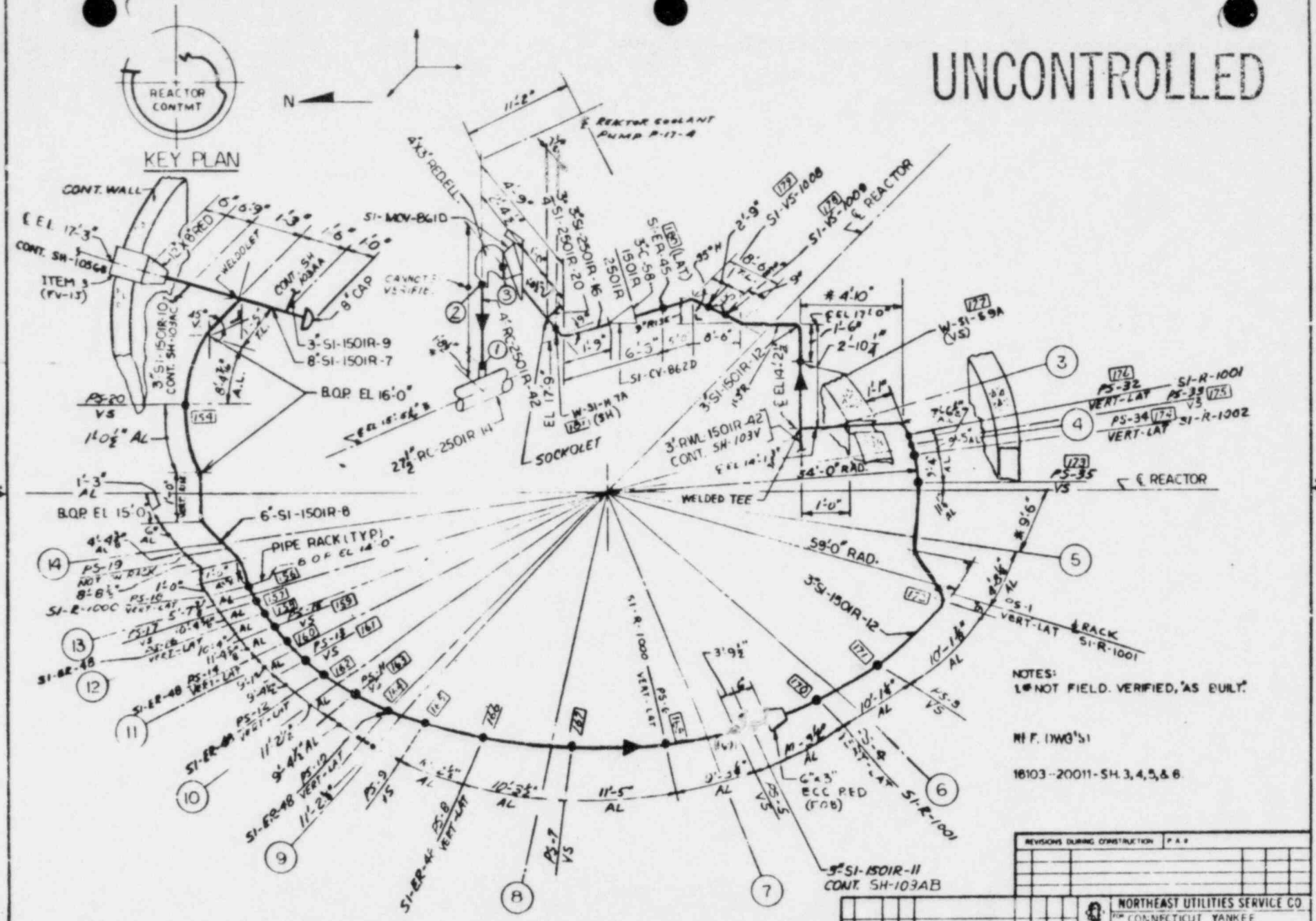
STONE & WEBSTER ENGINEERING CORPORATION
AND IS "AS BUILT" UNLESS OTHERWISE NOTED
S&W DWG. NO. 13429.01-MKS-103AB

NORTHEAST UTILITIES SERVICE CO.
CONNECTICUT YANKEE
SAFETY INJECTION LINE 3"SI-1501R-11 TO LOOP 3
16103

UNCONTROLLED



NOTES:
1. NOT FIELD VERIFIED, "AS BUILT".

REF. DWG'S:

16103-20011-SH. 3, 4, 5, & 6.

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S&W DWG. NO. 13429.01-MKS-103R

NO INSUL.

REVISIONS DURING CONSTRUCTION	P.A.#

NORTHEAST UTILITIES SERVICE CO.
FOR CONNECTICUT YANKEE

HPSI TO LOOP 4

F.W.S.	DWN.	SCALE	DATE

16103 | 20231-SH 103R

LEGEND

D = Damage Possible; Further Evaluation Required

A = Acceptable (Damage Not Possible) or No Interaction

SOURCE	
SYSTEM	HPSI to Reactor Coolant Loop #1
LINE	4-RC-2501R-39 &
DRAWING	MKS-103AA (CYW-29)
TARGET / BREAK PT.	1 2 3
Reactor Coolant*	A ↔ A
Main Steam*	A ↔ A
Feedwater*	A ↔ A
Charging*	A ↔ A
Residual Heat Removal*	A ↔ A
Service Water*	A ↔ A
Safety Injection	A ↔ A
Containment Liner	A ↔ A

* Minimum Required Safe Shutdown System

LEGEND

D = Damage Possible; Further Evaluation Required

A = Acceptable (Damage Not Possible) or No Interaction

● = Minimum Required Safe Shutdown System

TARGET	SOURCE
SYSTEM	HPSI to Reactor Coolant Loop #2
LINE	1-RC-2501R-40 & 3-SI-1501R-10
DRAWING	HKS-103AC (CYW-33)
BREAK PT.	1 2 3 4
Reactor Coolant*	A ⟷ A
Main Steam*	A ⟷ A
Feedwater*	A ⟷ A
Charging*	A ⟷ A
● Residual Heat Removal*	A ⟷ A
Service Water*	A ⟷ A
Safety Injection	A ⟷ A
Containment Liner	A ⟷ A

LEGEND

D = Damage Possible; Further Evaluation Required

A = Acceptable (Damage Not Possible) or No Interaction

	SOURCE
SYSTEM	HPSI to Reactor Coolant Loop #3
LINE	3-SI-2501R-11 & 4-BC-2501R-A1
DRAWING	MKS-103AB
TARGET / BREAK PT.	1 2 3
Reactor Coolant*	A ⟷ A
Main Steam*	A ⟷ A
Feedwater*	A ⟷ A
Charging*	A ⟷ A
Residual Heat Removal*	A ⟷ A
Service Water*	A ⟷ A
Safety Injection	A ⟷ A
Containment Liner	A ⟷ A

Minimum Required Safe Shutdown System

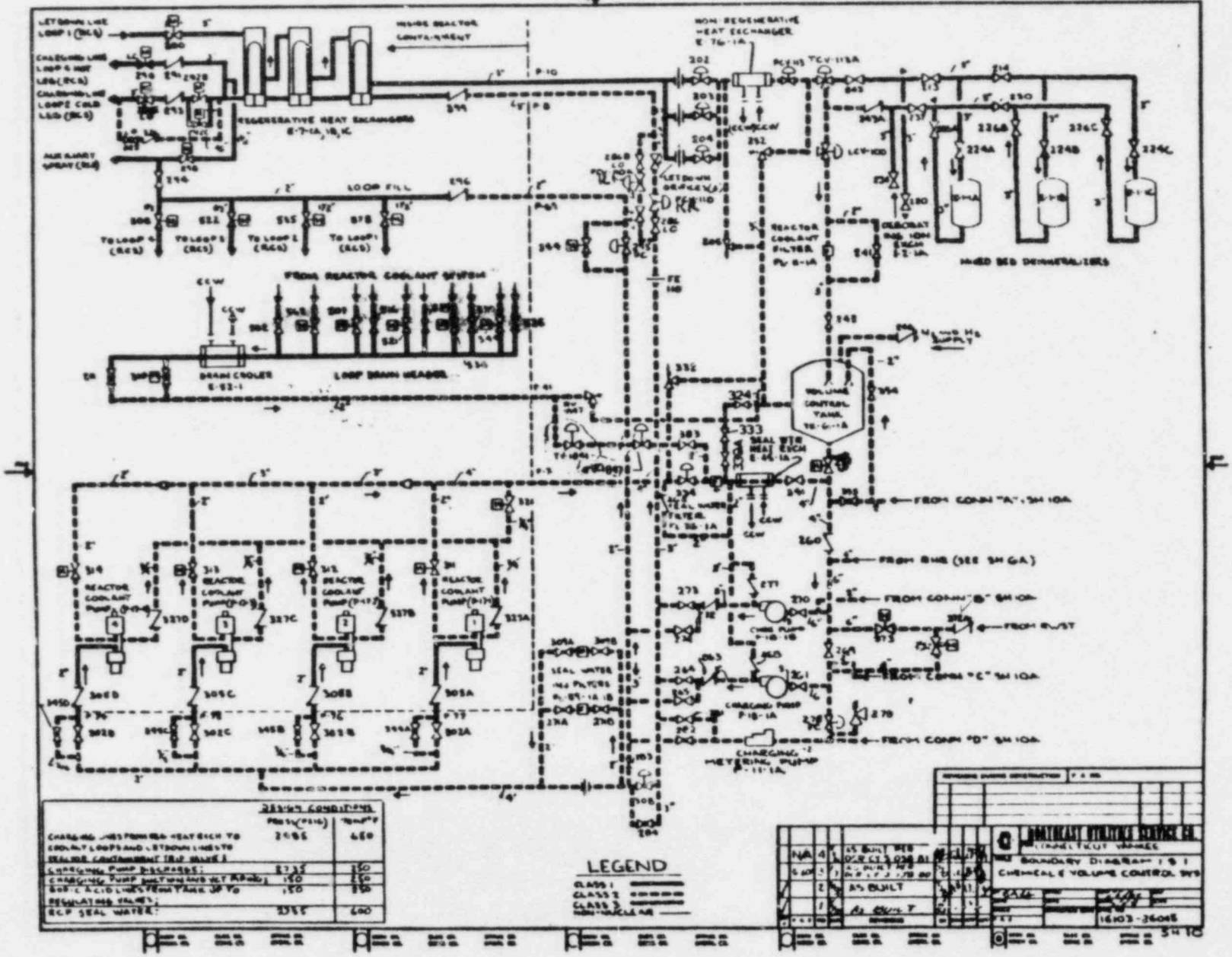
LEGEND

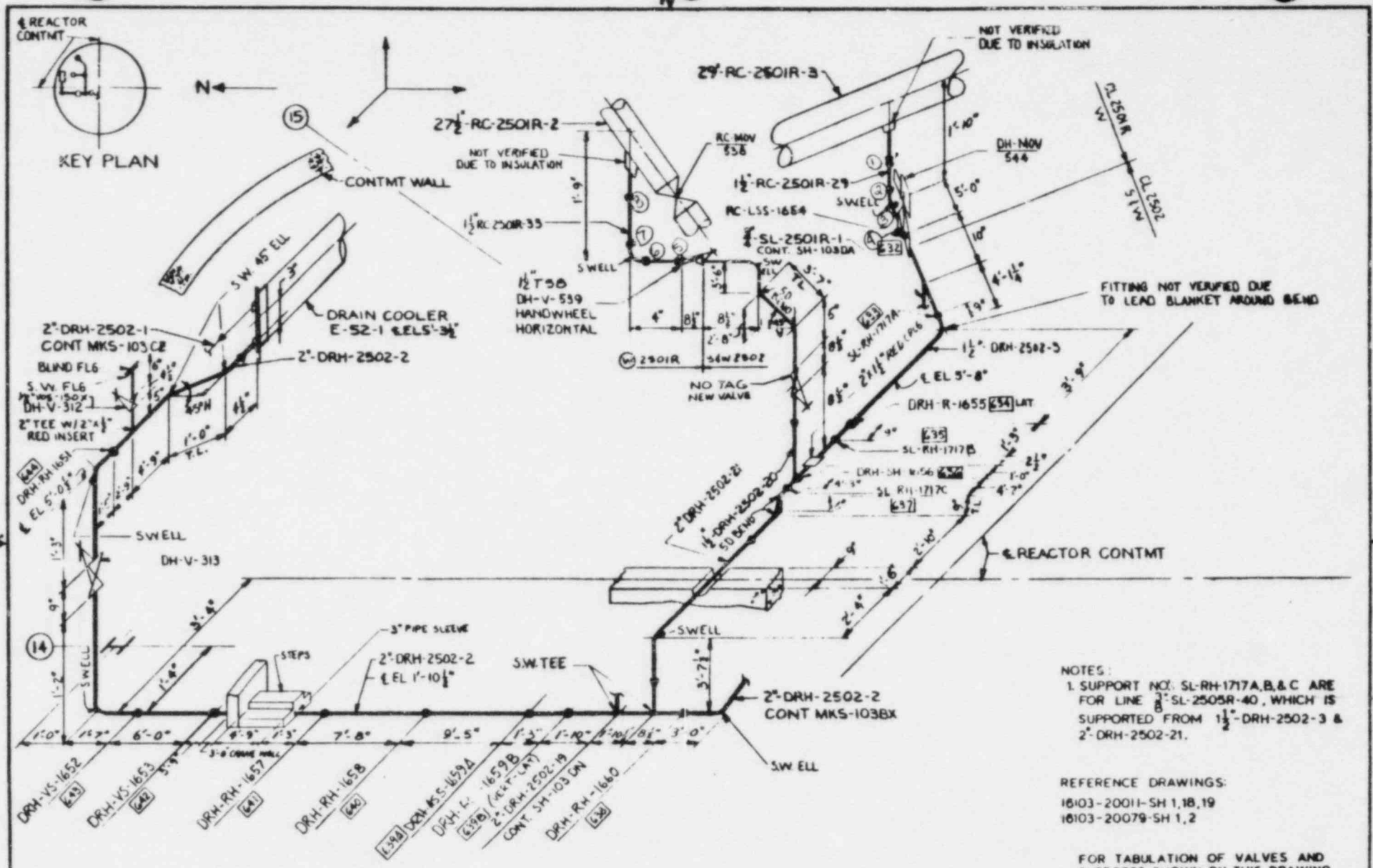
D = Damage Possible; Further Evaluation Required

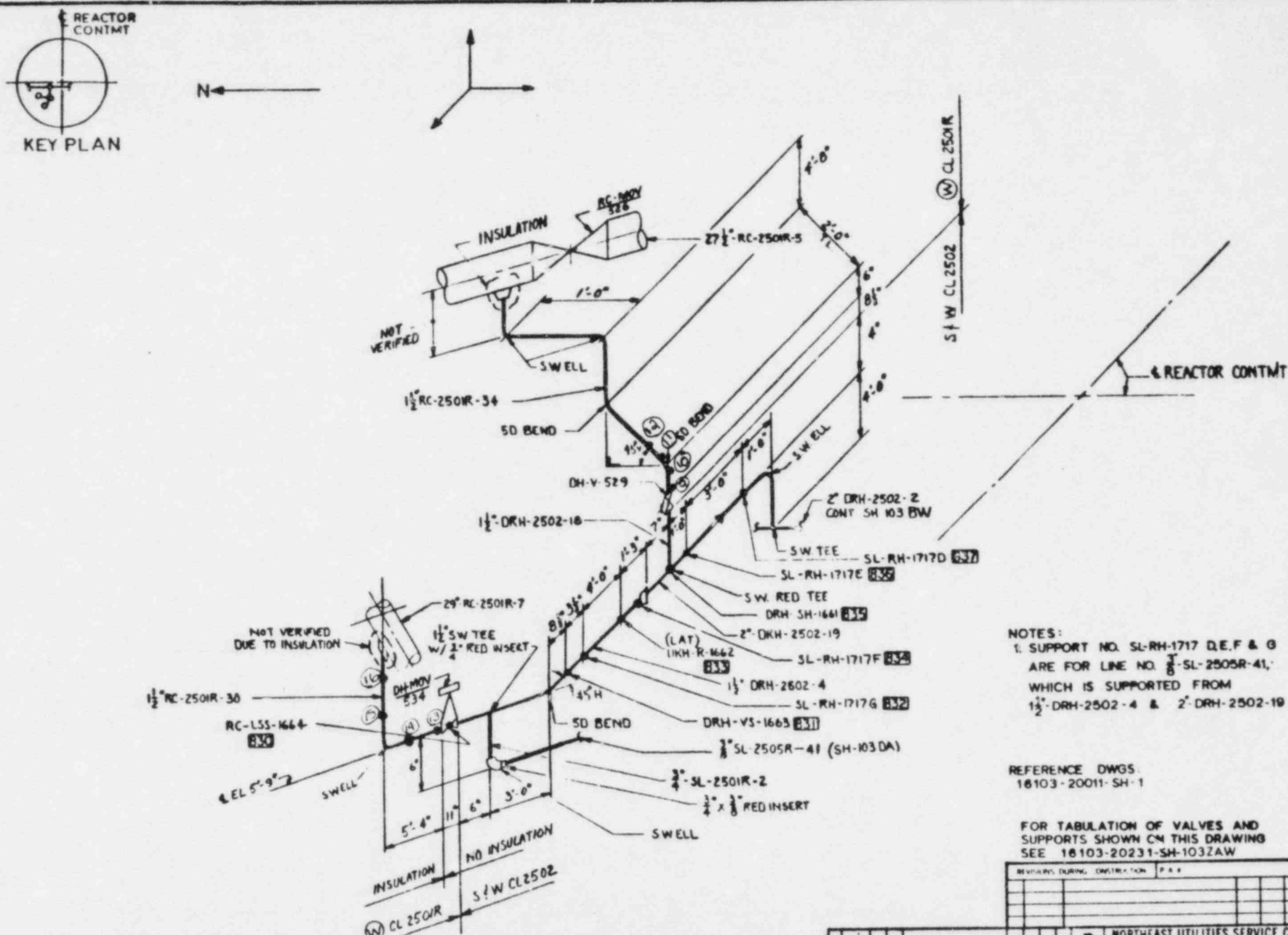
A = Acceptable (Damage Not Possible) or No Interaction

SOURCE	
SYSTEM	HPSI to Reactor Coolant Loop #4
LINE	4-RC-2501R-42 & 3-SI-1501R-12
DRAWING	MKS-103E (CYLO-41)
TARGET / BREAK PT.	1 2 3
Reactor Coolant*	A ⟷ A
Main Steam*	A ⟷ A
Feedwater*	A ⟷ A
Charging*	A ⟷ A
Residual Heat Removal*	A ⟷ A
Service Water*	A ⟷ A
Safety Injection	A ⟷ A
Containment Liner	A ⟷ A

Minimum Required Safe Shutdown System


REGENERATIVE HEAT EXCHANGER
NON-REGENERATIVE HEAT EXCHANGER
MIXED BED DEMINERALIZERS
LOOP FILL
FROM REACTOR COOLANT SYSTEM
DRAIN COOLER
LOOP DRAIN HEADER
VOLUME CONTROL TANK
REACTOR COOLANT PUMP
CHARGING PUMP
CHARGING METERING PUMP
SEAL WATER HEAT EXCH
SEAL WATER FILTER
REACTOR COOLANT FILTER
LETDOWN ORIFICES
FROM CONN "A", SH 10A
FROM CONN "B" SH 10A
FROM CONN "C" SH 10A
FROM CONN "D" SH 10A
FROM RWST
FROM BMR (SEE SH 6A)
LEGEND
CLASS 1
CLASS 2
CLASS 3
NON-NUCLEAR
AS BUILT
CHEMICAL & VOLUME CONTROL SYS
16103-26015


℄ REACTOR CONTMT
KEY PLAN
N
CONTMT WALL
27½"-RC-2501R-2
NOT VERIFIED DUE TO INSULATION
RC MOV 538
1½"-RC-2501R-33
1½" T98 DH-V-539 HANDWHEEL HORIZONTAL
SWELL
29"-RC-2501R-3
NOT VERIFIED DUE TO INSULATION
1½"-RC-2501R-29
DH-MOV 544
RC-LSS-1654
2"-SL-2501R-1 CONT. SH-103DA
CL 2501R SW
CL 2502 SW
FITTING NOT VERIFIED DUE TO LEAD BLANKET AROUND BEND
1½"-DRH-2502-3
℄ EL 5'-8"
DRH-R-1655
SL-RH-1717B
SL-RH-1717C
SL-RH-1717A
2"-DRH-2502-21
1½"-DRH-2502-20
2"-DRH-2502-22
℄ REACTOR CONTMT
NO TAG NEW VALVE
DRAIN COOLER E-52-1 ℄ EL 5'-3½"
S.W. 45° ELL
2"-DRH-2502-1 CONT MKS-103CB
2"-DRH-2502-2
BLIND FLG
S. VV. FLG
DH-V-312
2" TEE W/ 2"x½" RED INSERT
DRH-RH-1651
℄ EL 5'-0½"
SWELL
DH-V-313
3" PIPE SLEEVE
2"-DRH-2502-2
℄ EL 1'-10½"
STEPS
S.W. TEE
2"-DRH-2502-2 CONT MKS-103BX
SWELL
S.W. ELL
DRH-VS-1652
DRH-VS-1653
DRH-RH-1657
DRH-RH-1658
DRH-RS-1659A
DRH-L-1659B (ACCT-LAT)
2"-DRH-2502-19 CONT. SH-103 GN
DRH-RH-1660
NOTES:
1. SUPPORT NO. SL-RH-1717A, B, & C ARE FOR LINE 2"-SL-2505R-40, WHICH IS SUPPORTED FROM 1½"-DRH-2502-3 & 2"-DRH-2502-21.
REFERENCE DRAWINGS:
18103-20011-SH 1, 18, 19
18103-20079-SH 1, 2
FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 18103-20231-SH-103ZAH & ZAJ
NO INSULATION
THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED
S&W DWG. NO. 13429.
MKS-103BW
NORTHEAST UTILITIES SERVICE CO
"CONNECTICUT YANKEE
REACTOR COOLANT
HIGH PRESSURE DRAIN PIPING
LOOP 1
1610-0231-SH-103BW



NOTES:
1. SUPPORT NO. SL-RH-1717 D,E,F & G ARE FOR LINE NO. ⅜"-SL-2505R-41, WHICH IS SUPPORTED FROM 1½"-DRH-2502-4 & 2"-DRH-2502-19

REFERENCE DWGS.
18103-20011-SH-1

FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 18103-20231-SH-103ZAW

INSULATION AS NOTED

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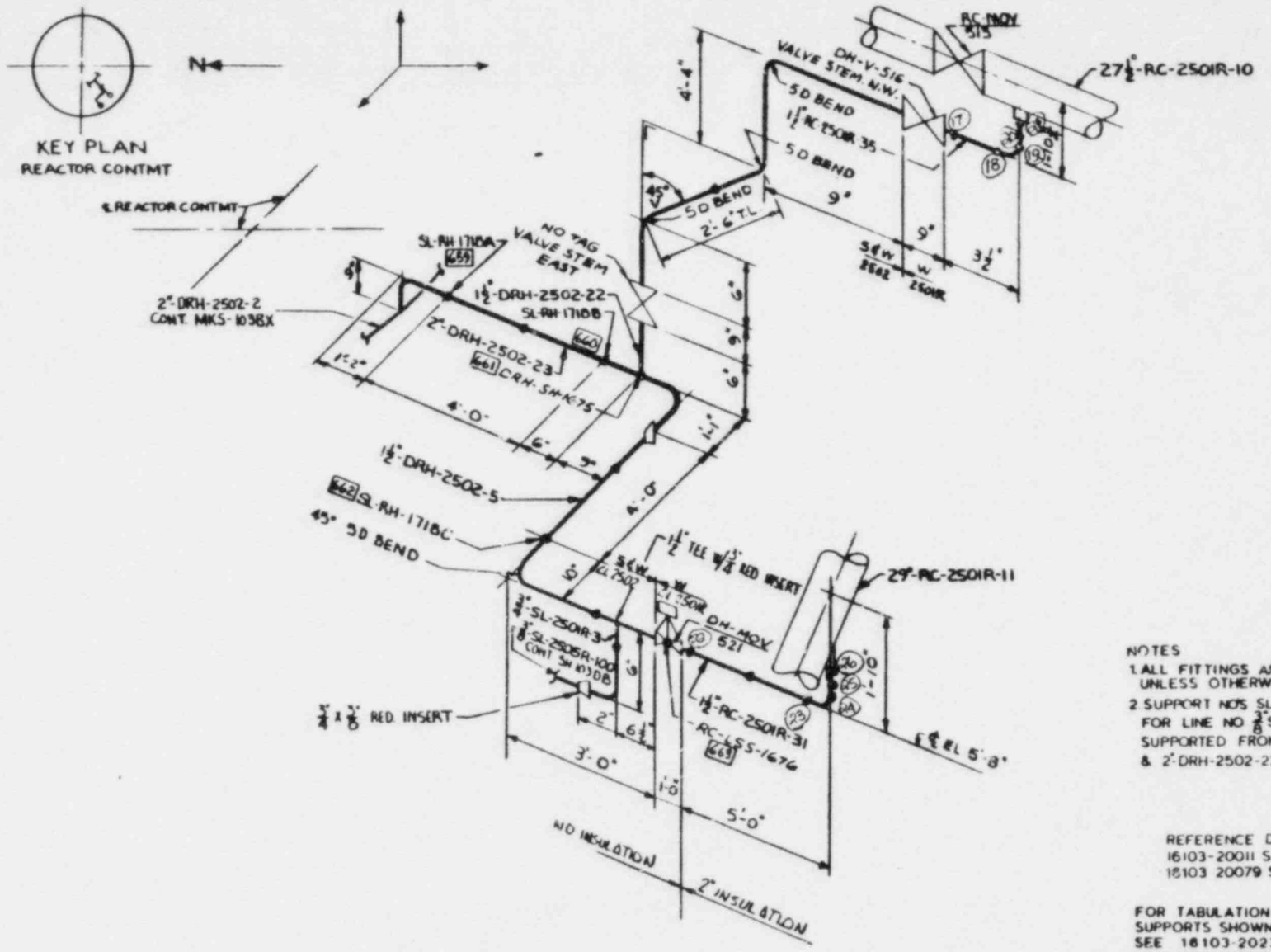
S&W DWG. NO. 134... 01-MKS-103DN

NORTHEAST UTILITIES SERVICE CO.
CONNECTICUT YANKEE
REACTOR COOLANT HIGH PRESSURE DRAIN PIPING LOOP 2
161... 20231-SH-103DN



NOTES

1. ALL FITTINGS ARE SOCKET WELD UNLESS OTHERWISE NOTED.
2. SUPPORT NOS SL-RH-1718A, B & C ARE FOR LINE NO ⅜"-SL-2505R-100 ; WHICH IS SUPPORTED FROM LINE 1½"-DRH-2502-5 & 2"-DRH-2502-23

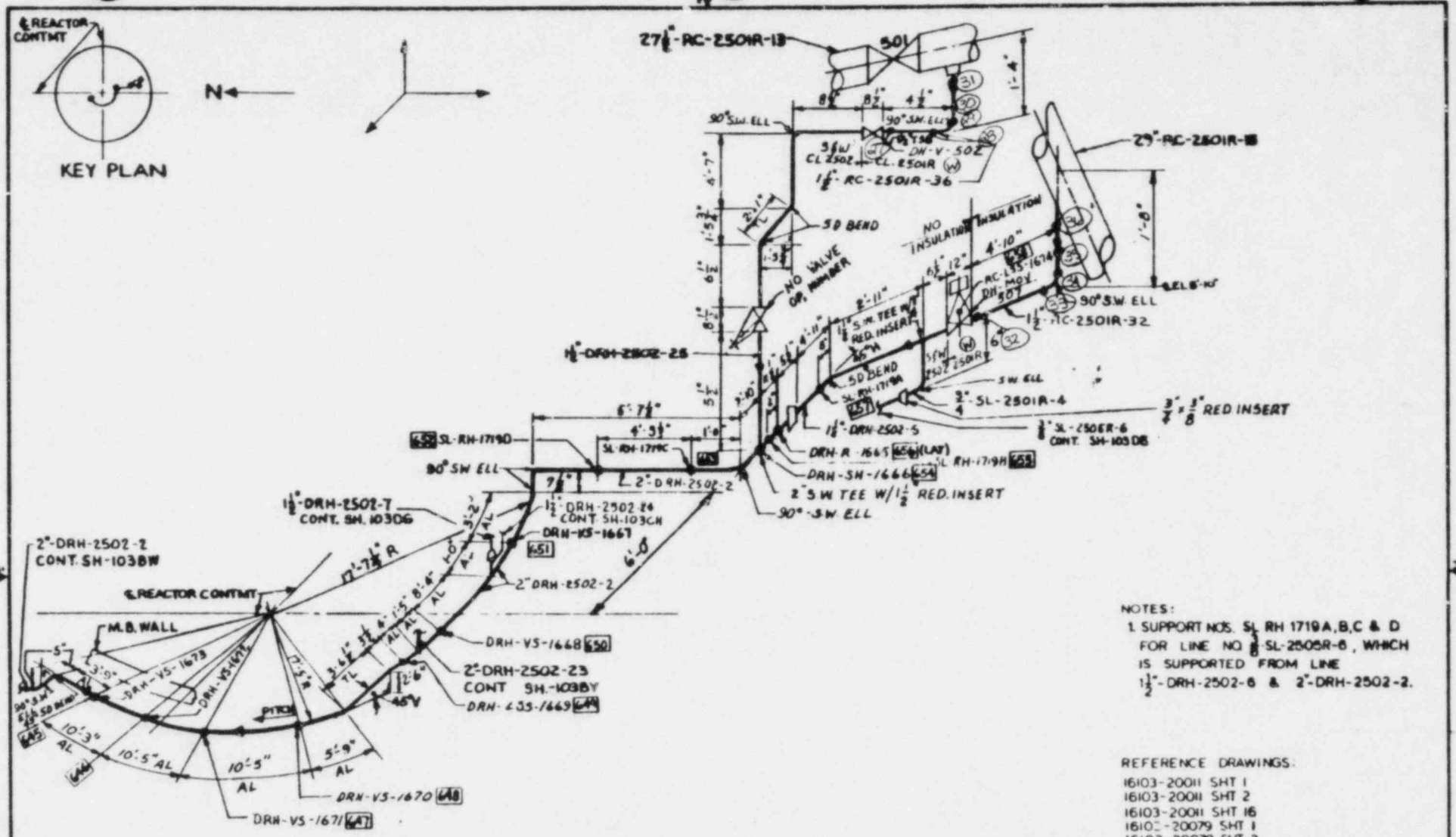
REFERENCE DRAWINGS:
16103-20011 SHT 2,15
16103 20079 SHT 1,2

FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 16103-20231-SH-103 ZAJ & ZAK

INSULATION: AS NOTED

THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED
S&W DWG. NO 13425 MKS-103BY

NORTHEAST UTILITIES SERVICE CO
"CONNECTICUT YANKEE
REACTOR COOLANT
HIGH PRESSURE DRAIN PIPING
LOOP 1
16103



NOTES:

1. SUPPORT NOS. SL RH 1719A, B, C & D FOR LINE NO. ¾"-SL-2506R-6, WHICH IS SUPPORTED FROM LINE 1½"-DRH-2502-6 & 2"-DRH-2502-2.

REFERENCE DRAWINGS:

16103-20011 SHT 1
16103-20011 SHT 2
16103-20011 SHT 16
16103-20079 SHT 1
16103-20079 SHT 2

FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 16103-20231-SH-103 ZAJ

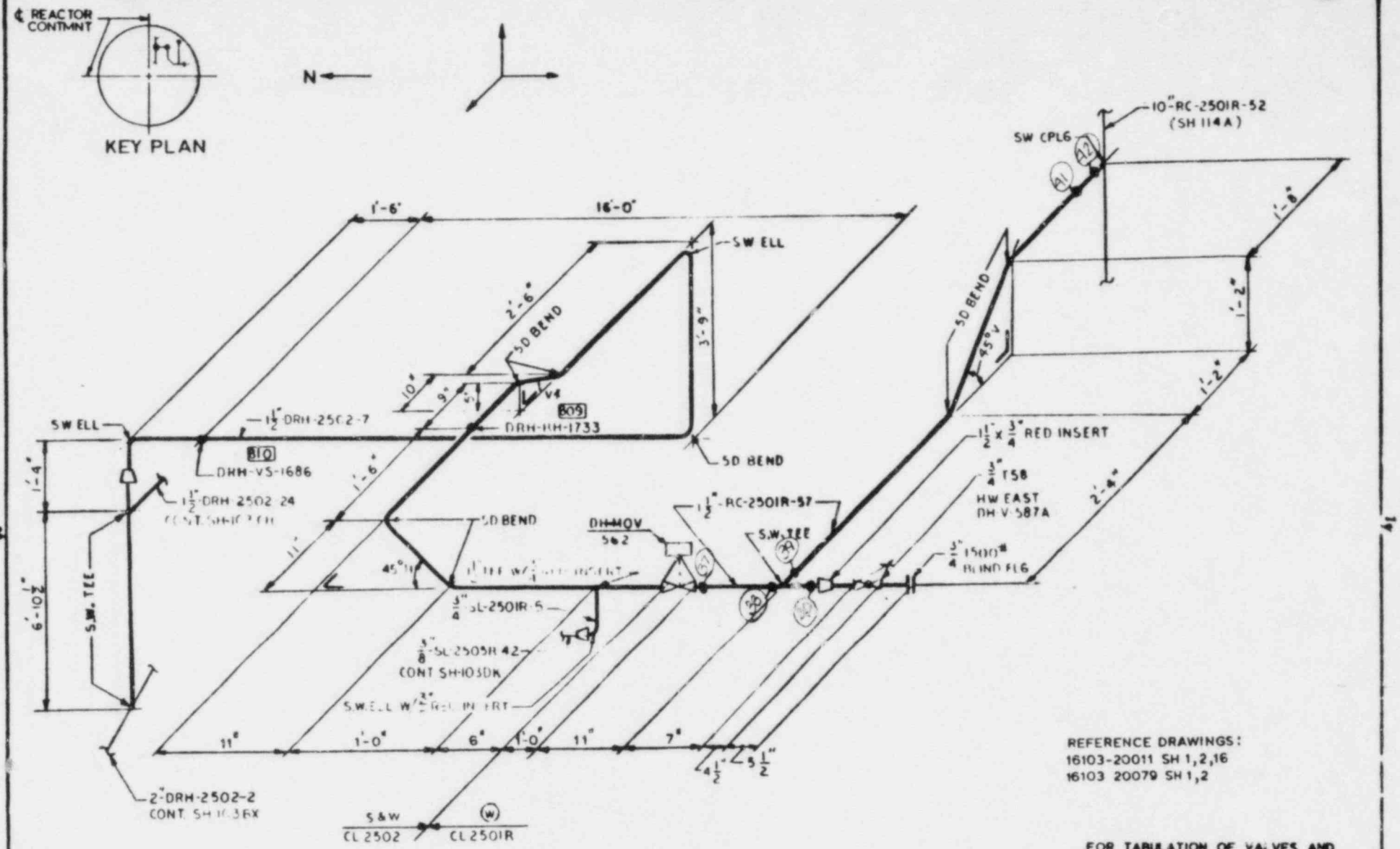
INSULATION AS NOTED

THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED

S&W DWG. NO. 134.01-MKS-103 BX

NORTHEAST UTILITIES SERVICE CO
"CONNECTICUT YANKEE
REACTOR COOLANT
HIGH PRESSURE DRAIN PIPING
LOOP 4

16IL 20231 SH-103BX



REFERENCE DRAWINGS:
16103-20011 SH 1,2,16
16103 20079 SH 1,2

FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 16103-20231-SH-103 PAV

NO INSULATION

THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED
S&W DWG. NO. 13429 MKS-103 DG

REVISIONS DURING CONSTRUCTION

NORTHEAST UTILITIES SERVICE CO
THE CONNECTICUT YANKEE
REACTOR COOLANT
HIGH PRESSURE DRAIN PIPING
LOOP 4
16103
11-SH-103DG

LEGEND

D = Damage Possible; Further Evaluation Required

A = Acceptable (Damage Not Possible) or No Interaction

TARGET	SOURCE	
	SYSTEM	Drain Header (Loop #1)
	LINE	1½-DEH-2502-3 & 1½-RC-2501E-33 & 2-DEH-2502-21
	DRAWING	1038W (CYW-1)
	BREAK PT.	1 2 3 4 5 6 7 8
Reactor Coolant*		A ← → A
Main Steam*		A ← → A
Feedwater*		A ← → A
Charging*		A ← → A
Residual Heat Removal*		A ← → A
Service Water*		A ← → A
Safety Injection		A ← → A
Containment Liner		A ← → A

Minimum Required Safe Shutdown System

LEGEND

D = Damage Possible; Further Evaluation Required

A = Acceptable (Damage Not Possible) or No Interaction

● Minimum Required Safe Shutdown System

SOURCE	
SYSTEM	Drain Header (Loop #2)
LINE	2-DRH-2502-19/18 & 1½-DRH-2502-4
DRAWING	103 DN (CYW-2)
BREAK PT.	9 10 11 12 13 14 15 16

TARGET	
Reactor Coolant*	A ← → A
Main Steam*	A ← → A
Feedwater*	A ← → A
Charging*	A ← → A
● Residual Heat Removal*	A ← → A
Service Water*	A ← → A
Safety Injection	A ← → A
Containment Liner	A ← → A

LEGEND

D = Damage Possible; Further Evaluation Required

A = Acceptable (Damage Not Possible) or No Interaction

● = Minimum Required Safe Shutdown System

SOURCE

SYSTEM	Drain Header (Loop #2)
LINE	2-DRH-2502-2/23 & 1½-DRH-2502-5 & 1½ RC-2501B-31
DRAWING	103 D4 (CYW-3)
TARGET / BREAK PT.	17 18 19 20 21 22 23 24 25 26

TARGET	
Reactor Coolant*	A ← → A
Main Steam*	A ← → A
Feedwater*	A ← → A
Charging*	A ← → A
● Residual Heat Removal*	A ← → A
Service Water*	A ← → A
Safety Injection	A ← → A
Containment Liner	A ← → A

LEGEND

D = Damage Possible; Further Evaluation Required

A = Acceptable (Damage Not Possible) or No Interaction

	SOURCE
SYSTEM	Drain Header (Loop #4)
LINE	2-DEH-2502-2 & 1½ DEH-2502-6 & 1½ RC-2501R-32
DRAWING	1038X (CYW-4)
TARGET / BREAK PT.	27 28 29 30 31 32 33 34 35 36
Reactor Coolant*	A ← → A
Main Steam*	A ← → A
Feedwater*	A ← → A
Charging*	A ← → A
Residual Heat Removal*	A ← → A
Service Water*	A ← → A
Safety Injection	A ← → A
Containment Liner	A ← → A

● Minimum Required Safe Shutdown System

LEGEND

D = Damage Possible; Further Evaluation Required

A = Acceptable (Damage Not Possible) or No Interaction

● - Minimum Required Safe Shutdown System

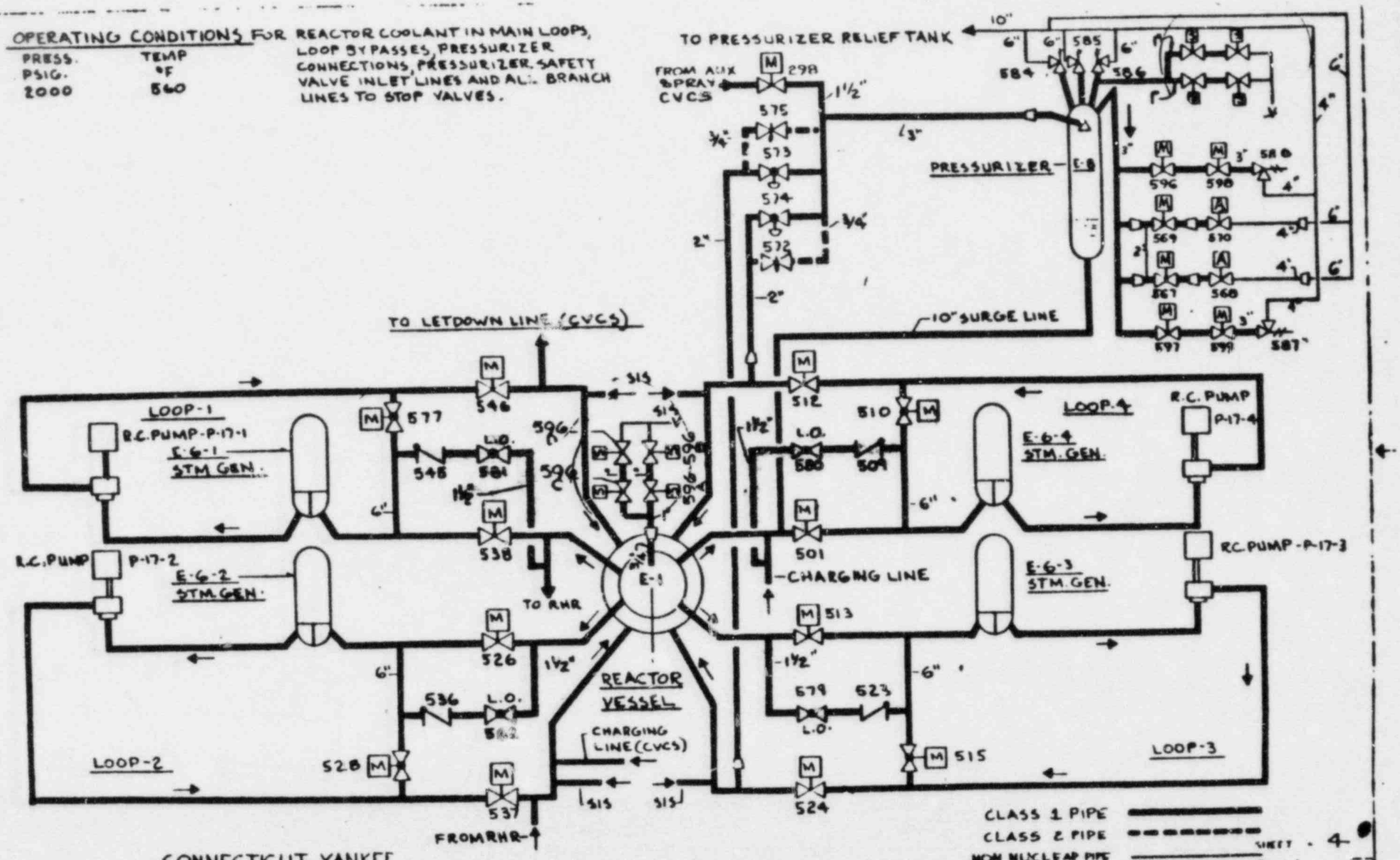
SOURCE

SYSTEM	Drain Header (Pzr Surge & Loop #4 Spray)
LINE	1½-DEH-2502-1/2A
DRAWING	103DG (CYW-5)
TARGET / BREAK PT.	37 38 39 40 41 42

TARGET	
Reactor Coolant*	A ← → A
Main Steam*	A ← → A
Feedwater*	A ← → A
Charging*	A ← → A
● Residual Heat Removal*	A ← → A
Service Water*	A ← → A
Safety Injection	A ← → A
Containment Liner	A ← → A

OPERATING CONDITIONS FOR REACTOR COOLANT IN MAIN LOOPS, LOOP BYPASSES, PRESSURIZER CONNECTIONS, PRESSURIZER SAFETY VALVE INLET LINES AND ALL BRANCH LINES TO STOP VALVES.

PRESS. PSIG.	TEMP °F
2000	560



CONNECTICUT YANKEE

IN-SERVICE INSPECTION — BOUNDARY DIAGRAM REACTOR COOLANT SYS.

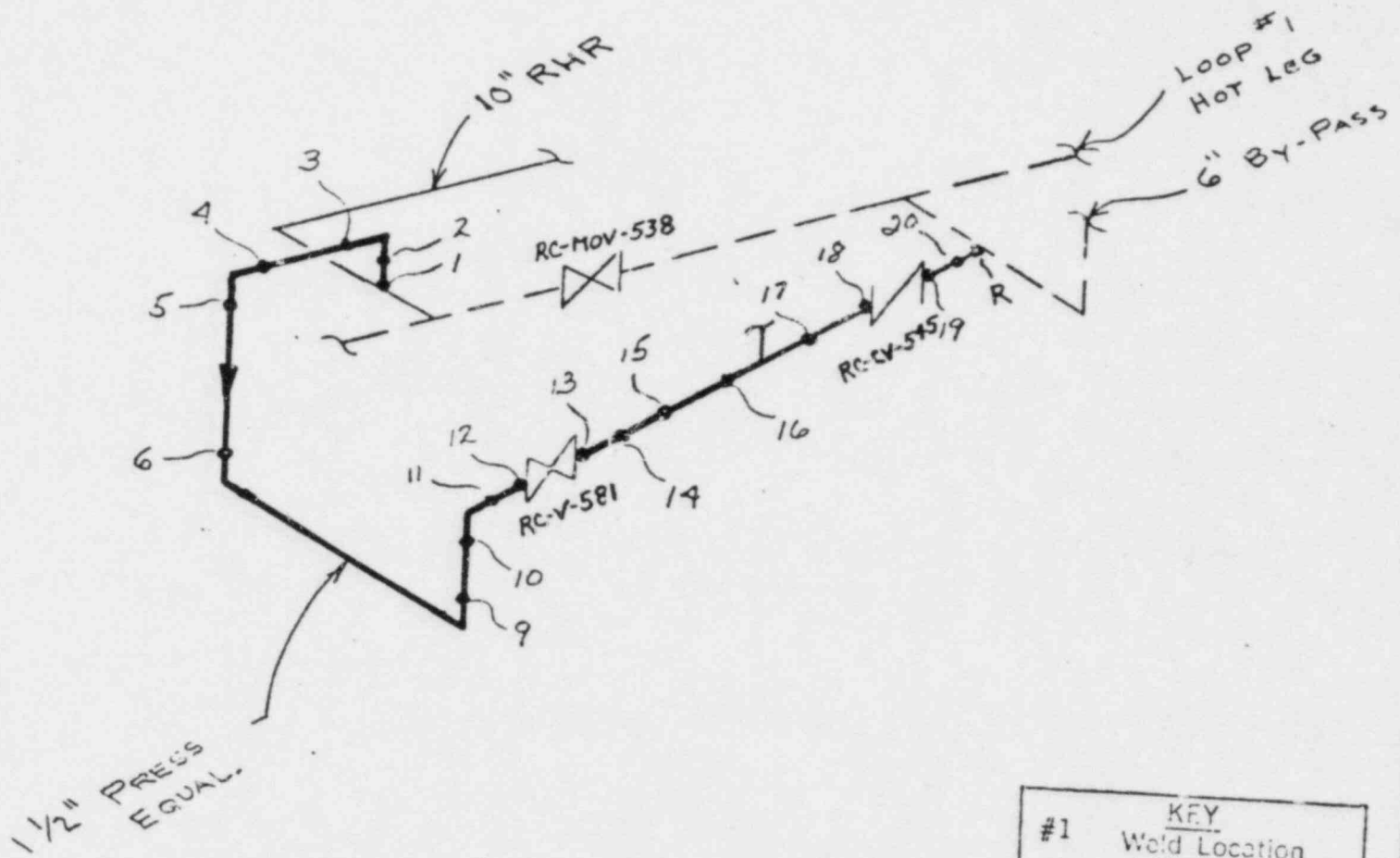
150-80 DCR CY-3	2 REV	330 BY	CHK	5300 APPRV	1 REV	SAH BY	RAJ CHK.	APPD	5/6/77	16103-26045

SHEET 4 OF 10

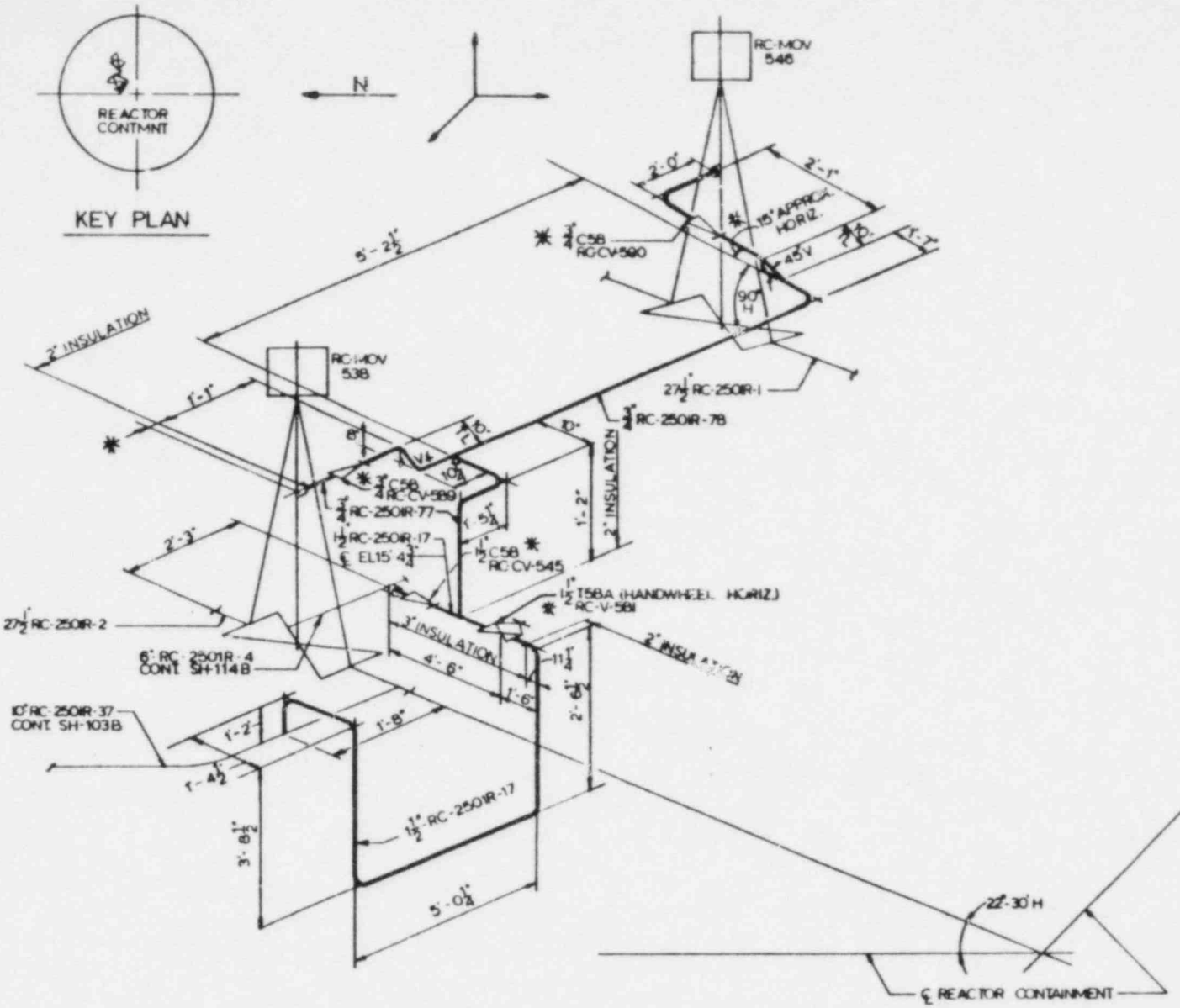
WESTINGHOUSE ELECTRIC CORPORATION

SKETCH SHEET
FORM 28577

LOOP #1 - 1½" PRESSURE EQUALIZATION LINE CYW-14



KEY
#1 — Weld Location & Ref. Number
A —X— Support Location & Ref. Number



INSULATION AS NOTED

NOTES:

1. * NOT FIELD VERIFIED
2. FITTINGS NOT VERIFIED DUE TO INSULATION.

REF DWGS

1. 16103-20011-SH-3&5

FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 16103-20231-SH-103ZAK

THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED

S&W DWG. NO. 13429.01-MKS-103BZ

REVISIONS DURING CONSTRUCTION									

NORTHEAST UTILITIES SERVICE CO

"CONNECTICUT YANKEE"

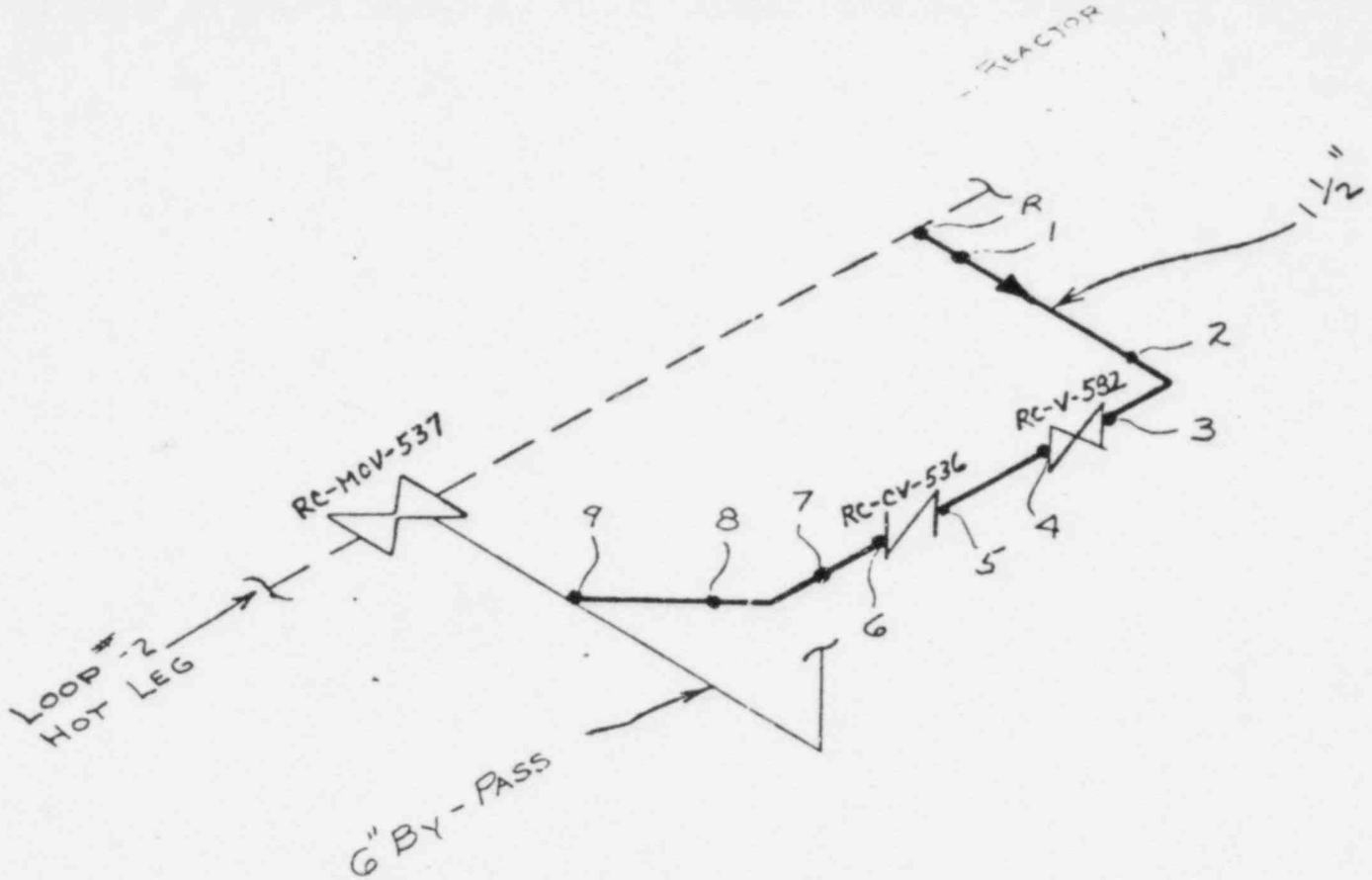
R.C. MOV ABOVE SEAT DRAINS LOOP 1

DESIGN RHP	DRAWN MRF	CHECKED	APPROVED
DATE 7/27/81	DATE 12/18/81	DATE	DATE
SCALE NONE	16103	20211-SH-103BZ	

WESTINGHOUSE ELECTRIC CORPORATION

SKETCH SHEET
FORM 28577

LOOP #-2 1½" PRESSURE EQUALIZATION LINE - CYW-15

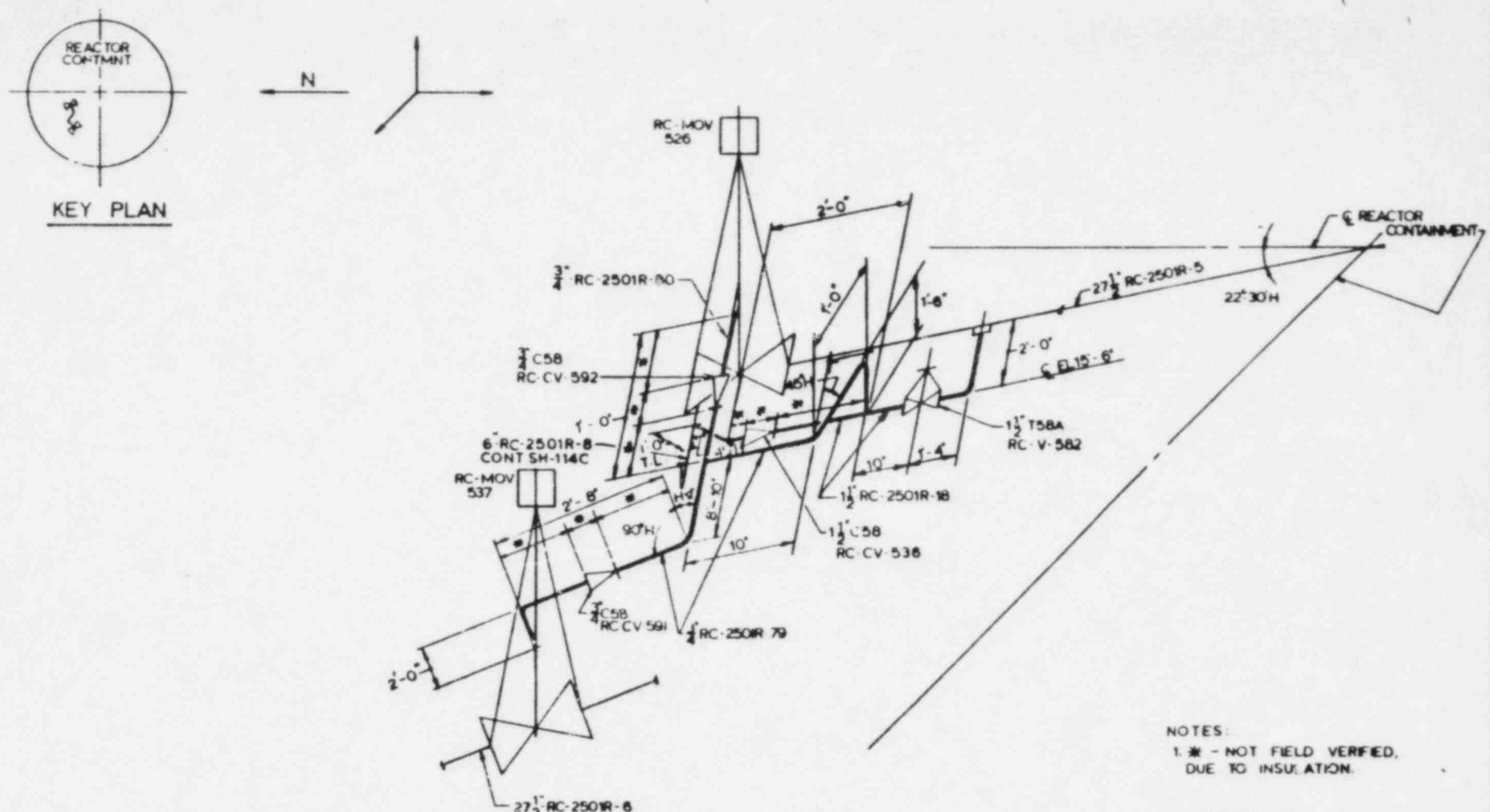


KEY

#1 Weld Location & Ref. Number

A Support Location & Ref. Number

5-29



NOTES:

1. ✱ - NOT FIELD VERIFIED, DUE TO INSULATION.

REFERENCE DWGS:
16103-20011-SH 3 & 5

FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 16103-20231-SH-103 ZAK

1 1/2" INSULATION

THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED

S&W DWG. NO. 13429.01-MKS-103 CA

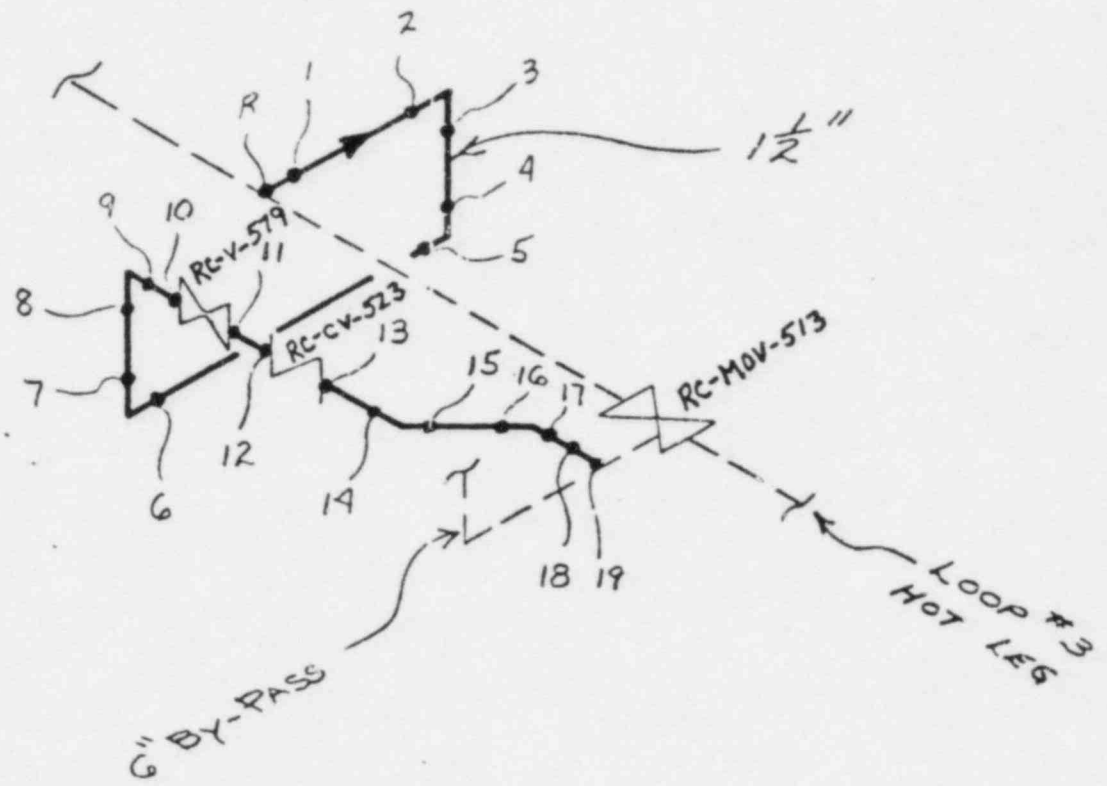
REVISIONS DURING CONSTRUCTION

NORTHEAST UTILITIES SERVICE CO.
CONNECTICUT YANKEE

RC-MOV ABOVE SEAT DRAINS
LOOP 2

RHP | MRF
16103
20231-SH-103CA

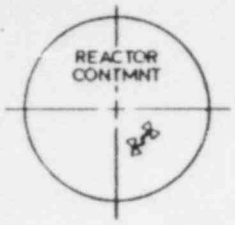
LOOP #3-1½" PRESSURE EQUALIZATION LINE CVW-16



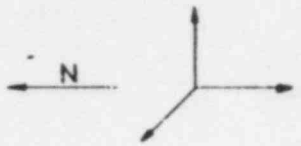
KEY
#1 Weld Location & Ref. Number
A Support Location & Ref. Number

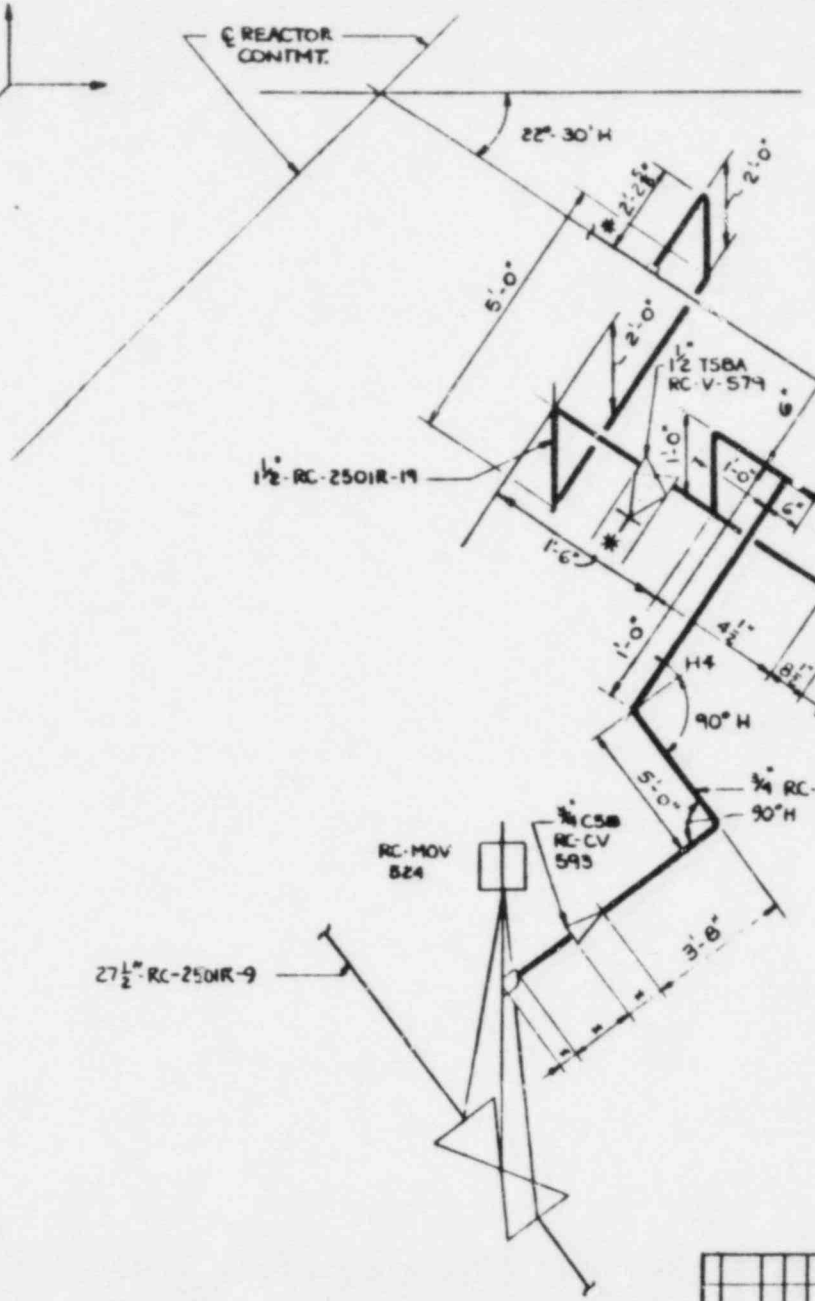
WESTINGHOUSE ELECTRIC CORPORATION

SKETCH SHEET
WESTINGHOUSE FORM 2444D



KEY PLAN





2" INSULATION

NOTES:
1. * DIM'S NOT VERIFIED, DUE TO INSULATION.

REFERENCE DWGS:
16103-20011-SH 4 & 6

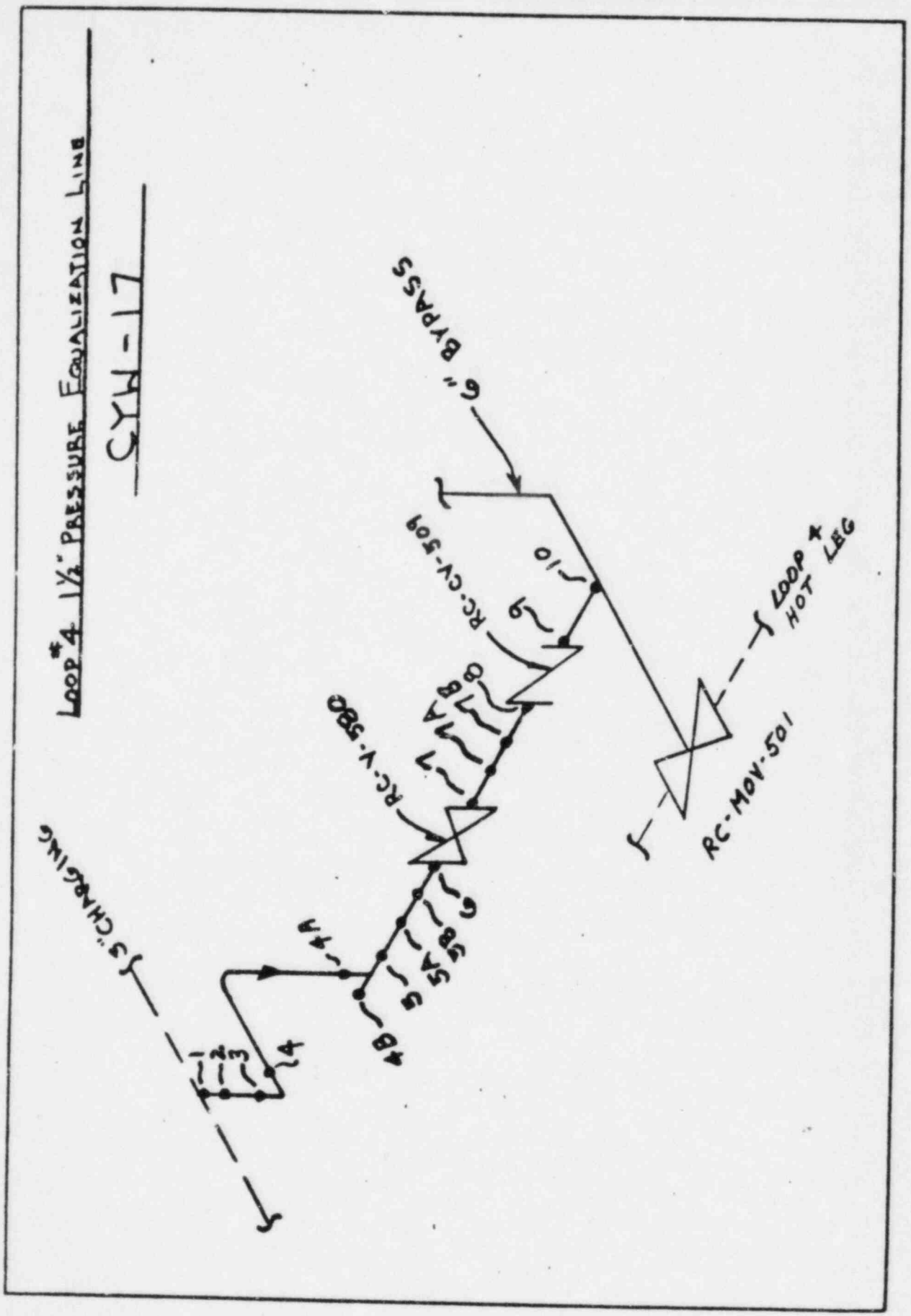
FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 16103-20231-SH-103 ZAK

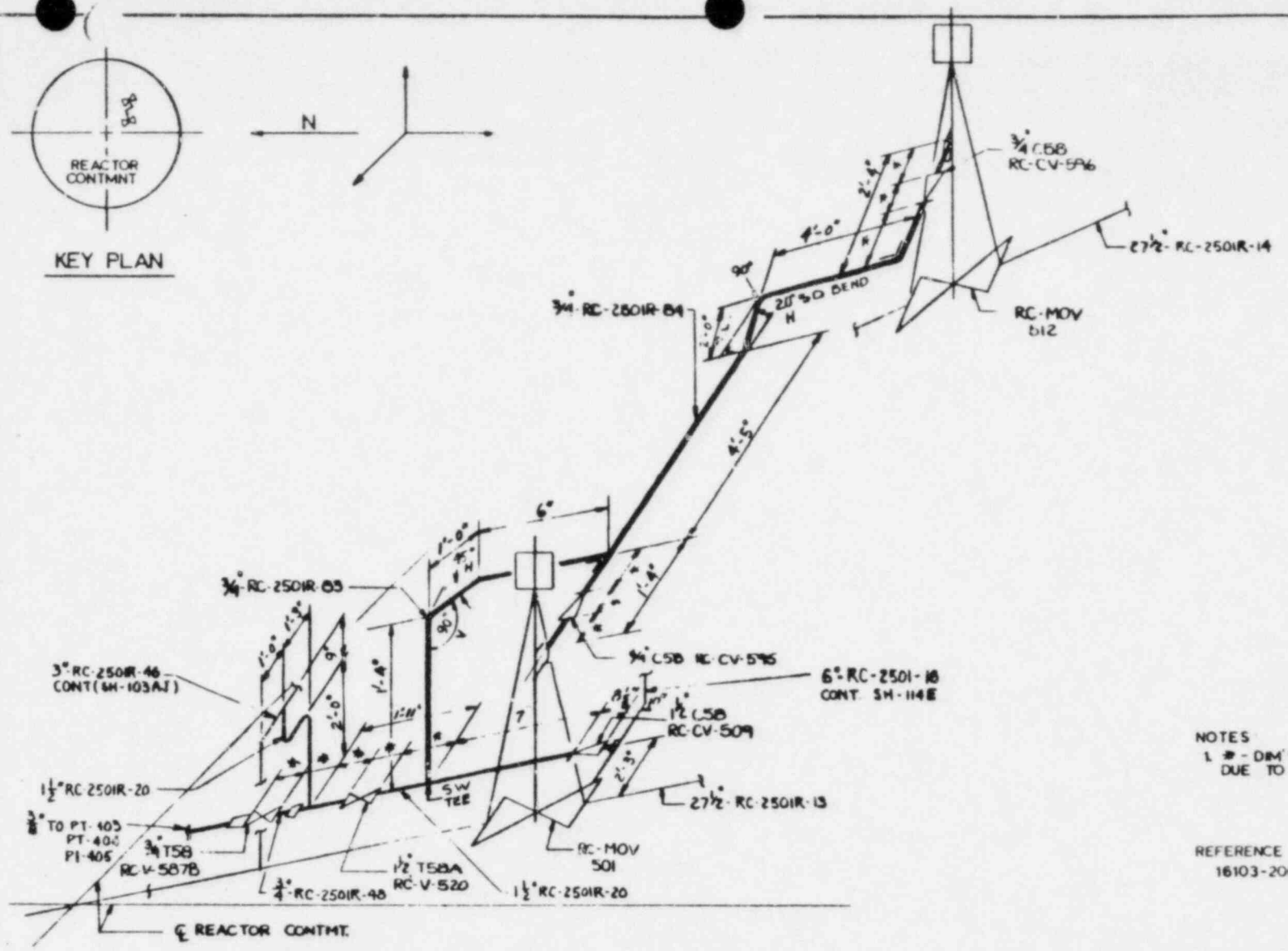
THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED
S&W DWG. NO. 13429.01-MKS-103 CB

NORTHEAST UTILITIES SERVICE CO.
"CONNECTICUT YANKEE

RC-MOV ABOVE SEAT DRAINS
LOOP 3

FILE MRF


Loop #4 1½" Pressure Equalization Line
SYM-17
6" BYPASS
RC-CV-509
10
9
8
7
RC-V-580
6
5
4B
4A
3
2
1
3" CHARGING
LOOP 4 HOT LEG
RC-MOV-501



NOTES
1. # - DIM'S NOT VERIFIED DUE TO INSULATION.

REFERENCE DWGS:
16103-20011-SH 4 & 6

FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 16103-20231-SH-103 ZAK

2½" INSULATION

THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED
S&W DWG. NO. 13429.01-MKS-103 CC

NORTHEAST UTILITIES SERVICE CO.
"CONNECTICUT YANKEE

RC-MOV ABOVE SEAT DRAINS LOOP 4

RHP	MRT		
3-25-81	12-18-81		
NONE	16103	20231-SH-103CC	

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

	SOURCE
SYSTEM	REACTOR COOLANT LOOP # 1
LINE	PRESSURE EQUALIZATION LINE ($1\frac{1}{2}$-RC-2501R-17)
DRAWING	CYW-14

TARGET	BREAK PT. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Reactor Coolant*	A	←																		→ A
Main Steam*	A	←																		→ A
Feedwater*	A	←																		→ A
Charging*	A	←																		→ A
Residual Heat Removal*	A	←																		→ A
Service Water*	A	←																		→ A
Safety Injection	A	←																		→ A
Containment Liner	A	←																		→ A

*Minimum Required Safe Shutdown System

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	REACTOR COOLANT LOOP #2
LINE	PRESSURE EQUALIZATION LINE (1½-RC-2501R-18)
DRAWING	CYW-15
BREAK PT.	1 2 3 4 5 6 7 8 9
Reactor Coolant*	A ◄——► A
Main Steam*	A ◄——► A
Feedwater*	A ◄- - -► A
Charging*	A ◄——► A
Residual Heat Removal*	A ◄——► A
Service Water*	A ◄- - -► A
Safety Injection	A ◄——► A
Containment Liner	A ◄——► A

*Minimum Required Safe Shutdown System

LEGEND

D = Damage Possible, Further Evaluation Required

A = Acceptable (damage not possible) OR No interaction

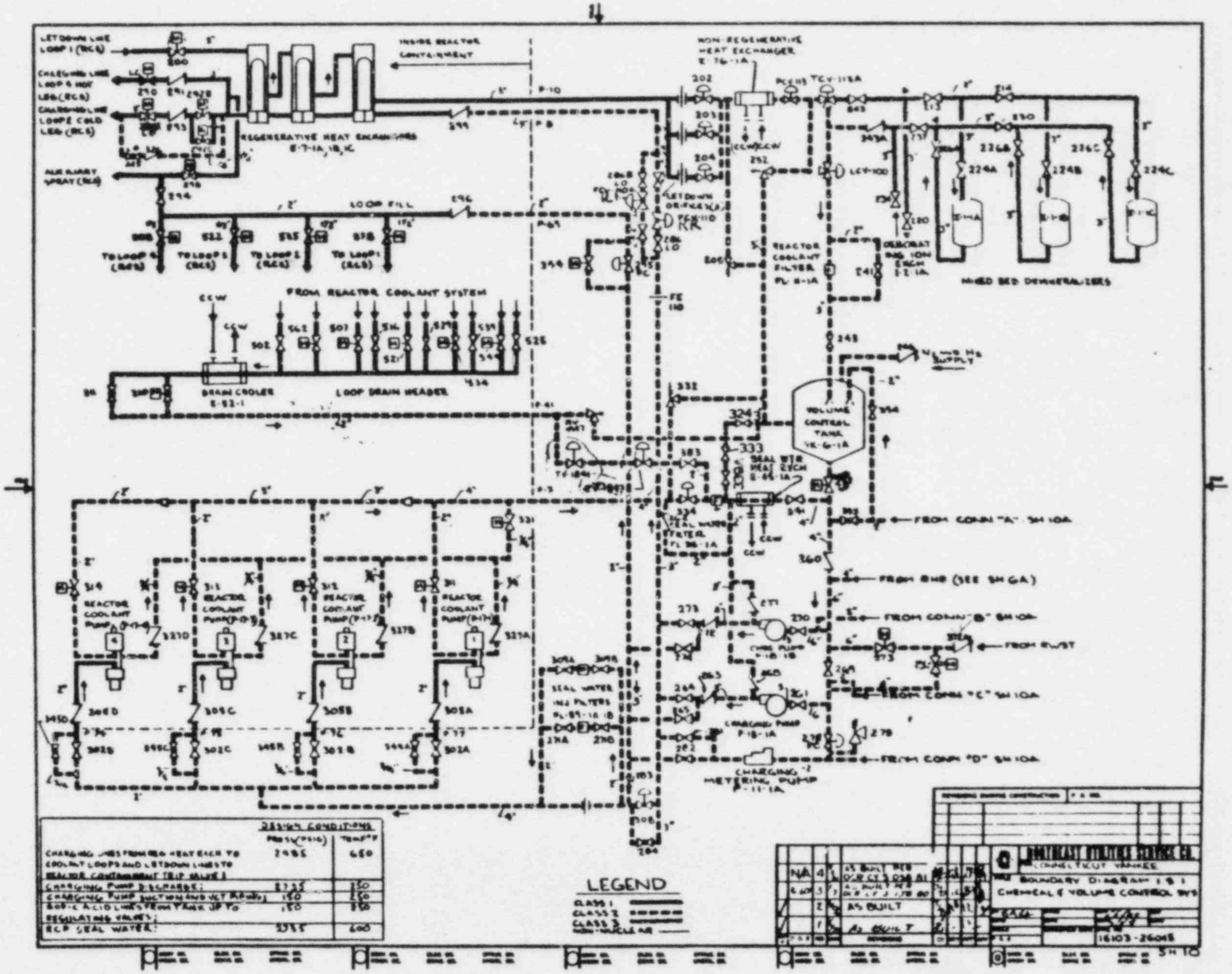
TARGET	SOURCE																		
SYSTEM	REACTOR COOLANT LOOP #3																		
LINE	PRESSURE EQUALIZATION LINE (1½-RC-250R-19)																		
DRAWING	CYW-16																		
BREAK PT.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Reactor Coolant*	A	←																	A
Main Steam*	A	←																	A
Feedwater*	A	←																	A
Charging*	A	←																	A
Residual Heat Removal*	A	←																	A
Service Water*	A	←																	A
Safety Injection	A	←																	A
Containment Liner	A	←																	A

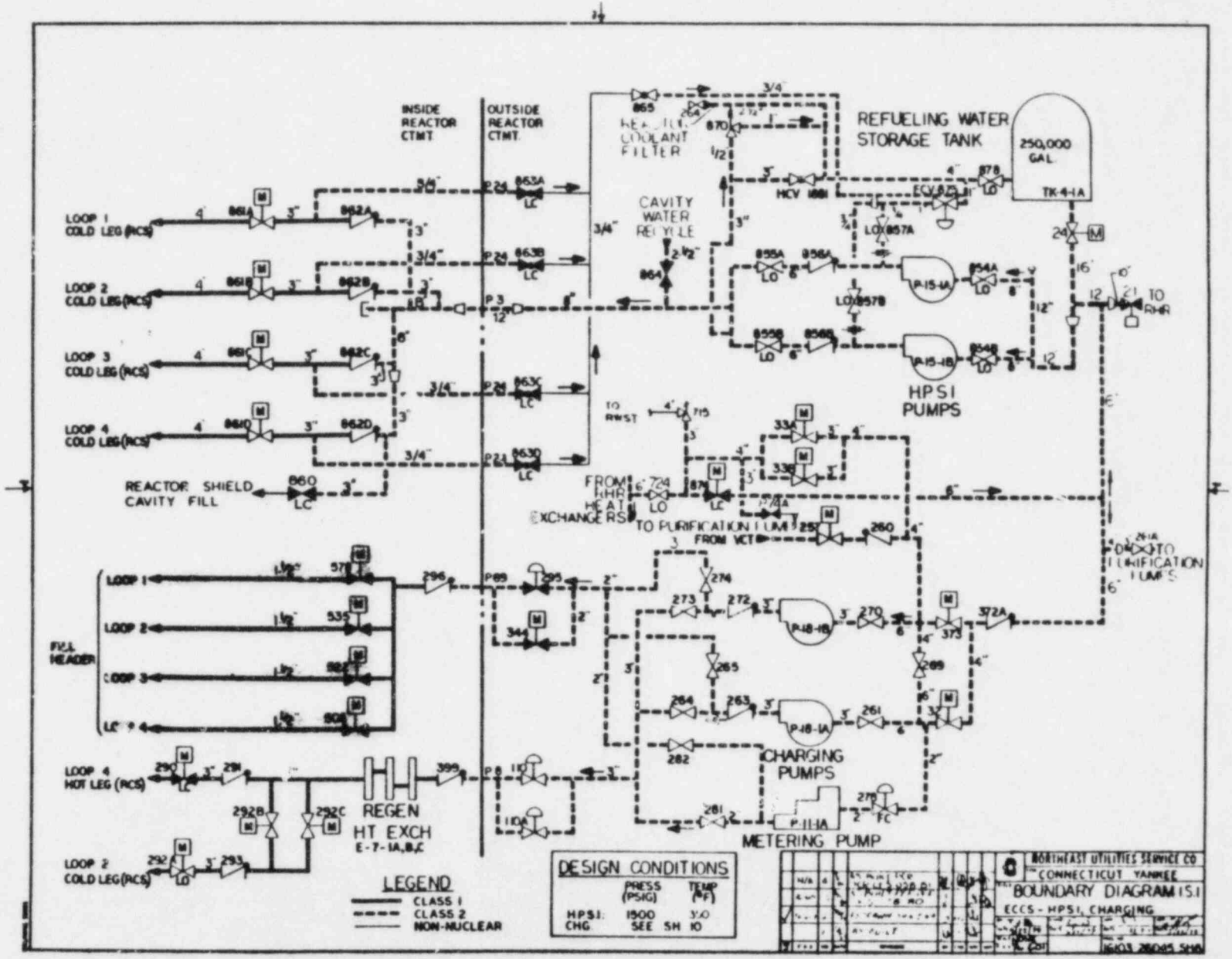
*Minimum Required Safe Shutdown System

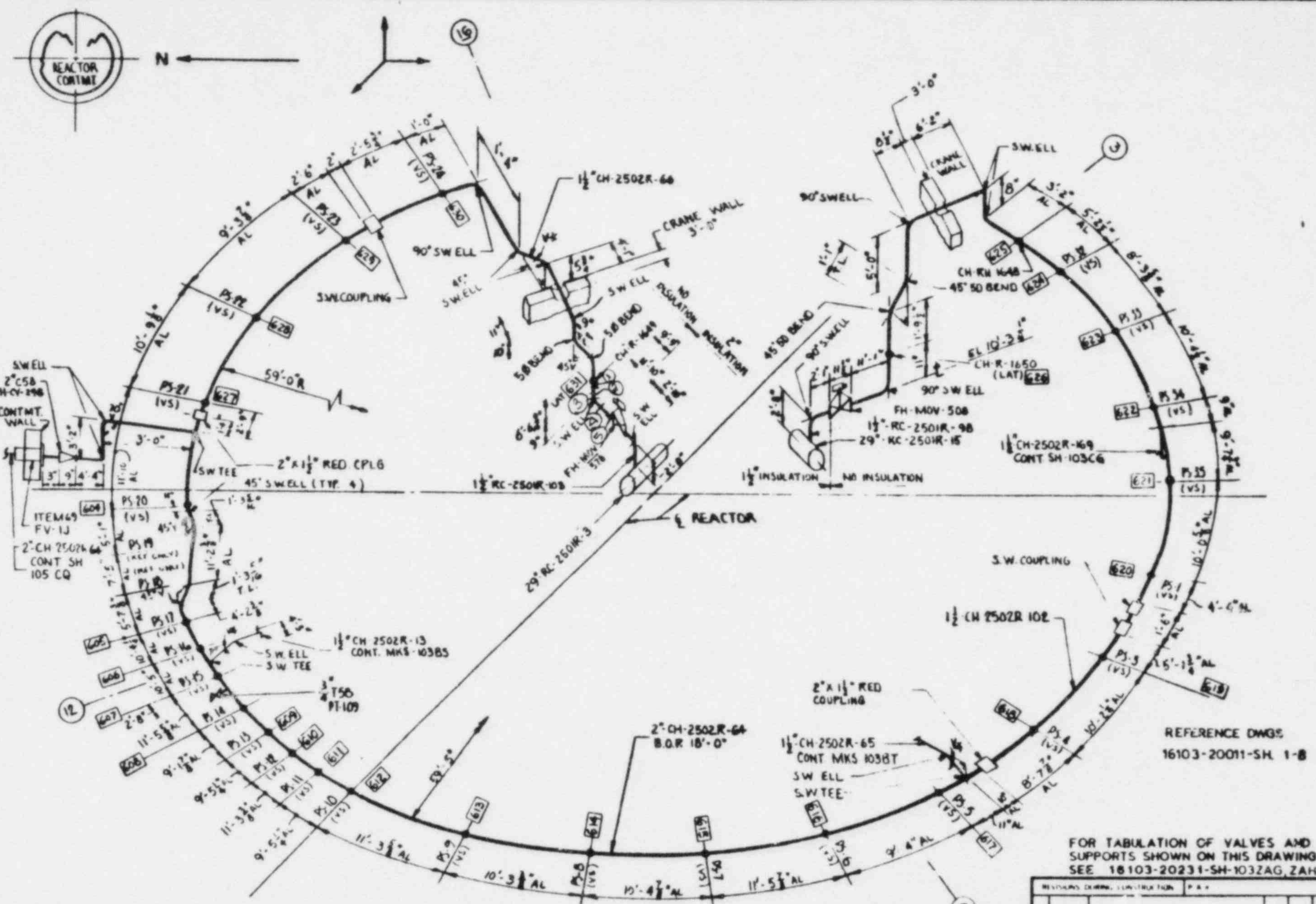
LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	REACTOR COOLANT LOOP #4
LINE	PRESSURE EQUALIZATION LINE (1½-RC-2501R-20)
DRAWING	CYW-17
BREAK PT.	1 2 3 4 4A 4B 5 5A 5B 6 7 7A 7B 8 9 10
Reactor Coolant*	A ◄——— A
Main Steam*	A ◄——— A
Feedwater*	A ◄——— A
Charging*	A ◄——— A
Residual Heat Removal*	A ◄——— A
Service Water*	A ◄——— A
Safety Injection	A ◄——— A
Containment Liner	A ◄——— A

*Minimum Required Safe Shutdown System


INSIDE REACTOR CONTAINMENT
NON-REGENERATIVE HEAT EXCHANGER E-76-1A
REGENERATIVE HEAT EXCHANGERS E-7-1A, 1B, 1C
LOOP FILL
FROM REACTOR COOLANT SYSTEM
LOOP DRAIN HEADER
DRAIN COOLER E-82-1
MIXED BED DEMINERALIZERS
REACTOR COOLANT FILTER FL-8-1A
VOLUME CONTROL TANK
REACTOR COOLANT PUMP
SEAL WATER INJ FILTERS
CHARGING PUMP P-18-1A
CHARGING METERING PUMP
FROM CONN "A" SH 10A
FROM RHR (SEE SH 6A)
FROM CONN "B" SH 10A
FROM RWST
FROM CONN "C" SH 10A
FROM CONN "D" SH 10A
DESIGN CONDITIONS
LEGEND
CLASS 1
CLASS 2
CLASS 3
AS BUILT
BOUNDARY DIAGRAM 1 & 1
CHEMICAL & VOLUME CONTROL SYS
16103-26015
SH 10


INSIDE REACTOR CTMT
OUTSIDE REACTOR CTMT
REFUELING WATER STORAGE TANK
250,000 GAL.
TK-4-1A
LOOP 1 COLD LEG (RCS)
LOOP 2 COLD LEG (RCS)
LOOP 3 COLD LEG (RCS)
LOOP 4 COLD LEG (RCS)
CAVITY WATER RECYCLE
REACTOR SHIELD CAVITY FILL
HPSI PUMPS
P-15-1A
P-15-1B
TO RHR
TO RWST
FROM RHR HEAT EXCHANGERS
TO PURIFICATION LINE
FROM VCT
TO PURIFICATION PUMPS
FILL HEADER
LOOP 1
LOOP 2
LOOP 3
LOOP 4
CHARGING PUMPS
P-18-1B
P-18-1A
P-11-1A
METERING PUMP
LOOP 4 HOT LEG (RCS)
LOOP 2 COLD LEG (RCS)
REGEN HT EXCH E-7-1A,B,C
LEGEND
CLASS 1
CLASS 2
NON-NUCLEAR
DESIGN CONDITIONS
PRESS (PSIG)
TEMP (°F)
HPSI
CHG
1500
SEE SH 10
340
NORTHEAST UTILITIES SERVICE CO
CONNECTICUT YANKEE
BOUNDARY DIAGRAM 151
ECCS - HPSI, CHARGING



FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 18103-20231-SH-103ZAG, ZAH

REFERENCE DWGS
16103-20011-SH. 1-8

INSULATION AS NOTED

THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED

S&W DWG. NO.1342 J-MKS-103 BV

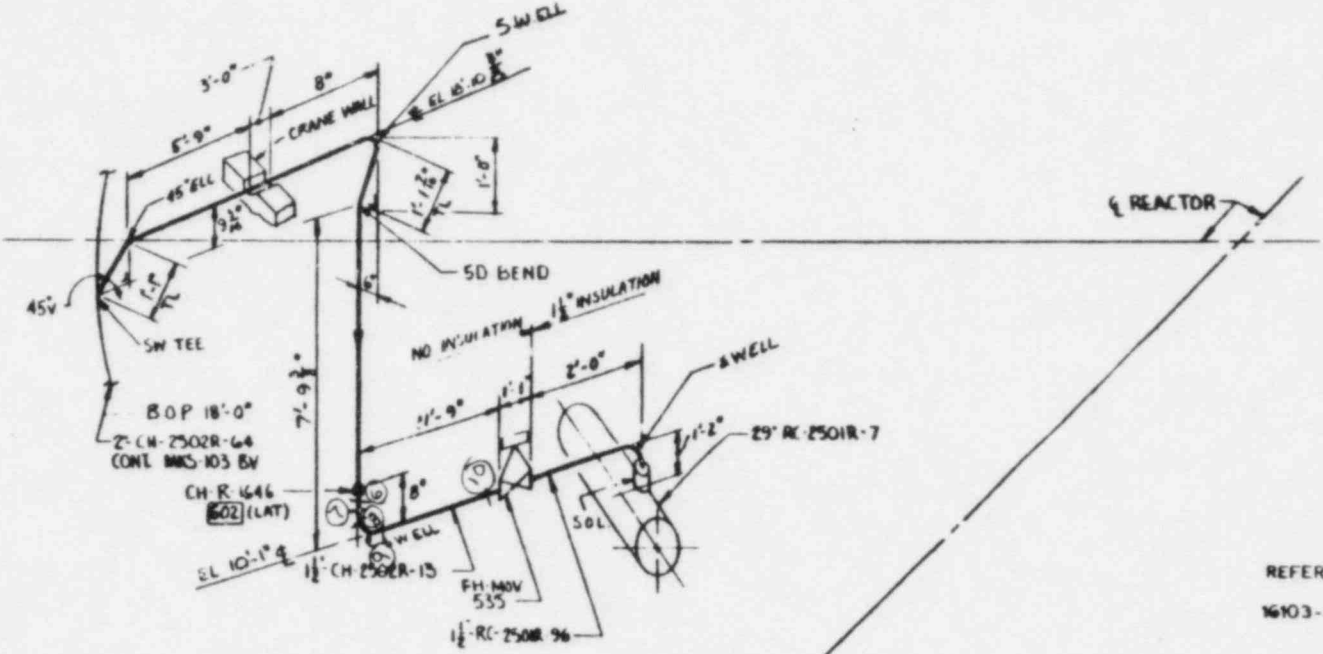
NORTHEAST UTILITIES SERVICE CO
CONNECTICUT YANKEE

CHEMICAL VOLUME CONTROL
LOOP 1 & LOOP 4

16103-20231-SH-103BV

KEY PLAN

N



REFERENCE DWGS

16103-20011-SH 1,3,5 & 7

INSULATION: AS NOTED

FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 16103-20231-SH-103ZAG

THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED

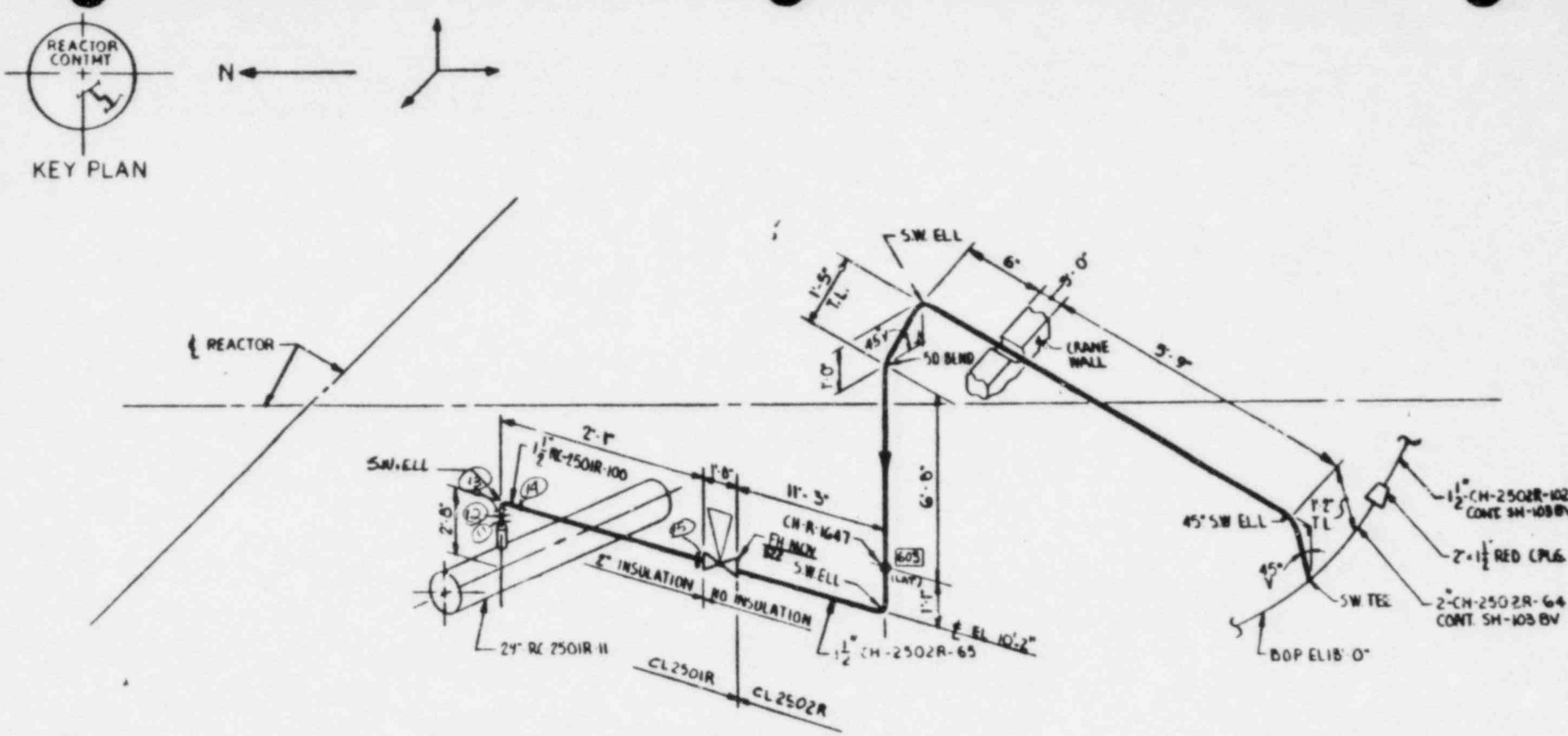
S&W DWG. NO. 13429.01-MKS-103 BS

NORTHEAST UTILITIES SERVICE CO
"CONNECTICUT YANKEE

CHEMICAL VOLUME CONTROL
LOOP 2

JVG	MRF		
BD	12-11-83		

16103 | 20231 SH 103BS



REFERENCE DWGS

1. 16103-20011-SH.-2,4,6&A

FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 16103-20231-SH-1032AG

REVISIONS DURING CONSTRUCTION

NORTHEAST UTILITIES SERVICE CO.
FOR CONNECTICUT YANKEE

CHEMICAL VOLUME CONTROL
LOOP 3

20231-SH-103BT

THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED

S&W DWG. NO.1342 1-MKS-103BT

INSULATION AS NOTED

LEGEND

D = Damage Possible; Further Evaluation Required

A = Acceptable (Damage Not Possible) or No Interaction

	SOURCE
SYSTEM	Fill Header (Loop #1)
LINE	1 1/2 - CH - 2502R - 66
DRAWING	103BV (CYW-18)
TARGET / BREAK PT.	1 2 3 4 5
Reactor Coolant*	A ⟷ A
Main Steam*	A ⟷ A
Feedwater*	A ⟷ A
Charging*	A ⟷ A
Residual Heat Removal*	A ⟷ A
Service Water*	A ⟷ A
Safety Injection	A ⟷ A
Containment Liner	A ⟷ A

Minimum Required Safe Shutdown System

LEGEND

D = Damage Possible; Further Evaluation Required

A = Acceptable (Damage Not Possible) or No Interaction

TARGET	SOURCE
SYSTEM	Fill Header (Loop #2)
LINE	1½ CH-2502E-13
DRAWING	10385 (CYW-19)
BREAK PT.	6 7 8 9 10
Reactor Coolant*	A ↔ A
Main Steam*	A ↔ A
Feedwater*	A ↔ A
Charging*	A ↔ A
Residual Heat Removal*	A ↔ A
Service Water*	A ↔ A
Safety Injection	A ↔ A
Containment Liner	A ↔ A

Minimum Required Safe Shutdown System

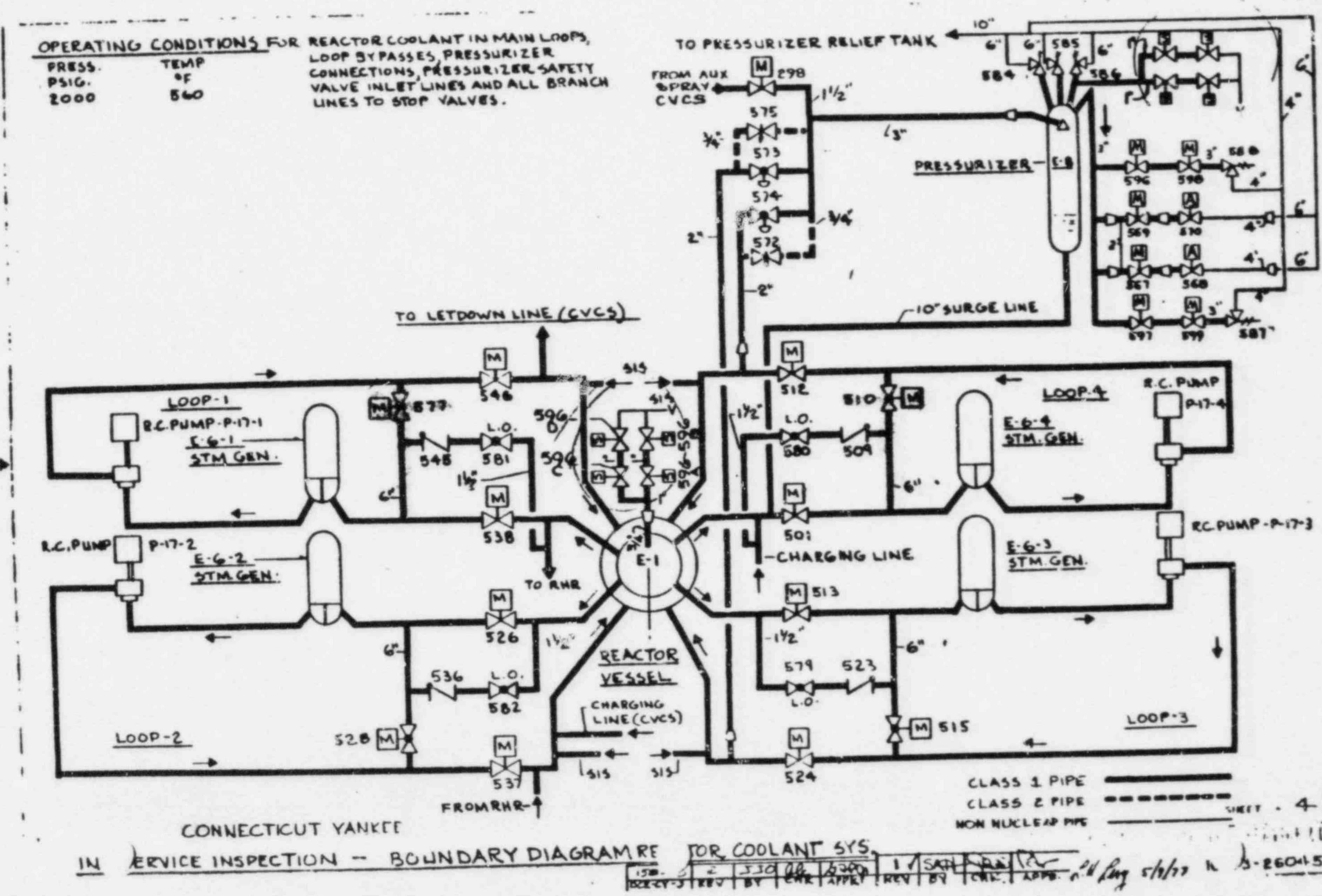
LEGEND

D = Damage Possible; Further Evaluation Required

A = Acceptable (Damage Not Possible) or No Interaction

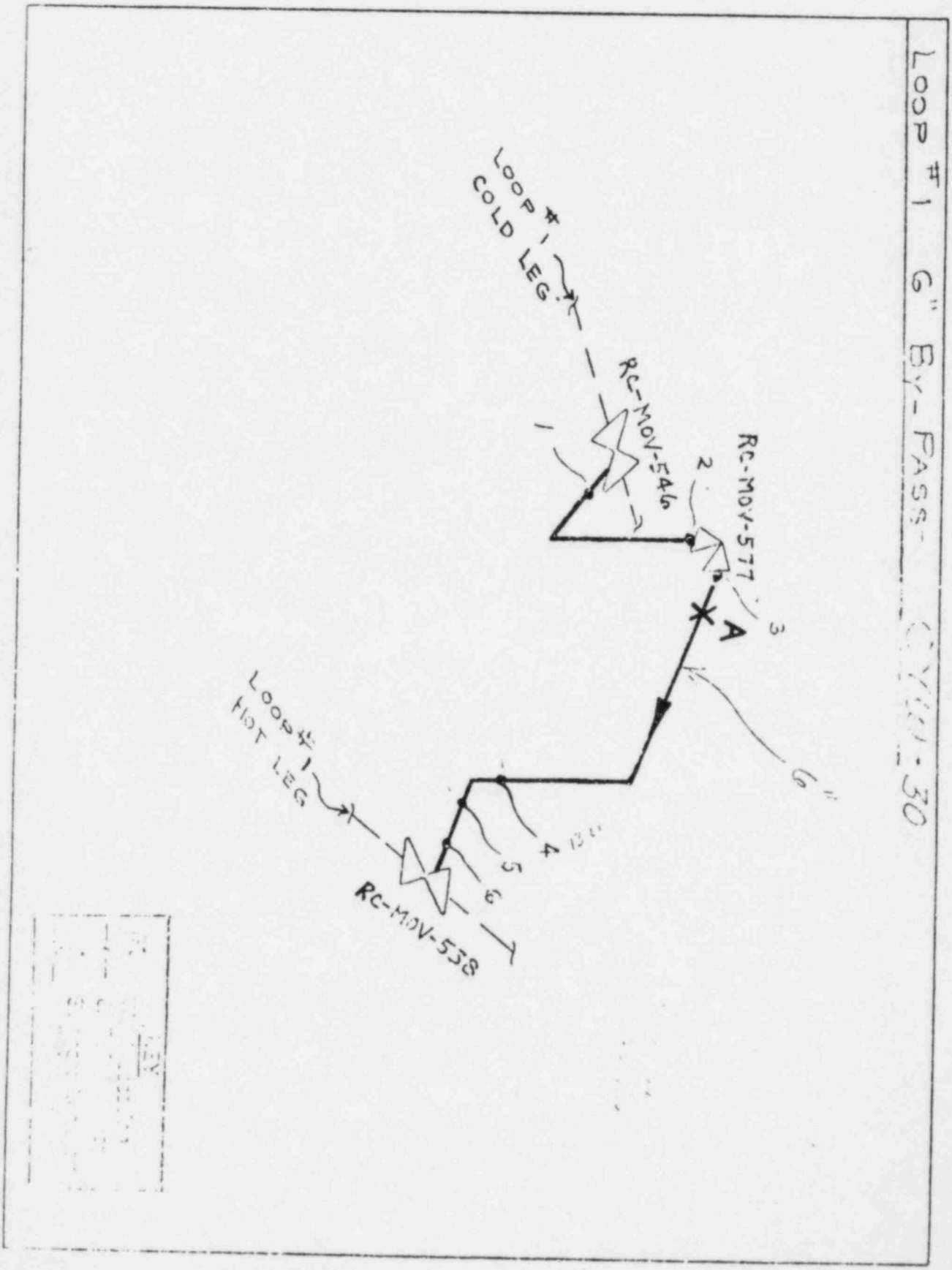
	SOURCE
SYSTEM	Fill Header (Loop #3)
LINE	1½ CH-2502R-65
DRAWING	103 BT (CYW-20)
TARGET / BREAK PT.	11 12 13 14 15
Reactor Coolant*	A ← → A
Main Steam*	A ← → A
Feedwater*	A ← → A
Charging*	A ← → A
Residual Heat Removal*	A ← → A
Service Water*	A ← → A
Safety Injection	A ← → A
Containment Liner	A ← → A

● Minimum Required Safe Shutdown System


OPERATING CONDITIONS FOR REACTOR COOLANT IN MAIN LOOPS, LOOP BYPASSES, PRESSURIZER CONNECTIONS, PRESSURIZER SAFETY VALVE INLET LINES AND ALL BRANCH LINES TO STOP VALVES.
PRESS. PSIG. 2000
TEMP °F 560
TO PRESSURIZER RELIEF TANK
FROM AUX SPRAY CVCS
PRESSURIZER
E-8
10" SURGE LINE
TO LETDOWN LINE (CVCS)
LOOP-1
R.C. PUMP-P-17-1
E-6-1 STM. GEN.
R.C. PUMP
P-17-2
E-6-2 STM. GEN.
LOOP-2
LOOP-4
R.C. PUMP
P-17-4
E-6-4 STM. GEN.
RC. PUMP-P-17-3
E-6-3 STM. GEN.
LOOP-3
E-1
REACTOR VESSEL
CHARGING LINE
CHARGING LINE (CVCS)
TO RHR
FROM RHR
L.O.
CLASS 1 PIPE
CLASS 2 PIPE
NON NUCLEAR PIPE
SHEET 4
CONNECTICUT YANKEE
IN SERVICE INSPECTION - BOUNDARY DIAGRAM REACTOR COOLANT SYS.
5/9/77
B-26015

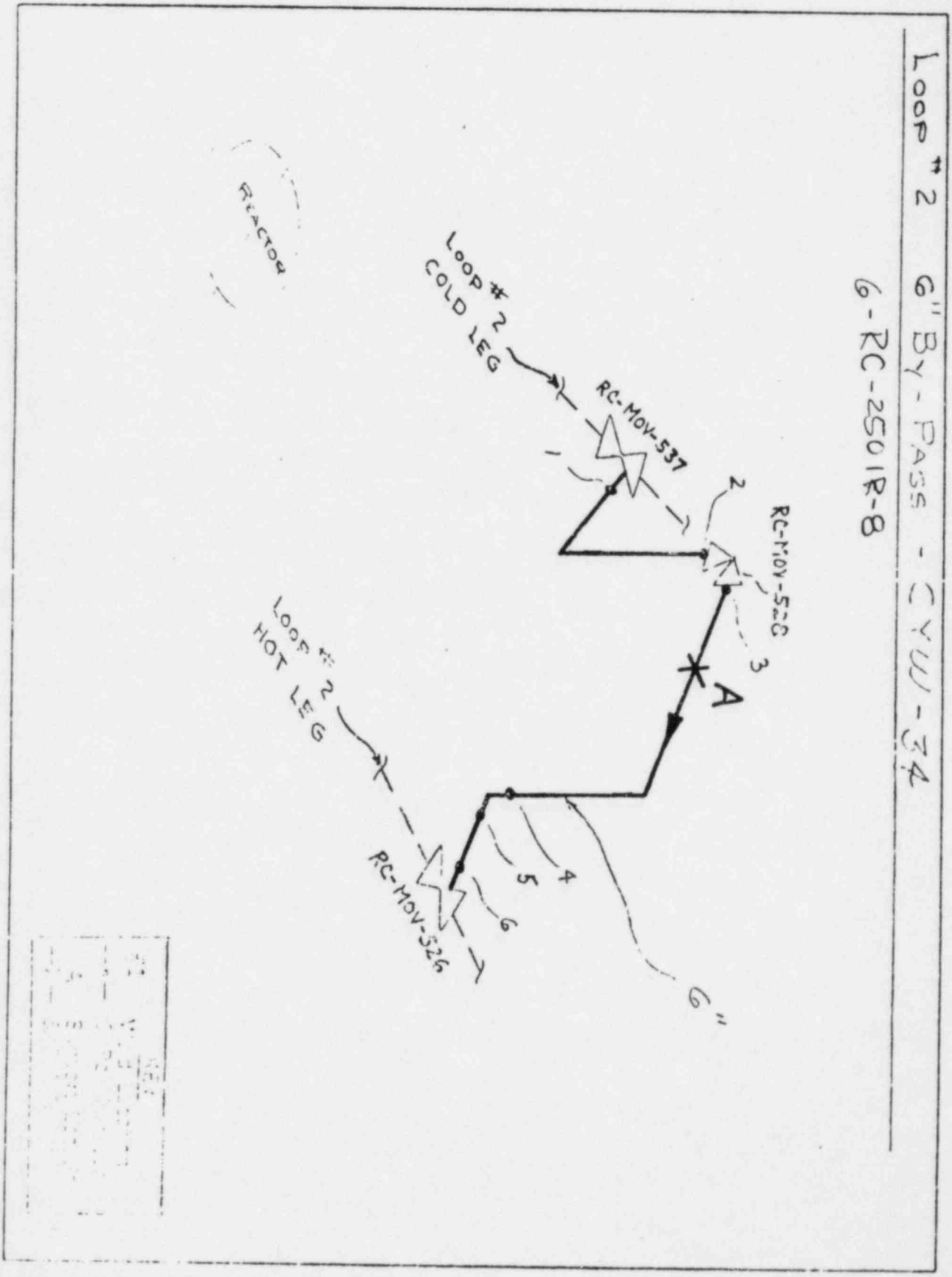
SKETCH SHEET
FORM 29577

WESTINGHOUSE ELECTRIC CORPORATION



SKETCH SHEET
FORM 28577

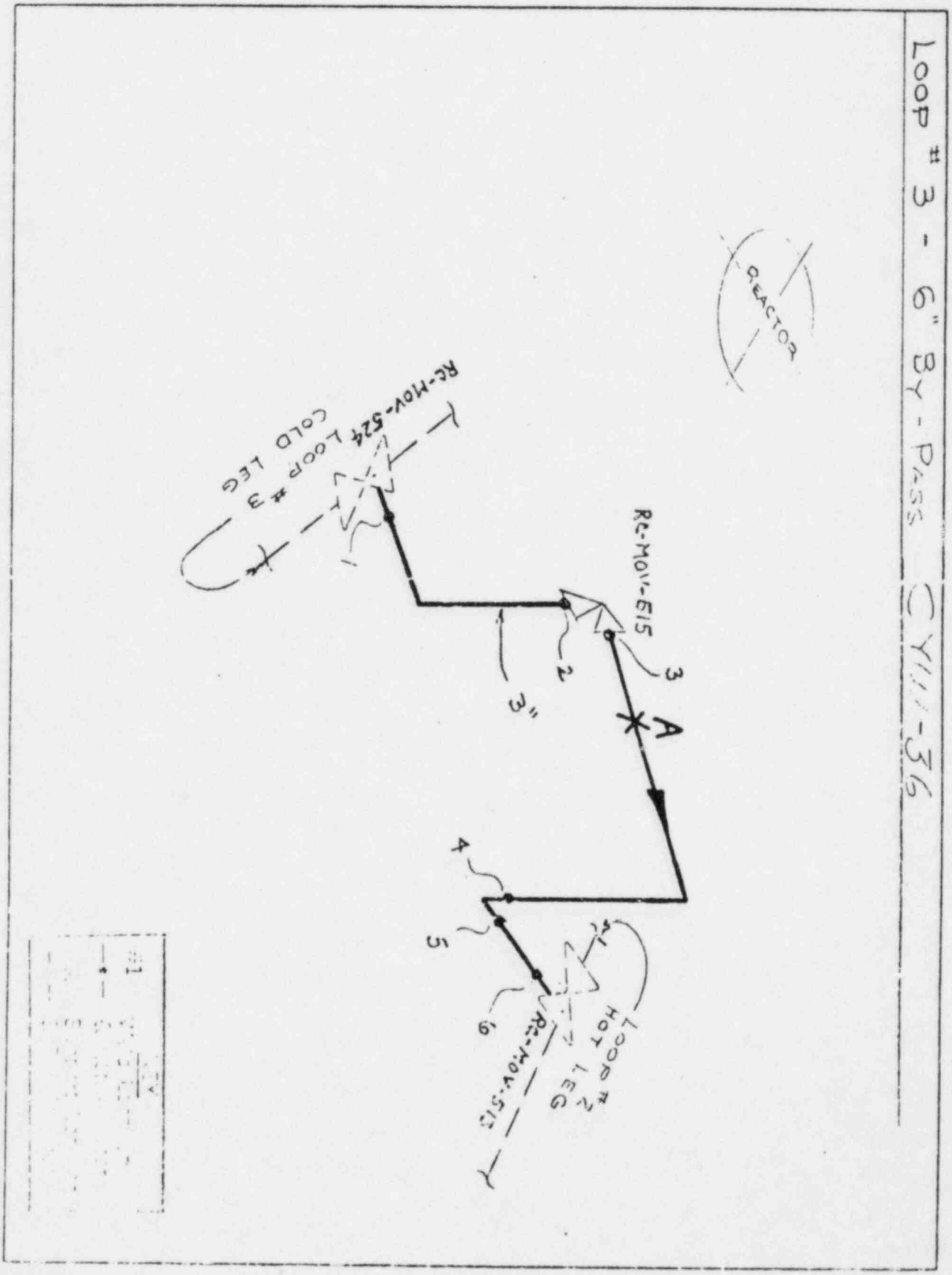
WESTINGHOUSE ELECTRIC CORPORATION



5-50

SKETCH SHEET
FORM 28577

WESTINGHOUSE ELECTRIC CORPORATION

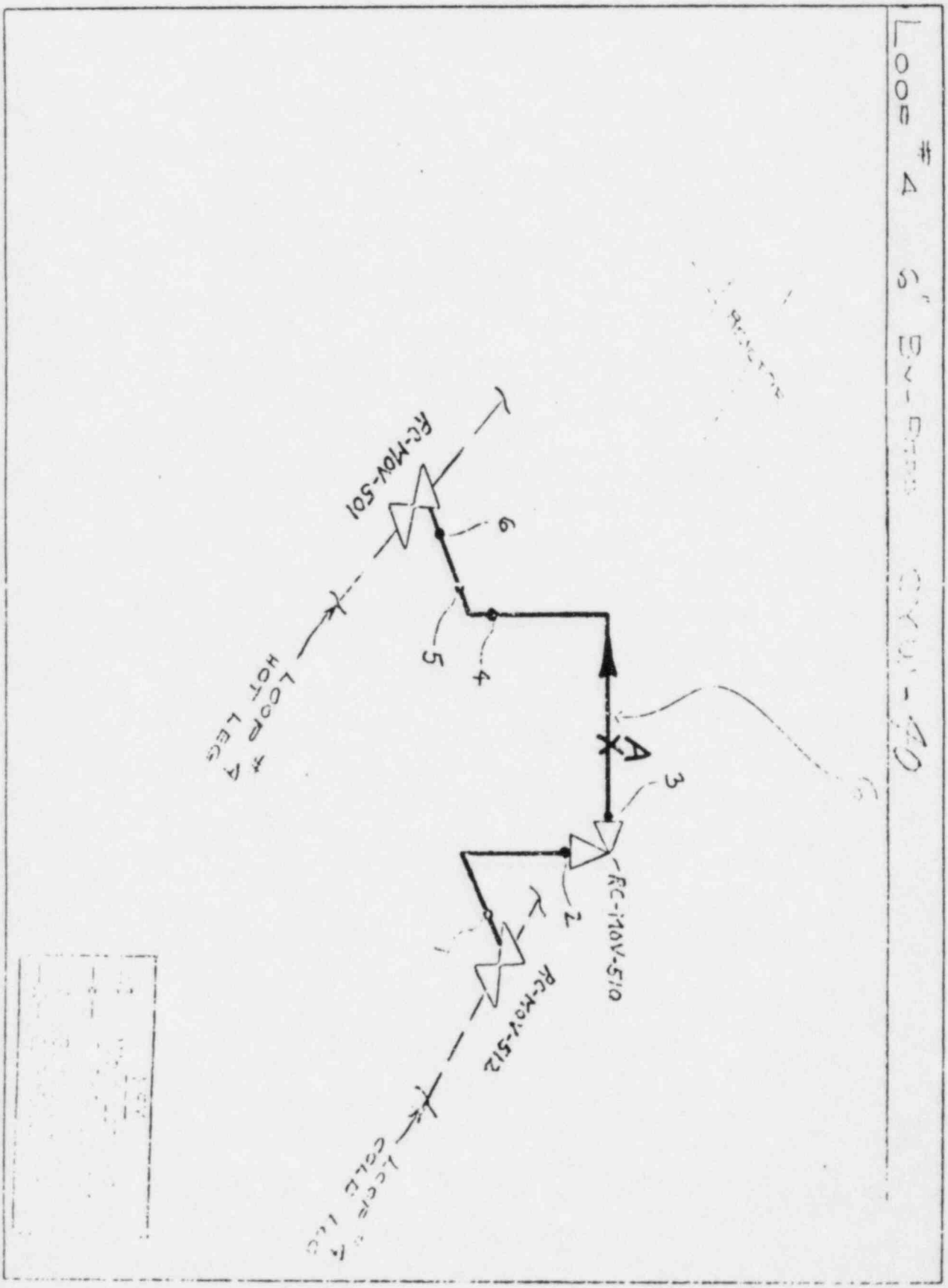


5-52

SKETCH SHEET

FORM 28511

WESTINGHOUSE ELECTRIC CORPORATION



D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	REACTOR COOLANT LOOP #1
LINE	BY PASS (6-RC-2501R)
DRAWING	CYW-30
BREAK PT.	1 2 3 4 5 6
Reactor Coolant*	A ⟷ A
Main Steam*	A ⟷ A
Feedwater*	A ⟷ A
Charging*	A ⟷ A
Residual Heat Removal*	A ⟷ A
Service Water*	A ⟷ A
Safety Injection 3-SI-1501R-9	D ⟷ D
Containment Liner	A ⟷ A

*Minimum Required Safe Shutdown System

D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	REACTOR COOLANT LOOP #2
LINE	BYPASS (6-RC-2501-E)
DRAWING	CYW-34
BREAK PT.	1 2 3 4 5 6
Reactor Coolant*	A ⟷ A
Main Steam*	A ⟷ A
Feedwater*	A ⟷ A
Charging* 3-CH-2501R-95	D ⟷ D
Residual Heat Removal*	A ⟷ A
Service Water*	A ⟷ A
Safety Injection 3-SI-1501R-10	D ⟷ D
Containment Liner	A ⟷ A

*Minimum Required Safe Shutdown System

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	REACTOR COOLANT LOOP #3
LINE	BYPASS (6-RC-2501R-12)
DRAWING	CYW-36
BREAK PT.	1 2 3 4 5 6
Reactor Coolant*	A ⟷ A
Main Steam*	A ⟷ A
Feedwater*	A ⟷ A
Charging*	A ⟷ A
Residual Heat Removal*	A ⟷ A
Service Water*	A ⟷ A
Safety Injection 3"-SI-1501R-11	D ⟷ D
Containment Liner	A ⟷ A

*Minimum Required Safe Shutdown System

LEGEND

D = Damage Possible, Further Evaluation Required

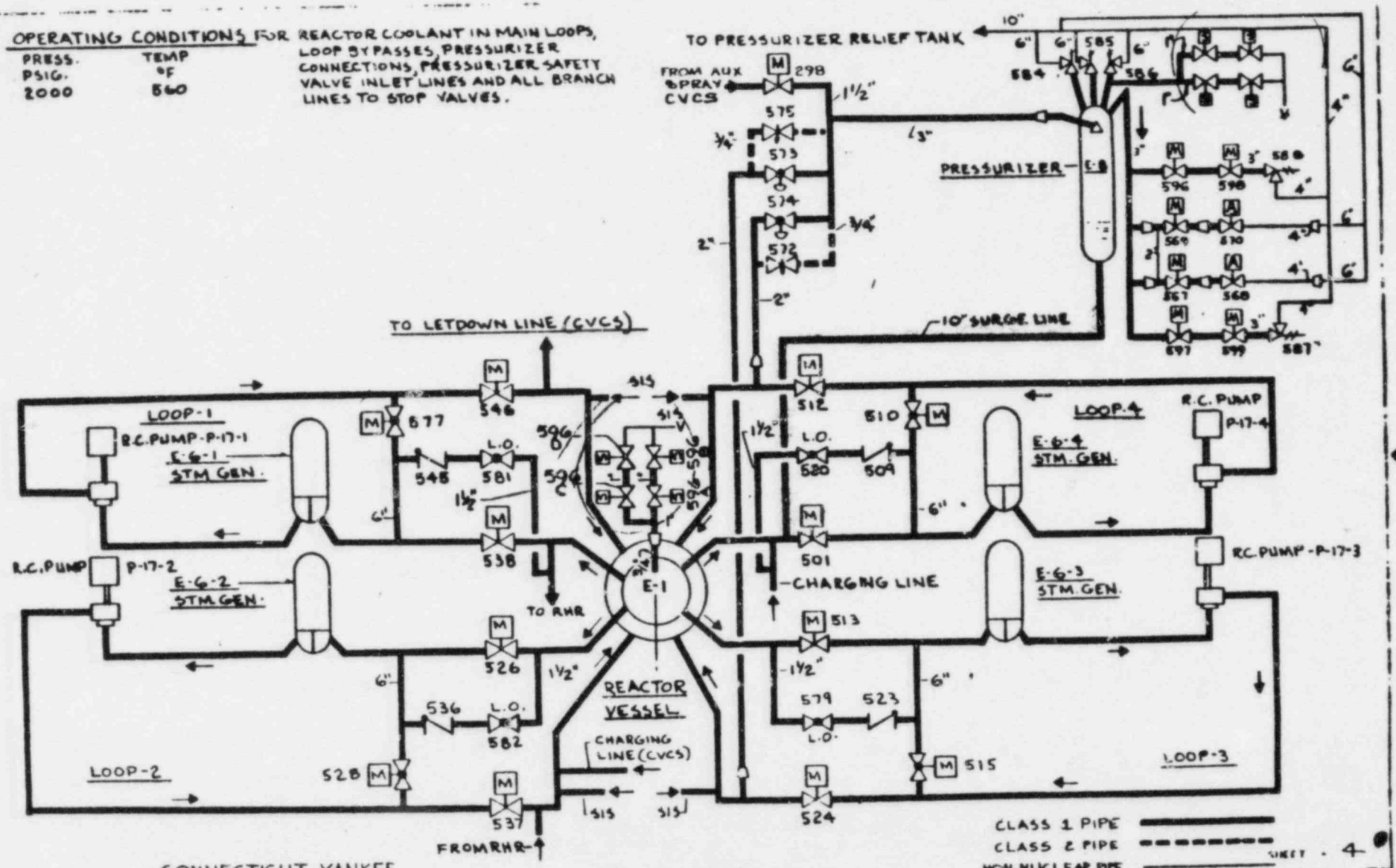
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE						
	SYSTEM	REACTOR COOLANT LOOP #4					
	LINE	BY PASS (6-RC-2501R-16)					
	DRAWING	CYW-40					
	BREAK PT.	1	2	3	4	5	6
Reactor Coolant*		A	←	→			A
Main Steam*		A	←	→			A
Feedwater*		A	←	→			A
Charging*		A	←	→			A
Residual Heat Removal*		A	←	→			A
Service Water*		A	←	→			A
Safety Injection 3-SI-2501R-12		D	←	→			D
Containment Liner		A	←	→			A

*Minimum Required Safe Shutdown System

OPERATING CONDITIONS FOR REACTOR COOLANT IN MAIN LOOPS, LOOP BYPASSES, PRESSURIZER CONNECTIONS, PRESSURIZER SAFETY VALVE INLET LINES AND ALL BRANCH LINES TO STOP VALVES.

PRESS. PSIG.	TEMP °F
2000	560

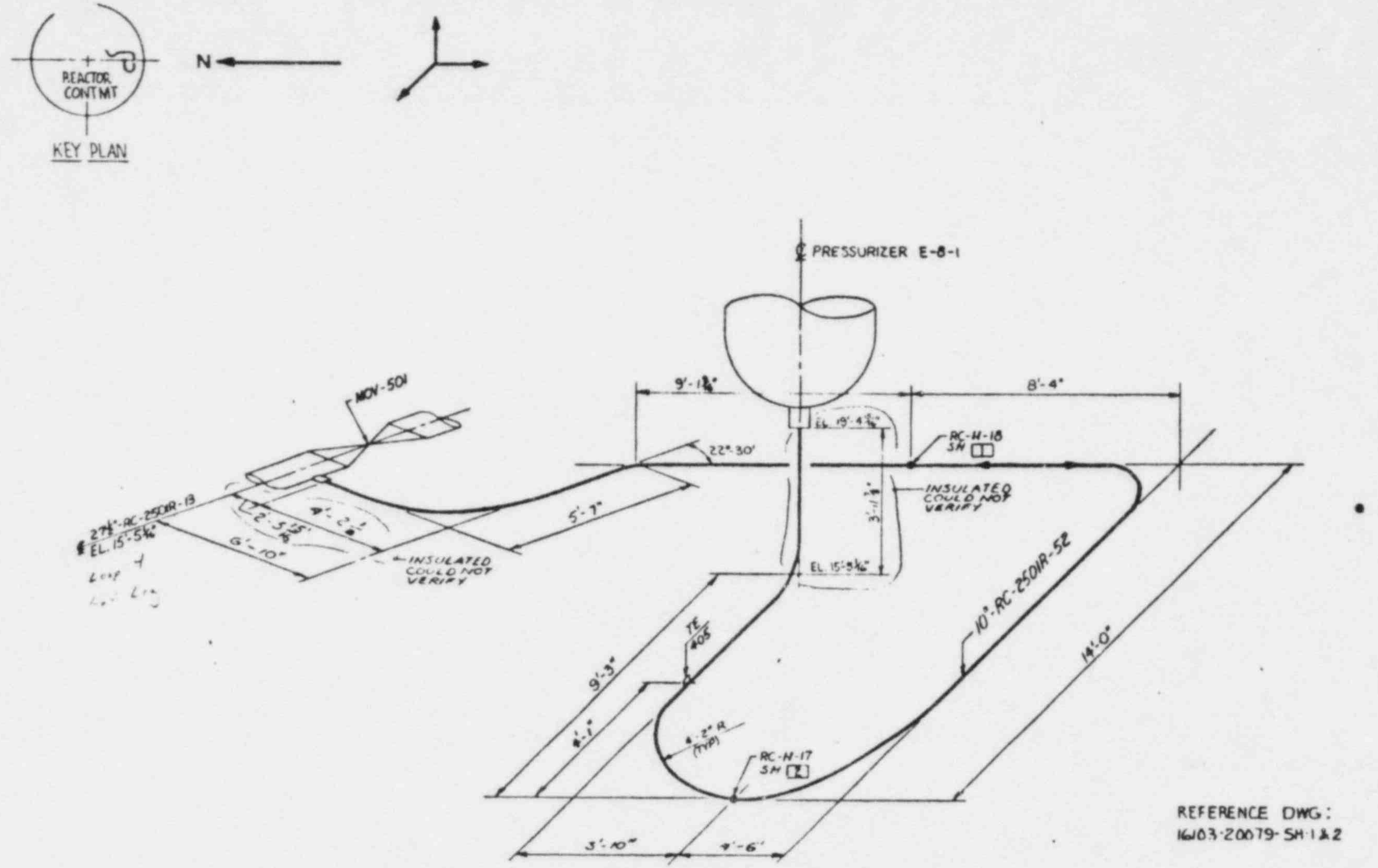


CONNECTICUT YANKEE

IN ERVICE INSPECTION — BOUNDARY DIAGRAM RE FOR COOLANT SYS.

SHEET 4

D-26045



REFERENCE DWG:
16103-20079-SH 1 & 2

UNCONTROLLED COPY

4" INSULATION

THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED
S&W DWG. NO. 1347 01-MKS-114A

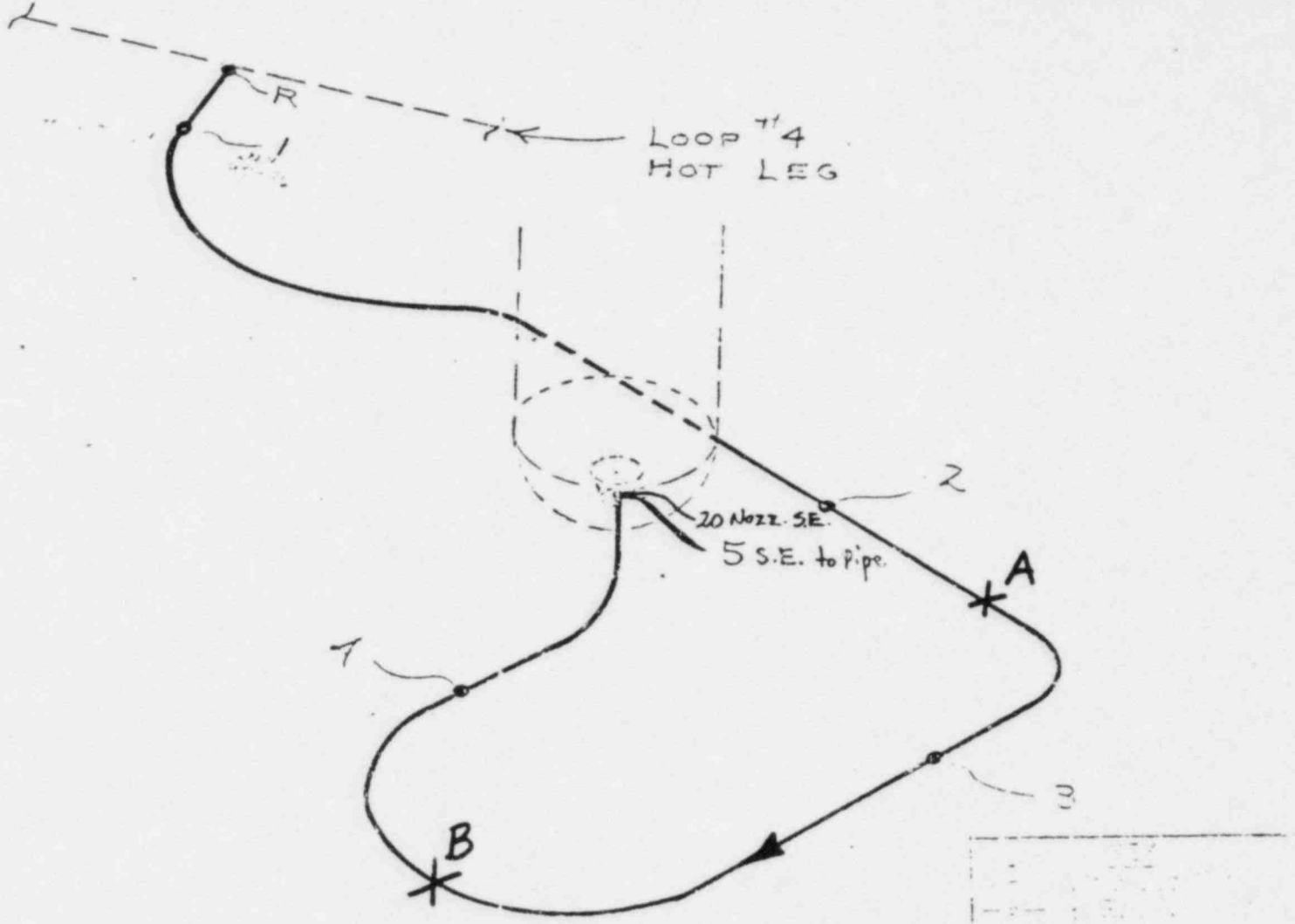
REVISIONS DURING CONSTRUCTION

NORTHEAST UTILITIES SERVICE CO.
CONNECTICUT YANKEE

PRESSURIZER LINE
10"-RC-2501R-52

161 0231-SH-114A

LOOP # 4 = 10" - PRESS. SURGE LINE CYW-38



WESTINGHOUSE ELECTRIC CORPORATION

SKETCH SHEET

WESTINGHOUSE FORM 2444D

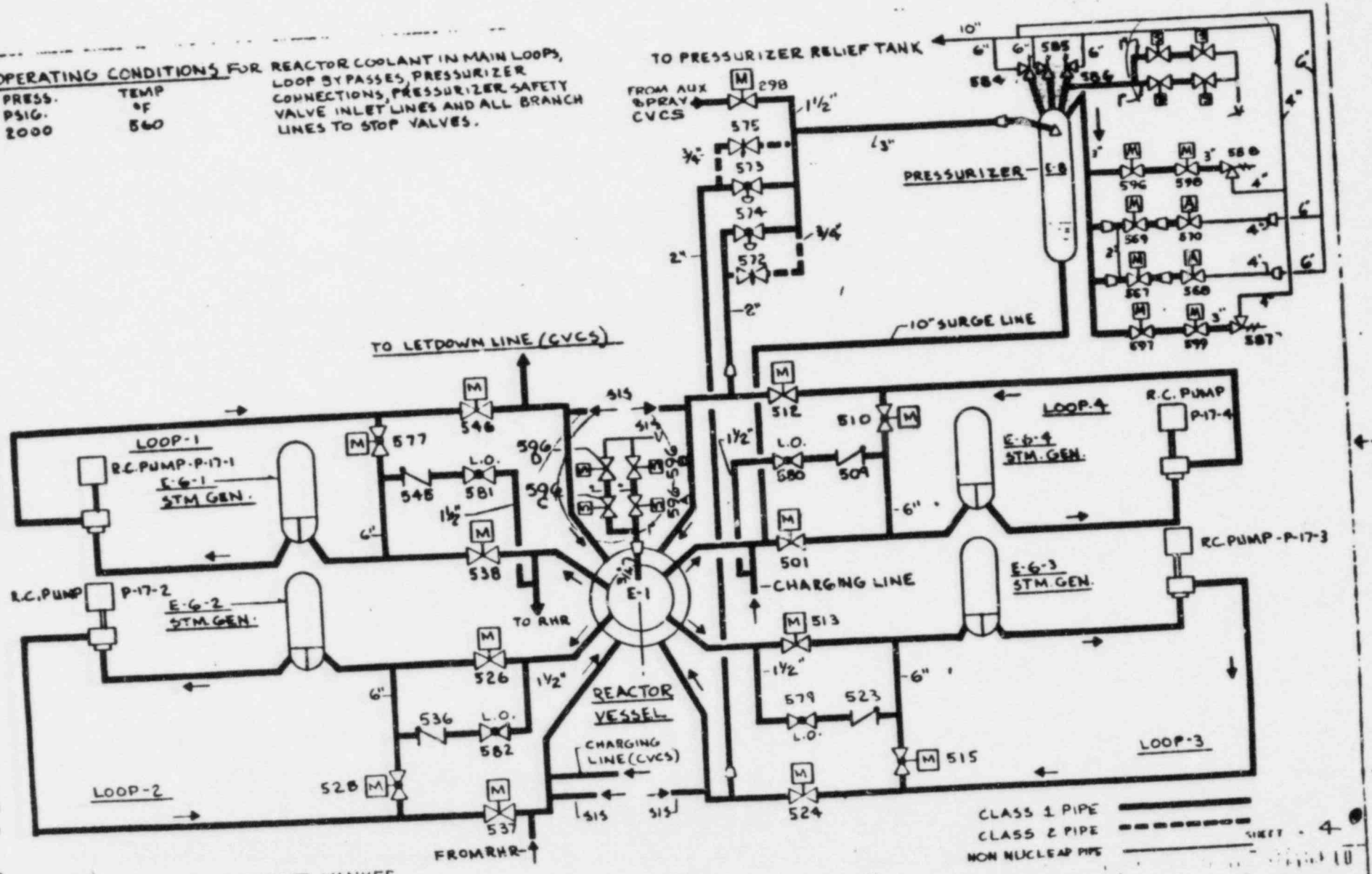
LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	PRESSURIZER SURGE
LINE	10-RC-2501R-52
DRAWING	CYW-38
BREAK PT.	1 2 3 4 5
Reactor Coolant*	A ⟷ A
Main Steam*	A ⟷ A
Feedwater*	A ⟷ A
Charging*	A ⟷ A
Residual Heat Removal*	A ⟷ A
Service Water*	A ⟷ A
Safety Injection	A ⟷ A
Containment Liner	A ⟷ A

*Minimum Required Safe Shutdown System

OPERATING CONDITIONS FOR REACTOR COOLANT IN MAIN LOOPS, LOOP BYPASSES, PRESSURIZER CONNECTIONS, PRESSURIZER SAFETY VALVE INLET LINES AND ALL BRANCH LINES TO STOP VALVES.

PRESS. PSIG.	TEMP °F
2000	650



CONNECTICUT YANKEE

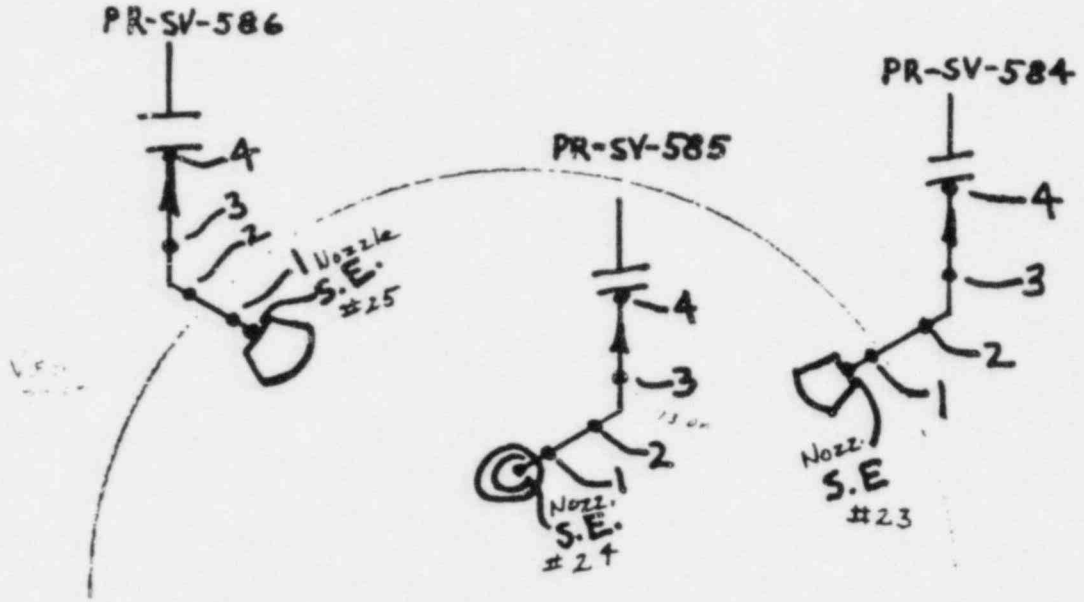
IN-SERVICE INSPECTION -- BOUNDARY DIAGRAM REACTOR COOLANT SYS.

SHEET 4 OF 10

6045

5-61

Pressurizer Safety 3" Lines CYW-85



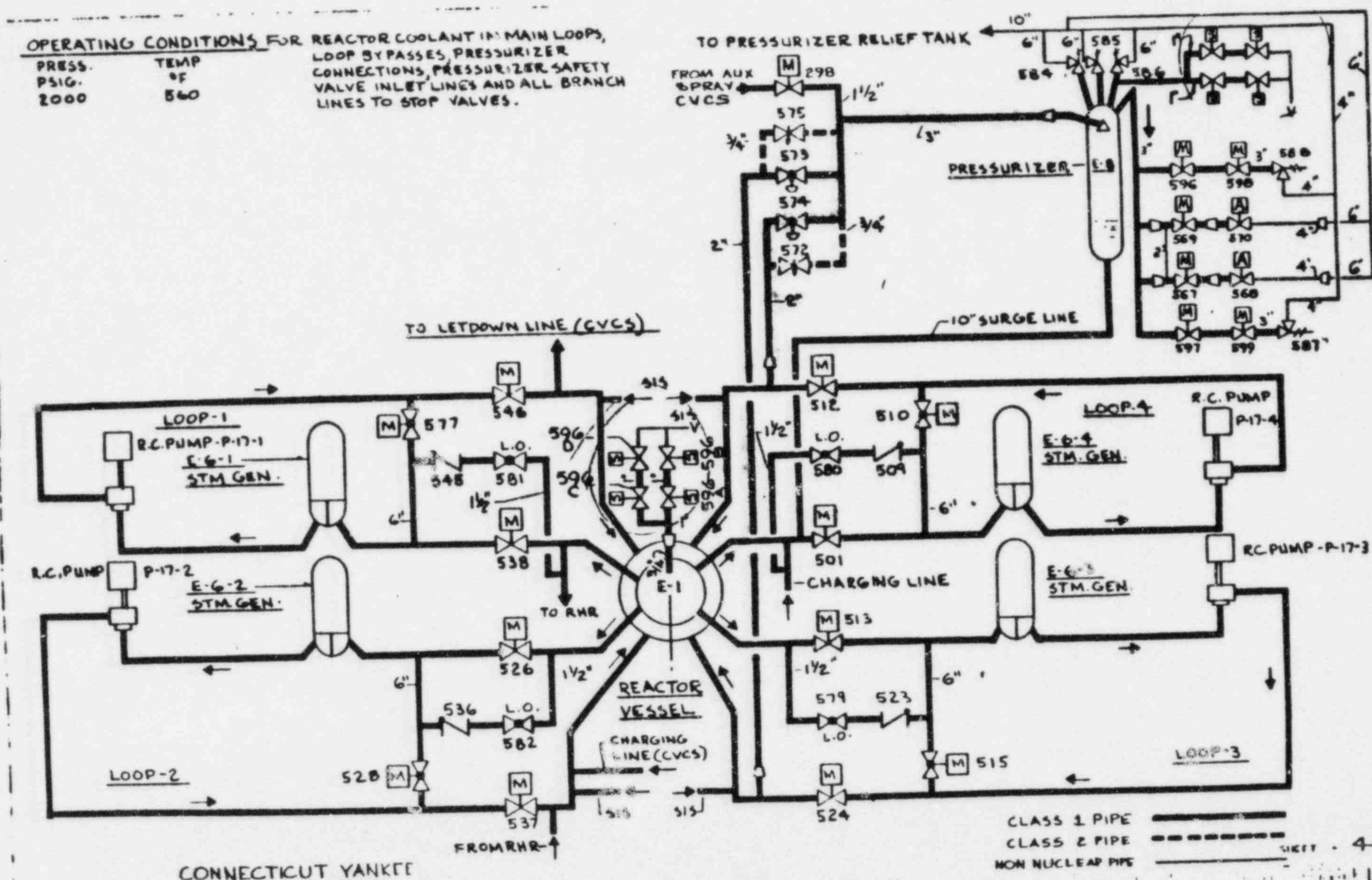
SKETCH SHEET
FORM 28577

WESTINGHOUSE ELECTRIC CORPORATION

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE											
SYSTEM	PRESSURIZER											
LINE	3-RC-2501R-51 & 3-RC-2501R-62 & 3-RC-2501R-68											
DRAWING	CYW-45											
BREAK PT.	1	2	3	4	1	2	3	4	1	2	3	4
Reactor Coolant*	A											A
Main Steam*	A											A
Feedwater*	A											A
Charging*	A											A
Residual Heat Removal*	A											A
Service Water*	A											A
Safety Injection	A											A
Containment Liner	A											A

*Minimum Required Safe Shutdown ystem



IN ERVICE INSPECTION - BOUNDARY DIAGRAM RE OR COOLANT SYS.

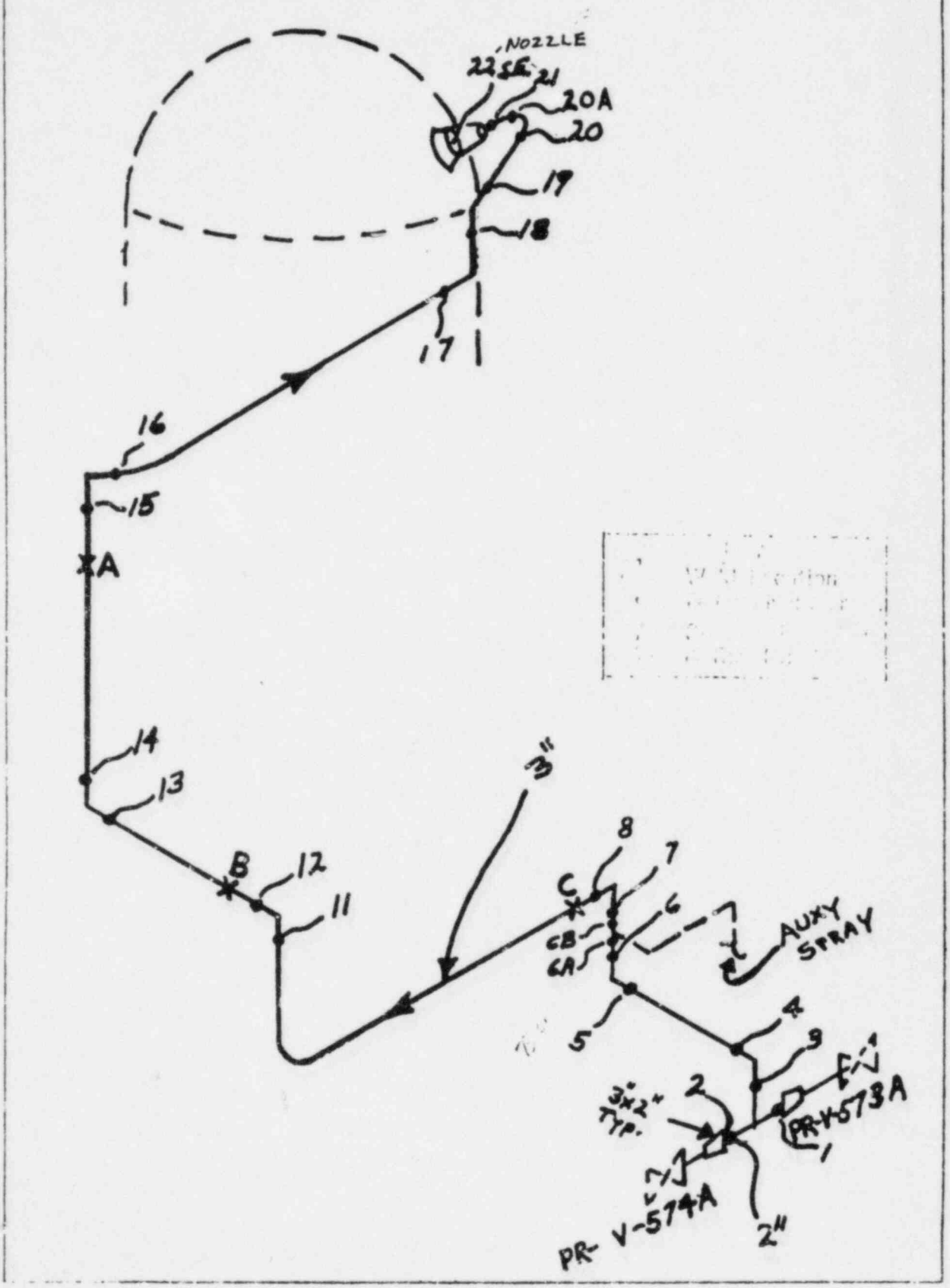
SHEET - 4 -

)-26045

SKETCH SHEET
FORM 28577

WESTINGHOUSE ELECTRIC CORPORATION

4"ø3" PRESSURIZER SPRAY LINE CYW-46

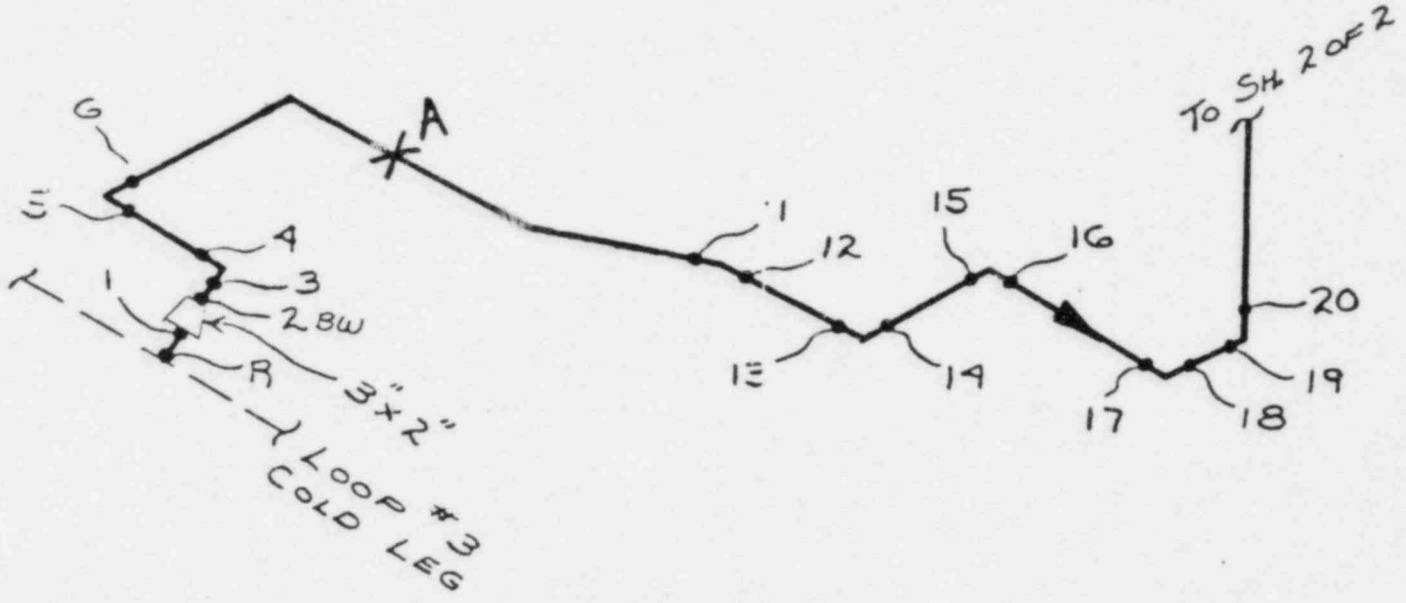


WESTINGHOUSE ELECTRIC CORPORATION

SKETCH SHEET
WESTINGHOUSE FORM 2446D

Loop #3 3"+2" Spray

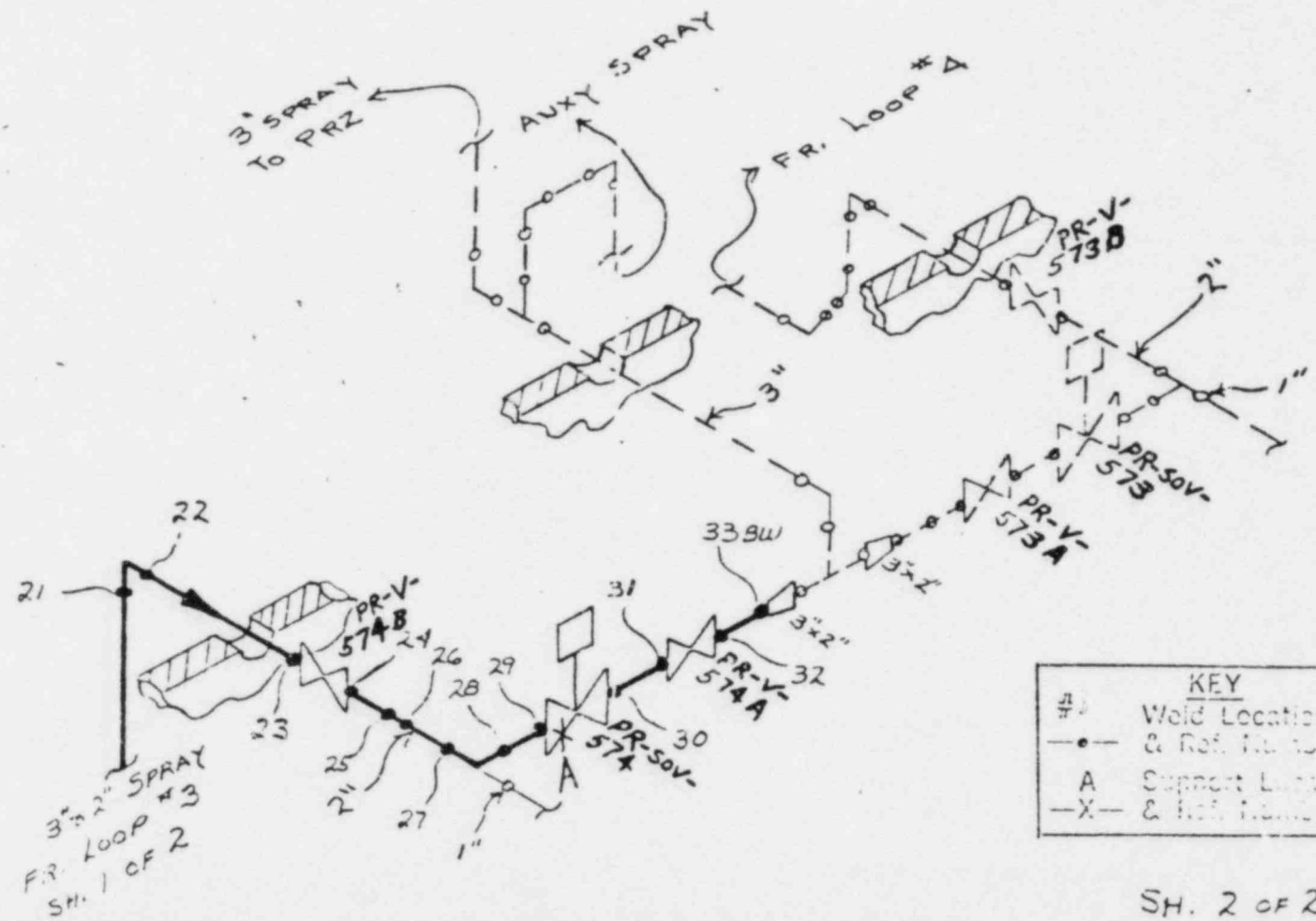
CYW-23



KEY
#1 Weld Location & Ref. Number
A Support Location & Ref. Number

Sh 1 of 2

LOOP #3 - 3"x2" SPRAY CYW-24



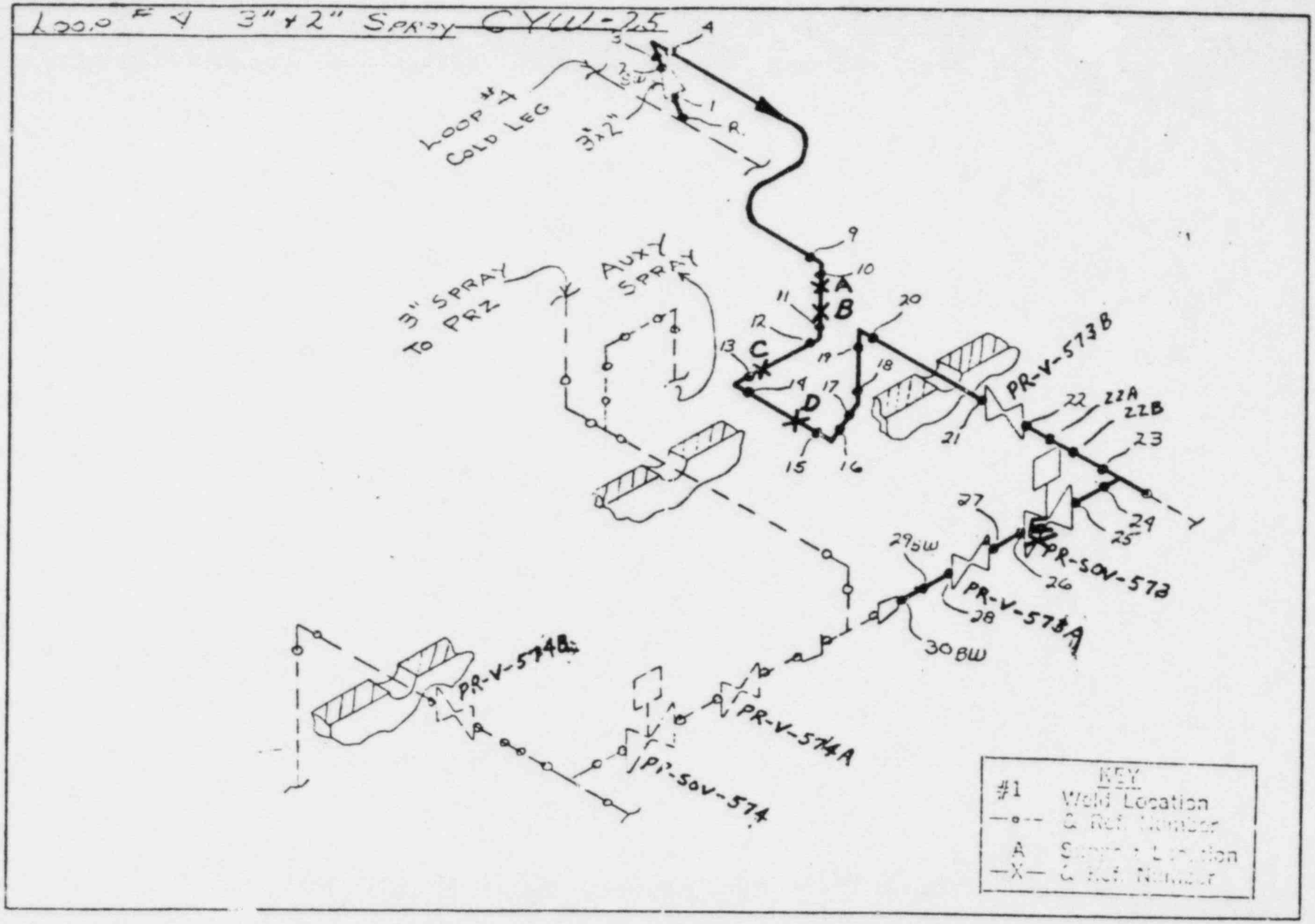
SH. 2 OF 2

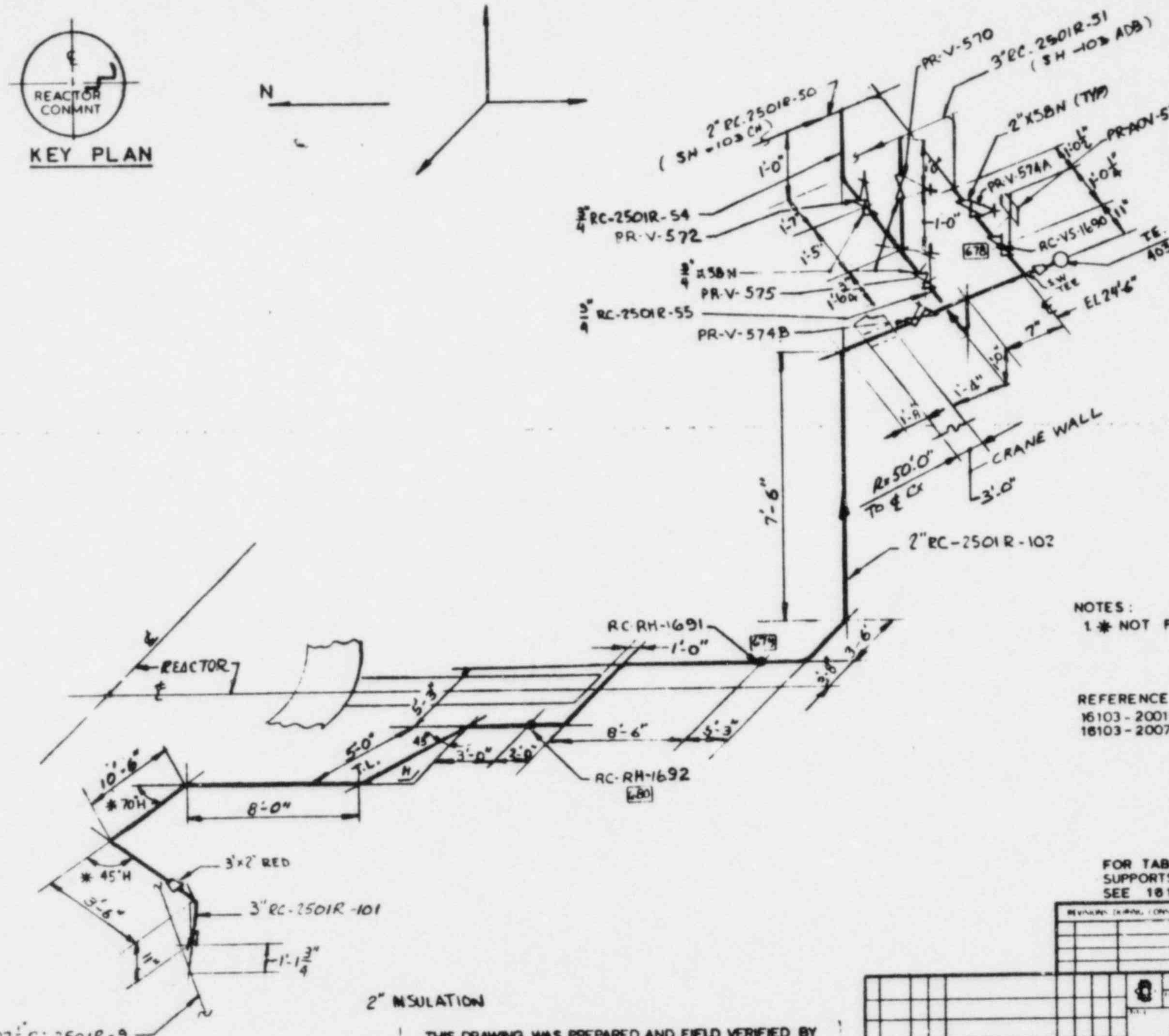
SKETCH SHEET
WESTINGHOUSE FORM 2440

WESTINGHOUSE ELECTRIC CORPORATION

SKETCH SHEET
WESTINGHOUSE FORM 2440

WESTINGHOUSE ELECTRIC CORPORATION





NOTES:
1. * NOT FIELD VERIFIED.

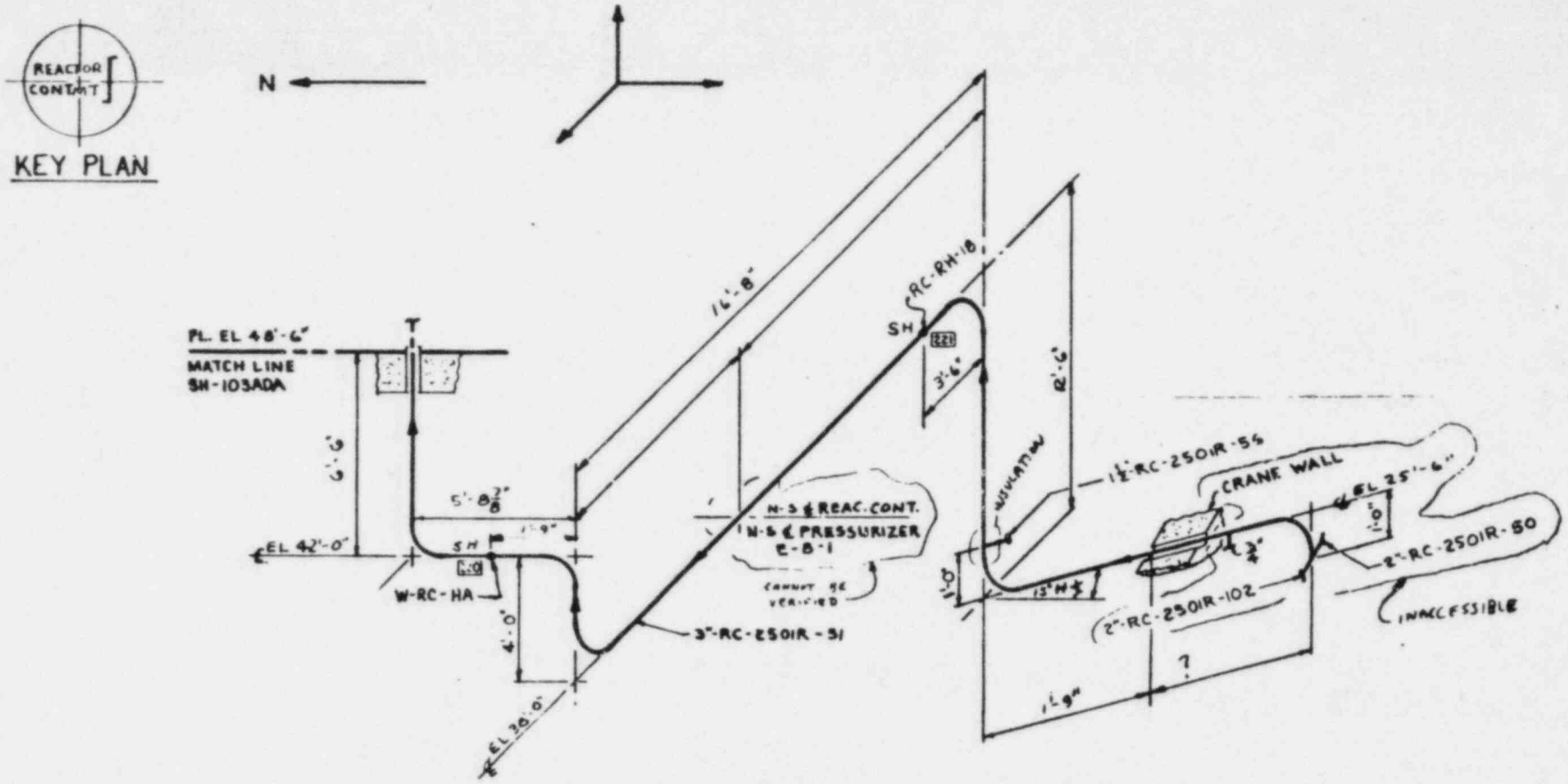
REFERENCE DWGS
16103-20011 SH-6, 8, 10, 12, 20
16103-20079-SH 1

FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 18103-20231-SH-103ZAM

THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED

S&W DWG. NO. 13429 MKS-103 CJ

NORTHEAST UTILITIES SERVICE CO.
CONNECTICUT YANKEE
2" RC-2501R-102
20231 SH103CJ



REFERENCE DWGS:

16103 - 20011 Sh. 12 & 20

UNCONTROLLED

REVISIONS DURING CONSTRUCTION	P.A.#

NORTHEAST UTILITIES SERVICE CO
CONNECTICUT YANKEE

TITLE: PRESSURIZER LINE
3"-RC-2501R-51 SH 2 OF 2

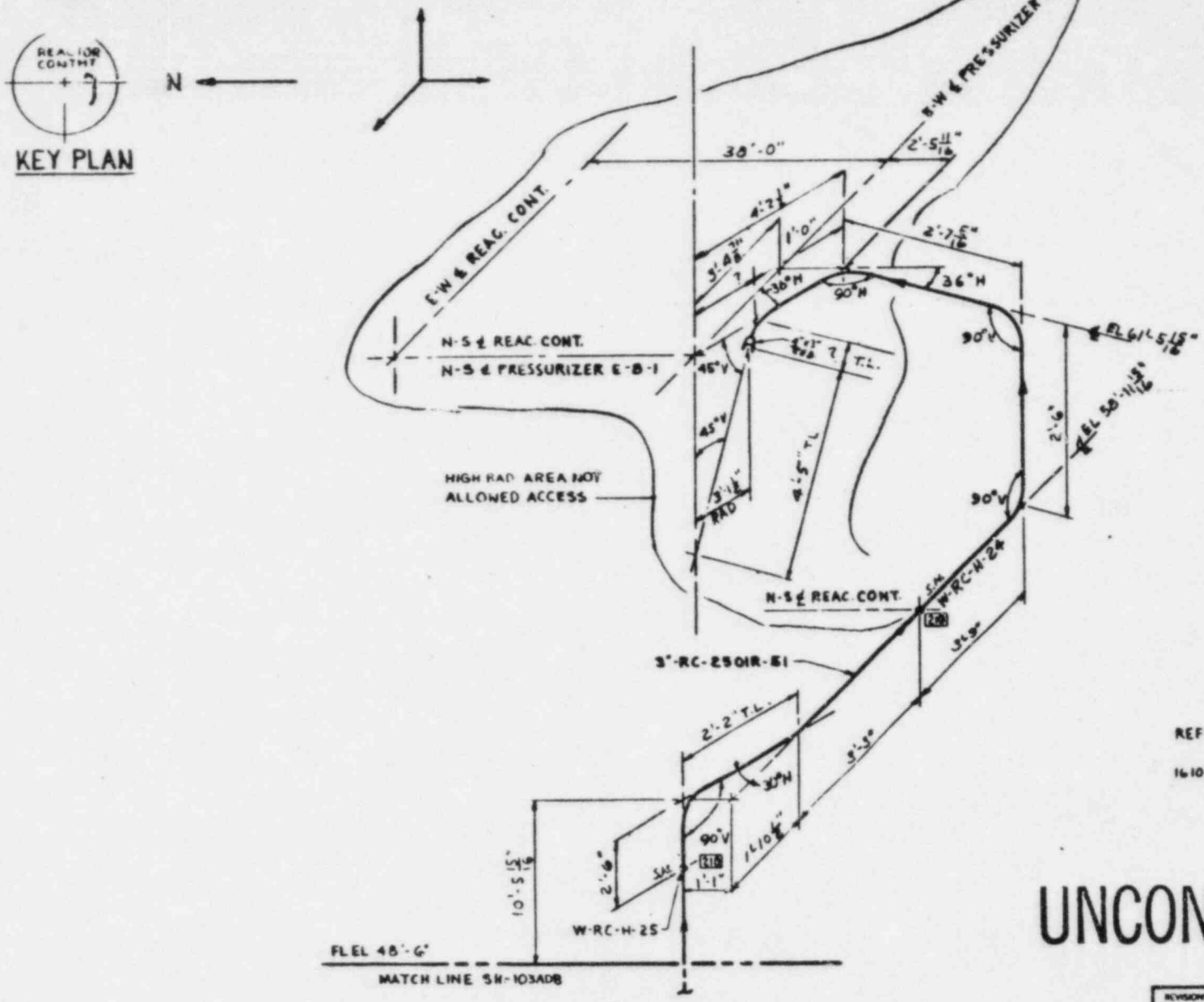
DESIGNED	DRAWN	TRACED	CHECKED
S.N.G.	K.L.S.		
9-5-72	9-5-72		

16103 — SH-103ADB

THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED

S&W DWG. NO. 13429. MKS-103AD-SH-2

3" INSUL VON



REFERENCE DWGS:

16103-20011 SH. 14 & 20

UNCONTROLLED

3" INSULATION

THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED

S&W DWG. NO. 13425 MKS-103AD-SH 1

REVISIONS DURING CONSTRUCTION	PA #

NORTHEAST UTILITIES SERVICE CO
FOR CONNECTICUT YANKEE

TITLE: PRESSURIZER LINE
3"-RC-2501R-51 SH. 1 OF 2

DES.	DRN. KCS	CHK.	APP.
DATE 9-5-79	SCALE 1:29		
W.O.	16103	DWG. NO.	1-SH-103AL-A

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	SPRAY (LOOP #3)
LINE	2-RC-2501R-102 & 3-RC-2501R-101
DRAWING	CYW-23
BREAK PT.	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Reactor Coolant*	A ← → A
Main Steam*	A ← → A
Feedwater*	A ← → A
Charging*	A ← → A
Residual Heat Removal*	A ← → A
Service Water*	A ← → A
Safety Injection	A ← → A
Containment Liner	A ← → A

*Minimum Required Safe Shutdown System

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET		SOURCE
	SYSTEM	SPRAY (LOOP #3)
	LINE	2-RC-2501R-102
	DRAWING	CY10-34
	BREAK PT.	21 22 23 24 25 26 27 28 29 30 31 32 33
Reactor Coolant*		A ◄——► A
Main Steam*		A ◄——► A
Feedwater*		A ◄——► A
Charging*		A ◄——► A
Residual Heat Removal*		A ◄——► A
Service Water*		A ◄——► A
Safety Injection		A ◄——► A
ntainment Liner		A ◄——► A

inimum Required Safe Shutdown
ystem

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET		SOURCE
	SYSTEM	SPRAY (LOOP #4)
	LINE	2-RC-2501R-50
	DRAWING	CYW-25
	BREAK PT.	1 2 3 4 9 10 11 12 13 14 15 16 17 18 19 20
Reactor Coolant*		A ◄——————————► A
Main Steam*		A ◄——————————► A
Feedwater*		A ◄——————————► A
Charging*		A ◄——————————► A
Residual Heat Removal*		A ◄——————————► A
Service Water*		A ◄——————————► A
Safety Injection		A ◄——————————► A
tainment Liner		A ◄——————————► A

nimum Required Safe Shutdown
ystem

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	SPRAY (LOOP #4)
LINE	2-RC-2501R-50
DRAWING	CYW-25
BREAK PT.	21 22 22A 22B 23 24 25 26 27 28 29 30
Reactor Coolant*	A ◄——► A
Main Steam*	A ◄——► A
Feedwater*	A ◄——► A
Charging*	A ◄——► A
Residual Heat Removal*	A ◄——► A
Service Water*	A ◄——► A
Safety Injection	A ◄——► A
Containment Liner	A ◄——► A

*Minimum Required Safe Shutdown System

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	PRESSURIZER
LINE	3-RC-2501R-51
DRAWING	MKS-103 AD (Sheet 1) (CYW-46)
BREAK PT.	13 14 15 16 17 18 19 20 21
Reactor Coolant*	A ◄——► A
Main Steam*	A ◄——► A
Feedwater*	A ◄——► A
Charging*	A ◄——► A
Residual Heat Removal*	A ◄——► A
Service Water*	A ◄——► A
Safety Injection	A ◄——► A
Containment Liner	A ◄——► A

*Minimum Required Safe Shutdown System

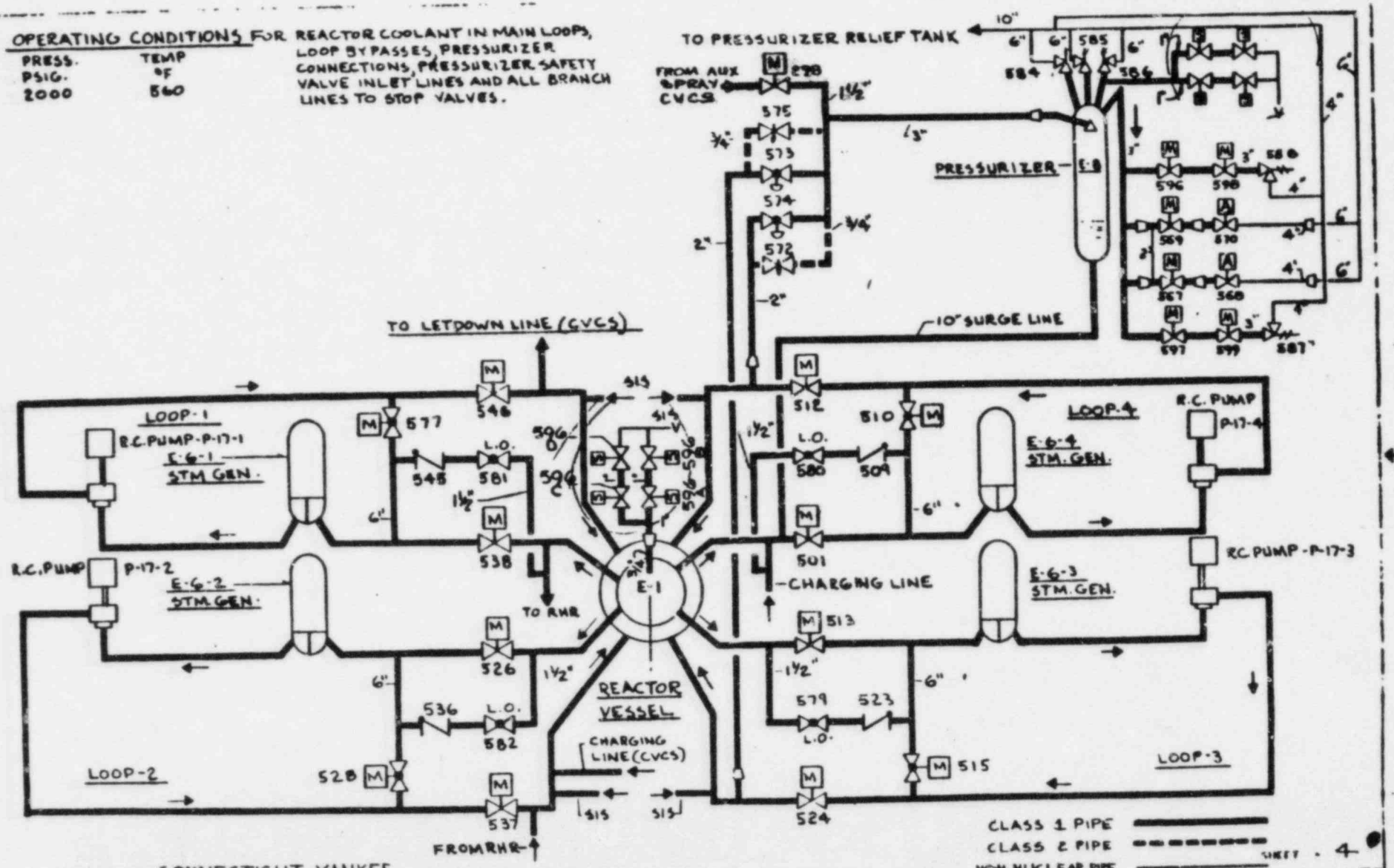
LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	PRESSURIZER
LINE	3-RC-2501R-51
DRAWING	MKS-1031D (Sheet 2) (CYW-46)
BREAK PT.	1 2 3 4 5 6 7 8 9 10 11 12
Reactor Coolant*	A ◄——————► A
Main Steam*	A ◄——————► A
Feedwater*	A ◄——————► A
Charging*	A ◄——————► A
Residual Heat Removal*	A ◄——————► A
Service Water*	A ◄——————► A
Safety Injection	A ◄——————► A
Containment Liner	A ◄——————► A

*Minimum Required Safe Shutdown System

OPERATING CONDITIONS FOR REACTOR COOLANT IN MAIN LOOPS, LOOP BYPASSES, PRESSURIZER CONNECTIONS, PRESSURIZER SAFETY VALVE INLET LINES AND ALL BRANCH LINES TO STOP VALVES.

PRESS. PSIG.	TEMP °F
2000	560



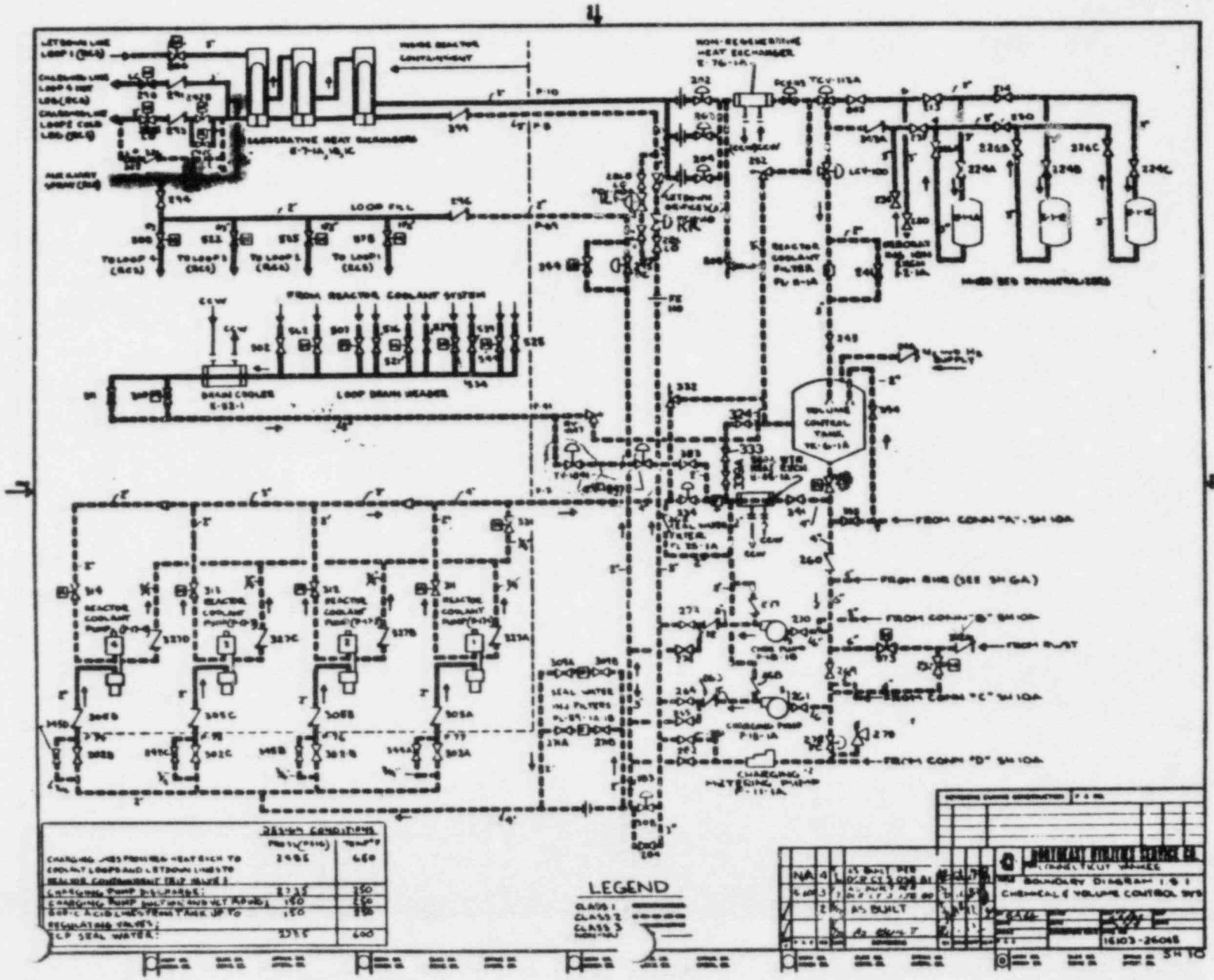
CONNECTICUT YANKEE

IN SERVICE INSPECTION -- BOUNDARY DIAGRAM RE FOR COOLANT SYS.

SHEET - 4

1510 DCCN-3	2 REV	330 BY	CHK	6300 APPRT	1 REV	SAT BY	CHK.	APPD.		5/11/77	16

D-26045

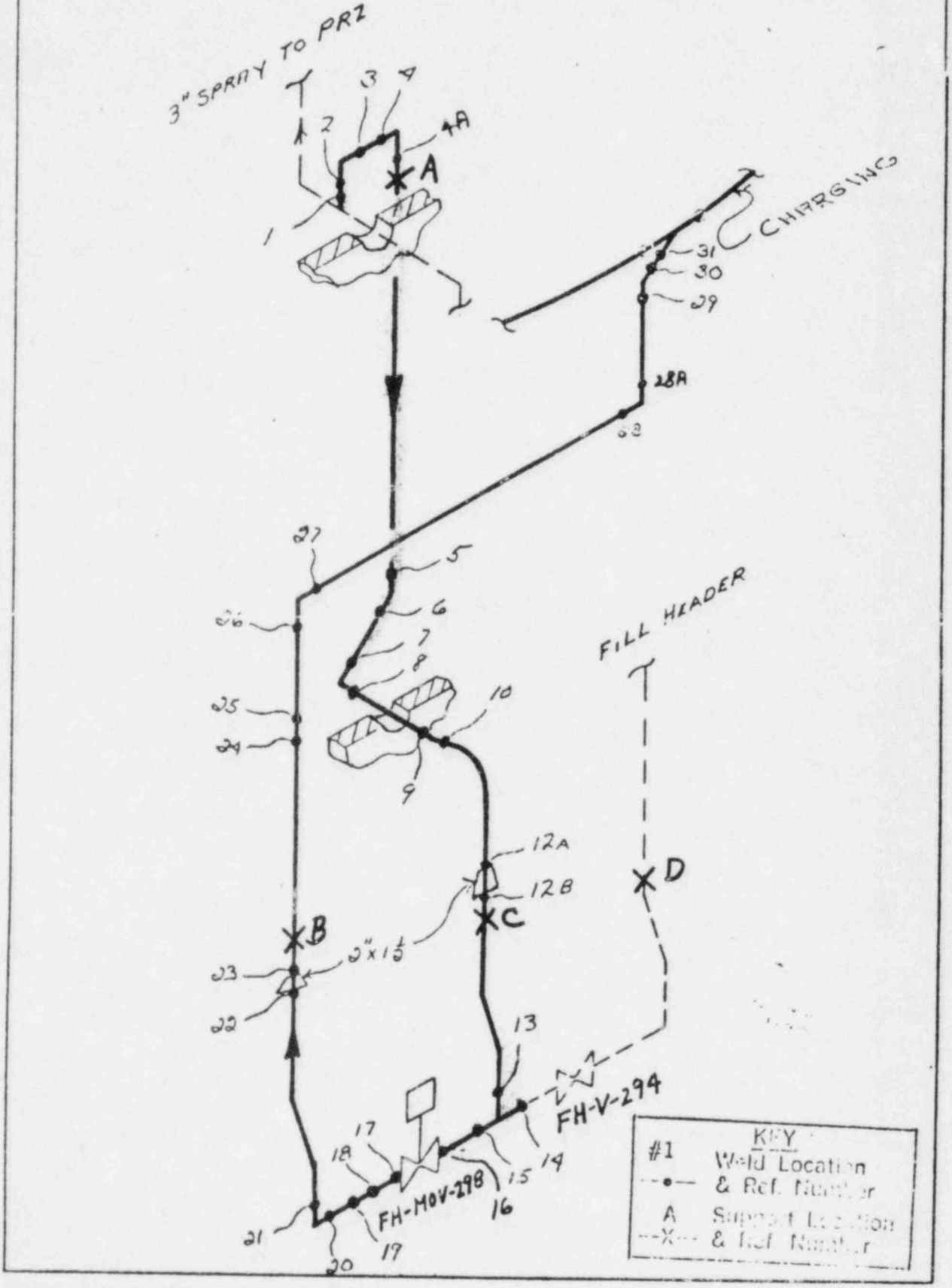

REGENERATIVE HEAT EXCHANGER
NON-REGENERATIVE HEAT EXCHANGER
LOOP FILL
FROM REACTOR COOLANT SYSTEM
DRAIN COOLER
LOOP DRAIN HEADER
VOLUME CONTROL TANK
REACTOR COOLANT PUMP
SEAL WATER INJ FILTERS
CHARGING PUMP
CHARGING / HI HEADING PUMP
FROM CONN "A" SH 10A
FROM RHR (SEE SH 6A)
FROM CONN "B" SH 10A
FROM RUST
FROM CONN "C" SH 10A
FROM CONN "D" SH 10A
LEGEND
CLASS 1
CLASS 2
CLASS 3
AS BUILT
CHEMICAL & VOLUME CONTROL SYS
16103-26048
SH 10

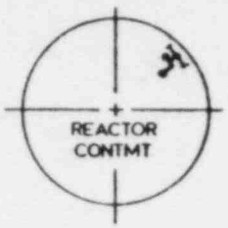
SKETCH SHEET

WESTINGHOUSE FORM 2444D

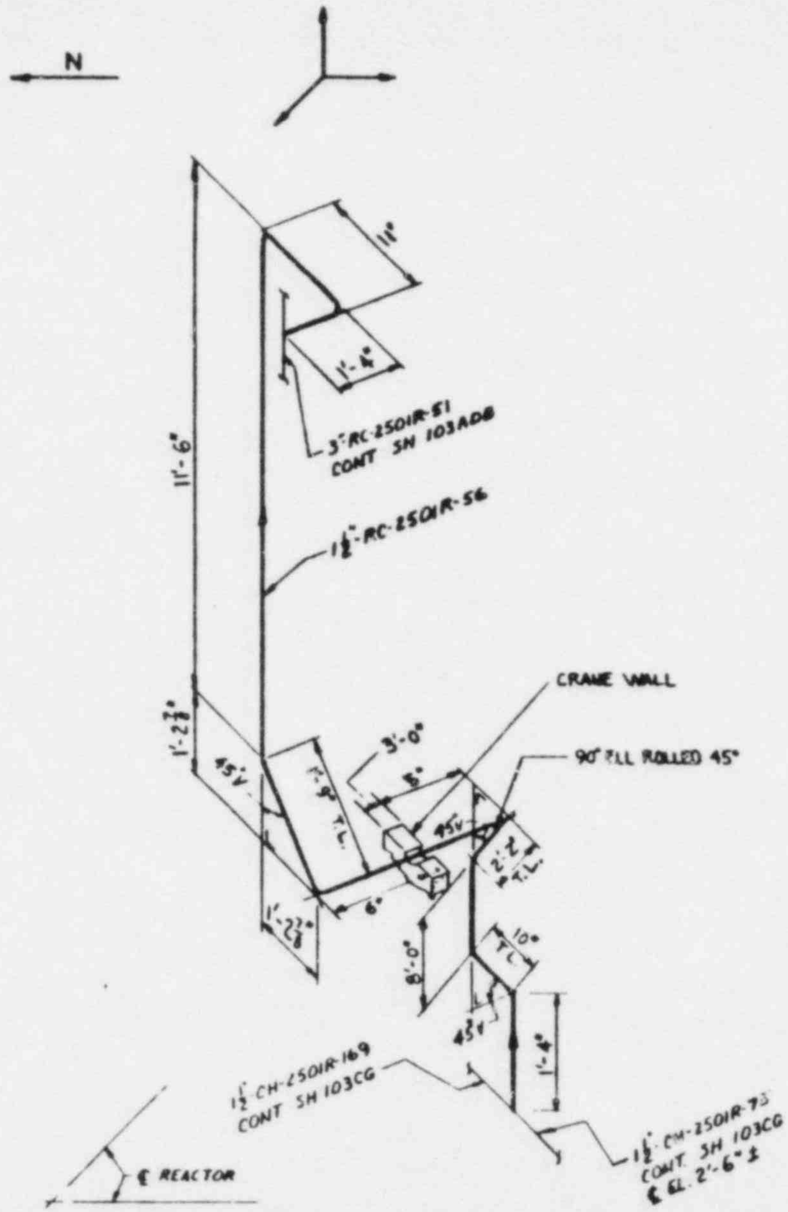
WESTINGHOUSE ELECTRIC CORPORATION

2" x 1½" AUXILIARY SPRAY LINE CVW-26





KEY PLAN



NOTES:
1. ALL FITTINGS SOCKET WELD UNLESS OTHERWISE NOTED.

REF DWGS
16103-20011-SH 2, 4, 6, 8, 10, 12, 15 & 20

FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 16103-20231-SH-103ZAL

INSULATED

THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGIN[illegible]NG CORPORATION AND IS "AS BUILT" UNLESS [illegible]ERWISE NOTED
S&W DWG. NO. 13429.0[illegible]KS-103CF

0	N[illegible]THEAST UTILITIES SERVICE CO. CONNECTICUT YANKEE
	PRESSURIZER SPRAY LINE 1½" RC-2501R-56
WEJ 3-11-81 NONE	12-21-81
16103	20231-SH-103CF

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	Aux. Spray
LINE	1½-RC-2501R-56
DRAWING	CYW-26
BREAK PT.	1 2 3 4 5 6 7 8 9 10 11B 12B
Reactor Coolant*	A ← → A
Main Steam*	A ← → A
Feedwater*	A ← → A
Charging*	A ← → A
Residual Heat Removal*	A ← → A
Service Water*	A ← → A
Safety Injection	A ← → A
tainment Liner	A ← → A

nimum Required Safe Shutdown
ystem

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

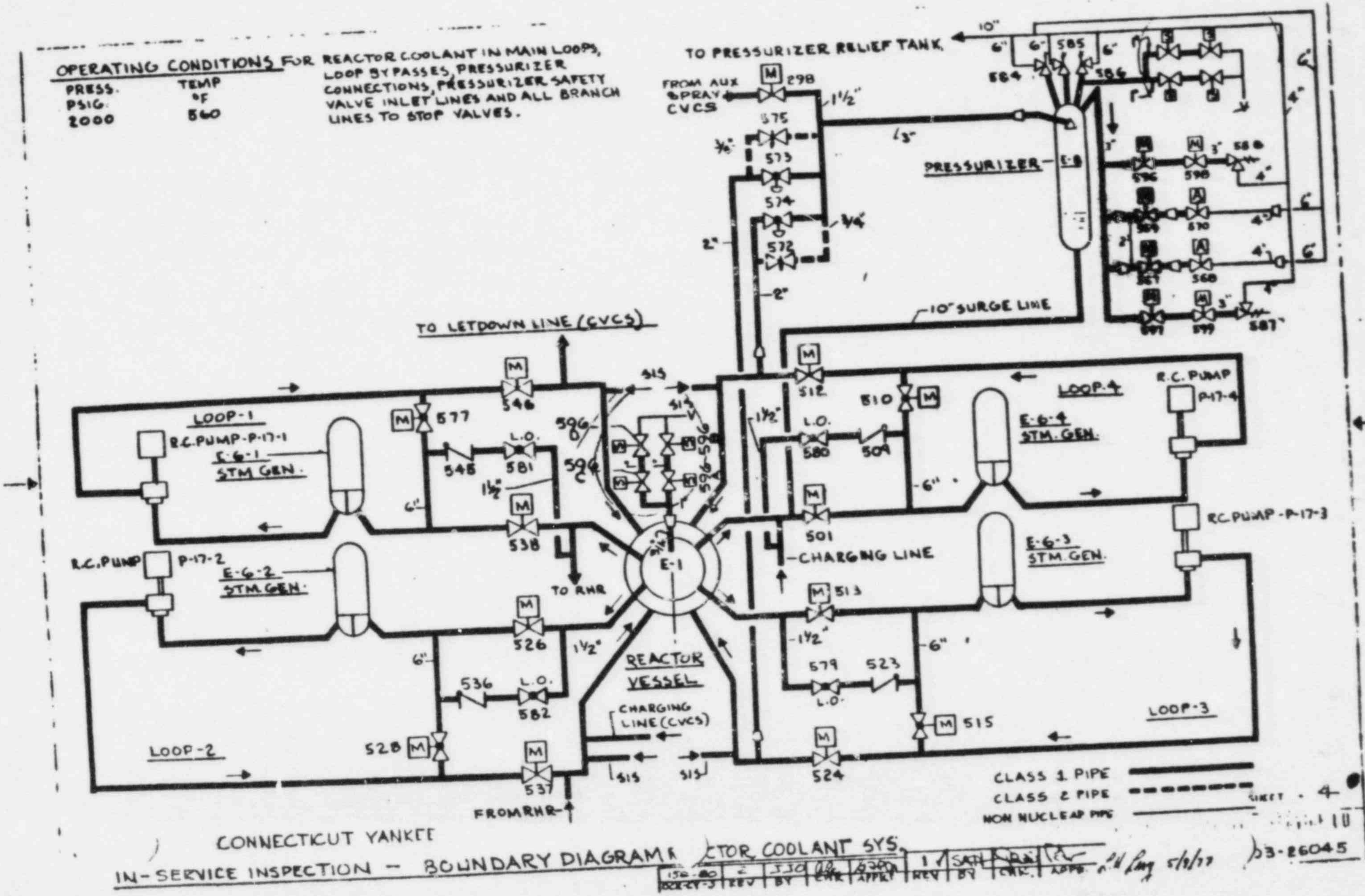
TARGET	SOURCE														
SYSTEM	Aux. SPRAY														
LINE	1½-CH-2501R-75														
DRAWING	CYW-26														
BREAK PT.	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Reactor Coolant*	A	←	—	—	—	—	—	—	—	—	—	—	—	→	A
Main Steam*	A	←	—	—	—	—	—	—	—	—	—	—	—	→	A
Feedwater*	A	←	—	—	—	—	—	—	—	—	—	—	—	→	A
Charging*	A	←	—	—	—	—	—	—	—	—	—	—	—	→	A
Residual Heat Removal*	A	←	—	—	—	—	—	—	—	—	—	—	—	→	A
Service Water*	A	←	—	—	—	—	—	—	—	—	—	—	—	→	A
Safety injection	A	←	—	—	—	—	—	—	—	—	—	—	—	→	A
tainment Liner	D	←	—	—	—	—	—	—	—	—	—	—	—	→	D

nimum Required Safe Shutdown
ystem

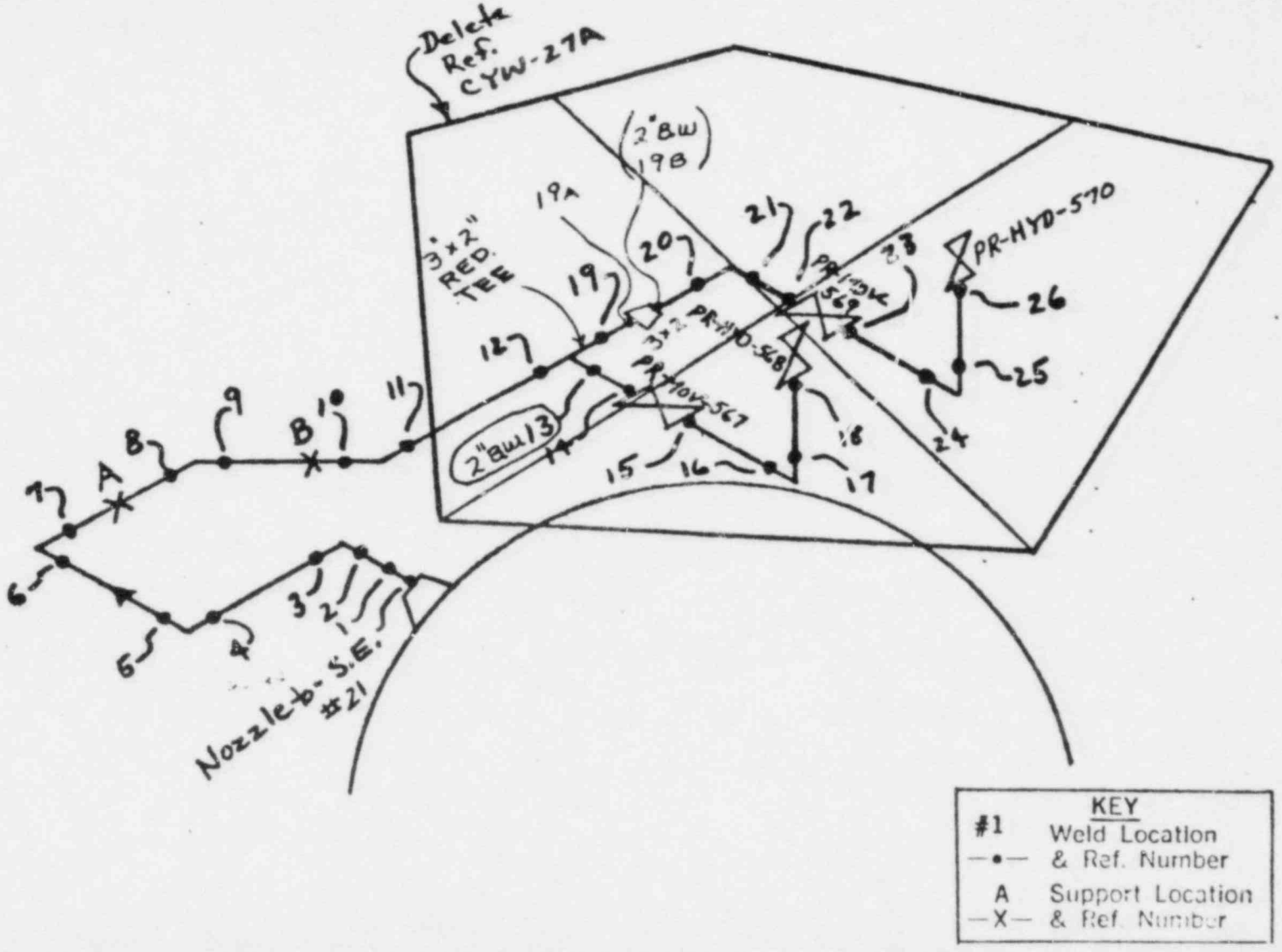
LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	AUX. SPRAY
LINE	1½-CH-2501R-75
DRAWING	CYW-26
BREAK PT.	28 28A 29 30 31
Reactor Coolant*	A ⟷ A
Main Steam*	A ⟷ A
Feedwater*	A ⟷ A
Charging*	A ⟷ A
Residual Heat Removal*	A ⟷ A
Service Water*	A ⟷ A
Safety Injection	A ⟷ A
Containment Liner	D ⟷ D

inimum Required Safe Shutdown
ystem


OPERATING CONDITIONS FOR REACTOR COOLANT IN MAIN LOOPS, LOOP BYPASSES, PRESSURIZER CONNECTIONS, PRESSURIZER SAFETY VALVE INLET LINES AND ALL BRANCH LINES TO STOP VALVES.
PRESS. PSIG. 2000
TEMP °F 560
TO PRESSURIZER RELIEF TANK
FROM AUX SPRAY CVCS
PRESSURIZER
E-8
10" SURGE LINE
TO LETDOWN LINE (CVCS)
LOOP-1
R.C. PUMP-P-17-1
E-6-1 STM GEN.
LOOP-2
R.C. PUMP P-17-2
E-6-2 STM. GEN.
LOOP-3
R.C. PUMP-P-17-3
E-6-3 STM. GEN.
LOOP-4
R.C. PUMP P-17-4
E-6-4 STM. GEN.
REACTOR VESSEL
E-1
CHARGING LINE
CHARGING LINE (CVCS)
TO RHR
FROM RHR
SIS
L.O.
CLASS 1 PIPE
CLASS 2 PIPE
NON NUCLEAR PIPE
CONNECTICUT YANKEE
IN-SERVICE INSPECTION - BOUNDARY DIAGRAM R[...]CTOR COOLANT SYS.
SHEET - 4
3-26045

Pressurizer Relief 2" & 3" Lines CYW-27



WESTINGHOUSE ELECTRIC CORPORATION

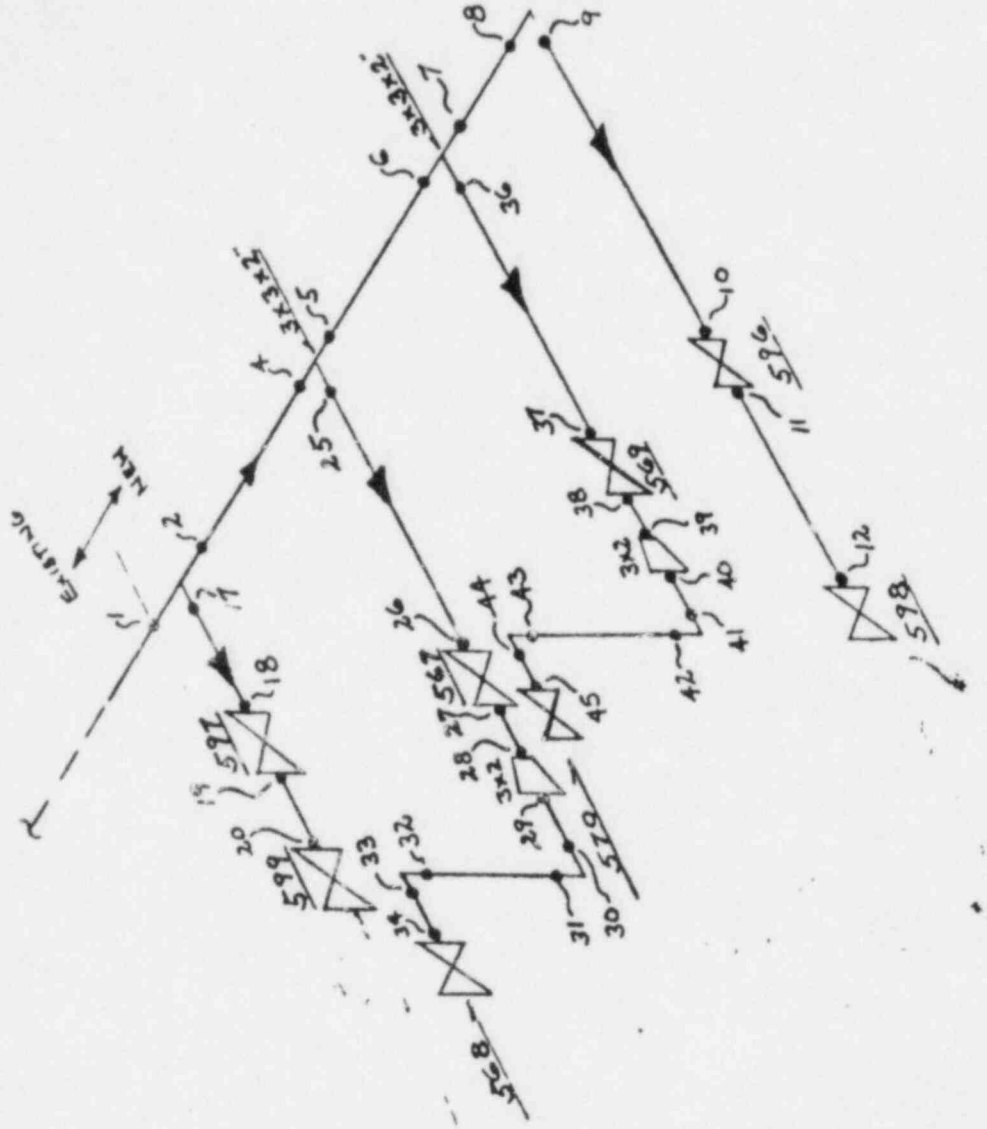
SKETCH SHEET
FORM 28577

14-41

SKETCH SHEET
FORM 28577

WESTINGHOUSE ELECTRIC CORPORATION

PRESSURIZER 3" & 2" RELIEF LINE CYW-27A
NEWLY INSTALLED Nov. 1977



26, 27, 37, 38	2" Socket Welds
36, 25, 28, 39	2" Butt Welds

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	PRESSURIZER
LINE	RELIEF LINES
DRAWING	CVW-27
BREAK PT.	1 2 3 4 5 6 7 8 9 10 11
Reactor Coolant*	A ◄——————► A
Main Steam*	A ◄——————► A
Feedwater*	A ◄——————► A
Charging*	A ◄——————► A
Residual Heat Removal*	A ◄——————► A
Service Water*	A ◄——————► A
Safety Injection	A ◄——————► A
Containment Liner	A ◄——————► A

*Minimum Required Safe Shutdown System

LEGEND

D = Damage Possible, Further Evaluation Required

A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE												
	SYSTEM	PRESSURIZER											
	LINE	RELIEF LINE											
	DRAWING	CYW-27A											
	BREAK PT.	1	2	3	4	5	6	7	8	9	10	11	12
Reactor Coolant*		A	←										A
Main Steam*		A	←										A
Feedwater*		A	←										A
Charging*		A	←										A
Residual Heat Removal*		A	←										A
Service Water*		A	←										A
Safety Injection		A	←										A
Containment Liner		A	←										A

*Minimum Required Safe Shutdown System

D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

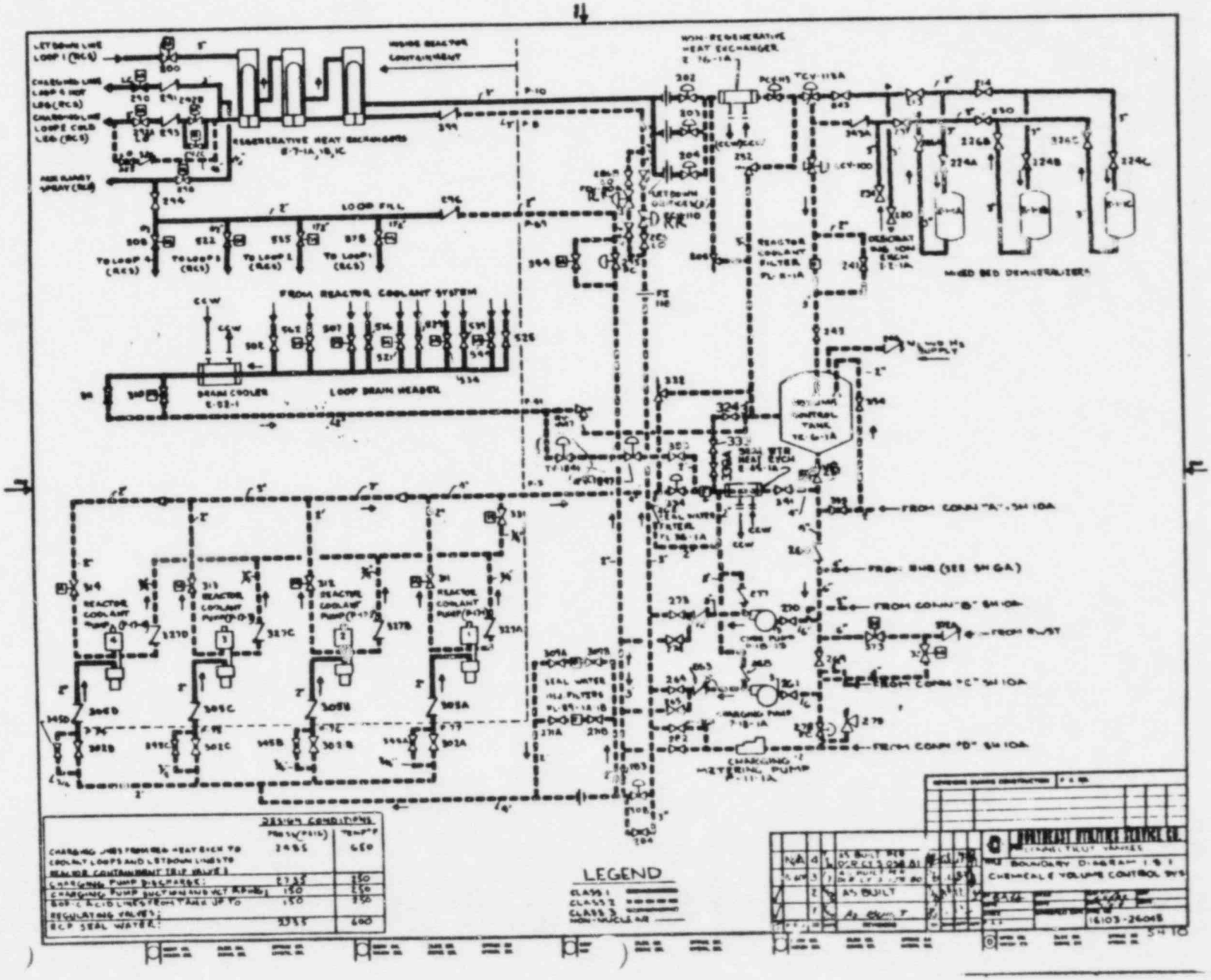
TARGET	SOURCE																	
	SYSTEM	PRESSURIZER																
	LINE	RELIEF LINE																
	DRAWING	CVW-27A																
	BREAK PT.	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Reactor Coolant*		A	←																A
Main Steam*		A	←																A
Feedwater*		A	←																A
Charging*		A	←																A
Residual Heat Removal*		A	←																A
Service Water*		A	←																A
Safety Injection		A	←																A
Containment Liner		A	←																A

*Minimum Required Safe Shutdown System

D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	PRESSURIZER
LINE	RELIEF LINE
DRAWING	CYW-27A
BREAK PT.	36 37 38 39 40 41 42 43 44 45
Reactor Coolant*	A ◄——► A
Main Steam*	A ◄——► A
Feedwater*	A ◄——► A
Charging*	A ◄——► A
Residual Heat Removal*	A ◄——► A
Service Water*	A ◄——► A
Safety Injection	A ◄——► A
Containment Liner	A ◄——► A

*Minimum Required Safe Shutdown System

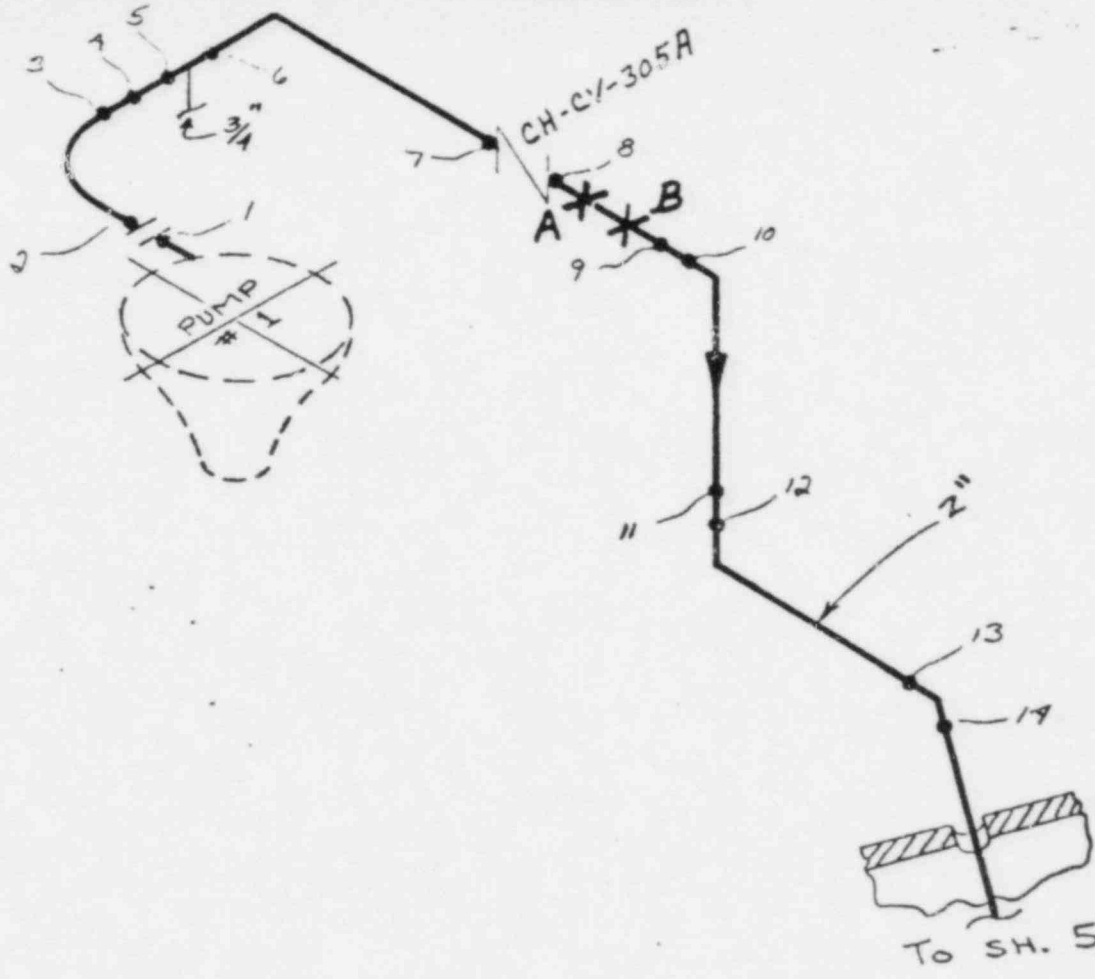


	DESIGN CONDITIONS	
	PRESS (PSIG)	TEMP °F
CHARGING LINES FROM REGEN HEAT EXCH TO COOLANT LOOPS AND LETDOWN LINES TO REACTOR CONTAINMENT (ISOLATION VALVE)	2485	650
CHARGING PUMP DISCHARGE	2735	150
CHARGING PUMP SUCTION AND VCT (RELIEF)	150	150
BORIC ACID LINES FROM TANKS UP TO REGULATING VALVES	150	150
RCP SEAL WATER	2735	600

WESTINGHOUSE ELECTRIC CORPORATION

SKETCH SHEET
FORM 28577

LOOP #1 2" SEAL INJECTION CVH-8



KEY
#1 Weld Location & Ref. Number
A Support Location & Ref. Number

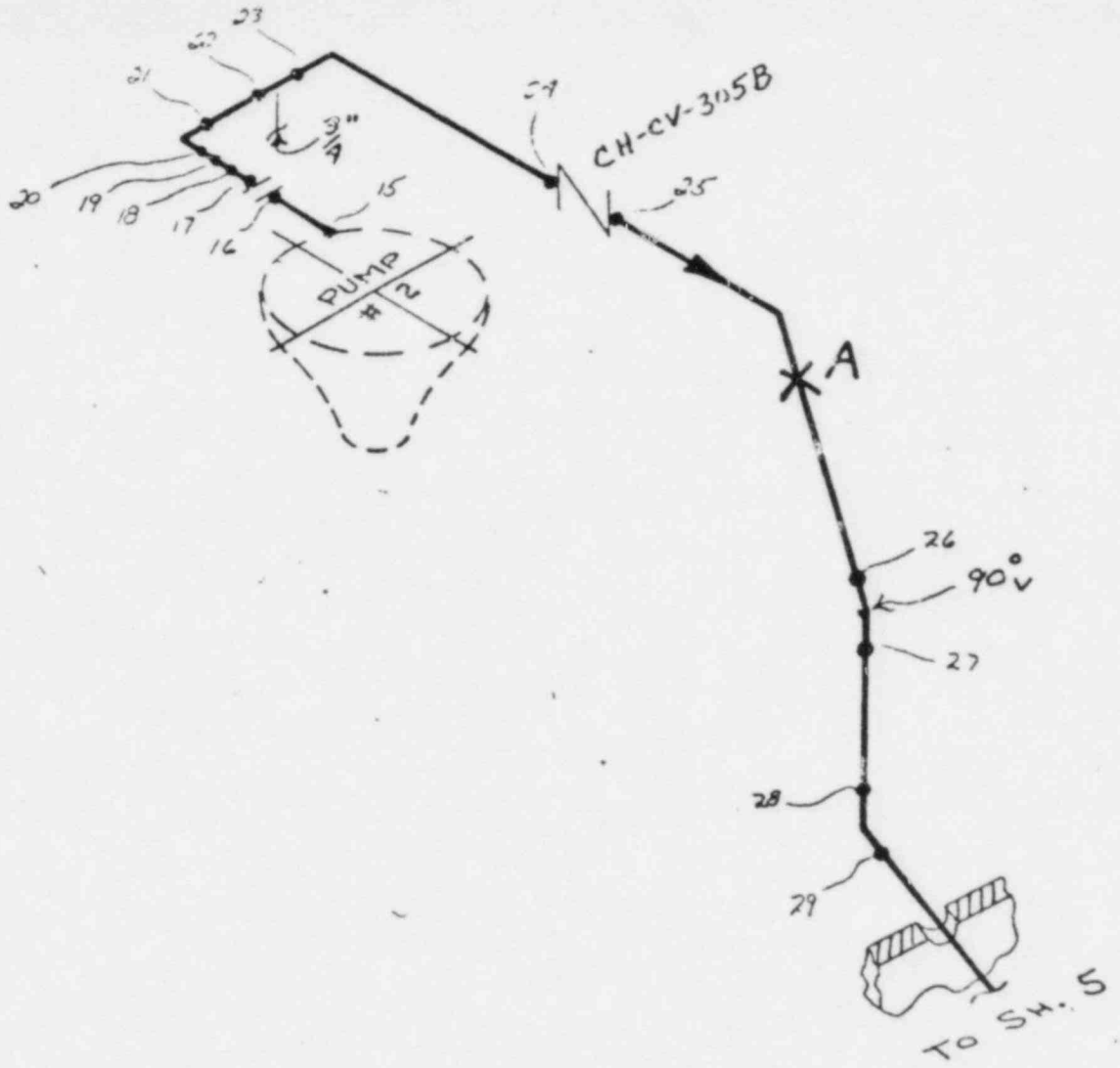
SH. 1 OF 5

5-22

WESTINGHOUSE ELECTRIC CORPORATION

SKETCH SHEET
FORM 28577

LOOP # 2 2" SEAL INJECTION CYW-9



KEY
#1 Weld Location & Ref. Number
A Support Location & Ref. Number

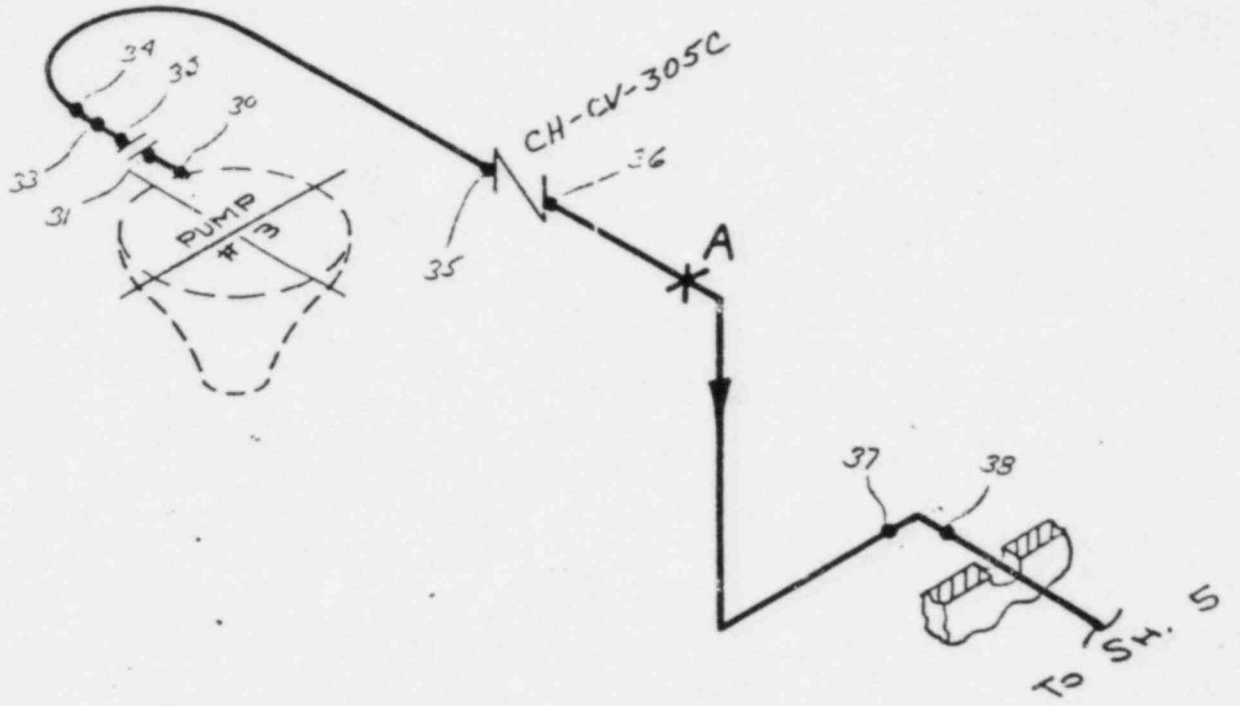
SH. 2 OF 6

WESTINGHOUSE ELECTRIC CORPORATION

SKETCH SHEET
FORM 28577

Loop #3 - 2" Seal Injection CYW-10

2-CH-2501X-18



KEY

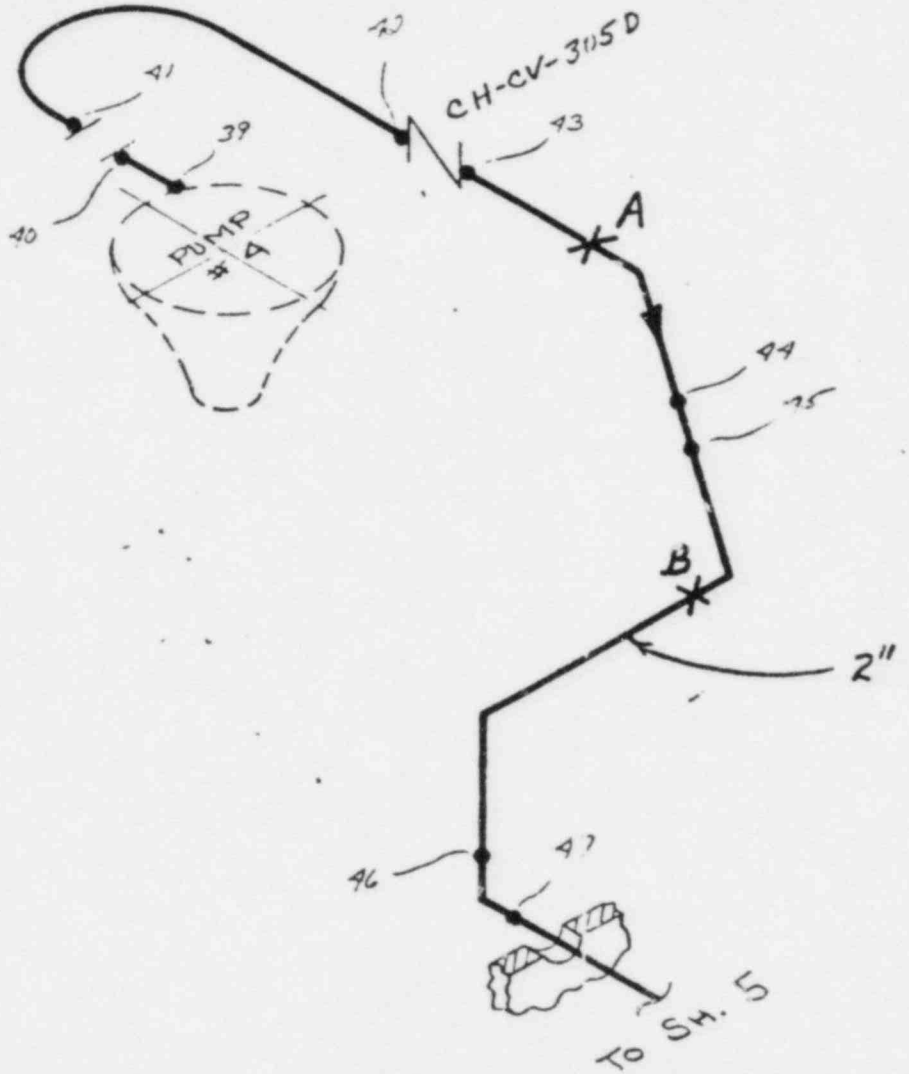
#1 —•—	Weld Location & Ref. Number
A —X—	Support Location & Ref. Number

SH. 3 OF 6

WESTINGHOUSE ELECTRIC CORPORATION

SKETCH SHEET
FORM 28577

LOOP #4 - 2" - SEAL INJECTION CYW-11

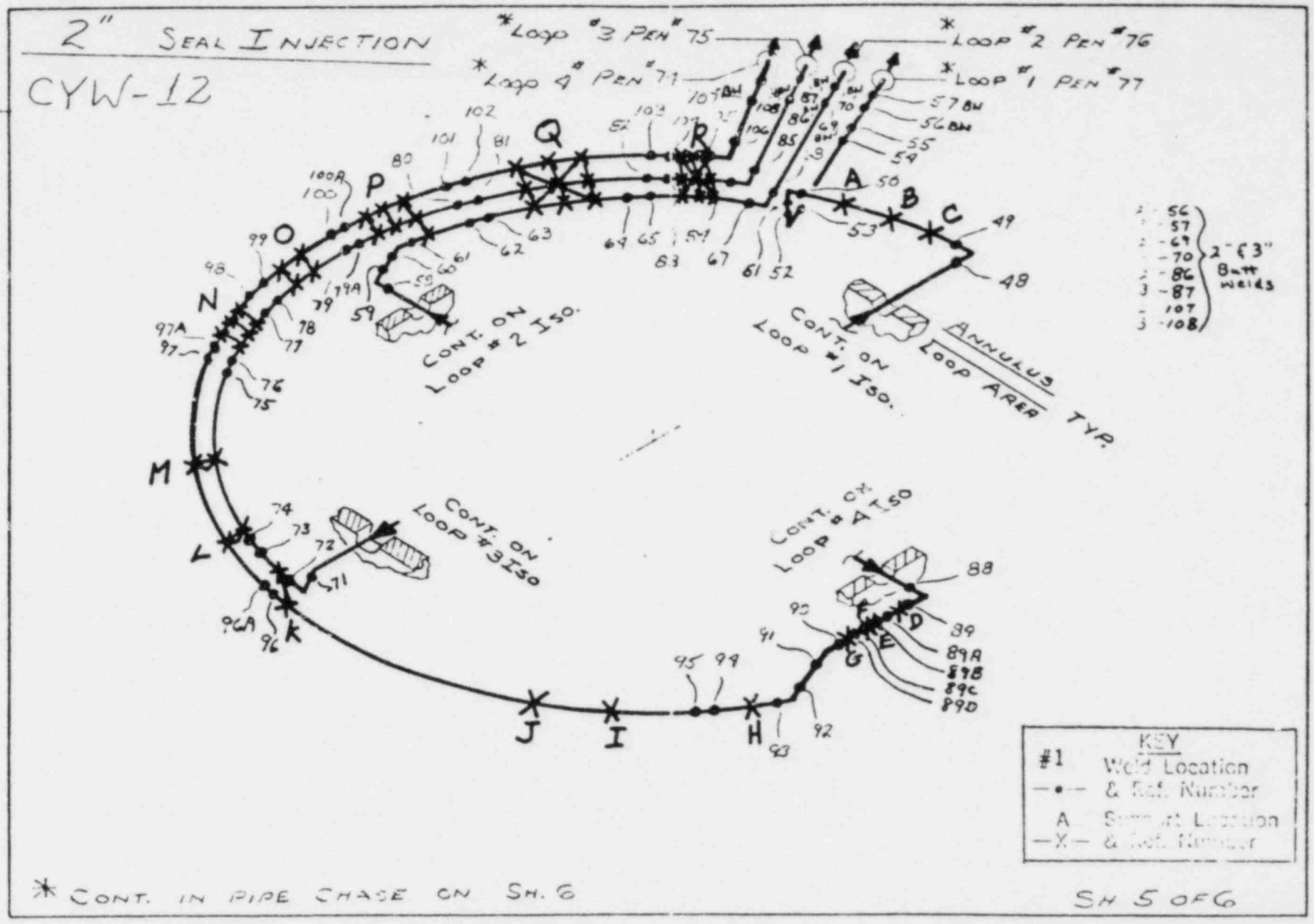


KEY

#1 —•—	Weld Location & Ref. Number
A —X—	Support Location & Ref. Number

SH 4 OF 6

5-12

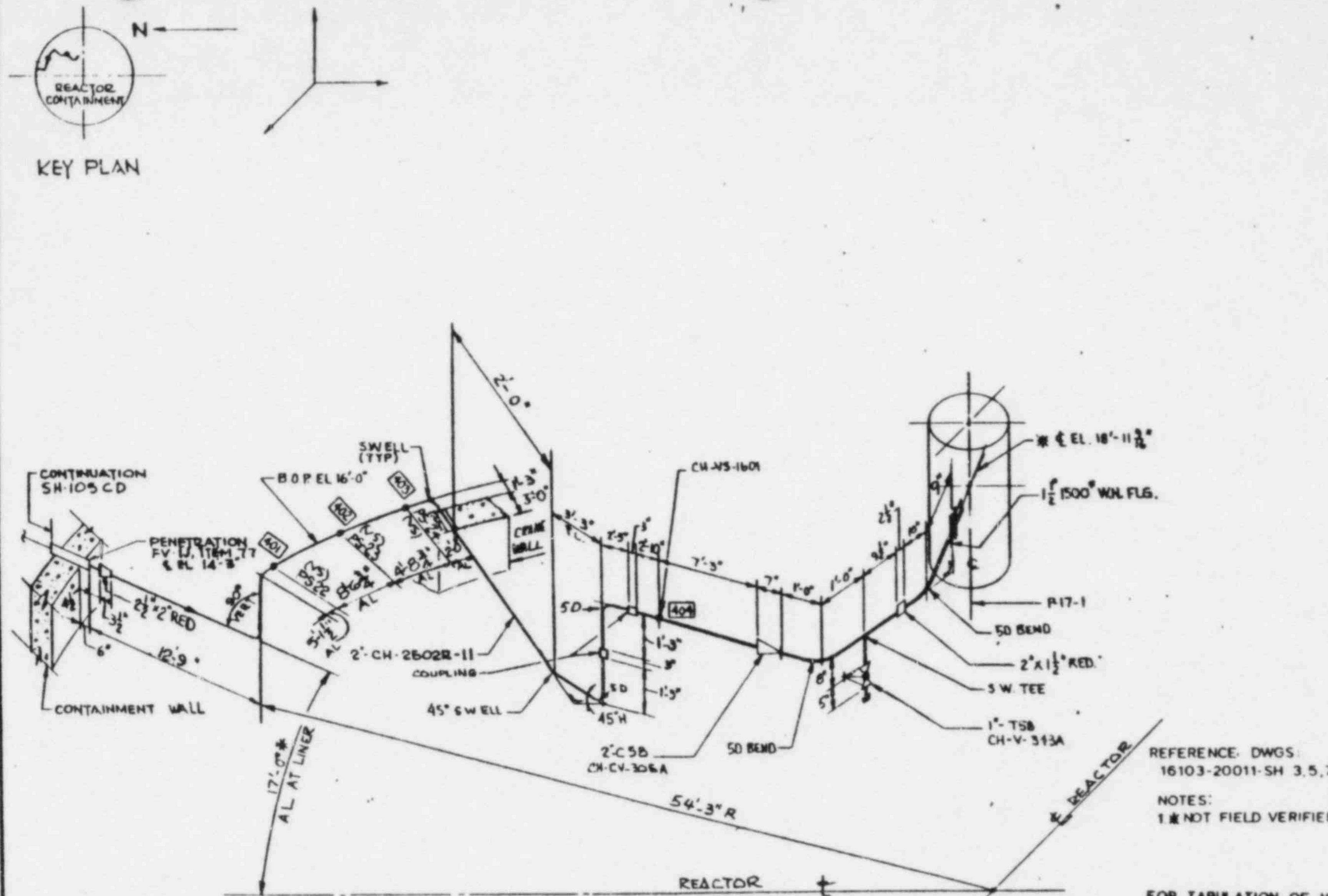


WESTINGHOUSE ELECTRIC CORPORATION

SKETCH SHEET
WESTINGHOUSE FORM 2444D

SH 5 OF 6

5-26



REFERENCE: DWGS:
16103-20011-SH 3,5,7

NOTES:
1.* NOT FIELD VERIFIED.

FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 18103-20231-SH-103 ZAA

THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED
S&W DWG. NO. 13429. MKS-103BA

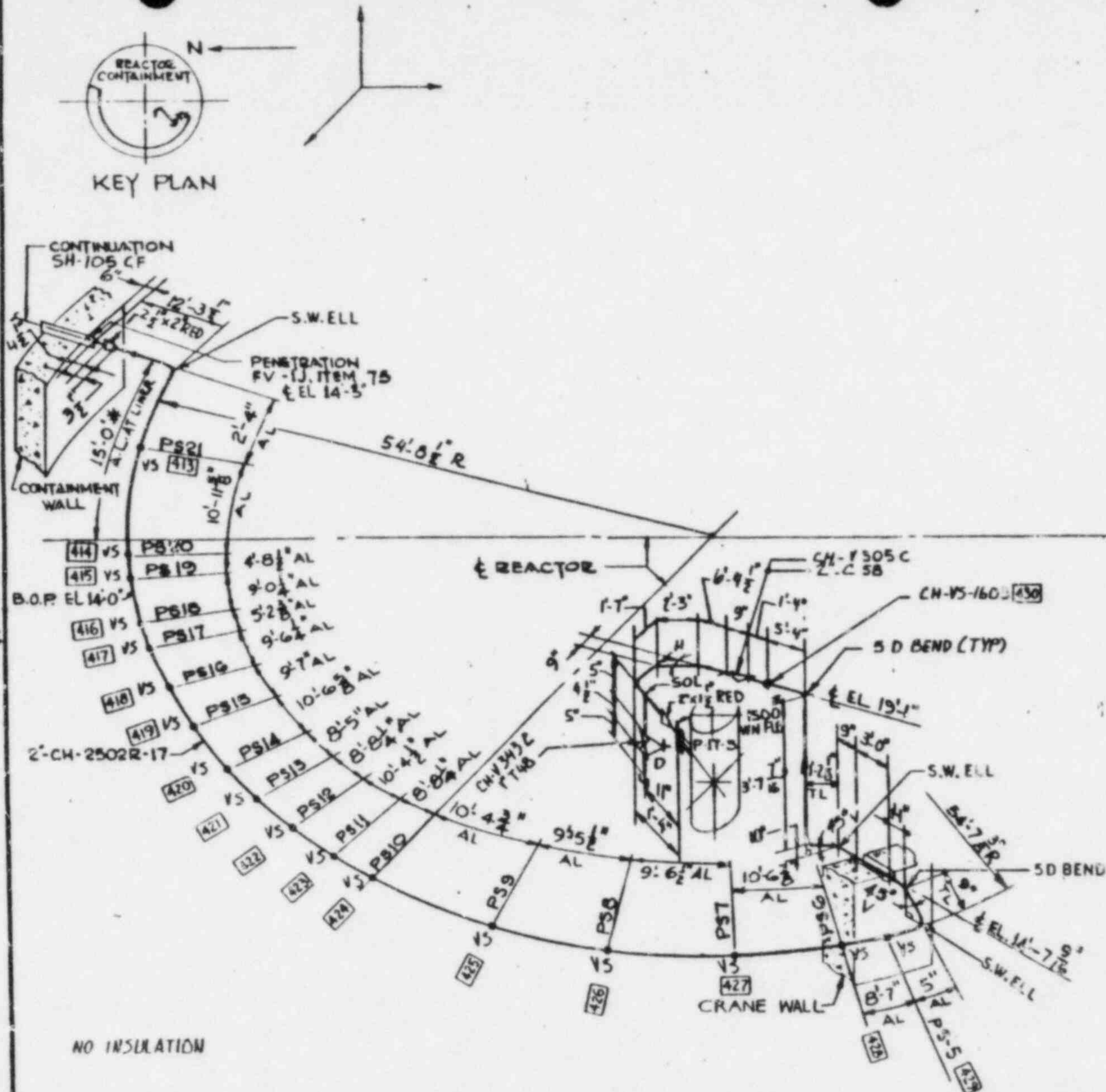
NO INSP TION

NORTHEAST UTILITIES SERVICE CO	
CONNECTICUT YANKEE	
SEAL WATER TO LOOP NO.1	
9-17-80	16103
	20231-SH-103BA

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	REACTOR COOLANT LOOP #4
LINE	RC PUMP SEAL INJECTION (2-CH-2502R-20)
DRAWING	CYW-11 (Sheet 4
BREAK PT.	39 40 41 42 43 44 45 46 47
Reactor Coolant*	A ⟷ A
Main Steam*	A ⟷ A
Feedwater*	A ⟷ A
Charging*	A ⟷ A
Residual Heat Removal*	A ⟷ A
Service Water*	A ⟷ A
Safety Injection	A ⟷ A
Containment Liner	A ⟷ A

*Minimum Required Safe Shutdown System



NOTES:
1. ✱ NOT FIELD VERIFIED.

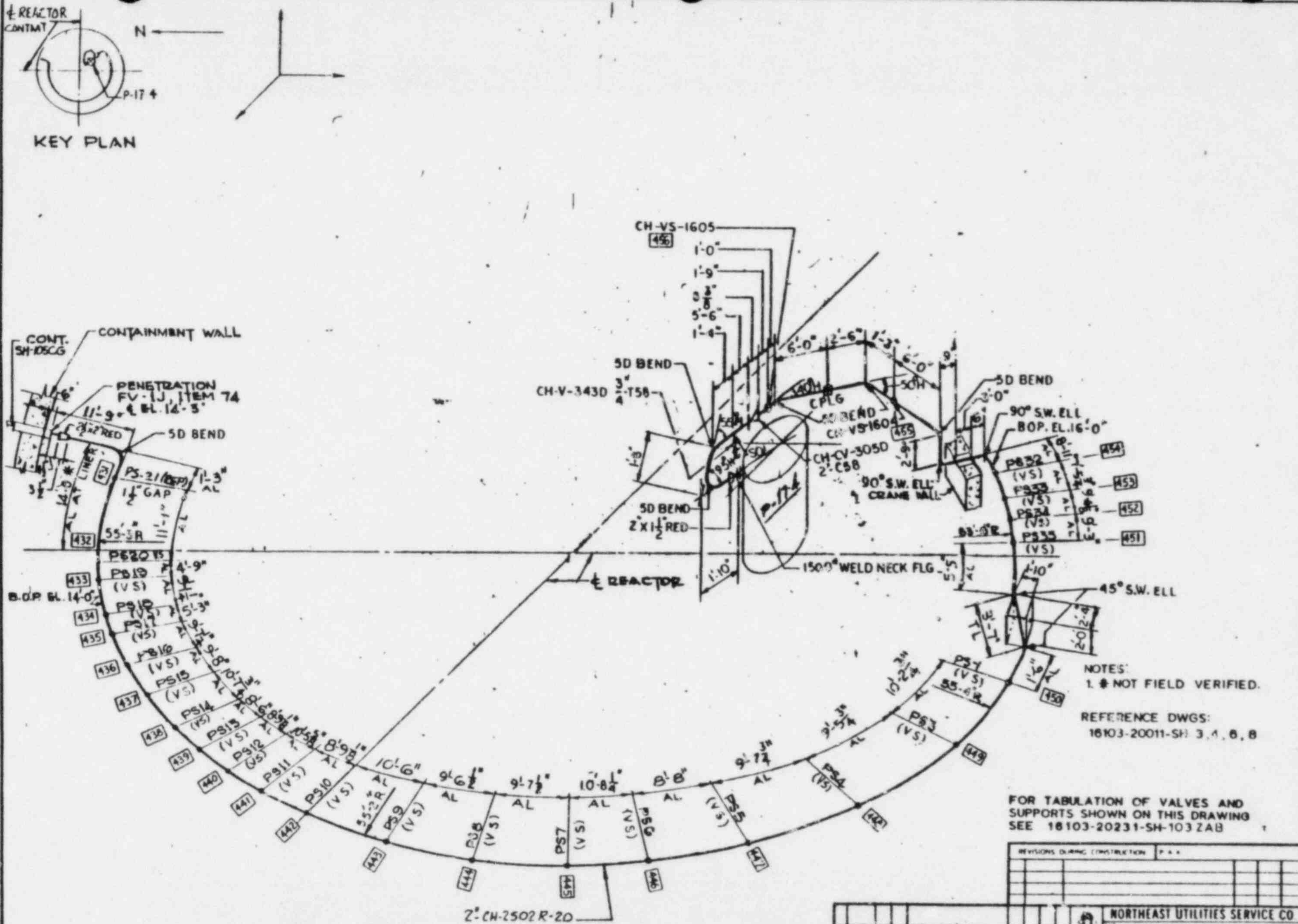
REFERENCE DWGS:
16103-20011-SH 3, 4, 6, 8

FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 16103-20231-SH-103ZAA

THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED
S&W DWG. NO. 13429.01-N-103BC

REVISIONS DURING CONSTRUCTION

NORTHEAST UTILITIES SERVICE CO.
CONNECTICUT YANKEE
SEAL WATER TO LOOP NO. 3
16103
20231-SH-103BC



NOTES:
1. # NOT FIELD VERIFIED.

REFERENCE DWGS:
16103-20011-SH 3, 4, 6, 8

FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 16103-20231-SH-103 ZAB

NOT INSULATED

THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED

S&W DWG. NO. 13429.C 1XS-103BD

REVISIONS DURING CONSTRUCTION

NORTHEAST UTILITIES SERVICE CO.
CONNECTICUT YANKEE

SEAL WATER
TO LOOP NO. 4

16103 20231-SH-103BD

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE													
SYSTEM	REACTOR COOLANT LOOP #1													
LINE	RC PUMP SEAL INJECTION (2-CH-250ZR-11)													
DRAWING	CYW-8 (Sheet 1)													
BREAK PT.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Reactor Coolant*	A	←	—	—	—	—	—	—	—	—	—	—	→	A
Main Steam*	A	←	—	—	—	—	—	—	—	—	—	—	→	A
Feedwater*	A	←	—	—	—	—	—	—	—	—	—	—	→	A
Charging*	A	←	—	—	—	—	—	—	—	—	—	—	→	A
Residual Heat Removal*	A	←	—	—	—	—	—	—	—	—	—	—	→	A
Service Water*	A	←	—	—	—	—	—	—	—	—	—	—	→	A
Safety Injection	A	←	—	—	—	—	—	—	—	—	—	—	→	A
Containment Liner	A	←	—	—	—	—	—	—	—	—	—	—	→	A

*Minimum Required Safe Shutdown System

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	REACTOR COOLANT LOOP #2
LINE	RC PUMP SEAL INJECTION (2CH-2502R-14)
DRAWING	CVW-9 (Sheet 2)
BREAK PT.	16 17 18 19 20 21 22 23 24 25 26 27 28 29
Reactor Coolant*	A ◄ ► A
Main Steam*	A ◄ ► A
Feedwater*	A ◄ ► A
Charging*	A ◄ ► A
Residual Heat Removal*	A ◄ ► A
Service Water*	A ◄ ► A
Safety Injection	A ◄ ► A
Containment Liner	A ◄ ► A

*Minimum Required Safe Shutdown System

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	Reactor Coolant Loop #3
LINE	RC Pump Seal Injection (2-CH-2502R-17)
DRAWING	CYW-10 (Sheet 3)
BREAK PT.	30 31 32 33 34 35 36 37 38
Reactor Coolant*	A ⟷ A
Main Steam*	A ⟷ A
Feedwater*	A ⟷ A
Charging*	A ⟷ A
Residual Heat Removal*	A ⟷ A
Service Water*	A ⟷ A
Safety Injection	A ⟷ A
Containment Liner	A ⟷ A

*Minimum Required Safe Shutdown ystem

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET		SOURCE
	SYSTEM	REACTOR COOLANT LOOP #4
	LINE	RC PUMP SEAL INJECTION (2-CH-2502R-20)
	DRAWING	CYW-11 (Sheet 4
	BREAK PT.	39 40 41 42 43 44 45 46 #7
Reactor Coolant*		A ⟷ A
Main Steam*		A ⟷ A
Feedwater*		A ⟷ A
Charging*		A ⟷ A
Residual Heat Removal*		A ⟷ A
Service Water*		A ⟷ A
Safety Injection		A ⟷ A
Containment Liner		A ⟷ A

*Minimum Required Safe Shutdown System

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE										
	SYSTEM	REACTOR COOLANT LOOP #1									
	LINE	RC PUMP SEAL INJECTION									
	DRAWING	CYW-12 (Sheet 5)									
	BREAK PT.	48	49	50	51	52	53	54	55	56	57
Reactor Coolant*		A	←							→	A
Main Steam*		A	←							→	A
Feedwater*		A	←							→	A
Charging*		A	←							→	A
Residual Heat Removal*		A	←							→	A
Service Water*		A	←							→	A
Safety Injection		A	←							→	A
Containment Liner		D	←							→	D

*Minimum Required Safe Shutdown System

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE												
	SYSTEM	REACTOR COOLANT LOOP #2											
	LINE	RC PUMP SEAL INJECTION											
	DRAWING	CVW-12 (Sheet 5)											
	BREAK PT.	59	60	61	62	63	64	65	66	67	68	69	70
Reactor Coolant*		A	←										→ A
Main Steam*		A	←										→ A
Feedwater*		A	←										→ A
Charging*		A	←										→ A
Residual Heat Removal*		A	←										→ A
Service Water*		A	←										→ A
Safety Injection		A	←										→ A
Containment Liner		D	←										→ D

*Minimum Required Safe Shutdown System

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET		SOURCE
	SYSTEM	REACTOR COOLANT LOOP #3
	LINE	RC PUMP SEAL INJECTION
	DRAWING	CYW-12 (Sheet 5)
	BREAK PT.	71 72 73 74 75 76 77 78 79 79A 80 81 82
Reactor Coolant*		A ◄——► A
Main Steam*		A ◄——► A
Feedwater*		A ◄——► A
Charging*		A ◄——► A
Residual Heat Removal*		A ◄——► A
Service Water*		A ◄——► A
Safety Injection		A ◄——► A
Containment Liner		D ◄——► D

*Minimum Required Safe Shutdown System

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	REACTOR COOLANT LOOP #3
LINE	RC PUMP SEAL INJECTION
DRAWING	CYW-12 (Sheet 5)
BREAK PT.	B3&4 B5&6 B7
Reactor Coolant*	A ⟷ A
Main Steam*	A ⟷ A
Feedwater*	A ⟷ A
Charging*	A ⟷ A
Residual Heat Removal*	A ⟷ A
Service Water*	A ⟷ A
Safety Injection	A ⟷ A
Containment Liner	D ⟷ D

*Minimum Required Safe Shutdown System

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	REACTOR COOLANT LOOP #4
LINE	RC PUMP SEAL INJECTION
DRAWING	CYW-12 (Sheet 5)
BREAK PT.	88 89 89A 89B 89C 89D 90 91 92 93 94 95 96 96A 97
Reactor Coolant*	A ← → A
Main Steam*	A ← → A
Feedwater*	A ← → A
Charging*	A ← → A
Residual Heat Removal*	A ← → A
Service Water*	A ← → A
Safety Injection	A ← → A
Containment Liner	D ← → D

*Minimum Required Safe Shutdown System

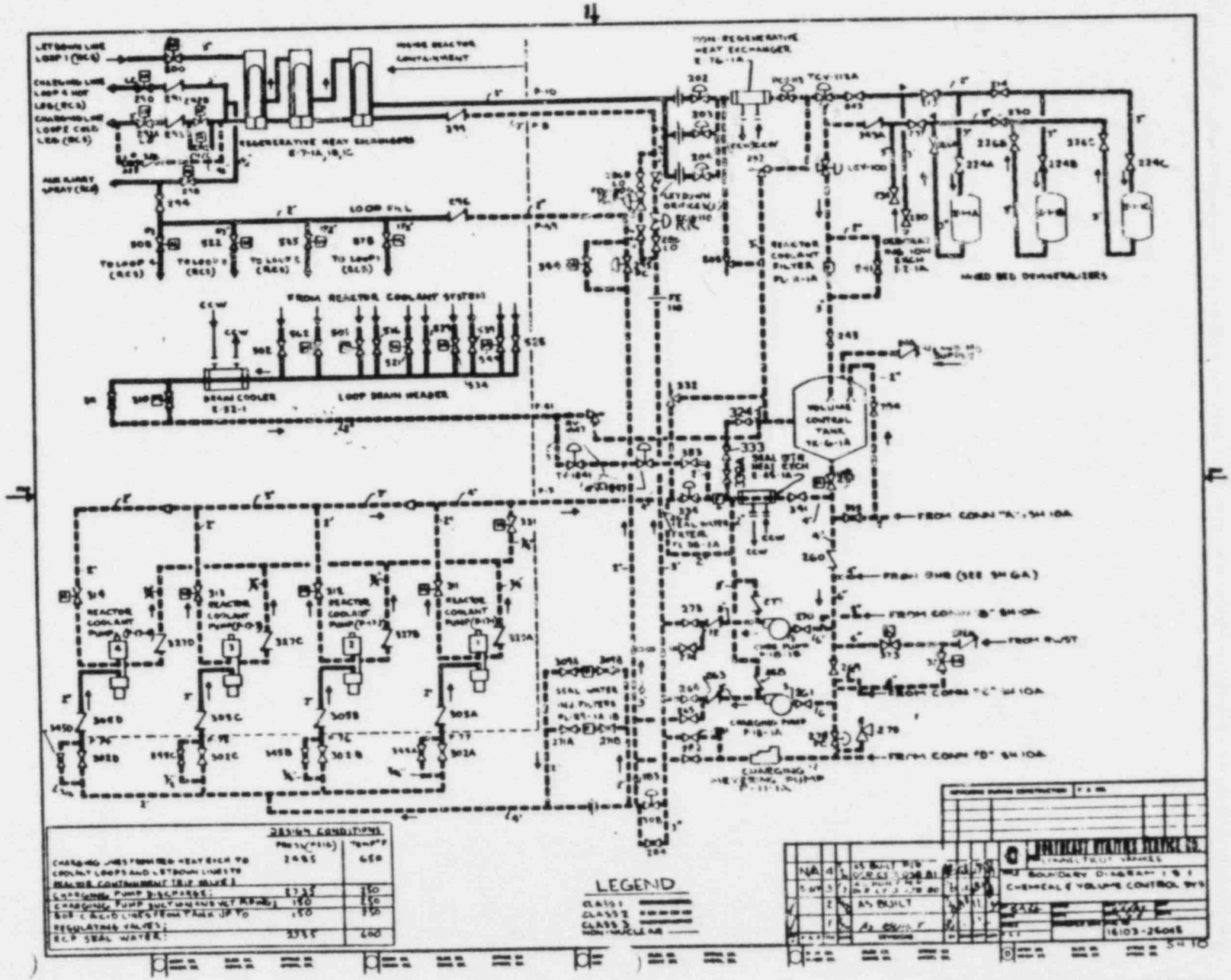
LEGEND

D = Damage Possible, Further Evaluation Required

A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	REACTOR COOLANT LOOP #4
LINE	RC PUMP SEAL INJECTION
DRAWING	CY40-12 (SHEET
BREAK PT.	97A 98 99 100 100A 101 102 103 104 105 106 107 108
Reactor Coolant*	A ← → A
Main Steam*	A ← → A
Feedwater*	A ← → A
Charging*	A ← → A
Residual Heat Removal*	A ← → A
Service Water*	A ← → A
Safety Injection	A ← → A
Containment Liner	D ← → D

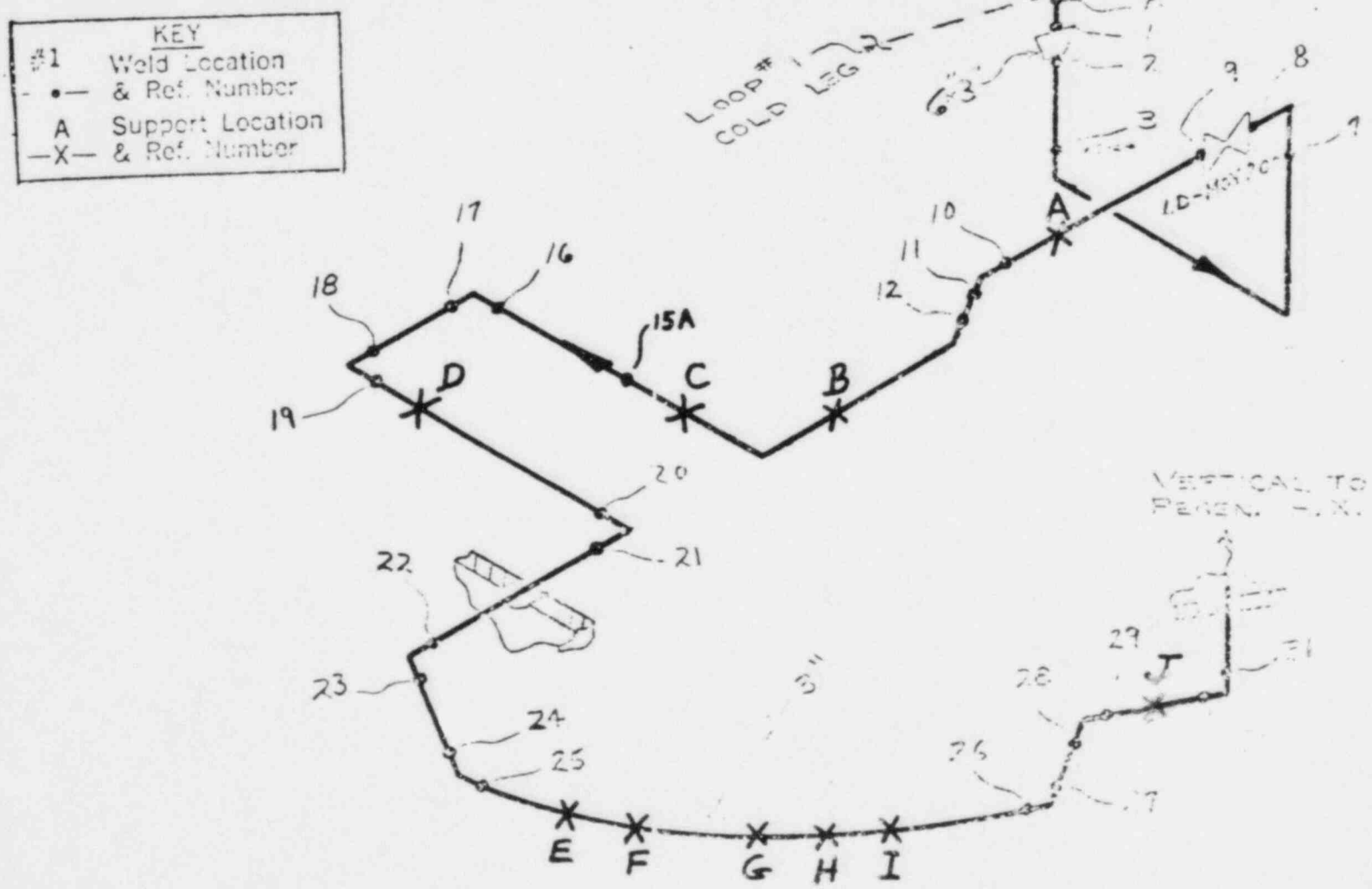
*Minimum Required Safe Shutdown System


LETDOWN LINE LOOP 1 (RCS)
CHARGING LINE LOOP 4 HOT LEG (RCS)
CHARGING LINE LOOP 2 COLD LEG (RCS)
AUX SURGE LINE (RCS)
REGENERATIVE HEAT EXCHANGER E-7-1A, 1B, 1C
NON-REGENERATIVE HEAT EXCHANGER E-76-1A
INSIDE REACTOR CONTAINMENT
LOOP FILL
TO LOOP 4 (RCS)
TO LOOP 3 (RCS)
TO LOOP 2 (RCS)
TO LOOP 1 (RCS)
FROM REACTOR COOLANT SYSTEM
DRAIN COOLER E-82-1
LOOP DRAIN HEADER
LETDOWN ORIFICES
REACTOR COOLANT FILTER FL-8-1A
MIXED BED DEMINERALIZERS
VOLUME CONTROL TANK TK-6-1A
SEAL WTR HEAT EXCH E-66-1A
SEAL WATER FILTER FL-36-1A
REACTOR COOLANT PUMP (P-1A)
REACTOR COOLANT PUMP (P-1B)
REACTOR COOLANT PUMP (P-1C)
REACTOR COOLANT PUMP (P-1D)
SEAL WATER INJ FILTERS FL-89-1A,1B
CHARGING PUMP P-18-1A
CHARGING PUMP P-18-1B
FROM CONN "A" SH 10A
FROM SIHB (SEE SH 6A)
FROM CONN "B" SH 10A
FROM RWST
FROM CONN "C" SH 10A
FROM CONN "D" SH 10A
LEGEND
CLASS 1
CLASS 2
CLASS 3
NON-NUCLEAR
DESIGN CONDITIONS
PRESS (PSIG)
TEMP °F
CHARGING LINES FROM REGEN HEAT EXCH TO COOLANT LOOPS AND LETDOWN LINES TO REACTOR CONTAINMENT (TRIP VALVES)
2485
650
CHARGING PUMP DISCHARGE:
2735
250
CHARGING PUMP SUCTION AND VCT RETURN:
150
150
BOR (ACID) LINES FROM TANK DISCH TO REGULATING VALVES:
150
150
RCP SEAL WATER:
2735
600
AS BUILT
16103-26048

WESTINGHOUSE ELECTRIC CORPORATION

SKETCH SHEET

LOOP # 1 6"×3" LETDOWN - CYNI-31



SKETCH SHEET

D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE																
	SYSTEM	CHEMICAL VOLUME CONTROL SYSTEM															
	LINE	3-RC-2501R-44#70															
	DRAWING	MKS-103AH (CYW-31)															
	BREAK PT.	1	2	3	4	5	6	7	8	9	10	11	12	15A	16	17
Reactor Coolant*		A	←													→	A
Main Steam*		A	←													→	A
Fe. water*		A	←													→	A
Charging*		A	←													→	A
Residual Heat Removal*		A	←													→	A
Service Water*		A	←													→	A
Safety Injection		A	←													→	A
Containment Liner		A	←													→	A

*Minimum Required Safe Shutdown
'stem

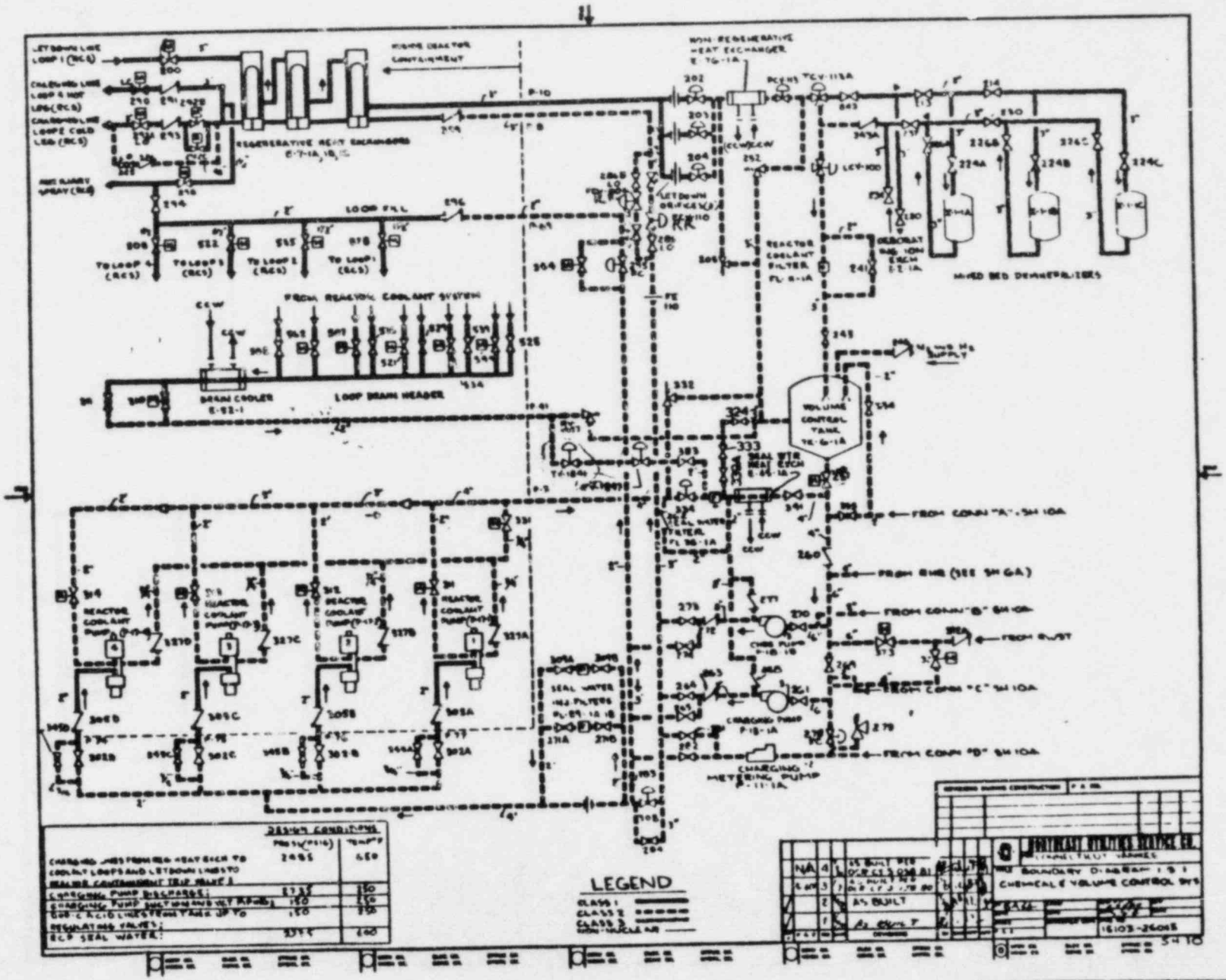
LEGEND

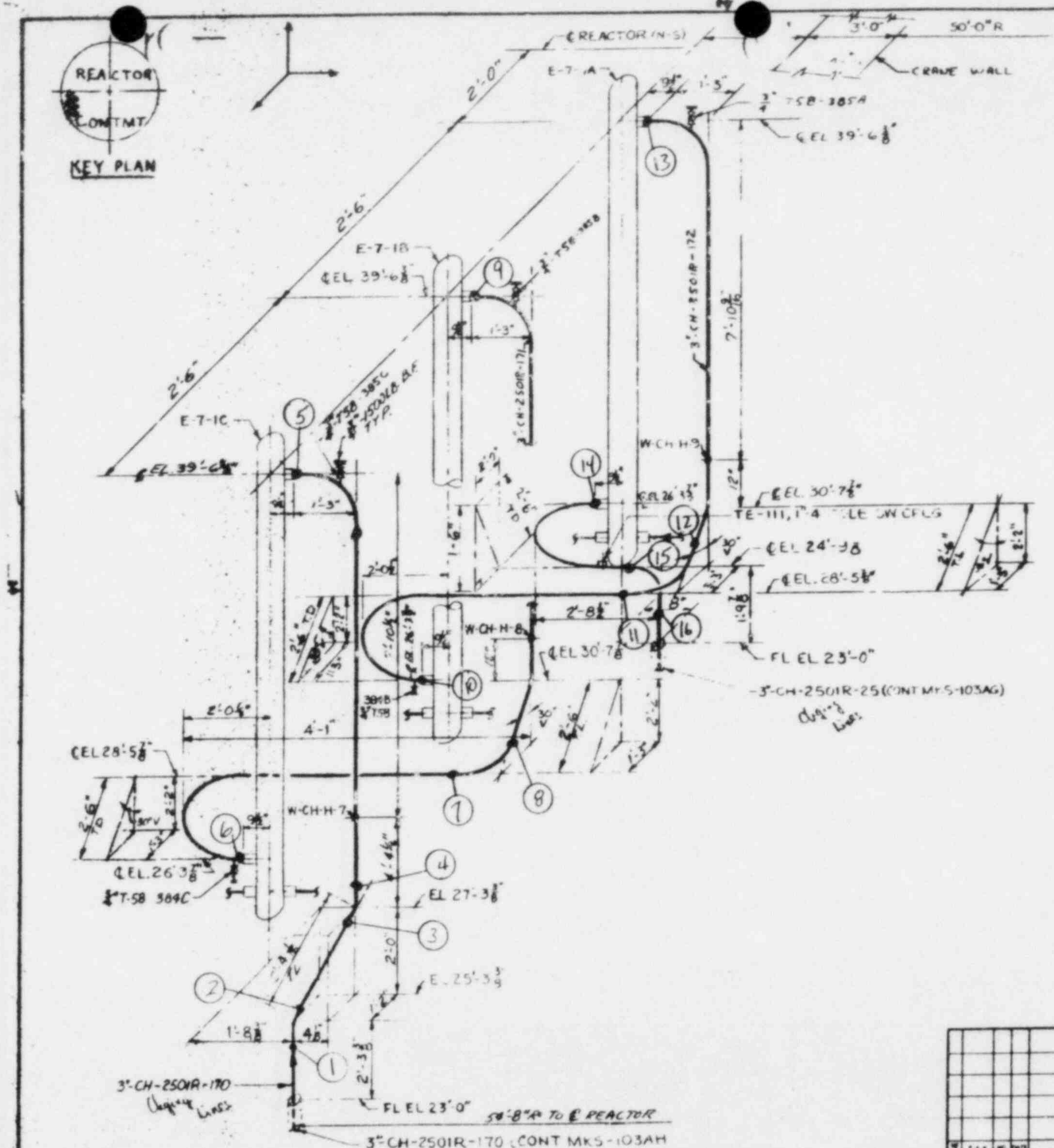
D = Damage Possible, Further Evaluation Required

A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE													
	SYSTEM	CHEMICAL VOLUME CONTROL SYSTEM												
	LINE	3-RC-2501R-44 & 170												
	DRAWING	MKS-103RH(CYW-31)												
	BREAK PT.	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Reactor Coolant*		A	←												→ A
Main Steam*		A	←												→ A
Feedwater*		A	←												→ A
Charging*		A	←												→ A
Residual Heat Removal*		A	←												→ A
Service Water*		A	←												→ A
Safety Injection		A	←												→ A
Containment Liner		A	←												→ A

*Minimum Required Safe Shutdown System


NON-REGENERATIVE HEAT EXCHANGER E 76-1A
REGENERATIVE HEAT EXCHANGERS E-7-1A, 1B, 1C
REACTOR COOLANT FILTER FL 8-1A
MIXED BED DEMINERALIZERS
LOOP DRAIN HEADER
DRAIN COOLER E-82-1
VOLUME CONTROL TANK TK 6-1A
REACTOR COOLANT PUMP
SEAL WATER HEAT EXCH E 64-1A
SEAL WATER FILTER FL 30-1A
CHARGING PUMP P-18-1A
CHARGING METERING PUMP P-11-1A
FROM CONN "A" SH 10A
FROM CONN "B" SH 10A
FROM CONN "C" SH 10A
FROM CONN "D" SH 10A
FROM RHR (SEE SH 6A)
FROM RWST
LEGEND
CLASS 1
CLASS 2
CLASS 3
NON-NUCLEAR
DESIGN CONDITIONS
CHEMICAL & VOLUME CONTROL SYS
AS BUILT
16103-26015

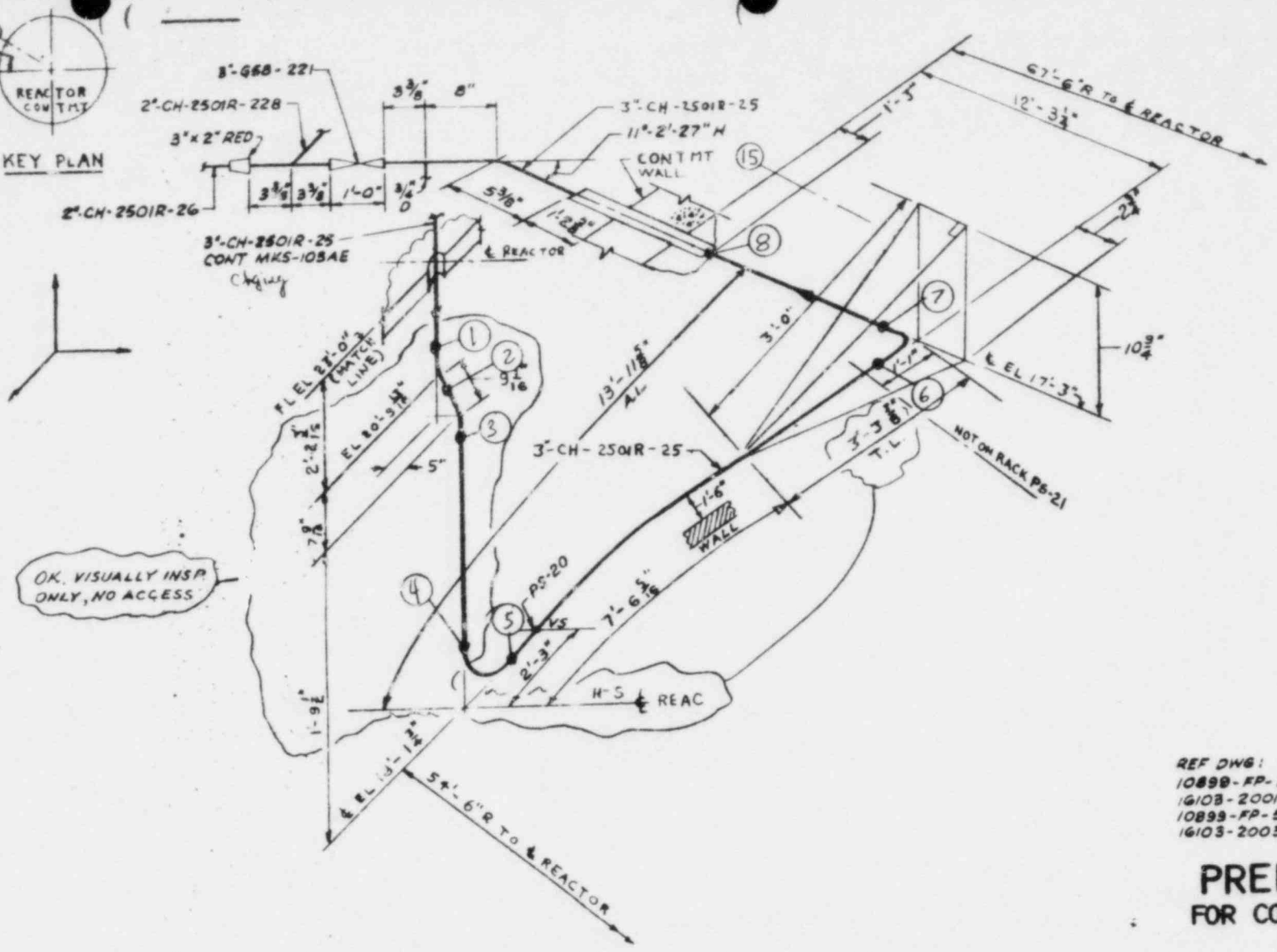


PRELIMINARY
FOR COMMENTS ONLY

NOTE: HIGH RADITION AREA
5 REM PER HOUR CY-H.P.
NO ENTRY A.J. TM 9-28-79

REFERENCE DWG:
10899-FP-3L, S, T
16103-20011, SH 16, 17, 18

REVISIONS DURING CONSTRUCTION	
NORTHEAST UTILITIES SERVICE CO.	
CONNECTICUT YANKEE	
CONT. CHEMICAL & VOLUME CONTROL REG. HT. EXCH.-SHELL SIDE	
R.W.H. 9-6-79	OHBL 9-17-79
13429.01	MKS-103AE



REF DWG:
10899-FP-3C, 3E, 3G, 3J, 3L, 3S, 3T
16103-20011 SH 3, 5, 7, 10, 11, 17, 18
10899-FP-5B, 5C
16103-20034 SH 1, 2

PRELIMINARY
FOR COMMENTS ONLY

REVISIONS DURING CONSTRUCTION	P.A.F.

NORTHEAST UTILITIES SERVICE CO
FOR CONNECTICUT YANKEE
TITLE: CONT CHEMICAL & VOLUME CONTROL FROM HT. EXCH. E-7-1A, B, C

DRN R.W.H.	CHKD S.W.G.	APP
DATE 9-6-79	DATE 9-10-79	DATE
SCALE —	13429.01	DWG NO MKS-103AG

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

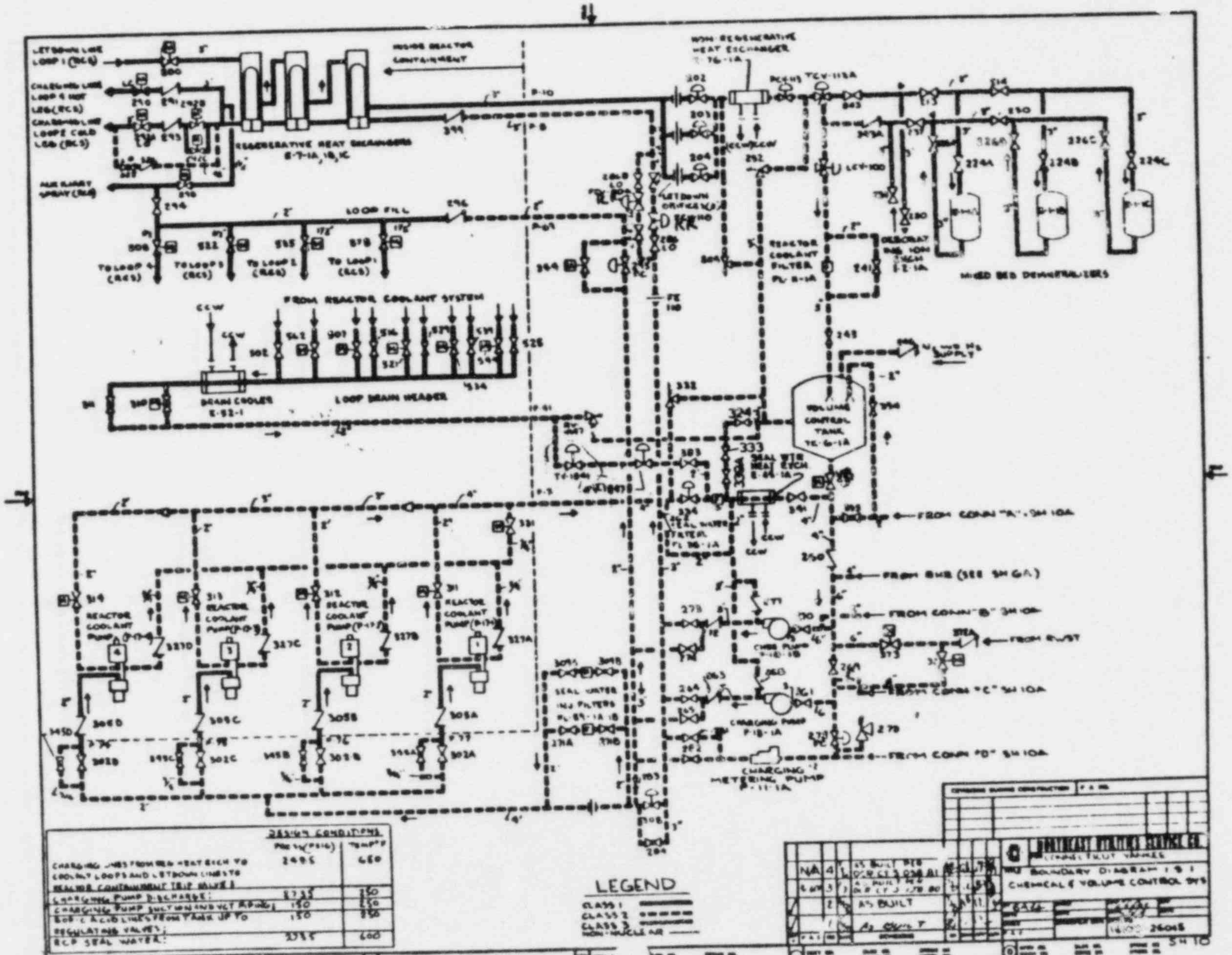
TARGET	SOURCE															
SYSTEM	CHEMICAL VOLUME CONTROL SYSTEM															
LINE	3-CH-2501R-170 & 171 & 172 & 25															
DRAWING	MKS-103AE															
BREAK PT.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Reactor Coolant*	A	←	—	—	—	—	—	—	—	—	—	—	—	—	→	A
Main Steam*	A	←	—	—	—	—	—	—	—	—	—	—	—	—	→	A
Feedwater*	A	←													→	A
Charging*	A	←	—	—	—	—	—	—	—	—	—	—	—	—	→	A
Residual Heat Removal*	A	←	—	—	—	—	—	—	—	—	—	—	—	—	→	A
Service Water*	A	←	—	—	—	—	—	—	—	—	—	—	—	—	→	A
Safety Injection	A	←	—	—	—	—	—	—	—	—	—	—	—	—	→	A
Containment Liner	A	←	—	—	—	—	—	—	—	—	—				→	A

*Minimum Required Safe Shutdown ystem

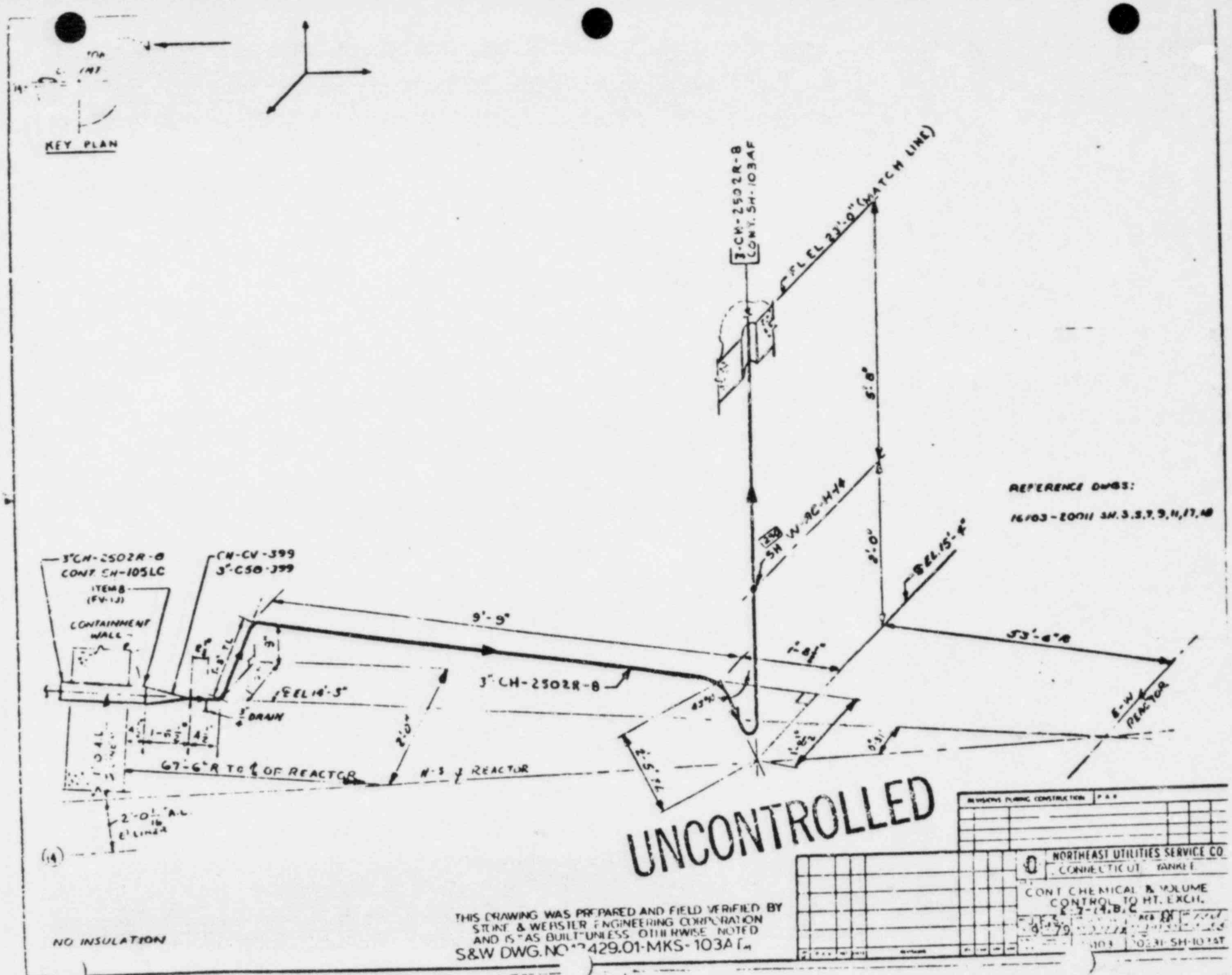
LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	CHEMICAL VOLUME CONTROL SYSTEM
LINE	3-CH-250\R-25
DRAWING	MKS-103AG (CYW-44)
BREAK PT.	1 2 3 4 5 6 7 8
Reactor Coolant*	A ⟷ A
Main Steam*	A ⟷ A
Feedwater*	A ⟷ A
Charging*	A ⟷ A
Residual Heat Removal*	A ⟷ A
Service Water*	A ⟷ A
Safety Injection	A ⟷ A
Containment Liner	D D D A ⟷ A

*Minimum Required Safe Shutdown System



LEGEND
CLASS 1
CLASS 2
CLASS 3
NON-NUCLEAR
DESIGN CONDITIONS
2485
650
2735
150
150
150
2735
600
CHEMICAL & VOLUME CONTROL SYS
AS BUILT
SH 10
REGENERATIVE HEAT EXCHANGERS
NON-REGENERATIVE HEAT EXCHANGER
VOLUME CONTROL TANK
MIXED BED DEMINERALIZERS
LOOP DRAIN HEADER
FROM REACTOR COOLANT SYSTEM
REACTOR COOLANT FILTER
SEAL WATER INJ FILTERS
CHARGING PUMP
CHARGING METERING PUMP
FROM RWST
LOOP FILL
DRAIN COOLER
INSIDE REACTOR CONTAINMENT

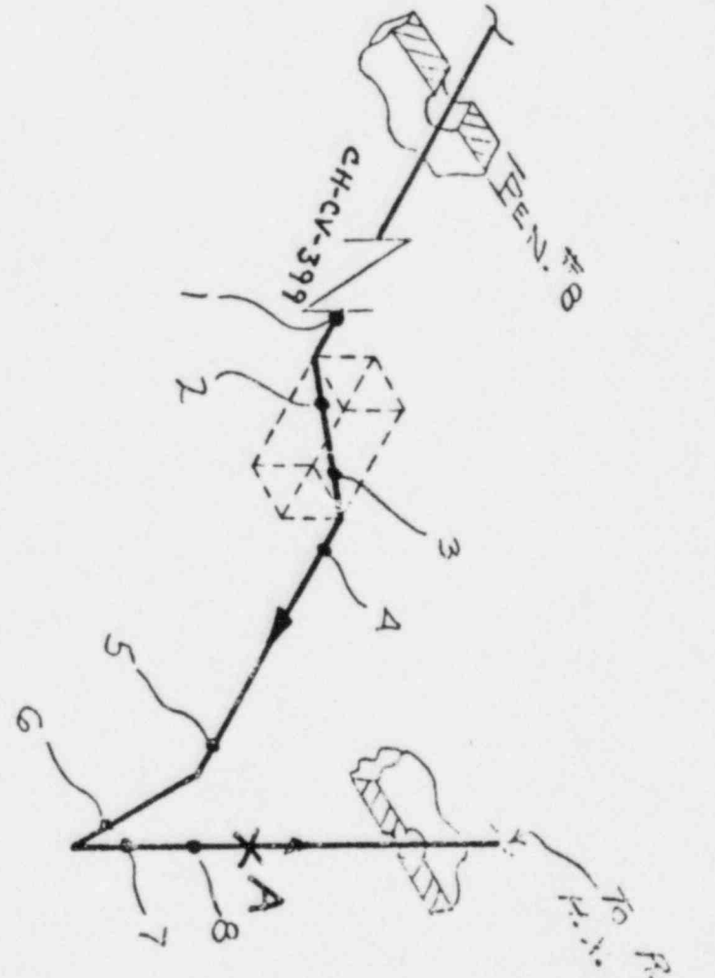


KEY PLAN
3"CH-2502R-8
CONT. SH-105LC
ITEM 8 (FV-13)
CONTAINMENT WALL
CH-CV-399
3"-CSO-399
9'-9"
3" CH-2502R-8
EL 14'-5"
3/4" DRAIN
67'-6"R TO ℄ OF REACTOR
N-S ℄ REACTOR
2'-0 1/16" A.L.
3"-CH-2502R-8
CONT. SH-103AF
EL EL 23'-0" (MATCH LINE)
5'-8"
3'-0"
EL 15'-4"
53'-6"R
E-W REACTOR
REFERENCE DWGS:
16103-20011 SH. 3,5,7,9,11,17,18
NO INSULATION
UNCONTROLLED
THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED
NORTHEAST UTILITIES SERVICE CO.
CONNECTICUT YANKEE
CONT. CHEMICAL & VOLUME CONTROL TO HT. EXCH.

SKETCH SHEET
WESTINGHOUSE FORM 2444D

WESTINGHOUSE ELECTRIC CORPORATION

3" CHARGING LINE CYUU - 412



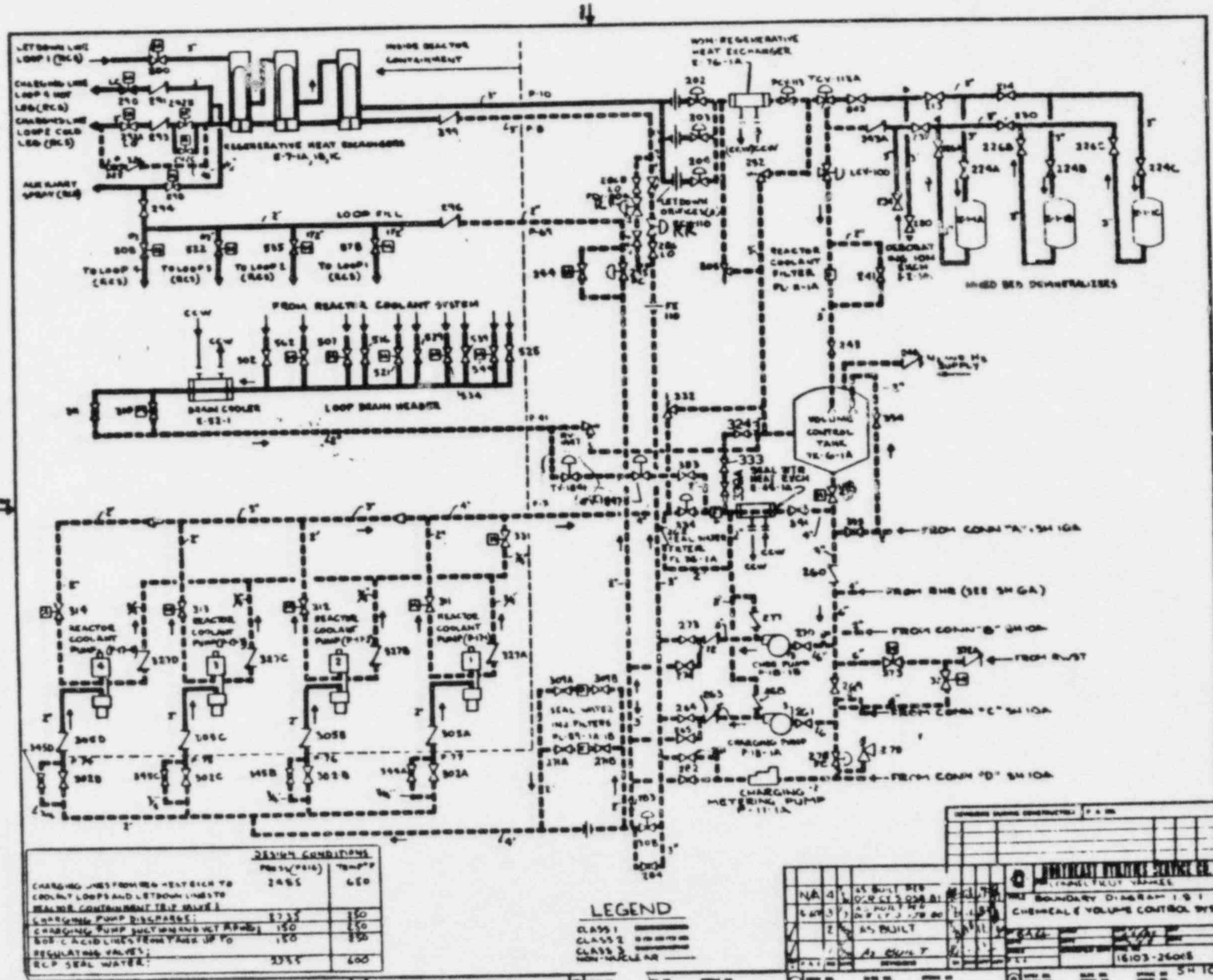
LEGEND

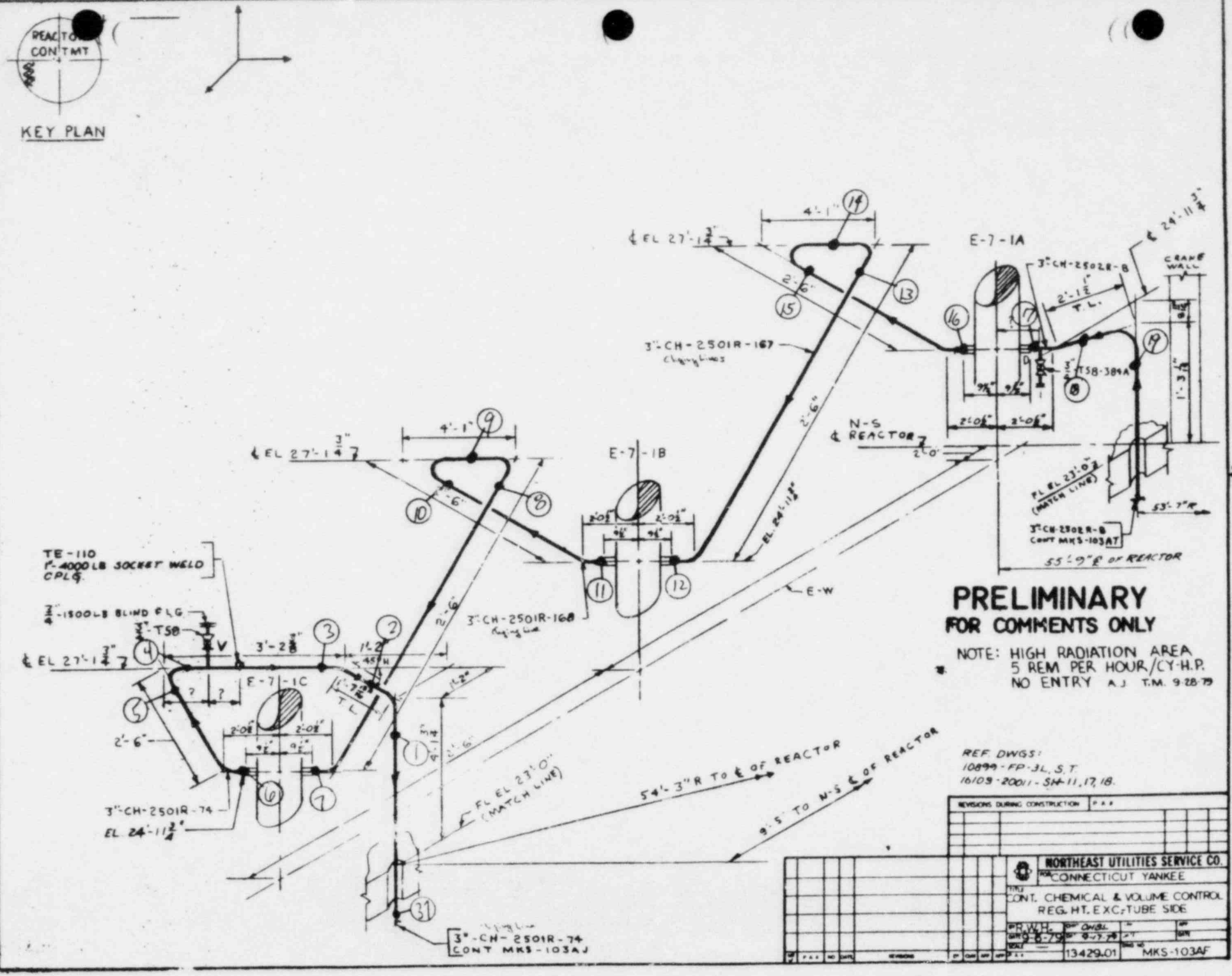
D = Damage Possible, Further Evaluation Required

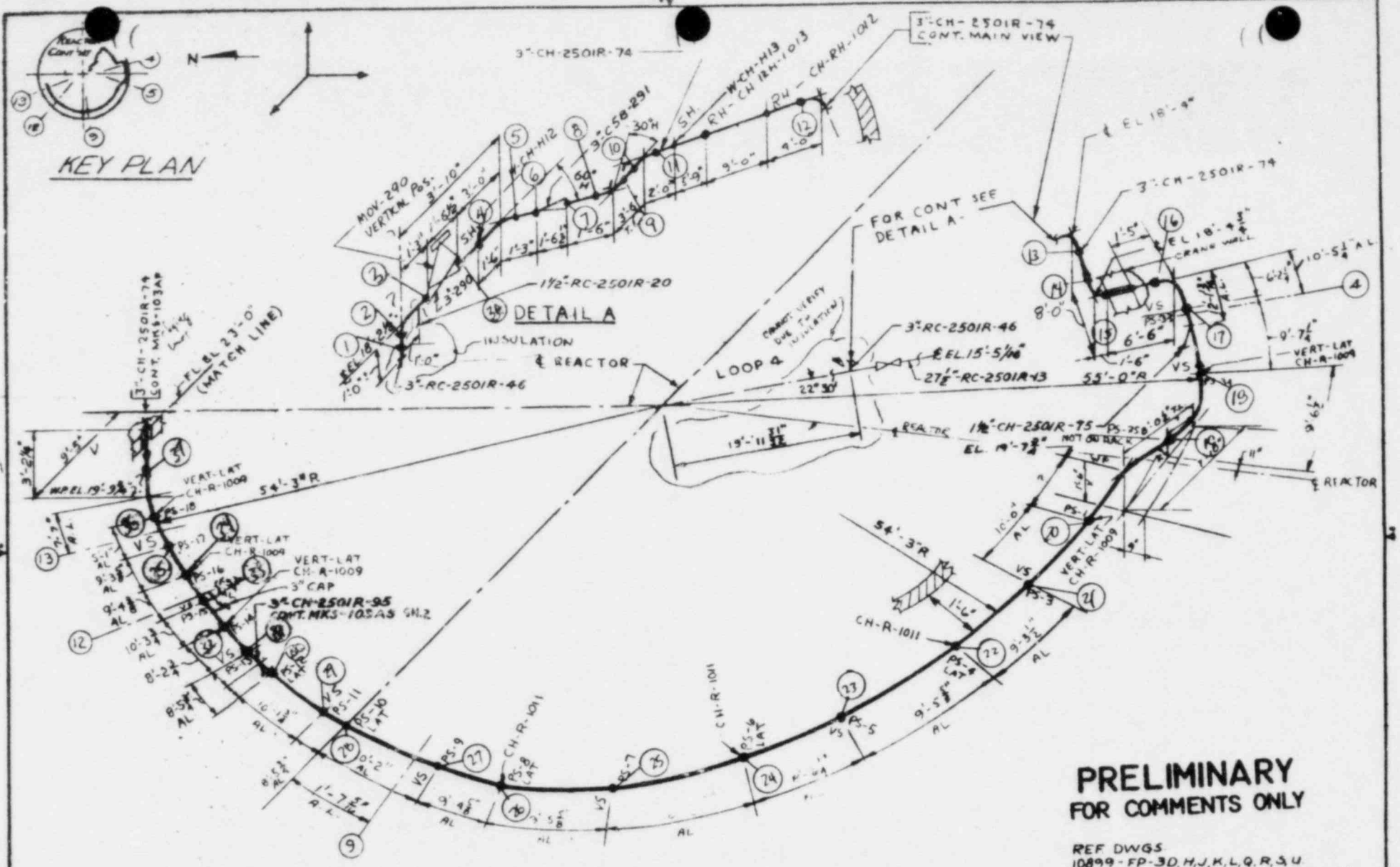
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	CHEMICAL VOLUME CONTROL SYSTEM
LINE	3-CH-2502R-8
DRAWING	MKS-103AT (CYW-42)
BREAK PT.	1 2 3 4 5 6 7 8 9
Reactor Coolant*	A ⟷ A
Main Steam*	A ⟷ A
Feedwater*	A ⟷ A
Charging*	A ⟷ A
Residual Heat Removal*	A ⟷ A
Service Water*	A ⟷ A
Safety Injection	A ⟷ A
Containment Liner	D ⟷ D A ⟷ A

*Minimum Required Safe Shutdown System


INSIDE REACTOR CONTAINMENT
NON-REGENERATIVE HEAT EXCHANGER
REGENERATIVE HEAT EXCHANGERS
LOOP FILL
FROM REACTOR COOLANT SYSTEM
LOOP DRAIN HEADER
DRAIN COOLER
REACTOR COOLANT FILTER
MIXED BED DEMINERALIZERS
VOLUME CONTROL TANK
SEAL WATER HEAT EXCH
SEAL WATER FILTER
SEAL WATER INJ FILTERS
REACTOR COOLANT PUMP
CHARGING PUMP
CHARGING METERING PUMP
FROM RHR (SEE SH 6A)
FROM RWST
DESIGN CONDITIONS
LEGEND
CLASS 1
CLASS 2
CLASS 3
NON-NUCLEAR
AS BUILT
BOUNDARY DIAGRAM
CHEMICAL & VOLUME CONTROL SYS
16103-26018
SH 10


KEY PLAN
REACTOR CONTMT
E-7-1A
E-7-1B
E-7-1C
3"-CH-2501R-167
3"-CH-2501R-168
3"-CH-2501R-74
EL 24'-11 3/4"
3"-CH-2502R-8
TSB-389A
3"-CH-2502R-8
CONT MKS-103AT
3"-CH-2501R-74
CONT MKS-103AJ
TE-110
1"-4000LB SOCKET WELD CPLG.
3/4"-1500LB BLIND FLG
3"-TSB
N-S ℄ REACTOR
E-W
FL EL 23'-0" (MATCH LINE)
55'-9" R OF REACTOR
54'-3" R TO ℄ OF REACTOR
N-S TO N-S ℄ OF REACTOR
CRANE WALL
PRELIMINARY
FOR COMMENTS ONLY
NOTE: HIGH RADIATION AREA
5 REM PER HOUR/CY-H.P.
NO ENTRY A.J. T.M. 9-28-79
REF. DWGS:
10899-FP-3L, S.T.
16109-2001-SH-11, 17, 18.
REVISIONS DURING CONSTRUCTION
NORTHEAST UTILITIES SERVICE CO.
CONNECTICUT YANKEE
CONT. CHEMICAL & VOLUME CONTROL
REG. HT. EXC.; TUBE SIDE
13429.01
MKS-103AF



PRELIMINARY
FOR COMMENTS ONLY

REF DWGS
10899-FP-3D, H, J, K, L, Q, R, S, U
16103-20011 SH-4, 8, 9, 10, 11, 15, 16, 17, 19

NOTE:
CH-R-1009 TO BE ADDED AT RACKS
PS-18, 16, 14, 12 & 34 PER MKS-103AJ-H1.09
CH-R-1011 TO BE ADDED AT RACKS
PS-4, 6 & 8 PER MKS-103AJ-H1011

INSULATION 3"

REVISIONS DURING CONSTRUCTION	P.E.D.

NORTHEAST UTILITIES SERVICE CO.
CONNECTICUT YANKEE
CONT. CHEMICAL & VOLUME CONTROL TO LOOP 4 FROM HT. EXCH.

DRWN	DES.	CHKD.	APP.
R.W.H.	S.W.G.		
DATE 9-6-79	DATE 9-19-79	DATE	DATE
SCALE			DWG. NO.
P.E.D.		13429.01	MKS-103AJ

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

	SOURCE
SYSTEM	CHEMICAL VOLUME CONTROL SYSTEM
LINE	3-CH-2501R-17C & 171 & 172 & 25
DRAWING	MKS-103AF
BREAK PT.	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

TARGET	
Reactor Coolant*	A ← → A
Main Steam*	A ← → A
Feedwater*	A ← → A
Charging*	A ← → A
Residual Heat Removal*	A ← → A
Service Water*	A ← → A
Safety Injection	A ← → A
Containment Liner	A ← → A

*Minimum Required Safe Shutdown System

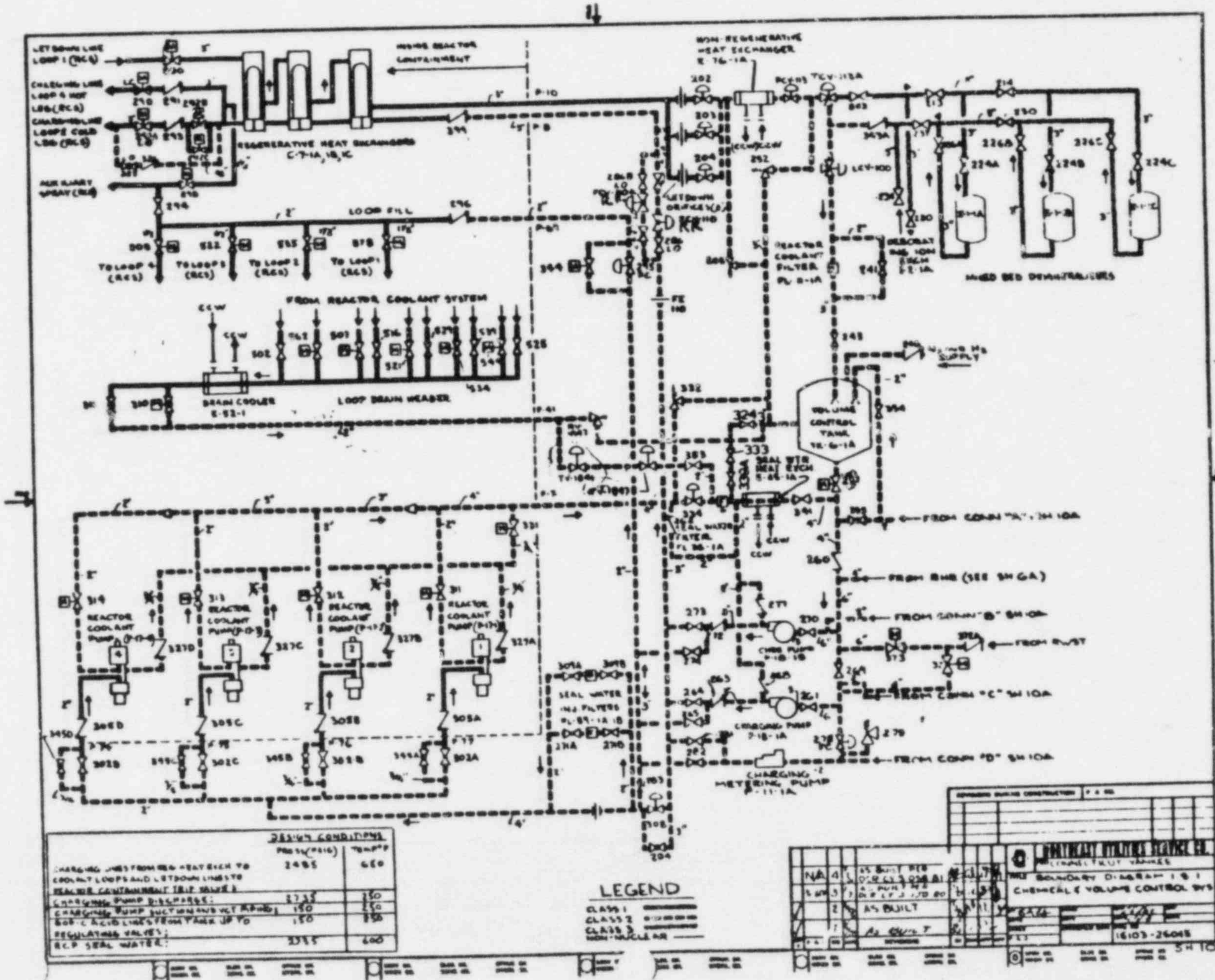
LEGEND

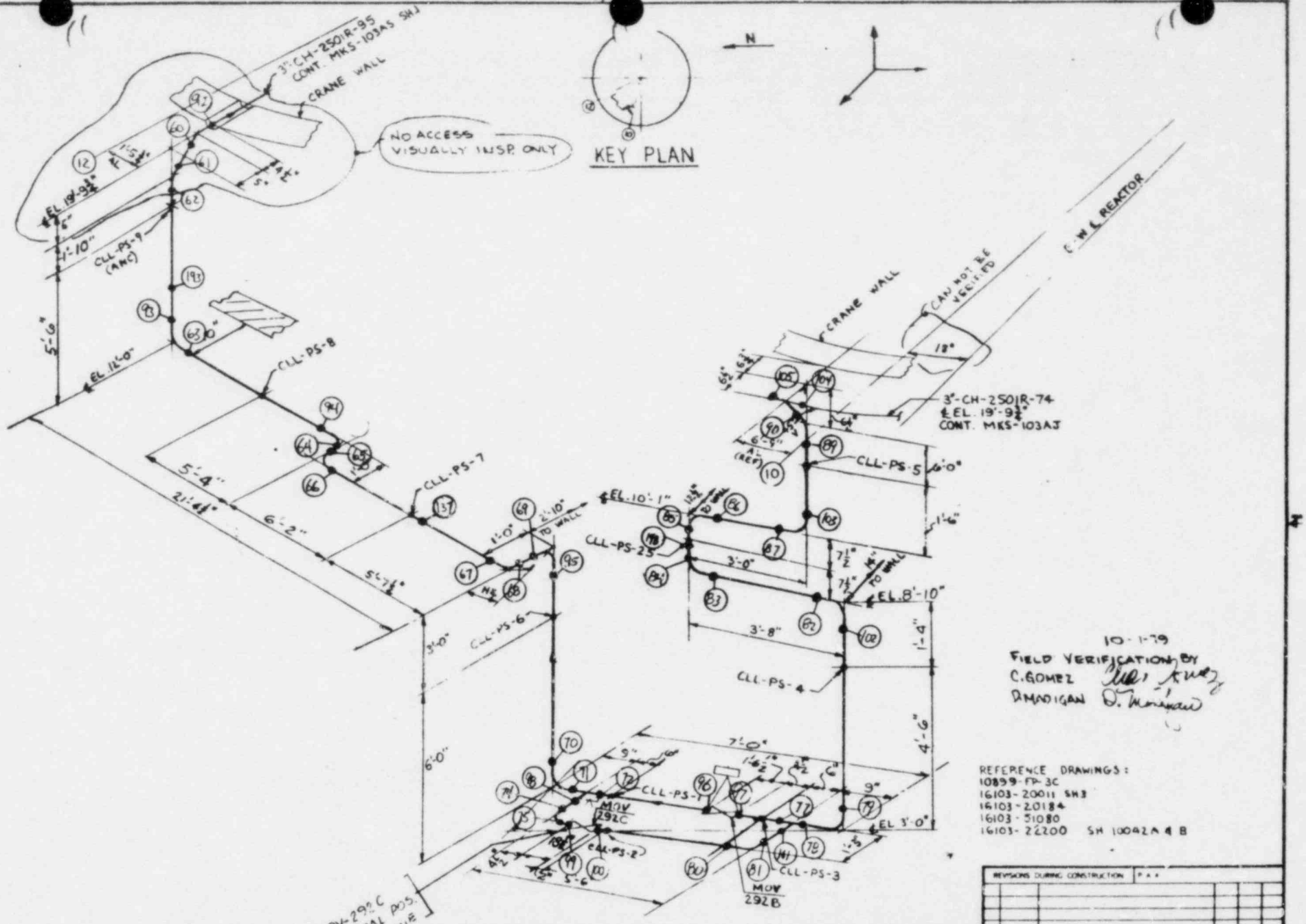
D = Damage Possible, Further Evaluation Required

A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	CHEMICAL VOLUME CONTROL SYSTEM
LINE	3-RC-2501R-74
DRAWING	MKS-103AJ (CYW-39)
BREAK PT.	19 20 21 22 23 24 25 ~~26~~ 27 ~~28~~ ~~29~~ 30 31 32 33 34 35 36 37
Reactor Coolant*	A ← → A
Main Steam*	A ← → A
Feedwater*	A ← → A
Charging*	A ← → A
Residual Heat Removal*	A ← → A
Service Water* 6-WS-151-151 & 152 (27→37)	D ← → D
Safety Injection	A ← → A
Containment Liner	D ← → D

*Minimum Required Safe Shutdown System


LETDOWN LINE LOOP 1 (RCS)
CHARGING LINE LOOP 4 HOT LEG (RCS)
AUXILIARY SPRAY (RCS)
REGENERATIVE HEAT EXCHANGERS
INSIDE REACTOR CONTAINMENT
NON-REGENERATIVE HEAT EXCHANGER
LOOP FILL
FROM REACTOR COOLANT SYSTEM
DRAIN COOLER
LOOP DRAIN HEADER
REACTOR COOLANT FILTER
MIXED BED DEMINERALIZERS
VOLUME CONTROL TANK
SEAL WTR HEAT EXCH
SEAL WATER FILTER
REACTOR COOLANT PUMP
SEAL WATER INJ FILTERS
CHARGING PUMP
CHARGING METERING PUMP
FROM RHR (SEE SH 6A)
FROM RWST
DESIGN CONDITIONS
LEGEND
CLASS 1
CLASS 2
CLASS 3
NON-NUCLEAR
AS BUILT
CONNECTICUT YANKEE
CHEMICAL & VOLUME CONTROL SYS
16103-26015
SH 10



10-1-79
FIELD VERIFICATION BY
C. GOMEZ
R MADIGAN

REFERENCE DRAWINGS:
10859-FP-3C
16103-20011 SH3
16103-20184
16103-31080
16103-22200 SH 10042A & B

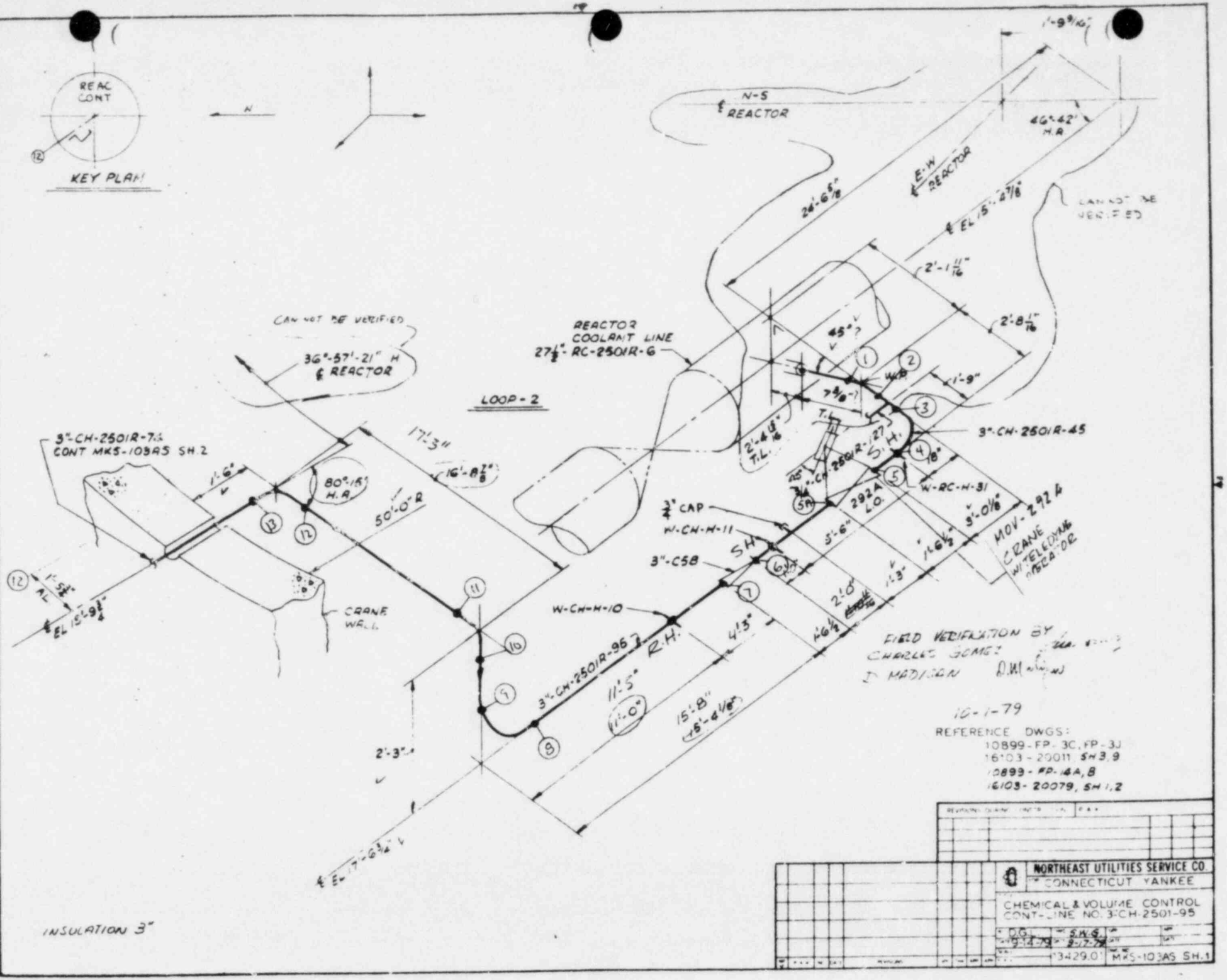
INSULATION 3"

REVISIONS DURING CONSTRUCTION	P.A.#

NORTHEAST UTILITIES SERVICE CO.
for CONNECTICUT YANKEE

TITLE: CHEMICAL & VOLUME CONTROL LINE 3"-CH-250'R-95 SHEET 2

BY KGS	CHKD	APP'D	APP'D
DATE 9-26-79	DATE	DATE	DATE
SCALE	P.A.# 13429.01	DWG. NO. MKS-103AS SH.2	


REAC CONT
KEY PLAN
N
N-S
℄ REACTOR
E-W
℄ REACTOR
46'-42" H.A
24'-6 5/16"
℄ EL 15'-2 7/8"
CAN NOT BE VERIFIED
2'-1 11/16"
2'-8 1/16"
1'-9 9/16"
REACTOR COOLANT LINE
27½" - RC-2501R-6
45°
LOOP - 2
CAN NOT BE VERIFIED
36'-57'-21" H
℄ REACTOR
3"-CH-2501R-7
CONT MKS-103AS SH 2
17'-3"
16'-8 7/8"
80°-18" H.A
50'-0" R
1'-6"
3"-CH-2501R-45
W-RC-H-31
3" CAP
W-CH-H-11
3"-CS8
W-CH-H-10
3"-CH-2501R-95
RH
SH
292A
MOV-292A
CRANE W/TELEDYNE ACTUATOR
CRANE WALL
℄ EL 15'-9 3/4"
2'-3"
℄ E-17'-6 3/4"
11'-5"
11'-0"
15'-8"
15'-6 1/8"
4'-3"
2'-0"
INSULATION 3"
FIELD VERIFICATION BY
CHARLES GOMEZ
D MADISON
10-1-79
REFERENCE DWGS:
10899-FP-3C, FP-3J
16103-20011, SH 3, 9
10899-FP-16A, B
16103-20079, SH 1, 2
NORTHEAST UTILITIES SERVICE CO.
CONNECTICUT YANKEE
CHEMICAL & VOLUME CONTROL
CONT-LINE NO. 3"CH-2501-95
D.G.
9-14-79
S.M.S.
9-17-79
13429.01
MKS-103AS SH.1

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE												
SYSTEM	CHEMICAL VOLUME CONTROL SYSTEM (CHARGING												
LINE	3-CH-2501R-95												
DRAWING	MKS-1034S (Sheet 1) (CYW-32)												
BREAK PT.	1	2	3	4	5	6	7	8	9	10	11	12	13
Reactor Coolant*	A												A
Main Steam*	A												A
Feedwater*	A												A
Charging*	A												A
Residual Heat Removal*	A												A
Service Water*	A												A
Safety Injection	A												A
Containment Liner	A												A

*Minimum Required Safe Shutdown System

LEGEND

D = Damage Possible, Further Evaluation Required

A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE																			
SYSTEM	CHEMICAL VOLUME CONTROL SYSTEM (CHARGING)																			
LINE	3-CH-250/R-95																			
DRAWING	MKS-103AJ (Sheet 2) (CYW-321) (16103-20184)																			
BREAK PT.	92	60	61	62	193	93	63	94	64	65	66	137	67	68	69	95	70	71	72	98
Reactor Coolant*	A	←																	→	A
Main Steam*	A	←																	→	A
Feedwater*	A	←																	→	A
Charging*	A	←																	→	A
Residual Heat Removal*	A	←																	→	A
Service Water*	A	←																	→	A
Safety Injection	A	←																	→	A
Containment Liner	D	←																	→	D

*Minimum Required Safe Shutdown System

LEGEND

D = Damage Possible, Further Evaluation Required

A = Acceptable (damage not possible) or No Interaction

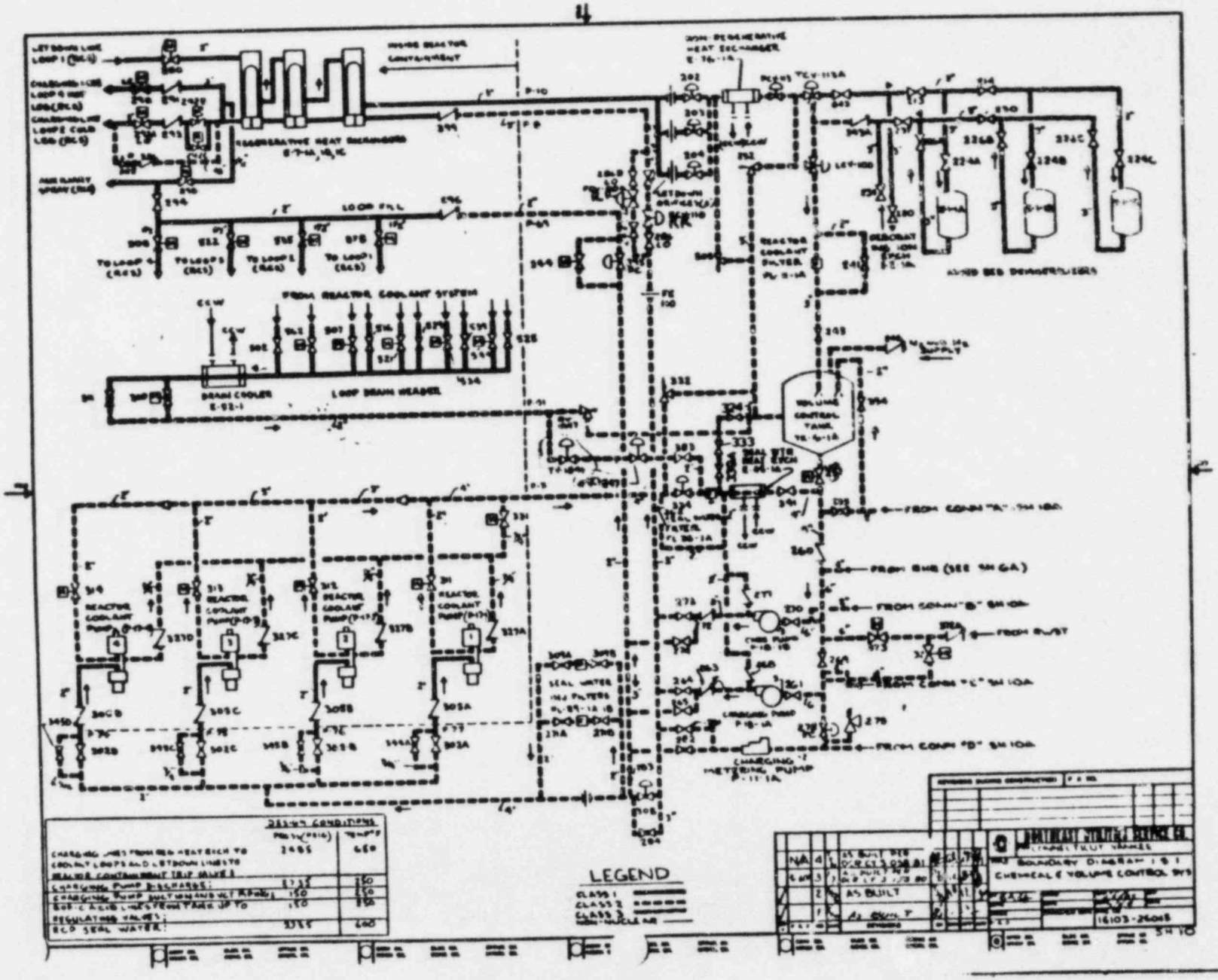
TARGET	SOURCE																		
	SYSTEM	CHEMICAL VOLUME CONTROL SYSTEM (CHARGING)																	
	LINE	3-CH-2501-R-95																	
	DRAWING	MKS-103 AS (Sheet 2)																	
	BREAK PT.	74	75	99	100	80	81	101	77	78	96	97	79	102	82	83	84	148	85	86
Reactor Coolant*		A	←																→	A
Main Steam*		A	←																→	A
Feedwater*		A	←																→	A
Charging*		A	←																→	A
Residual Heat Removal*		A	←																→	A
Service Water*		A	←																→	A
Safety Injection		A	←																→	A
Containment Liner		D	←																→	D

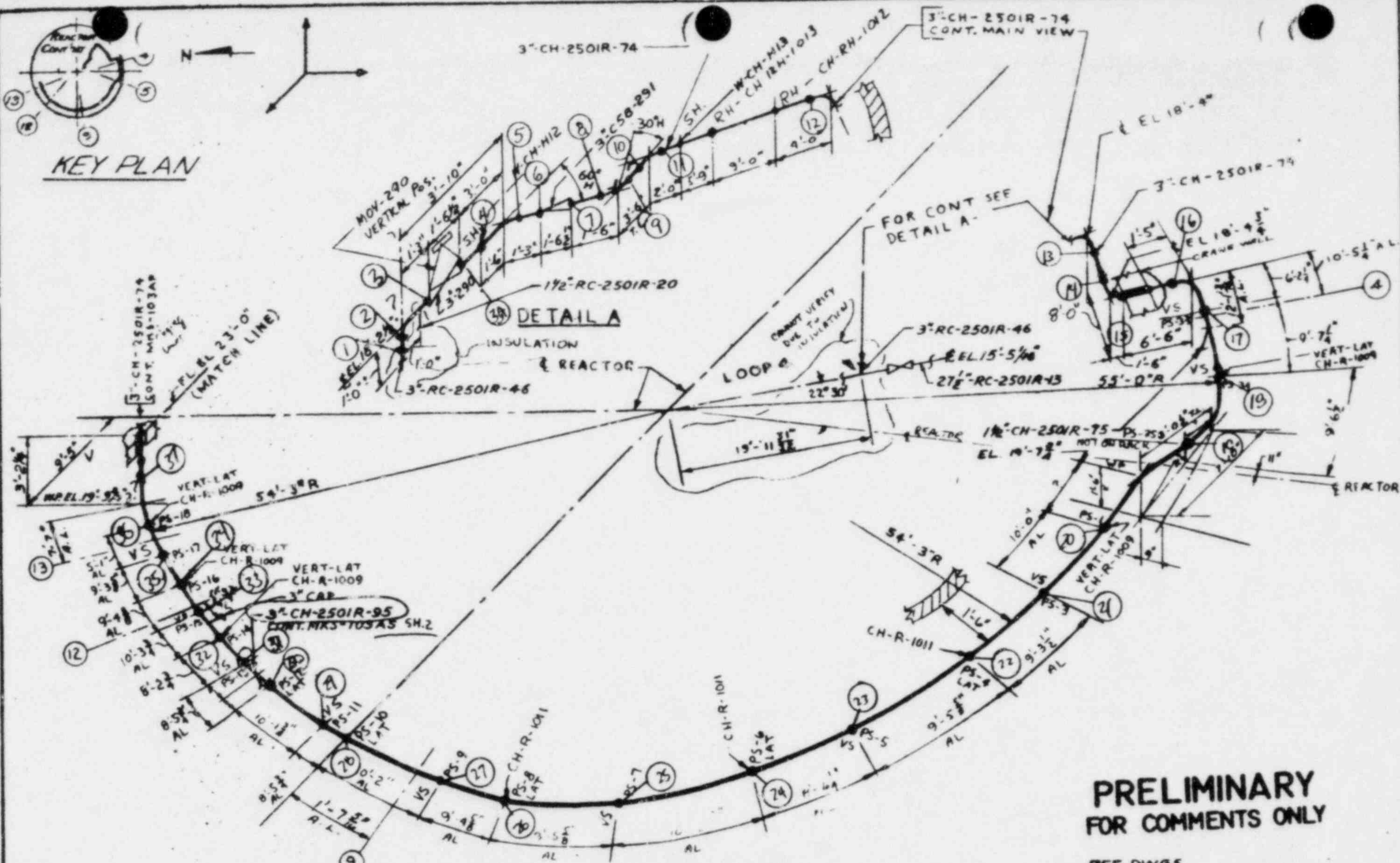
*Minimum Required Safe Shutdown System

D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	CHEMICAL VOLUME CONTROL SYSTEM (CHARGING)
LINE	3-CH-2501R-95
DRAWING	MKS-103AS (Sheet 2)
BREAK PT.	103 99 95 90 104 105
Reactor Coolant*	A ⟷ A
Main Steam*	A ⟷ A
Feedwater*	A ⟷ A
Charging*	A ⟷ A
Residual Heat Removal*	A ⟷ A
Service Water*	A ⟷ A
Safety Injection	A ⟷ A
Containment Liner	D ⟷ D

*Minimum Required Safe Shutdown System


LEGEND
CLASS 1
CLASS 2
CLASS 3
NON-NUCLEAR
AS BUILT
16103-26065



PRELIMINARY
FOR COMMENTS ONLY

REF DWGS
10899 - FP-3D, H, J, K, L, Q, R, S, U
16103 - 20011 SH-4, 8, 9, 10, 11, 15, 16, 17, 19

NOTE:
CH-R-1009 TO BE ADDED AT RACKS
PS-18, 16, 14, & 34 PER MKS-103AJ-H1009
CH-R-1011 TO BE ADDED AT RACKS
PS-4, 6 & 8 PER MKS-103AJ-H1011

INSULATION 3"

REVISIONS DURING CONSTRUCTION

NORTHEAST UTILITIES SERVICE CO.
CONNECTICUT YANKEE
CONT. CHEMICAL & VOLUME CONTROL TO LOOP 4 FROM HT. EXCH.
R.W.H. 9-6-79
S.W.G. 9-19-79
13429.01 MKS-103AJ

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET		SOURCE
	SYSTEM	CHEMICAL VOLUME CONTROL SYSTEM
	LINE	3-RC-2501R-468 T4
	DRAWING	MKS-103AJ (CYW-39)
	BREAK PT.	1 2 3 3A 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
Reactor Coolant*		A ← A
Main Steam*		A ← A
Feedwater*		A ← A
Charging*		A ← A
Residual Heat Removal*		A ← A
Service Water*		A ← A
Safety Injection		A ← A D
Containment Liner		A ← A D

*Minimum Required Safe Shutdown System

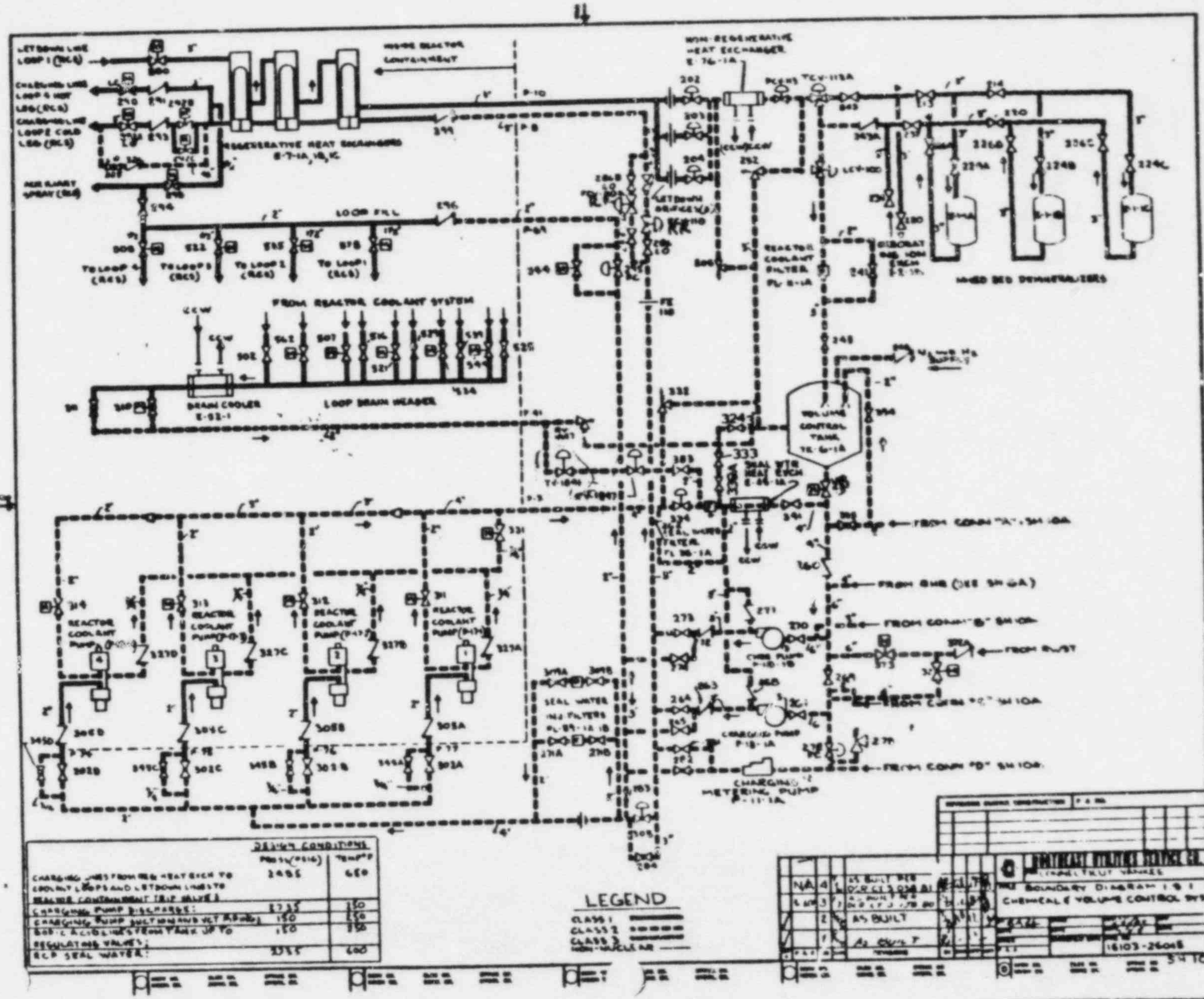
LEGEND

D = Damage Possible, Further Evaluation Required

A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	CHEMICAL VOLUME CONTROL SYSTEM
LINE	3-RC-2501R-74
DRAWING	MKS-103AJ (CYW-39)
BREAK PT.	19 20 21 22 23 24 25 26 27 ~~28 29 30 31 32 33 34 35 36 37~~
Reactor Coolant*	A ← A → A
Main Steam*	A ← A → A
Feedwater*	A ← A → A
Charging*	A ← A → A
Residual Heat Removal*	A ← A → A
Service Water* 6-WS-151-151&152 (27→37)	D ← D → D
Safety Injection	A ← A → A
Containment Liner	D ← D → D

*Minimum Required Safe Shutdown System



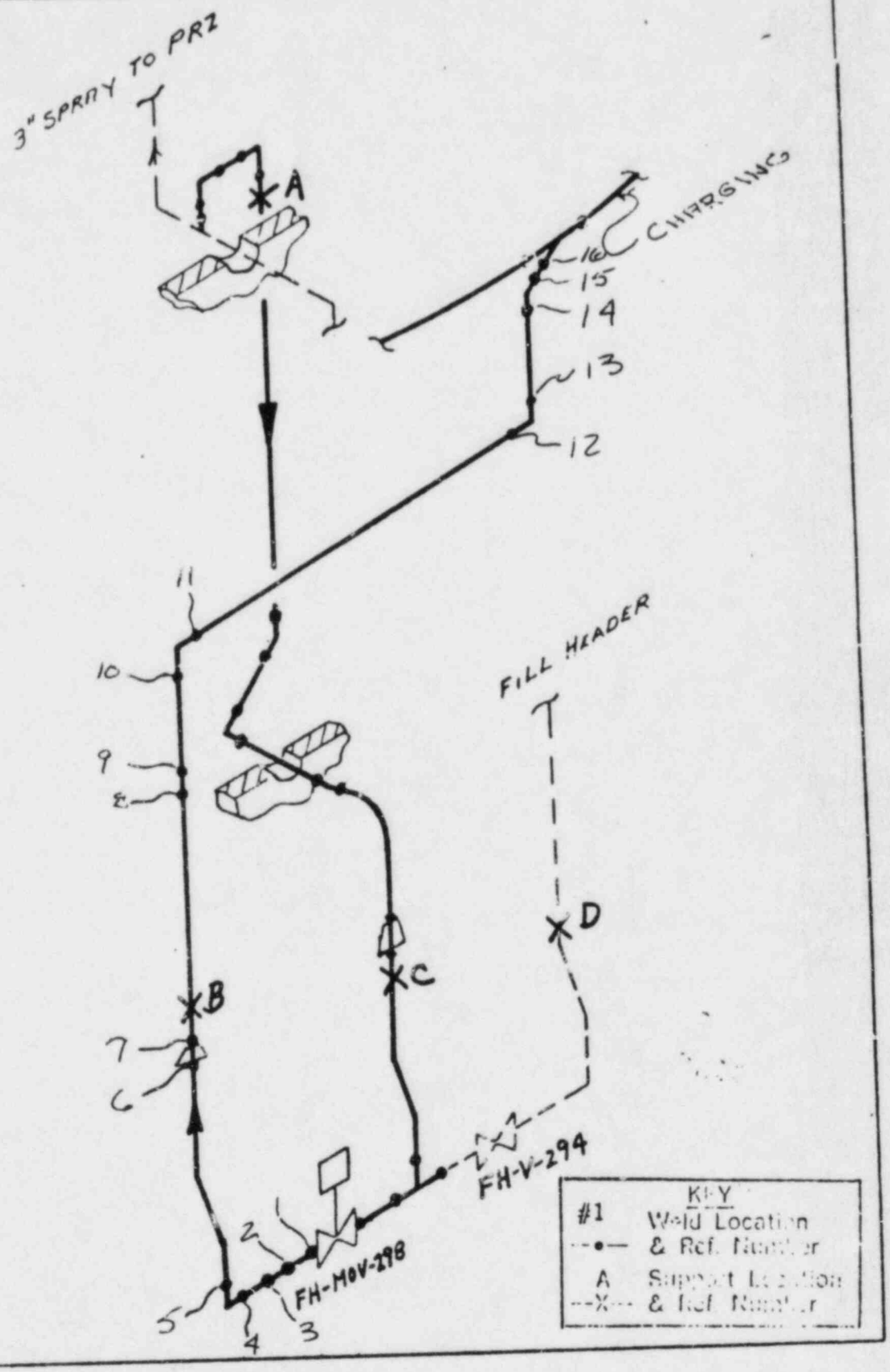
NON-REGENERATIVE HEAT EXCHANGER
REGENERATIVE HEAT EXCHANGERS
INSIDE REACTOR CONTAINMENT
LOOP FILL
FROM REACTOR COOLANT SYSTEM
LOOP DRAIN HEADER
DRAIN COOLER
REACTOR COOLANT FILTER
MIXED BED DEMINERALIZERS
VOLUME CONTROL TANK
SEAL WATER FILTER
SEAL WATER INJ. FILTERS
CHARGING PUMP
CHARGING METERING PUMP
REACTOR COOLANT PUMP
FROM RWST
DESIGN CONDITIONS
LEGEND
CLASS 1
CLASS 2
CLASS 3
NON-NUCLEAR
AS BUILT
CHEMICAL & VOLUME CONTROL SYS

SKETCH SHEET

WESTINGHOUSE FORM 24440

WESTINGHOUSE ELECTRIC CORPORATION

2" x 1½" AUXILIARY SPRAY LINE CYW-26

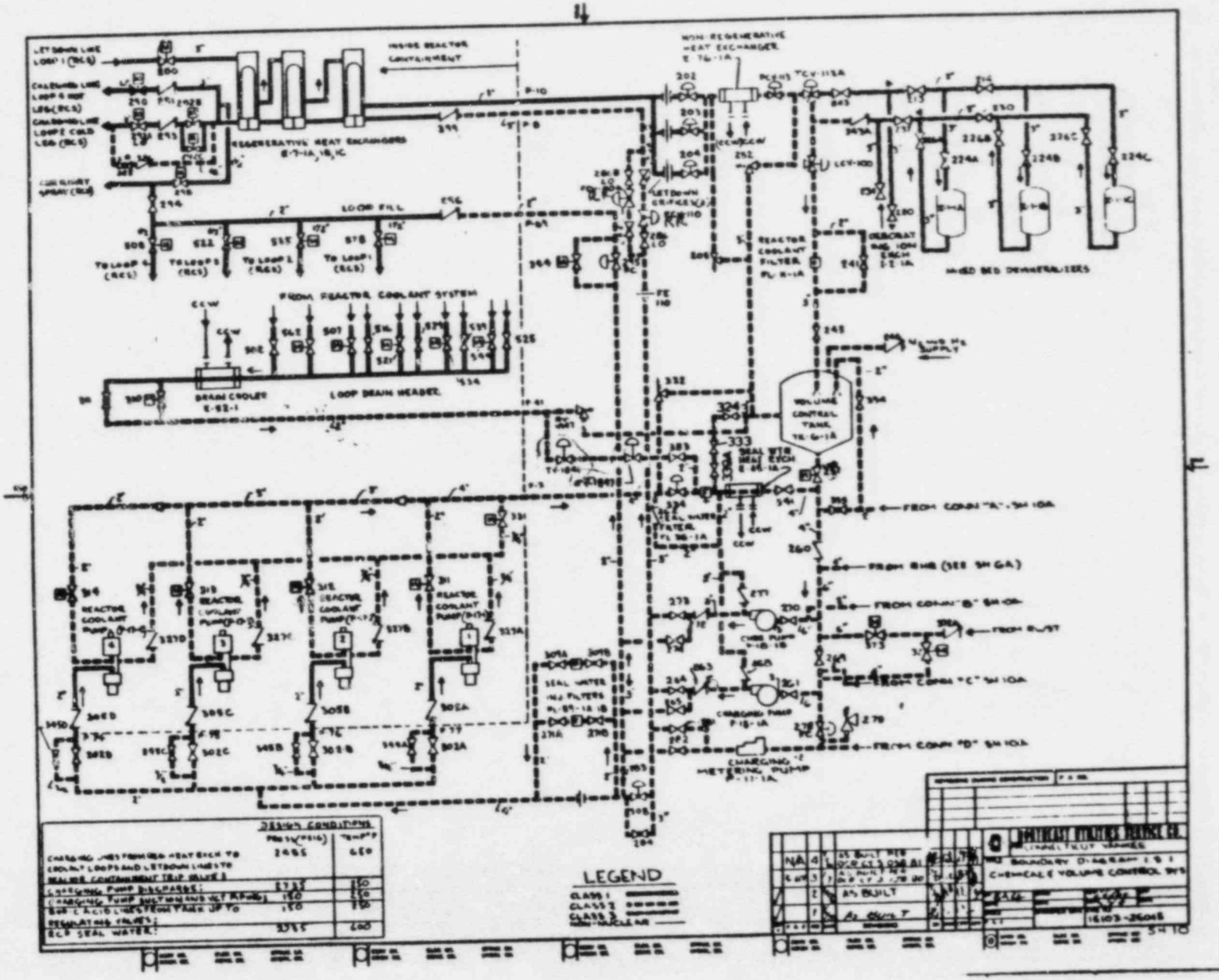


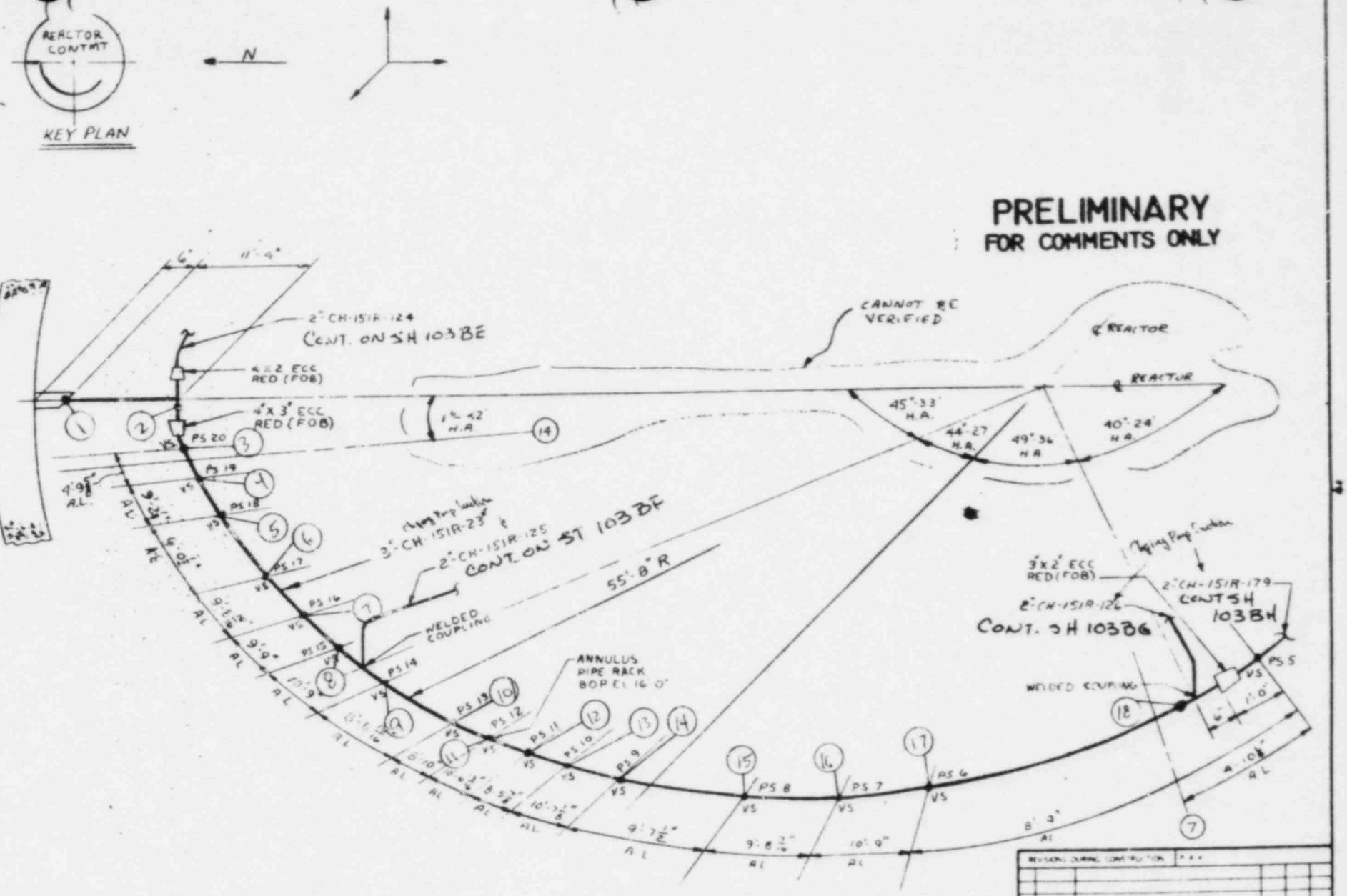
5-40

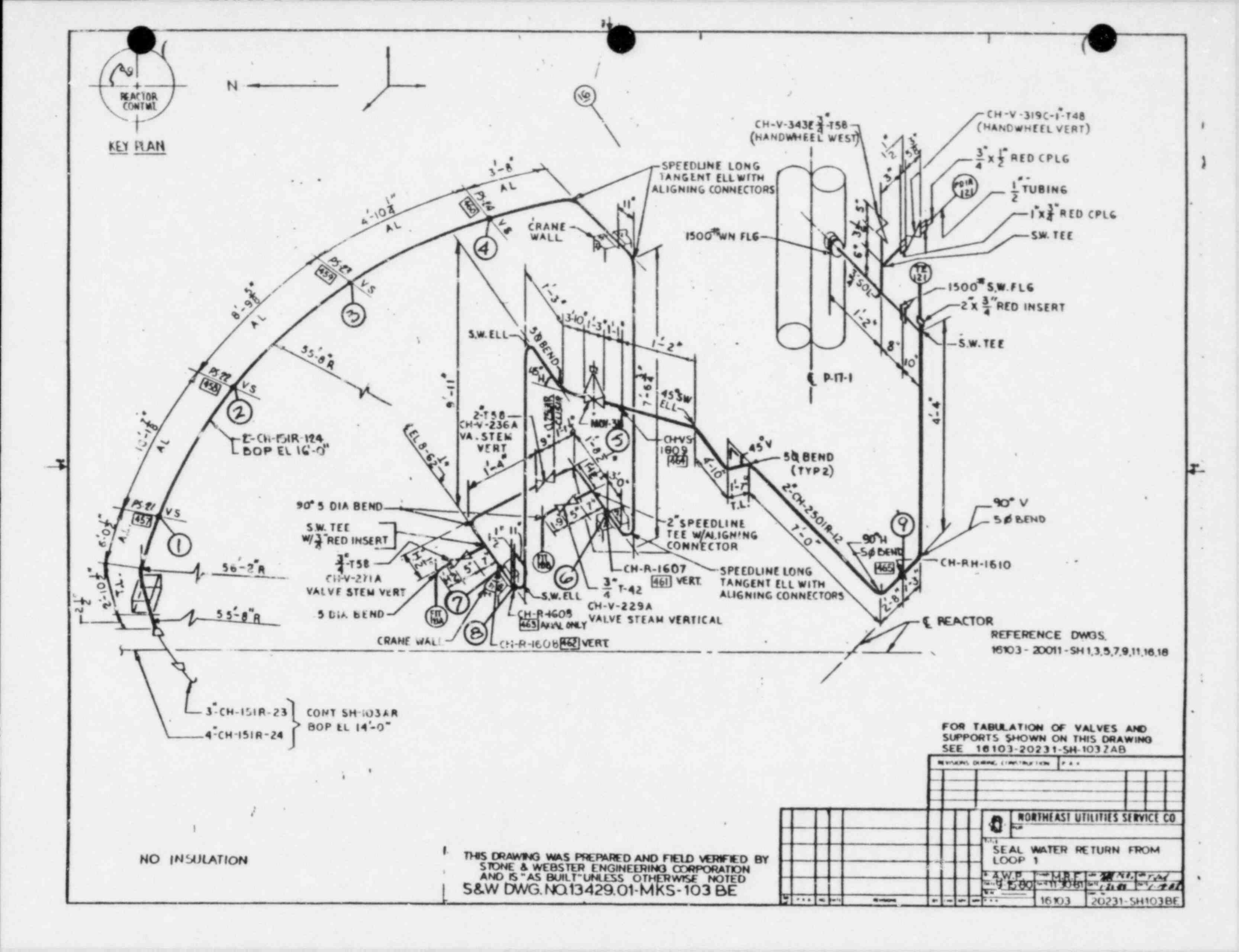
LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE															
SYSTEM	Aux Spray Line															
LINE	1½" CH-2501R-75.169															
DRAWING	CYW-26															
BREAK PT.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Reactor Coolant*	A ←															→ A
Main Steam*	A ←															→ A
Feedwater*	A ←															→ A
Charging*	A ←															→ A
Residual Heat Removal*	A ←															→ A
Service Water*	A ←															→ A
Safety Injection	A ←															→ A
Containment Liner	A ←															→ A

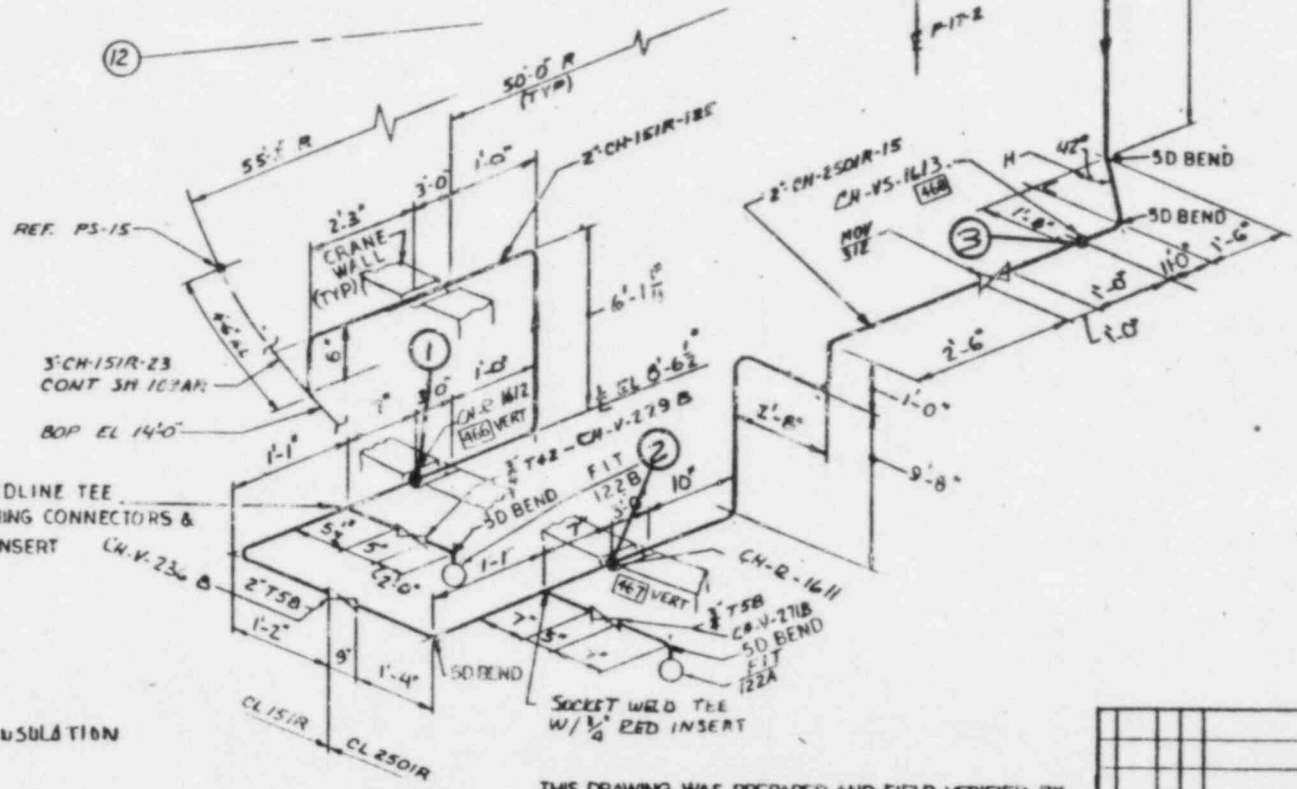
*Minimum Required Safe Shutdown System

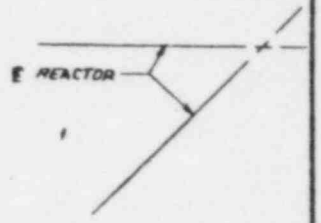

LETDOWN LINE LOOP 1 (RCS)
CHARGING LINE LOOP 4 HOT LEG (RCS)
CHARGING LINE LOOP 2 COLD LEG (RCS)
INSIDE REACTOR CONTAINMENT
REGENERATIVE HEAT EXCHANGERS E-7-1A, 1B, 1C
NON-REGENERATIVE HEAT EXCHANGER E-76-1A
LOOP FILL
TO LOOP 4 (RCS)
TO LOOP 3 (RCS)
TO LOOP 2 (RCS)
TO LOOP 1 (RCS)
FROM REACTOR COOLANT SYSTEM
DRAIN COOLER E-82-1
LOOP DRAIN HEADER
REACTOR COOLANT PUMP
REACTOR COOLANT FILTER
MIXED BED DEMINERALIZERS
VOLUME CONTROL TANK
SEAL WATER HEAT EXCH
SEAL WATER FILTER
SEAL WATER INJ FILTERS
CHARGING PUMP
CHARGING / METERING PUMP
FROM CONN "A" SH 10A
FROM RHR (SEE SH 6A)
FROM CONN "B" SH 10A
FROM RWST
FROM CONN "C" SH 10A
FROM CONN "D" SH 10A
LEGEND
CLASS 1
CLASS 2
CLASS 3
NON-NUCLEAR
DESIGN CONDITIONS
CHARGING LINES FROM REGEN HEAT EXCH TO COOLANT LOOPS AND LETDOWN LINES TO REGEN CONTAINMENT TRIP VALVES
CHARGING PUMP DISCHARGE
CHARGING PUMP SUCTION AND VCT RETURN
BOR. ACID LINES FROM TANK UP TO
REGULATING VALVES
RCP SEAL WATER
AS BUILT
CHEMICAL & VOLUME CONTROL SYS
1E103-2604E
SH 10


REACTOR CONTMT
KEY PLAN
N
PRELIMINARY
FOR COMMENTS ONLY
2" CH-151R-124
CONT. ON SH 103BE
4"x2" ECC RED (FOB)
4"x3" ECC RED (FOB)
CANNOT BE VERIFIED
℄ REACTOR
45°-33" H.A.
44°-27" H.A.
49°-36" H.A.
40°-24" H.A.
3" CH-151R-23
2" CH-151R-125
CONT. ON ST 103BF
55'-8" R
WELDED COUPLING
ANNULUS PIPE RACK BOP EL 16'-0"
3"x2" ECC RED (FOB)
2" CH-151R-126
CONT. SH 103BG
2" CH-151R-179
CONT SH 103BH
WELDED COUPLING
NO INSULATION
NORTHEAST UTILITIES SERVICE CO.
CONNECTICUT YANKEE
CHEMICAL & VOLUME CONTROL
CONT-LINE NO 3"CH-151R-23
1342901
MKS-103AR


REACTOR CONTAINMENT
KEY PLAN
N
SPEEDLINE LONG TANGENT ELL WITH ALIGNING CONNECTORS
CRANE WALL
CH-V-343E 3/4"-T58 (HANDWHEEL WEST)
CH-V-319C-1"-T48 (HANDWHEEL VERT)
3/4" X 1/2" RED CPLG
1/2" TUBING
1" X 3/4" RED CPLG
S.W. TEE
1500# WN FLG
1500# S.W. FLG
2" X 3/4" RED INSERT
S.W. TEE
P-17-1
S.W. ELL
5Ø BEND
45° SW ELL
2"-T58 CH-V-236A VA. STEM VERT
CH-VS 1809
45° V
5Ø BEND (TYP 2)
2"-CH-250IR-12
90° V
5Ø BEND
90° H
5Ø BEND
CH-RH-1610
90° S DIA BEND
S.W. TEE W/ 3/4" RED INSERT
3/4"-T58 CH-V-271A VALVE STEM VERT
5 DIA BEND
2" SPEEDLINE TEE W/ ALIGNING CONNECTOR
CH-R-1607 461 VERT.
SPEEDLINE LONG TANGENT ELL WITH ALIGNING CONNECTORS
S.W. ELL
3/4"-T-42 CH-V-229A VALVE STEAM VERTICAL
CH-R-1608 462 VERT
CH-R-1605 465 AXIAL ONLY
CRANE WALL
REACTOR
REFERENCE DWGS. 16103-20011-SH 1,3,5,7,9,11,16,18
2"-CH-151R-124 BOP EL 16'-0"
3"-CH-151R-23
4"-CH-151R-24
CONT SH-103AR BOP EL 14'-0"
56'-2" R
55'-8" R
55'-8" R
NO INSULATION
THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED
S&W DWG. NO. 13429.01-MKS-103 BE
FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 16103-20231-SH-103 AB
NORTHEAST UTILITIES SERVICE CO
SEAL WATER RETURN FROM LOOP 1
16103
20231-SH103BE

KEY PLAN





NOTES:

1. CL151R ELBOWS ARE SPEEDLINE LONG TANGENT W/ALIGNING CONNECTORS UNLESS OTHERWISE NOTED
2. CL 2501R ELBOWS ARE SOCKET WELD UNLESS OTHERWISE NOTED.
3. ALL VALVE STEMS ARE VERTICAL UNLESS OTHERWISE SHOWN.

REF. DWGS:
16103-20011- SH 1
SH 3
SH 5
SH 7
SH 9
SH 11
SH 19

FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 16103-20231-SH-103ZAC

THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED
S&W DWG. NO. 13429.01-MKS-103BF

REVISIONS DURING CONSTRUCTION	P. A. NO.

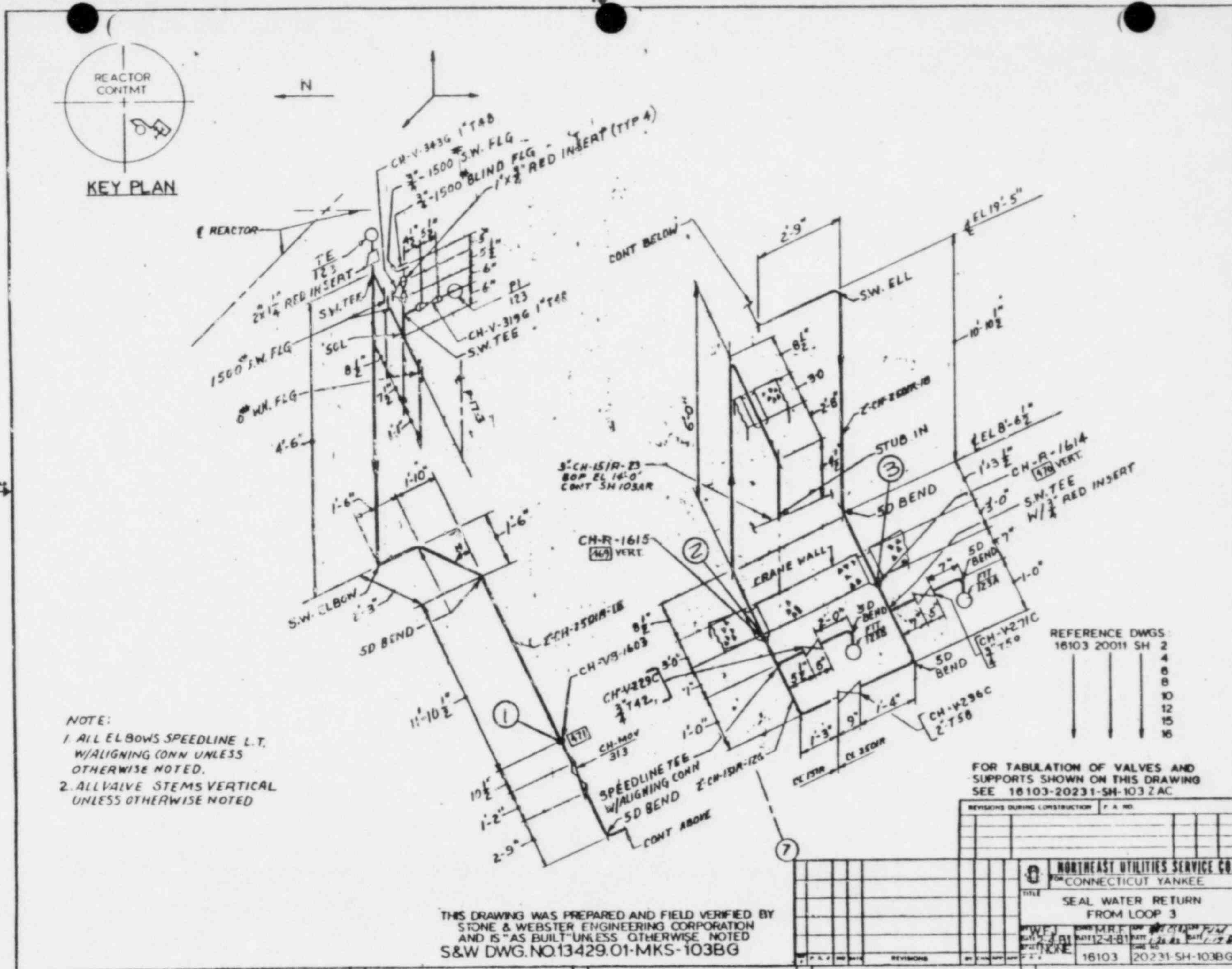
NORTHEAST UTILITIES SERVICE CO.
for CONNECTICUT YANKEE

TITLE: SEAL WATER RETURN FROM LOOP 2

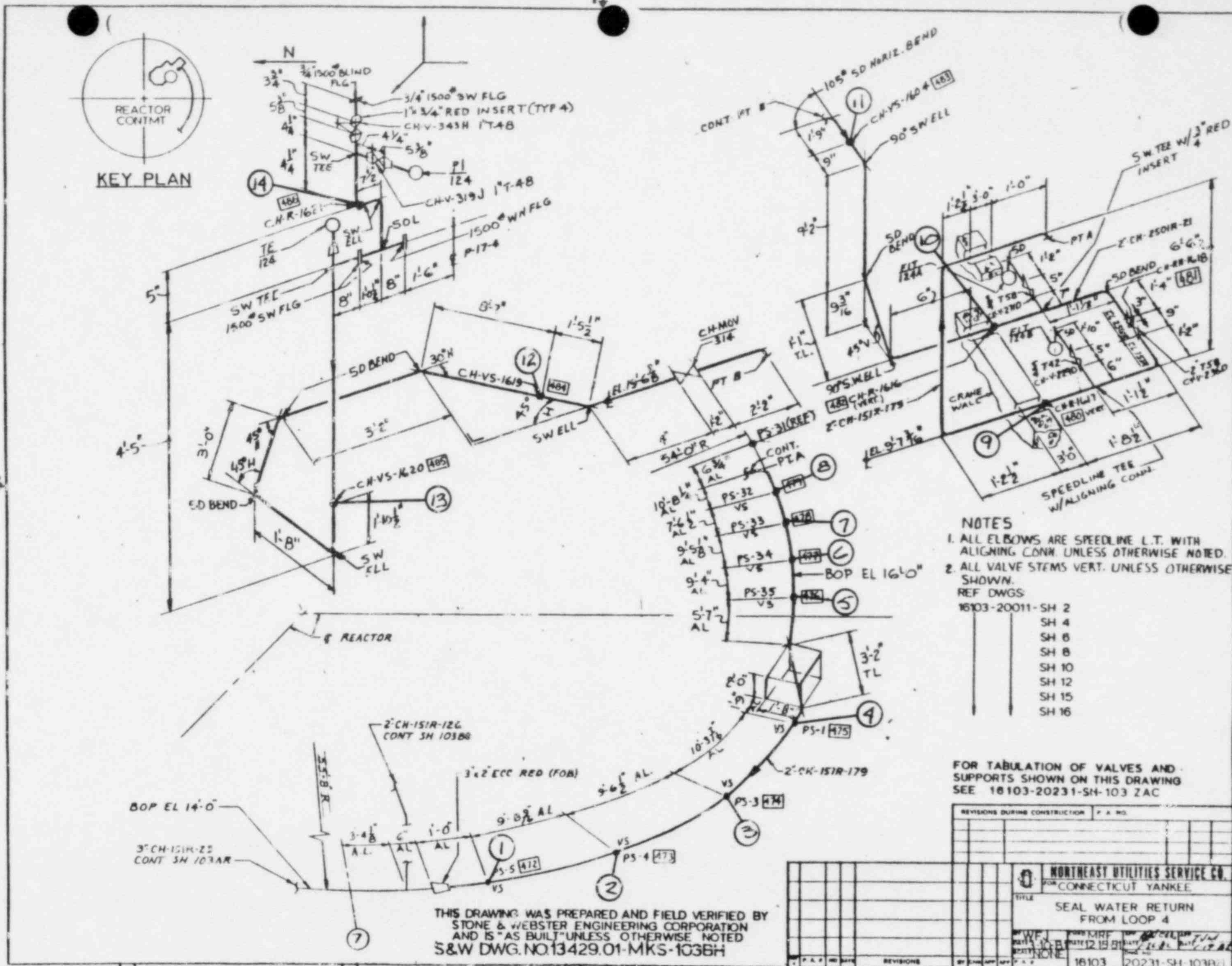
W.O.	DRAWING SERIES	DATE
NONE	16103	12 2 81

20231-SH-103BF

REVISIONS	BY	CHK	APP	DATE
P. A. # NO.				



REACTOR CONTMT
KEY PLAN
N
℄ REACTOR
CONT BELOW
SW. ELL
EL 19'-5"
CH-V-343G 1" TAB
3/4"-1500# S.W. FLG
3/4"-1500 BLIND FLG
1"x3/4" RED INSERT (TYP 4)
TEE 123
2"x1 1/4" RED INSERT
S.W. TEE
1500# S.W. FLG
CH-V-319G 1" TAB
S.W. TEE
PI 123
10'-10 1/2"
STUB IN
EL 8'-6 1/2"
CH-R-1614 VERT
SD BEND
S.W. TEE W/3/4" RED INSERT
3"-CH-151R-23 BOP EL 14'-0" CONT SH 103AR
CH-R-1615 VERT
CRANE WALL
S.W. ELBOW
SD BEND
2"-CH-2501R-18
CH-V8-1603
CH-V229C 3/4" T42
CH-MOV 313
SPEEDLINE TEE W/ALIGNING CONN
2"-CH-151R-126
SD BEND
CONT ABOVE
CH-V-271C 3/4" T50
CH-V-296C 2" T58
℄ 151R
℄ 3501R
REFERENCE DWGS: 18103 20011 SH 2 4 6 8 10 12 15 16
NOTE:
1. ALL ELBOWS SPEEDLINE L.T. W/ALIGNING CONN UNLESS OTHERWISE NOTED.
2. ALL VALVE STEMS VERTICAL UNLESS OTHERWISE NOTED
FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 18103-20231-SH-103 Z AC
THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED
S&W DWG. NO. 13429.01-MKS-103BG
NORTHEAST UTILITIES SERVICE CO.
CONNECTICUT YANKEE
SEAL WATER RETURN FROM LOOP 3
12-1-81
16103
20231-SH-103BG


KEY PLAN
REACTOR CONTMT
N
3/4" 1500# BLIND FLG
3/4" 1500# SW FLG
1"x3/4" RED INSERT (TYP 4)
CH-V-343H 1"T48
SW TEE
PI 124
CH-V-319J 1"T-48
SOL
1500# WN FLG
P-17-4
TE 124
SW ELL
SW TEE
1500# SW FLG
C.H.R-1621
CH-VS-1619
CH-VS-1620
SD BEND
SWELL
CH-MOV 314
PT B
PS-31 (REF)
CONT. PTA
54'-0" R
PS-32
PS-33
PS-34
PS-35
BOP EL 16'-0"
℄ REACTOR
CONT PT B
105° SD HORIZ. BEND
CH-VS-1604
90° SWELL
SD BEND
SW TEE W/ 3/4" RED INSERT
2"-CH-2501R-21
CH-R-1618
90° SWELL
CH-R-1616 (VERT)
2"-CH-151R-179
CRANE WALL
EL 9'-7 3/16"
SPEEDLINE TEE W/ALIGNING CONN.
2"-CH-151R-126
CONT SH 103BG
3"x2" ECC RED (FOB)
BOP EL 14'-0"
3"-CH-151R-22
CONT SH 103AR
53'-8" R
PS-1
PS-3
PS-4
PS-5
2"-CH-151R-179
NOTES
1. ALL ELBOWS ARE SPEEDLINE L.T. WITH ALIGNING CONN. UNLESS OTHERWISE NOTED.
2. ALL VALVE STEMS VERT. UNLESS OTHERWISE SHOWN.
REF DWGS:
18103-20011-SH 2
SH 4
SH 6
SH 8
SH 10
SH 12
SH 15
SH 16
FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 18103-20231-SH-103 ZAC
THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED
S&W DWG. NO. 13429.01-MKS-103BH
REVISIONS DURING CONSTRUCTION
NORTHEAST UTILITIES SERVICE CO.
CONNECTICUT YANKEE
SEAL WATER RETURN
FROM LOOP 4
NONE
18103
20231-SH-103BH

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE																	
SYSTEM	Charging Pump Suction																	
LINE	3" CH-151R-23																	
DRAWING	MKS-103AR																	
BREAK PT.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Reactor Coolant*	A	←															→	A
Main Steam*	A	←															→	A
Feedwater*	A	←															→	A
Charging*	A	←															→	A
Residual Heat Removal*	A	←															→	A
Service Water*	A	←															→	A
Safety Injection	A	←															→	A
Containment Liner	A	←															→	A

*Minimum Required Safe Shutdown System

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	Seal Water Return From Loop #1
LINE	2"-CH-151R-129
DRAWING	20231-SH 103BF
BREAK PT.	1 2 3 4 5 6 7 8 9
Reactor Coolant*	A ◄——► A
Main Steam*	A ◄——► A
Feedwater*	A ◄——► A
Charging*	A ◄——► A
Residual Heat Removal*	A ◄——► A
Service Water*	A ◄——► A
Safety Injection	A ◄——► A
Containment Liner	A ◄——► A

*Minimum Required Safe Shutdown System

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE		
SYSTEM	Seal Water Return From Loop #2		
LINE	2" CH 151R-125		
DRAWING	20231 SH 103BF		
BREAK PT.	1	2	3
Reactor Coolant*	A	A	A
Main Steam*	A	A	A
Feedwater*	A	A	A
Charging*	A	A	A
Residual Heat Removal*	A	A	A
Service Water*	A	A	A
Safety Injection	A	A	A
Containment Liner	A	A	A

*Minimum Required Safe Shutdown System

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE		
SYSTEM	Seal Water Return From Loop #3		
LINE	2" CH 151R-126		
DRAWING	20231-SH 103BG		
BREAK PT.	1	2	3
Reactor Coolant*	A	A	A
Main Steam*	A	A	A
Feedwater*	A	A	A
Charging*	A	A	A
Residual Heat Removal*	A	A	A
Service Water*	A	A	A
Safety Injection	A	A	A
Containment Liner	A	A	A

*Minimum Required Safe Shutdown System

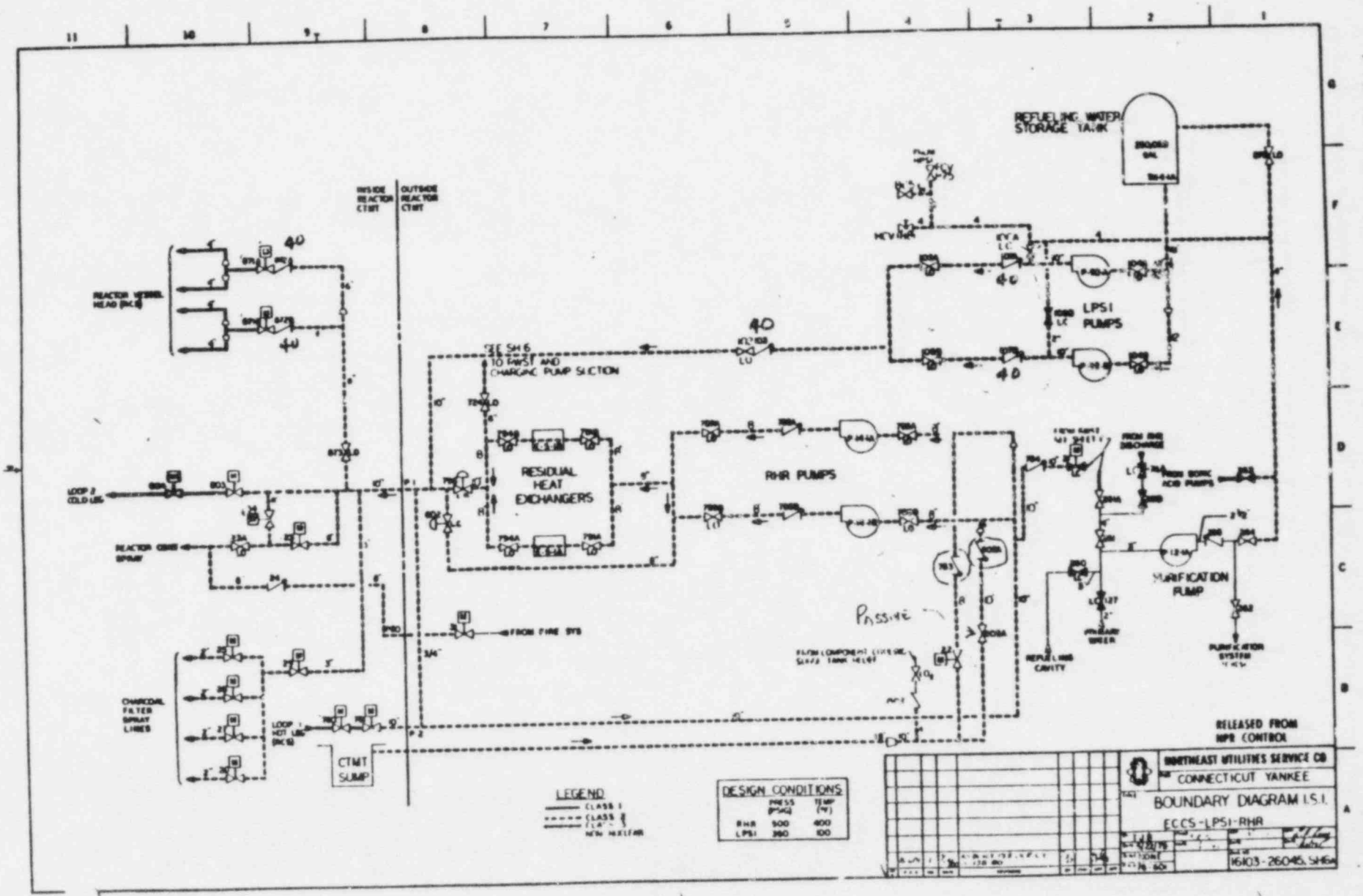
LEGEND

D = Damage Possible, Further Evaluation Required

A = Acceptable (damage not possible) or No Interaction

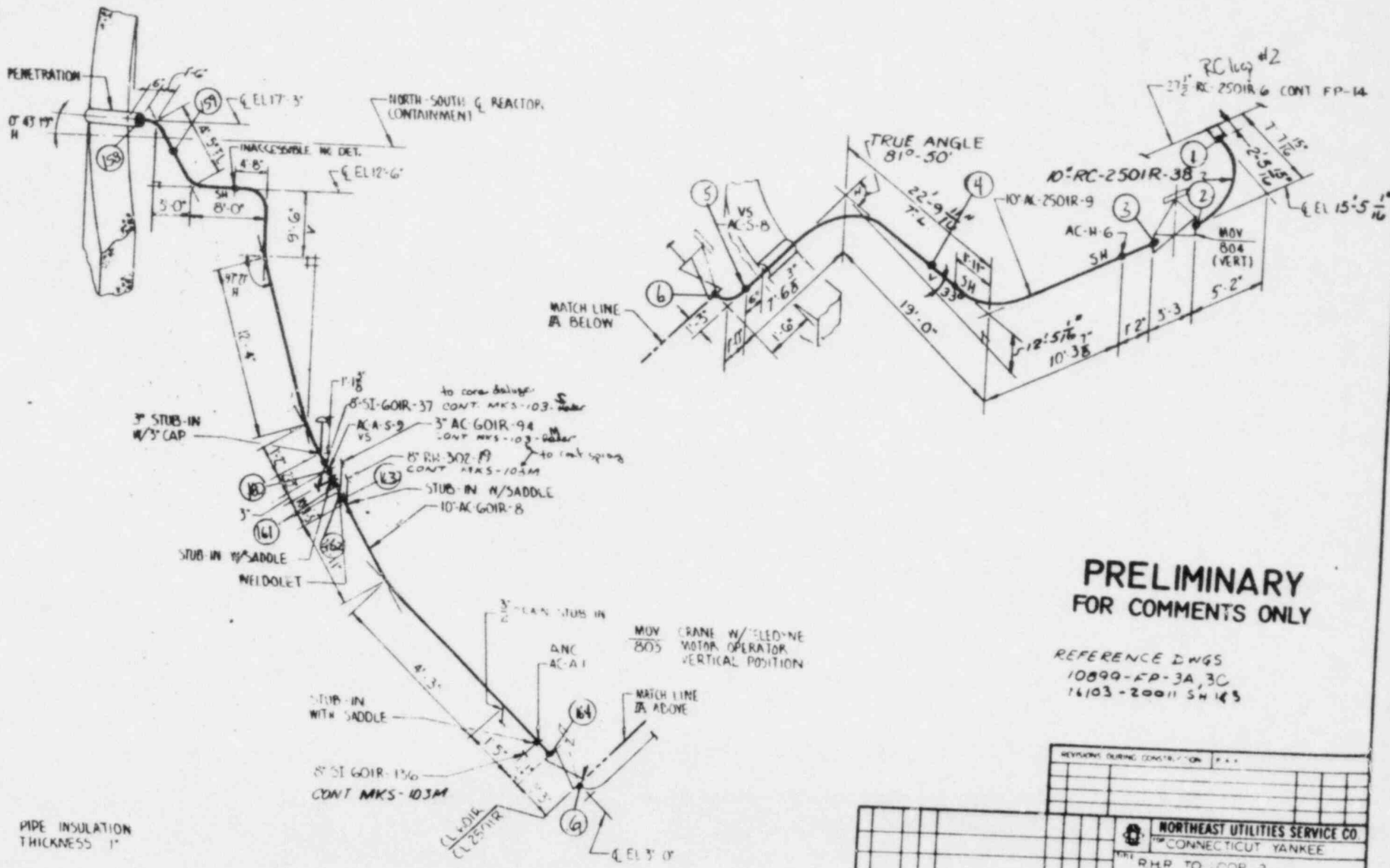
TARGET	SOURCE													
SYSTEM	Seal Water Return From Loop #4													
LINE	2" CH-151R-179													
DRAWING	20231-SH 103 BH													
BREAK PT.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Reactor Coolant*	A	←	—	—	—	—	—	—	—	—	—	—	→	A
Main Steam*	A	←	—	—	—	—	—	—	—	—	—	—	→	A
Feedwater*	A	←	—	—	—	—	—	—	—	—	—	—	→	A
Charging*	A	←	—	—	—	—	—	—	—	—	—	—	→	A
Residual Heat Removal*	A	←	—	—	—	—	—	—	—	—	—	—	→	A
Service Water*	A	←	—	—	—	—	—	—	—	—	—	—	→	A
Safety Injection	A	←	—	—	—	—	—	—	—	—	—	—	→	A
Containment Liner	A	←	—	—	—	—	—	—	—	—	—	—	→	A

*Minimum Required Safe Shutdown System


REFUELING WATER STORAGE TANK
LPSI PUMPS
RESIDUAL HEAT EXCHANGERS
RHR PUMPS
PURIFICATION PUMP
REACTOR VESSEL HEAD (RCS)
LOOP 2 COLD LEG
REACTOR CAVITY SPRAY
CHARCOAL FILTER SPRAY LINES
LOOP 1 HOT LEG (RCS)
CTMT SUMP
FROM FIRE SYS
INSIDE REACTOR CTMT
OUTSIDE REACTOR CTMT
SEE SH 6
10" RHR & CHARGING PUMP SUCTION
FROM BORIC ACID PUMPS
REPLACEMENT WATER
PURIFICATION SYSTEM
Passive
RELEASED FROM NPR CONTROL
LEGEND
CLASS 1
CLASS 2
NON NUCLEAR
DESIGN CONDITIONS
PRESS (PSIG)
TEMP (°F)
RHR 500 400
LPSI 350 100
0
NORTHEAST UTILITIES SERVICE CO
CONNECTICUT YANKEE
BOUNDARY DIAGRAM I.S.I.
ECCS-LPSI-RHR
16103-26045, SH6A

N

KEY PLAN



PRELIMINARY
FOR COMMENTS ONLY

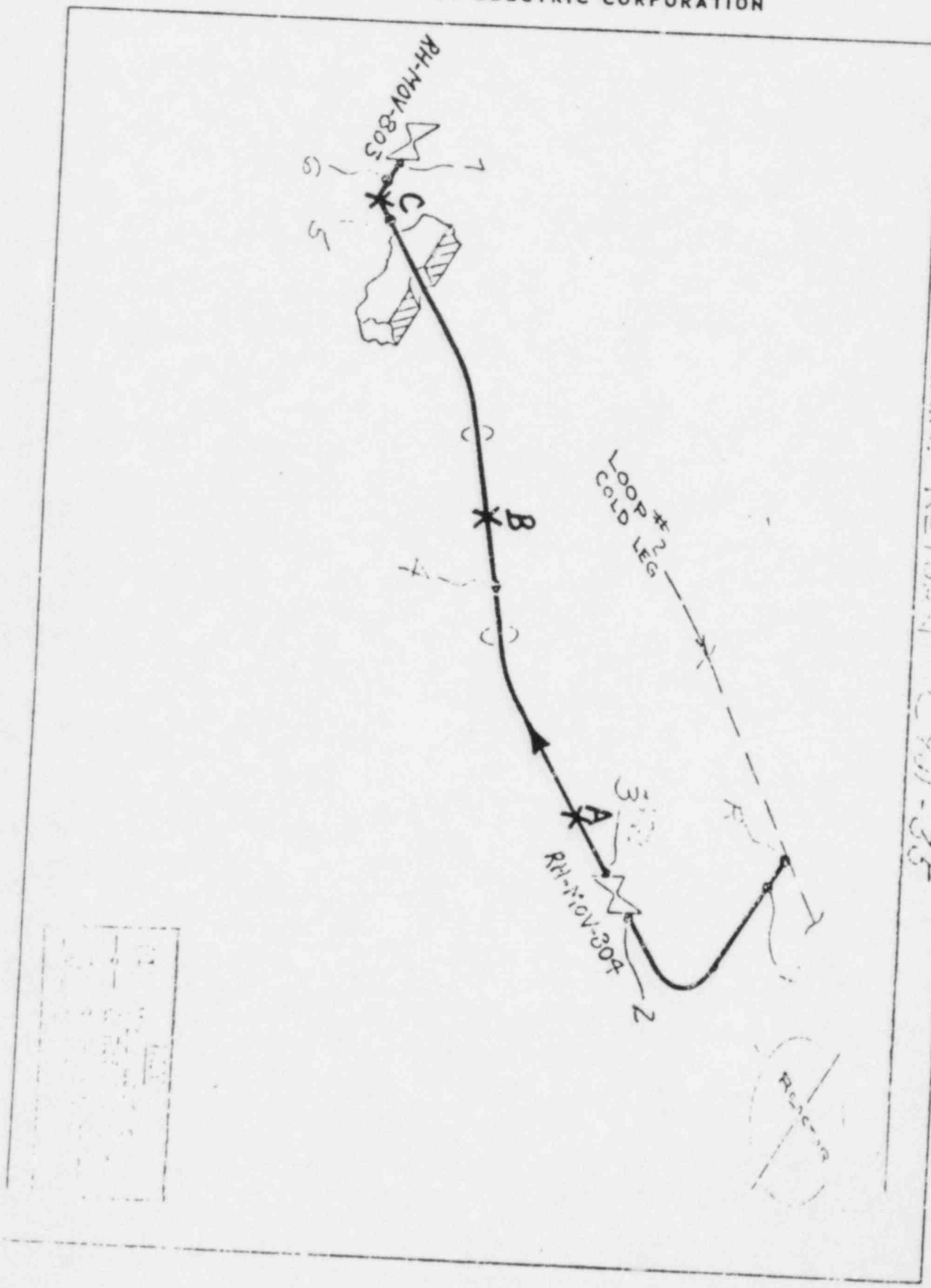
REFERENCE DWGS
10899-FP-3A, 3C
12103-20011 SH 1&3

REVISIONS DURING CONSTRUCTION			

NORTHEAST UTILITIES SERVICE CO
CONNECTICUT YANKEE
RHR TO LOOP 2
10"AC 601R 8, 10"AC-2501R 9

SKETCH SHEET
FORM 2-571

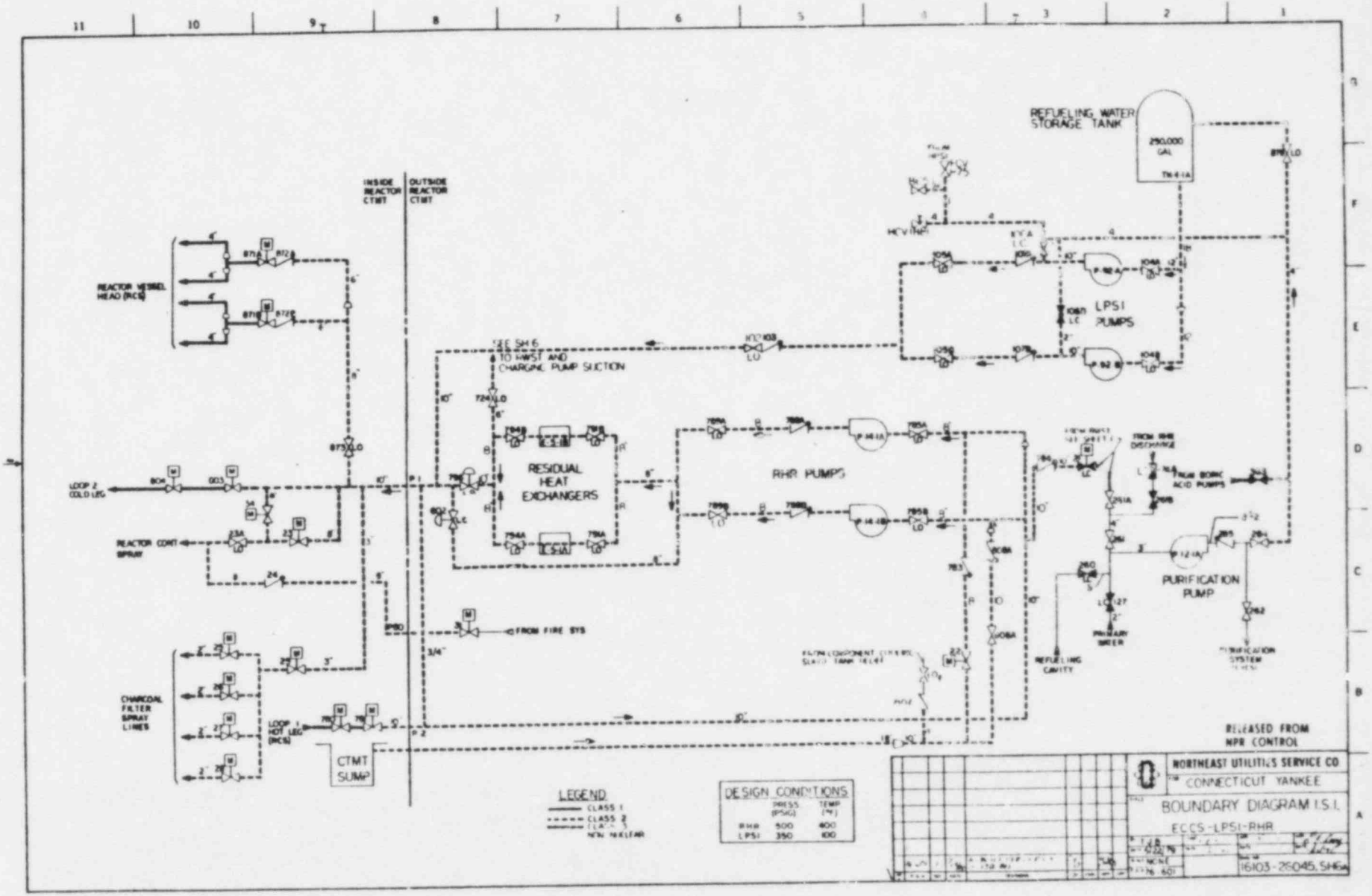
WESTINGHOUSE ELECTRIC CORPORATION



LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE													
SYSTEM	RESIDUAL HEAT REMOVAL													
LINE	10-AC-2501R-9 & 10-AC-601R-8													
DRAWING	M&S-103.4 (CYW-35)													
BREAK PT.	1	2	3	4	5	6	158	159	160	161	162	163	164	
Reactor Coolant* 3-RC-2501R-45 #95	D	↔	D	A	↔									A
Main Steam*	A	↔												A
Feedwater*	A	↔												A
Charging*	A	↔												A
Residual Heat Removal*	A	↔												A
Service Water*	A	↔												A
Safety Injection 8-SI-601R-37	A	↔	A	D	↔									D
tainment Liner	A	↔	A	D	↔									D

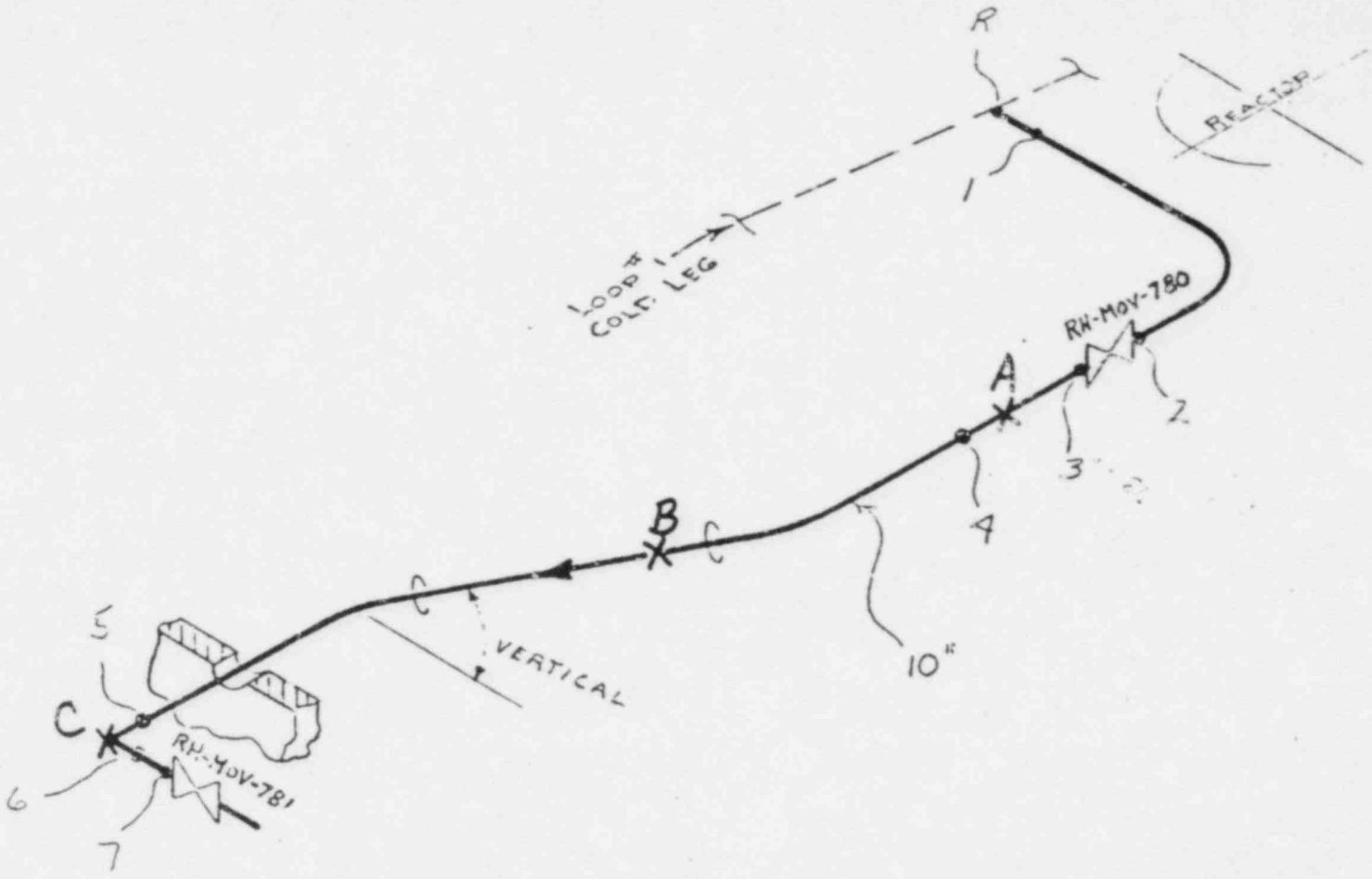
inimum Required Safe Shutdown
—system


REFUELING WATER STORAGE TANK
250,000 GAL
TK-41A
INSIDE REACTOR CTMT
OUTSIDE REACTOR CTMT
REACTOR VESSEL HEAD (RCS)
LPSI PUMPS
P-92A
P-92B
SEE SH 6 TO WHST AND CHARGING PUMP SUCTION
RESIDUAL HEAT EXCHANGERS
RHR PUMPS
P-34A
P-34B
FROM RWST DISCHARGE
RWR BORIC ACID PUMPS
PURIFICATION PUMP
P-12A
REACTOR CONT SPRAY
LOOP 2 COLD LEG
FROM FIRE SYS
CHARCOAL FILTER SPRAY LINES
LOOP 1 HOT LEG (RCS)
CTMT SUMP
REFUELING CAVITY
PRIMARY WATER
PURIFICATION SYSTEM
RELEASED FROM NPR CONTROL
LEGEND
CLASS 1
CLASS 2
CLASS 3
NON NUCLEAR
DESIGN CONDITIONS
PRESS (PSIG)
TEMP (°F)
RHR 500 400
LPSI 350 400
NORTHEAST UTILITIES SERVICE CO
CONNECTICUT YANKEE
BOUNDARY DIAGRAM I.S.I.
ECCS-LPSI-RHR
16103-26045, SH 5

WESTINGHOUSE ELECTRIC CORPORATION

SKETCH SHEET

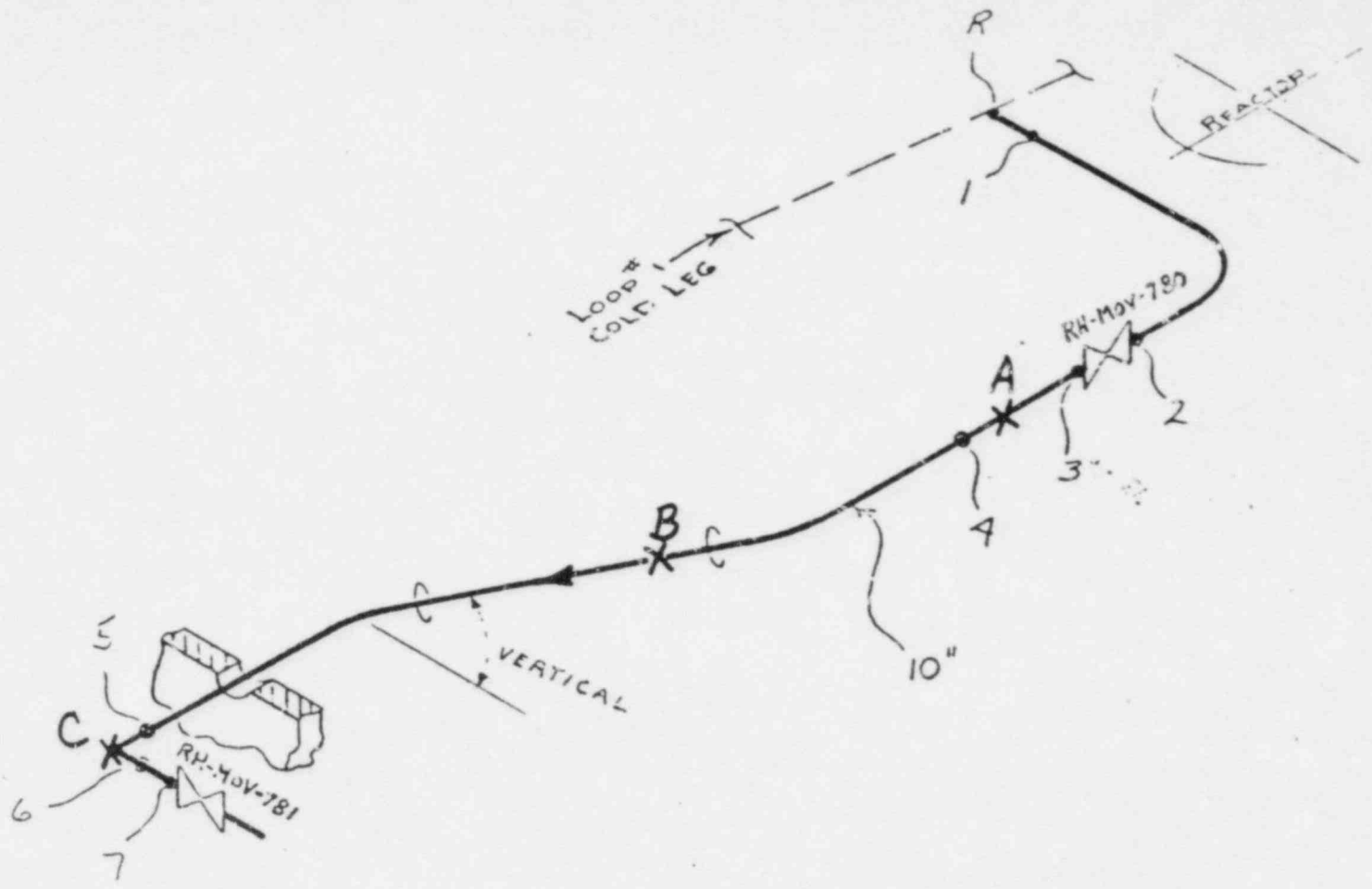
LOOP #1 10" R.H.R. TAKE-OFF CYW-28

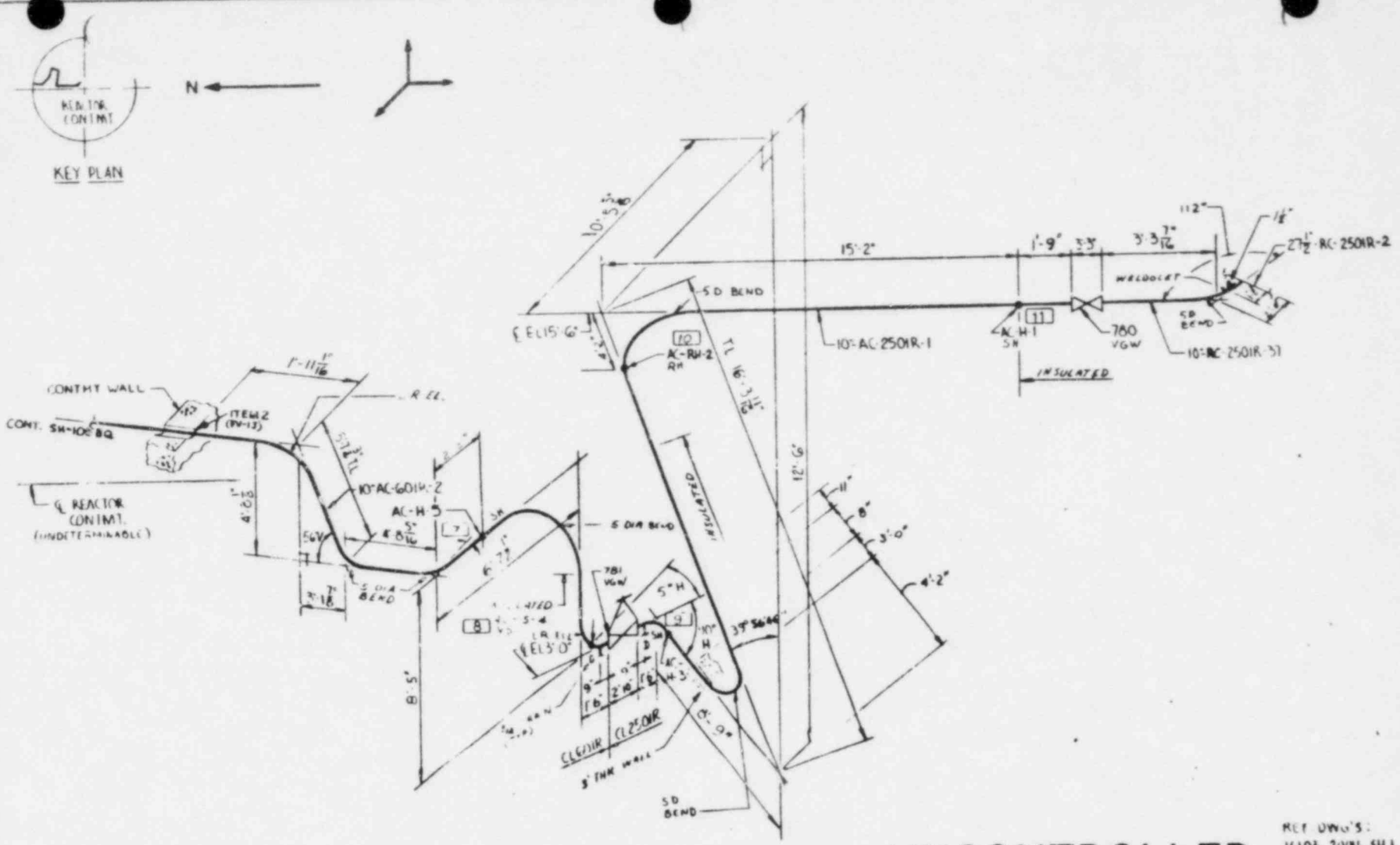


WESTINGHOUSE ELECTRIC CORPORATION

SKETCH SHEET

LOOP #1 10" R.H.R. TAKE-OFF CYW-28





UNCONTROLLED

REF DWG'S:
16103-20011 SH 1
16103-20011-SH3
16103-20011-SH1B

THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED
S&W DWG. NO. 13429.01-MKS-103B

REVISIONS DURING CONSTRUCTION

NORTHEAST UTILITIES SERVICE CO
"CONNECTICUT YANKEE

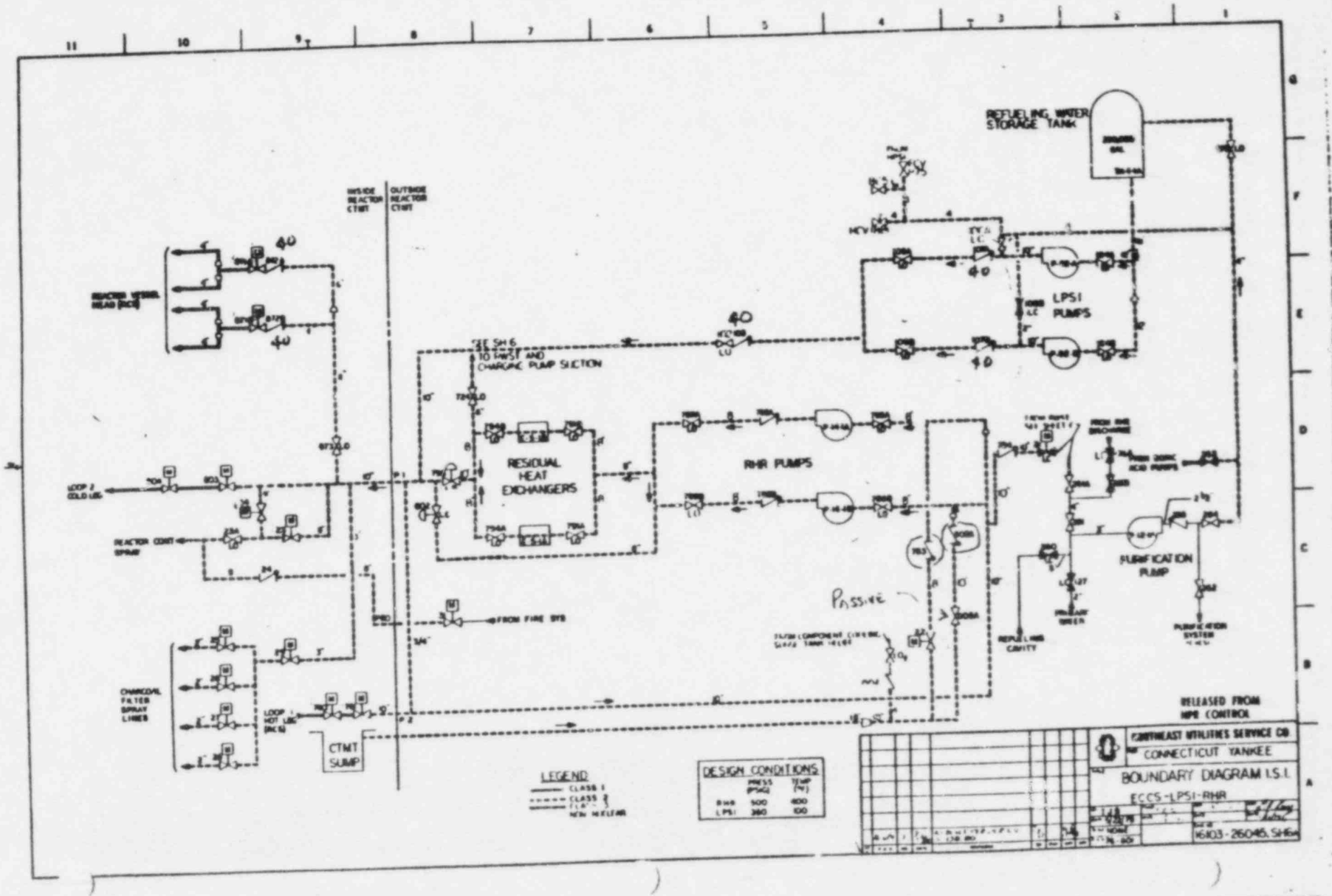
FROM RHR LOOP 1
10"-AC-6014-2 10"-AC-2501R-1

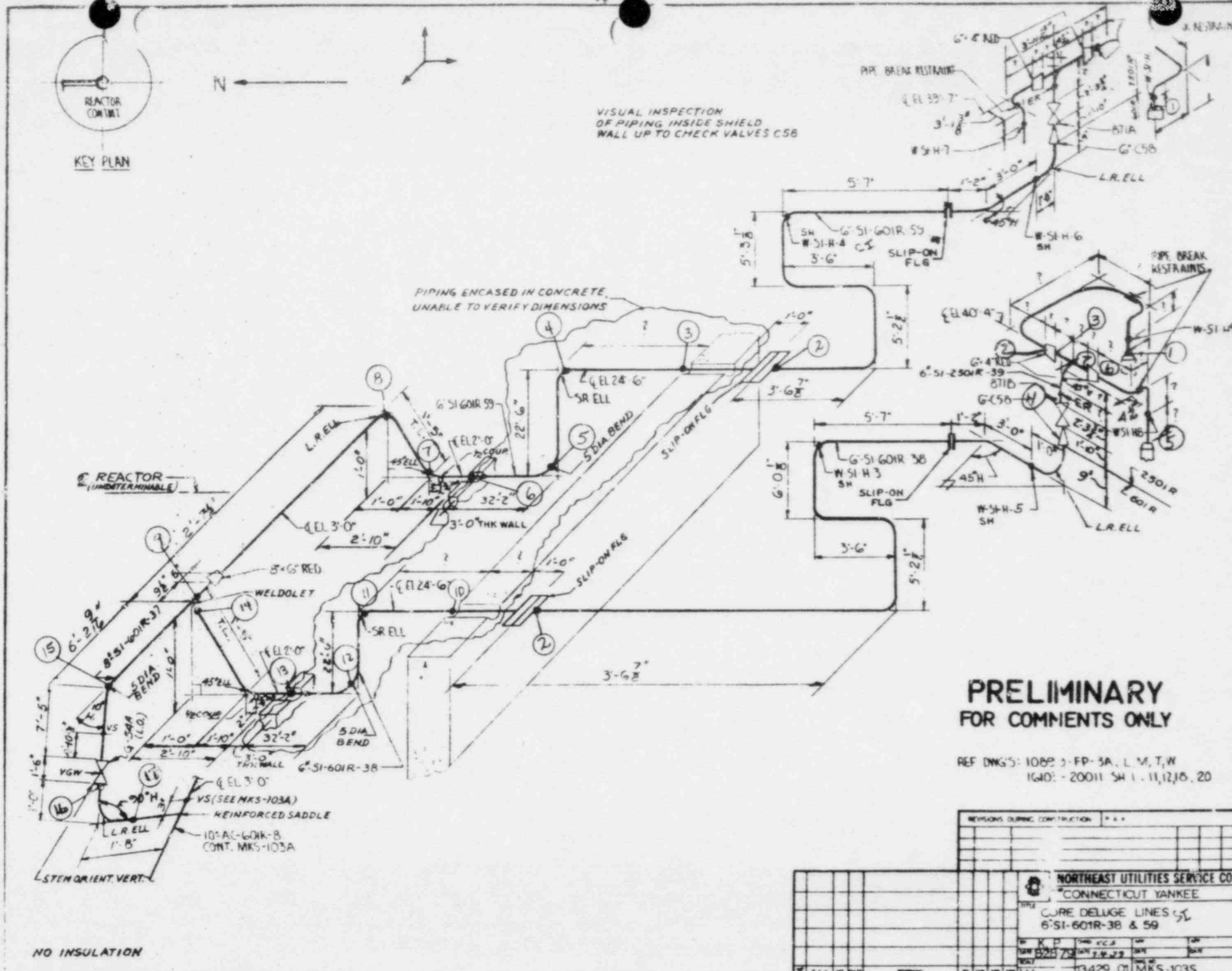
16103 20231-SH-103B

LEGEND
= Damage Possible, Further Evaluation Required
= Acceptable (damage not possible) or No Interaction

TARGET	SOURCE											
SYSTEM	RESIDUAL HEAT REMOVAL											
LINE	10-AC-2501R-1 & 10-AC-601R-2											
DRAWING	MKS-103B (CYL0-2B)											
BREAK PT.	1	2	3	4	5	6	1	2	3	4	5	6
Reactor Coolant*	A	←	→			A						
Main Steam*	A	←	→			A						
Feedwater*	A	←	→			A						
Charging*	A	←	→			A						
Residual Heat Removal*	A	←	→			A						
Service Water*	A	←	→			A						
Safety Injection	A	←	→			A						
Containment Liner	A	→	A	D	←	→	D					

*Minimum Required Safe Shutdown System


REFUELING WATER STORAGE TANK
INSIDE REACTOR CTMT
OUTSIDE REACTOR CTMT
LPSI PUMPS
RHR PUMPS
RESIDUAL HEAT EXCHANGERS
PURIFICATION PUMP
CTMT SUMP
CHARGOIL FILTER SPRAY LINES
REACTOR CONT SPRAY
LOOP 2 COLD LEG
LOOP 1 HOT LEG
FROM FIRE SYS
PASSIVE
REFUELING CAVITY
PURIFICATION SYSTEM
LEGEND
CLASS 1
CLASS 2
NON NUCLEAR
DESIGN CONDITIONS
PRESS (PSIG)
TEMP (°F)
RHR 500 400
LPSI 350 100
RELEASED FROM NPR CONTROL
NORTHEAST UTILITIES SERVICE CO
CONNECTICUT YANKEE
BOUNDARY DIAGRAM I.S.I.
ECCS-LPSI-RHR
16103-26046, SH6


KEY PLAN
REACTOR CONTMT
N
VISUAL INSPECTION OF PIPING INSIDE SHIELD WALL UP TO CHECK VALVES C58
PIPING ENCASED IN CONCRETE, UNABLE TO VERIFY DIMENSIONS
PIPE BREAK RESTRAINT
PIPE BREAK RESTRAINTS
6"-8" RED
8"-6" RED
WELDOLET
SLIP-ON FLG
5 DIA BEND
SR ELL
L.R. ELL
6"-SI-601R-59
6"-SI-601R-38
8"-SI-601R-37
6"-SI-2501R-39
3'-0" THK WALL
℄ REACTOR (UNDETERMINABLE)
STEM ORIENT. VERT.
KEINFORCED SADDLE
10"-AC-601R-8 CONT. MKS-103A
VS (SEE MKS-103A)
NO INSULATION
PRELIMINARY
FOR COMMENTS ONLY
REF DWG'S: 1088 5-FP-3A, L, M, T, W
16103-20011 SH 1, 11, 12, 18, 20
NORTHEAST UTILITIES SERVICE CO.
CONNECTICUT YANKEE
CORE DELUGE LINES
6"SI-601R-38 & 59
13429.01
MKS-103S

LEGEND

D = Damage Possible; Further Evaluation Required

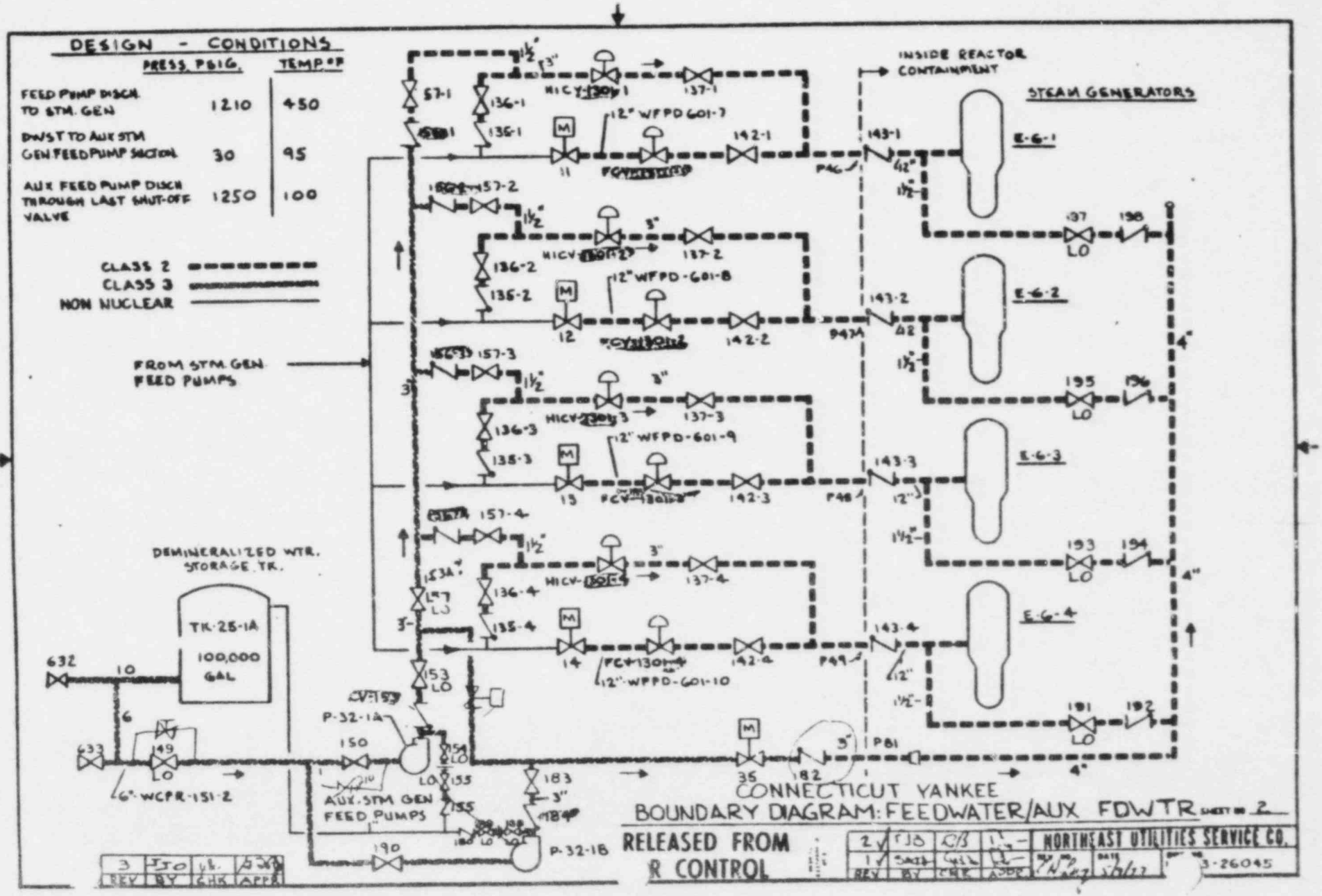
A = Acceptable (Damage Not Possible) or No Interaction

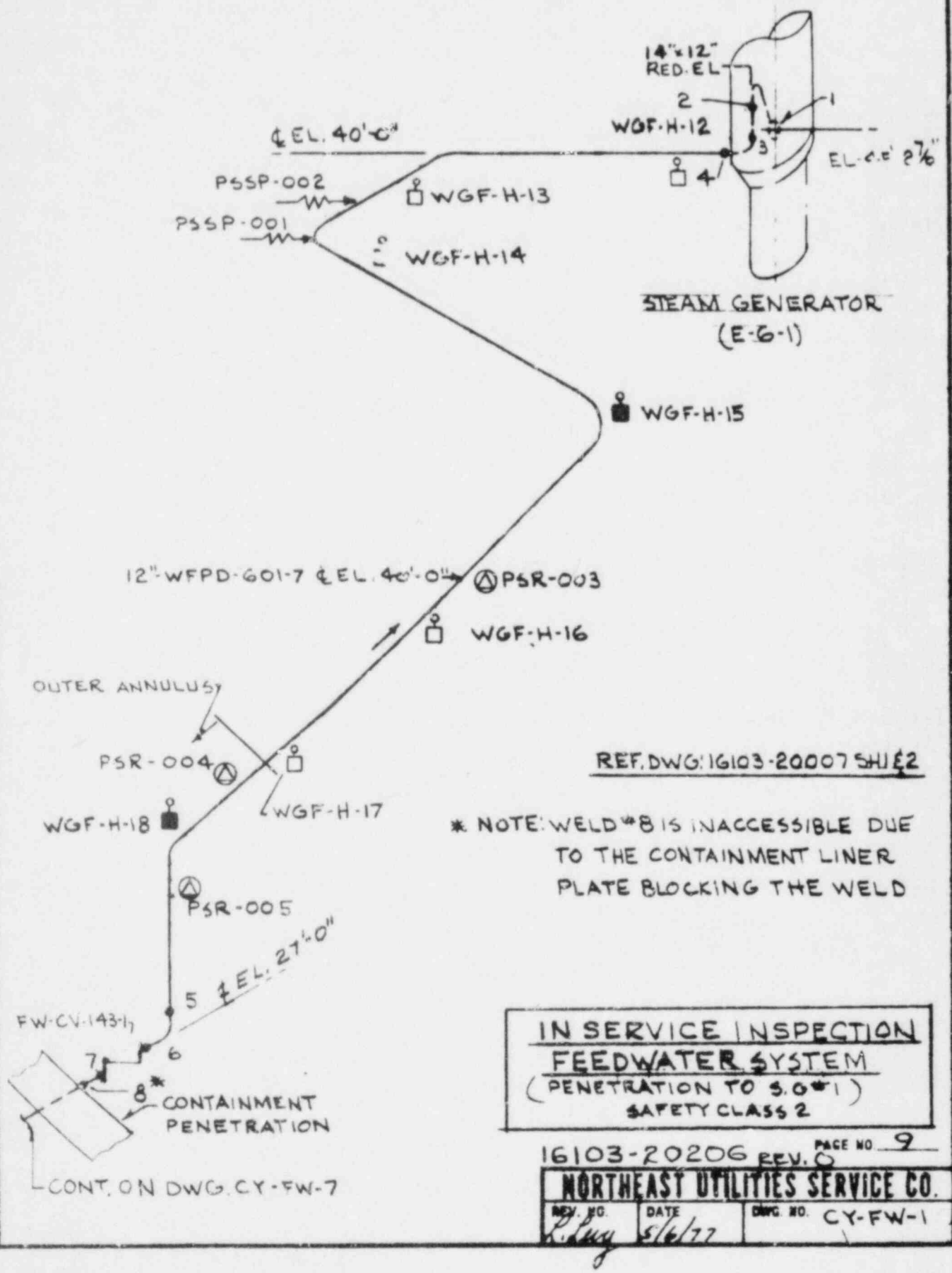
SOURCE

SYSTEM	Core Deluge
LINE	6-SI-601R-38 & 59
DRAWING	MKS-1035
TARGET / BREAK PT.	1 2 3 4 5 6 7

TARGET	1 2 3 4 5 6 7
Reactor Coolant*	A ← → A
Main Steam*	A ← → A
Feedwater*	A ← → A
Charging*	A ← → A
Residual Heat Removal*	A ← → A
Service Water*	A ← → A
Safety Injection	A ← → A
Containment Liner	A ← → A

Minimum Required Safe Shutdown System


DESIGN - CONDITIONS
PRESS. PSIG. | TEMP. °F
FEED PUMP DISCH TO STM. GEN | 1210 | 450
DWST TO AUX STM GEN FEED PUMP SUCTION | 30 | 95
AUX FEED PUMP DISCH THROUGH LAST SHUT-OFF VALVE | 1250 | 100
CLASS 2
CLASS 3
NON NUCLEAR
FROM STM. GEN FEED PUMPS
INSIDE REACTOR CONTAINMENT
STEAM GENERATORS
E-6-1
E-6-2
E-6-3
E-6-4
12" WFPD 601-7
12" WFPD-601-8
12" WFPD-601-9
12" WFPD-601-10
DEMINERALIZED WTR. STORAGE TK.
TK-25-1A
100,000 GAL
P-32-1A
P-32-1B
AUX. STM GEN FEED PUMPS
6" WCPR-151-2
CONNECTICUT YANKEE
BOUNDARY DIAGRAM: FEEDWATER/AUX FDWTR
RELEASED FROM R CONTROL
NORTHEAST UTILITIES SERVICE CO.



REF. DWG: 16103-20007 SHEET 2

* NOTE: WELD #8 IS INACCESSIBLE DUE TO THE CONTAINMENT LINER PLATE BLOCKING THE WELD

IN SERVICE INSPECTION
FEEDWATER SYSTEM
(PENETRATION TO S.O #1)
SAFETY CLASS 2

16103-20206 REV. 0 PAGE NO. 9

NORTHEAST UTILITIES SERVICE CO.

REV. NO.	DATE	DWG. NO.
0	5/6/77	CY-FW-1

LEGEND

D = Damage Possible; Further Evaluation Required

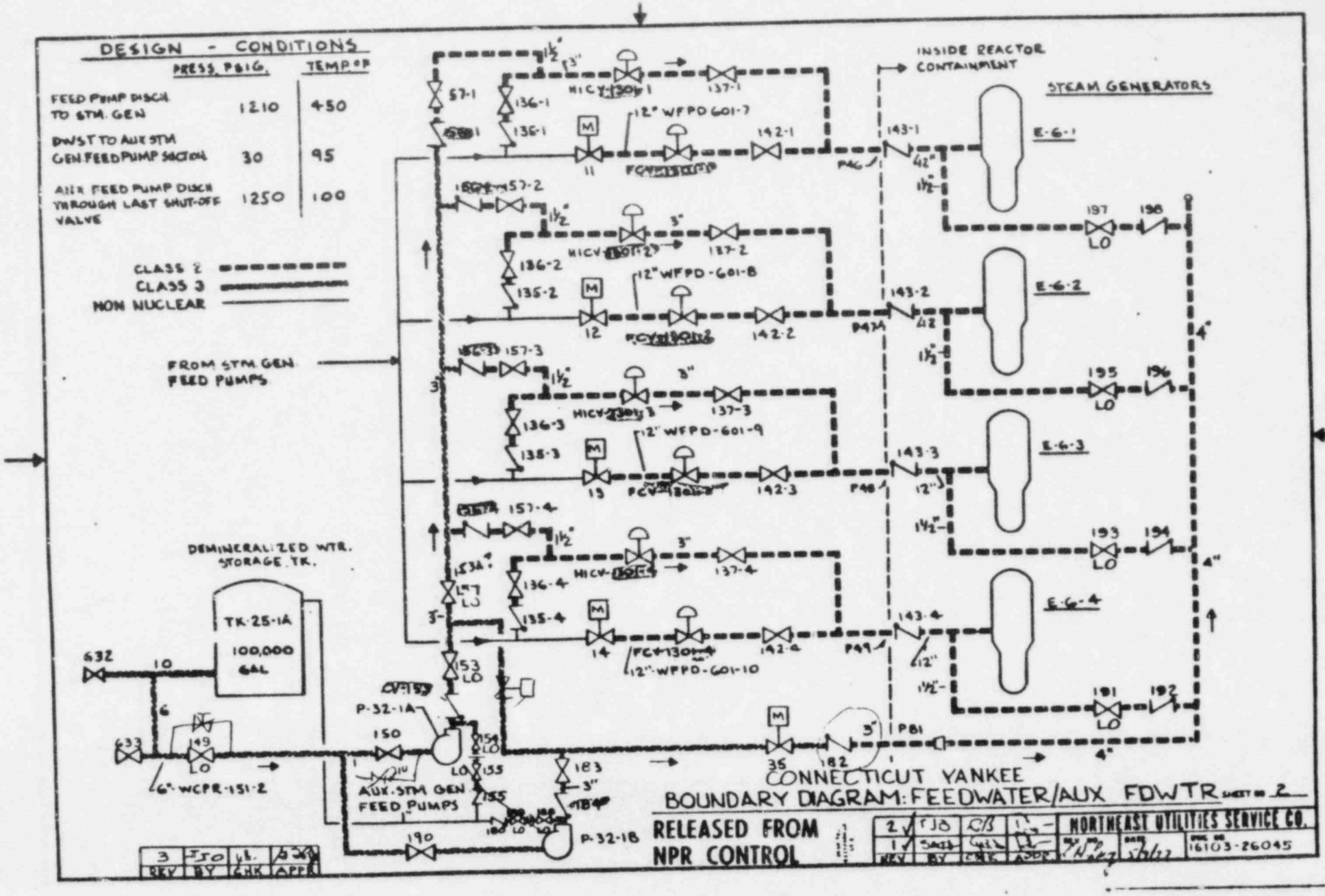
A = Acceptable (Damage Not Possible) or No Interaction

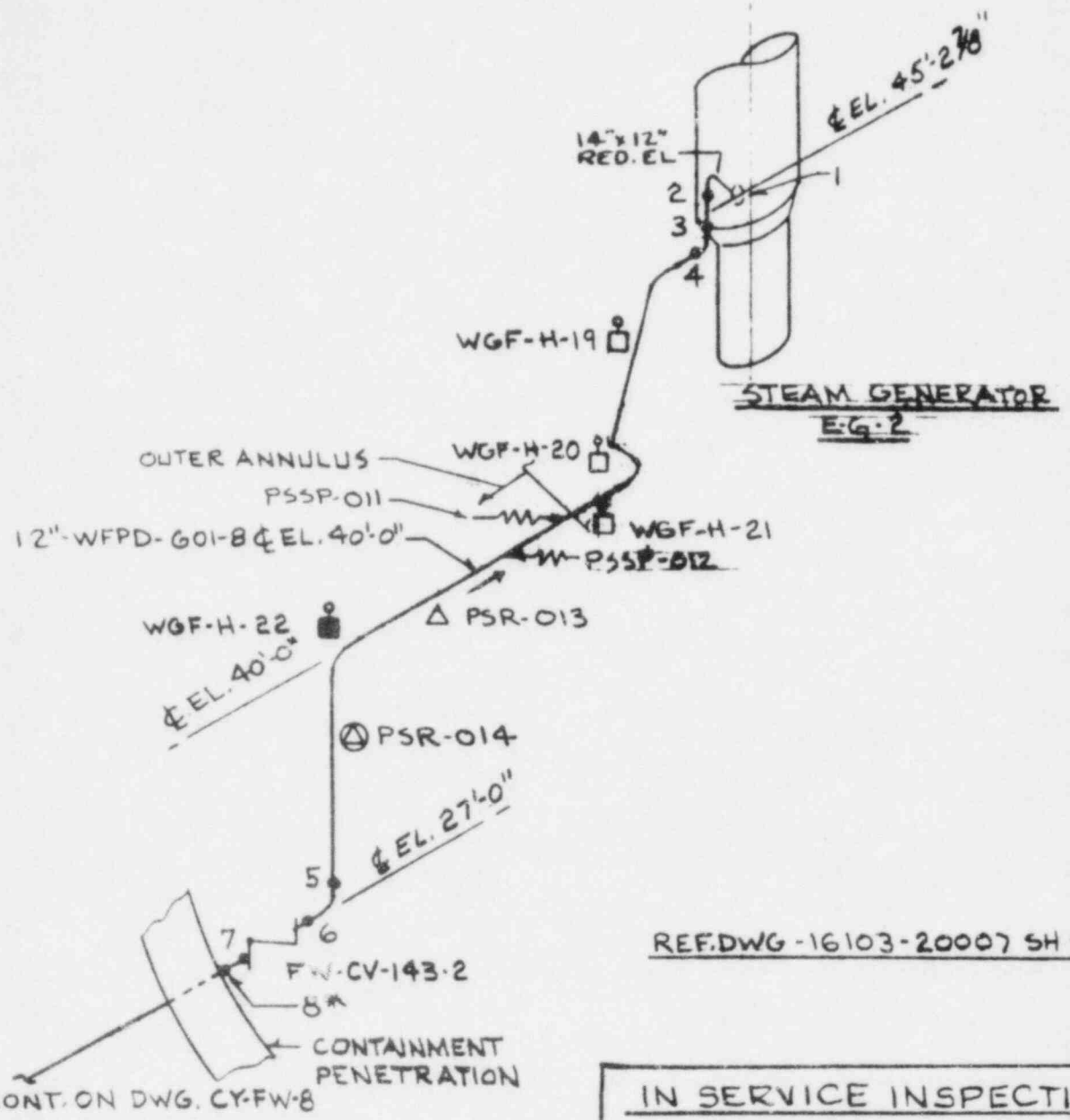
● Minimum Required Safe Shutdown System

SOURCE

SYSTEM	Steam Generator Feedwater (#1)
LINE	WFPD-601-7
DRAWING	MKS-102Q (C4-FW-1)
BREAK PT.	1 2 3 4 5 6 7 8

TARGET		
Reactor Coolant*	RCP #2 Motor	D ◄——► D
	RCP #1, #3 & #4	A ◄——► A
Main Steam*		A ◄——► A
Feedwater*		A ◄——► A
Charging*		A ◄——► A
● Residual Heat Removal*		A ◄——► A
Service Water*		A ◄——► A
Safety Injection		A ◄——► A
Containment Liner		A ◄——► A


DESIGN - CONDITIONS
PRESS. P.S.I.G.
TEMP. °F
FEED PUMP DISCH TO STM. GEN
1210
450
DWST TO AUX STM GEN FEED PUMP SUCTION
30
95
AUX FEED PUMP DISCH THROUGH LAST SHUT-OFF VALVE
1250
100
CLASS 2
CLASS 3
NON NUCLEAR
FROM STM GEN FEED PUMPS
DEMINERALIZED WTR. STORAGE TK.
TK-25-1A
100,000 GAL
INSIDE REACTOR CONTAINMENT
STEAM GENERATORS
E-6-1
E-6-2
E-6-3
E-6-4
12" WFPD 601-7
12" WFPD-601-8
12" WFPD-601-9
12" WFPD-601-10
AUX. STM GEN FEED PUMPS
P-32-1A
P-32-1B
6" WCPR-151-2
CONNECTICUT YANKEE
BOUNDARY DIAGRAM: FEEDWATER/AUX FDWTR
RELEASED FROM NPR CONTROL
NORTHEAST UTILITIES SERVICE CO.
16103-26045



REF. DWG - 16103-20007 SH 1 & 2

* NOTE; WELD #8 IS INACCESSIBLE DUE TO THE CONTAINMENT LINER PLATE BLOCKING THE WELD.

IN SERVICE INSPECTION

FEEDWATER SYSTEM

(PENETRATION TO S.G. #2)

SAFETY CLASS #2

16103-20206 REV. 0

PAGE NO. 10

NORTHEAST UTILITIES SERVICE CO.

REV. NO.	DATE	DWG. NO.
2	5/6/77	CY-FW-2

LEGEND

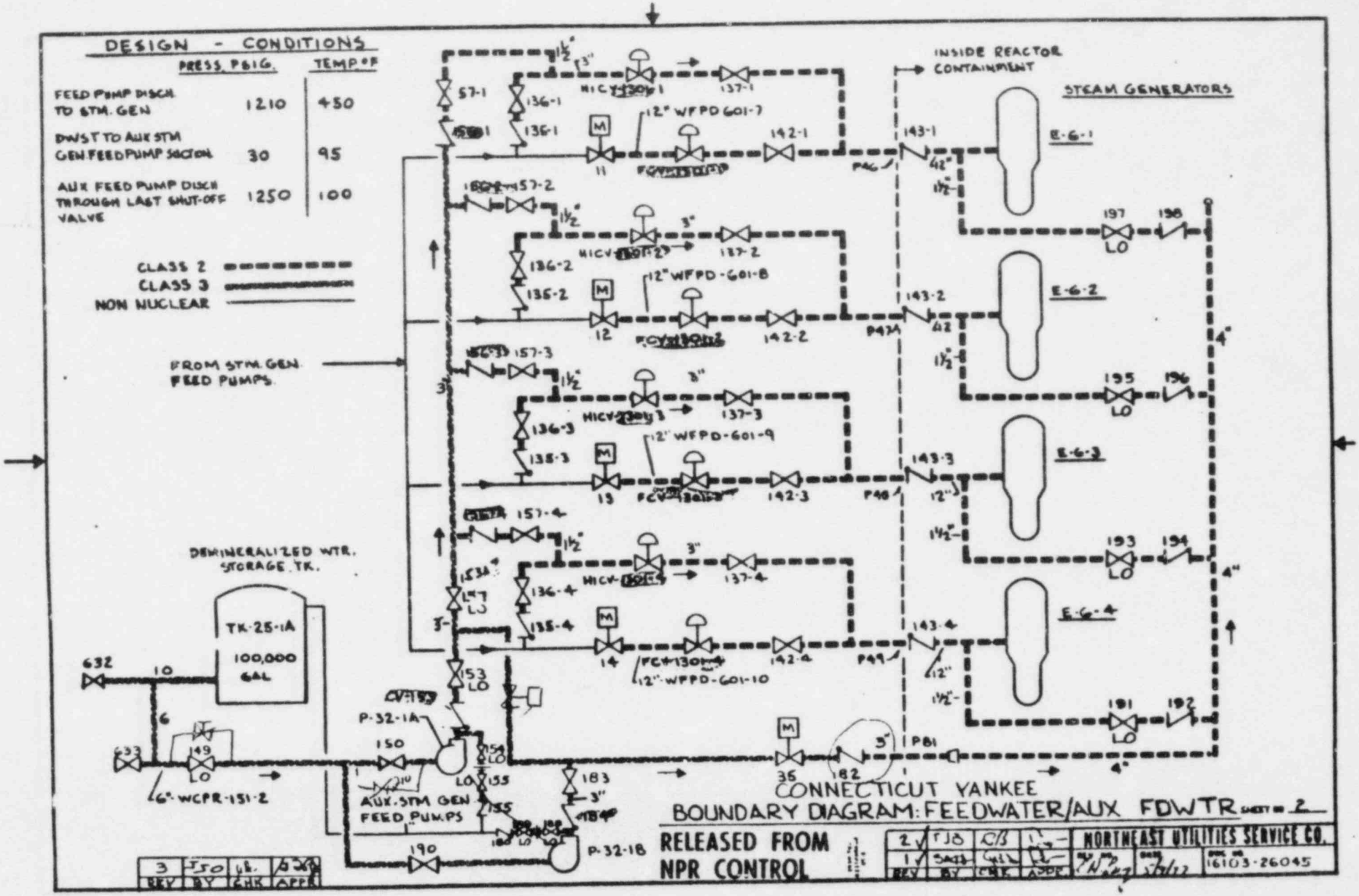
D = Damage Possible; Further Evaluation Required

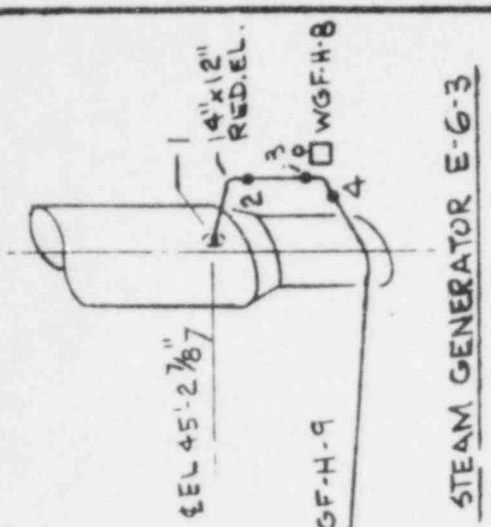
A = Acceptable (Damage Not Possible) or No Interaction

● No Interaction

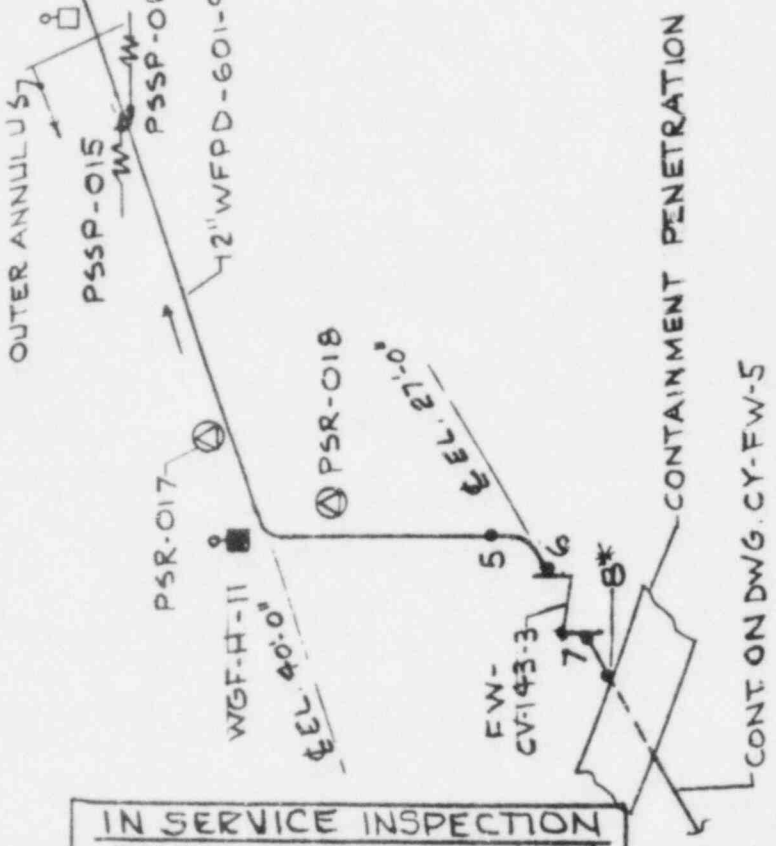
	SOURCE
SYSTEM	Steam Generator Feedwater (#2)
LINE	WFPD-601-8
DRAWING	MKS-102R (CY-FW-2)
TARGET / BREAK PT.	1 2 3 4 5 6 7 8
Reactor Coolant* (RCP #2 Motor; RCP #1, #3 & #4)	D ◄——————————► D A ◄——————————► A
Main Steam*	A ◄——————————► A
Feedwater*	A ◄——————————► A
Charging*	A ◄——————————► A
● Residual Heat Removal*	A ◄——————————► A
Service Water*	A ◄——————————► A
Safety Injection	A ◄——————————► A
Containment Liner	A ◄——► A D ◄——► D

● Minimum Required Safe Shutdown System


DESIGN - CONDITIONS
PRESS. P.S.I.G.
TEMP °F
FEED PUMP DISCH. TO STM. GEN. 1210 450
DWST TO AUX STM GEN FEED PUMP SUCTION 30 95
AUX FEED PUMP DISCH THROUGH LAST SHUT-OFF VALVE 1250 100
CLASS 2
CLASS 3
NON NUCLEAR
FROM STM. GEN. FEED PUMPS
DEMINERALIZED WTR. STORAGE TK.
TK-25-1A
100,000 GAL
INSIDE REACTOR CONTAINMENT
STEAM GENERATORS
E-6-1
E-6-2
E-6-3
E-6-4
12" WFPD-601-7
12" WFPD-601-8
12" WFPD-601-9
12" WFPD-601-10
6" WCPR-151-2
AUX. STM GEN FEED PUMPS
P-32-1A
P-32-1B
CONNECTICUT YANKEE
BOUNDARY DIAGRAM: FEEDWATER/AUX FDWTR
RELEASED FROM NPR CONTROL
NORTHEAST UTILITIES SERVICE CO.
16103-26045



*NOTE: WELD #8 IS INACCESSIBLE DUE TO THE CONTAINMENT LINER PLATE BLOCKING THE WELD.



IN SERVICE INSPECTION
FEEDWATER SYSTEM
(PENETRATION TO S.G. #3)
SAFETY CLASS 2

REF. DWGS.-16103-20007 SH 1&2

PAGE NO. 12

6103-20206 REV. 0

NORTHEAST UTILITIES SERVICE CO.

REV. NO.	DATE	DWG. NO.
	5/16/77	CY-FW-4

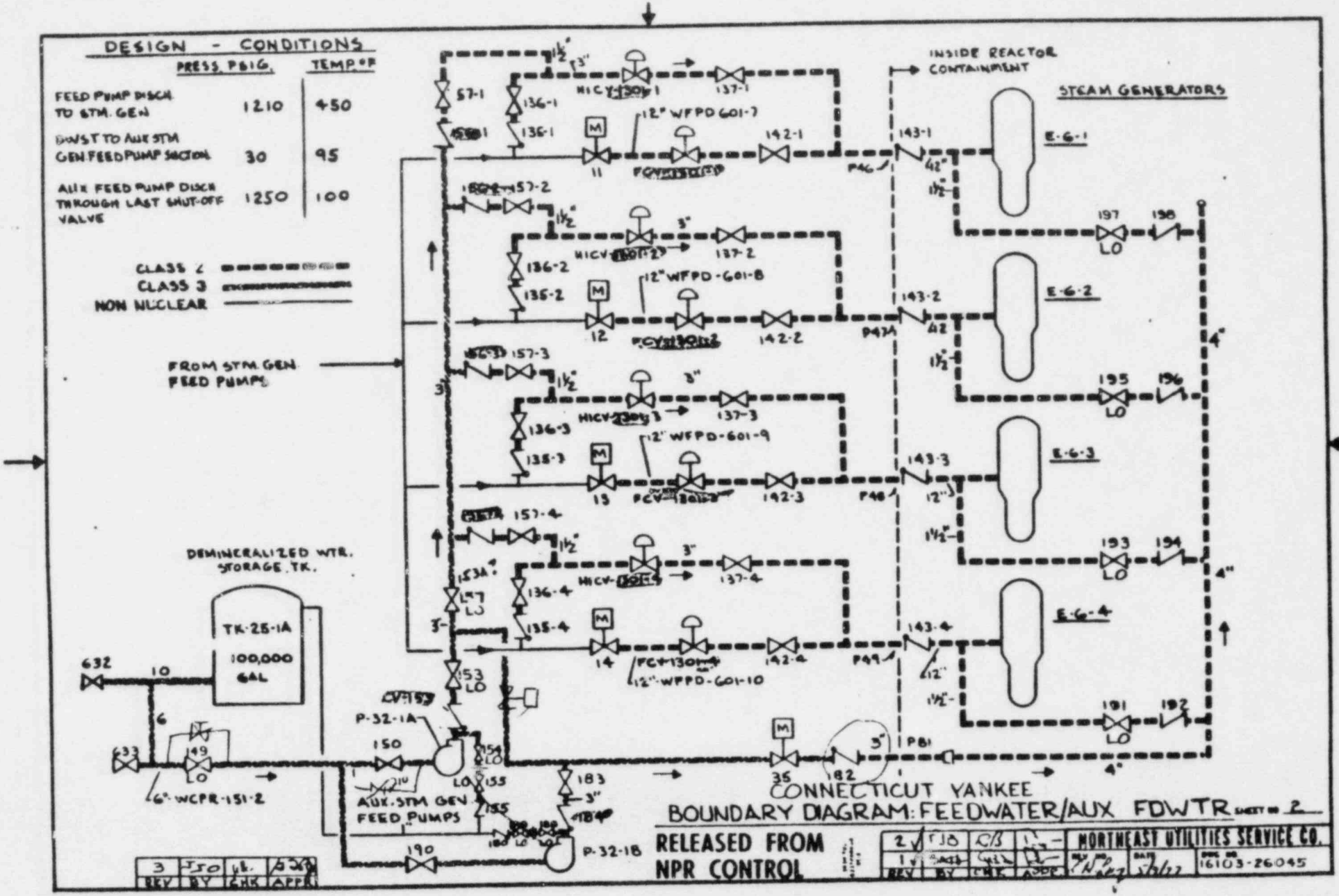
LEGEND

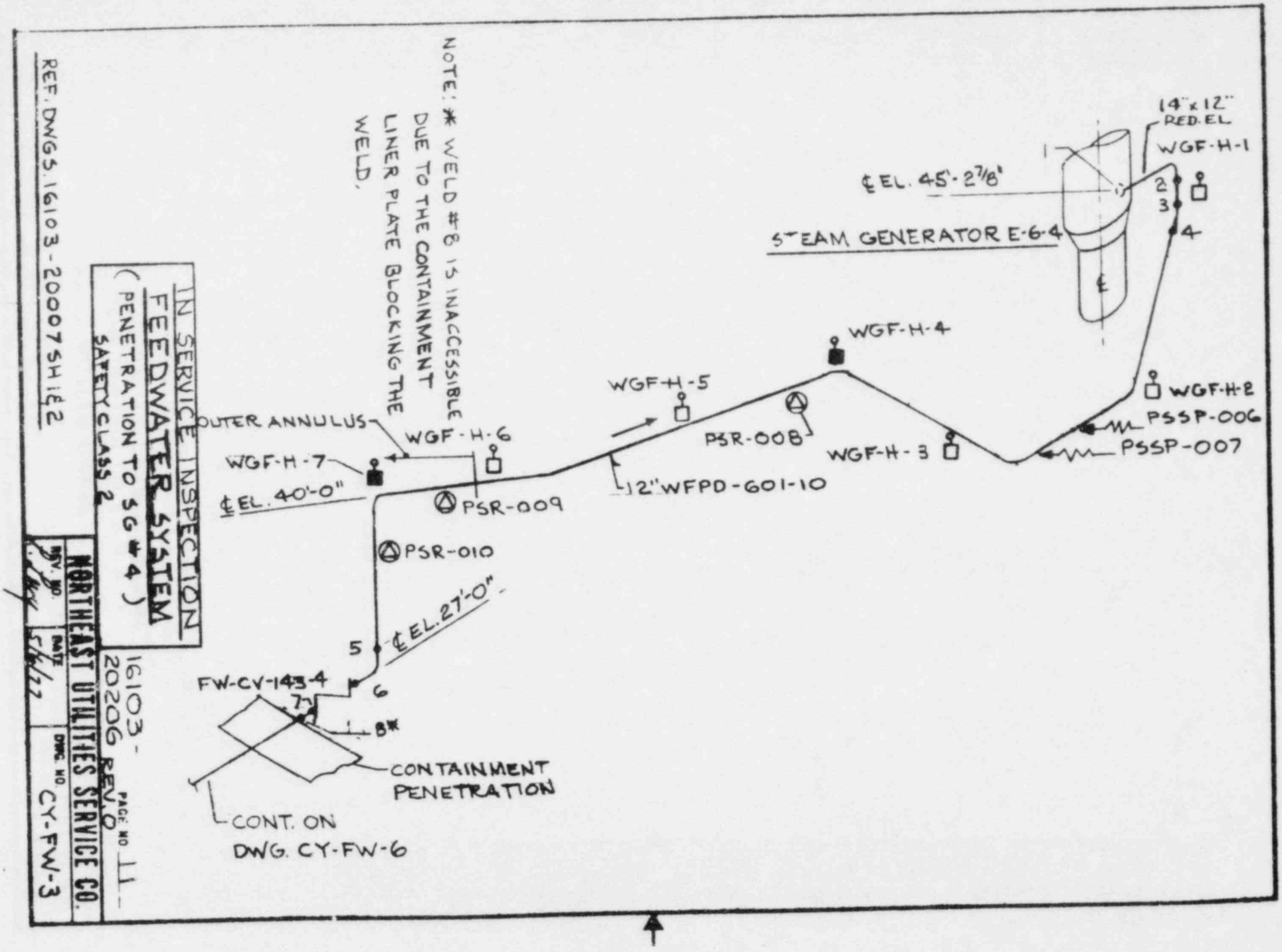
D = Damage Possible; Further Evaluation Required

A = Acceptable (Damage Not Possible) or No Interaction

TARGET	SOURCE	
	SYSTEM	Steam Generator Feedwater (#3)
	LINE	WFPD - 601-9
	DRAWING	MKS - 102N (CY-FW-4)
	BREAK PT.	1 2 3 4 5 6 7 8
Reactor Coolant* RCP#3 Motor RCP#1, #2 & #4		D ◄——► D A ◄——► A
Main Steam*		A ◄——► A
Feedwater*		A ◄——► A
Charging*		A ◄——► A
Residual Heat Removal*		A ◄——► A
Service Water*		A ◄——► A
Safety Injection		A ◄——► A
Containment Liner		A ◄——► A

● Minimum Required Safe Shutdown System


DESIGN - CONDITIONS
PRESS. PSIG.
TEMP. °F
FEED PUMP DISCH TO STM. GEN
1210
450
DIVST TO AUX STM GEN FEED PUMP SUCTION
30
95
AUX FEED PUMP DISCH THROUGH LAST SHUT-OFF VALVE
1250
100
CLASS 2
CLASS 3
NON NUCLEAR
FROM STM. GEN FEED PUMPS
INSIDE REACTOR CONTAINMENT
STEAM GENERATORS
E-6-1
E-6-2
E-6-3
E-6-4
12" WFPD 601-7
12" WFPD-601-8
12" WFPD-601-9
12" WFPD-601-10
DEMINERALIZED WTR. STORAGE TK.
TK-25-1A
100,000 GAL
P-32-1A
P-32-1B
AUX. STM GEN FEED PUMPS
6" WCPR-151-2
CONNECTICUT YANKEE
BOUNDARY DIAGRAM: FEEDWATER/AUX FDWTR
RELEASED FROM NPR CONTROL
NORTHEAST UTILITIES SERVICE CO.
DWG. NO. 16103-26045


NOTE: * WELD #8 IS INACCESSIBLE DUE TO THE CONTAINMENT LINER PLATE BLOCKING THE WELD.
14" x 12" RED. EL
WGF-H-1
℄ EL. 45'-2 7/8"
STEAM GENERATOR E-6-4
WGF-H-4
WGF-H-5
WGF-H-2
PSSP-006
PSSP-007
PSR-008
WGF-H-3
12" WFPD-601-10
OUTER ANNULUS
WGF-H-6
WGF-H-7
℄ EL. 40'-0"
PSR-009
PSR-010
℄ EL. 27'-0"
FW-CV-143-4
CONTAINMENT PENETRATION
CONT. ON DWG. CY-FW-6
IN SERVICE INSPECTION
FEEDWATER SYSTEM
(PENETRATION TO SG # 4)
SAFETY CLASS 2
REF. DWGS. 16103-20007 SH 1 & 2
NORTHEAST UTILITIES SERVICE CO.
DWG NO CY-FW-3
PAGE NO 11
REV. NO
DATE
16103-20206 REV. 0

LEGEND

D = Damage Possible; Further Evaluation Required

A = Acceptable (Damage Not Possible) or No Interaction

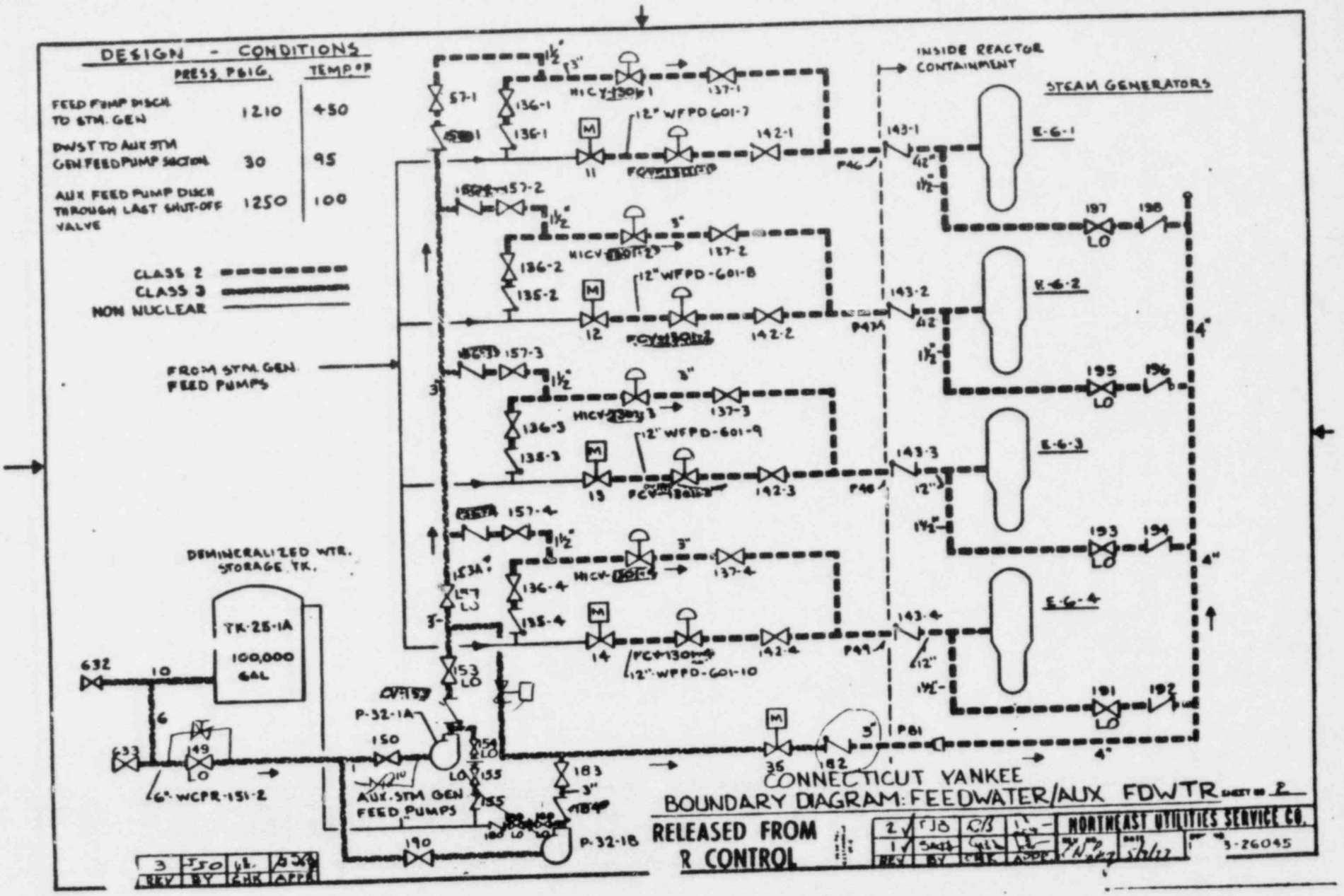
● No Interaction

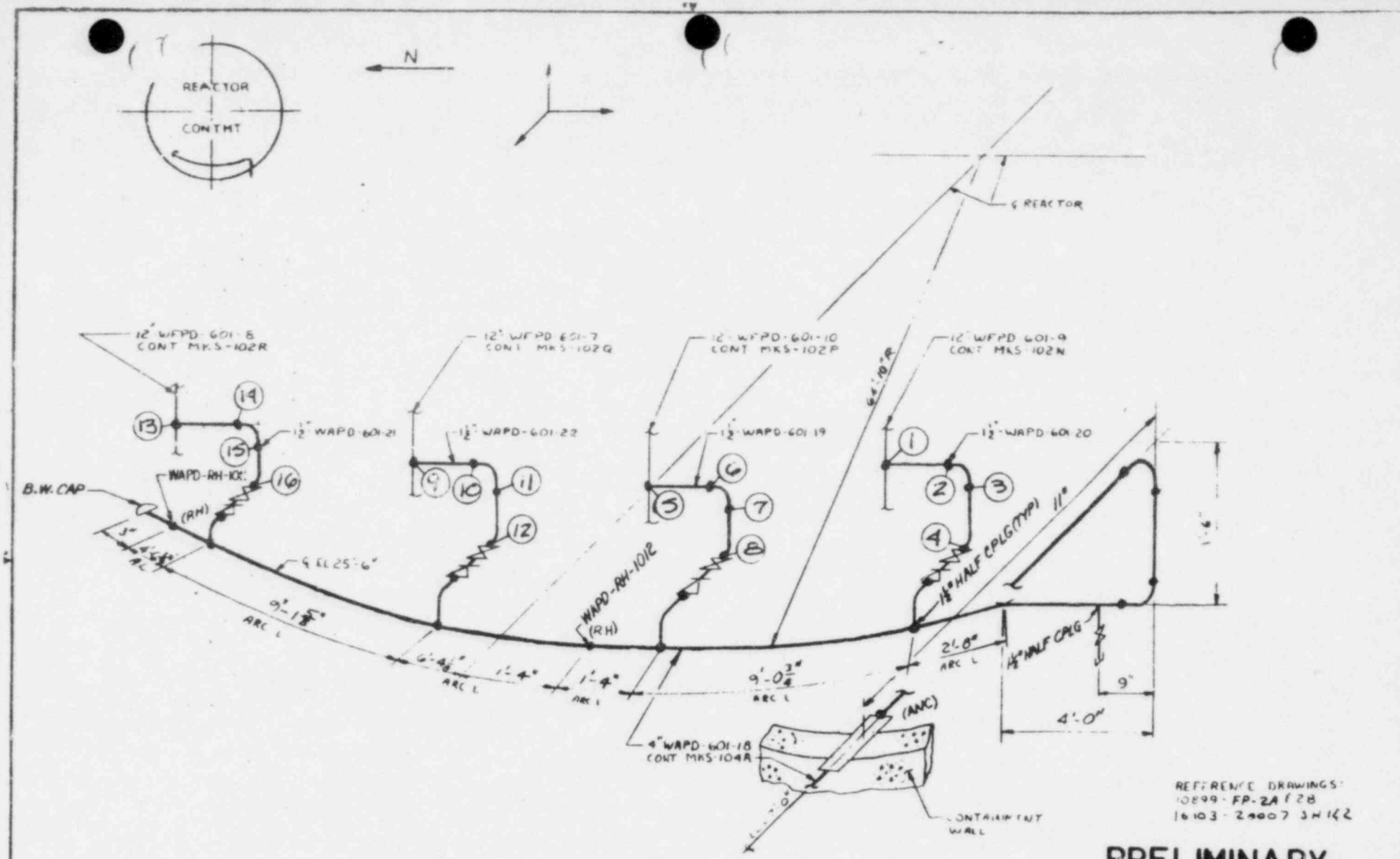
SOURCE

SYSTEM	Steam generator Feedwater (#4)
LINE	WFPD-601-10
DRAWING	MKS-102P (C4-FW-3)
TARGET / BREAK PT.	1 2 3 4 5 6 7 8

TARGET	BREAK PT. 1 2 3 4 5 6 7 8
Reactor Coolant* (RCP #3 Motor; RCP #1, #2 & #4)	D ◄——► D A ◄——► A
Main Steam*	A ◄——► A
Feedwater*	A ◄——► A
Charging*	A ◄——► A
● Residual Heat Removal*	A ◄——► A
Service Water*	A ◄——► A
Safety Injection	A ◄——► A
Containment Liner	A ◄——► A

● Minimum Required Safe Shutdown System


DESIGN - CONDITIONS
PRESS. PSIG.
TEMP °F
FEED PUMP DISCH. TO STM. GEN
1210
450
DNST TO AUX STM GEN FEED PUMP SECTION
30
95
AUX FEED PUMP DISCH THROUGH LAST SHUT-OFF VALVE
1250
100
CLASS 2
CLASS 3
NON NUCLEAR
FROM STM. GEN. FEED PUMPS
DEMINERALIZED WTR. STORAGE TK.
TK-25-1A
100,000 GAL
INSIDE REACTOR CONTAINMENT
STEAM GENERATORS
E-6-1
E-6-2
E-6-3
E-6-4
12" WFPD-601-7
12" WFPD-601-8
12" WFPD-601-9
12" WFPD-601-10
6" WCPR-151-2
AUX. STM GEN FEED PUMPS
P-32-1A
P-32-1B
CONNECTICUT YANKEE
BOUNDARY DIAGRAM: FEEDWATER/AUX FDWTR
RELEASED FROM R CONTROL
NORTHEAST UTILITIES SERVICE CO.



REFERENCE DRAWINGS:
10899-FP-2A F 28
16103-24007 SH 162

PRELIMINARY
FOR COMMENTS ONLY

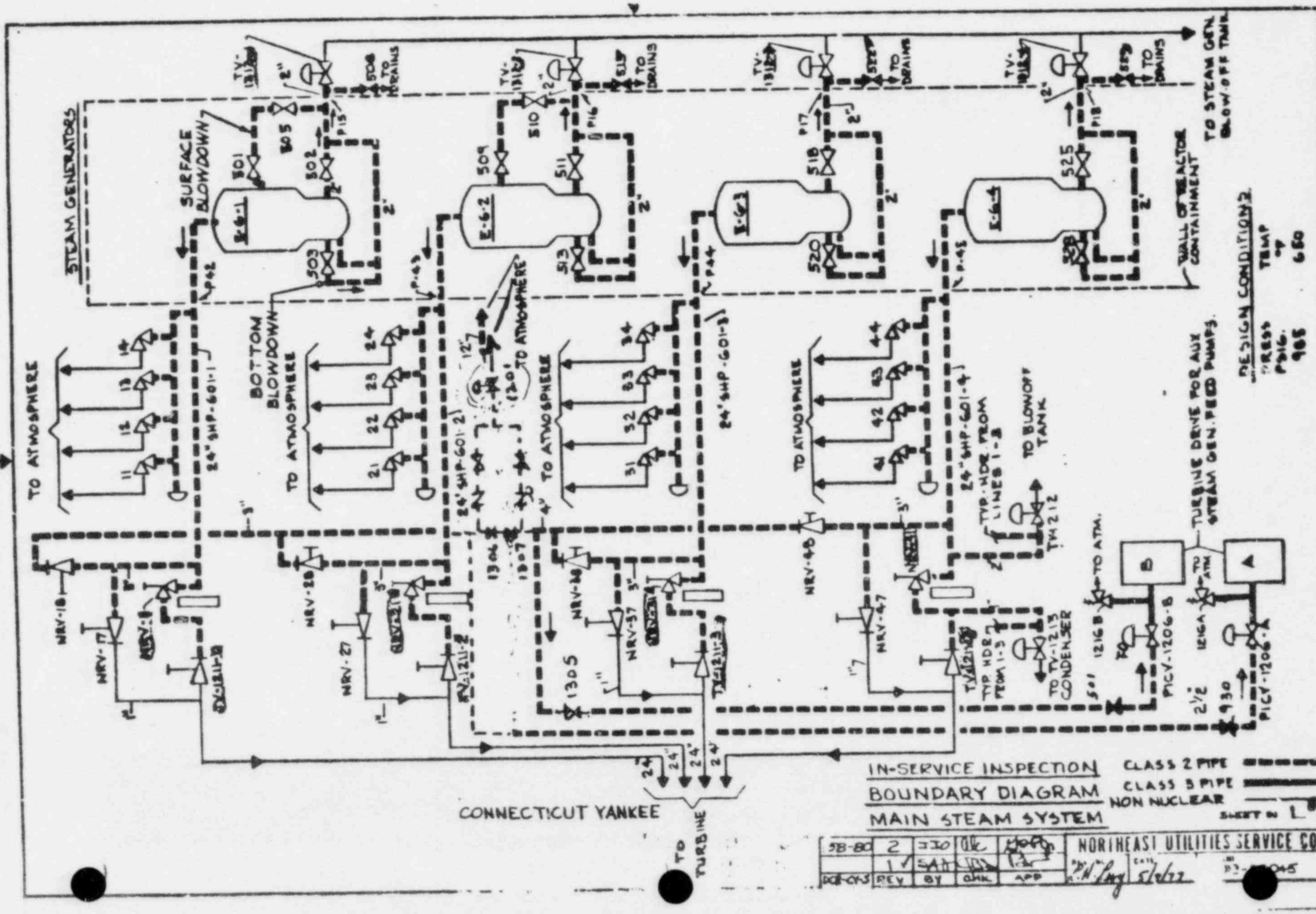
NO INSUL.

REVISIONS DURING CONSTRUCTION	
NORTHEAST UTILITIES SERVICE CO	
FOR CONNECTICUT YANKEE	
AUX FEEDWATER INSIDE CONTAINMENT	
DRAWN TEP 8 2 79	CHKD KCS 8 22 79
SCALE	1342907
	MKS-102S

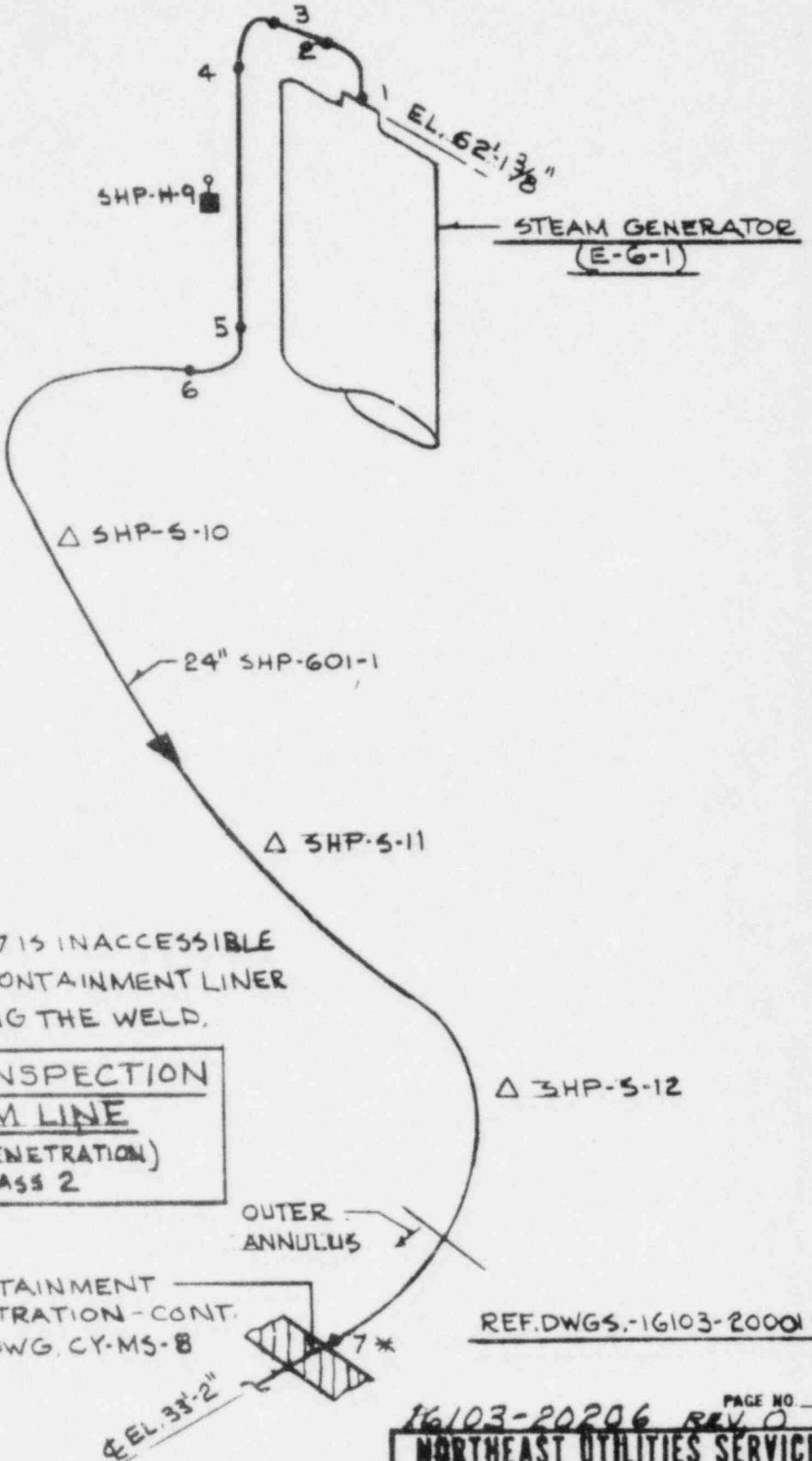
LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE															
	SYSTEM	AUXILIARY FEEDWATER														
	LINE	WAPD-601-19&20&21&22														
	DRAWING	MKS-102S														
	BREAK PT.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Reactor Coolant*		A	←													→	A
Main Steam*		A	←													→	A
Feedwater*		A	←													→	A
Charging*		A	←													→	A
Residual Heat Removal*		A	←													→	A
Service Water*		A	←													→	A
Safety Injection		A	←													→	A
ntainment Liner		A	←													→	A

inimum Required Safe Shutdown
oystem



STEAM GENERATORS
SURFACE BLOWDOWN
BOTTOM BLOWDOWN
TO ATMOSPHERE
TO DRAINS
TO STEAM GEN. BLOW-OFF TANK
WALL OF REACTOR CONTAINMENT
DESIGN CONDITIONS
PRESS PSIG. 985
TEMP °F 650
TURBINE DRIVE FOR AUX STEAM GEN. FEED PUMPS
TO BLOWOFF TANK
TYP. HDR. FROM LINES 1-3
TO TV-1213 CONDENSER
TO ATM.
24" SHP-601-1
24" SHP-601-2
24" SHP-601-3
24" SHP-601-4
NRV-17
NRV-18
NRV-27
NRV-28
NRV-37
NRV-47
NRV-48
PICV-1206-A
PICV-1206-B
CONNECTICUT YANKEE
TO TURBINE
IN-SERVICE INSPECTION
BOUNDARY DIAGRAM
MAIN STEAM SYSTEM
CLASS 2 PIPE
CLASS 3 PIPE
NON NUCLEAR
NORTHEAST UTILITIES SERVICE CO.
REV
BY
CHK
APP



* NOTE: WELD #7 IS INACCESSIBLE DUE TO THE CONTAINMENT LINER PLATE BLOCKING THE WELD.

IN SERVICE INSPECTION

MAIN STEAM LINE

(S.G #1 TO PENETRATION)

SAFETY CLASS 2

REF. DWGS. -16103-2000 SHT 2

16103-20206 REV 0

PAGE NO. 1

NORTHEAST UTILITIES SERVICE CO.

REV. NO.	DATE	DWG. NO.
2 Dwg	5/6/77	CY-MS-1

LEGEND

D = Damage Possible; Further Evaluation Required

A = Acceptable (Damage Not Possible) or No Interaction

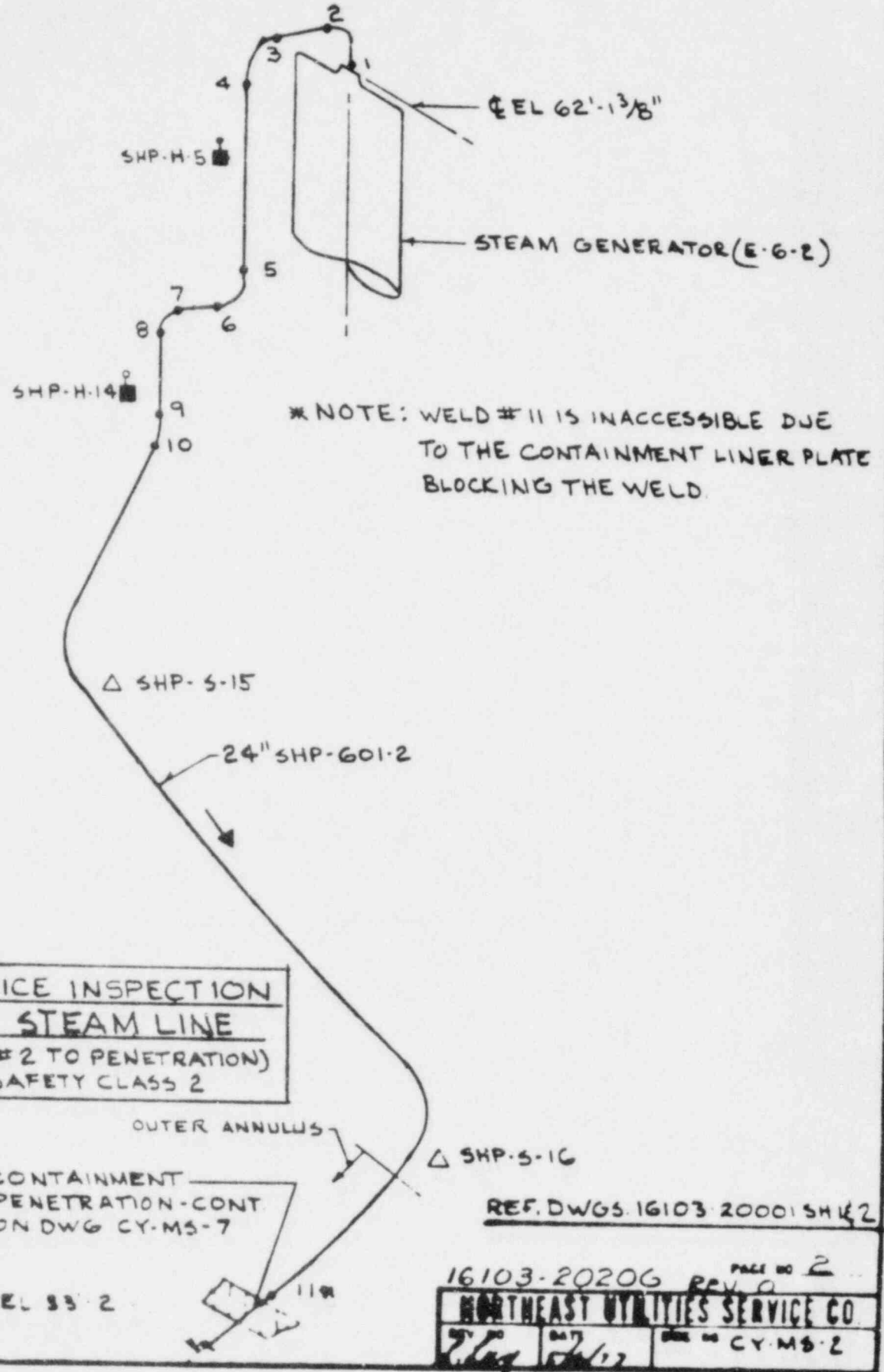
SOURCE

SYSTEM	main Steam
LINE	24-SHP-601-1
DRAWING	MKS-101J (CY-MS-1)
TARGET / BREAK PT.	1 2 3 4 5 6 7

TARGET		BREAK PT. 1 2 3 4 5 6 7
Reactor Coolant*	RCP#2 Motor RCP#1, #3, #4	D ◄——► D A ◄——► A
Main Steam*		A ◄——► A
Feedwater*	FDW 7 FDW 8, 9, 10	D ◄——► D A ◄——► A D
Charging*		A ◄——► A
Residual Heat Removal*		A ◄——► A
Service Water*		A ◄——► A
Safety Injection		A ◄——► A
Containment Liner		A ◄——► A D

Minimum Required Safe Shutdown System

NORTHEAST UTILITIES SERVICE CO.
IN-SERVICE INSPECTION
BOUNDARY DIAGRAM
MAIN STEAM SYSTEM
CLASS 2 PIPE
CLASS 3 PIPE
NON NUCLEAR
CONNECTICUT YANKEE
TO TURBINE
TO ATMOSPHERE
STEAM GENERATORS
SURFACE BLOWDOWN
BOTTOM BLOWDOWN
TO STEAM GEN. BLOW-OFF TANK
TO DRAINS
TO BLOWOFF TANK
TURBINE DRIVE FOR AUX STEAM GEN. FEED PUMPS.
DESIGN CONDITIONS
PRESS. 985 PSIG.
TEMP. 650°F


2
3
1
4
℄ EL 62'-1 3/8"
SHP-H-5
STEAM GENERATOR (E-6-2)
5
7
6
8
SHP-H-14
9
10
* NOTE: WELD # 11 IS INACCESSIBLE DUE TO THE CONTAINMENT LINER PLATE BLOCKING THE WELD
△ SHP-S-15
24" SHP-601-2
IN SERVICE INSPECTION
MAIN STEAM LINE
(S.G. # 2 TO PENETRATION)
SAFETY CLASS 2
OUTER ANNULUS
△ SHP-S-16
CONTAINMENT PENETRATION - CONT ON DWG CY-MS-7
REF. DWGS. 16103-20001 SH # 2
℄ EL 33'-2
11*
16103-20206
PAGE NO 2
REV 0
NORTHEAST UTILITIES SERVICE CO
DWG NO CY-MS-2

LEGEND

D = Damage Possible; Further Evaluation Required

A = Acceptable (Damage Not Possible) or No Interaction

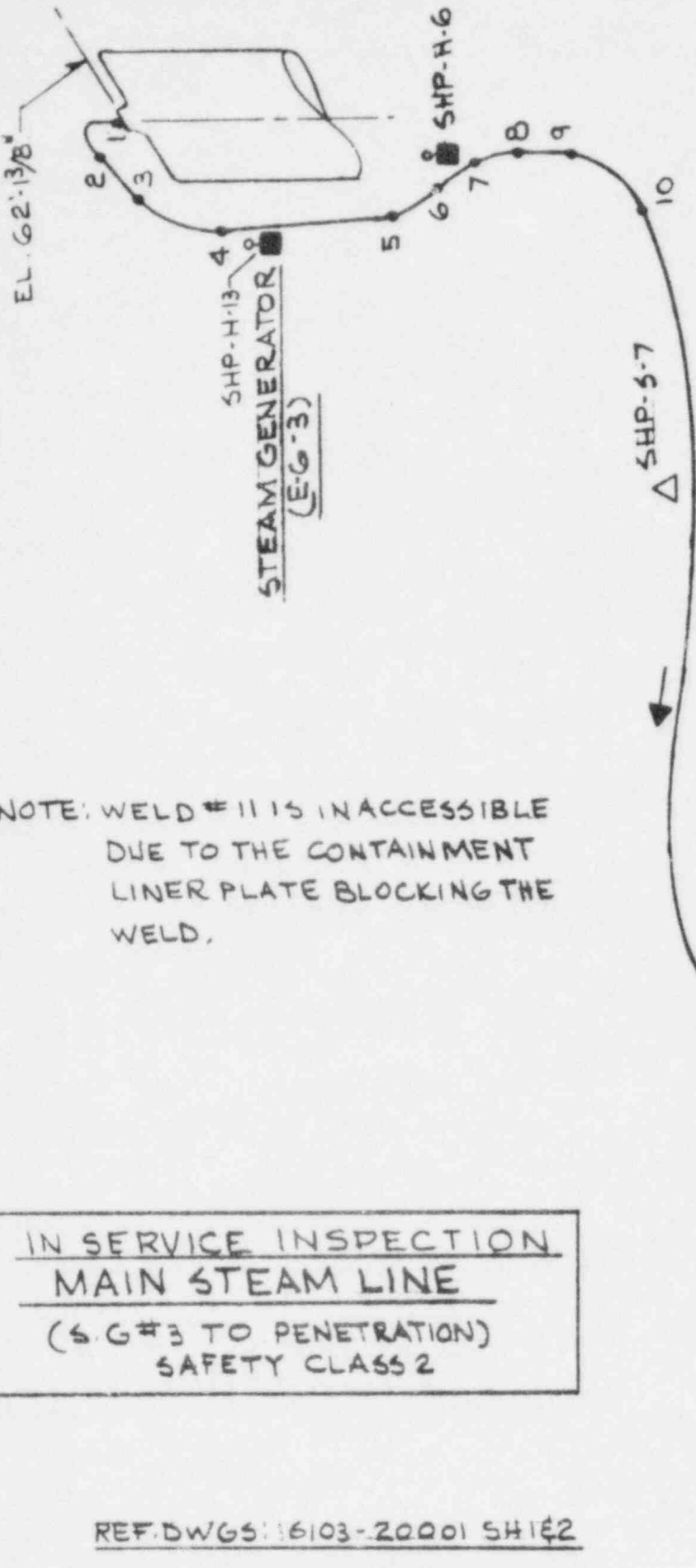
● = Minimum Required Safe Shutdown System

SOURCE

SYSTEM	Main Steam
LINE	24-SHP-601-2
DRAWING	NKS-101K (CY-MS-2)
BREAK PT.	1 2 3 4 5 6 7 8 9 10 11

TARGET		
Reactor Coolant*	RCP #2 Motor	D ◄——► D
	RCP #1, #3 & #4	A ◄——► A
Main Steam*		A ◄——► A
Feedwater*	FDW 7 & 8	D ◄——► D
	FDW 9 & 10	A ◄——► A D
Charging*		A ◄——► A
Residual Heat Removal*		A ◄——► A
Service Water*		A ◄——► A
Safety Injection		A ◄——► A
Containment Liner		A ◄——► A

CONNECTICUT YANKEE
IN-SERVICE INSPECTION
BOUNDARY DIAGRAM
MAIN STEAM SYSTEM
CLASS 2 PIPE
CLASS 3 PIPE
NON NUCLEAR
NORTHEAST UTILITIES SERVICE CO.
DESIGN CONDITIONS
PRESS. 985 PSIG.
TEMP 550 °F
TO TURBINE
TO ATMOSPHERE
TO CONDENSER
TO BLOWOFF TANK
TURBINE DRIVE FOR AUX STEAM GEN. FEED PUMPS
TO STEAM GEN BLOW-OFF TANK
TO DRAINS
STEAM GENERATORS
BOTTOM BLOWDOWN
SURFACE BLOWDOWN
E-6-1
E-6-2
E-6-3
E-6-4



* NOTE: WELD # 11 IS INACCESSIBLE DUE TO THE CONTAINMENT LINER PLATE BLOCKING THE WELD.

IN SERVICE INSPECTION

MAIN STEAM LINE

(S.G #3 TO PENETRATION)
SAFETY CLASS 2

REF. DWGS: 16103-20001 SHEET 2

16103-20206 REV. 0 PAGE NO. 3

NORTHEAST UTILITIES SERVICE CO.

REV. NO.	DATE	DWG NO.
	5/16/77	CY-MS-3

LEGEND

D = Damage Possible; Further Evaluation Required

A = Acceptable (Damage Not Possible) or No Interaction

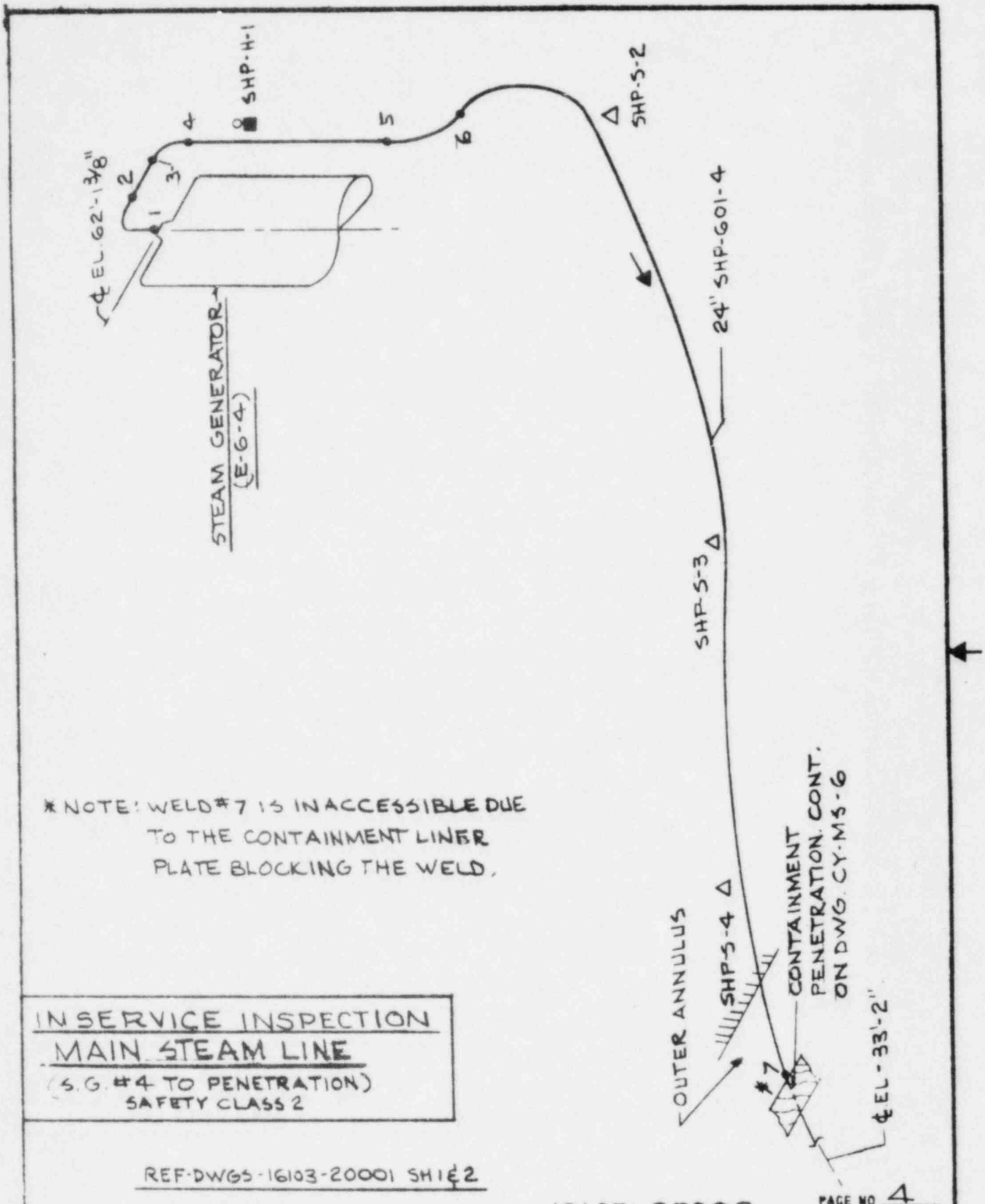
● Minimum Required Safe Shutdown System

SOURCE

SYSTEM	main Steam
LINE	24-SHP-601-3
DRAWING	MKS-101G (CY-MS-3)
BREAK PT.	1 2 3 4 5 6 7 8 9 10 11

TARGET		
Reactor Coolant*	RCP#3 Motor	D ←——→ D
	RCP#1, #2 & #4	A ←——→ A
Main Steam*		A ←——→ A
Feedwater*	FWD 7, 8, & 10	A ←——→ A D
	FWD 9	D ←——→ D
Charging*		A ←——→ A
● Residual Heat Removal*		A ←——→ A
Service Water*		A ←——→ A
Safety Injection		A ←——→ A
Containment Liner		A ←——→ A

IN-SERVICE INSPECTION
BOUNDARY DIAGRAM
MAIN STEAM SYSTEM
CLASS 2 PIPE
CLASS 3 PIPE
NON NUCLEAR
NORTHEAST UTILITIES SERVICE CO.
CONNECTICUT YANKEE
TO TURBINE
TO ATMOSPHERE
STEAM GENERATORS
BOTTOM BLOWDOWN
SURFACE BLOWDOWN
TURBINE DRIVE FOR AUX STEAM GEN FEED PUMPS
TO ATM.
TO BLOWOFF TANK
TO CONDENSER
TO DRAINS
DESIGN CONDITIONS
PRESS. 985 PSIG.
TEMP. 650 °F



* NOTE: WELD #7 IS INACCESSIBLE DUE TO THE CONTAINMENT LINER PLATE BLOCKING THE WELD.

IN SERVICE INSPECTION
MAIN STEAM LINE
(S.G. #4 TO PENETRATION)
SAFETY CLASS 2

REF-DWGS-16103-20001 SH 1 & 2

16103-20206 REV. 0

PAGE NO 4

NORTHEAST UTILITIES SERVICE CO.

REV. NO.	DATE	DWG. NO.
0	5/6/77	CY-MS-4

LEGEND

D = Damage Possible; Further Evaluation Required

A = Acceptable (Damage Not Possible) or

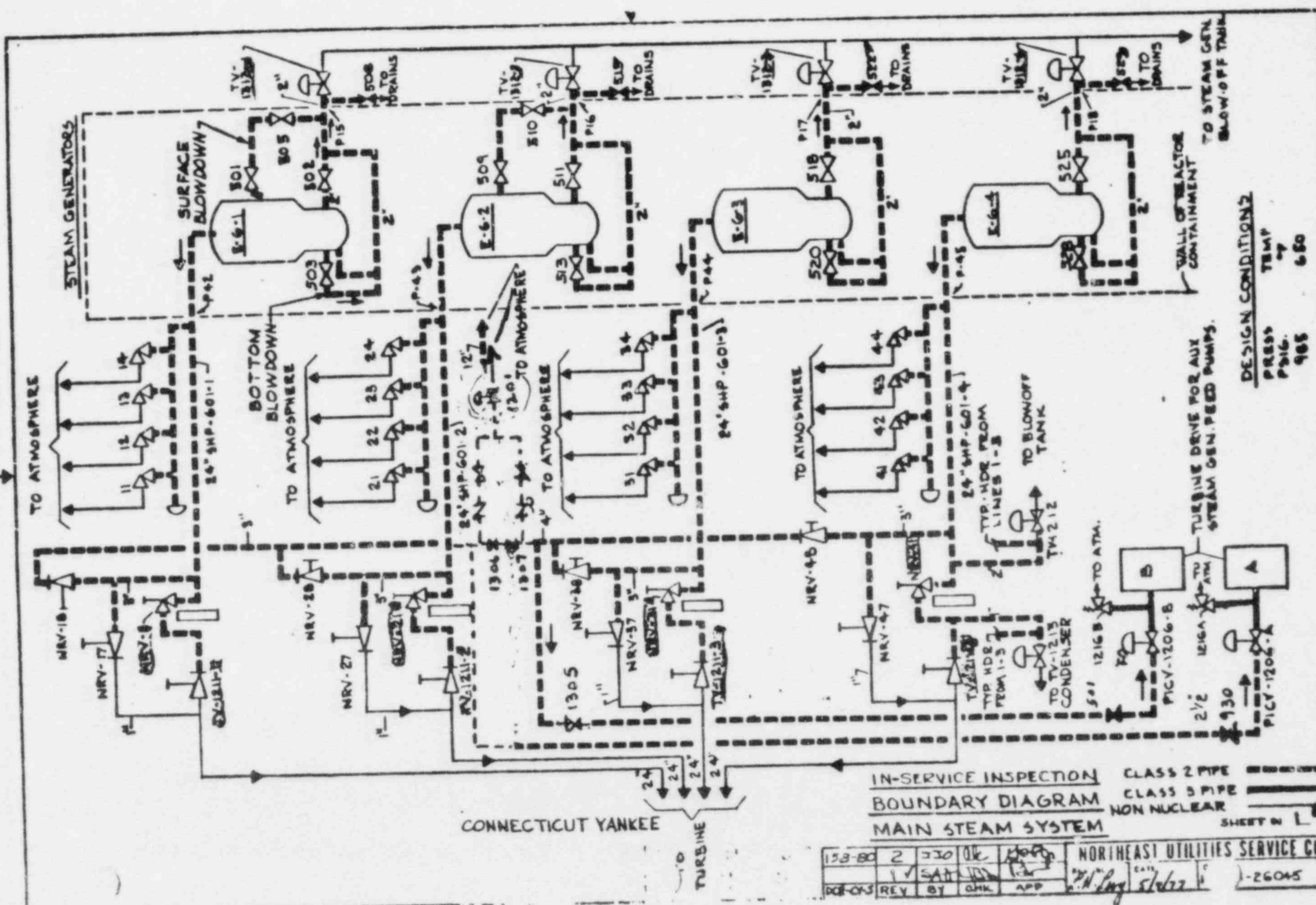
= No Interaction

SOURCE	
SYSTEM	Main Steam
LINE	24-SHP-601-A
DRAWING	MKS-101H (CY-MS-A)
BREAK PT.	1 2 3 4 5 6 7

TARGET		
Reactor Coolant*	RCP #3 Motor RCP #1, #2, & #4	D ⟷ D A ⟷ A
Main Steam*		A ⟷ A
Feedwater*	FWD 7, 8 & 9 FWD 10	A ⟷ A D D ⟷ D
Charging*		A ⟷ A
Residual Heat Removal*		A ⟷ A
Service Water*		A ⟷ A
Safety Injection		A ⟷ A
Containment Liner		A ⟷ A

Minimum Required Safe Shutdown System

1.



STEAM GENERATORS
SURFACE BLOWDOWN
BOTTOM BLOWDOWN
WALL OF REACTOR CONTAINMENT
TO STEAM GEN. BLOW-OFF TANK
TO DRAINS
TO ATMOSPHERE
24" SHP-601-1
24" SHP-601-2
24" SHP-601-3
24" SHP-601-4
TYP. HDR FROM LINES 1-3
TO BLOWOFF TANK
TV-1212
TO TV-1213 CONDENSER
TURBINE DRIVE FOR AUX STEAM GEN. FEED PUMPS
TO ATM.
PICV-1206-A
PICV-1206-B
1216 A
1216 B
DESIGN CONDITIONS
PRESS PSIG. 985
TEMP °F 650
CONNECTICUT YANKEE
TURBINE
IN-SERVICE INSPECTION
BOUNDARY DIAGRAM
MAIN STEAM SYSTEM
CLASS 2 PIPE
CLASS 3 PIPE
NON NUCLEAR
NORTHEAST UTILITIES SERVICE CO.
1-26045
REV
BY
CHK
APP

08510-5694

PIPING ISOMETRIC SKETCH SHEET

SHEET NO. 1

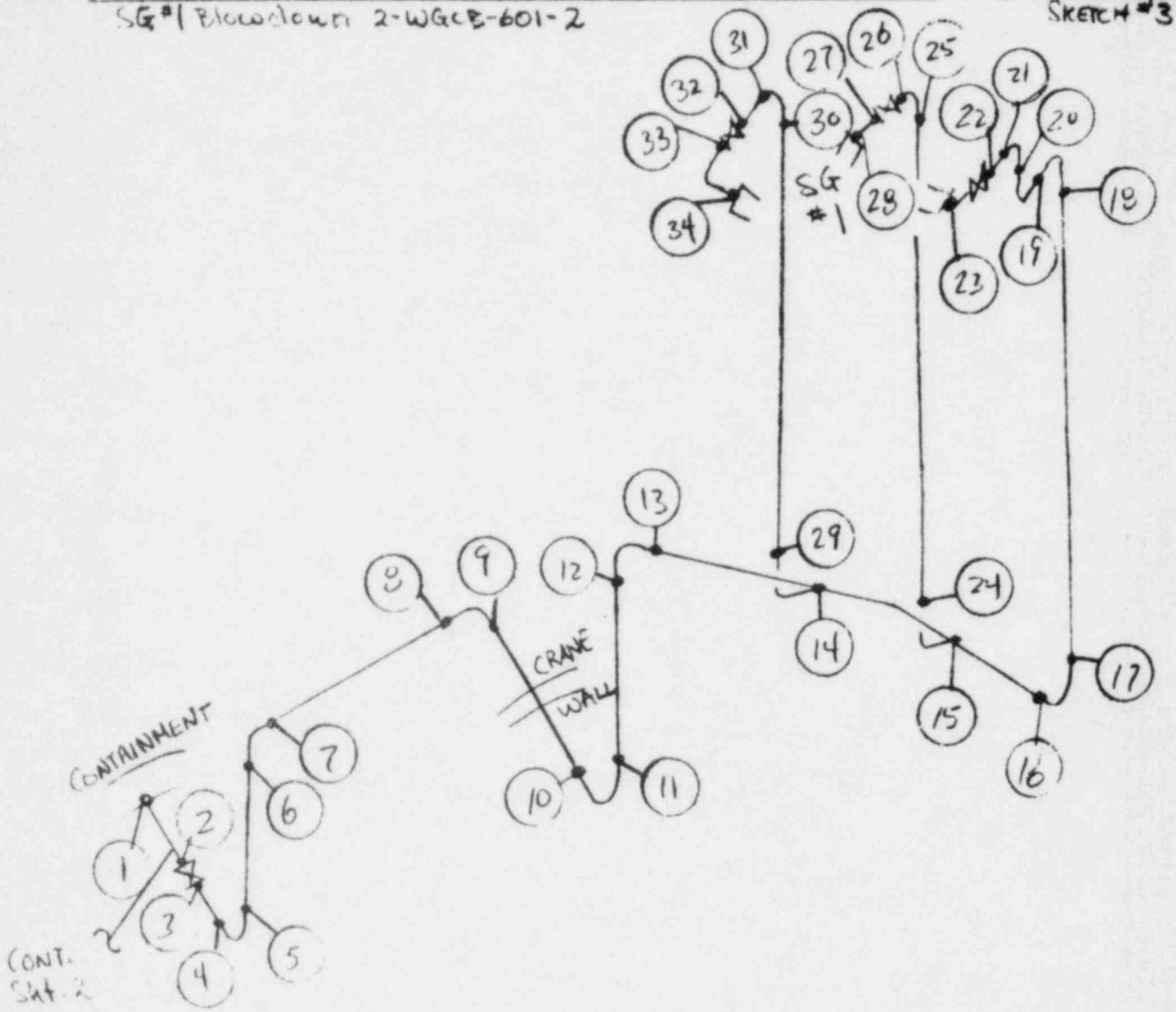
JOB NO.

DATE 1/21/80

BY JN

TITLE CY-HEPB INSIDE CONTAINMENT
SG#1 Blowdown 2-WGCB-601-2

SKETCH #3 Sht 1



08510-569A

PIPING ISOMETRIC SKETCH SHEET

SHEET NO. 1

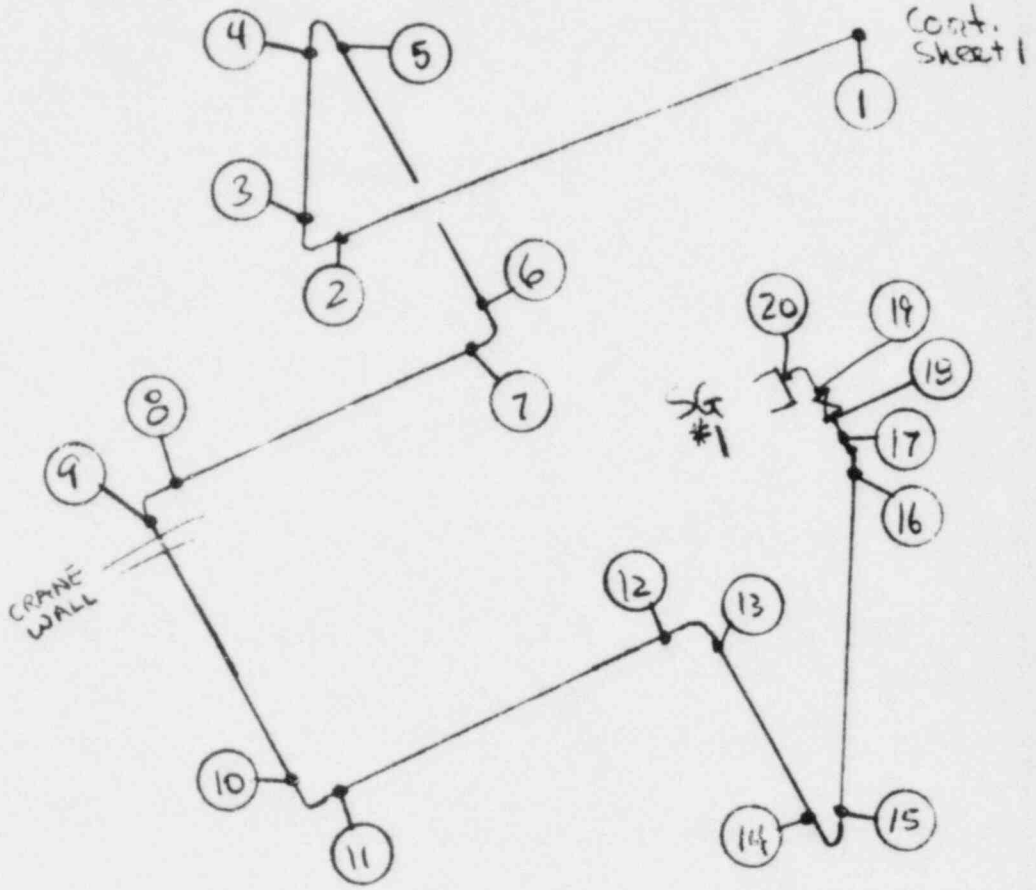
JOB NO. PA 79-815

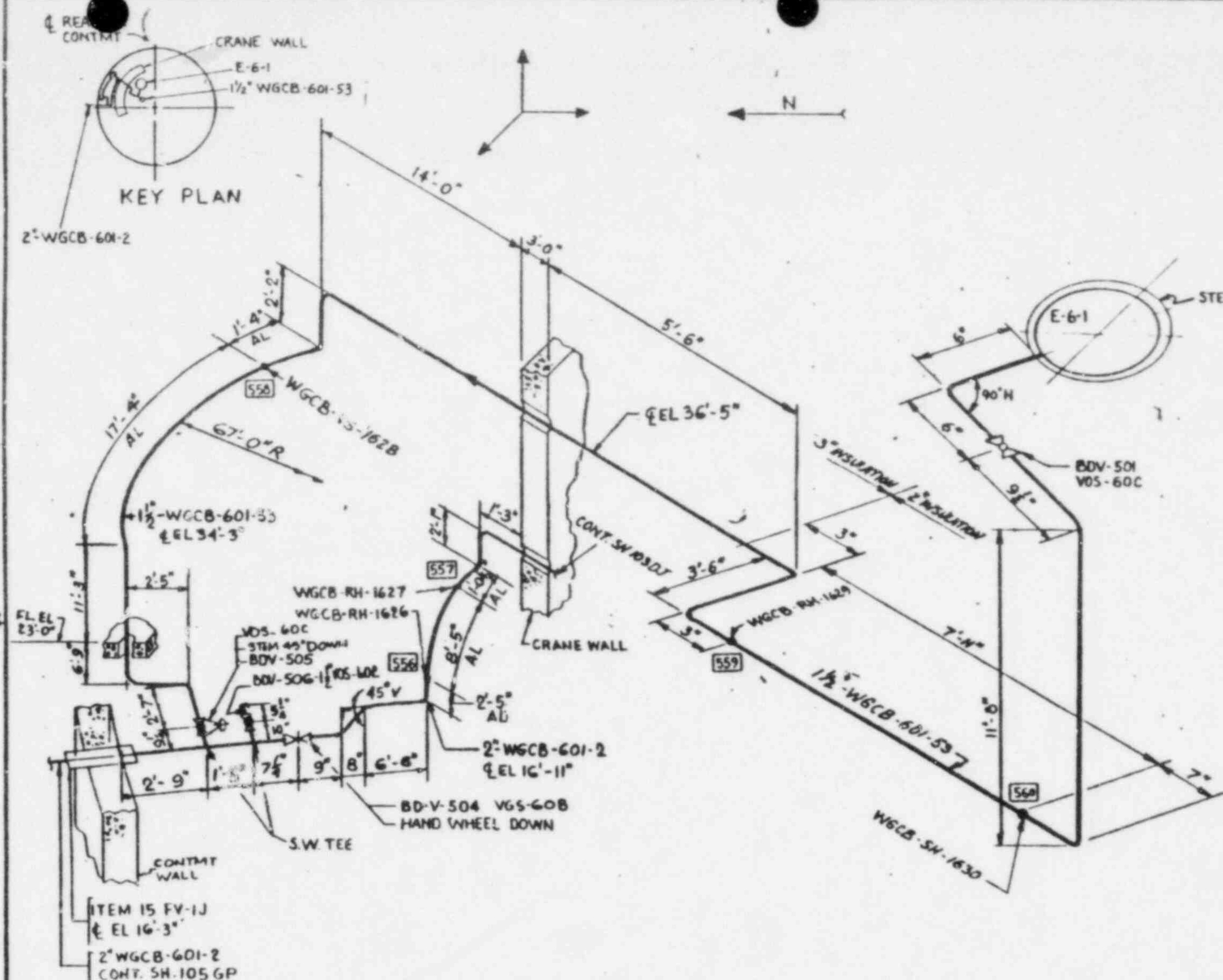
DATE 1-21-80

BY JN

TITLE CY-HEPP. INSIDE CONTAINMENT
SG #1 BLOWDOWN 1½-WGCB-601-54

Sketch #2 Sht. 2





REFERENCES DRAWINGS:
16103-20011-SH-5,7,9,11

NOTES:

1. ALL ELBOWS SOCKETWELD UNLESS OTHERWISE NOTED.
2. VALVE STEMS VERTICAL UNLESS OTHERWISE NOTED.

FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 16103-20231-SH-103 ZAF

INSULATION AS NOTED

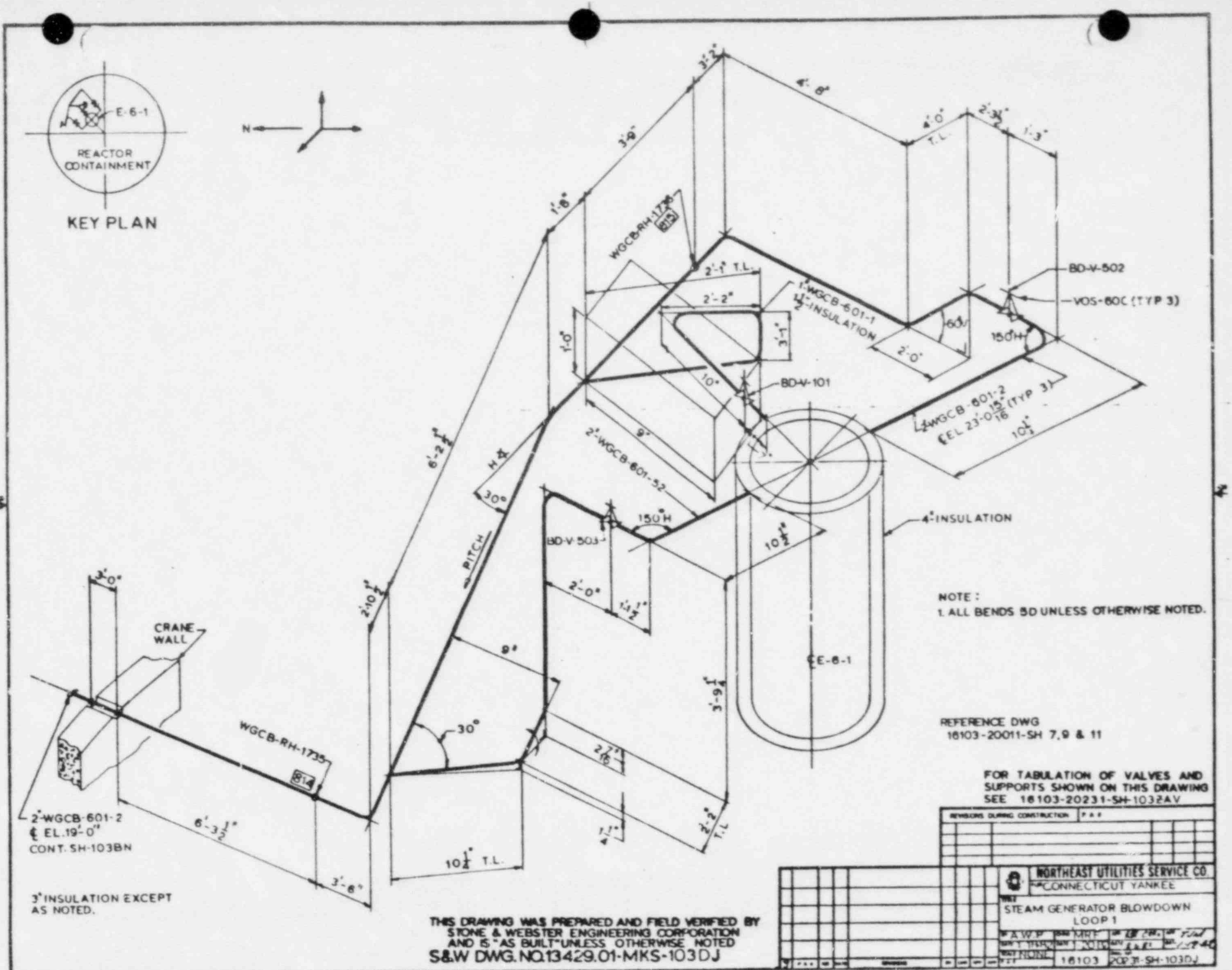
THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND "AS BUILT" UNLESS OTHERWISE NOTED

S&W DWG. NO. 13429.01-MKS-103BN

NORTHEAST UTILITIES SERVICE CO.
CONNECTICUT YANKEE

STEAM GENERATOR BLOWDOWN PIPING FROM LOOP 1

16103 | 20231-SH-103BN



REACTOR CONTAINMENT
E-6-1
KEY PLAN
N
CRANE WALL
2"-WGCB-601-2
℄ EL.19'-0"
CONT. SH-103BN
3" INSULATION EXCEPT AS NOTED.
WGCB-RH-1735
814
WGCB-RH-1736
815
PITCH
BD-V-503
BD-V-101
BD-V-502
VOS-60C (TYP 3)
1"-WGCB-601-1
1½"-INSULATION
2"-WGCB-601-52
2"-WGCB-601-2
℄ EL 23'-0 15/16" (TYP 3)
4" INSULATION
℄ E-6-1
150°H
30°
60°
NOTE :
1. ALL BENDS 5D UNLESS OTHERWISE NOTED.
REFERENCE DWG
18103-20011-SH 7,9 & 11
FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 18103-20231-SH-103ZAV
THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED
S&W DWG. NO.13429.01-MKS-103DJ
NORTHEAST UTILITIES SERVICE CO.
CONNECTICUT YANKEE
STEAM GENERATOR BLOWDOWN LOOP 1
18103
20231-SH-103DJ

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

	SOURCE
SYSTEM	STEAM GENERATOR #1
LINE	BLOWDOWN (2-WGCB-601-2)
DRAWING	SKETCH #3 sheet #1
TARGET / BREAK PT.	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
Reactor Coolant*	A ← → A
Main Steam*	A ← → A
Feedwater*	A ← → A
Charging*	A ← → A
Residual Heat Removal*	A ← → A
Service Water*	A ← → A
Safety Injection	A ← → A
tainment Liner	D ← → D A ← → A

nimum Required Safe Shutdown
system

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	STEAM GENERATOR #1
LINE	BLOWDOWN (2-WGCB-601-2)
DRAWING	SKETCH #3 SHEET 1
BREAK PT.	20 21 22 23 24 25 26 27 28 29 30 31 32 33 34
Reactor Coolant*	A ← → A
Main Steam*	A ← → A
Feedwater*	A ← → A
Charging*	A ← → A
Residual Heat Removal*	A ← → A
Service Water*	A ← → A
Safety Injection	A ← → A
tainment Liner	A ← → A

inimum Required Safe Shutdown
—system

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	STEAM GENERATOR #1
LINE	BLOWDOWN (1½-WGCB-601-54)
DRAWING	SKETCH #3 Sheet 2
BREAK PT.	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Reactor Coolant*	A ← → A
Main Steam*	A ← → A
Feedwater*	A ← → A
Charging*	A ← → A
Residual Heat Removal*	A ← → A
Service Water*	A ← → A
Safety Injection	A ← → A
tainment Liner	D ← → D A → A

nimum Required Safe Shutdown
ystem

1.

NORTHEAST UTILITIES SERVICE CO.
IN-SERVICE INSPECTION
BOUNDARY DIAGRAM
MAIN STEAM SYSTEM
CLASS 2 PIPE
CLASS 3 PIPE
NON NUCLEAR
DESIGN CONDITIONS
PRESS. 985 PSIG.
TEMP. 550°F
TO TURBINE
CONNECTICUT YANKEE
TO ATMOSPHERE
STEAM GENERATORS
BOTTOM BLOWDOWN
SURFACE BLOWDOWN
TO CONDENSER
TO BLOWOFF TANK
TO DRAINS
TURBINE DRIVE FOR AUX STEAM GEN. FEED PUMPS
TO STEAM GEN BLOW-OFF TANK
WALL OF REACTOR CONTAINMENT

08510-588A

PIPING ISOMETRIC SKETCH SHEET

SHEET NO. 1

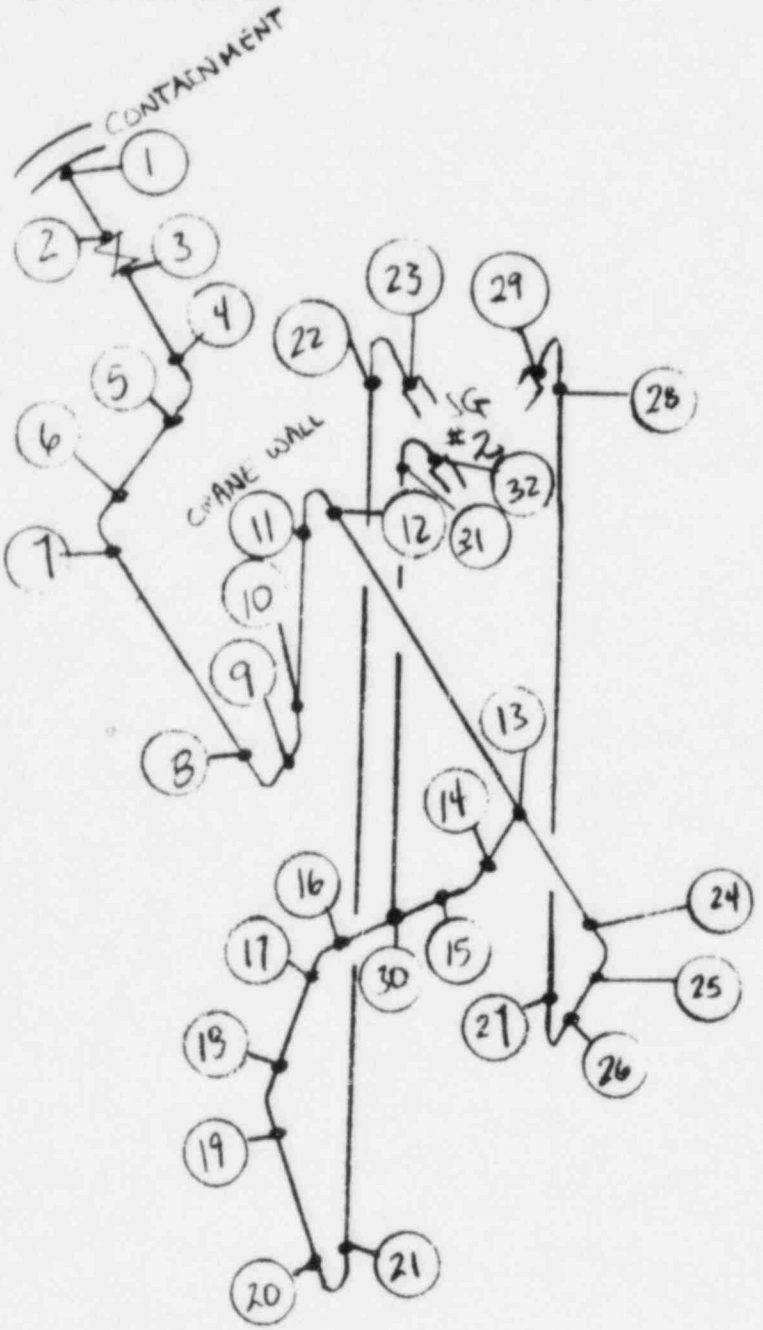
JOB NO. 1178-818

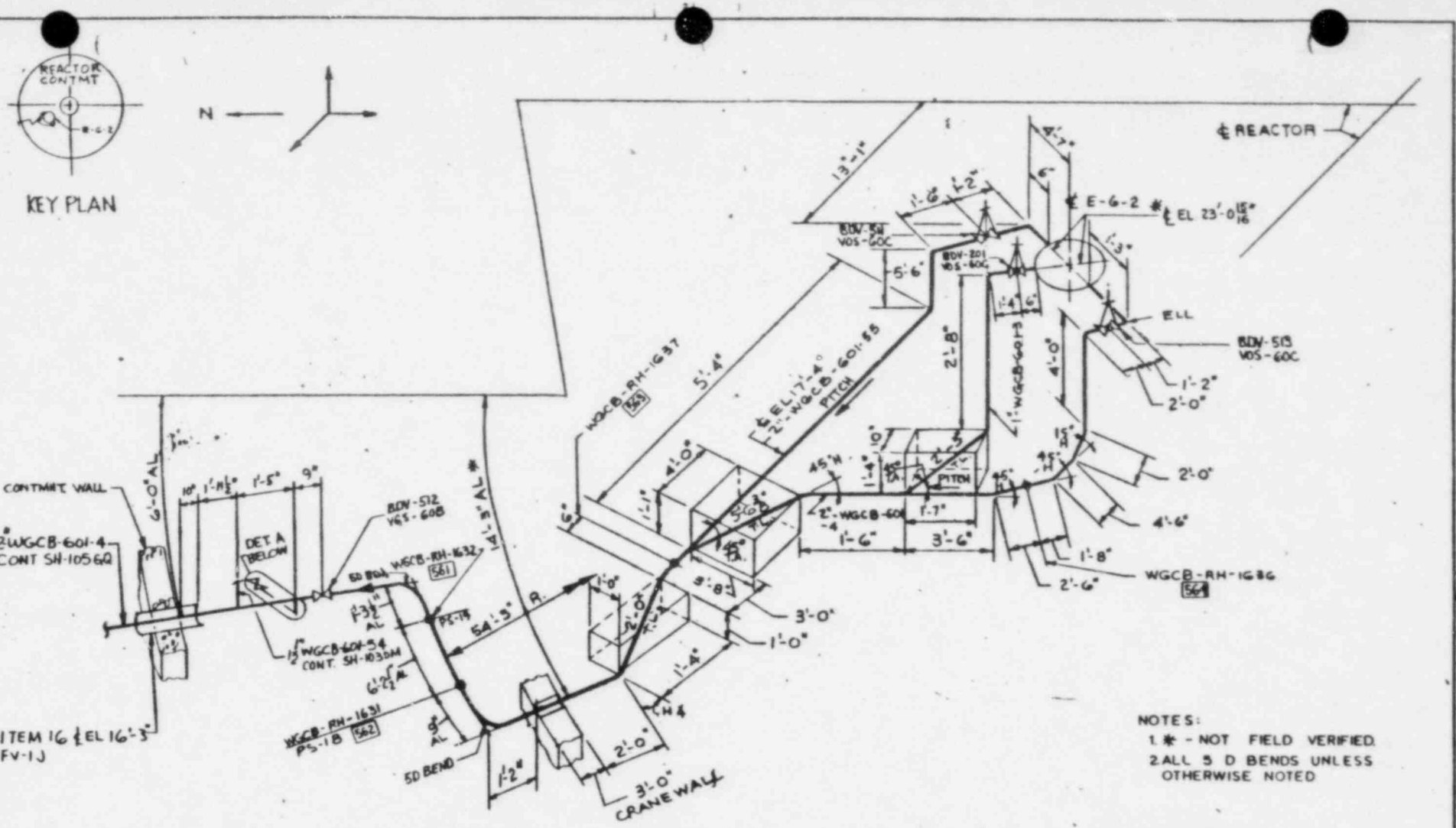
DATE 1-21-80

BY AJN

TITLE CY-HEPD INSIDE CONTAINMENT
SG #2 BLOWDOWN 2-WGCB-601-4

Sketch #1





NOTES:

1. * - NOT FIELD VERIFIED.
2. ALL 5 D BENDS UNLESS OTHERWISE NOTED.

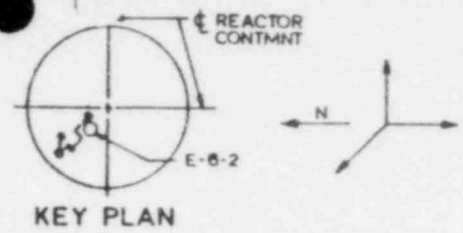
REFERENCE DWGS:
16103-20011-SH 5, 7, 9 & 11

FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 16103-20231-SH-103ZAF

THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED
S&W DWG. NO. 13429.01-MKS-103BP

REVISIONS DURING CONSTRUCTION

NORTHEAST UTILITIES SERVICE CO
CONNECTICUT YANKEE
STEAM GEN. BLOWDOWN LOOP 2
S.W.C. 12-29-81
16103
20231-SH-103BP



KEY PLAN

NOTES
1 ALL BENDS ARE 5D UNLESS OTHERWISE NOTED

REFERENCE DWGS:
16103-20011-SH 5,7,9,11 & 13

FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 16103-20231-SH-103 2AW

INSULATION AS NOTED

THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED
S&W DWG. NO. 13429.01-MKS-103 DM

REVISIONS DURING CONSTRUCTION	P.A.#

NORTHEAST UTILITIES SERVICE CO.
CONNECTICUT YANKEE

STEAM GENERATOR BLOWDOWN LOOP 2

SWC	MRE		
	16103	20231-SH-103DM	

LEGEND

D = Damage Possible, Further Evaluation Required

A = Acceptable (damage not possible) or No Interaction

SOURCE

TARGET		
	SYSTEM	STEAM GENERATOR #2
	LINE	BLOWDOWN (2-WGCB-601-4)
	DRAWING	SKETCH #1
	BREAK PT.	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
Reactor Coolant*		A ← → A
Main Steam*		A ← → A
Feedwater*		A ← → A
Charging*		A ← → A
Residual Heat Removal*		A ← → A
Service Water*		A ← → A
Safety Injection		A ← → A
Containment Liner		D ← → D A ← → A

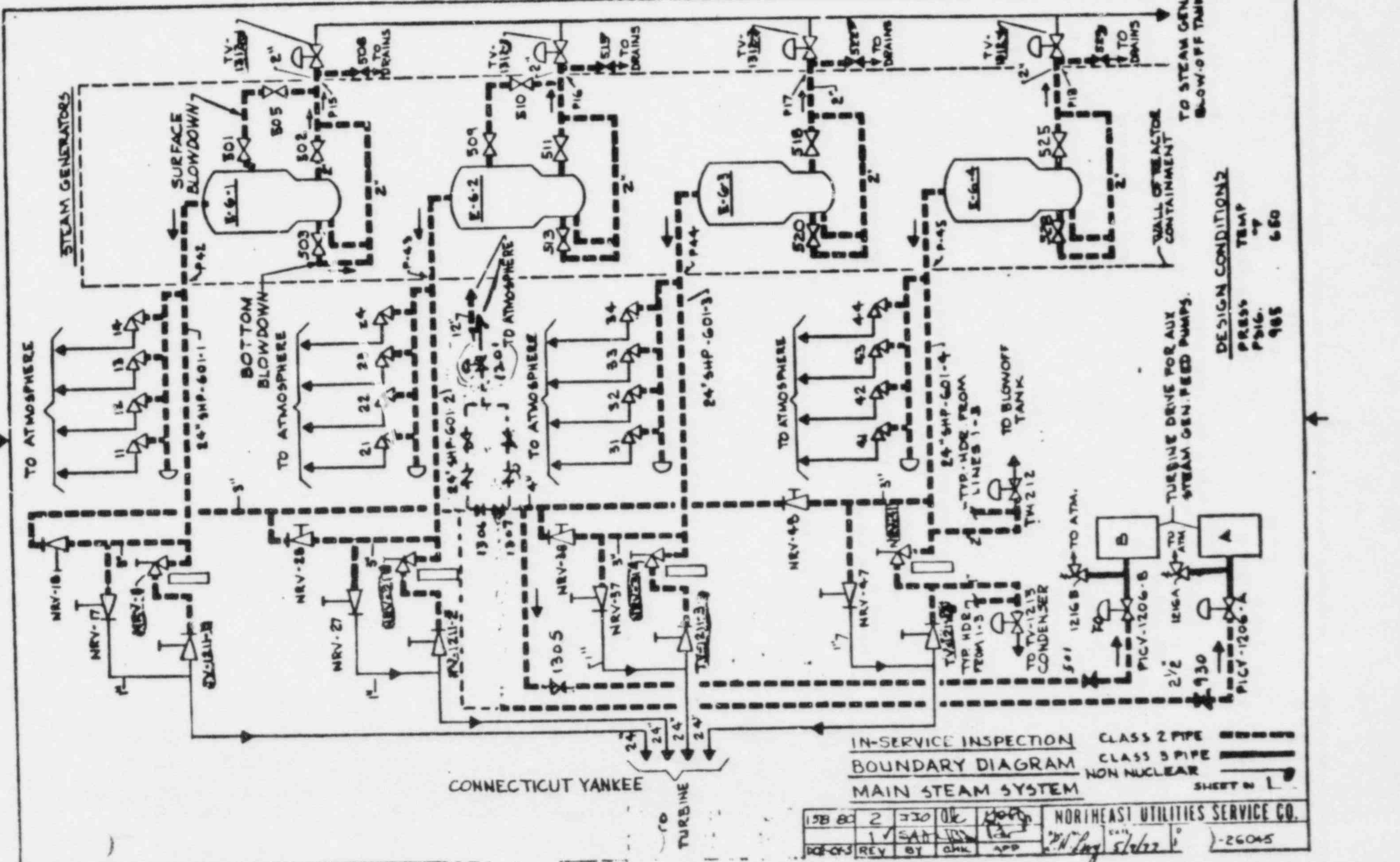
*Minimum Required Safe Shutdown ystem

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	STEAM GENERATOR #2
LINE	BLOWDOWN (2-WGCB-601-4)
DRAWING	SKETCH #1
BREAK PT.	20 21 22 23 24 25 26 27 28 29 30 31 32
Reactor Coolant*	A ← → A
Main Steam*	A ← → A
Feedwater*	A ← → A
Charging*	A ← → A
Residual Heat Removal*	A ← → A
Service Water*	A ← → A
Safety Injection	A ← → A
tainment Liner	A ← → A

inimum Required Safe Shutdown
ystem

1.



STEAM GENERATORS
SURFACE BLOWDOWN
BOTTOM BLOWDOWN
TO ATMOSPHERE
TO DRAINS
TO STEAM GEN. BLOW-OFF TANK
WALL OF REACTOR CONTAINMENT
DESIGN CONDITIONS
PRESS PSIG. 985
TEMP °F 650
24" SHP-601-1
24" SHP-601-2
24" SHP-601-3
24" SHP-601-4
TYP. HDR. FROM LINES 1-3
TO BLOWOFF TANK
TW-212
TO TV-1213 CONDENSER
TURBINE DRIVE FOR AUX STEAM GEN. FEED PUMPS
TO ATM.
PICV-1206-A
PICV-1206-B
NRV-18
NRV-17
NRV-28
NRV-27
NRV-38
NRV-37
NRV-48
NRV-47
TO TURBINE
CONNECTICUT YANKEE
IN-SERVICE INSPECTION
BOUNDARY DIAGRAM
MAIN STEAM SYSTEM
CLASS 2 PIPE
CLASS 3 PIPE
NON NUCLEAR
NORTHEAST UTILITIES SERVICE CO.
REV
BY
CHK
APP
)-26045

08510-589A

PIPING ISOMETRIC SKETCH SHEET

SHEET NO. 1

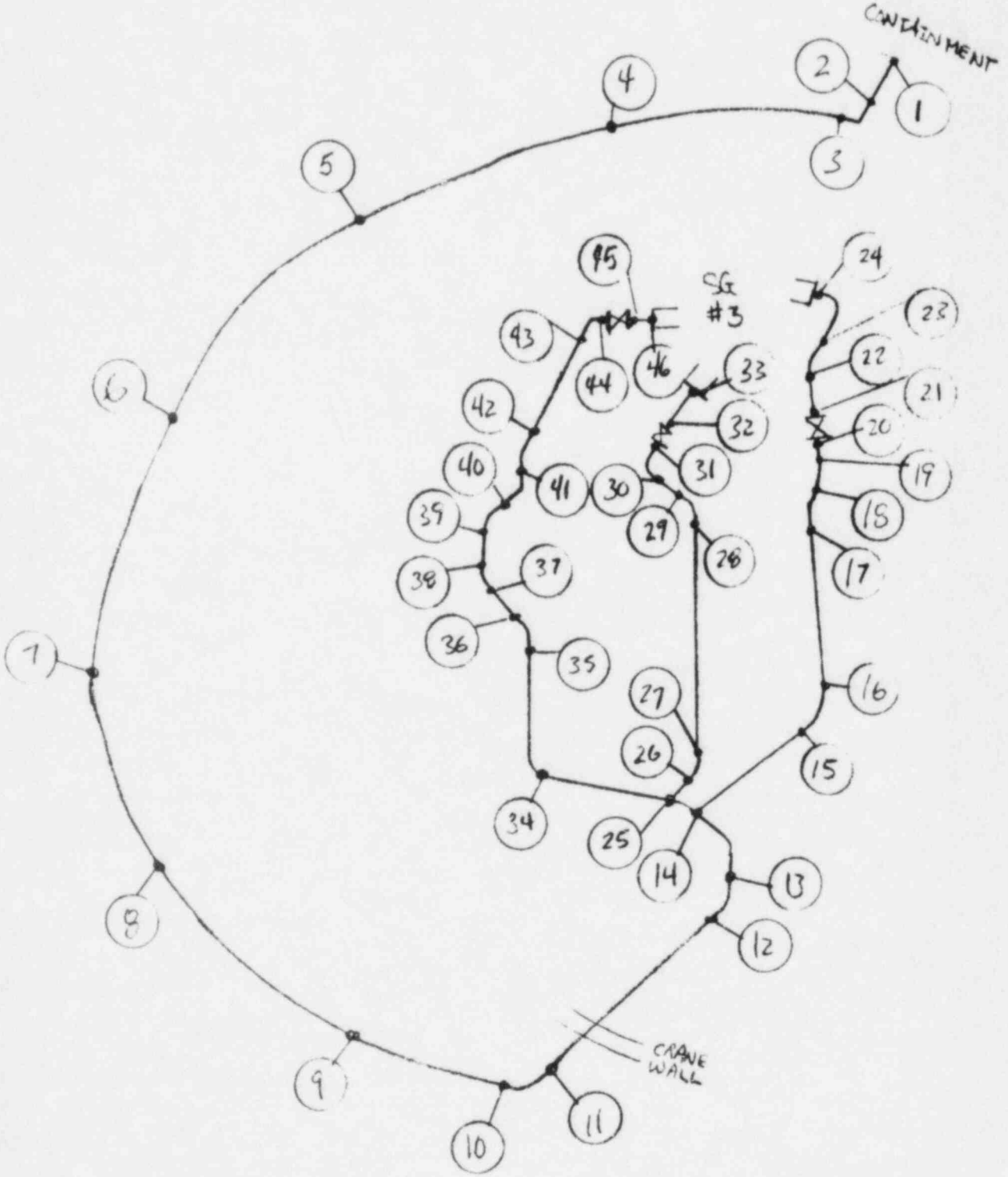
JOB NO.

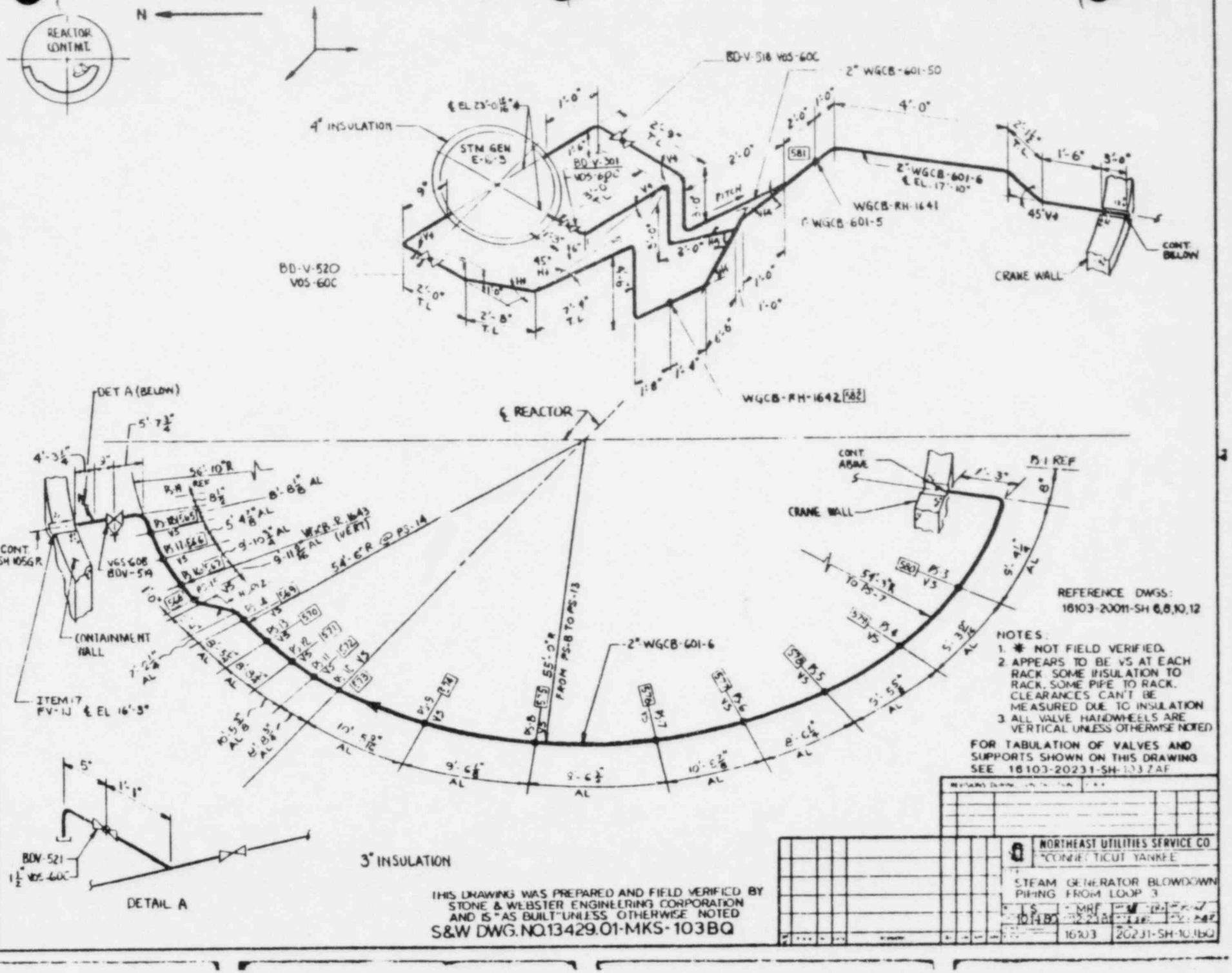
DATE 1/21/80

BY EJN

TITLE CY-HEPB INSIDE CONTAINMENT
CG#3 BLOWDOWN 2-WGCB-601-6

Sketch 2




REACTOR CONTMT.
N
BD-V-518 V05-60C
2" WGCB-601-50
4" INSULATION
STN GEN E-16-3
BD V-301 V05-60C
WGCB-RH-1641
2" WGCB-601-6
WGCB-601-5
CRANE WALL
CONT BELOW
BD-V-520 V05-60C
WGCB-RH-1642
DET A (BELOW)
℄ REACTOR
CONT SH 105GR
V05-608 BDV-519
CONTAINMENT WALL
ITEM 17 PV-1J ℄ EL 16'-3"
2" WGCB-601-6
CONT ABOVE
P5 REF
CRANE WALL
REFERENCE DWGS: 16103-20011-SH 6,8,10,12
NOTES:
1. * NOT FIELD VERIFIED.
2. APPEARS TO BE V5 AT EACH RACK. SOME INSULATION TO RACK, SOME PIPE TO RACK. CLEARANCES CAN'T BE MEASURED DUE TO INSULATION
3. ALL VALVE HANDWHEELS ARE VERTICAL UNLESS OTHERWISE NOTED
FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 16103-20231-SH-103 7AF
BDV-521 1½" V05-60C
DETAIL A
3" INSULATION
THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED
S&W DWG. NO. 13429.01-MKS-103BQ
NORTHEAST UTILITIES SERVICE CO
CONNECTICUT YANKEE
STEAM GENERATOR BLOWDOWN PIPING FROM LOOP 3
16103
20231-SH-103BQ

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	STEAM GENERATOR #3
LINE	BLOWDOWN (2-WGCB-601-6)
DRAWING	SKETCH #2
BREAK PT.	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
Reactor Coolant*	A ← → A
Main Steam*	A ← → A
Feedwater*	A ← → A
Charging*	A ← → A
Residual Heat Removal*	A ← → A
Service Water*	A ← → A
Safety Injection	A ← → A
ıtainment Liner	D ← → D A ← → A

inimum Required Safe Shutdown
-ystem

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE																		
SYSTEM	STEAM GENERATOR #3																		
LINE	BLOWDOWN (2-WGCB-601-6)																		
DRAWING																			
BREAK PT.	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Reactor Coolant*	A	←																→	A
Main Steam*	A	←																→	A
Feedwater*	A	←																→	A
Charging*	A	←																→	A
Residual Heat Removal*	A	←																→	A
Service Water*	A	←																→	A
Safety Injection	A	←																→	A
tainment Liner	A	←																→	A

inimum Required Safe Shutdown
System

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET	SOURCE
SYSTEM	STEAM GENERATOR #3
LINE	BLOWDOWN (2-WGCB-601-6)
DRAWING	SKETCH #2
BREAK PT.	39 40 41 42 43 44 45 46
Reactor Coolant*	A ⟷ A
Main Steam*	A ⟷ A
Feedwater*	A ⟷ A
Charging*	A ⟷ A
Residual Heat Removal*	A ⟷ A
Service Water*	A ⟷ A
Safety Injection	A ⟷ A
tainment Liner	A ⟷ A

nimum Required Safe Shutdown
ystem

IN-SERVICE INSPECTION
BOUNDARY DIAGRAM
MAIN STEAM SYSTEM
CONNECTICUT YANKEE
NORTHEAST UTILITIES SERVICE CO.
CLASS 2 PIPE
CLASS 3 PIPE
NON NUCLEAR
DESIGN CONDITIONS
PRESS. 985 PSIG.
TEMP. 650°F
TO ATMOSPHERE
TO TURBINE
STEAM GENERATORS
SURFACE BLOWDOWN
BOTTOM BLOWDOWN
TO BLOWDOWN TANK
TO CONDENSER
TURBINE DRIVE FOR AUX STEAM GEN. FEED PUMPS
TO STEAM GEN BLOW-OFF TANK
TO DRAINS
WALL OF REACTOR CONTAINMENT
24"-SHP-601-1
24"-SHP-601-2
24"-SHP-601-3
24"-SHP-601-4

08510-569A

PIPING ISOMETRIC SKETCH SHEET

SHEET NO. 1

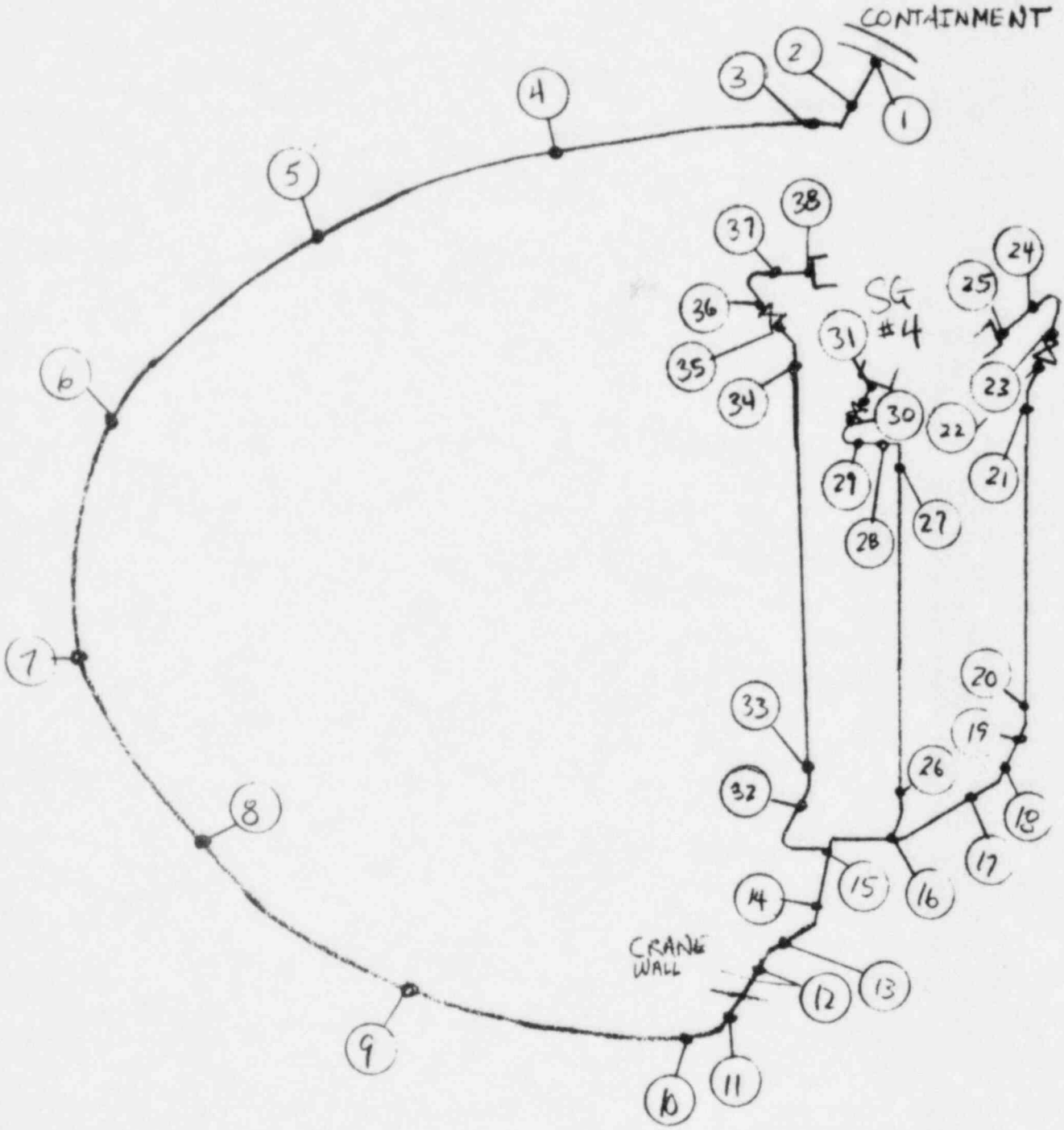
JOB NO. PA 79-518

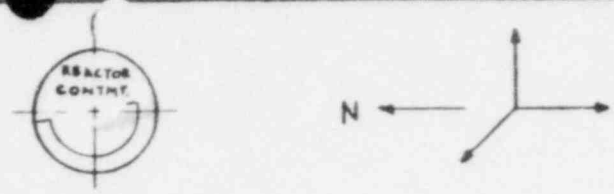
DATE 1-21-80

BY JN

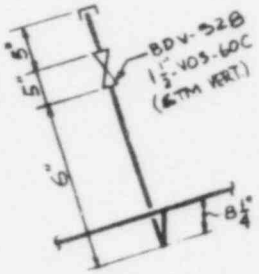
TITLE CY - HI PB INSIDE CONTAINMENT
SG #4 BLOWDOWN (2-WGCB-601-B)

Sketch #4

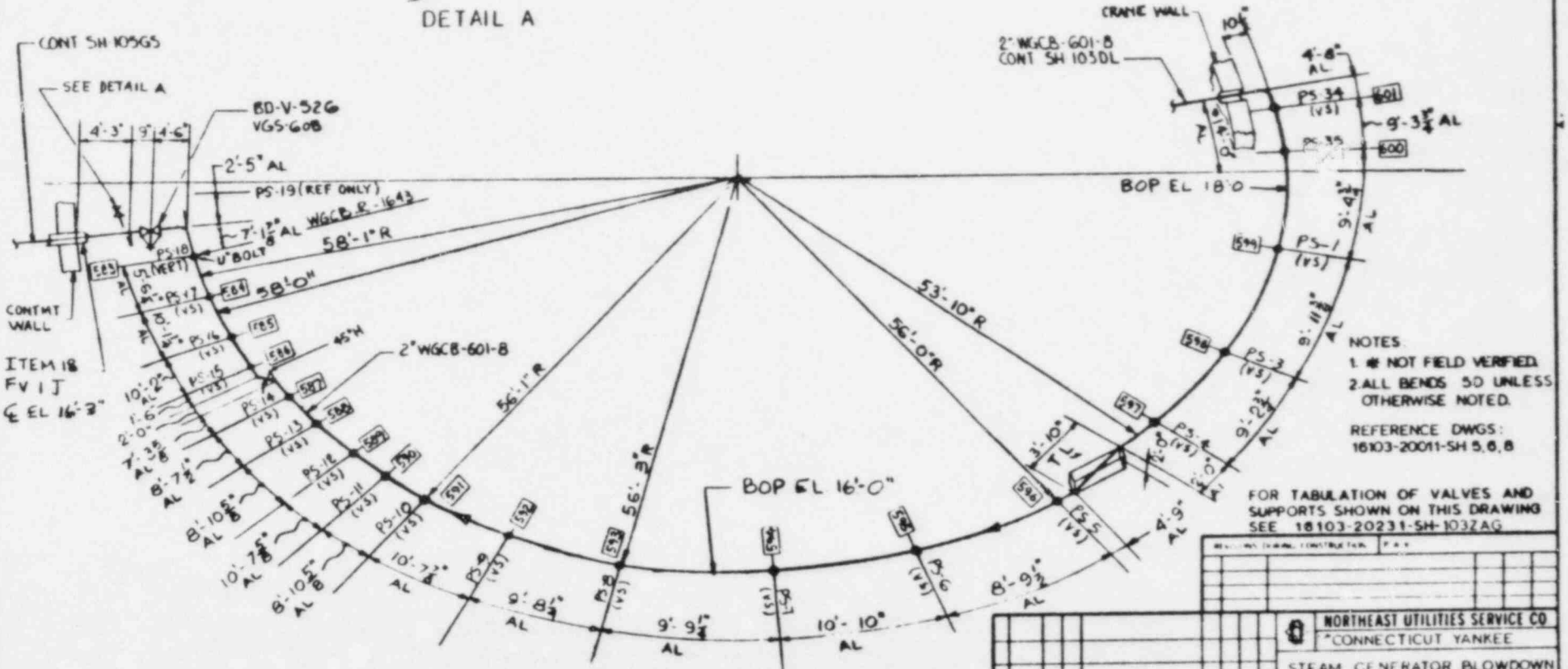




KEY PLAN



DETAIL A



NOTES
1. # NOT FIELD VERIFIED.
2. ALL BENDS 5D UNLESS OTHERWISE NOTED.

REFERENCE DWGS:
16103-20011-SH 5, 6, 8

FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 16103-20231-SH-103ZAG

THIS DRAWING WAS PREPARED AND FIELD VERIFIED BY STONE & WEBSTER ENGINEERING CORPORATION AND IS "AS BUILT" UNLESS OTHERWISE NOTED
S&W DWG. NO. 13429.01-MKS-103BR

NORTHEAST UTILITIES SERVICE CO
"CONNECTICUT YANKEE
STEAM GENERATOR BLOWDOWN FROM LOOP 4

J.C.	MRF		
9 26 80	12 11 81		
16103	20231-SH-103BR		

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

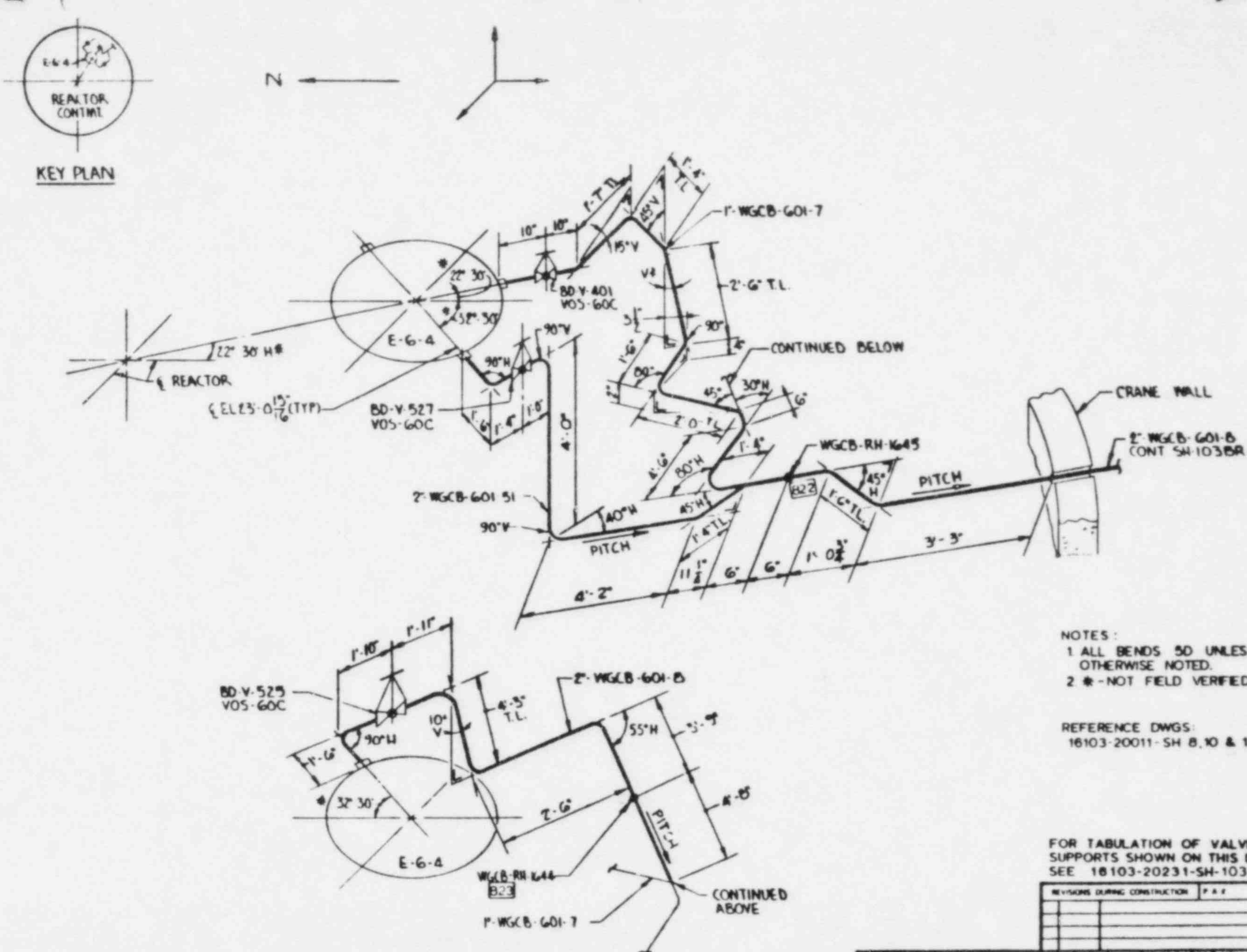
TARGET	SOURCE																	
SYSTEM	STEAM GENERATOR #4																	
LINE	BLOWDOWN (2-WGCB-601-8)																	
DRAWING	SKETCH #4																	
BREAK PT.	20	21	22	23	24	25	26	27	28	29	30	31	33	34	35	36	37	38
Reactor Coolant*	A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A
Main Steam*	A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A
Feedwater*	A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A
Charging*	A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A
Residual Heat Removal*	A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A
Service Water*	A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A
Safety Injection	A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A
tainment Liner	A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A

nimum Required Safe Shutdown
ystem

LEGEND
D = Damage Possible, Further Evaluation Required
A = Acceptable (damage not possible) or No Interaction

TARGET		SOURCE
	SYSTEM	STEAM GENERATOR #4
	LINE	BLOWDOWN (2-WGCB-601-8)
	DRAWING	SKETCH #4
	BREAK PT.	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
Reactor Coolant*		A ← → A
Main Steam*		A ← → A
Feedwater*		A ← → A
Charging*		A ← → A
Residual Heat Removal*		A ← → A
Service Water*		A ← → A
Safety Injection		A ← → A
tainment Liner		D ← → D A ← → A

nimum Required Safe Shutdown
system



NOTES:

1. ALL BENDS 5D UNLESS OTHERWISE NOTED.
2. * - NOT FIELD VERIFIED.

REFERENCE DWGS:
16103-20011-SH 8, 10 & 12

FOR TABULATION OF VALVES AND SUPPORTS SHOWN ON THIS DRAWING SEE 16103-20231-SH-1032AV

2½" INSULATION

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S&W DWG. NO. 13429.01-MKS-103DL

NORTHEAST UTILITIES SERVICE CO.
CONNECTICUT YANKEE
STEAM GENERATOR BLOWDOWN
LOOP 4

JVG 12-10-81 MRP 12-21-81

16103 20231-SH-103DL