MECHANICAL SYMBOLS & NOTES

VALVE BODY TYPE

- GATE VALVE
- DOUBLE DISC GATE VALVE
- GLOBE VALVE
- NEEDLE VALVE
- PLUG COCK VALVE
- BALL VALVE
- DIAPHRAGM VALVE
- HERMETICALLY SEALED VALVE
- ANGLE VALVE
- THREE WAY VALVE
- BLACKED IN VALVES ARE NORMALLY CLOSED. VALVE POSITION SHOWN IS AS IT IS DURING POWER OPERATION. VALVES THAT ARE NOT BLACKENED IN ARE NORMALLY "NOT CLOSED". THEY MAY BE OPEN OR THROTTLE. VALVE POSITIONS (CLOSED OR NOT CLOSED) ARE DEPICTED ON THESE DRAWINGS AND CONTROLLED BY OPERATING PROCEDURES.
- CHECK VALVE
- STOP CHECK VALVE (NORMALLY OPEN)
- STOP CHECK VALVE (NORMALLY CLOSED)
- BUTTERFLY VALVE FLANGED OR WAFER TYPE (NORMALLY OPEN)
- BUTTERFLY VALVE FLANGED OR WAFER TYPE (NORMALLY CLOSED)
- POST INDICATOR VALVE
- FIRE PROTECTION POST INDICATOR VALVE
- BLOW OFF VALVE
- "Y" PATTERN VALVE
- FLOAT CHECK VALVE
- AIR RELEASE VALVE
- VACUUM BREAKER
- VARIABLE CAPILLARY PRESSURE REDUCING ELEMENT
- FOOT VALVE WITH STRAINER
- DIVERTER VALVE
- SAFETY AND RELIEF VALVE
- GLOBE VALVE OR BALL VALVE
- HERMETICALLY SEALED VALVE OR BALL VALVE
- BALANCING VALVE

VALVE OPERATOR TYPES

- AIR DIAPHRAGM
- ELECTRIC MOTOR
- SOLENOID
- PISTON
- MANUAL GEAR OPERATED
- EXTENSION STEM OPERATOR
- QUICK OPENING
- SELF CONTAINED PRESSURE REGULATOR
- THROTTLING
- PROCESS ACTUATED AIR DIAPHRAGM OPERATOR WITH VALVE POSITIONER
- INSTRUMENT ACTUATED AIR DIAPHRAGM OPERATOR WITH VALVE POSITIONER

VALVE ACCESSORIES, DEFINITIONS AND ABBREVIATIONS

- STEM LEAKOFF
- BELLOWS SEAL
- CAPPED STEM
- EXTENSION STEM THROUGH SHIELD WALL OR FLOOR
- EXTENSION STEM NO WALL OR FLOOR PENETRATION
- FC — FAIL CLOSED
- FO — FAIL OPEN
- FAI — FAIL AS IS
- LC — LOCKED CLOSED — SEE NOTE 22 AND 23
- LC-2 — LOCKED CLOSED DURING UNIT 2 CONSTRUCTION — SEE NOTE 24
- LO — LOCKED OPEN — SEE NOTE 23
- SO — SEALED OPEN — SEE NOTE 25
- LIP — LOCKED IN POSITION — SEE NOTE 23
- NC — NORMALLY CLOSED
- NO — NORMALLY OPEN
- TC — TEST CONNECTION
- TD — TEST DRAIN
- TV — TEST VENT
- V — VENT
- D — DRAIN
- DH — DRAIN HEADER

PIPE AND EQUIPMENT ACCESSORIES

- RUPTURE DISC
- FLOW RESTRICTION ORIFICE
- SIGHT FLOW INDICATION
- THERMAL SLEEVE
- BLIND FLANGE
- CAPPED STUB
- REDUCER
- EXPANSION JOINT
- QUICK DISCONNECT COUPLING
- HOSE CONNECTION
- LOOP SEAL TRAP
- FLEXIBLE CONNECTION
- FD — FLOOR DRAIN
- BREAKDOWN ORIFICE
- TEMPORARY STRAINER
- SPECTACLE FLANGE
- WELD CAP
- CONTAINMENT ISOLATION CAP
- THREADED OR SOCKET WELDED CAP
- EDUCTOR OR EJECTOR
- CLASS 1 TO CLASS 2 FLOW RESTRICTOR (SPECIAL BRANCH CONNECTION)
- EXTERNAL MONITORING DEVICE
- DISC-LESS CHECK VALVE, INTERNALS REMOVED

PIPE AND EQUIPMENT ACCESSORIES (CONTINUED)

- 152 | 303 — PRESSURE CLASS TRANSITION
- BLENDER
- PENETRATION
- BASKET STRAINER
- S — SEPARATOR
- DOUBLE BASKET STRAINER
- T — STEAM TRAP
- JOHNSON SCREEN
- Y-STRAINER
- F — FILTER
- TEMPORARY CONE TYPE STRAINER
- OPEN FUNNEL DRAIN SYSTEM
- VENT STACK
- LOUVER
- FORWARD-REVERSE PITOT
- BY INSTR CONTR / BY PIPING CONTR — FLOW NOZZLE
- FE, FT — ANNUBAR FLOW MEASUREMENT (BY PIPING CONTR / BY INSTR CONTR)
- FT, FE — ORIFICE TYPE FLOW MEASUREMENT (BY INSTR CONTR / BY PIPING CONTR)
- FI — EITHER REPRESENTS A FLOW INDICATOR
- WATER METER
- FIRE HYDRANT
- VESSEL MANWAY
- SPARGER (INSIDE VESSEL)
- SPRAY NOZZLES

EQUIPMENT

- VERTICAL U-TUBE STEAM GENERATOR
- STRAIGHT TUBE HEAT EXCHANGER
- U-TUBE HEAT EXCHANGER
- COIL TYPE HEAT EXCHANGER
- VENT CONDENSER
- IMMERSION HEATER (STEAM OR ELECTRICAL)

EQUIPMENT (CONTINUED)

- ACCUMULATOR
- M — MIXER
- SHAFT SEAL PUMP
- POSITIVE DISPLACEMENT PUMP
- CENTRIFUGAL PUMP
- SMALL CANNED MOTOR PUMP
- FAN, BLOWER, OR COMPRESSOR
- VERTICAL CANNED PUMP

INSTRUMENTATION AND CONTROL SYMBOLS
(NOTE 20)

- LOCAL MOUNTED INSTRUMENT WITH SINGLE SERVICE AND FUNCTION
- BOARD REAR MOUNTED INSTRUMENT
- BOARD FRONT MOUNTED INSTRUMENT
- DIAPHRAGM SEAL

FIRST LETTER IN BALLOON INDICATES PROCESS VARIABLE. SEE REF 1 FOR COMPLETE TAG NUMBERING SYSTEM.

C-CONDUCTIVITY
T-TEMPERATURE
P-PRESSURE
F-FLOW
L-LEVEL
R-RADIOACTIVITY
A-ANALYSIS
X-TRIP
H-HAND
M-MODIFIER
D-DENSITY

SUCCEEDING LETTERS IN BALLOON INDICATE FUNCTION SEE REF 1 STANDARDS FOR COMPLETE TAG NUMBERING SYSTEM.

A-ALARM
V-VALVE DAMPER OR LOUVER
E-ELEMENT
S-SWITCH
W-WELL
T-TRANSMITTER
G-GLASS
Q-POWER SUPPLY
I-INDICATING
R-RECORD OR PRINT
C-CONTROL
Y-TRANSDUCER

TYPICAL INSTRUMENT CONNECTIONS

STRONGBACK
2" □" 1" LT LG
BY PIPING CONTR (TYP) | BY INSTR CONTR (TYP)
LC LS
BY PIPING CONTR (TYP) | BY INSTR CONTR (TYP)
LEVEL

VALVE LOCATION NUMBER IDENTIFICATION SYSTEM

1CS-0001: UNIT 1, SYSTEM, LOCATION NUMBER
2CS-0001: UNIT 2, SYSTEM, LOCATION NUMBER
XCS-0001: UNIT COMMON, SYSTEM, LOCATION NUMBER

ITEM — LINE DESIGNATIONS

6-CC-1-01-152 R-3 (R=POTENTIALLY RADIOACTIVE NUCLEAR PIPING)
6-CC-1-02-152G R (R=POTENTIALLY RADIOACTIVE NON-NUCLEAR PIPING)

NOMINAL SIZE
SYSTEM
UNIT NUMBER
LINE NUMBERS
PIPING CATEGORIES
SAFETY CLASS (NUCLEAR PIPING ONLY)

UNIT NUMBER

1 -UNIT 1
2 -UNIT 2
X -COMMON

LINE CODING

- MAIN PROCESS FLOW LINES (OUT OF SYSTEM AND UNIT TWO DASHED)
- SECONDARY PROCESS FLOW LINES (OUT OF SYSTEM AND UNIT TWO DASHED)
- PNEUMATIC INSTRUMENT LINES
- INSTRUMENT AIR SUPPLY FIXED PRESSURE
- ELECTRICAL SIGNALS
- INSTRUMENT CAPILLARY TUBING
- INSTRUMENT LINE
- ELECTRICAL HEAT TRACING
- SS | CS — TRANSITION PIECE (STAINLESS TO CARBON STEEL)
- SS | CS — TRANSITION PIECE (TYPICAL FOR FLANGED CONN)
- SHIELD WALL PENETRATION
- FLANGE CONNECTION (PIPING OR EQUIPMENT)
- TC □" — TEST CONNECTION LOCATION
- TV □" — TEST VENT LOCATION
- IMB | OMB — MISSILE BARRIER PENETRATION
- W BY OTHERS — SPLIT OF RESPONSIBILITY
- RWMS — BOUNDARY OF RADIOACTIVE WASTE MANAGEMENT SYSTEMS
- AREA BOUNDARIES

REFERENCE BLOCK

NORMALLY ONLY LINES WITHIN SYSTEMS ARE NUMBERED, HOWEVER IT IS ACCEPTABLE TO PROVIDE THE LINE/LOCATION NUMBER FOR A SYSTEM CHANGE.

SYSTEM REFERENCE
DASHED LINE IF OUT OF SYSTEM OR UNIT TWO
SECONDARY SAMPLING SYSTEM M1-0222-0 LOC: A-6
DIRECTION OF FLOW
DRAWING COORDINATES
DRAWING NUMBER

FROM AUXILIARY FEEDWATER SYSTEM M1-0206-0 LOC: F-5
DASHED LINE IF OUT OF SYSTEM OR UNIT TWO

TO BE INSTALLED WITH UNIT 1
FURNISHED BY VENDOR

TYPICAL REPRESENTATION OF UNIT 2 EQUIPMENT
TYPICAL REPRESENTATION OF VENDOR PACKAGE

CLASSIFICATIONS

- INDICATES "ANS" SAFETY CLASS (1, 2 AND 3) OR CPSES PIPING CLASS 5 (NON-NUCLEAR SAFETY)
- INDICATES CPSES PIPING CLASS G (ANS NON-NUCLEAR SAFETY)
- INDICATES CHANGE IN ANS OR PIPING CLASS
- V, D-151R-5 (TYP), NOTE 19, D, (TYP) — EITHER INDICATES CHANGE IN SAFETY CLASS FOR VENT, DRAIN, TEST AND SAMPLE CONNECTIONS ON SAFETY CLASS PIPE.

LINE SYMBOLS

AF -AUXILIARY FEEDWATER
BR -BORON RECYCLE
CA -COMPRESSED AIR-SERVICE AIR
CB -CONTROL FLUID HOLD-UP SYSTEM
CC -COMPONENT COOLING WATER
CD -CHEMICAL FEED DRAIN
CF -CHEMICAL FEED
CG -CARBON DIOXIDE GAS/ARGON GAS
CH -CHILLED WATER
CI -COMPRESSED AIR INSTRUMENT AIR
CL -CHLORINATION
CO -CONDENSATE
CP -CONDENSATE POLISHING
CS -CHEMICAL VOLUME CONTROL AND BORON THERMAL REGENERATION
CT -CONTAINMENT SPRAY
CV -CONDENSER VACUUM AND WATER BOX PRIMING
CW -CIRCULATING WATER
DC -DOMESTIC COLD WATER
DD -DEMINERALIZED AND RCS MAKE-UP WATER
DDW -DOMESTIC DEMINERALIZED WATER
DH -DOMESTIC HOT WATER
DHR -DOMESTIC WATER-HOT RECIRCULATION
DO -DIESEL GENERATOR FUEL OIL
EH -TURBINE CONTROL FLUID
EX -EXTRACTION STEAM
FD -FLOOR DRAINS
FP -FIRE PROTECTION
FR -FEEDWATER HEATER VENTS, RELIEF AND DRAINS
FW -STEAM GENERATOR FEEDWATER
R FX -DIVERSE AND FLEXIBLE STRATEGIES (FLEX)
GH -WASTE PROCESSING-GAS
GS -TURBINE GLAND STEAM AND DRAIN
HD -HEATER DRAINS
HG -HYDROGEN GAS
LO -TURBINE LUBE OIL
LT -LEAK TEST
MS -MAIN STEAM REHEAT AND STEAM DUMP
NG -NITROGEN GAS
OG -OXYGEN GAS
PS -PROCESS SAMPLING PRIMARY PLANT
PW -POTABLE WATER
RC -REACTOR COOLANT AND RTD BYPASS
RH -RESIDUAL HEAT REMOVAL
SA -AUXILIARY STEAM
SB -STEAM GENERATOR BLOWDOWN AND CLEAN-UP
SD -STORM DRAINS
SF -SPENT FUEL POOL COOLING AND CLEAN-UP
SI -SAFETY INJECTION
SN -SANITARY WASTE DRAINS
SO -GENERATOR SEAL OIL
SS -SECONDARY PLANT SAMPLING
ST -SEWAGE TREATMENT
SW -SERVICE WATER
TO -TURBINE OIL PURIFICATION
TW -TURBINE PLANT COOLING WATER
VA -HEATING AND VENTILATION SYSTEM
VD -VENTS AND DRAINS
VH -VENT HEADER
WD -POWDERED RESIN DISPOSAL
WM -WASTE MANAGEMENT SYSTEM
WP -WASTE PROCESSING LIQUID
WR -WATER TREATMENT DRAINS
WS -TURBINE WATER SPRAY
WT -WATER TREATMENT
XG -PLANT GAS

LEGEND

SYSTEMS

RCS -REACTOR COOLANT SYSTEM
CVCS -CHEMICAL AND VOLUME CONTROL SYSTEM
SIS -SAFETY INJECTION SYSTEM
RHRS -RESIDUAL HEAT REMOVAL SYSTEM
BRS -BORON RECYCLE SYSTEM
BTRS -BORON THERMAL REGENERATION SYSTEM
SFPCS -SPENT FUEL POOL COOLING SYSTEM
WPS(L) -WASTE PROCESSING SYSTEM (LIQUID)
WPS(G) -WASTE PROCESSING SYSTEM (GAS)
CCS -COMPONENT COOLING WATER SYSTEM
SS -PROCESS SAMPLING SYSTEM (PRIMARY PLANT)
CSS -CONTAINMENT SPRAY SYSTEM
DWS -DEMINERALIZED WATER SYSTEM
RMWS -REACTOR MAKE-UP WATER SYSTEM
RCPS -REACTOR CONTROL AND PROTECTION SYSTEM

EQUIPMENT

PRT -PRESSURIZER RELIEF TANK

RWST -REFUELING WATER STORAGE TANK
RMWST -REACTOR MAKE-UP WATER STORAGE TANK
GDT -GAS DECAY TANK
FDT -FLOOR DRAIN TANK
RCDT -REACTOR COOLANT DRAIN TANK
RHT -RECYCLE HOLD-UP TANK
SDT -SHUTDOWN TANK
SRST -SPENT RESIN STORAGE TANK
WHT -WASTE HOLD-UP TANK

GENERAL

W OR W -WESTINGHOUSE
A-E -ARCHITECT ENGINEER (GIBBS & HILL)
ATM -ATMOSPHERE
IMB -INSIDE MISSILE BARRIER
OMB -OUTSIDE MISSILE BARRIER
IRC -INSIDE REACTOR CONTAINMENT
ORC -OUTSIDE REACTOR CONTAINMENT
H_2 -HYDROGEN SUPPLY
N_2 -NITROGEN SUPPLY

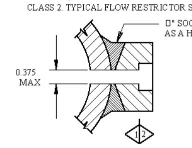
NOTES: (CONTINUED)

26. THREADED PIPE CAPS MAY BE ADDED TO OR REMOVED UNDER ADMINISTRATIVE CONTROLS FROM THE NON-SAFETY RELATED PIPING DOWNSTREAM OF ALL VENT, DRAIN AND TEST CONNECTION VALVES EXCEPT AS REQUIRED BY NOTE 27. WHERE APPLICABLE, TUBING AND FLEX HOSE MAY BE DISCONNECTED FROM THE PIPE NIPPLE AND LEFT SUPPORTED IN PLACE TO ACCOMMODATE THE INSTALLATION OF A THREADED PIPE CAP, OR TUBE CAP APPLIED PER NOTE 14.
27. LOCAL VENT, DRAIN AND TEST CONNECTION VALVES WITHIN THE CONTAINMENT PENETRATION BOUNDARY (SEE NOTE 14) ARE REQUIRED TO BE CAPPED WHERE SHOWN ON SYSTEM FLOW DIAGRAMS USING A "CONTAINMENT ISOLATION CAP" SYMBOL. THESE CAPS ARE ADMINISTRATIVELY CONTROLLED IN ACCORDANCE WITH OPERATING PROCEDURES.
28. MINIMUM REQUIREMENTS FOR PROCESS TEMPERATURE AND/OR FREEZE PROTECTION ARE TO BE MAINTAINED FOR PIPING TO BE HEAT TRACED AS SHOWN ON THE APPLICABLE FLOW DIAGRAMS. FOR PHYSICAL DETAILS OF HEAT TRACING, REFER TO E1/E2-1500 SERIES DRAWINGS.
29. FLOOR DRAIN COVERS AND FLOOR DRAIN STRAINERS LOCATED IN THE FLOOR DRAIN CUPS ARE BELOW THE LEVEL OF DETAIL SHOWN ON DESIGN DRAWINGS AND MAY BE REPLACED WITH EITHER A FLOOR DRAIN TOOL OR SOCK FILTERS OR BOTH AS DEPICTED IN DCN 11914. ENGINEERING REVIEW IS REQUIRED TO REPLACE THE SOLID DRAIN COVERS WITH A FLOOR DRAIN TOOL OR TO ADD A SOCK FILTER IN THE MSIV OR FWIV CUBICLES DURING MODES 1 THROUGH 4.

REV	DWN	CHKD	APVD	REMARKS
CP-27	DLK 04-14 2014	SM 04-14 2014		THIS DRAWING REVISED TO INCORPORATE DESIGN CHANGE FDA 2013-000008-09-00 PER SK-0002-13-000008-09-00.

NOTES:

1. THESE NOTES INDICATE GENERAL REQUIREMENTS APPLICABLE TO ALL DESIGN DRAWINGS. EXCEPTIONS AND AMENDMENTS TO THESE NOTES WILL BE INDICATED ON THE APPLICABLE DRAWINGS.
2. ALL PIPING SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE LATEST ISSUE OF THE APPLICABLE WESTINGHOUSE SPECIFICATION 6678864 AND G & H SPECIFICATIONS 2323-MS-43A, 43B, 44A, 44B AND 100.
3. FIELD WELD END PREPARATION FOR PIPING SHALL BE IN ACCORDANCE WITH THE APPLICABLE GIBBS & HILL DWGS XB-2323-M-555 THROUGH 560.
4. PIPING AND EQUIPMENT SHALL BE INSULATED IN ACCORDANCE WITH G & H SPECIFICATIONS 2323-MS-30 AND MS-31.
5. ALL DIMENSIONS SHOWN ARE IN FEET AND INCHES. PIPE SIZES ARE INDICATED BY THEIR NOMINAL DIAMETER, IN INCHES, UNLESS OTHERWISE NOTED.
6. FOR PLUMBING SYMBOLS AND NOTES SEE DRAWINGS M1-0236 AND M1-0236-A.
7. LOCATIONS, ELEVATIONS, DIMENSIONS, ETC. SHOWN ON DESIGN DRAWINGS ARE FOR PIPES IN COLD AND ERECTED POSITION. CONSIDERATION HAS BEEN GIVEN AND PROVISIONS HAVE BEEN MADE FOR THERMAL EXPANSION UNDER OPERATING CONDITIONS.
8. THE PIPING FABRICATOR SHALL MAKE ALLOWANCES FOR GASKET THICKNESSES AND WELDING GAPS NOT INDICATED ON THESE DRAWINGS.
9. CS AND SS VALVES 2" AND SMALLER WILL BE GLOBE RATED AT 600 LBS SOCKET WELD END SCH 80 UNLESS NOTED OTHERWISE.
10. FOR VENTILATION SYMBOLS AND NOTES SEE DWG MI-0313.
11. PIPE BENDS SHALL BE IN ACCORDANCE WITH G & H SPECIFICATIONS 2323-MS-43A, 43B, 44A OR 44B AS APPLICABLE.
12. PIPING FABRICATOR TO PROVIDE COMPANION FLANGES TO AGREE WITH CERTIFIED MANUFACTURERS EQUIPMENT DRAWINGS EXCEPT WHERE INDICATED ON THE COMPOSITE DRAWINGS.
13. ALL VALVES SHOWN TO HAVE LEAKOFF CONNECTIONS SHALL BE PERMANENTLY PIPED TO THE APPROPRIATE DRAIN POINT. ALL OTHER VALVES WITH LEAKOFFS WILL HAVE LEAKOFF CONNECTIONS CAPPED.
14. ON VENTS AND DRAINS WHERE A DOUBLE BARRIER/ISOLATION IS REQUIRED THE SECOND BARRIER/ISOLATION CAN BE □" OR □" CLASS 2505 TUBING/CONNECTOR WITH SWAGELOK CAPS.
15. IN SAFETY CLASS 1 PIPING A FLOW RESTRICTION IS REQUIRED, IN □" PIPING, TO ALLOW TRANSITION FROM SAFETY CLASS 1 TO SAFETY CLASS 2. TYPICAL FLOW RESTRICTOR SHOWN.



16. ALL ORIFICE PLATES USED WITH FLOW METERING INSTRUMENTATION IN THE NSSS SCOPE TO BE SUPPLIED BY WESTINGHOUSE. ALL ASSOCIATED ORIFICE FLANGES TO BE SUPPLIED BY OTHERS. ORIFICE FLANGES SHALL NOT BE LESS THAN 300 LB RF WITH FLANGE TAPS.
17. FOR ALL INSTRUMENTATION CONNECTIONS WITH A □" VALVE INSTALLED, THE PIPING SIZE IS □", AND THE PIPING PRESSURE-TEMPERATURE CLASS IS IDENTICAL TO THE CLASS OF PIPE TO WHICH IT IS CONNECTED.
18. FLOW DIRECTION FOR TEST CONNECTIONS, VENTS AND DRAINS ARE ASSUMED AWAY FROM THE PROCESS PIPING FOR VALVE ORIENTATION. FOR HERMETICALLY SEALED VALVES SUCH AS ROCKWELL-EDWARDS HERMAVALVES, THE PREFERRED VALVE FLOW ORIENTATION IS AWAY FROM THE PROCESS PIPING FOR VENT, DRAIN, TEST VENT, AND TEST DRAIN VALVES AND TOWARD THE PROCESS PIPING FOR TEST CONNECTION VALVES. HOWEVER, INSTALLATION IN EITHER ORIENTATION IS ACCEPTABLE.
19. APPROPRIATE DRAIN SUBSYSTEM(S) SHALL BE IDENTIFIED FOR ALL DRAIN POINTS BY GENERAL NOTE OR DRAIN POINT LEGEND OR BOTH.
20. FOR ADDITIONAL INSTRUMENTATION AND CONTROL SYMBOLS SEE THE M1-2200 SERIES DRAWINGS.
21. FOR INSTRUMENTATION SAFETY CLASS CHANGES REFER TO SPECIFICATION CPES-I-1018.
22. VALVES WHICH ARE LOCKED CLOSED FOR CONTAINMENT ISOLATION ARE DESCRIBED IN DBD-ME-013 AND SHALL BE CONTROLLED IN ACCORDANCE WITH TECHNICAL SPECIFICATION 3.6.3.
23. VALVES WHICH ARE LOCKED FOR OTHER THAN CONTAINMENT ISOLATION ARE DESCRIBED IN THEIR RESPECTIVE SYSTEM DESIGN BASIS DOCUMENT AND SHALL BE CONTROLLED IN ACCORDANCE WITH PRECAUTIONS AND LIMITATIONS THEREIN.
24. VALVE IS LOCKED CLOSED DURING UNIT 2 CONSTRUCTION/ UNIT 1 OPERATION TO SERVE AS UNIT 1/ UNIT 2 CROSS TIE ISOLATION. CONTROL OF VALVES AND LOCKS SHALL BE BY UNIT 1 OPERATORS.
25. VALVE IS SEALED OPEN. ALL AIR AND POWER CONNECTIONS ARE REMOVED AND THE VALVE IS SECURED IN THE OPEN POSITION.

NOTES: (CONTINUED BELOW)

REFERENCES:

EQUIPMENT LIST
LINE LIST
MOTOR LIST
VALVE LIST
SPECIALTY LIST
PIPING SPECIFICATION SHEETS
INSTRUMENTATION AND CONTROL DIAGRAM

THE FOLLOWING REFERENCES APPLY TO NSSS SCOPE — FLOW DIAGRAM ONLY

A. W WASTE PROCESSING PANEL, DWG 271C594
B. W ANNUNCIATOR LIST, DWG NUMBER
C. W MASTER COMPUTER INPUT/OUTPUT LIST
D. W RADIATION MONITORING SYSTEM, DWG 206C860
E. W PROCESS CONTROL BLOCK DIAGRAMS, DWG NUMBER
F. W ELEMENTARY WIRING DIAGRAMS, DWG NUMBER
G. W CONTROL AND ELECTRICAL STANDARDS SECTION 1.1 APPLICATION OF SYMBOLS FOR INSTRUMENT DIAGRAMS. SECTION 3.0-INSTRUMENT INSTALLATION DETAILS
H. W VALVE REFERENCE GUIDE, E-SPEC G-677473 REV
I. W MATERIAL SPECIFICATION PIPE AND FITTINGS, E-SPEC G-678854 REV
J. W SYSTEMS STANDARD DESIGN CRITERIA

FSAR FIGURE 3.2-1

THIS DRAWING CREATED ELECTRONICALLY

NON-SAFETY

LUMINANT
CPNPP
GLEN ROSE, TEXAS

MECHANICAL SYMBOLS & NOTES

DWG NO. M1-0200 | SH. NO. - | REV. CP-27

< FINAL PRINT >

me969100.dgn M1-0200

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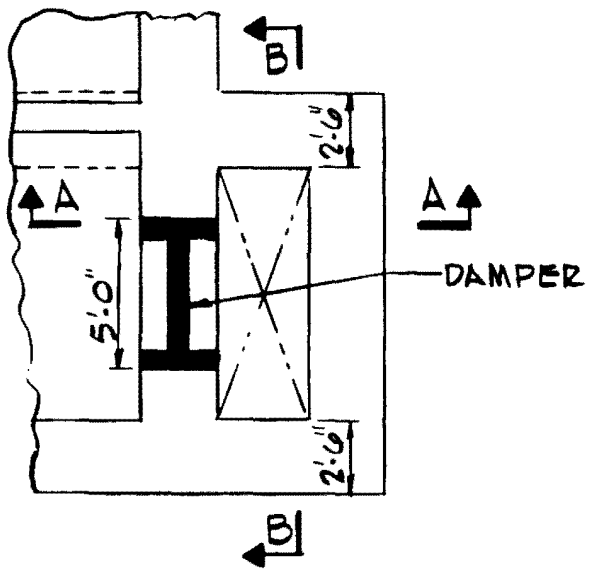
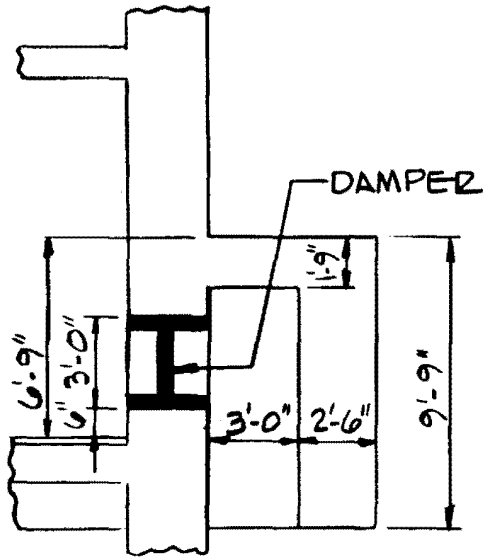
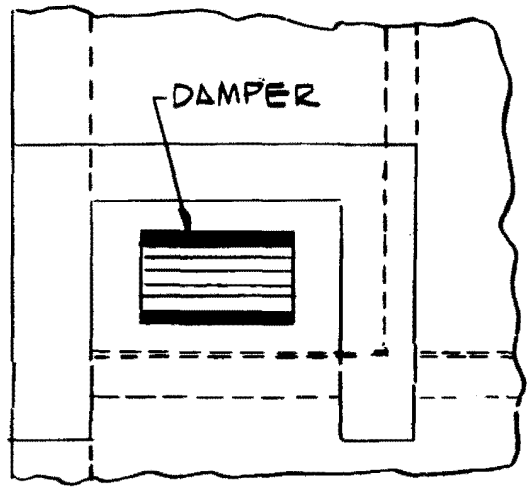


PLAN
TYPICAL WALL OPENING
WITH MISSILE BARRIER



SECTION A-A



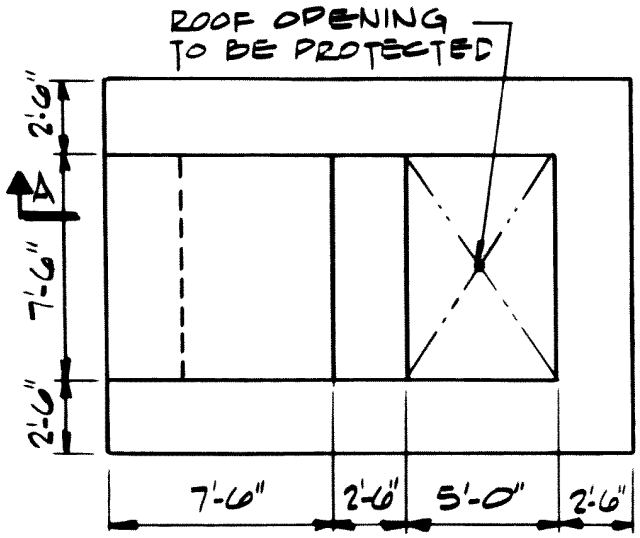
SECTION B-B

AMENDMENT 42
SEPTEMBER 12, 1983

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

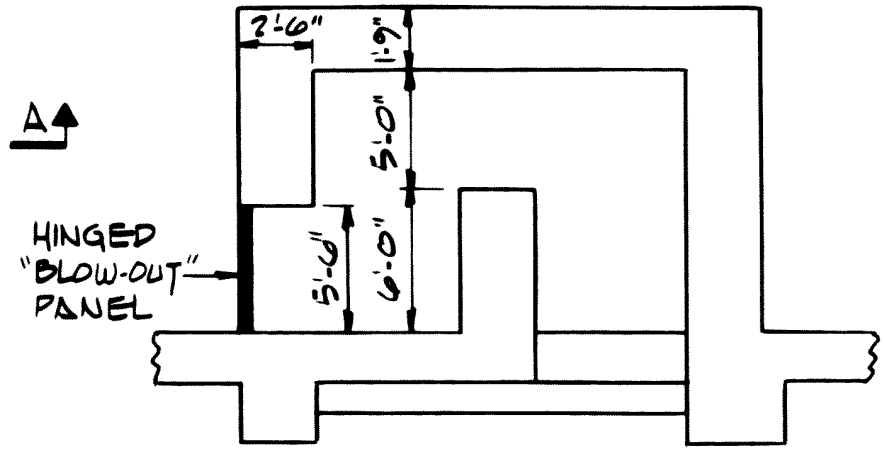
TYP. EXTERIOR WALL OPENING
FOR TORNADO DAMPERS

FIGURE 3.3-1



PLAN

TYPICAL ROOF OPENING WITH MISSILE BARRIER



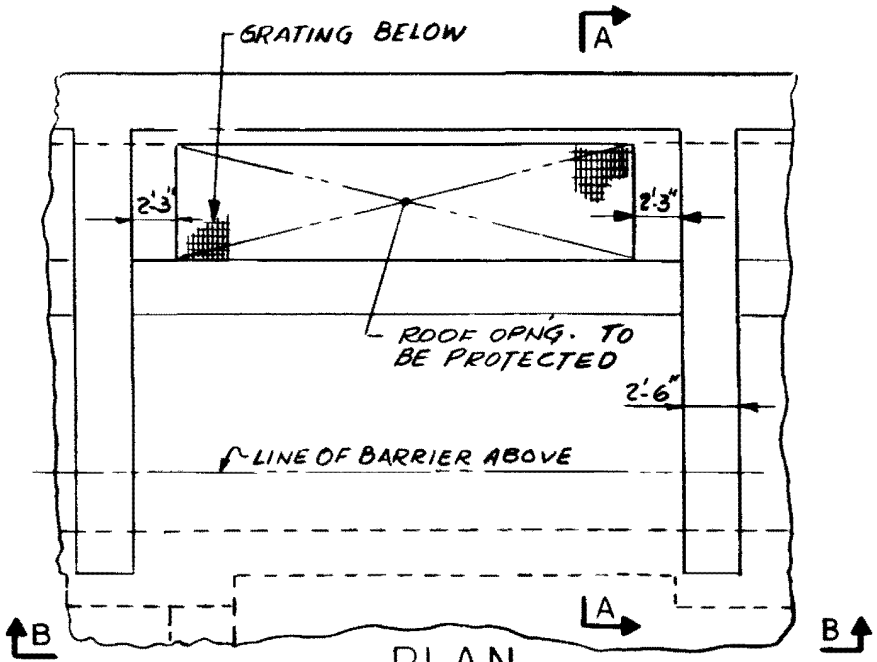
SECTION A-A

AMENDMENT 42
SEPTEMBER 12, 1983

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

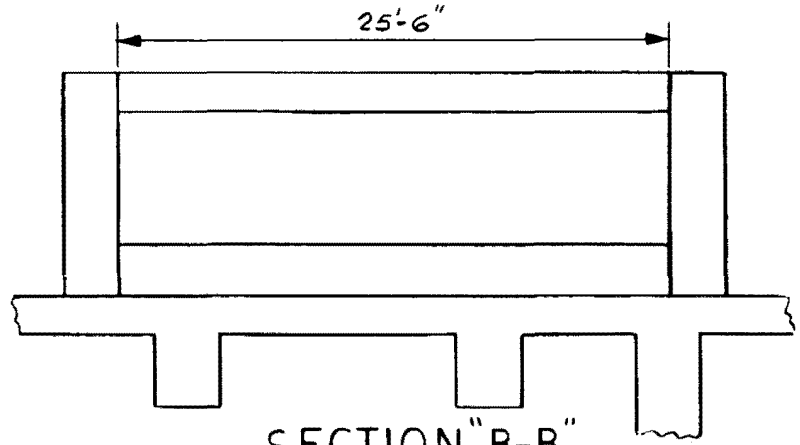
TYP. ROOF OPENING
MISSILE BARRIER

FIGURE 3.3-2

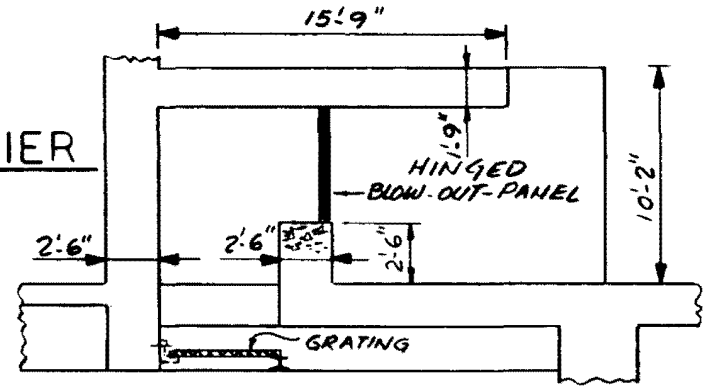


PLAN

TYP. ROOF OPN'G. WITH MISSILE BARRIER



SECTION "B-B"



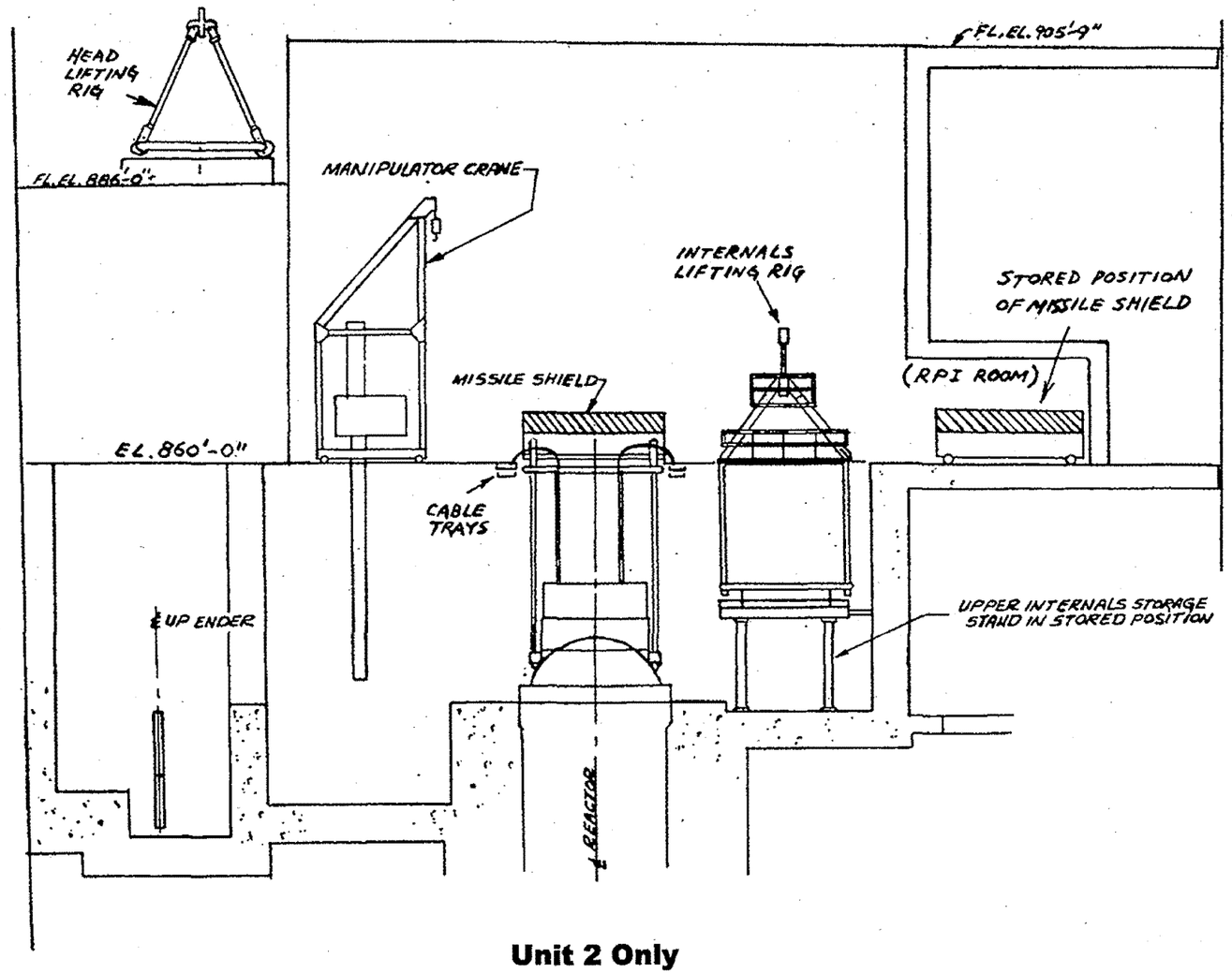
SECTION "A-A"

AMENDMENT 42
SEPTEMBER 12, 1983

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

TYP. ROOF OPENING MISSILE BARRIER WITH PROTECTIVE GRATING

FIGURE 3.3-3

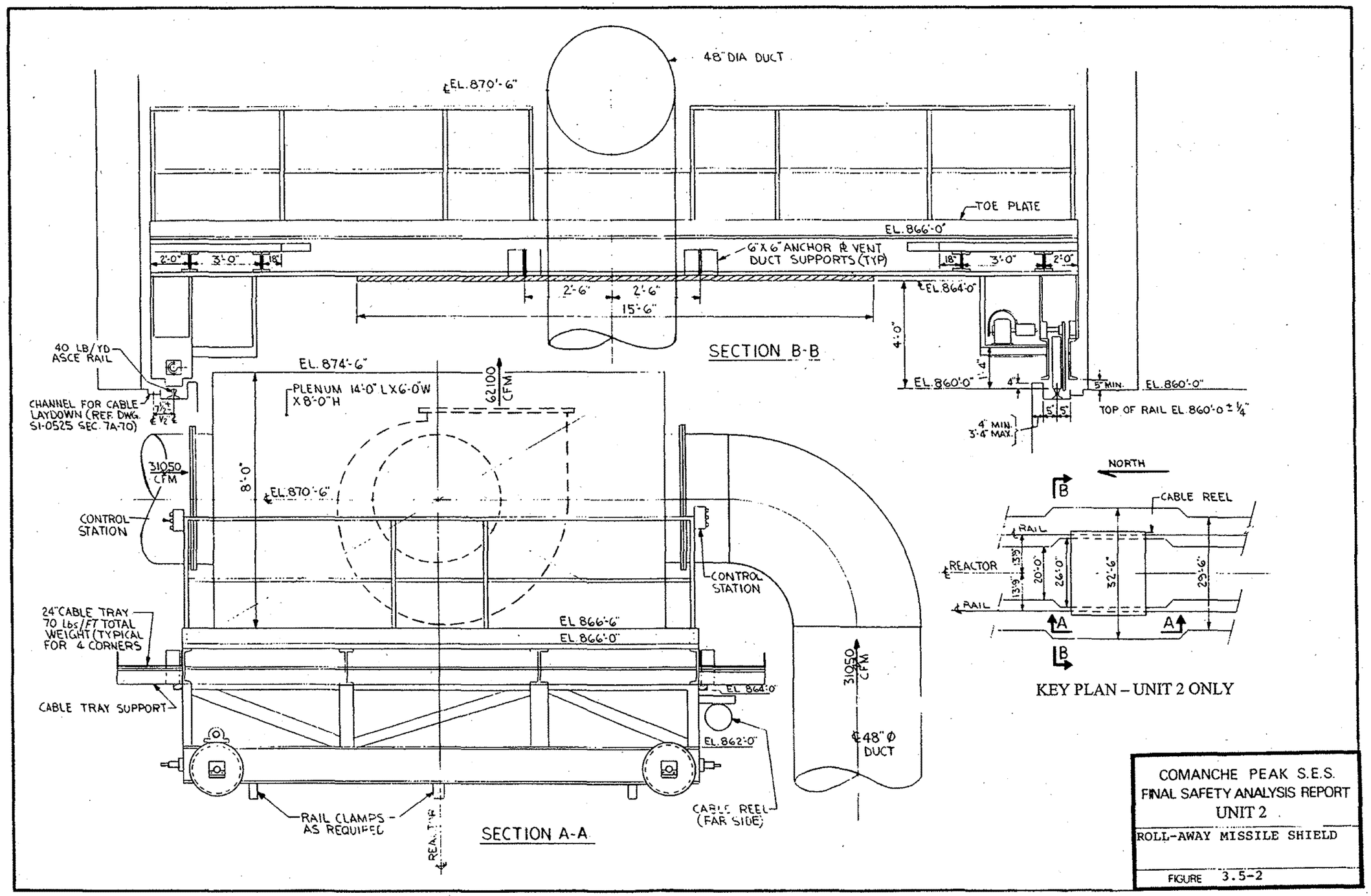


Unit 2 Only

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNIT 2

STATIONARY STORAGE SCHEME
ROLL-AWAY MISSILE SHIELD

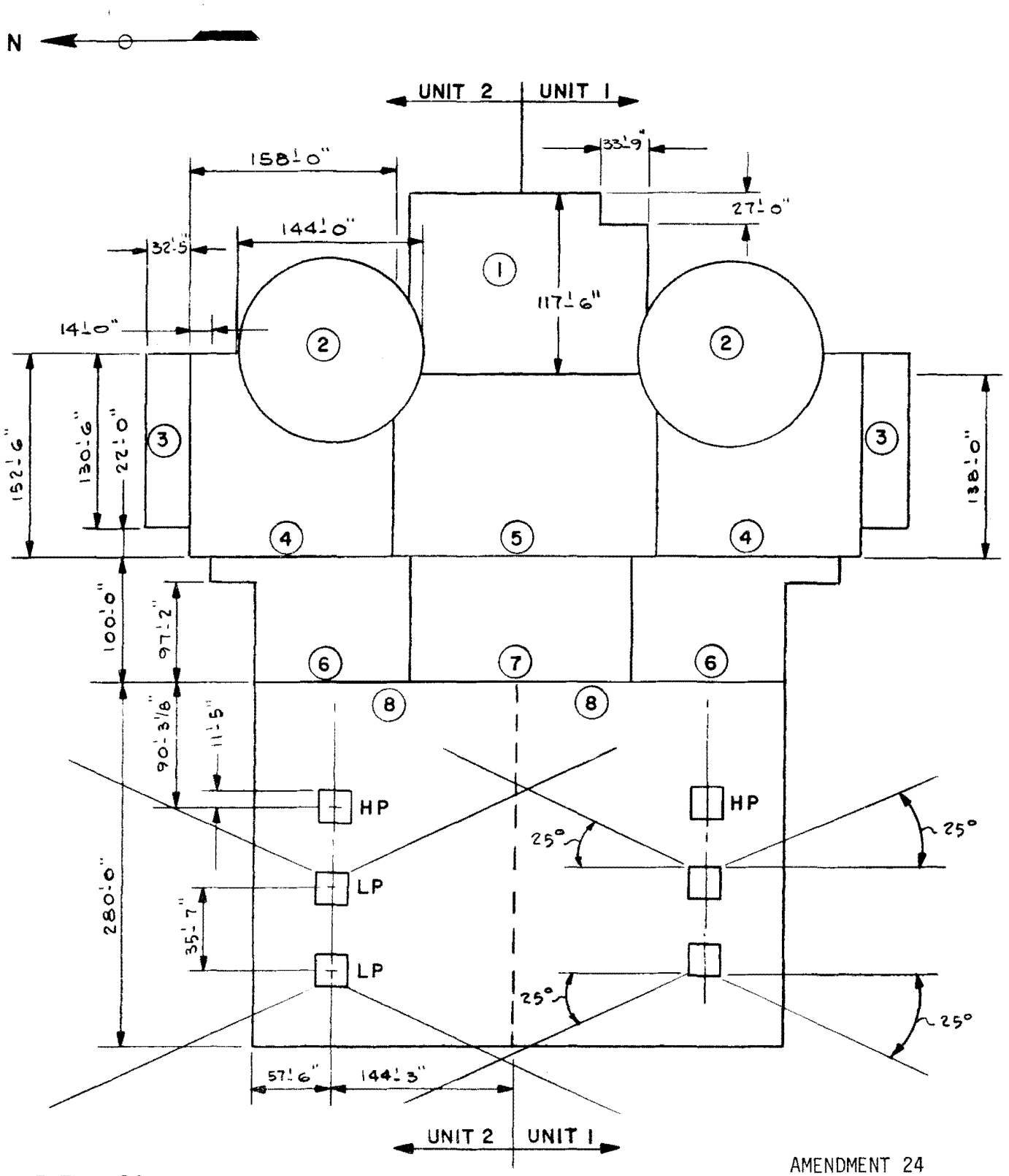
FIGURE 3.5-1



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNIT 2

ROLL-AWAY MISSILE SHIELD

FIGURE 3.5-2



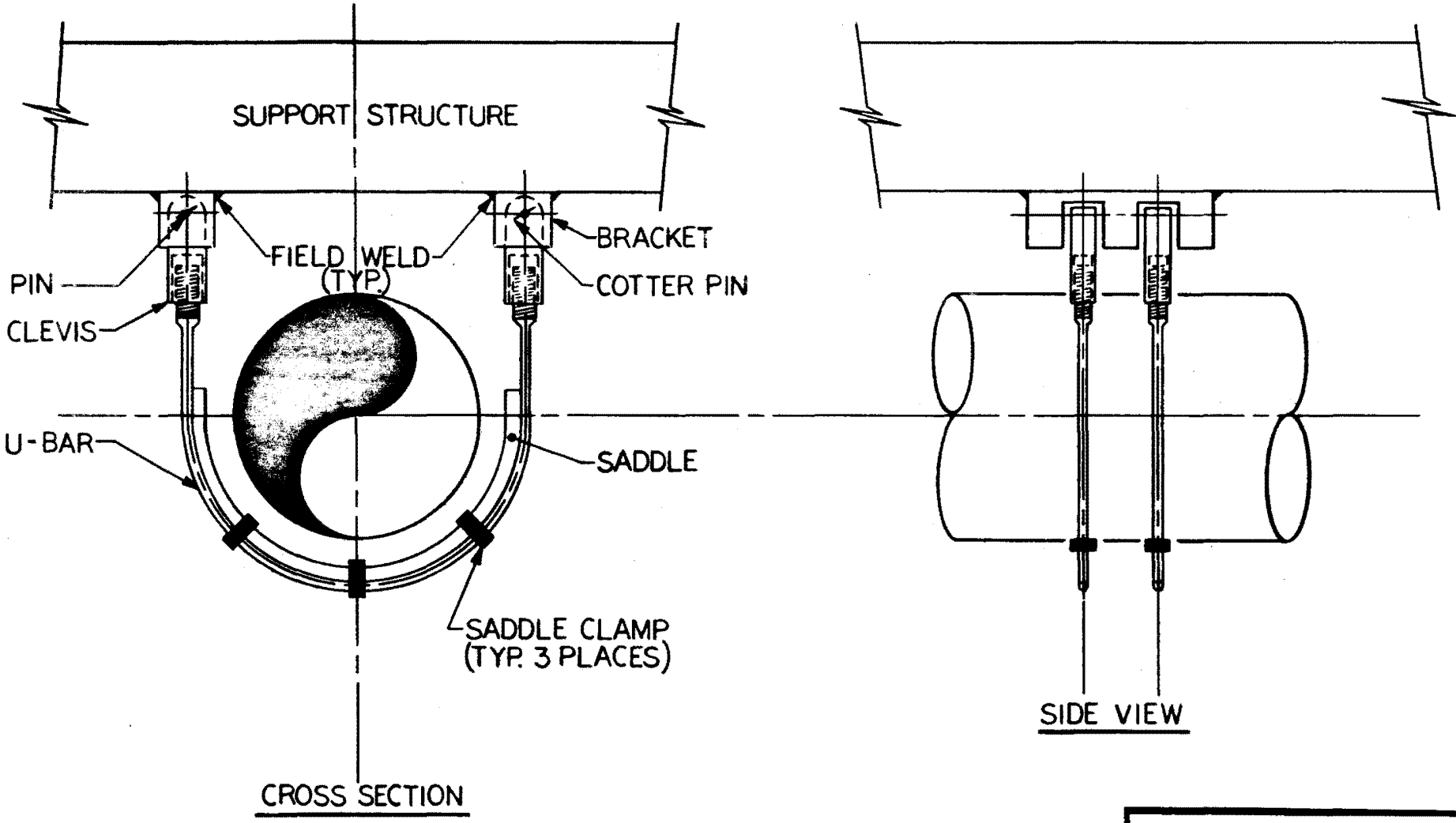
1. FUEL BLDG.
2. REACTOR BLDG.
3. DIESEL BLDG.
4. SAFEGUARDS BLDG.
5. AUXILIARY BLDG.
6. SWITCHGEAR BLDG.
7. ELECTRICAL & CONTROL BLDG.
8. TURBINE BLDG.

AMENDMENT 24
JULY 17, 1981

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

TURBINE MISSILE STRIKE ZONE - PLAN VIEW

FIGURE 3.5-3

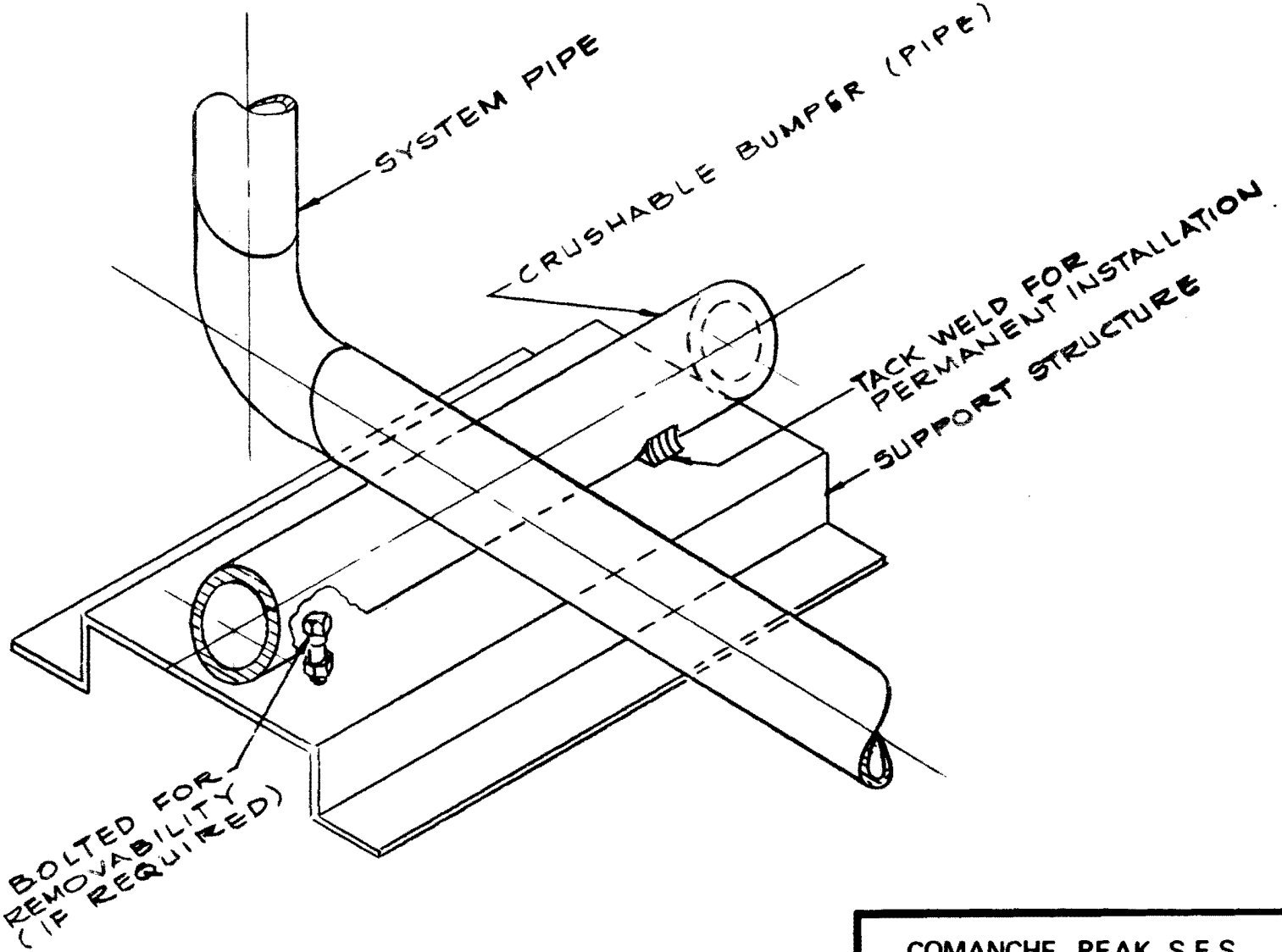


AMENDMENT 11
JULY 31, 1980

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

TYPICAL U-BAR
RESTRAINT

FIGURE 3.6B-1

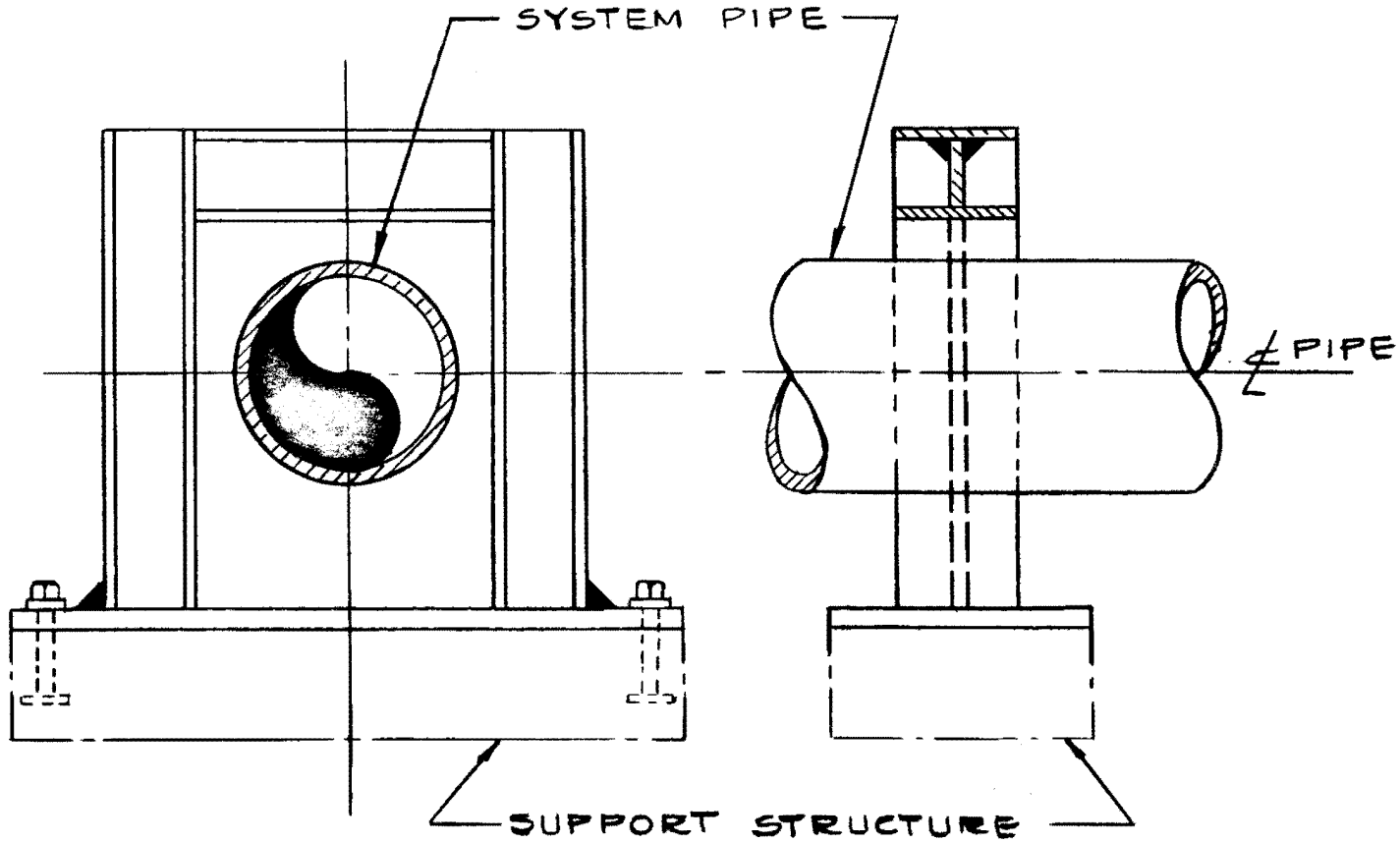


COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

TYPICAL PIPE WHIP RESTRAINT-CRUSHABLE BUMPER TYPE

FIGURE 3.6B-2

AMENDMENT 11
JULY 31, 1980

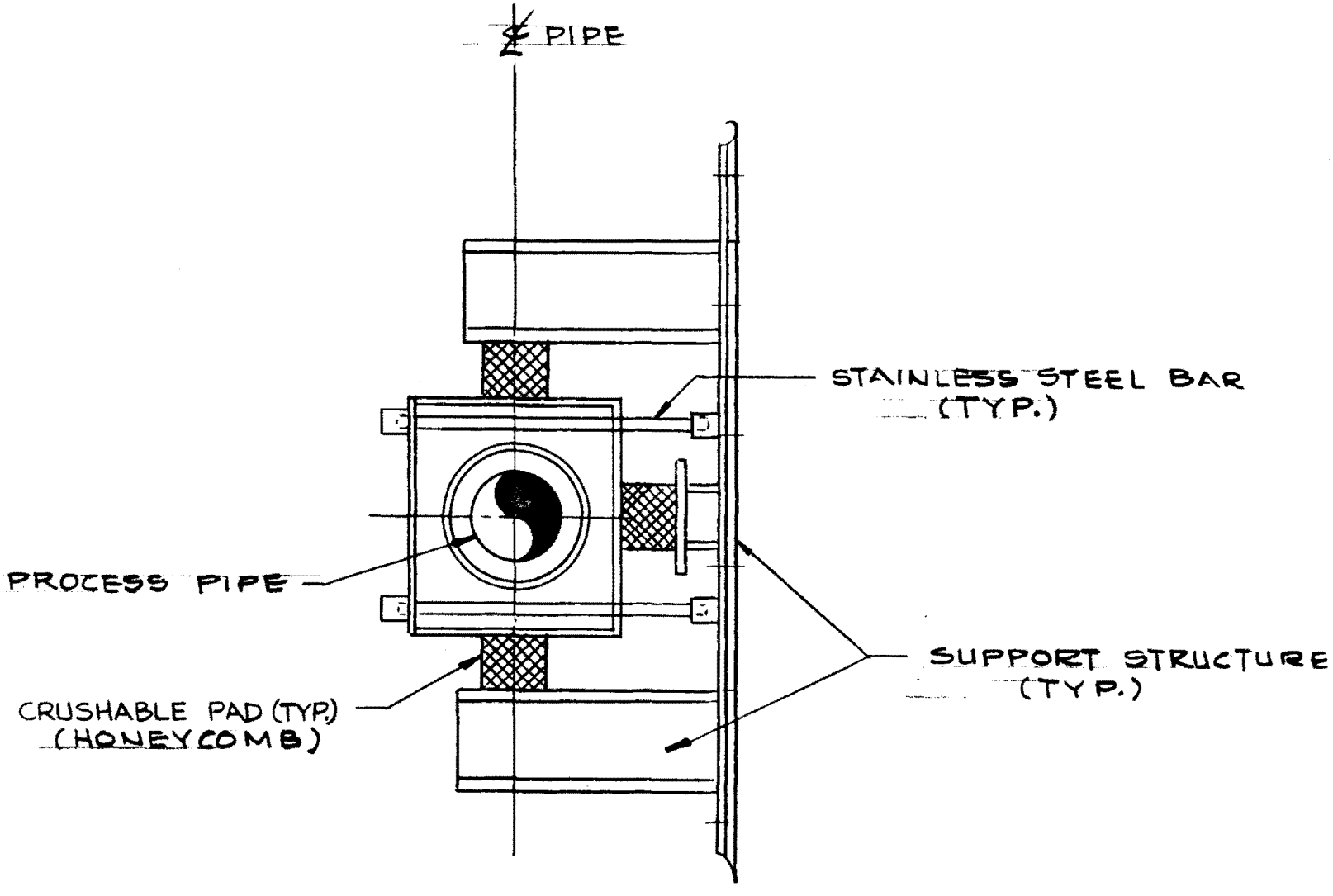


AMENDMENT 11
JULY 31, 1980

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

TYPICAL PIPE WHIP
RESTRAINT-HARD TYPE

FIGURE 3.6B-3

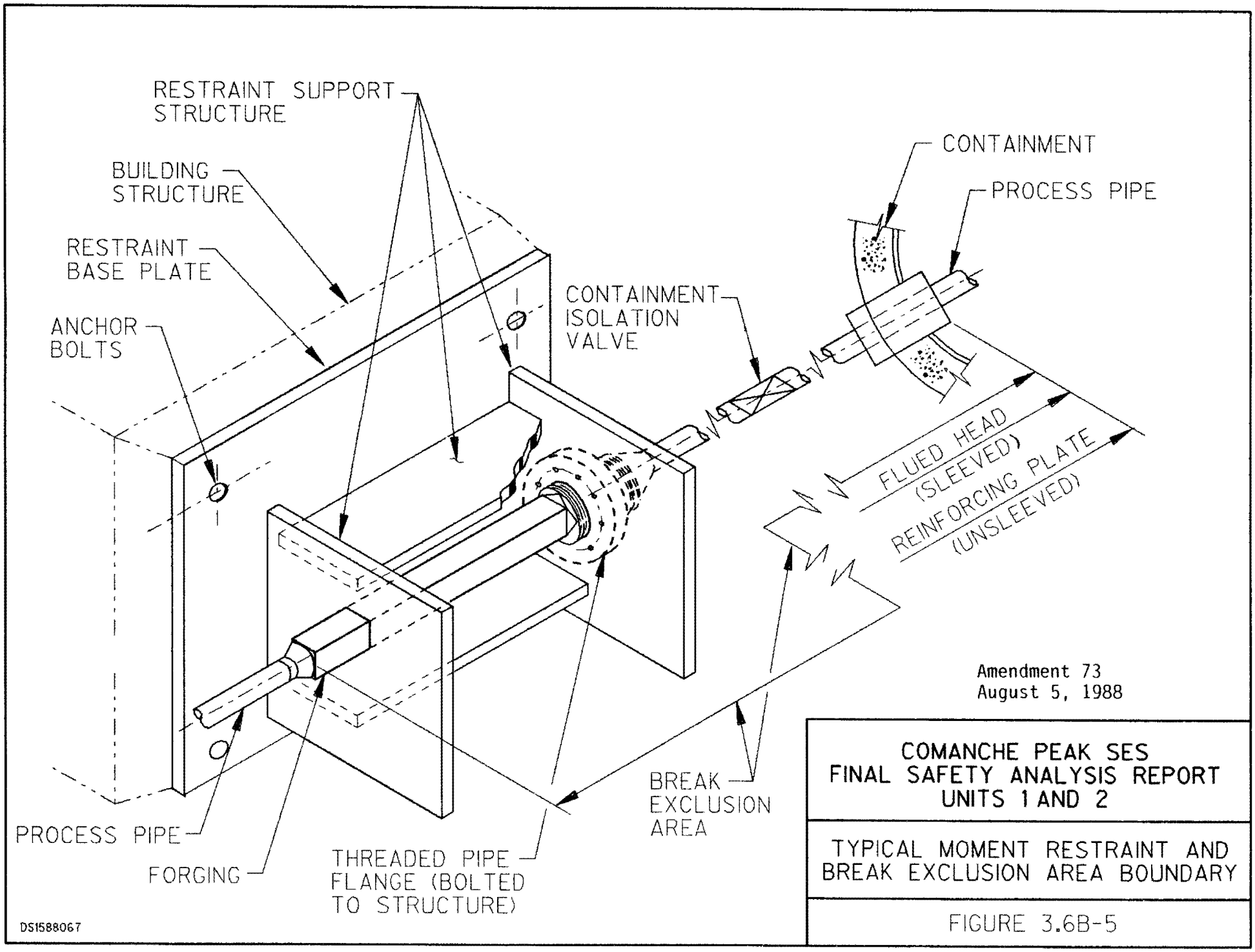


AMENDMENT 11
JULY 31, 1980

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

TYPICAL PIPE WHIP
RESTRAINT-IMPACT
ABSORBING TYPE

FIGURE 3.6B-4

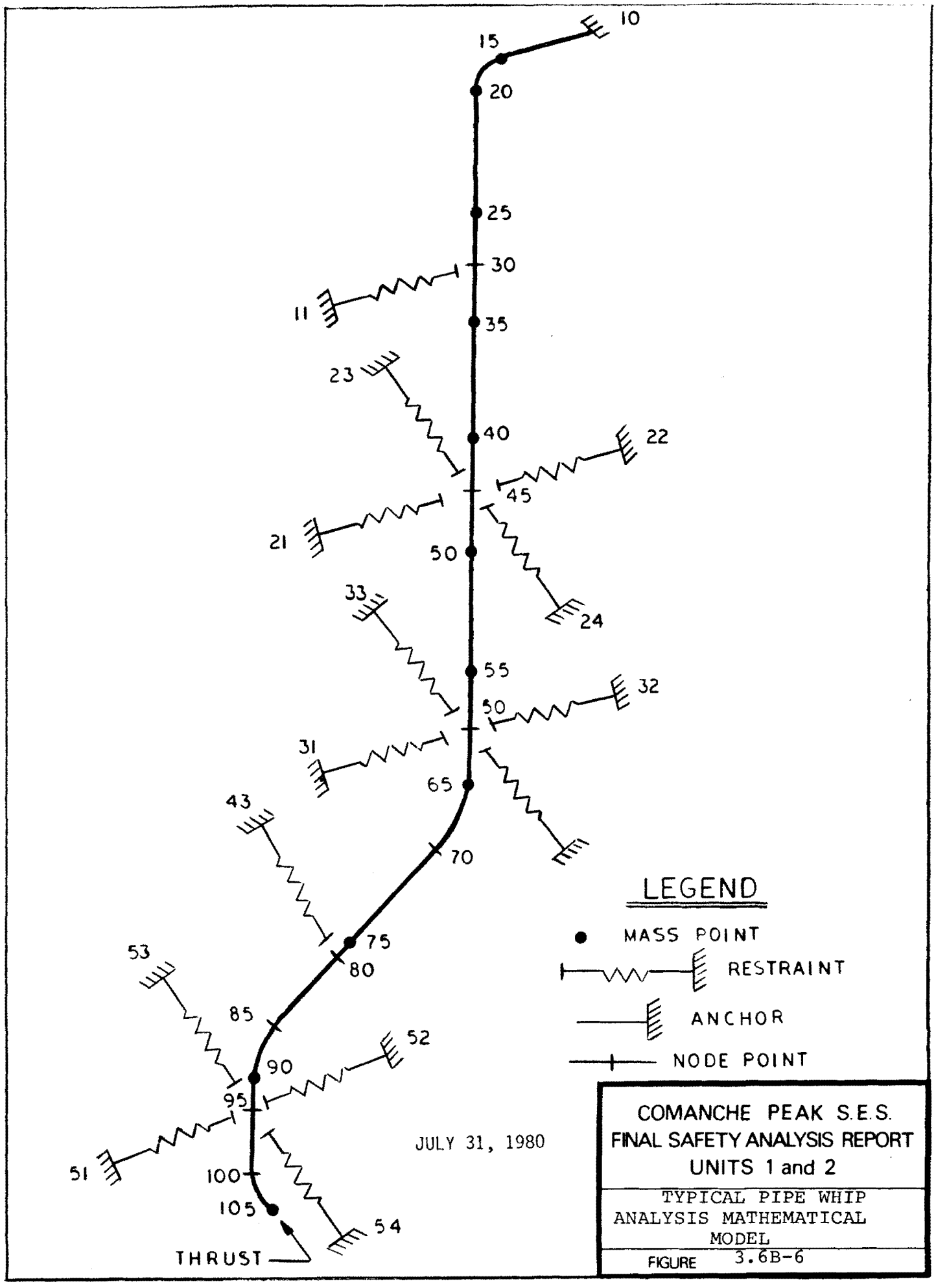


Amendment 73
August 5, 1988

COMANCHE PEAK SES
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

TYPICAL MOMENT RESTRAINT AND BREAK EXCLUSION AREA BOUNDARY

FIGURE 3.6B-5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105
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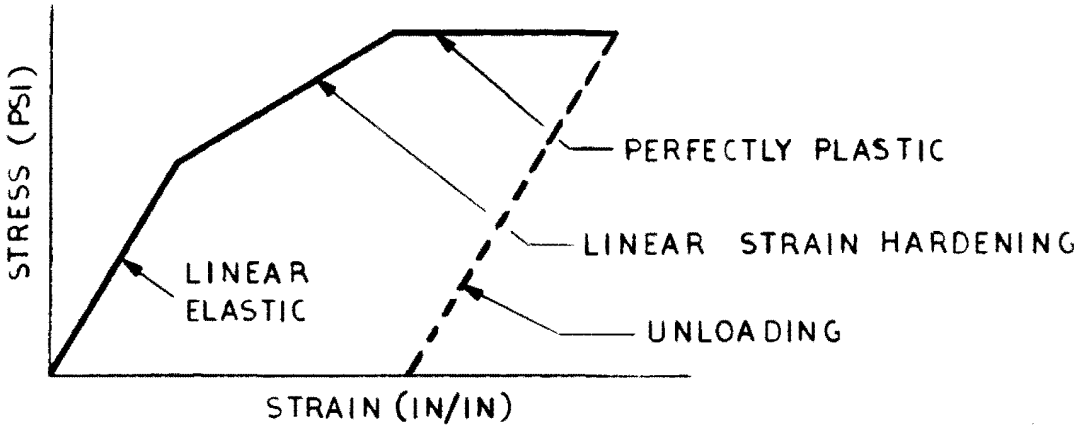
THRUST
LEGEND
MASS POINT
RESTRAINT
ANCHOR
NODE POINT
JULY 31, 1980
COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2
TYPICAL PIPE WHIP
ANALYSIS MATHEMATICAL
MODEL
FIGURE 3.6B-6

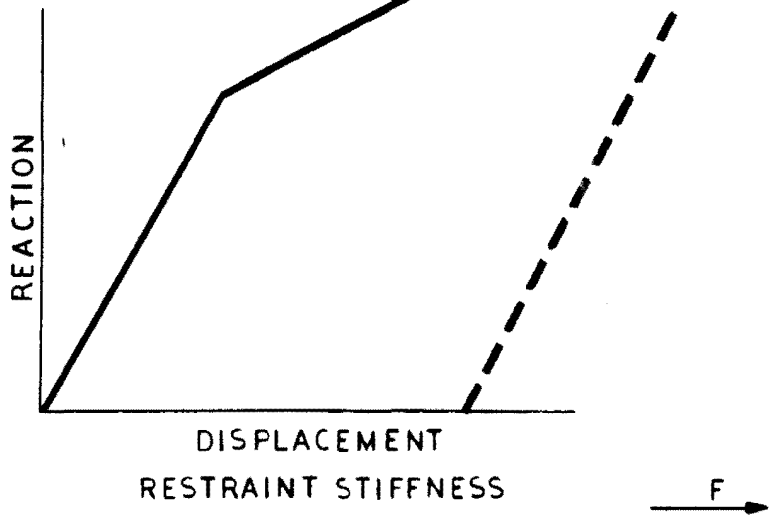


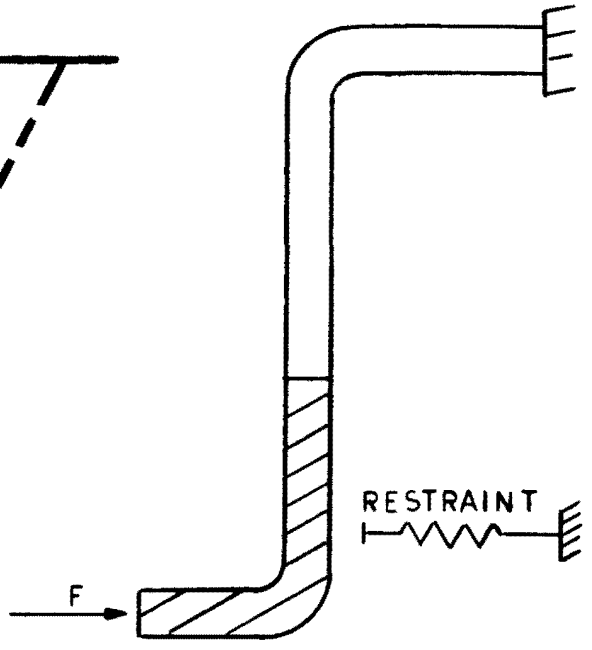
JULY 31, 1980

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

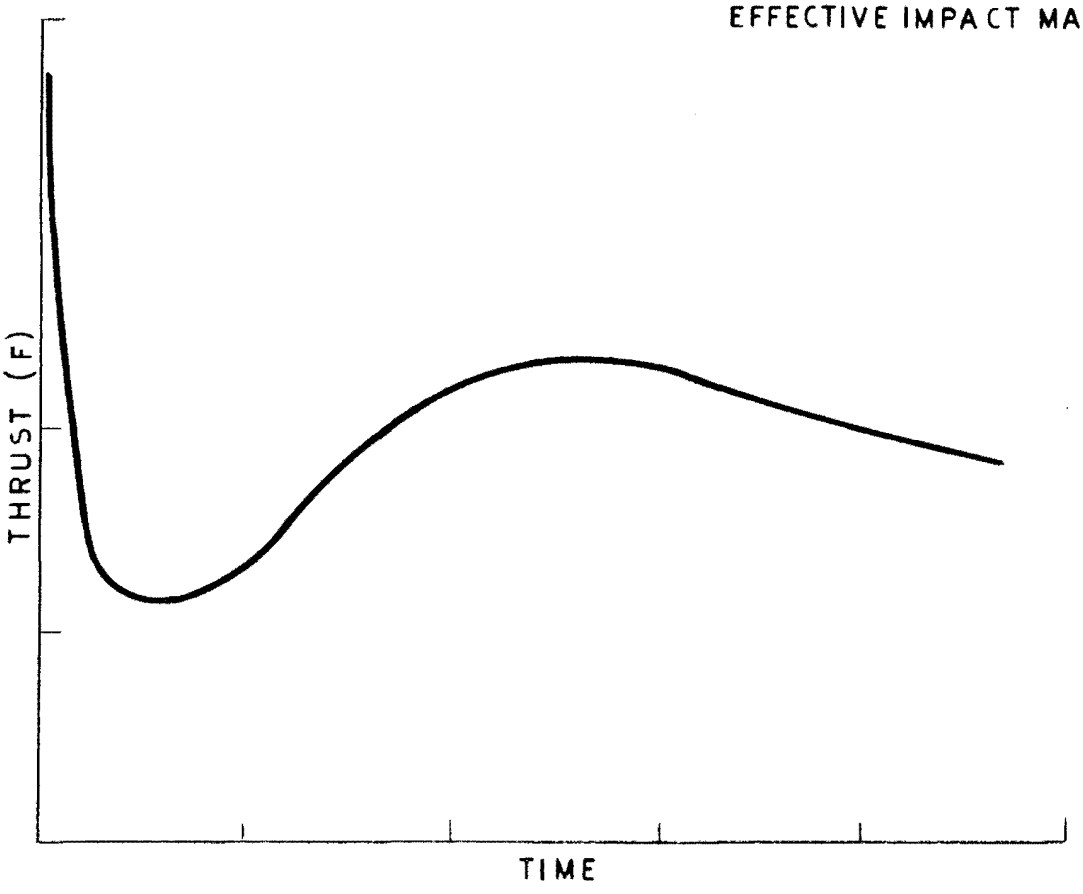
PIPING STRESS-STRAIN CHARACTERISTICS

FIGURE 3.6B-7





EFFECTIVE IMPACT MASS



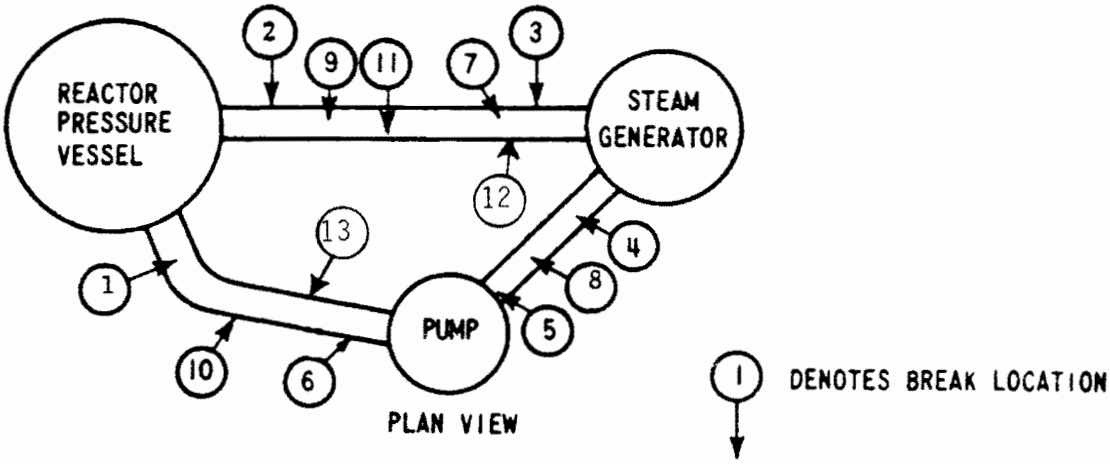
BLOWDOWN THRUST-TIME HISTORY

JULY 31, 1980

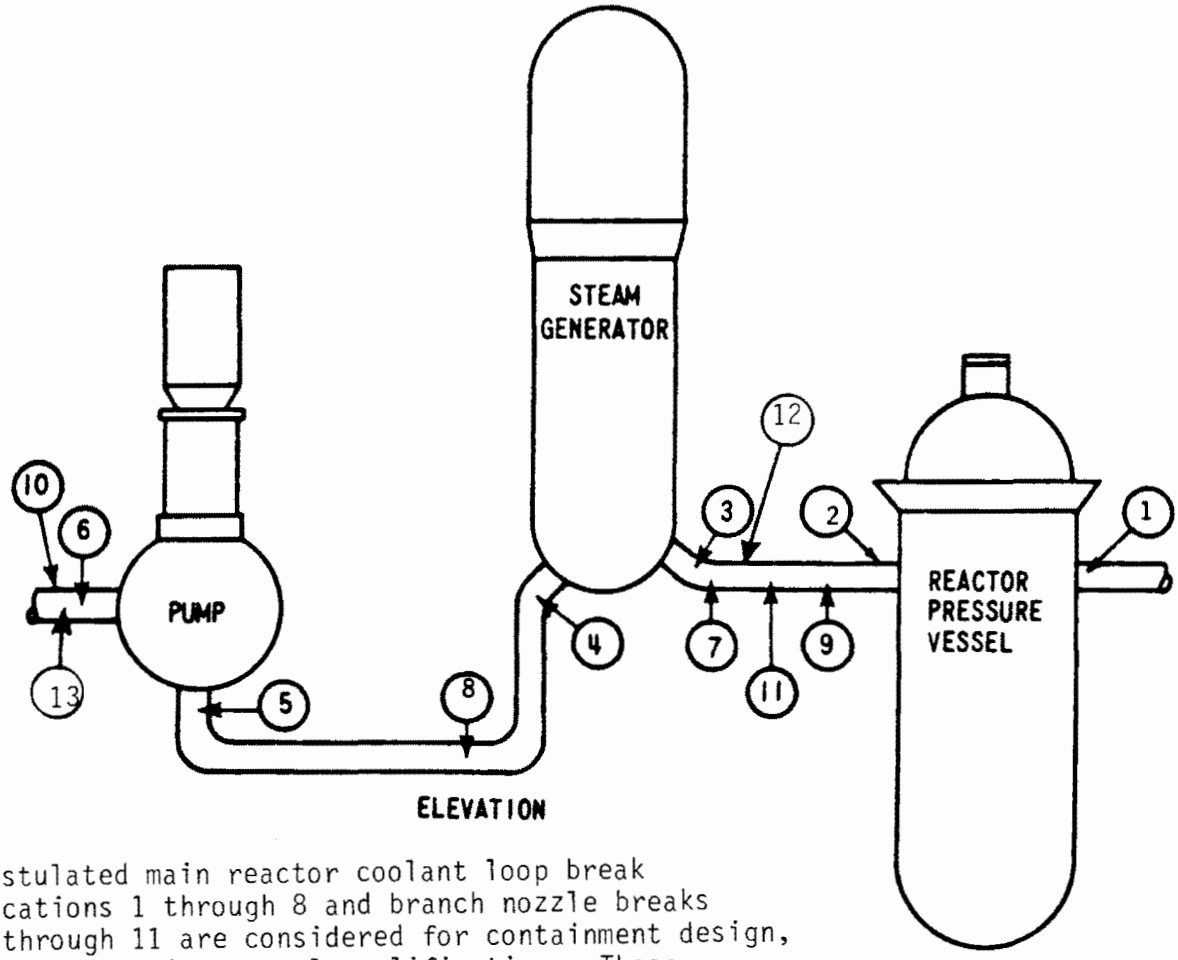
COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

RESTRAINT IMPACT

FIGURE 3.6B-8



PLAN VIEW



ELEVATION

NOTE: 1. Postulated main reactor coolant loop break locations 1 through 8 and branch nozzle breaks 9 through 11 are considered for containment design, ECCS and enviornmental qualification. These breaks are not postulated for dynamic effects. (Sections 3.6B.2.1.1 and 3.6B.2.1.2)

2. Branch nozzle breaks 12 and 13 are considered to account for the dynamic effects attributible to the largest RCL postulated breaks after application of LBB to selected lines.

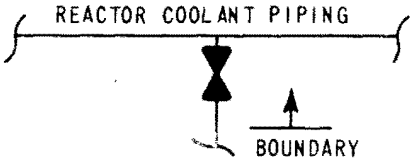
AMENDMENT 76
MAY 1, 1989

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Location of Postulated Breaks in Main Reactor Coolant Loop

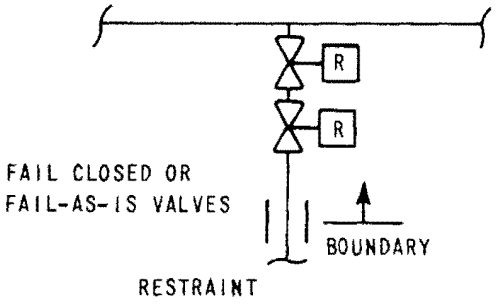
FIGURE 3.6B-9

CASE I OUTGOING LINES WITH NORMALLY CLOSED VALVE



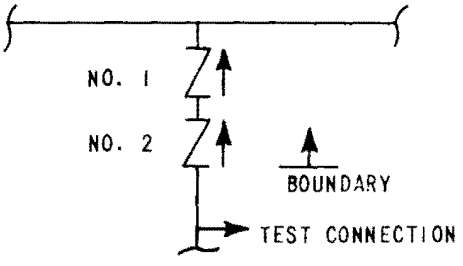
NOTE: PRESSURIZER SAFETY VALVES ARE INCLUDED UNDER THIS CASE.

CASE II OUTGOING LINES WITH NORMALLY OPEN VALVES

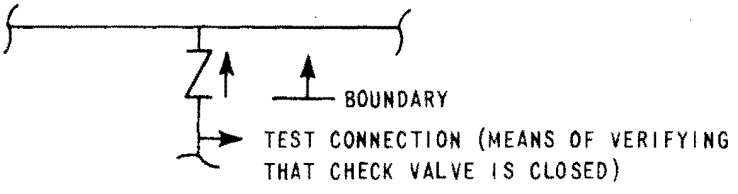


NOTE: THE REACTOR COOLANT PUMP NO. 1 SEAL IS ASSUMED TO BE EQUIVALENT TO FIRST VALVE

CASE III INCOMING LINES NORMALLY WITH FLOW



CASE IV INCOMING LINES NORMALLY WITHOUT FLOW



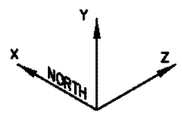
CASE V ALL INSTRUMENTATION TUBING AND INSTRUMENTS CONNECTED DIRECTLY TO THE REACTOR COOLANT SYSTEM IS CONSIDERED AS A BOUNDARY. HOWEVER, A BREAK WITHIN THIS BOUNDARY RESULTS IN A RELATIVELY SMALL FLOW WHICH CAN NORMALLY BE MADE UP WITH THE CHARGING SYSTEM.

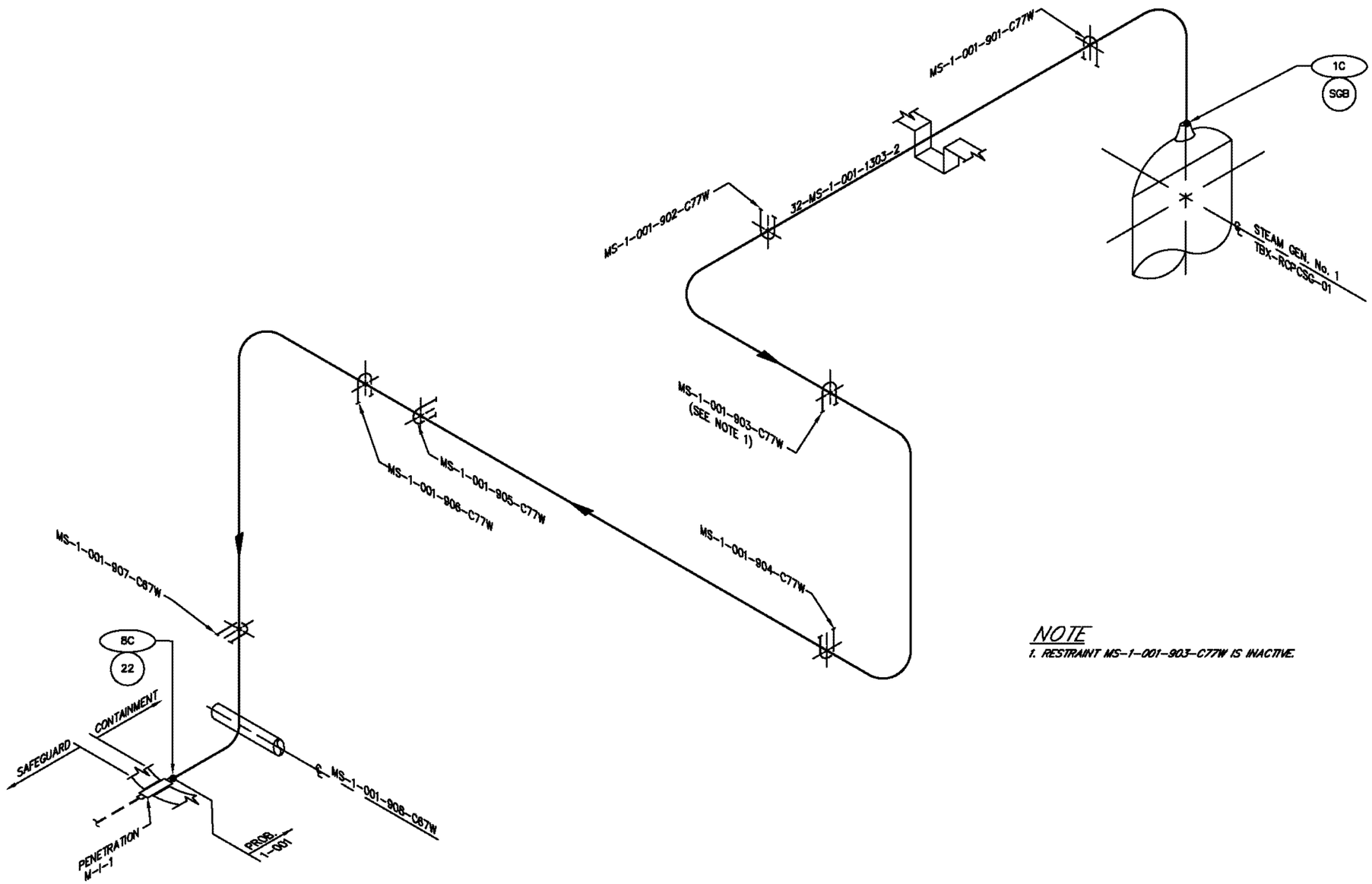
JULY 31, 1980

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Loss of Reactor Coolant Accident Boundary Limits

FIGURE 3.6B-10





LEGEND

- STRESS POINT
- BREAK NUMBER
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- BREAK LOCATION

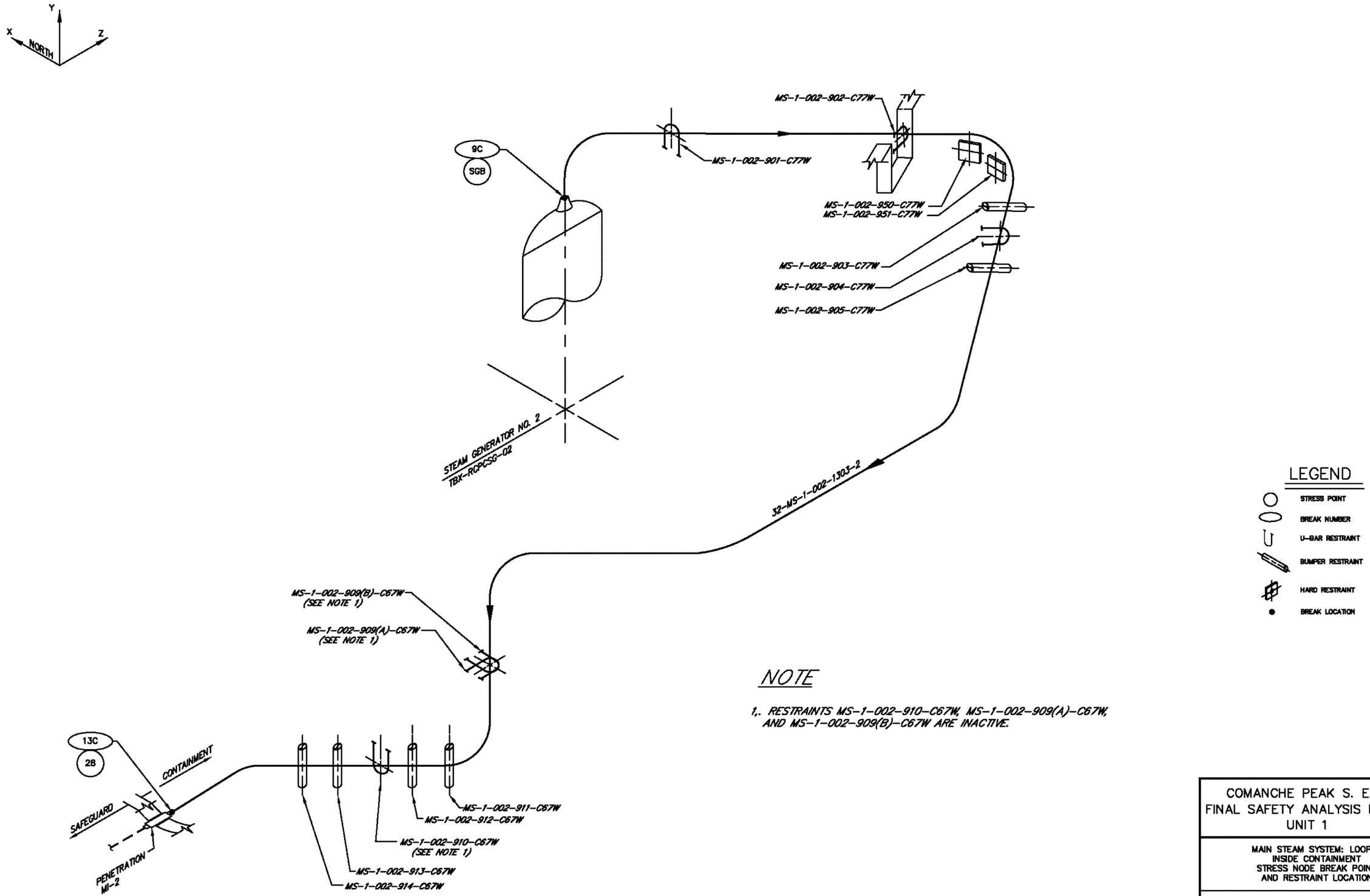
NOTE

1. RESTRAINT MS-1-001-903-C77W IS INACTIVE.

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

MAIN STEAM SYSTEM: LOOP 1
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

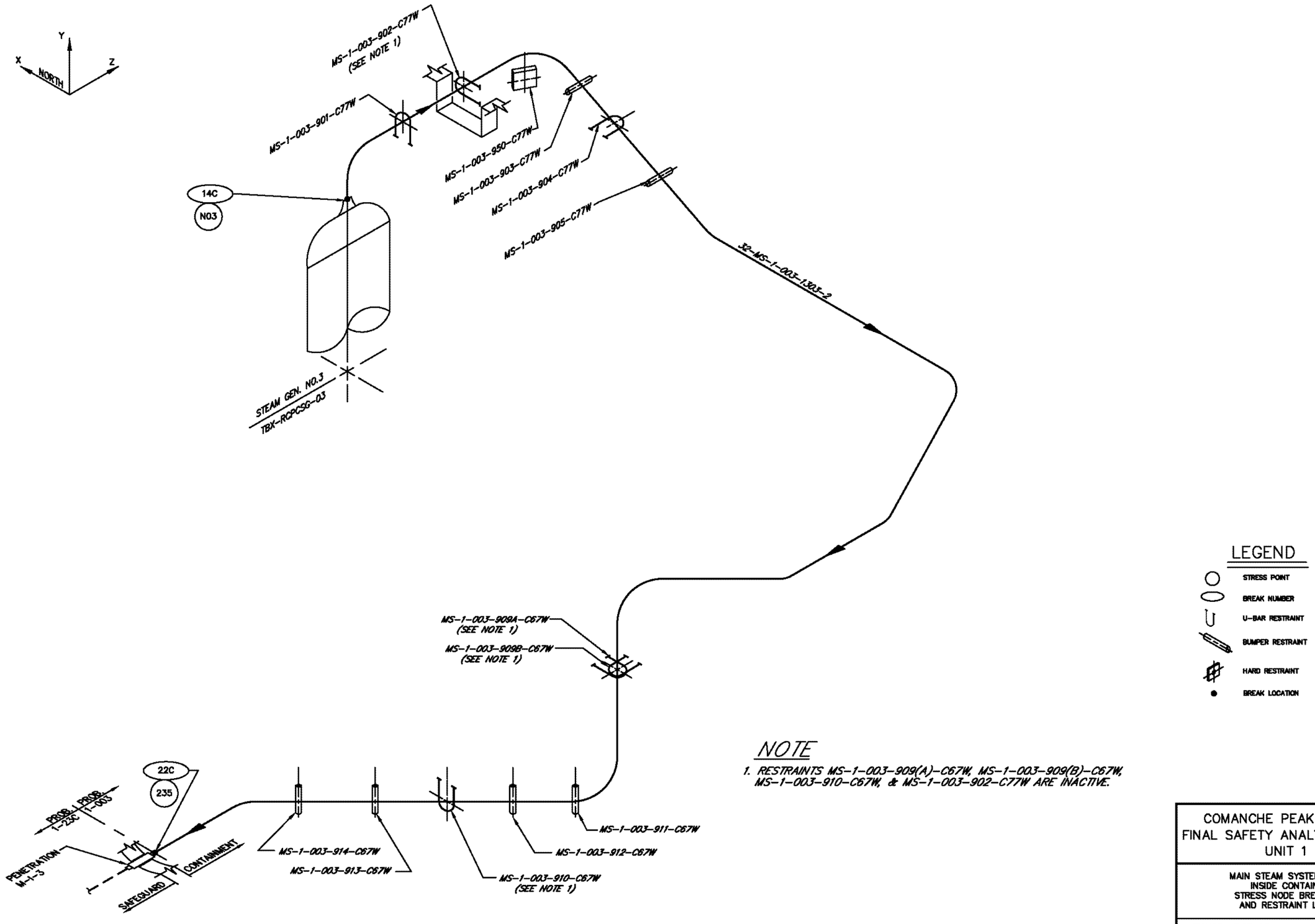
FIGURE 3.6B-11 PROB. 1-1



COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

MAIN STEAM SYSTEM: LOOP 2
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-12 PROB. 1-2



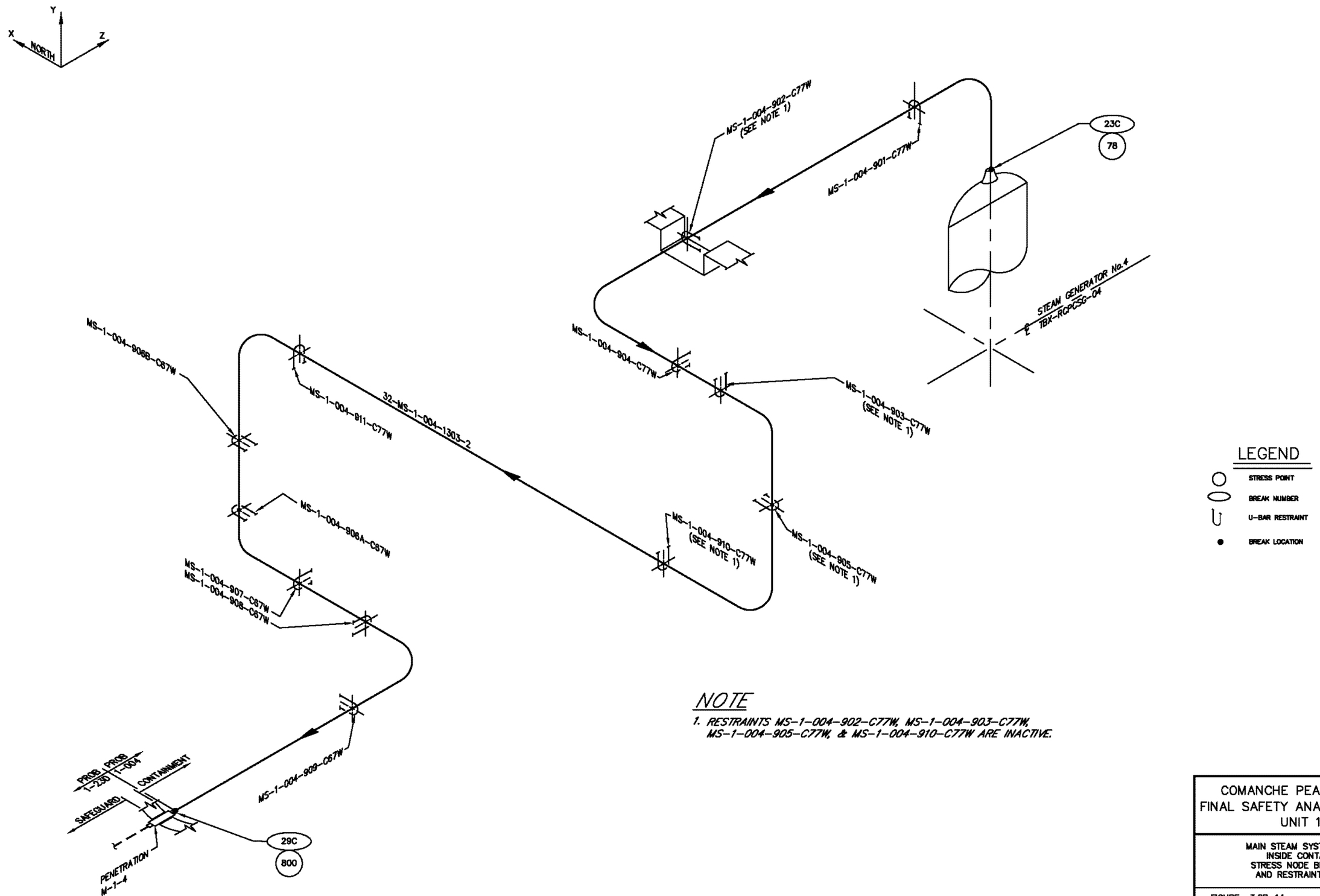
NOTE

1. RESTRAINTS MS-1-003-909(A)-C67W, MS-1-003-909(B)-C67W, MS-1-003-910-C67W, & MS-1-003-902-C77W ARE INACTIVE.

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

MAIN STEAM SYSTEM: LOOP 3
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-13 PROB. 1-3



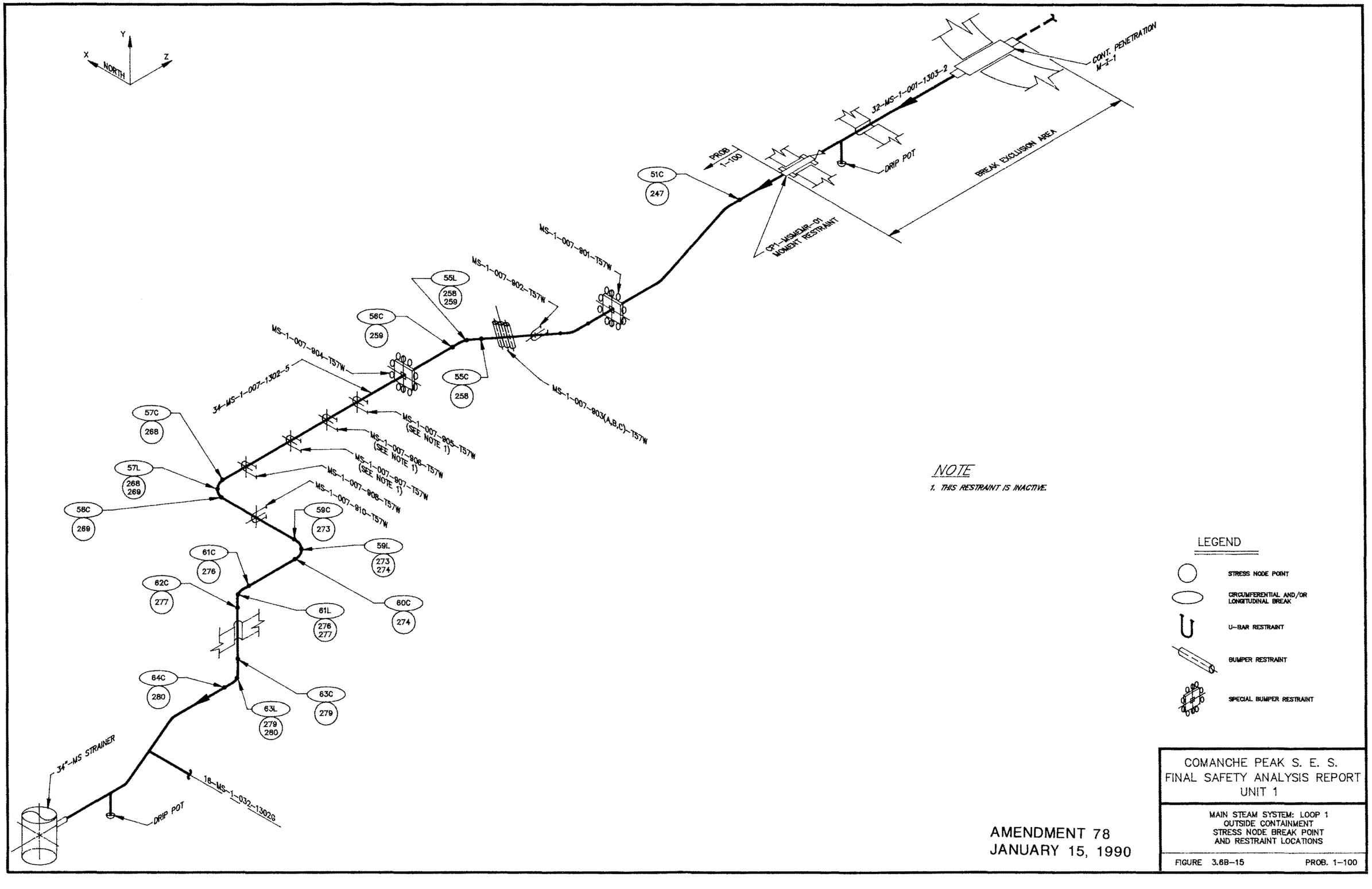
NOTE

1. RESTRAINTS MS-1-004-902-C77W, MS-1-004-903-C77W, MS-1-004-905-C77W, & MS-1-004-910-C77W ARE INACTIVE.

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

MAIN STEAM SYSTEM: LOOP 4
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-14 PROB. 1-4

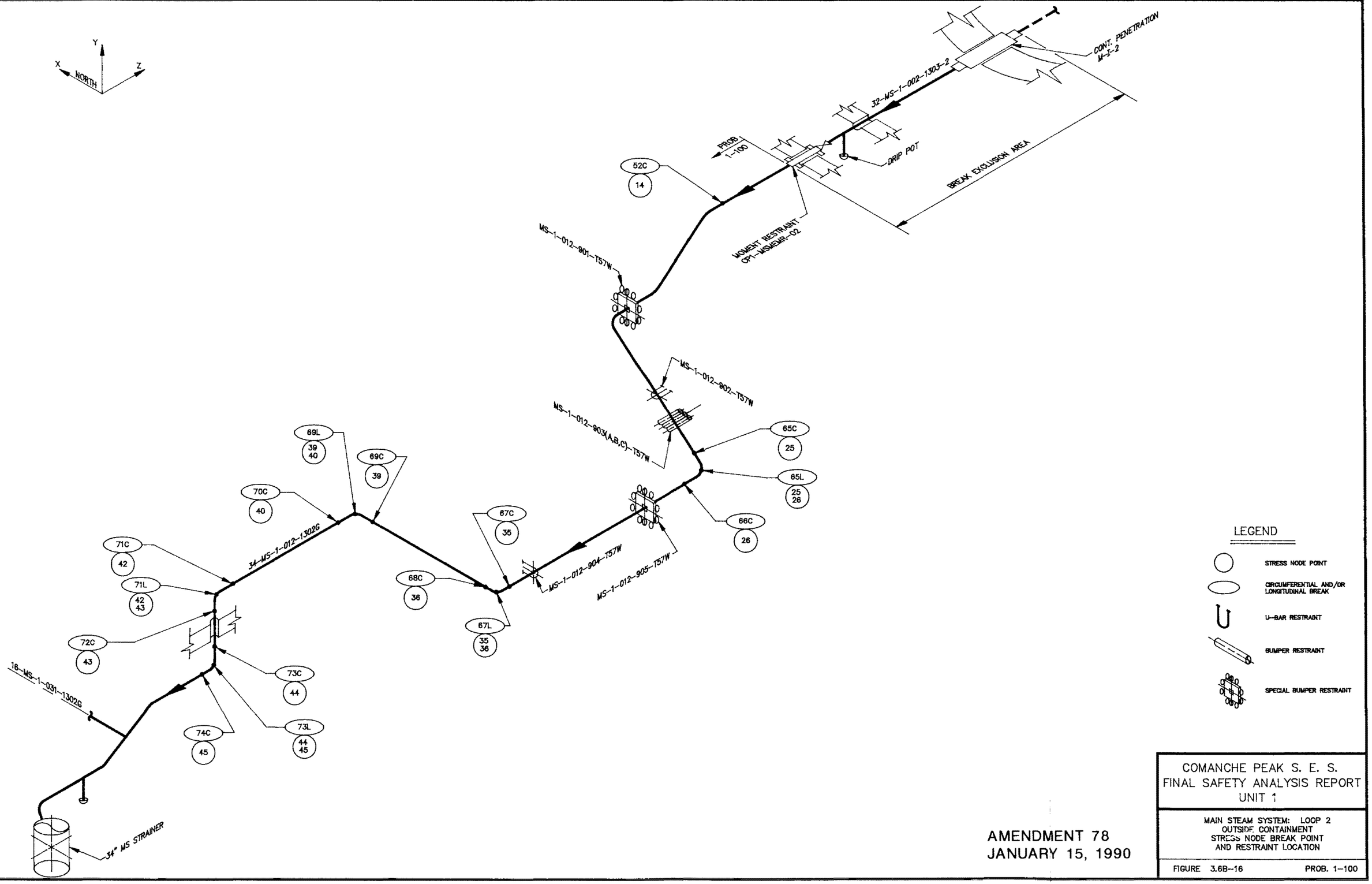


AMENDMENT 78
JANUARY 15, 1990

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

MAIN STEAM SYSTEM: LOOP 1
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATIONS

FIGURE 3.6B-15 PROB. 1-100

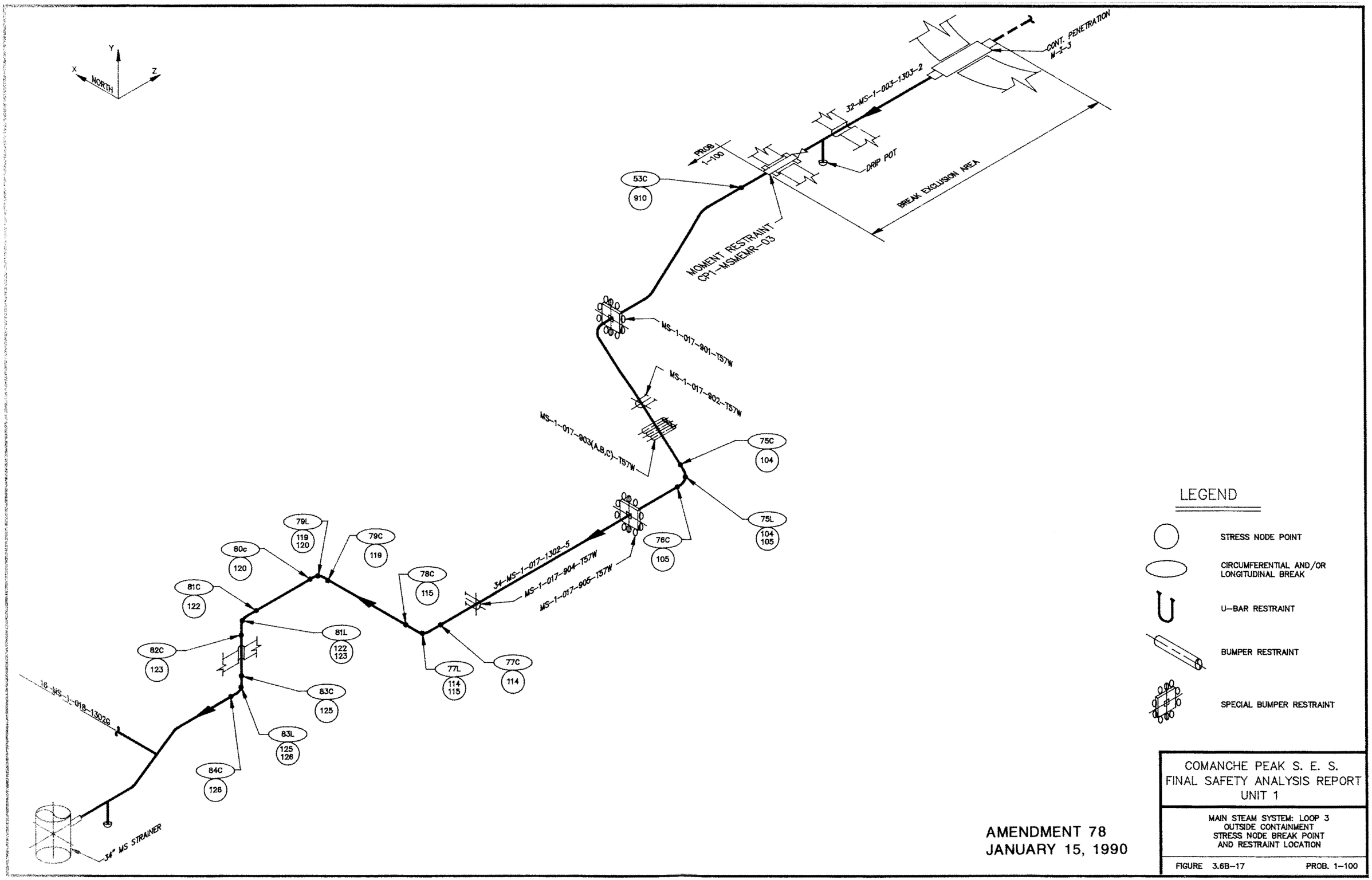


AMENDMENT 78
JANUARY 15, 1990

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

MAIN STEAM SYSTEM: LOOP 2
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-16 PROB. 1-100

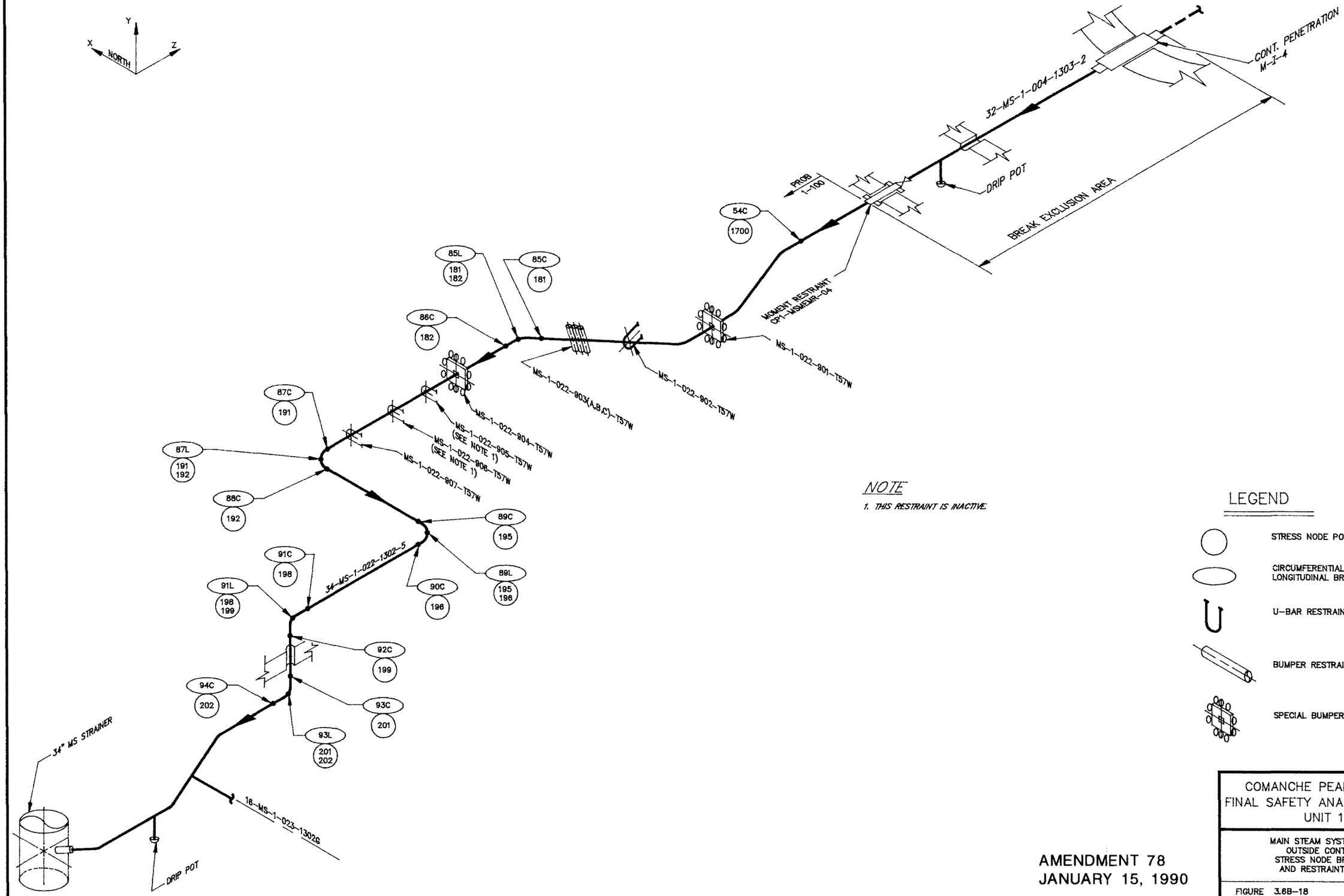


AMENDMENT 78
JANUARY 15, 1990

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

MAIN STEAM SYSTEM: LOOP 3
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-17 PROB. 1-100



NOTE

1. THIS RESTRAINT IS INACTIVE.

LEGEND

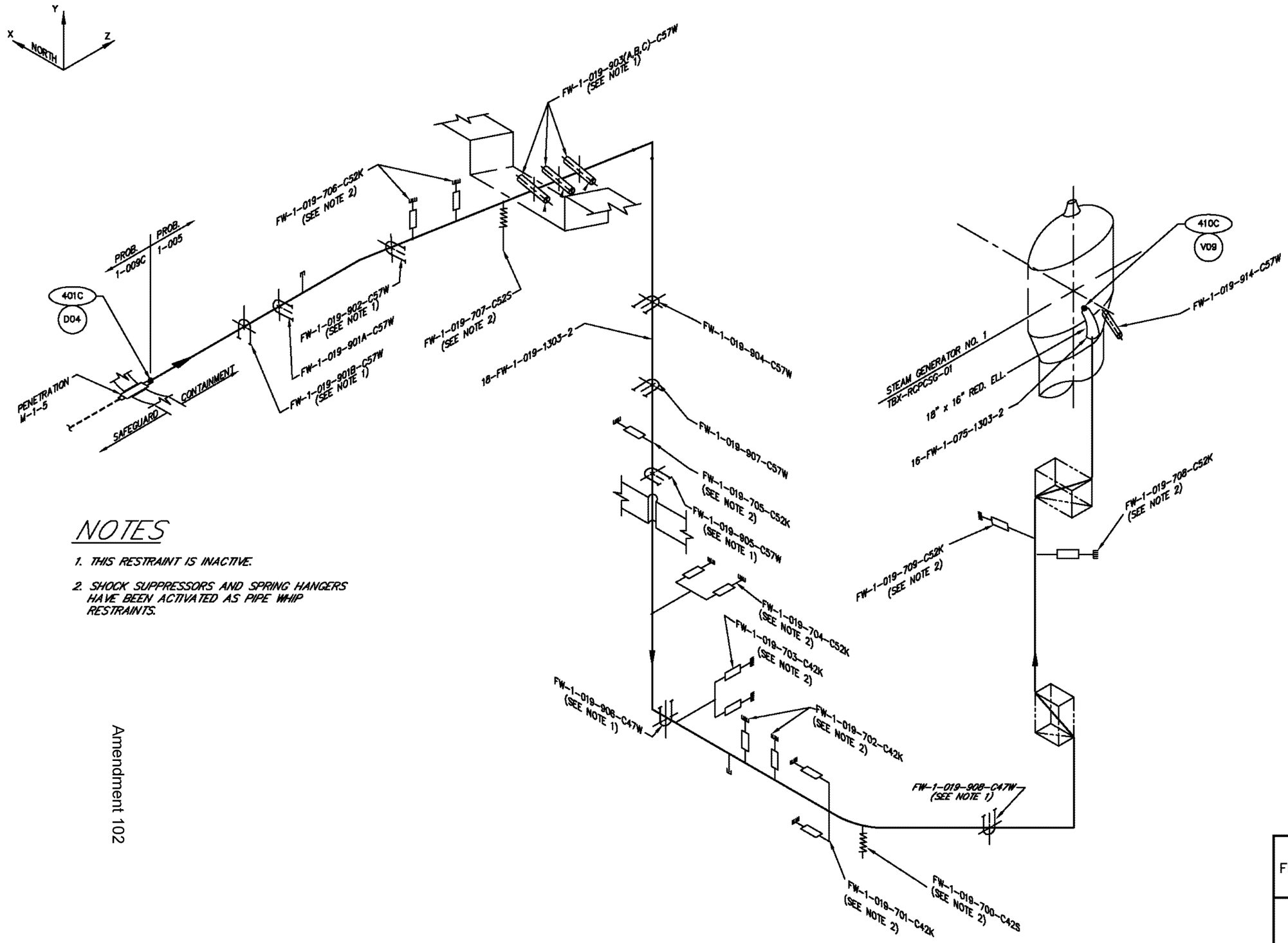
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- SPECIAL BUMPER RESTRAINT

AMENDMENT 78
JANUARY 15, 1990

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

MAIN STEAM SYSTEM: LOOP 4
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-18 PROB. 1-100



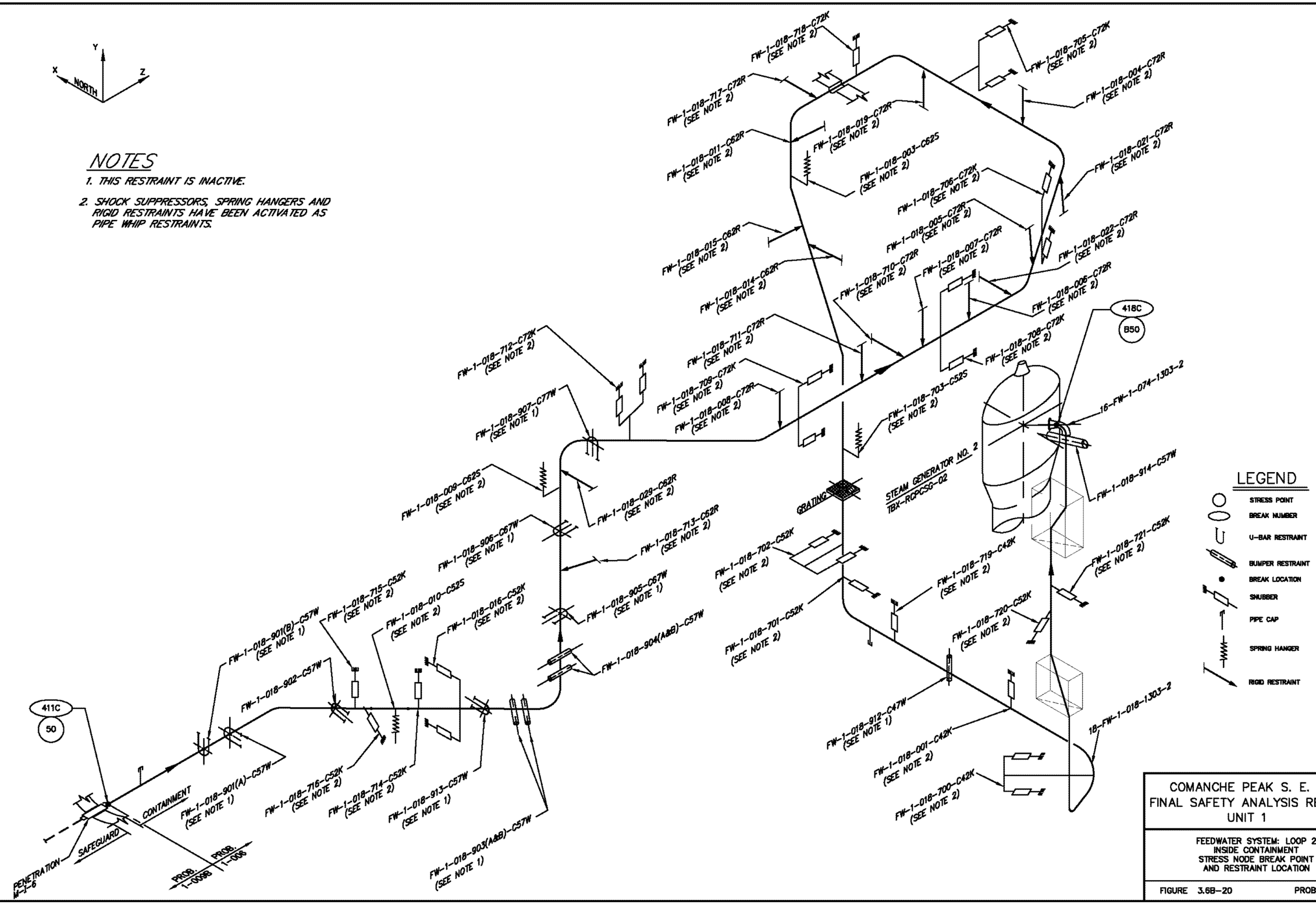
NOTES

1. THIS RESTRAINT IS INACTIVE.
2. SHOCK SUPPRESSORS AND SPRING HANGERS HAVE BEEN ACTIVATED AS PIPE WHIP RESTRAINTS.

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

FEEDWATER SYSTEM: LOOP 1
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

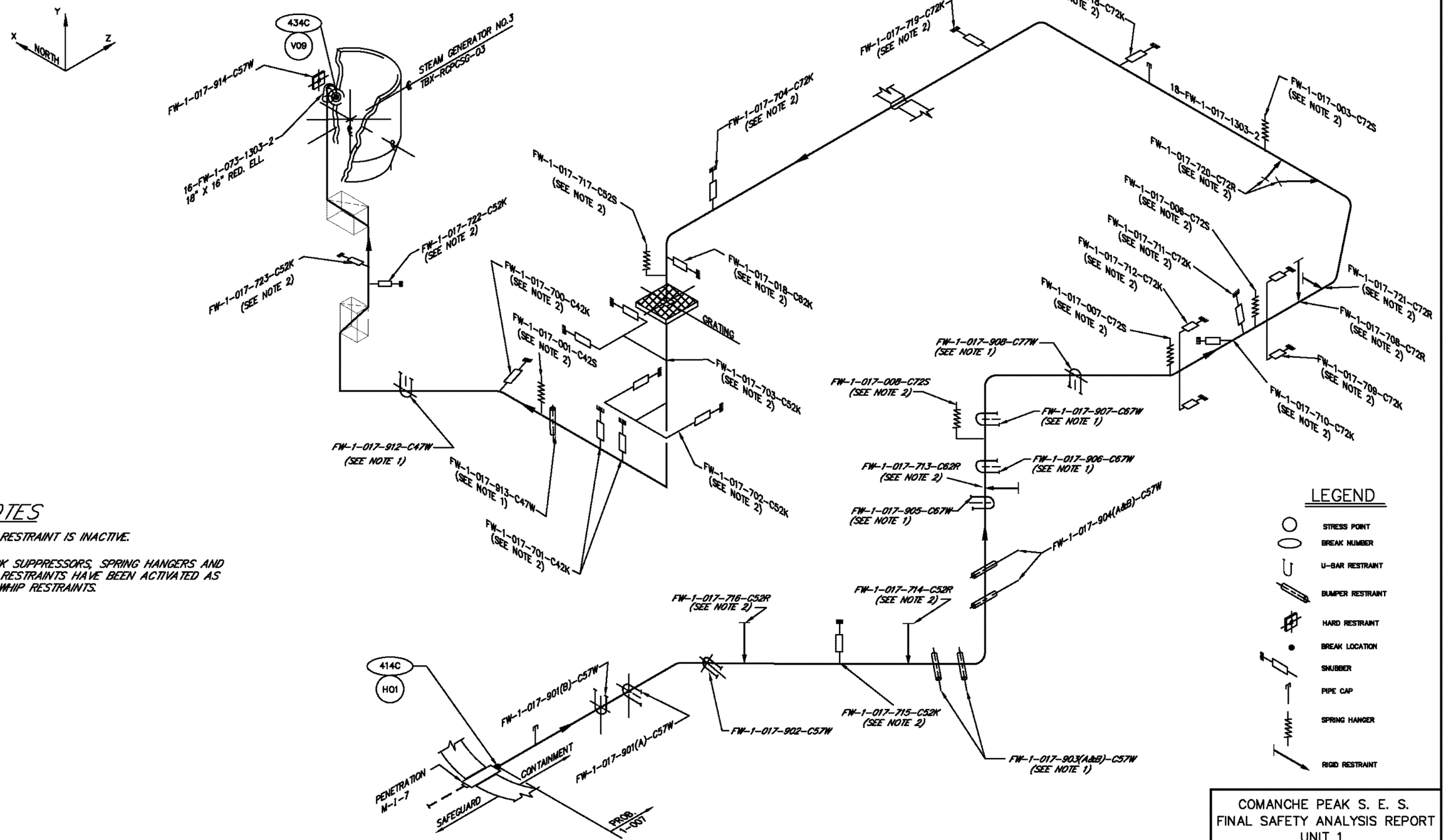
FIGURE 3.6B-19 PROB. 1-5



COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

FEEDWATER SYSTEM: LOOP 2
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-20 PROB. 1-6



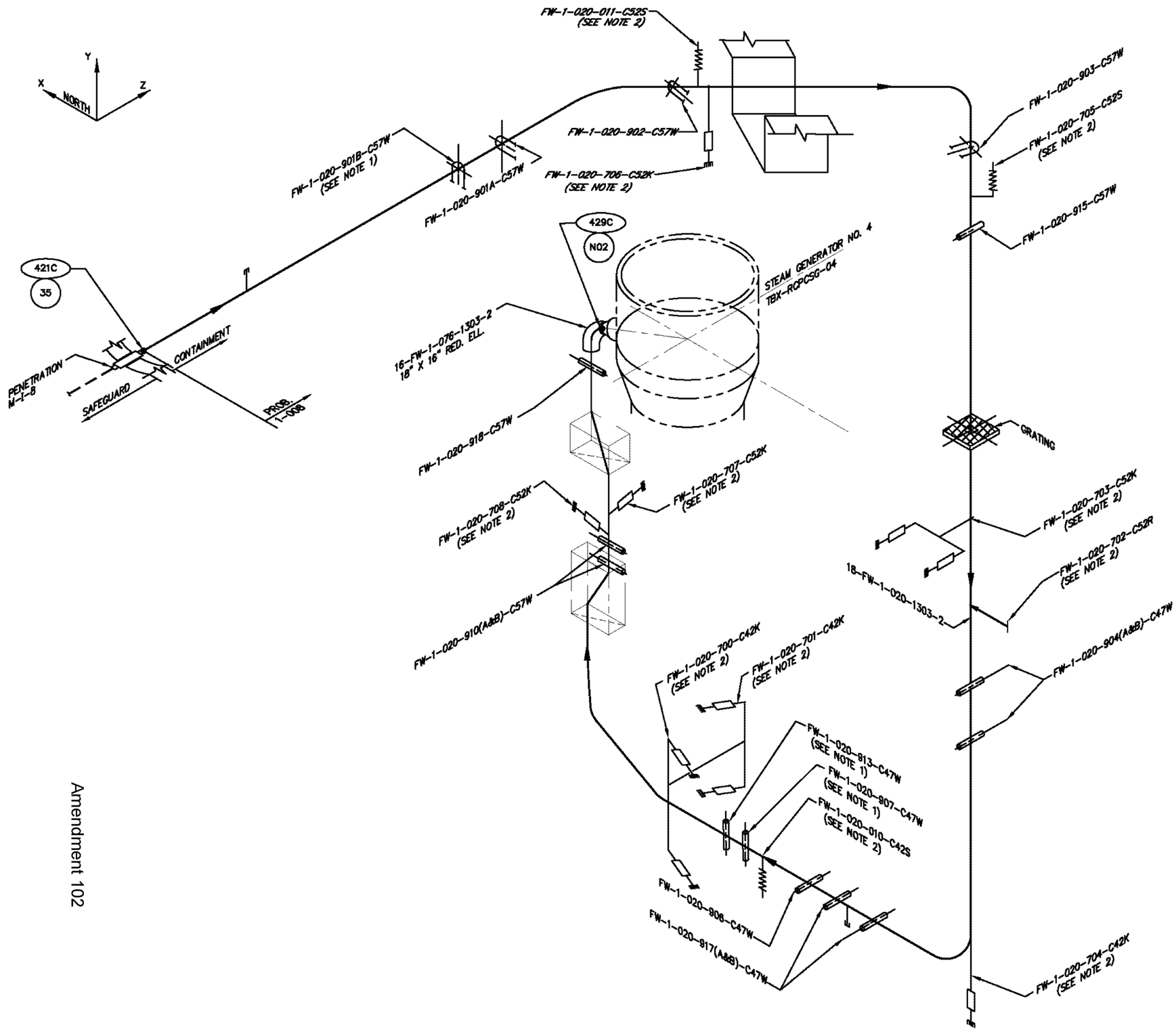
NOTES

1. THIS RESTRAINT IS INACTIVE.
2. SHOCK SUPPRESSORS, SPRING HANGERS AND RIGID RESTRAINTS HAVE BEEN ACTIVATED AS PIPE WHIP RESTRAINTS.

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

FEEDWATER SYSTEM: 1-3
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-21 PROB. 1-7



NOTES

1. THIS RESTRAINT IS INACTIVE.
2. SHOCK SUPPRESSORS, SPRING HANGERS AND RIDGID RESTRAINTS HAVE BEEN ACTIVATED AS PIPE WHIP RESTRAINTS.

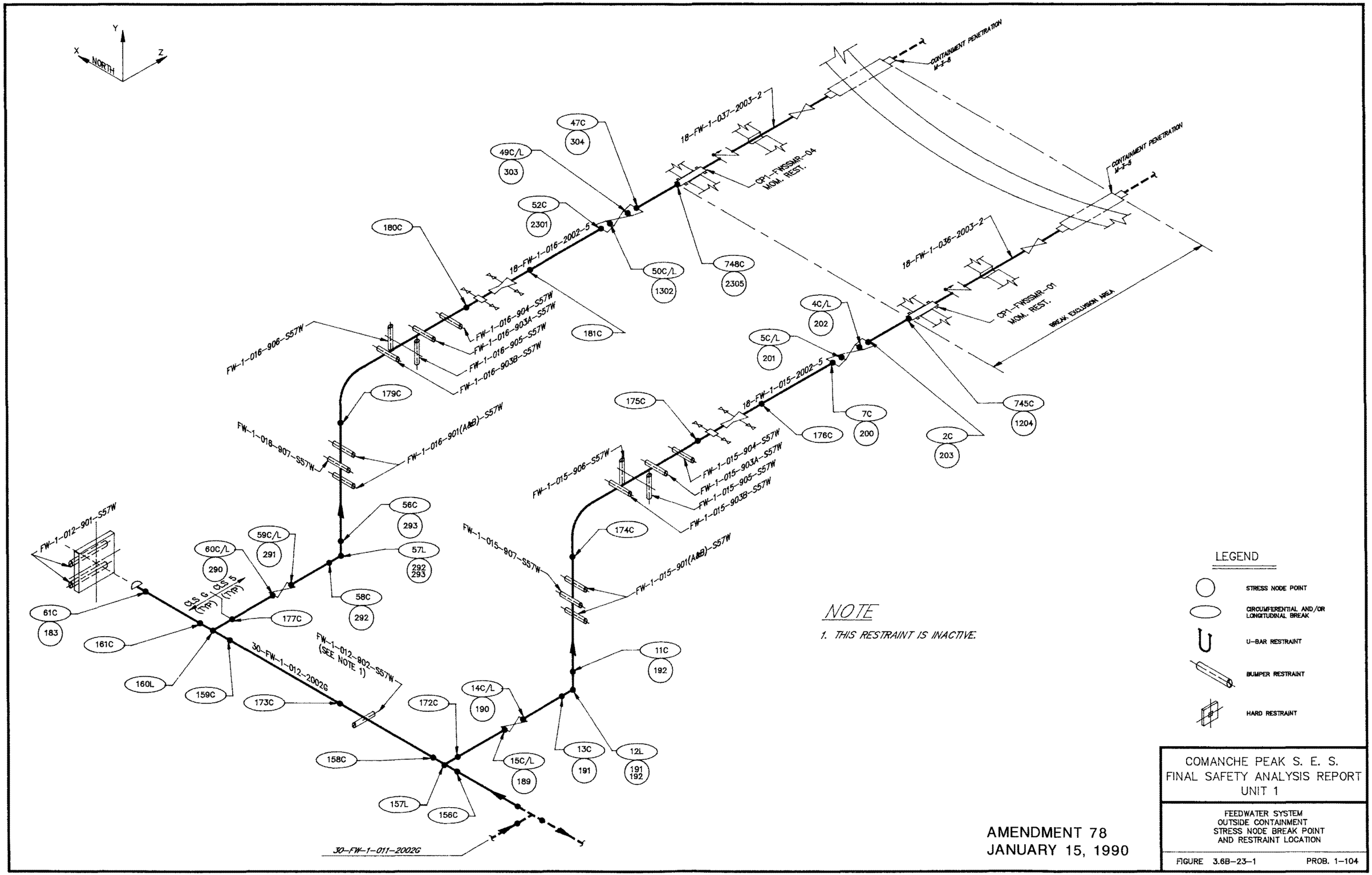
LEGEND

- STRESS POINT
- BREAK NUMBER
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT
- BREAK LOCATION
- SNUBBER
- PIPE CAP
- SPRING HANGER
- RIGID RESTRAINT

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

FEEDWATER SYSTEM: LOOP 4
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-22 PROB. 1-8



NOTE

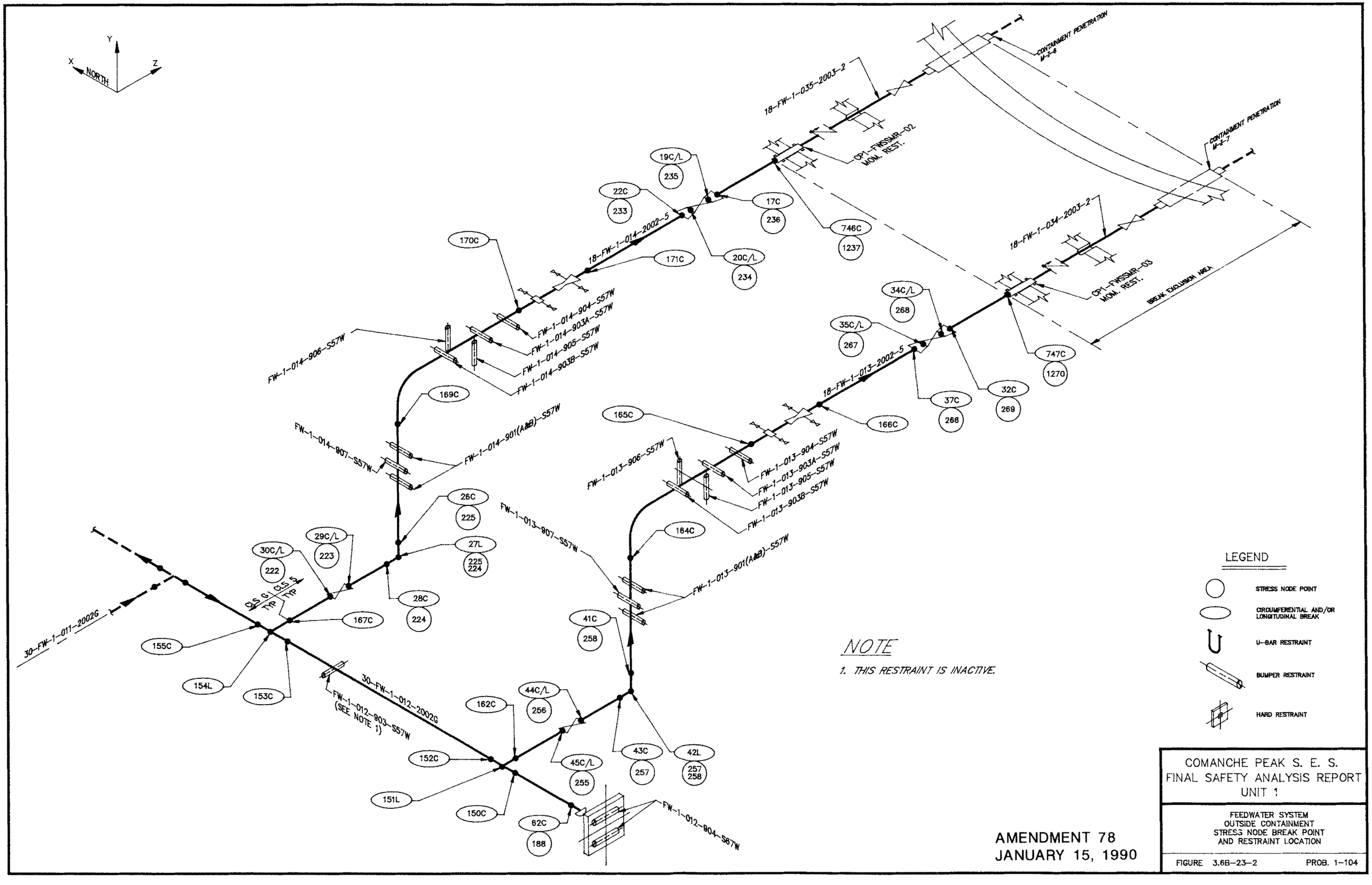
1. THIS RESTRAINT IS INACTIVE.

AMENDMENT 78
JANUARY 15, 1990

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

FEEDWATER SYSTEM
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-23-1 PROB. 1-104

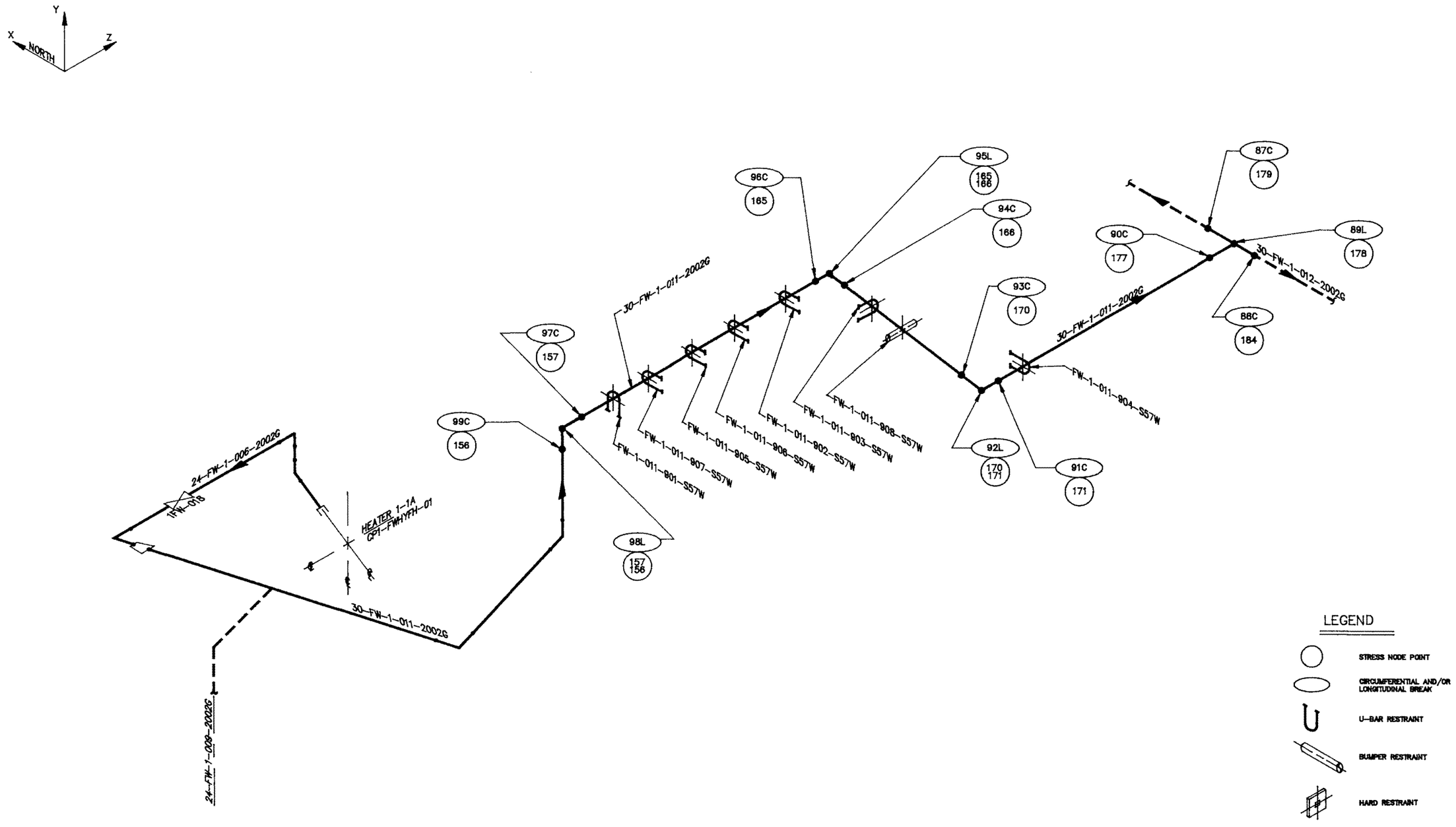


AMENDMENT 78
JANUARY 15, 1990

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

FEEDWATER SYSTEM
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-23-2 PROB. 1-104

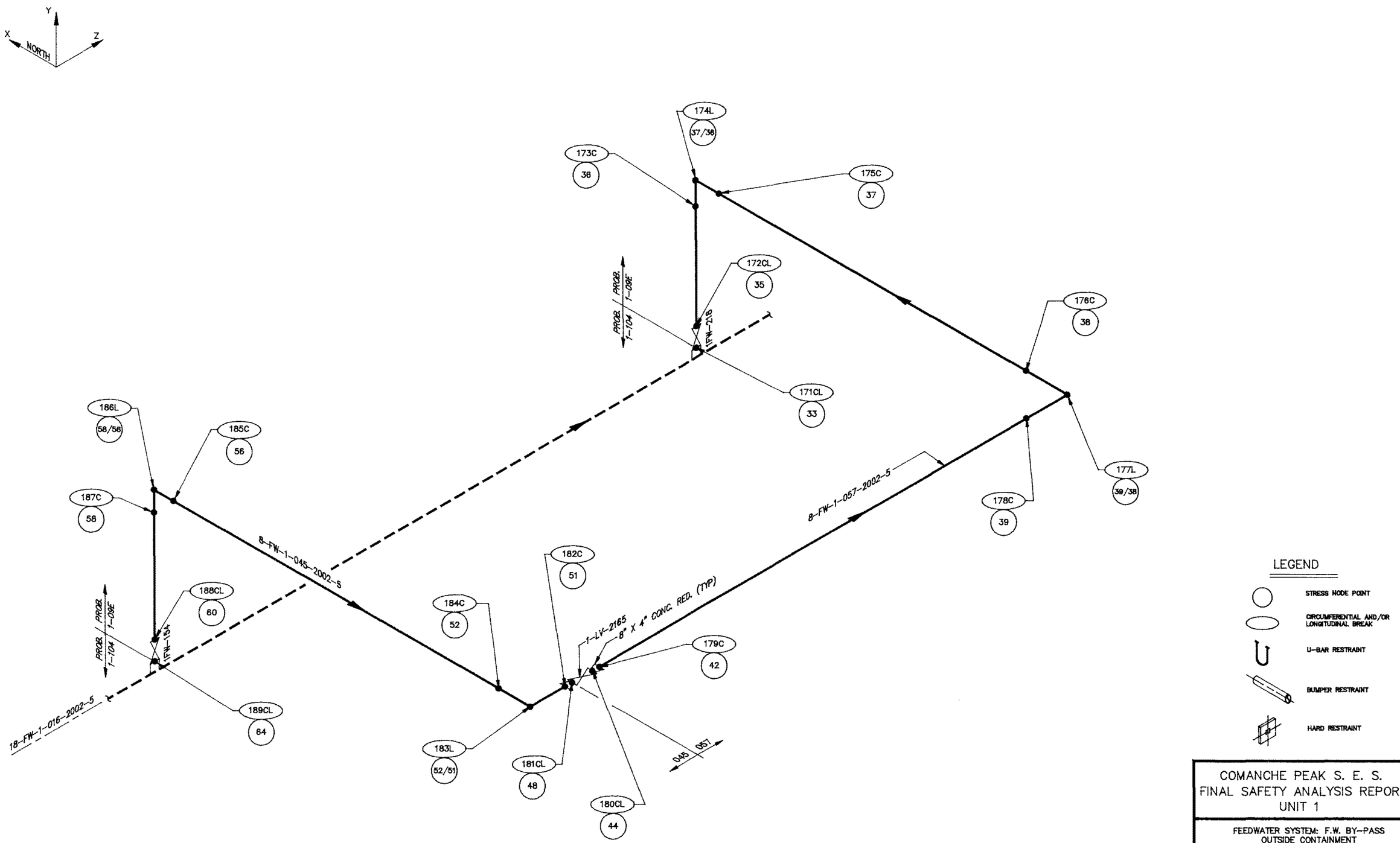


COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

FEEDWATER SYSTEM
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-23-3 PROB.1-104

AMENDMENT 76
MAY 1, 1989

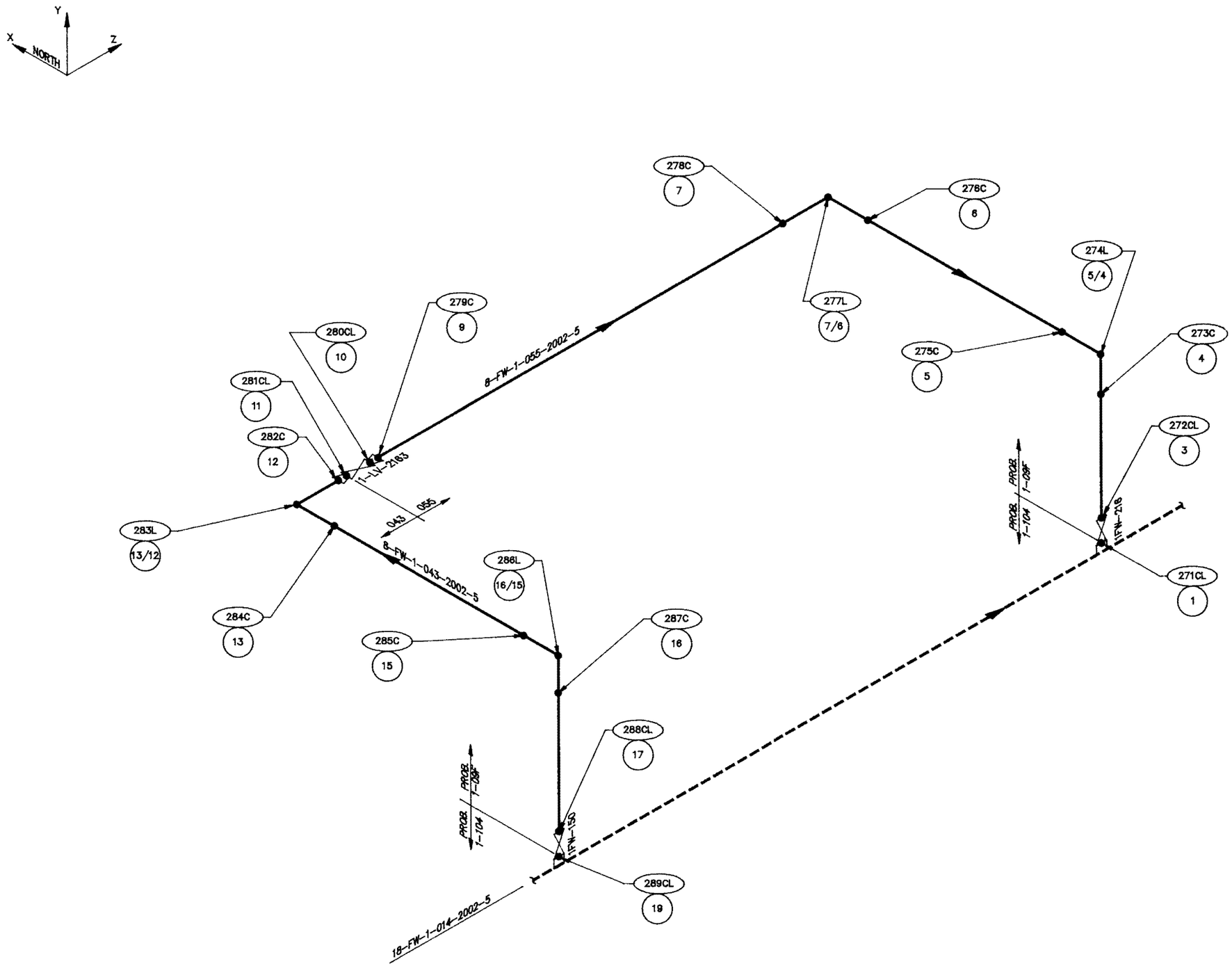


AMENDMENT 78
JANUARY 15, 1990

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

FEEDWATER SYSTEM: F.W. BY-PASS
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-24-1 PROB. 1-09E



LEGEND

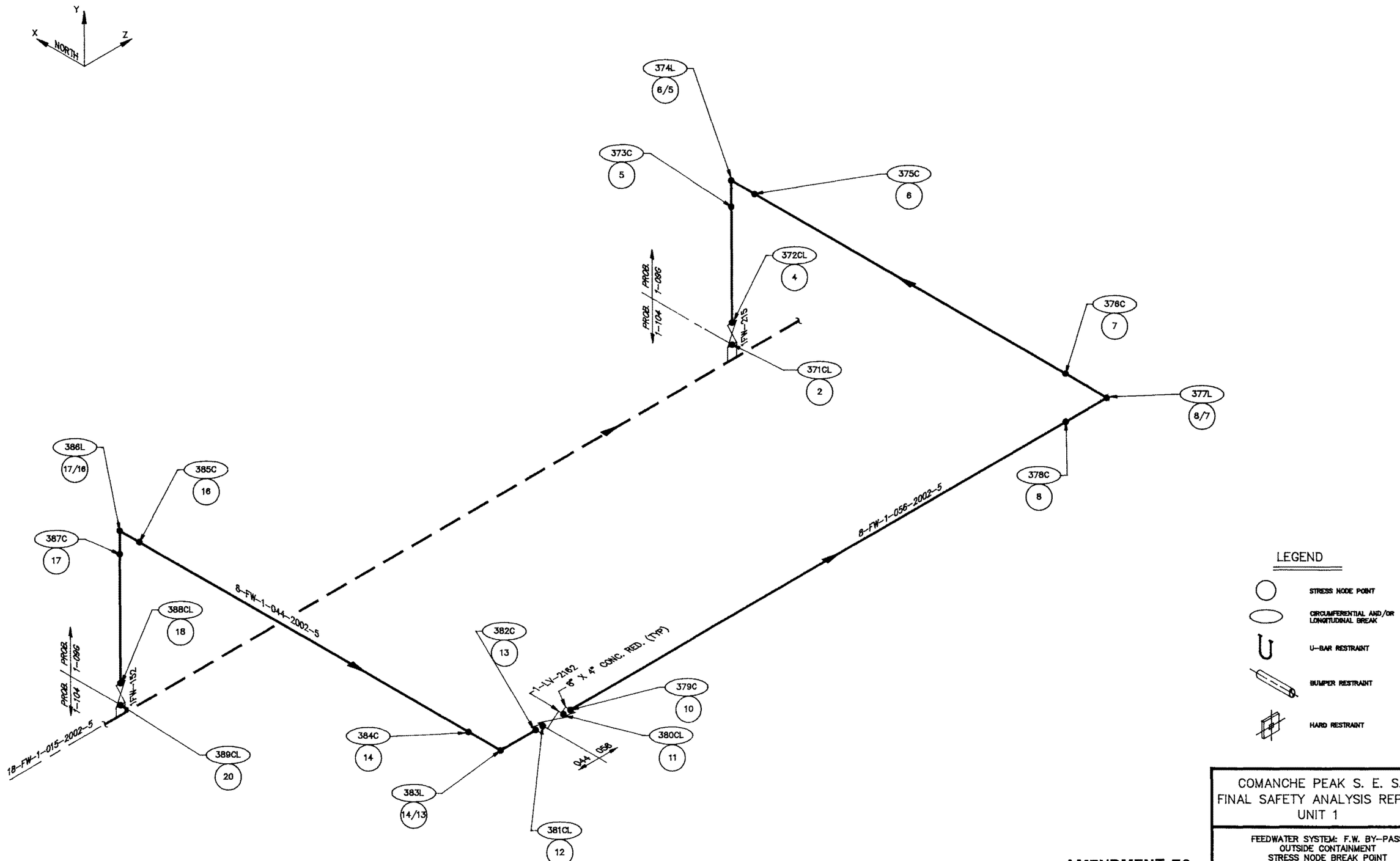
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

FEEDWATER SYSTEM: F.W. BY-PASS
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-24-2 PROB. 1-09F

AMENDMENT 76
MAY 1, 1989

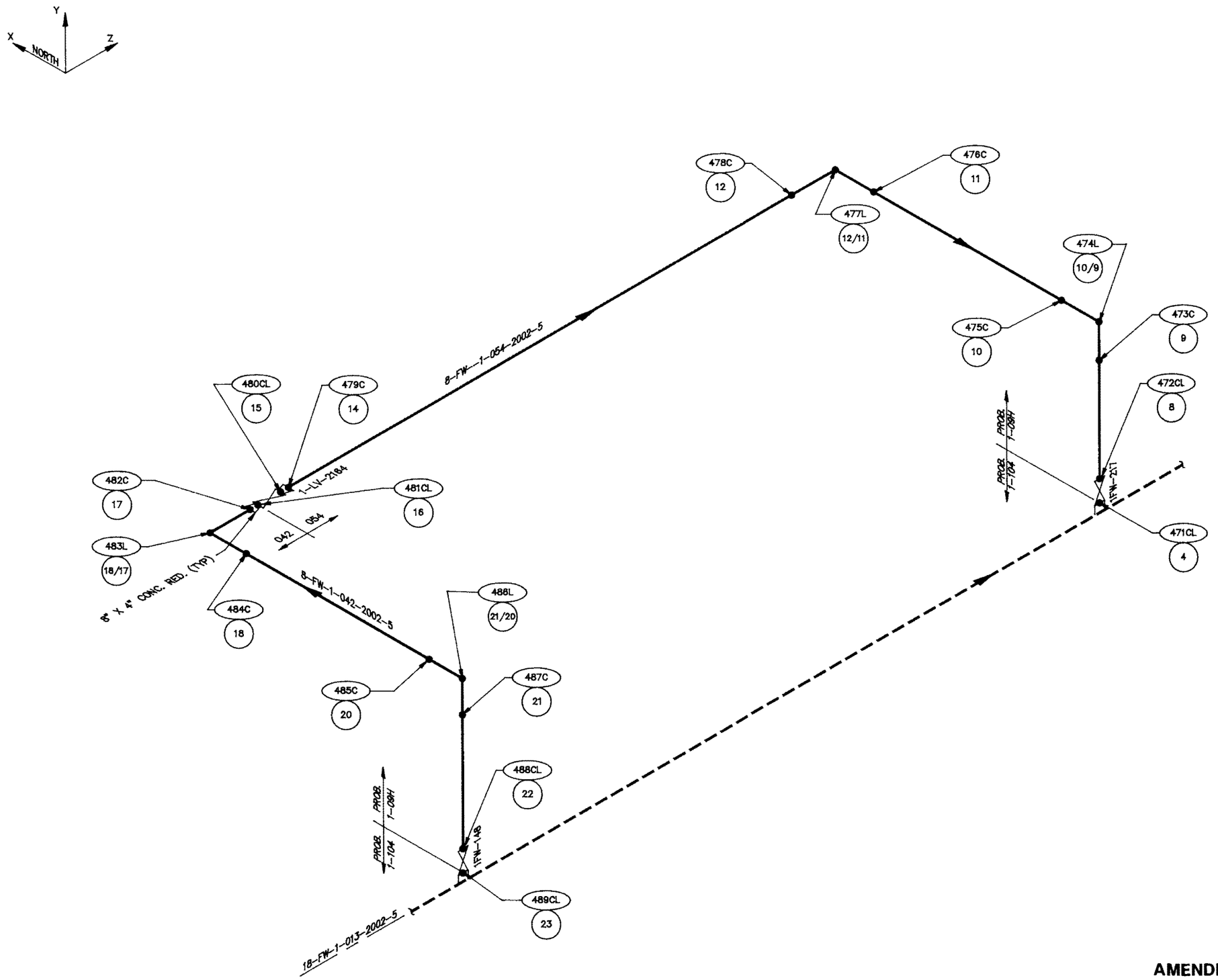


AMENDMENT 76
MAY 1, 1989

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

FEEDWATER SYSTEM: F.W. BY-PASS
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-24-3 PROB. 1-09G



LEGEND

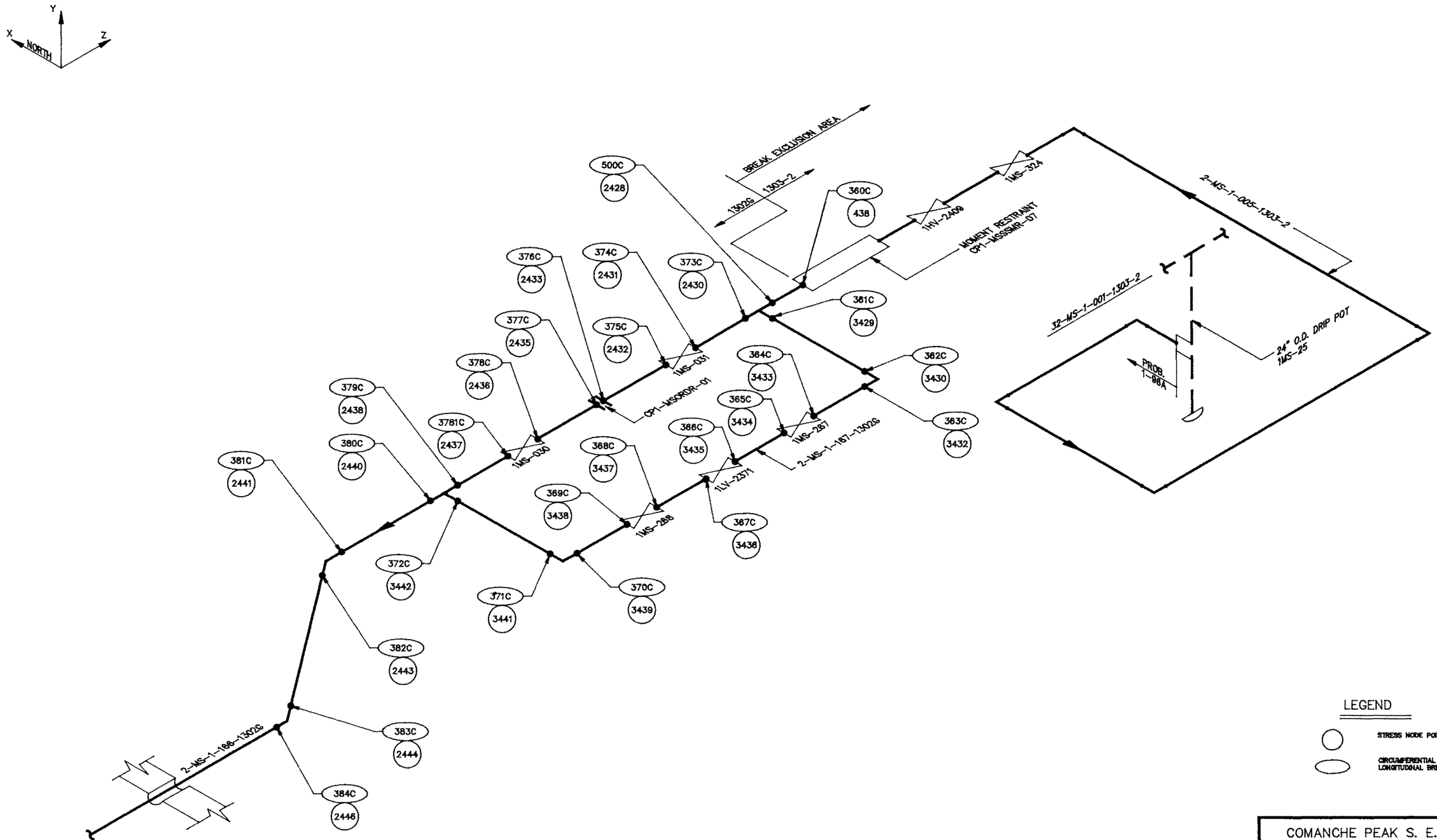
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT

AMENDMENT 76
MAY 1, 1989

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

FEEDWATER SYSTEM: F.W. BY-PASS
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-24-4 PROB. 1-09H

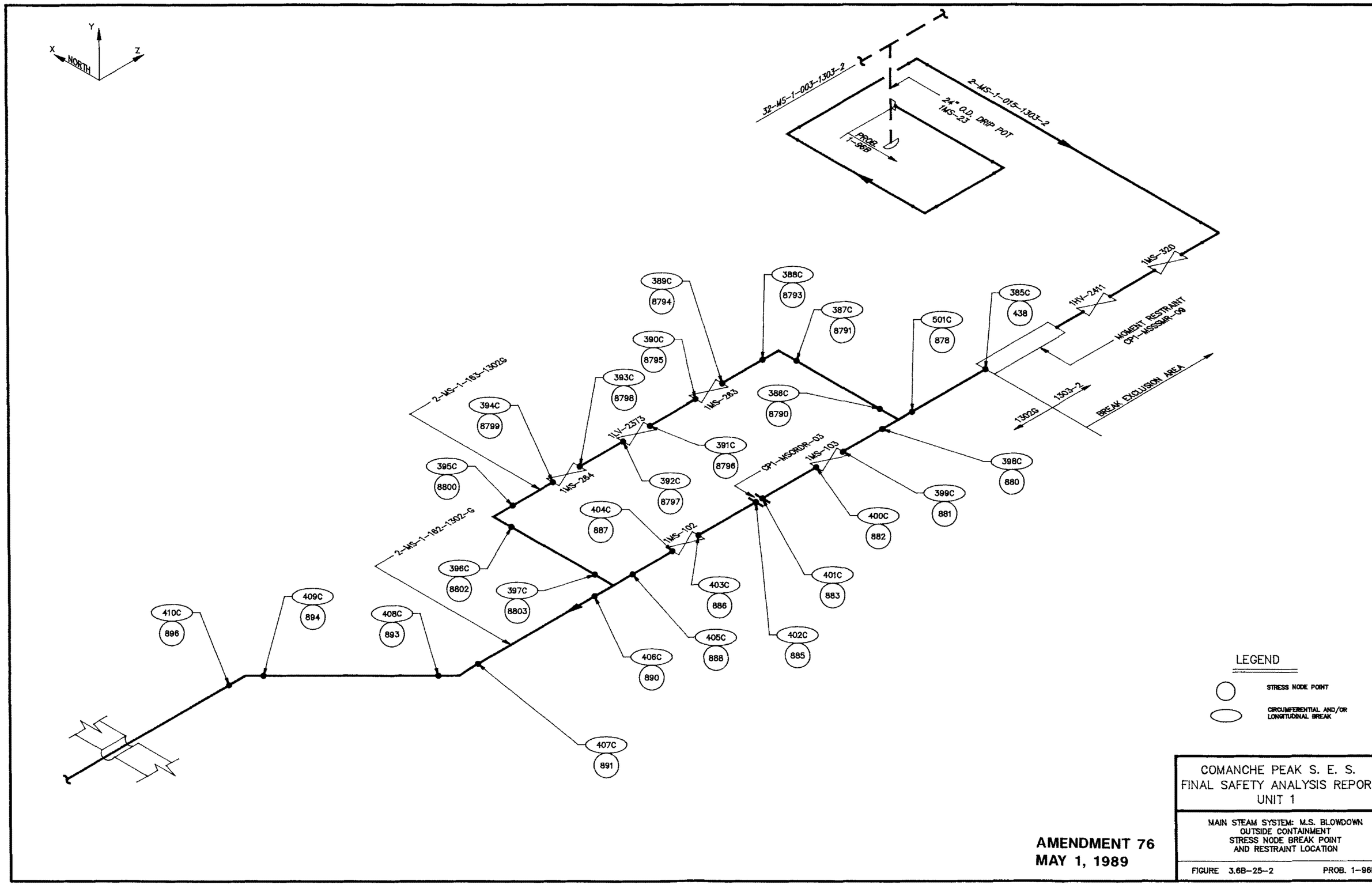


COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

MAIN STEAM SYSTEM: M.S. BLOWDOWN
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCTION

FIGURE 3.6B-25-1 PROB. 1-96A

AMENDMENT 76
MAY 1, 1989

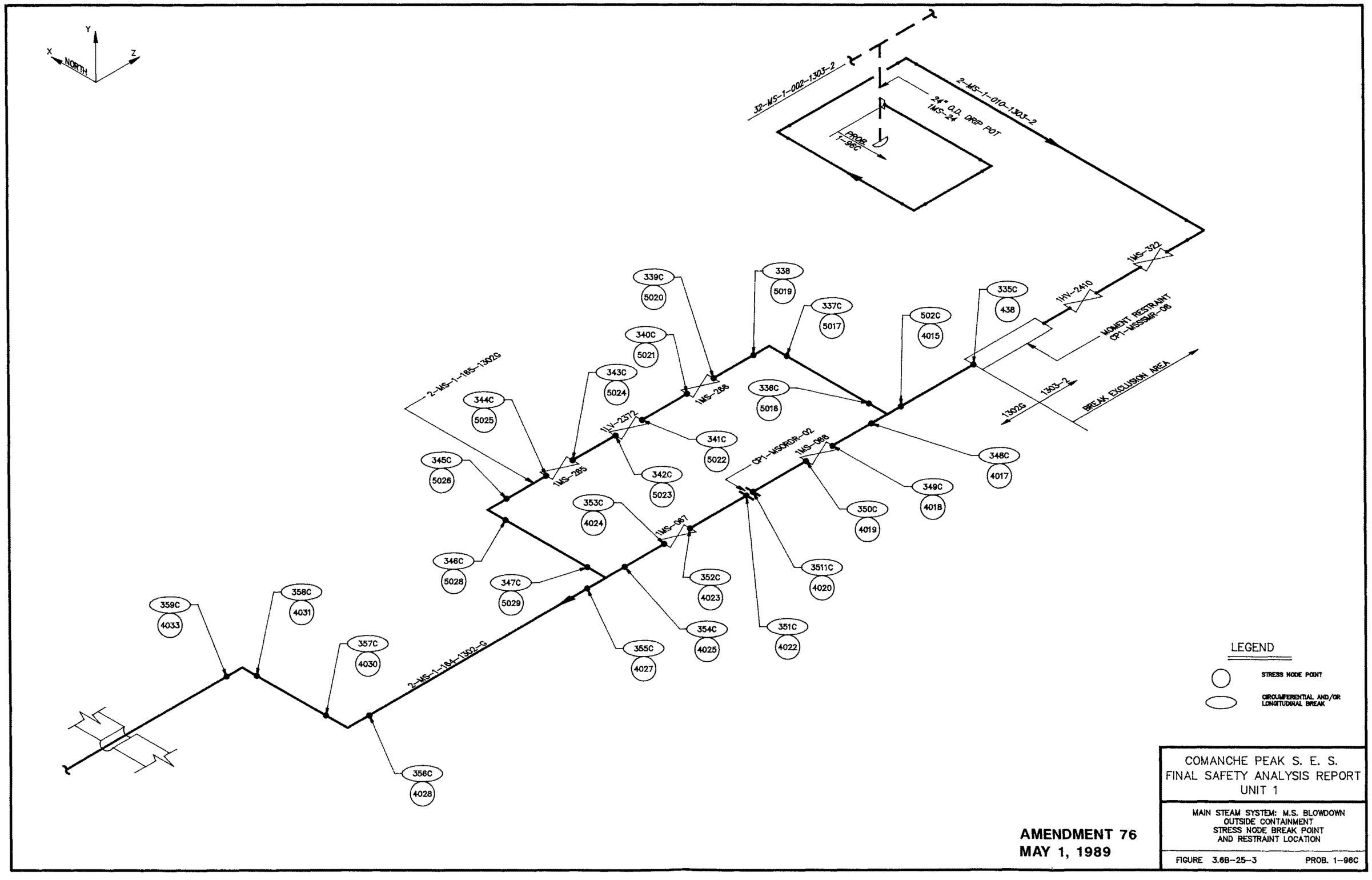


COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

MAIN STEAM SYSTEM: M.S. BLOWDOWN
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-25-2 PROB. 1-96B

AMENDMENT 76
MAY 1, 1989

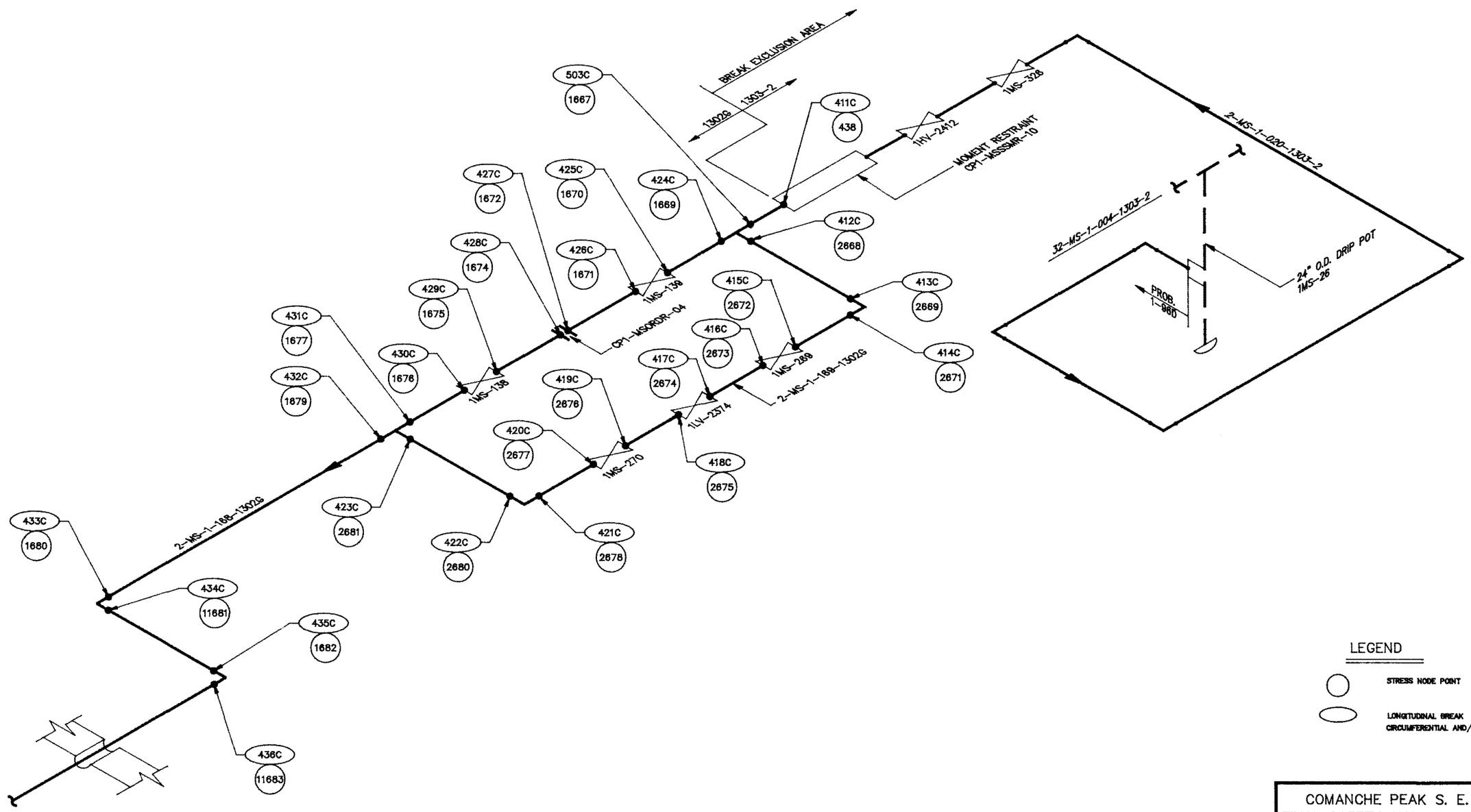


COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

MAIN STEAM SYSTEM: M.S. BLOWDOWN
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-25-3 PROB. 1-96C

AMENDMENT 76
MAY 1, 1989



LEGEND

STRESS NODE POINT

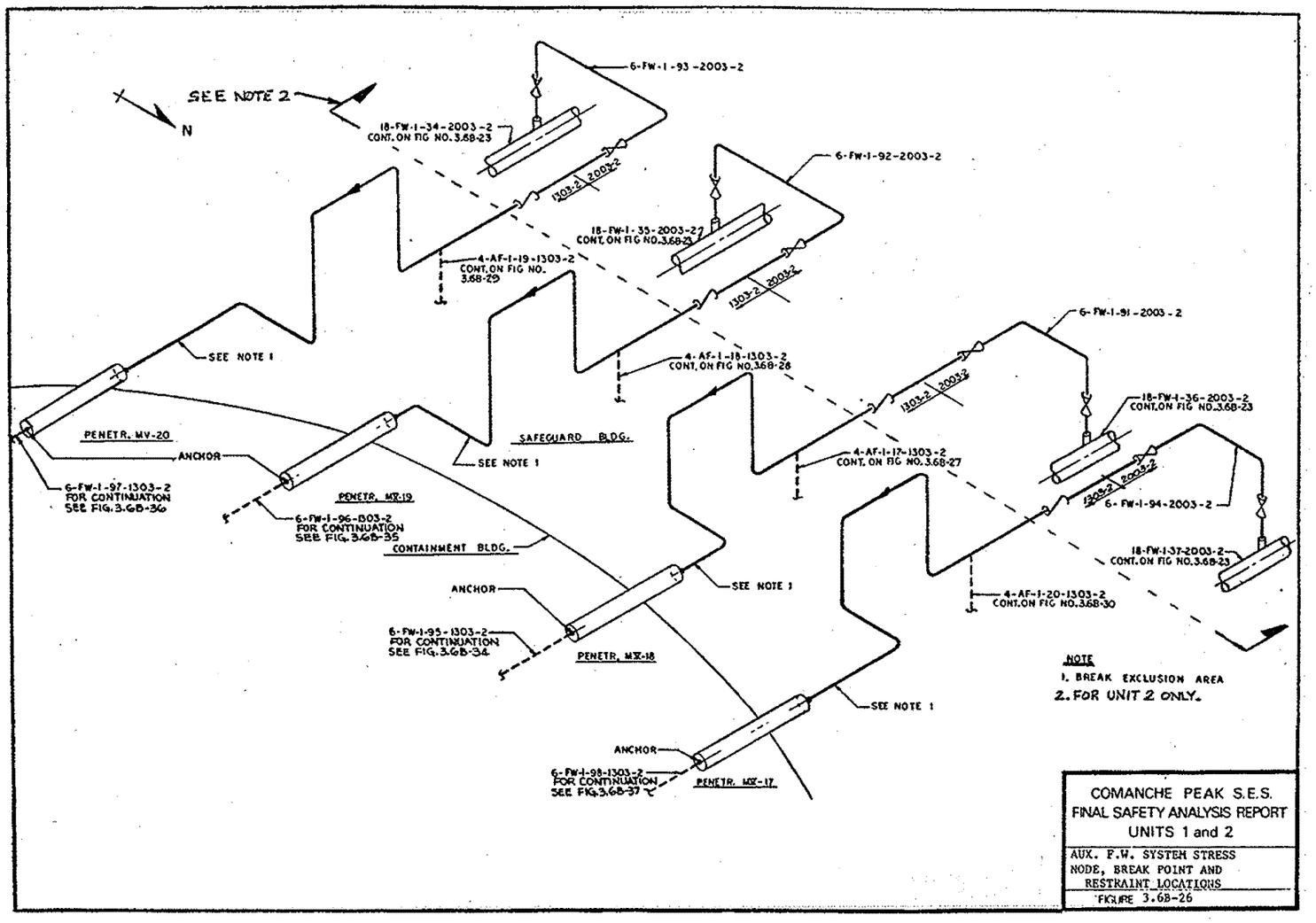
LONGITUDINAL BREAK
CIRCUMFERENTIAL AND/OR

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

MAIN STEAM SYSTEM: M.S. BLOWDOWN
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-25-4 PROB. 1-96D

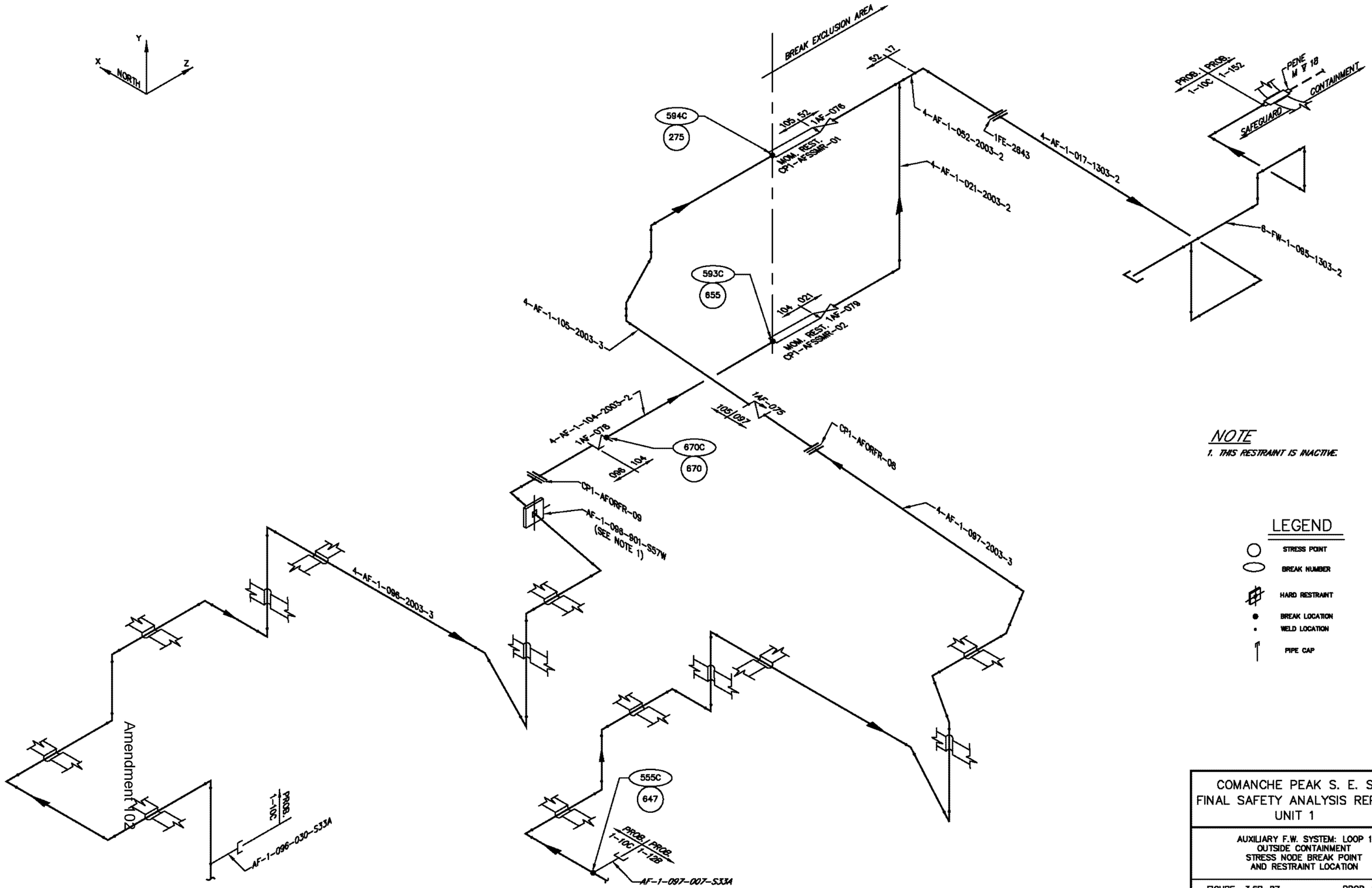
AMENDMENT 76
MAY 1, 1989



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

AUX. F.W. SYSTEM STRESS NODE, BREAK POINT AND RESTRAINT LOCATIONS

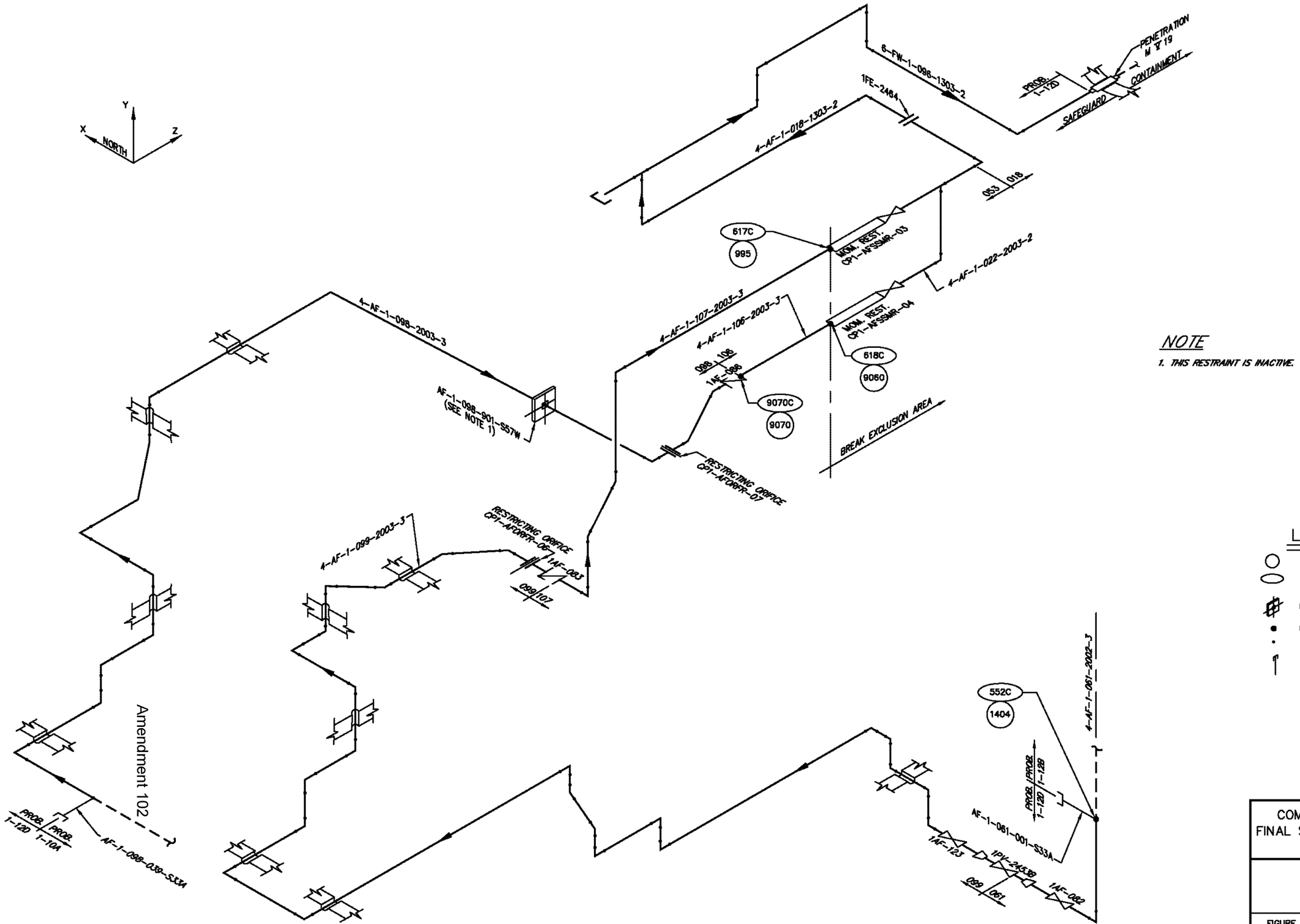
FIGURE 3.6B-26



COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

AUXILIARY F.W. SYSTEM: LOOP 1
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-27 PROB. 1-10C



NOTE

1. THIS RESTRAINT IS INACTIVE.

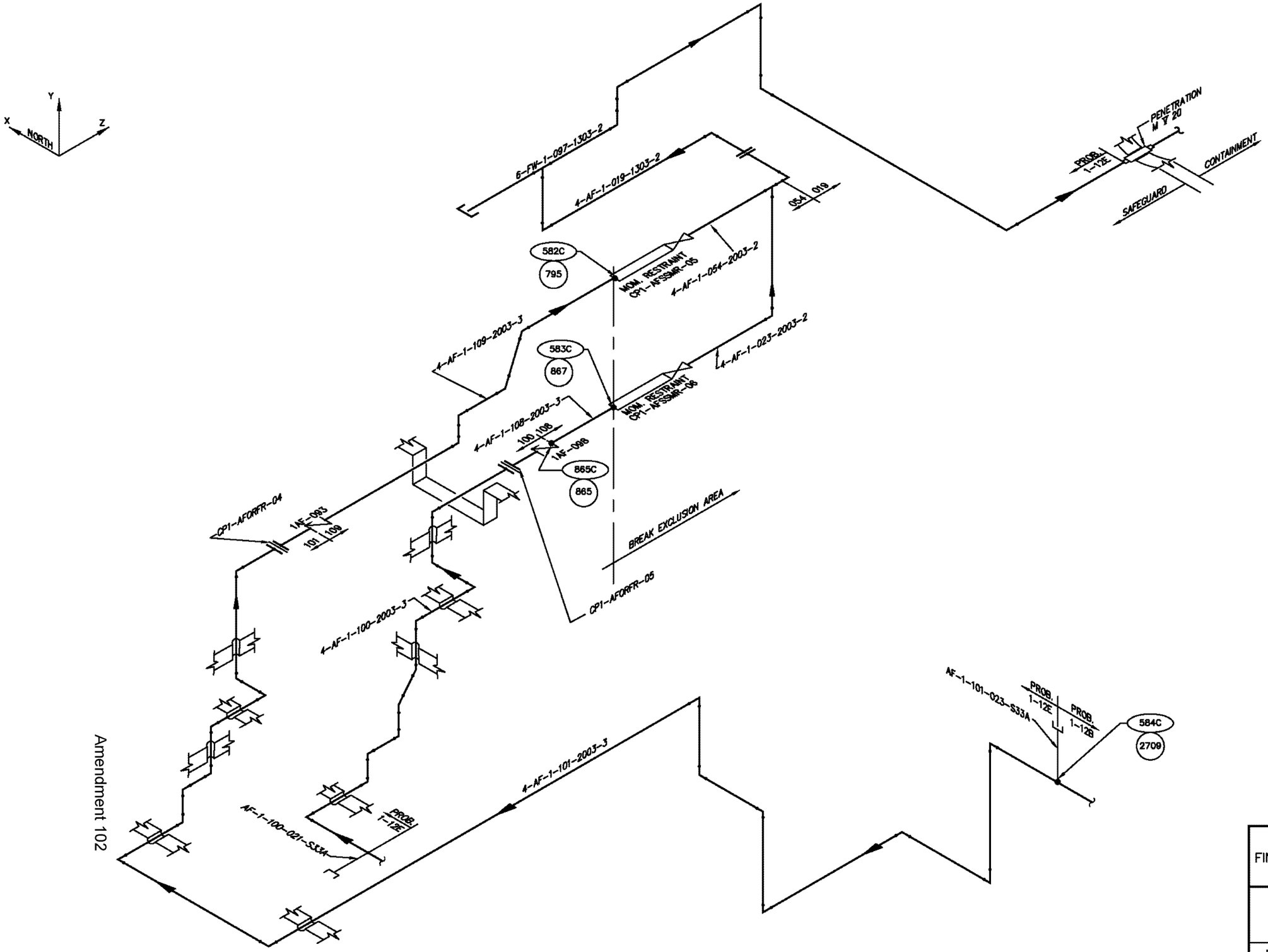
LEGEND

- STRESS POINT
- BREAK NUMBER
- HARD RESTRAINT
- BREAK LOCATION
- WELD LOCATION
- PIPE CAP

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

AUXILIARY F.W. SYSTEM
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-28 PROB. 1-12D



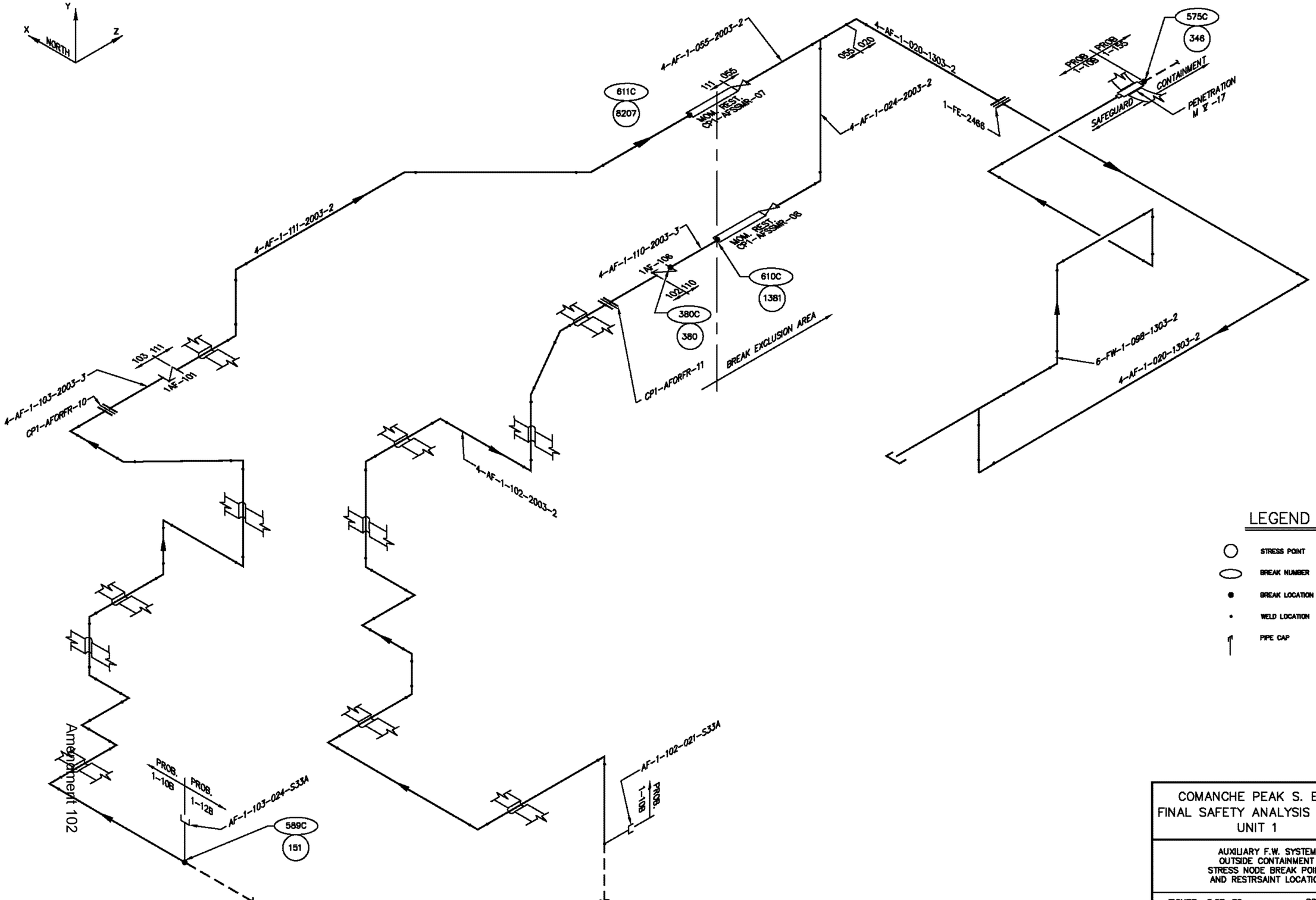
LEGEND

- STRESS POINT
- BREAK NUMBER
- BREAK LOCATION
- WELD LOCATION
- PIPE CAP

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

AUXILIARY F.W. SYSTEM: LOOP 3
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-29 PROB. 1-12E



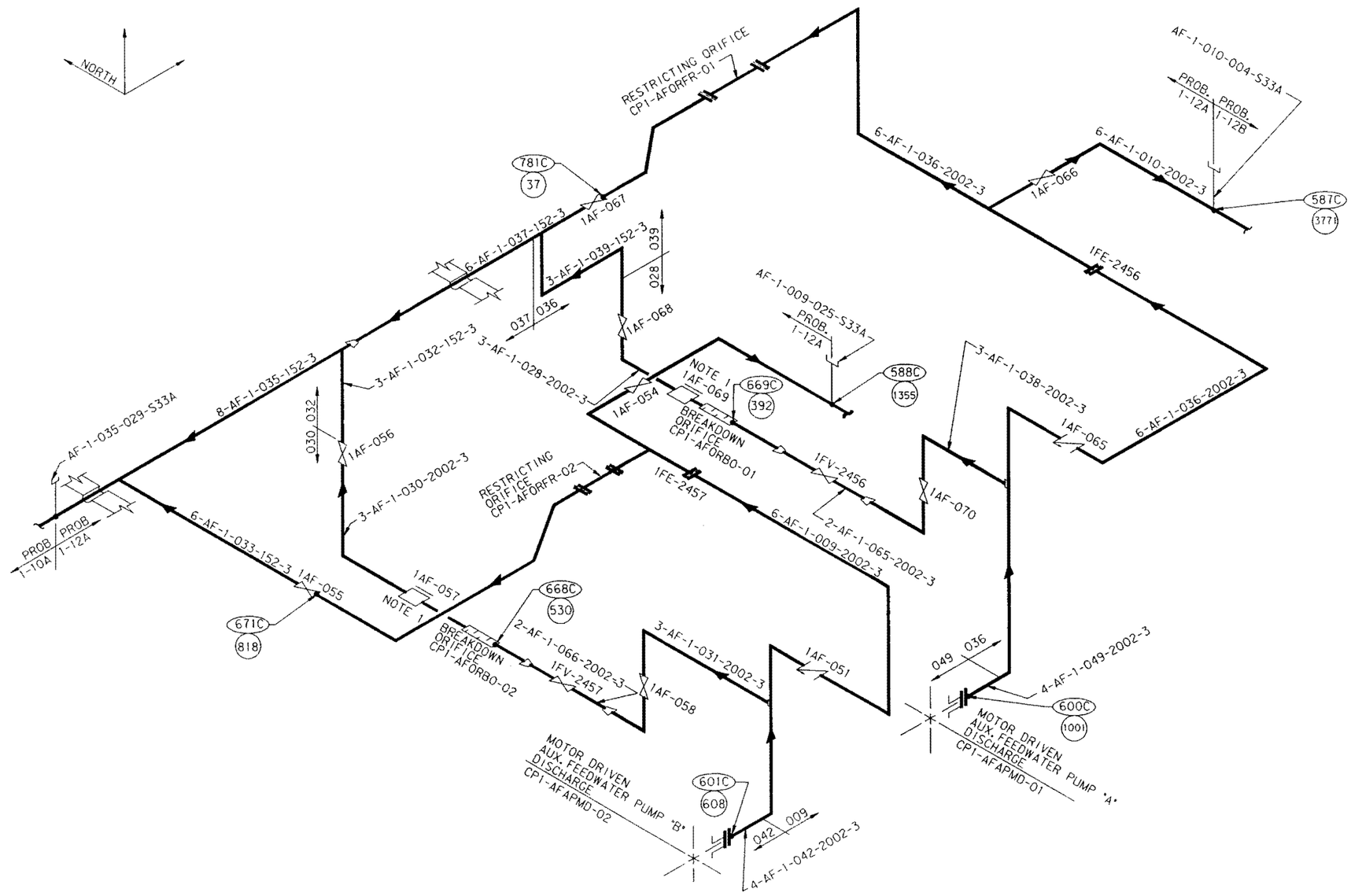
LEGEND

- STRESS POINT
- BREAK NUMBER
- BREAK LOCATION
- WELD LOCATION
- PIPE CAP

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

AUXILIARY F.W. SYSTEM
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRSAINT LOCATION

FIGURE 3.6B-30 PROB. 1-10B



LEGEND

- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- WHIP RESTRAINT

NOTES

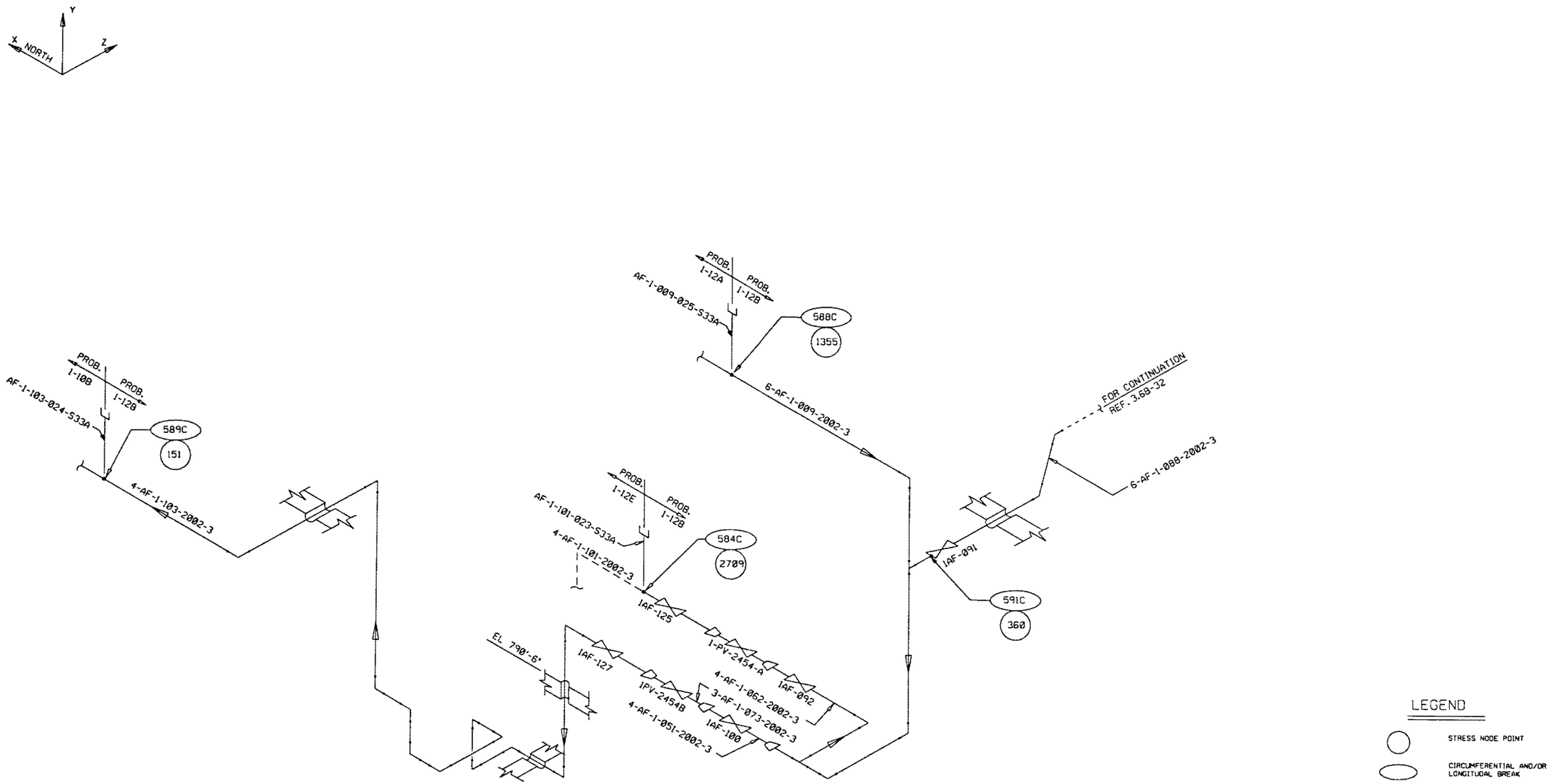
1. VALVE INTERNALS WERE REMOVED.

Amendment 91
April 15, 1994

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 1

AUXILIARY F.W. SYSTEM
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-31-1 PROB. 1-12A



COMANCHE PEAK S E S

FINAL SAFETY ANALYSIS REPORT

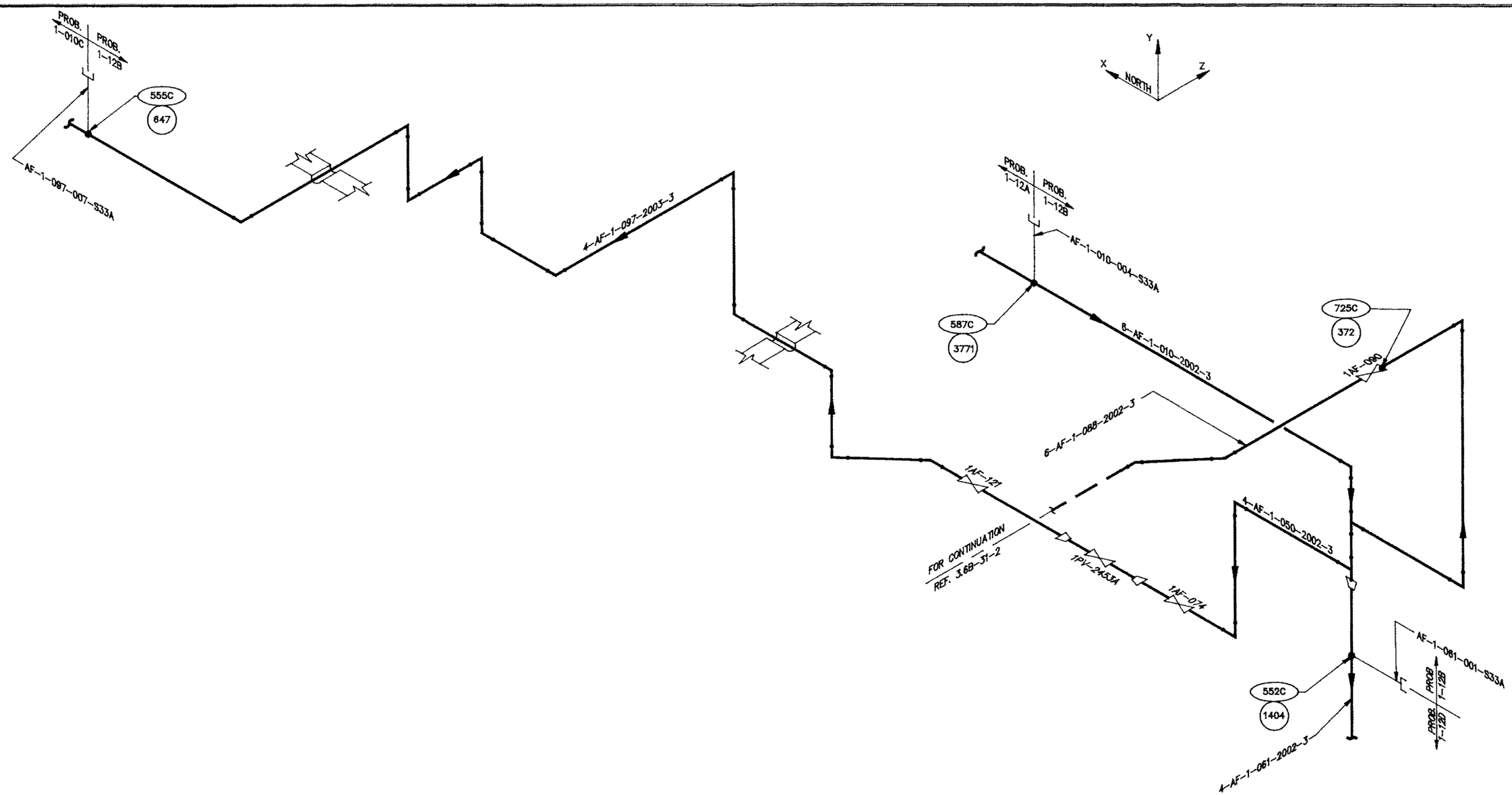
UNIT 1

AUXILIARY F.W. SYSTEM
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-31-2 PROB 1-12B

Amendment 96
August 2, 1999

ve0002fo.dgn



AMENDMENT 76
MAY 1, 1989

LEGEND

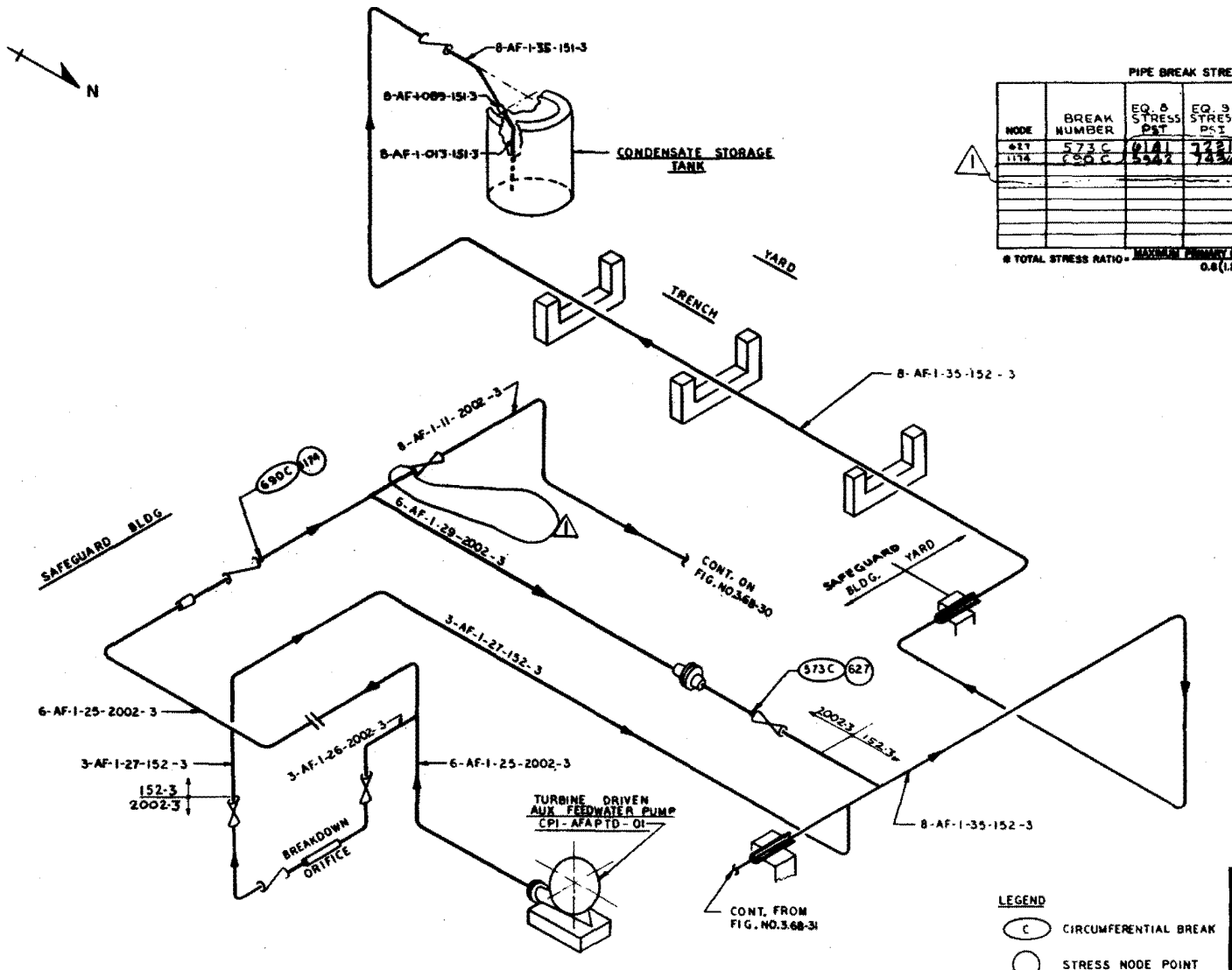
STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

AUXILIARY F.W. SYSTEM
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-32 PROB. 1-12B



PIPE BREAK STRESS ANALYSIS

NODE	BREAK NUMBER	EQ. 8 STRESS PSI	EQ. 9 STRESS PSI	EQ. 10 STRESS PSI	* TOTAL STRESS RATIO
627	573C	6181	7221	1096	
1114	690C	5542	7430	162	

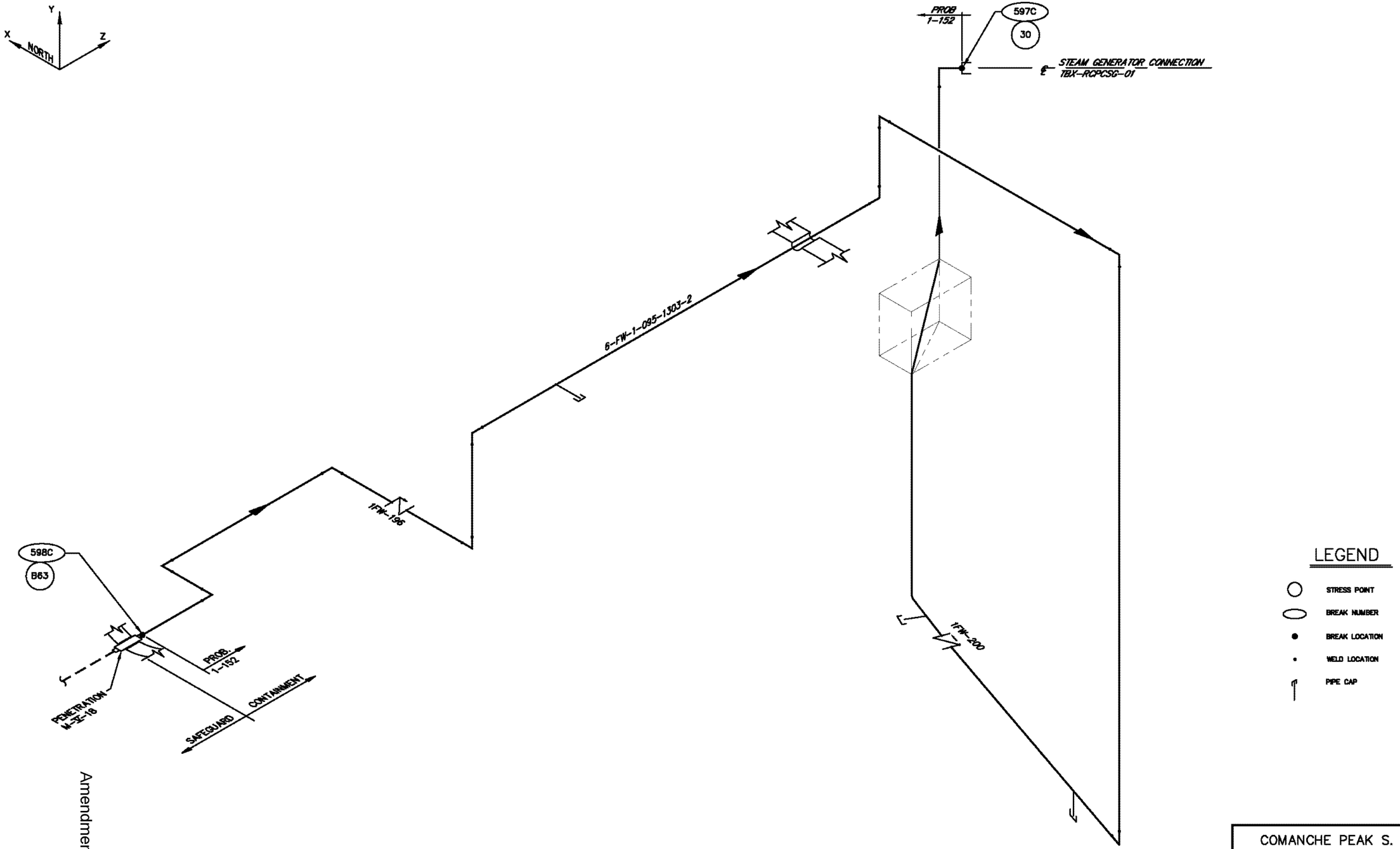
* TOTAL STRESS RATIO = $\frac{\text{MAXIMUM PRIMARY \& SECONDARY STRESS}}{0.8(1.2S_h + S_A)}$

AMENDMENT 41
JULY 11, 1983

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

AUX. F.W. SYSTEM STRESS NODE, BREAK POINT AND RESTRAINT LOCATIONS

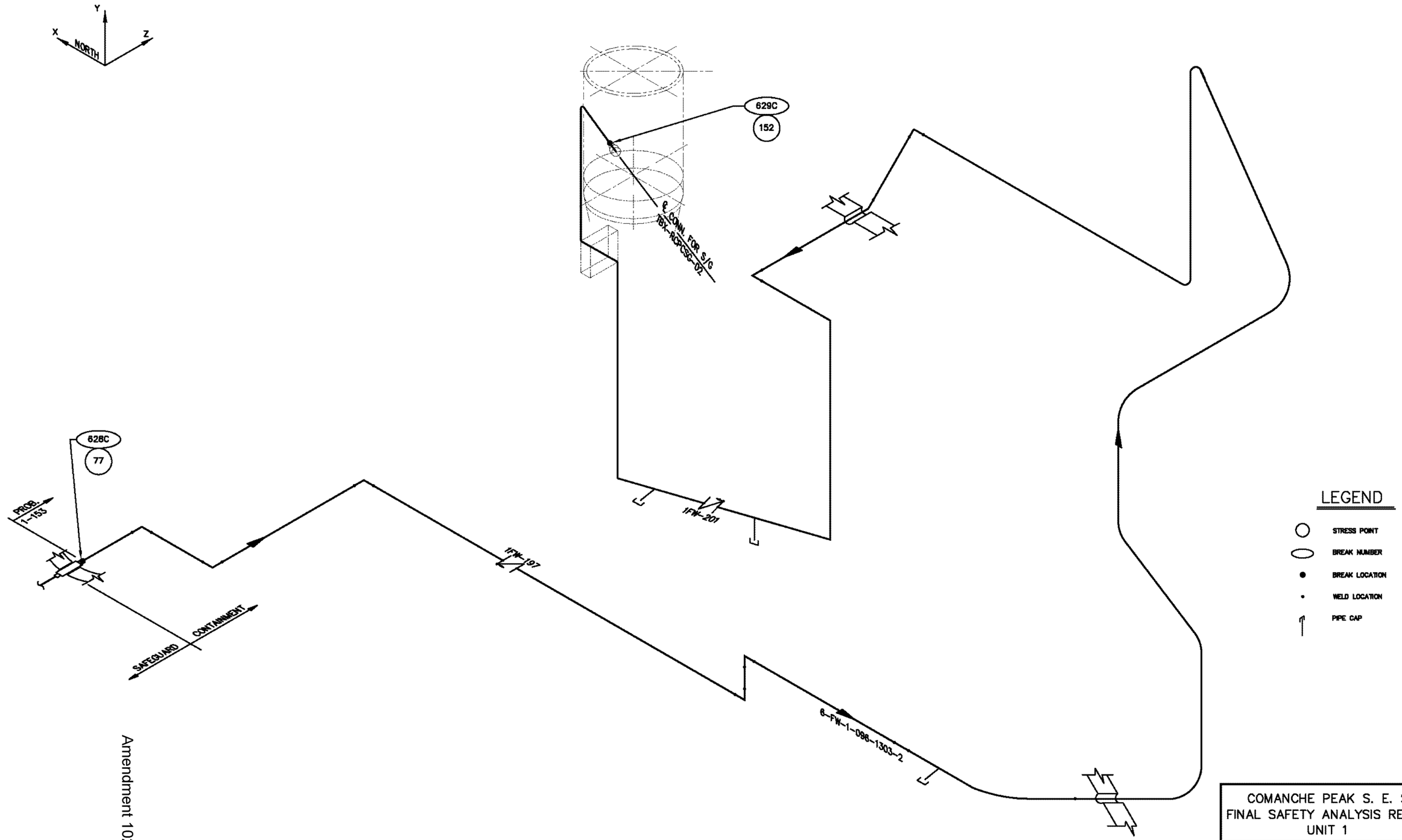
FIGURE 3.6B-33



COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

FEEDWATER SYSTEM: LOOP 1
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

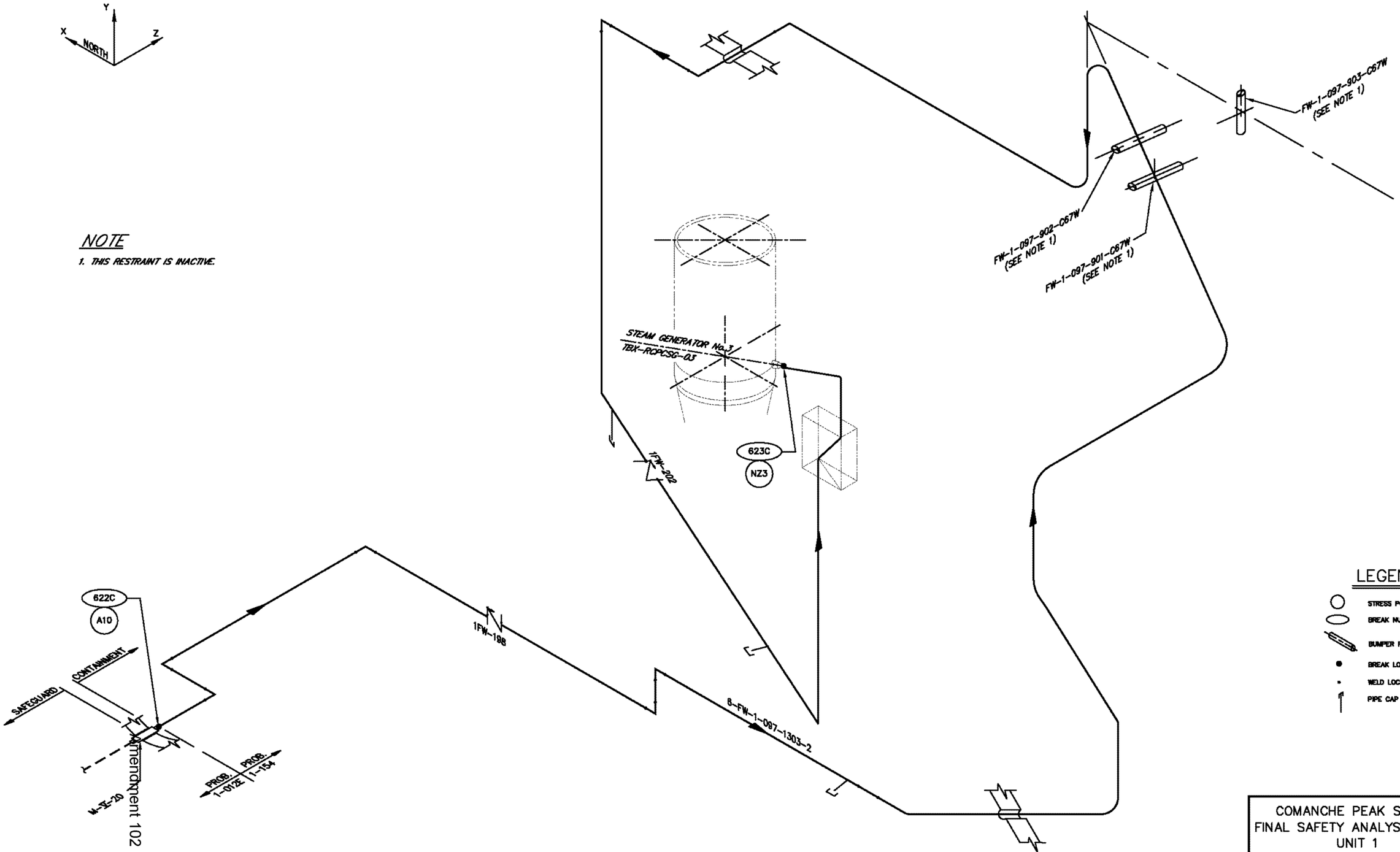
FIGURE 3.6B-34 PROB. 1-152



COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

FEEDWATER SYSTEM: LOOP 2
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

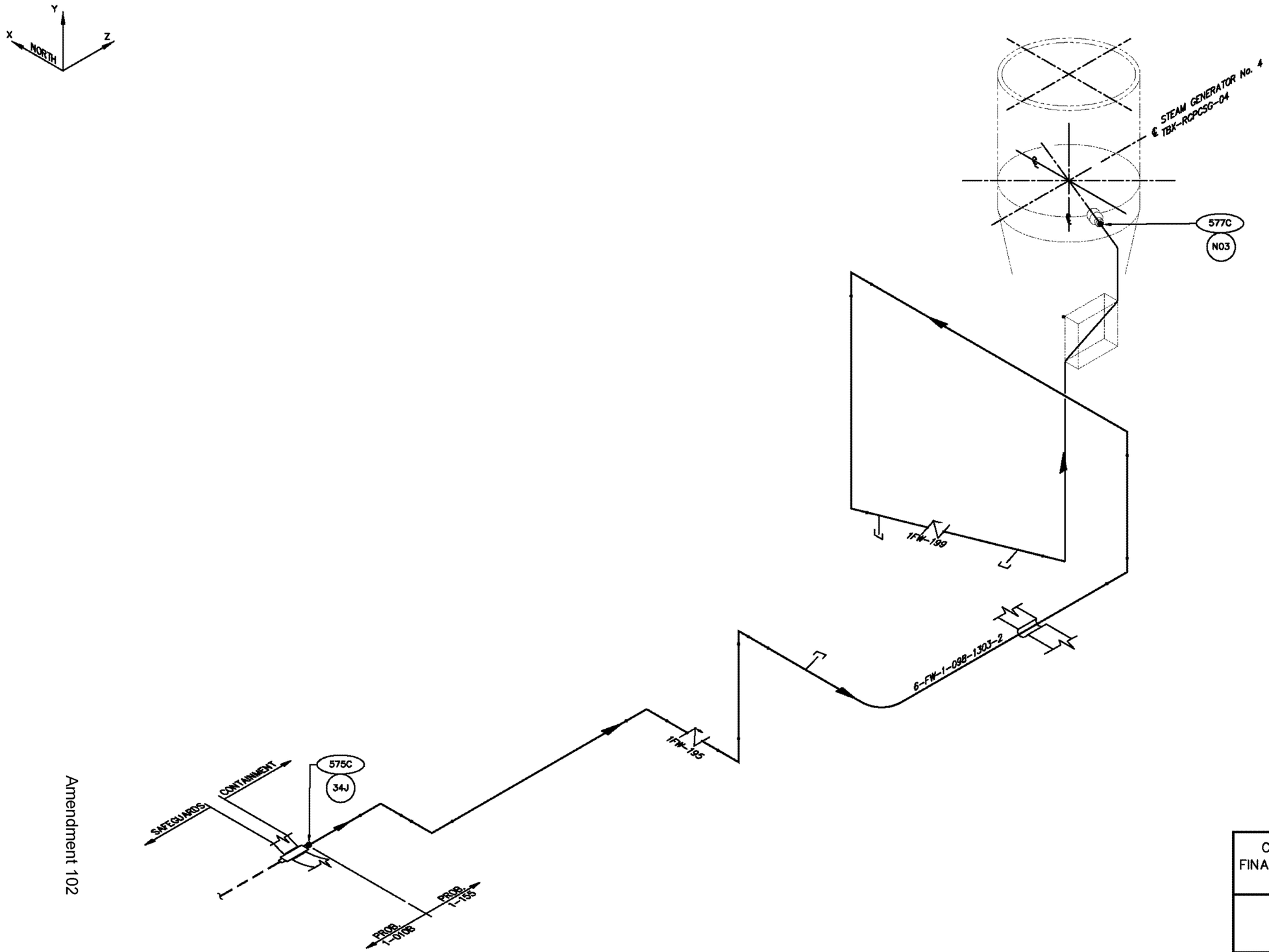
FIGURE 3.6B-35 PROB. 1-153



COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

FEEDWATER SYSTEM: LOOP 3
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

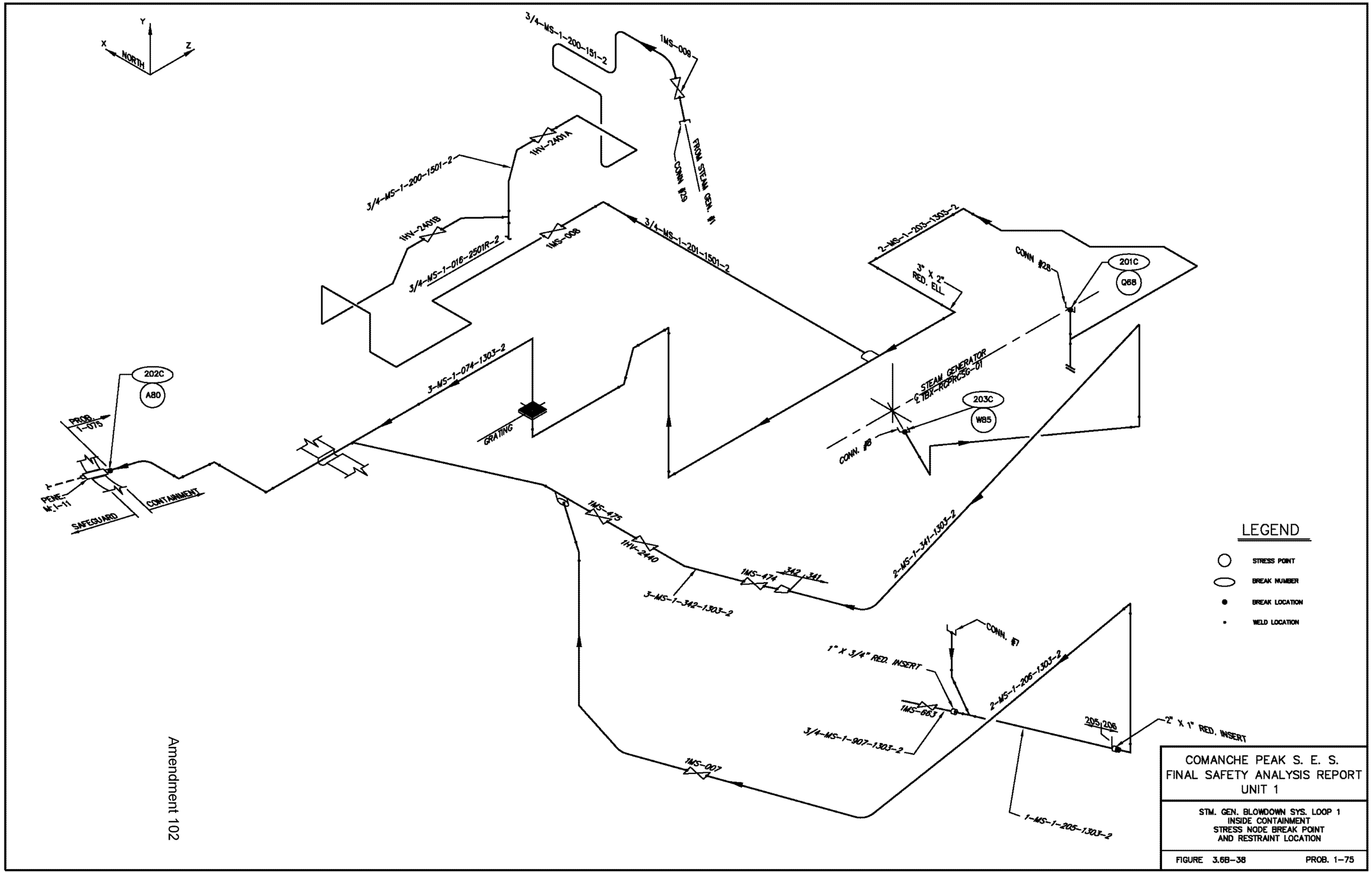
FIGURE 3.6B-36 PROB. 1-154



COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

FEEDWATER SYSTEM: LOOP 4
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

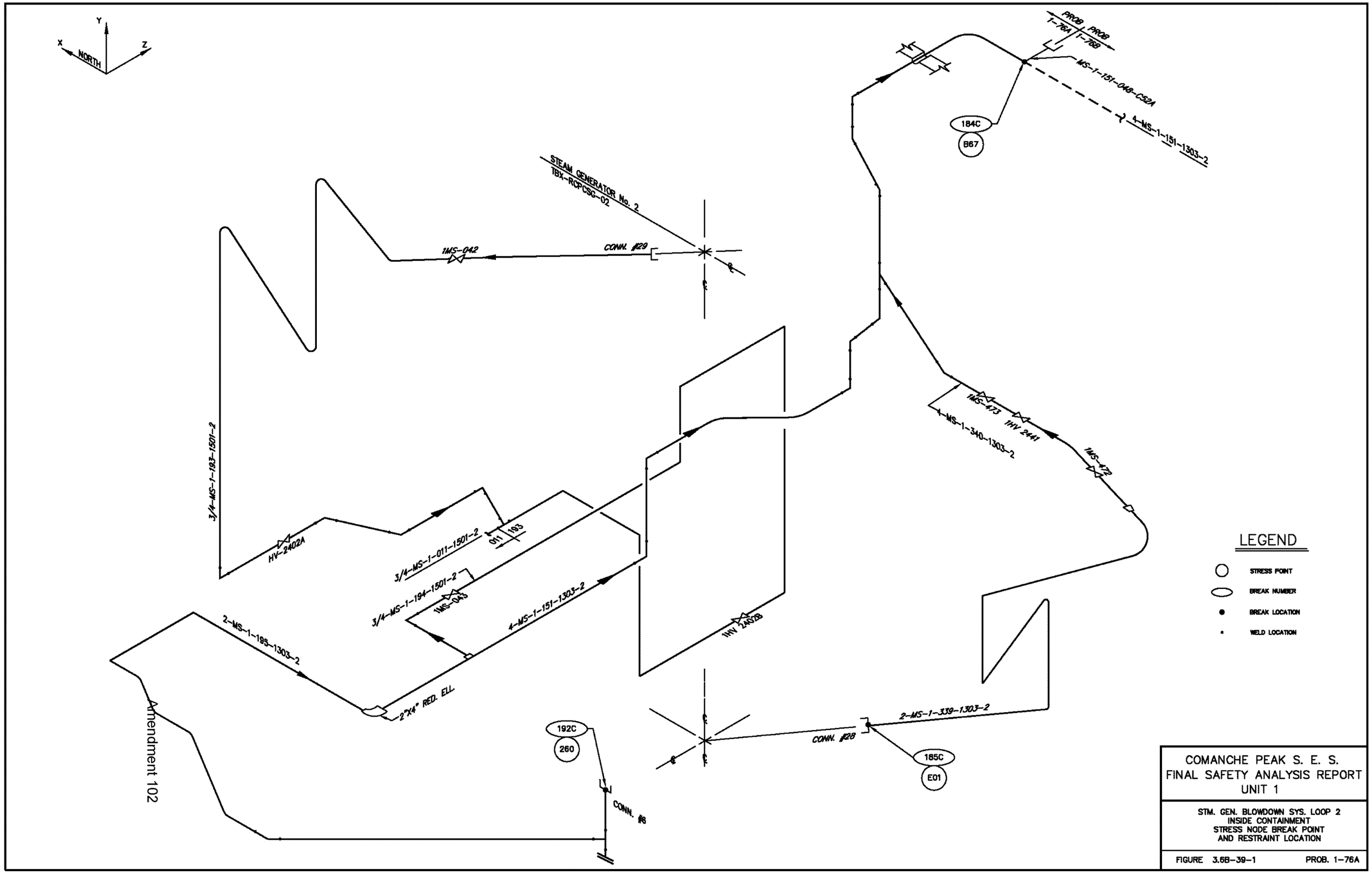
FIGURE 3.6B-37 PROB. 1-155

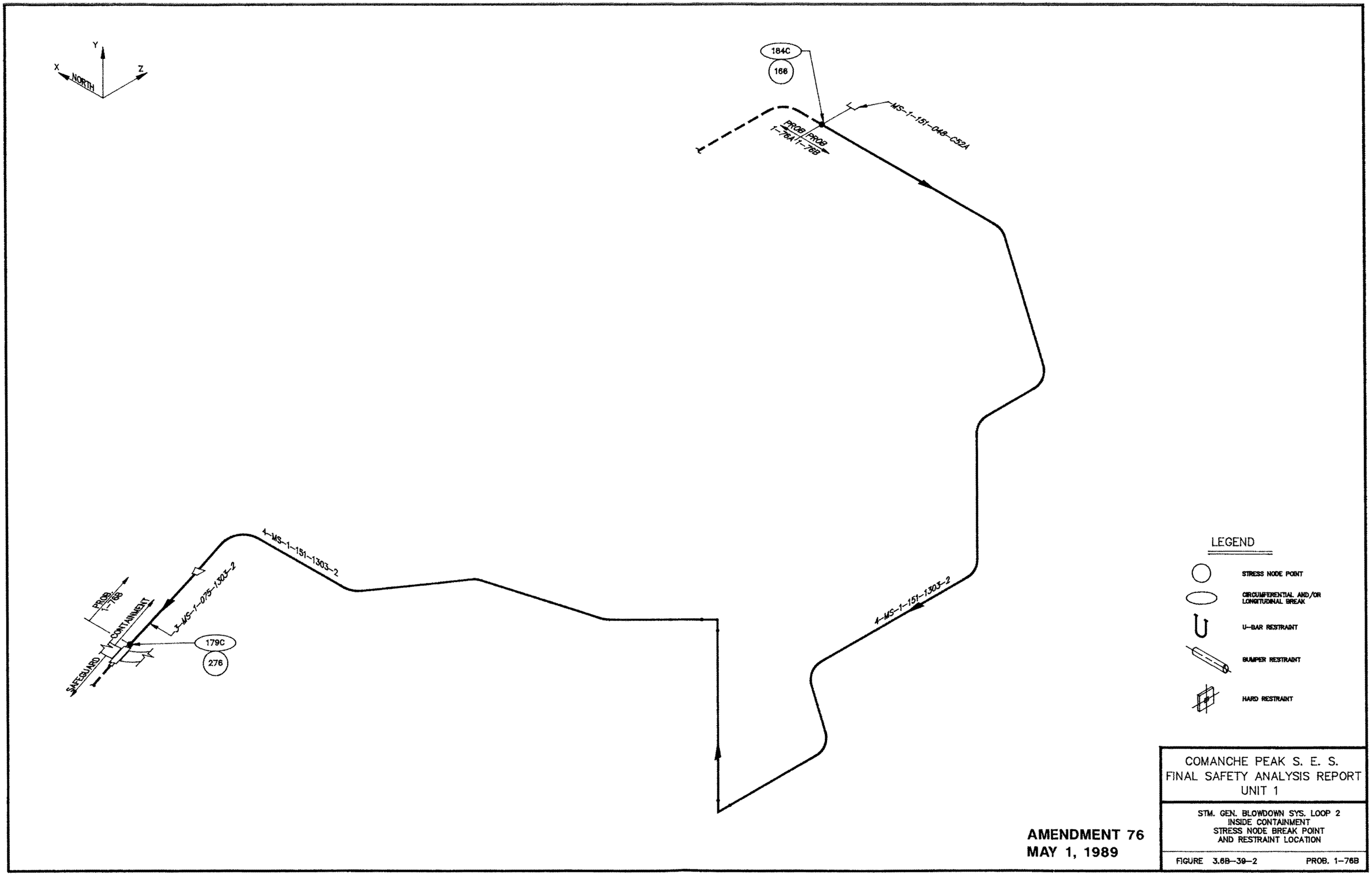


COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

STM. GEN. BLOWDOWN SYS. LOOP 1
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-38 PROB. 1-75


Y
X
NORTH
Z
PROB. 1-76A
PROB. 1-76B
MS-1-151-048-C52A
184C
B67
4-MS-1-151-1303-2
STEAM GENERATOR No. 2
TBX-RCPCSG-02
1MS-042
CONN. #29
3/4-MS-1-193-1501-2
1MS-473
1HV 2441
4-MS-1-340-1303-2
1MS-472
HV-2402A
3/4-MS-1-011-1501-2
011
193
3/4-MS-1-194-1501-2
1MS-043
4-MS-1-151-1303-2
1HV 2402B
2-MS-1-193-1303-2
2"X4" RED. ELL.
2-MS-1-339-1303-2
CONN. #28
185C
E01
192C
260
CONN. #8
LEGEND
STRESS POINT
BREAK NUMBER
BREAK LOCATION
WELD LOCATION
Amendment 102
COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1
STM. GEN. BLOWDOWN SYS. LOOP 2
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION
FIGURE 3.6B-39-1
PROB. 1-76A

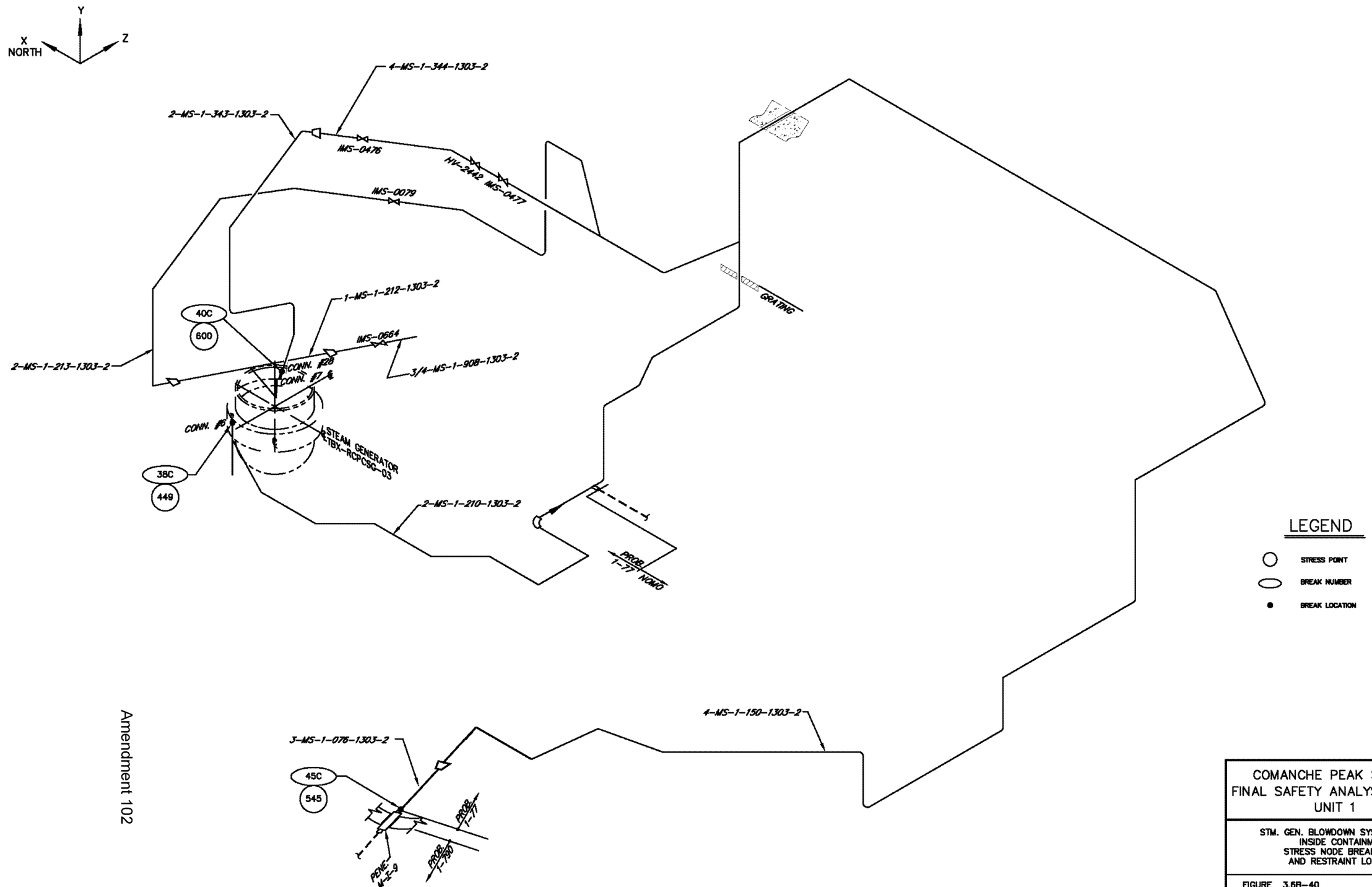


COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

STM. GEN. BLOWDOWN SYS. LOOP 2
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-39-2 PROB. 1-76B

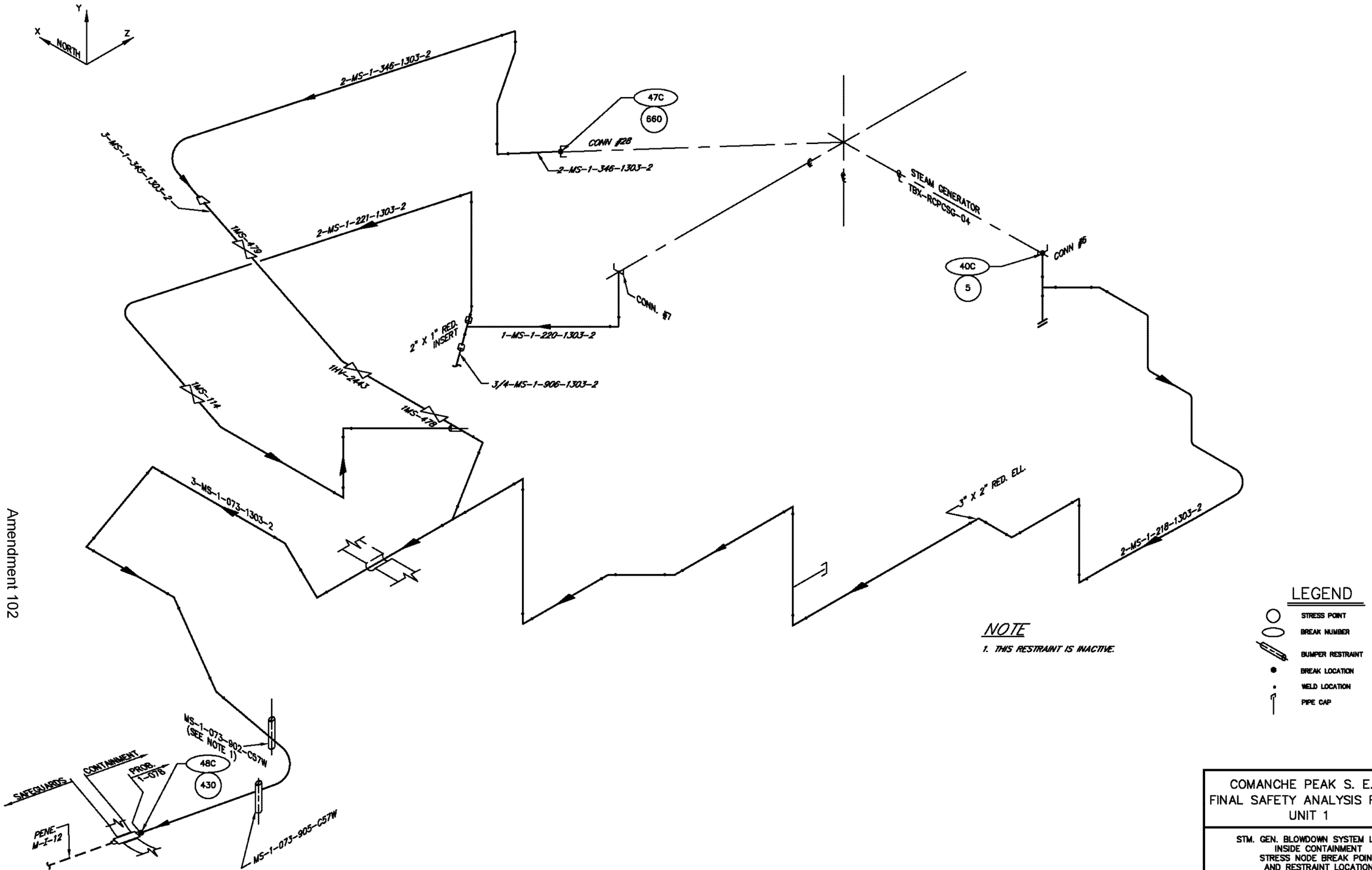
AMENDMENT 76
MAY 1, 1989



COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

STM. GEN. BLOWDOWN SYSTEM LOOP 3
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

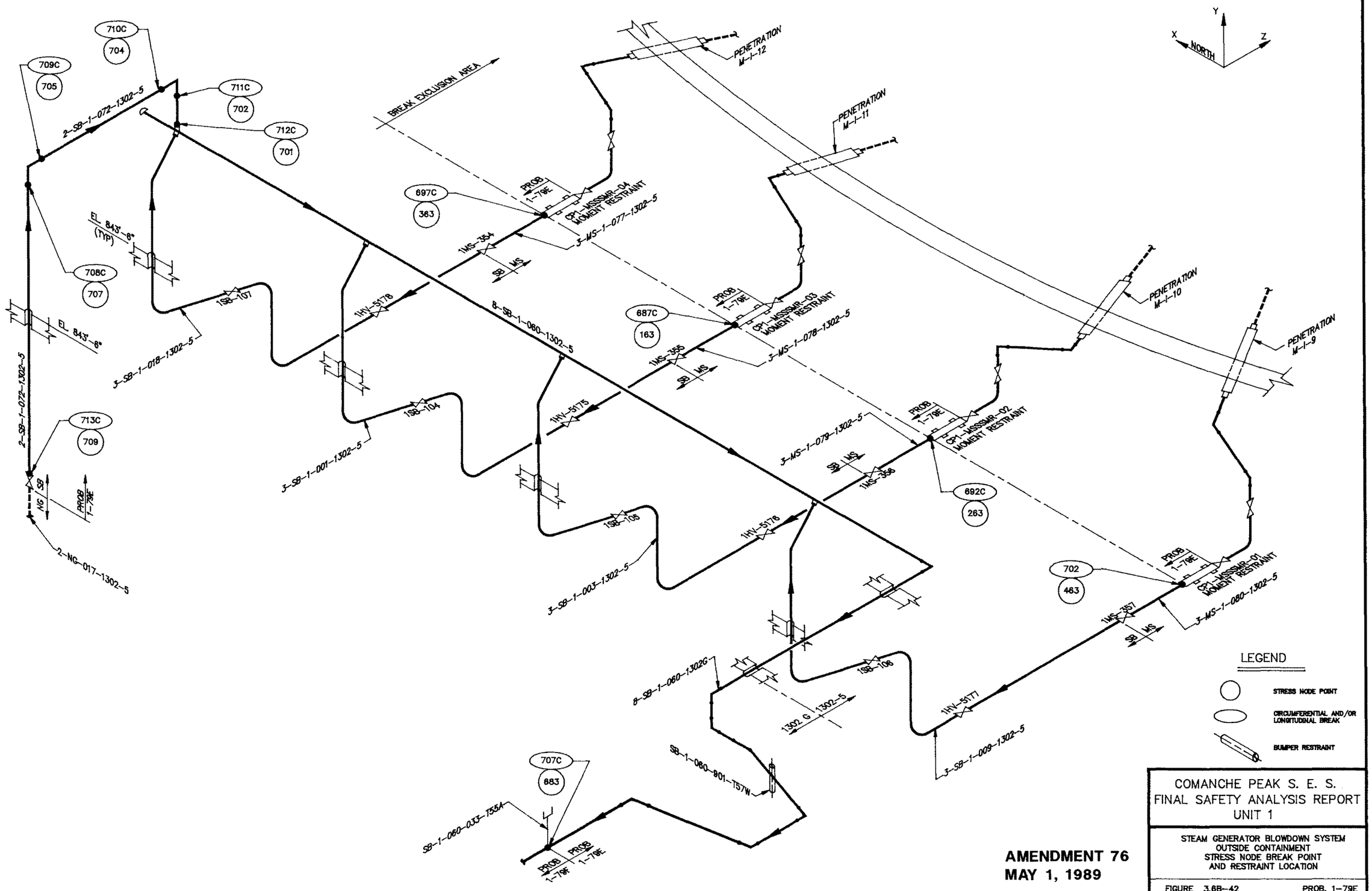
FIGURE 3.6B-40 PROB. 1-077



COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

STM. GEN. BLOWDOWN SYSTEM LOOP 4
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-41 PROB. 1-078

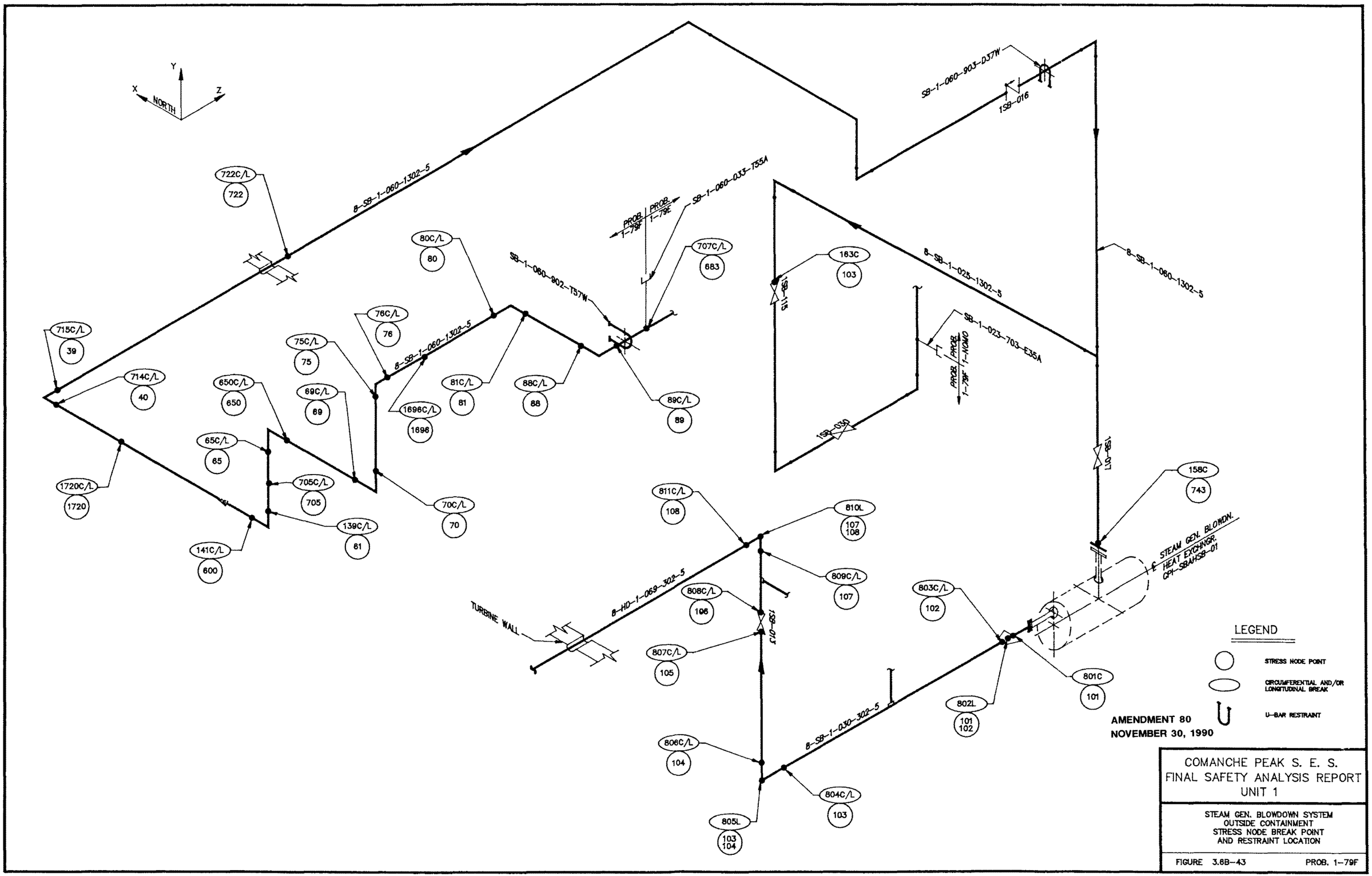


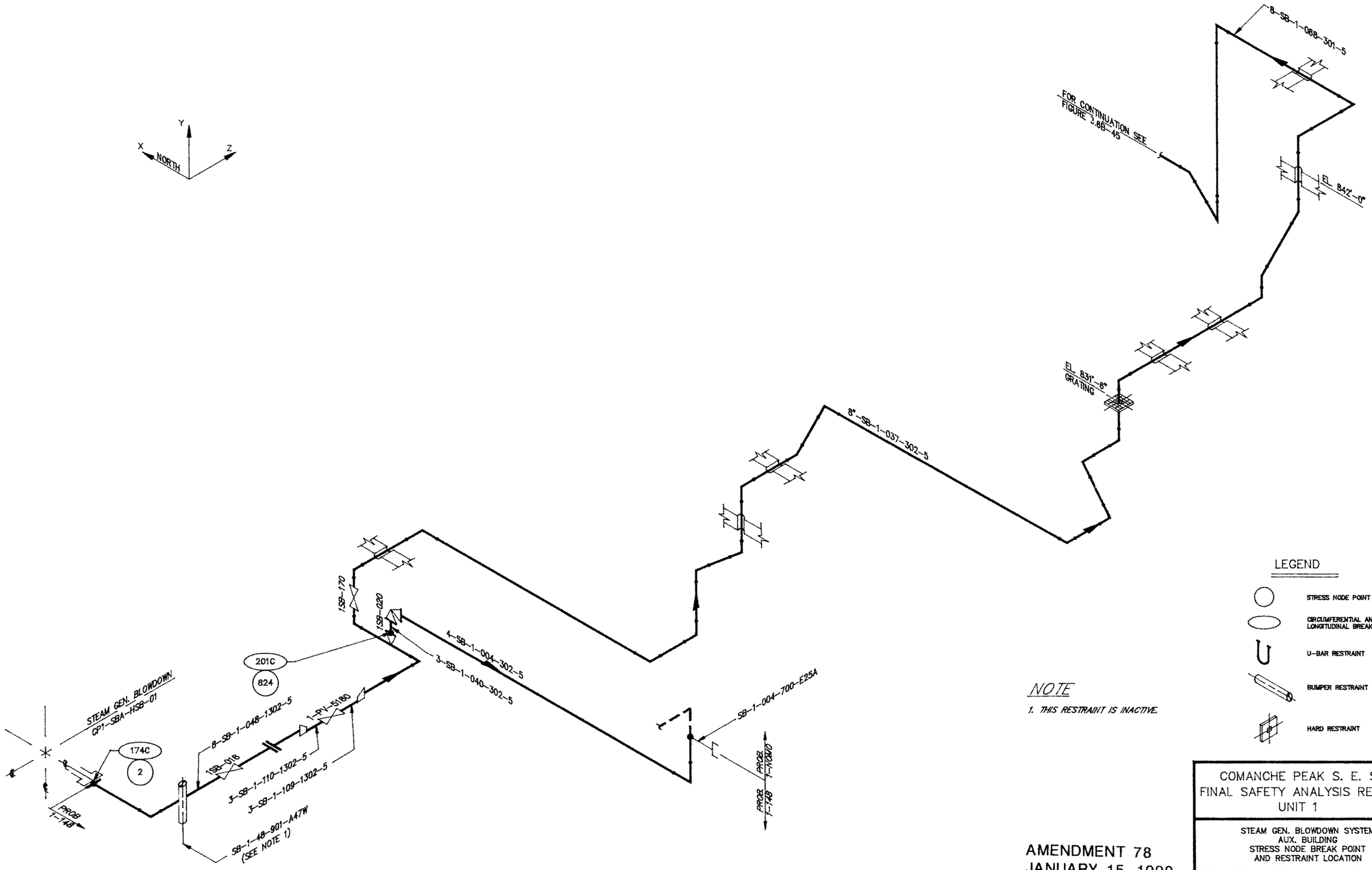
COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

STEAM GENERATOR BLOWDOWN SYSTEM
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-42 PROB. 1-79E

AMENDMENT 76
MAY 1, 1989


Y
X
NORTH
Z
8-SB-1-060-1302-5
722C/L
722
715C/L
39
714C/L
40
650C/L
650
69C/L
69
65C/L
65
1720C/L
1720
705C/L
705
139C/L
81
141C/L
600
70C/L
70
75C/L
75
76C/L
76
80C/L
80
1696C/L
1696
81C/L
81
88C/L
88
89C/L
89
SB-1-060-902-T57W
PROB. 1-79F
PROB. 1-79E
SB-1-060-033-T55A
707C/L
683
SB-1-060-903-D37W
1SB-016
163C
103
1SB-115
8-SB-1-025-1302-5
SB-1-023-703-E35A
PROB. 1-79F
PROB. 1-NONO
1SB-030
8-SB-1-060-1302-5
1LV-651
158C
743
STEAM GEN. BLOWDN. HEAT EXCHNGR. GPI-SBAHSB-01
811C/L
108
810L
107
108
809C/L
107
808C/L
106
807C/L
105
1SB-013
806C/L
104
805L
103
104
804C/L
103
8-HD-1-069-302-5
TURBINE WALL
8-SB-1-030-302-5
803C/L
102
802L
101
102
801C
101
LEGEND
STRESS NODE POINT
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
U-BAR RESTRAINT
AMENDMENT 80
NOVEMBER 30, 1990
COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1
STEAM GEN. BLOWDOWN SYSTEM
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION
FIGURE 3.6B-43
PROB. 1-79F



NOTE

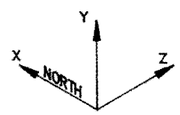
1. THIS RESTRAINT IS INACTIVE.

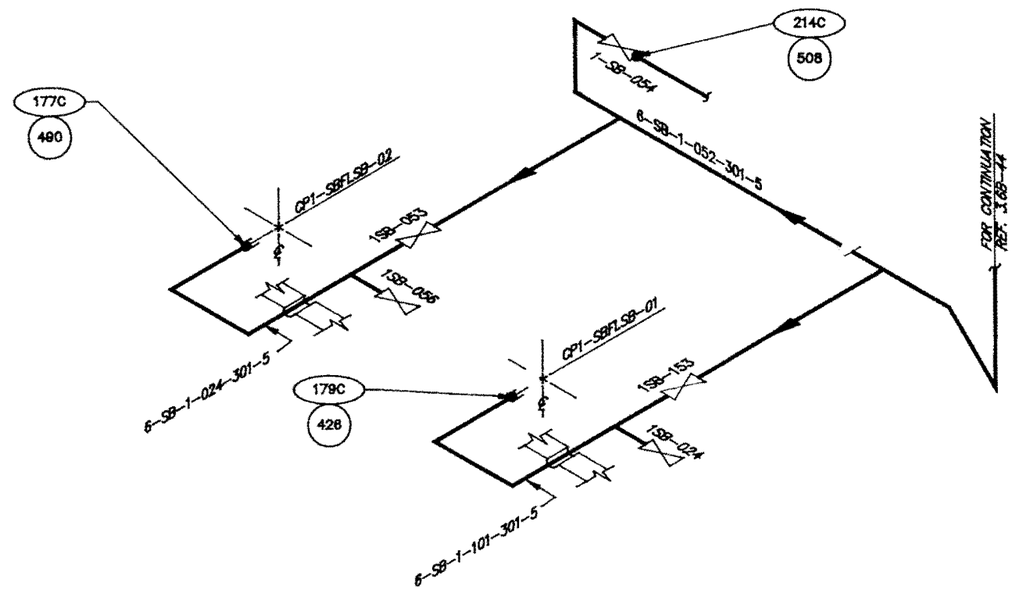
AMENDMENT 78
JANUARY 15, 1990

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

STEAM GEN. BLOWDOWN SYSTEM
AUX. BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-44 PROB. 1-148





LEGEND

STRESS NODE POINT

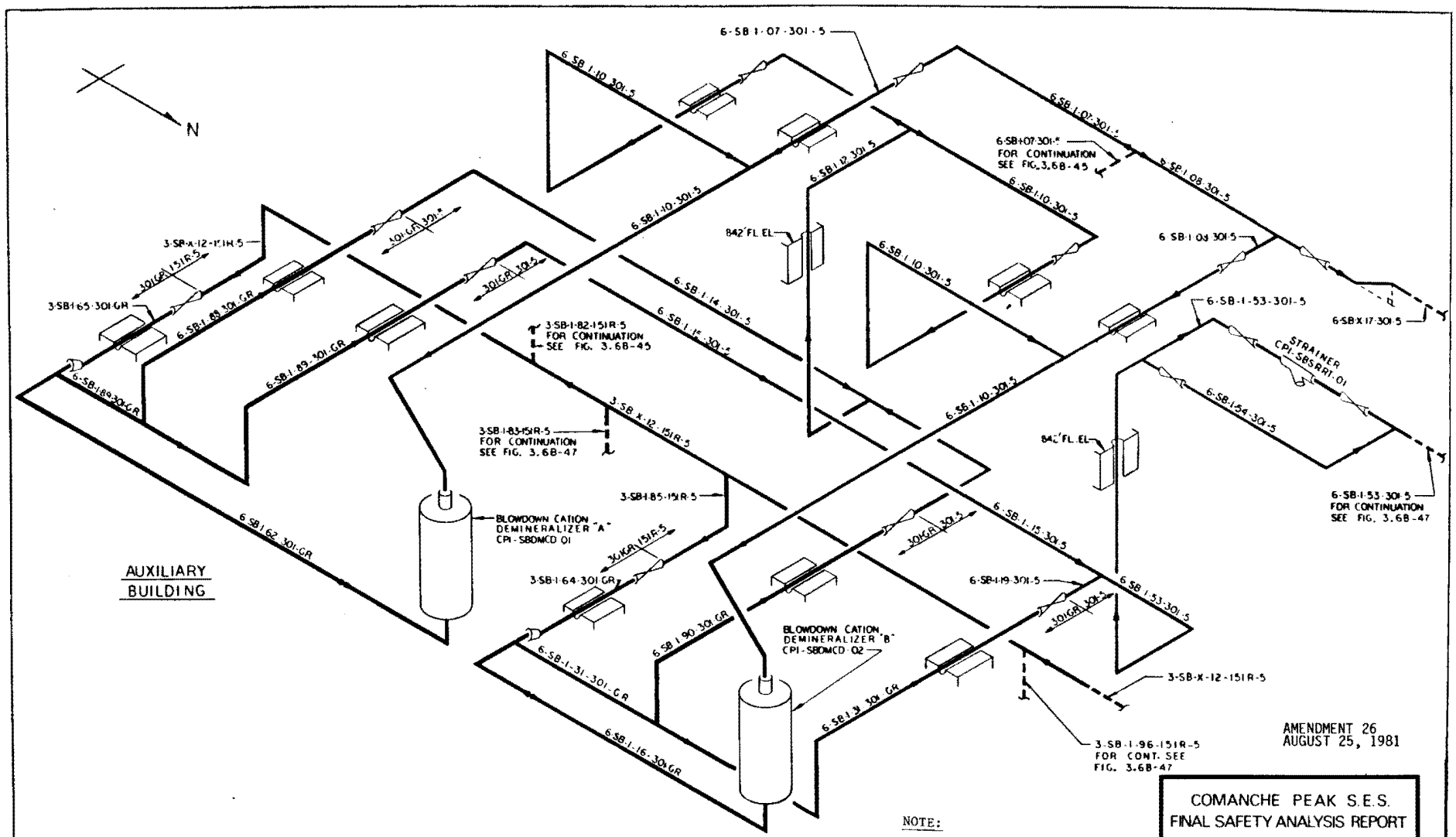
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

STEAM GEN. BLOWDOWN SYSTEM
AUX. BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-45 PROB. 1-148

AMENDMENT 76
MAY 1, 1989



AMENDMENT 26
AUGUST 25, 1981

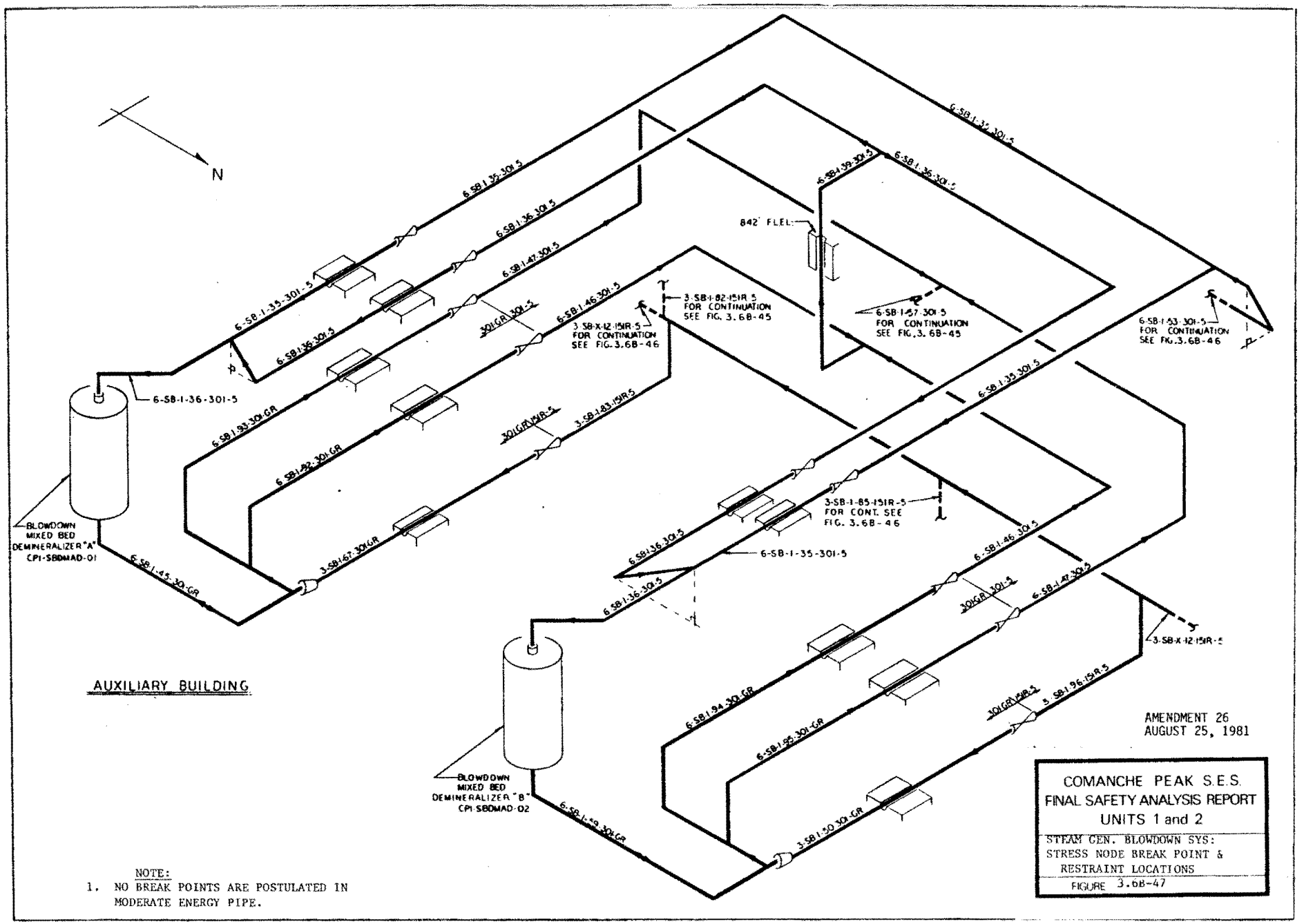
NOTE:

1. NO BREAK POINTS ARE POSTULATED IN MODERATE ENERGY PIPE.

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

STEAM GEN. BLOWDOWN SYS.
STRESS NODE BREAK POINT &
RESTRAINT LOCATIONS

FIGURE 3.6B-46



AMENDMENT 26
AUGUST 25, 1981

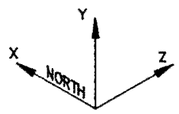
COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

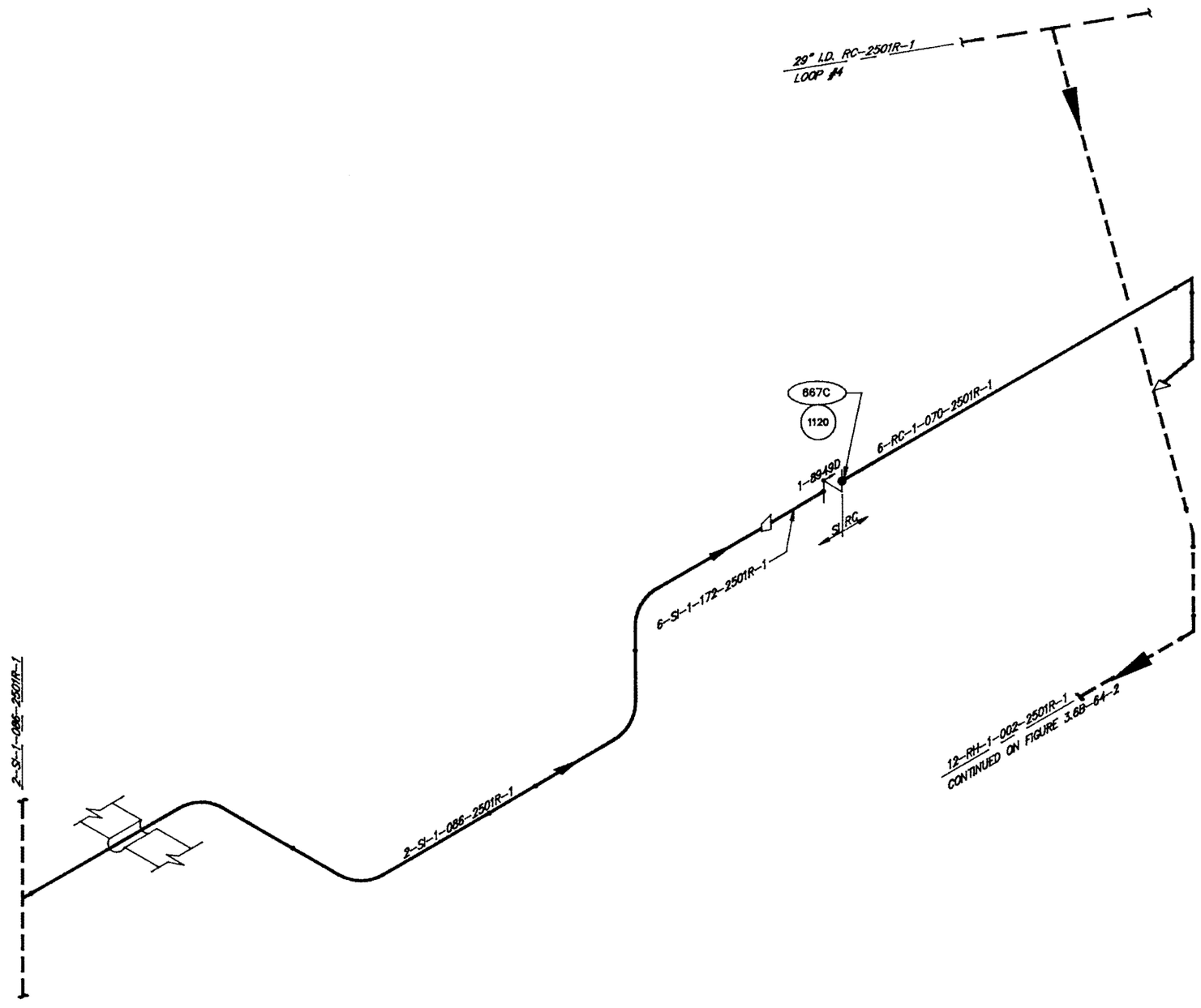
STEAM GEN. BLOWDOWN SYS:
STRESS NODE BREAK POINT &
RESTRAINT LOCATIONS

FIGURE 3.6B-47

NOTE:

1. NO BREAK POINTS ARE POSTULATED IN MODERATE ENERGY PIPE.





LEGEND

STRESS NODE POINT

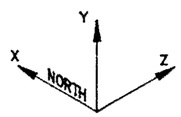
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

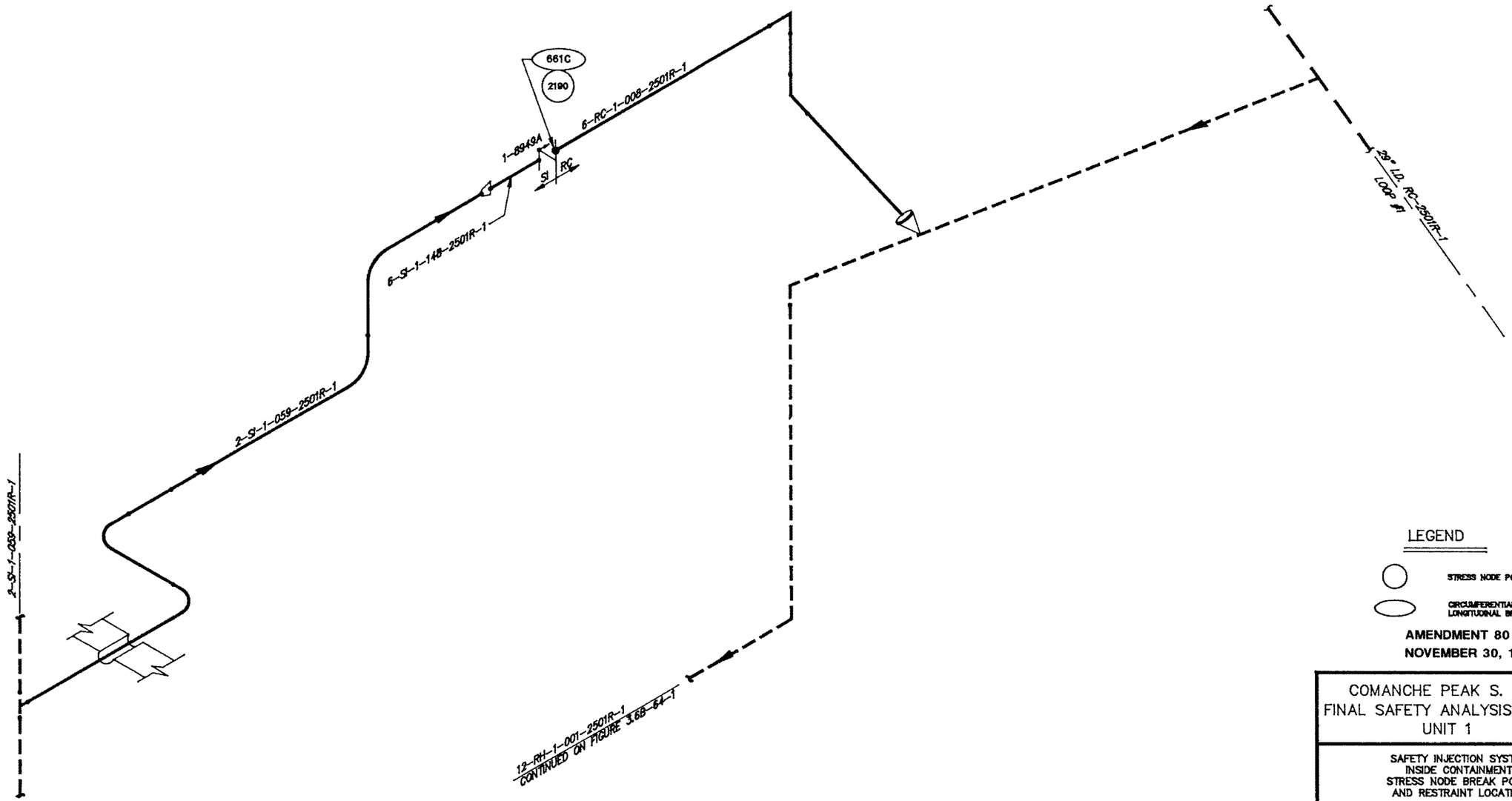
AMENDMENT 80
NOVEMBER 30, 1990

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-48-1 PROB. 1-13B





LEGEND

STRESS NODE POINT

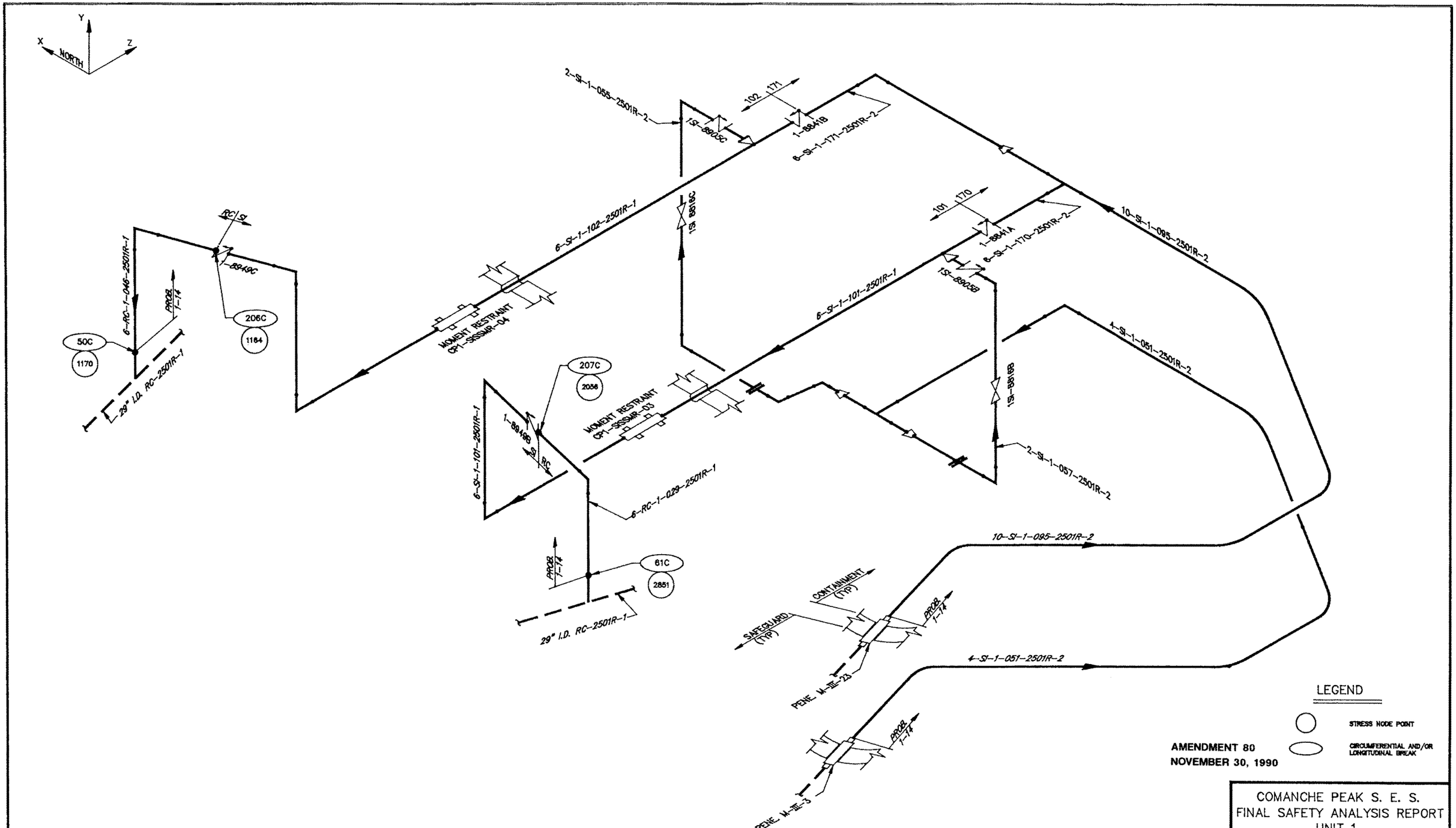
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

AMENDMENT 80
NOVEMBER 30, 1990

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-48-2 PROB. 1-13A

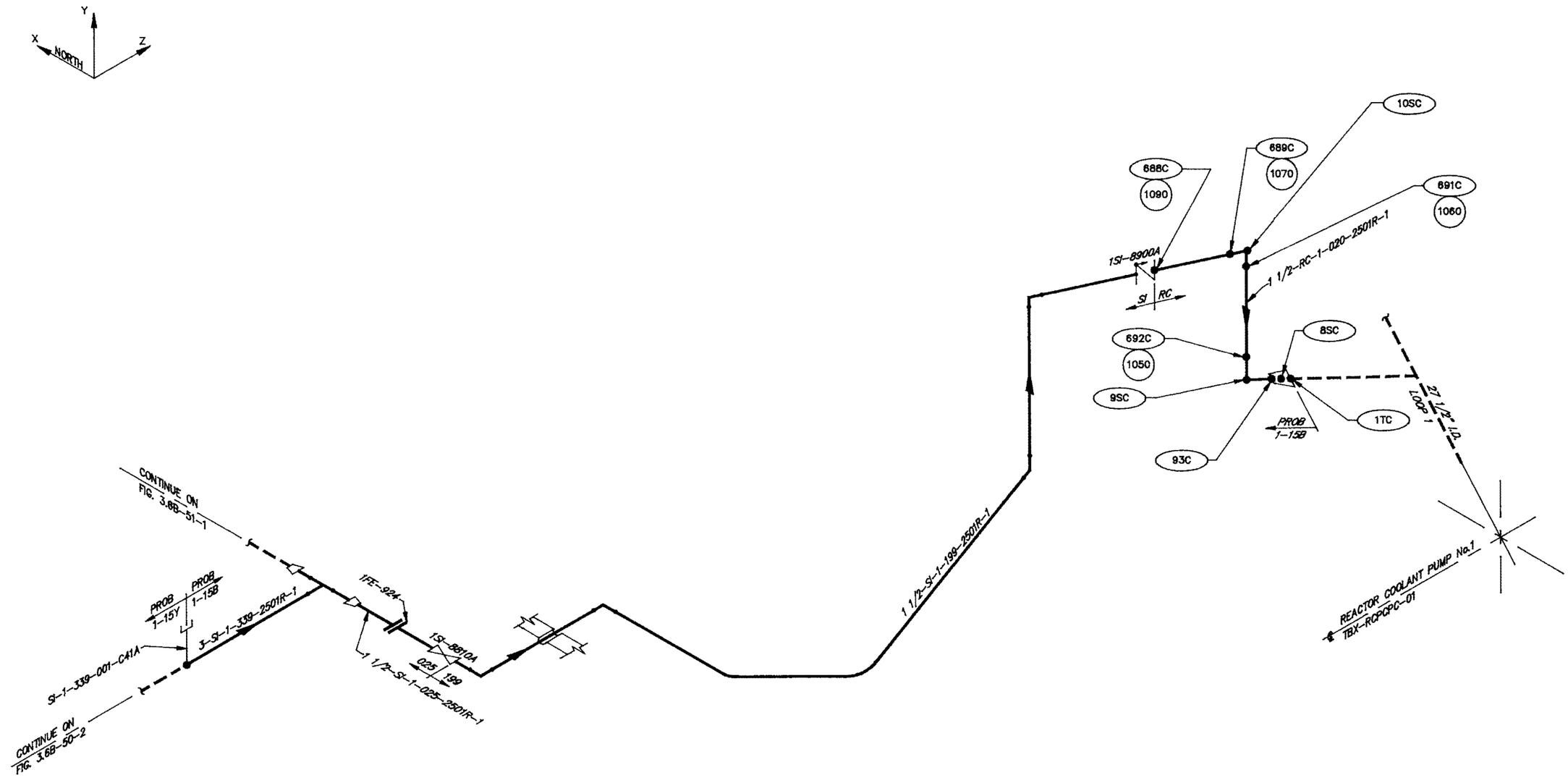


AMENDMENT 80
NOVEMBER 30, 1990

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-49 PROB. 1-14



LEGEND

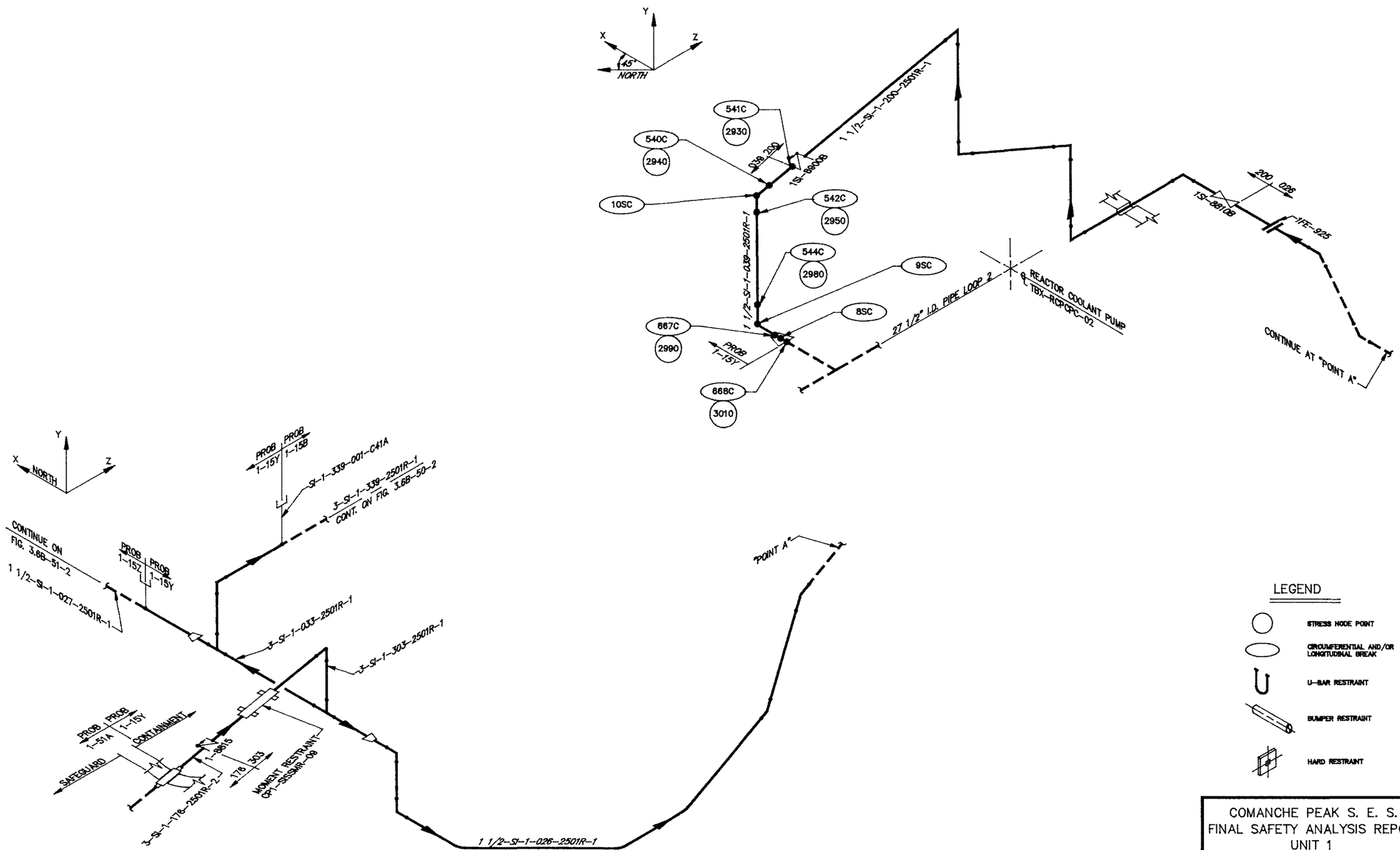
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT

AMENDMENT 76
MAY 1, 1989

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-50-1 PROB. 1-15B



LEGEND

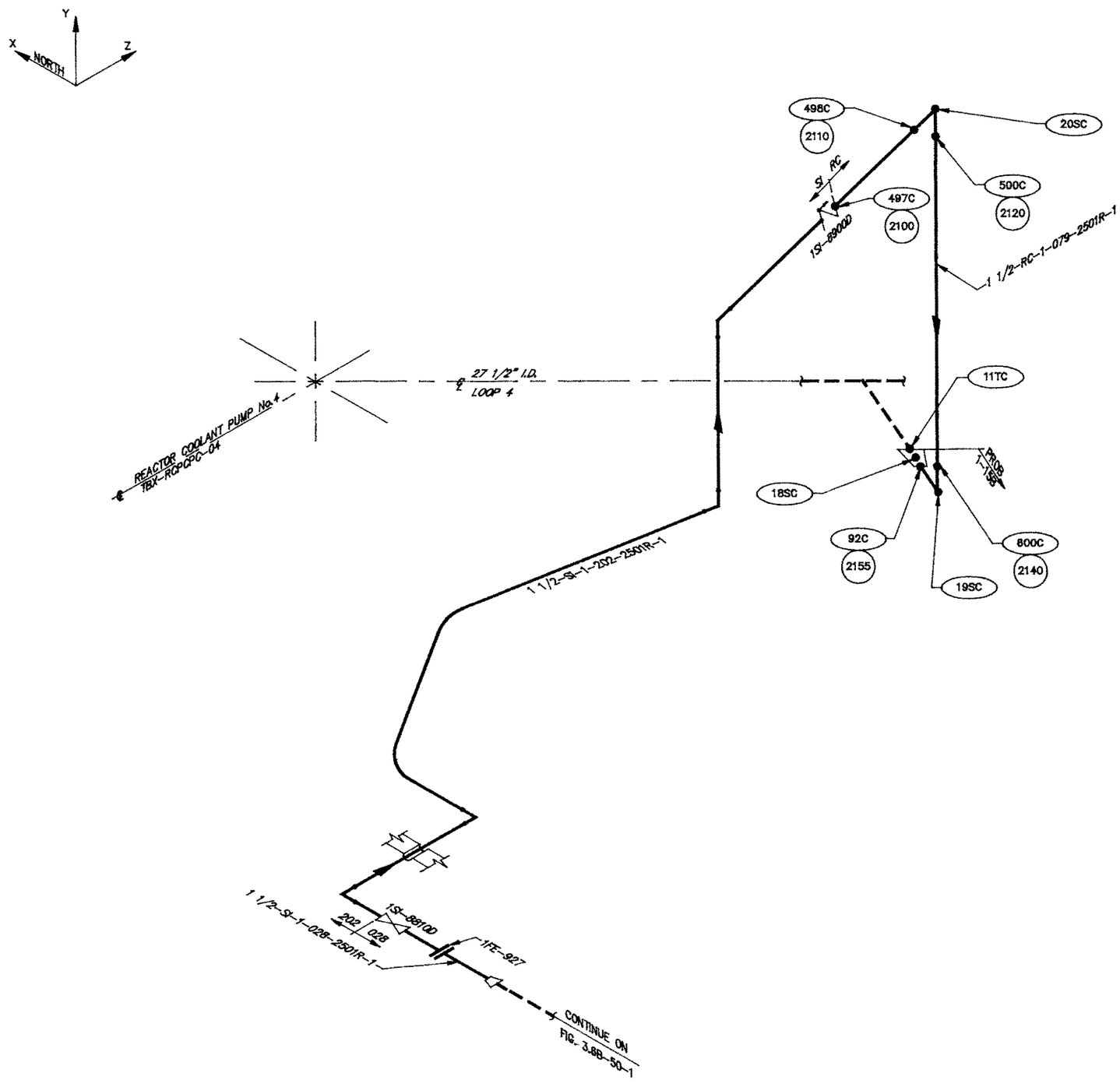
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT

AMENDMENT 76
MAY 1, 1989

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-50-2 PROB. 1-15Y



LEGEND

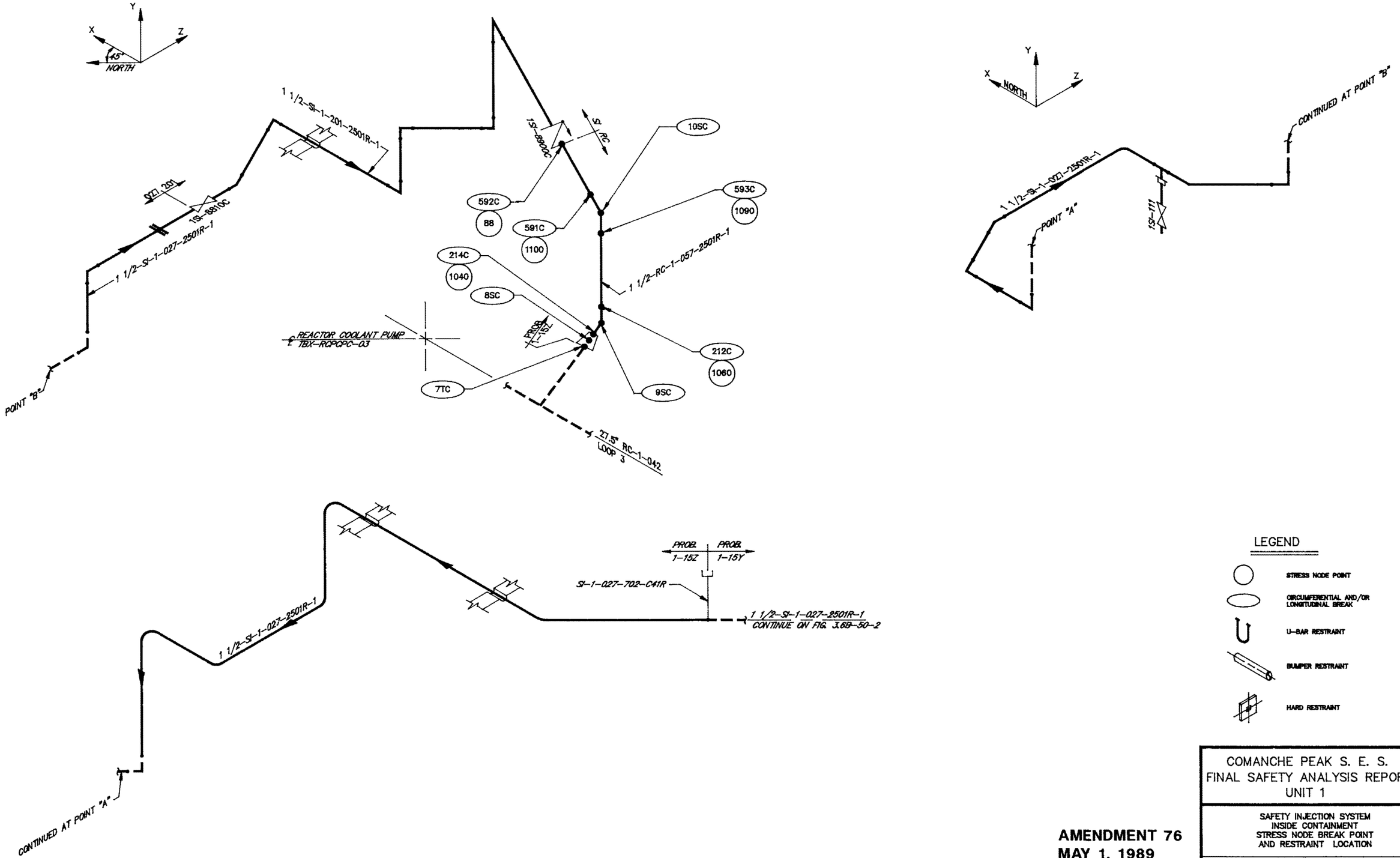
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-51-1 PROB. 1-15B

AMENDMENT 76
MAY 1, 1989

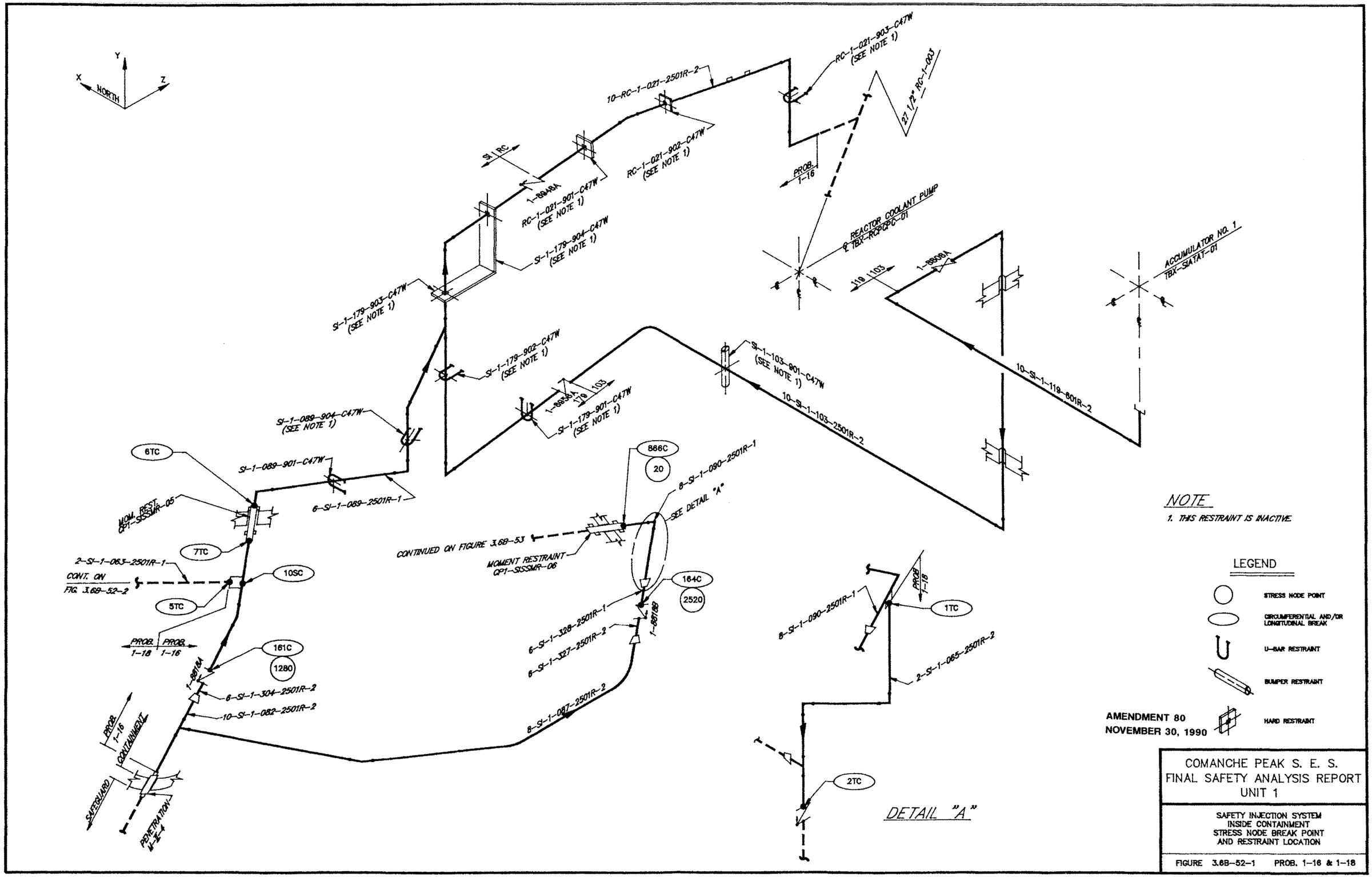


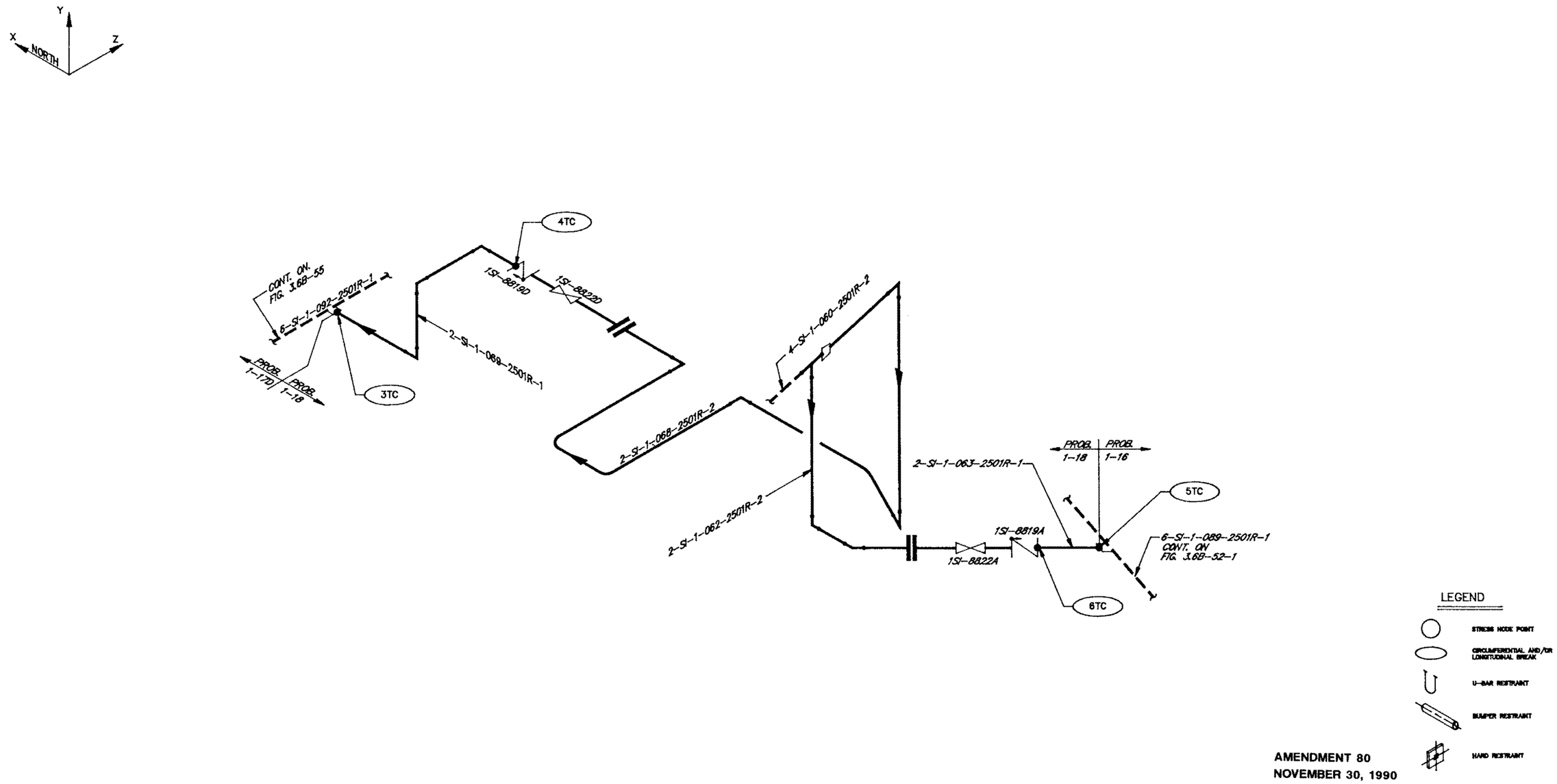
AMENDMENT 76
MAY 1, 1989

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-51-2 PROB. 1-15Z


NORTH
10-RC-1-021-2501R-2
RC-1-021-903-C47W (SEE NOTE 1)
27 1/2° RC-1-003
RC-1-021-902-C47W (SEE NOTE 1)
SI RC
1-868A
RC-1-021-901-C47W (SEE NOTE 1)
SI-1-179-904-C47W (SEE NOTE 1)
PROB. 1-16
REACTOR COOLANT PUMP
TBX-RCPCPC-01
119 103
1-868A
ACCUMULATOR NO. 1
TBX-SIATAT-01
SI-1-179-903-C47W (SEE NOTE 1)
SI-1-179-902-C47W (SEE NOTE 1)
SI-1-103-901-C47W (SEE NOTE 1)
10-SI-1-119-801R-2
1-868A
179 103
SI-1-179-901-C47W (SEE NOTE 1)
10-SI-1-103-2501R-2
SI-1-089-904-C47W (SEE NOTE 1)
6TC
866C
20
SI-1-089-901-C47W
8-SI-1-090-2501R-1
SEE DETAIL "A"
6-SI-1-089-2501R-1
MOM. REST. CP1-SISSMR-05
CONTINUED ON FIGURE 3.6B-53
MOMENT RESTRAINT CP1-SISSMR-06
7TC
2-SI-1-063-2501R-1
CONT. ON FIG. 3.6B-52-2
10SC
164C
2520
5TC
6-SI-1-328-2501R-1
1-881BA
PROB. 1-18
PROB. 1-16
161C
1280
6-SI-1-327-2501R-2
1-881BA
6-SI-1-304-2501R-2
10-SI-1-082-2501R-2
8-SI-1-087-2501R-2
PROB. 1-16
CONTAINMENT
SAFEGUARD
PENETRATION M-E-4
8-SI-1-090-2501R-1
PROB. 1-18
1TC
2-SI-1-065-2501R-2
2TC
DETAIL "A"
NOTE
1. THIS RESTRAINT IS INACTIVE.
LEGEND
STRESS NODE POINT
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
U-BAR RESTRAINT
BUMPER RESTRAINT
HARD RESTRAINT
AMENDMENT 80
NOVEMBER 30, 1990
COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1
SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION
FIGURE 3.6B-52-1 PROB. 1-16 & 1-18

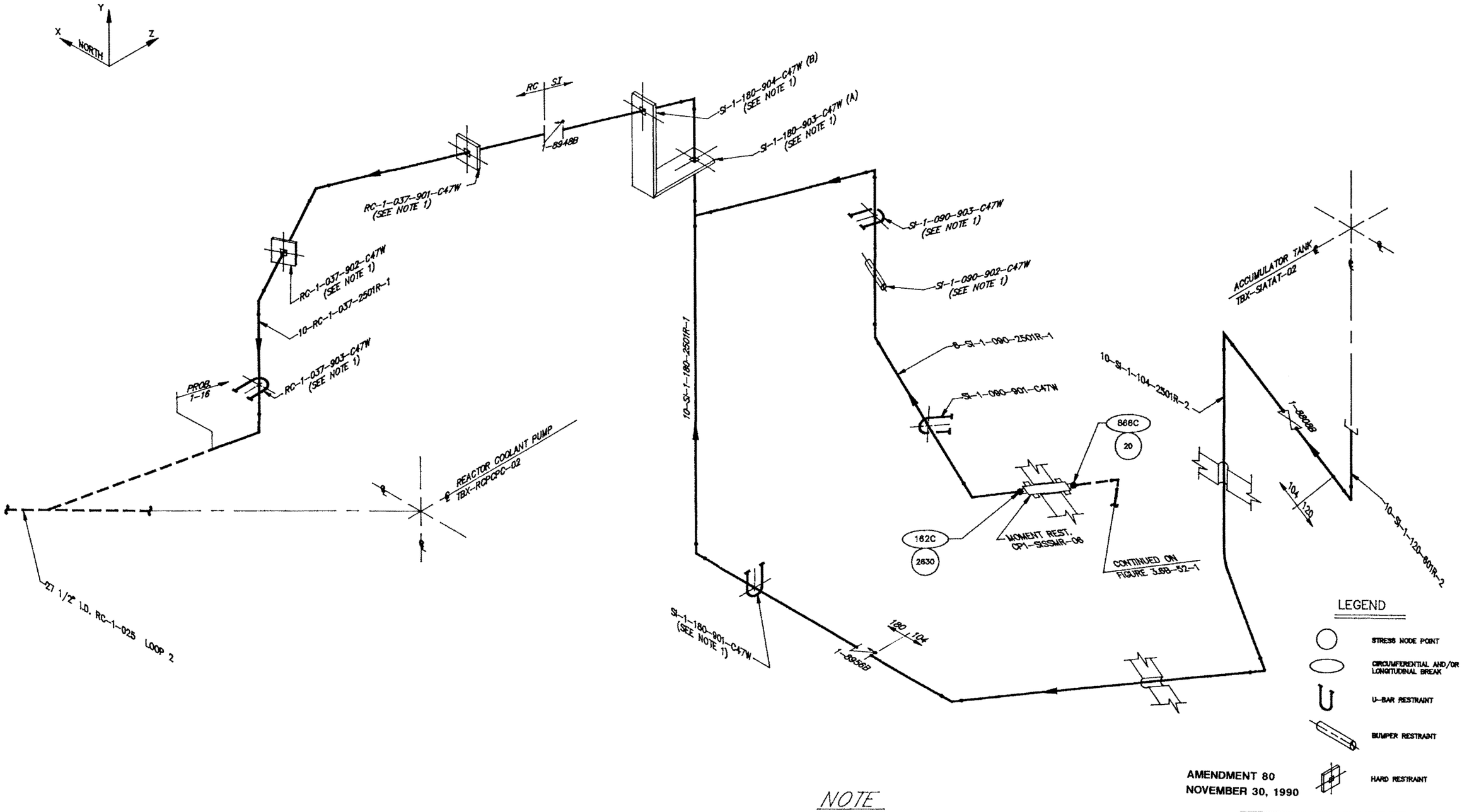


AMENDMENT 80
NOVEMBER 30, 1990

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-52-2 PROB. 1-18



AMENDMENT 80
NOVEMBER 30, 1990

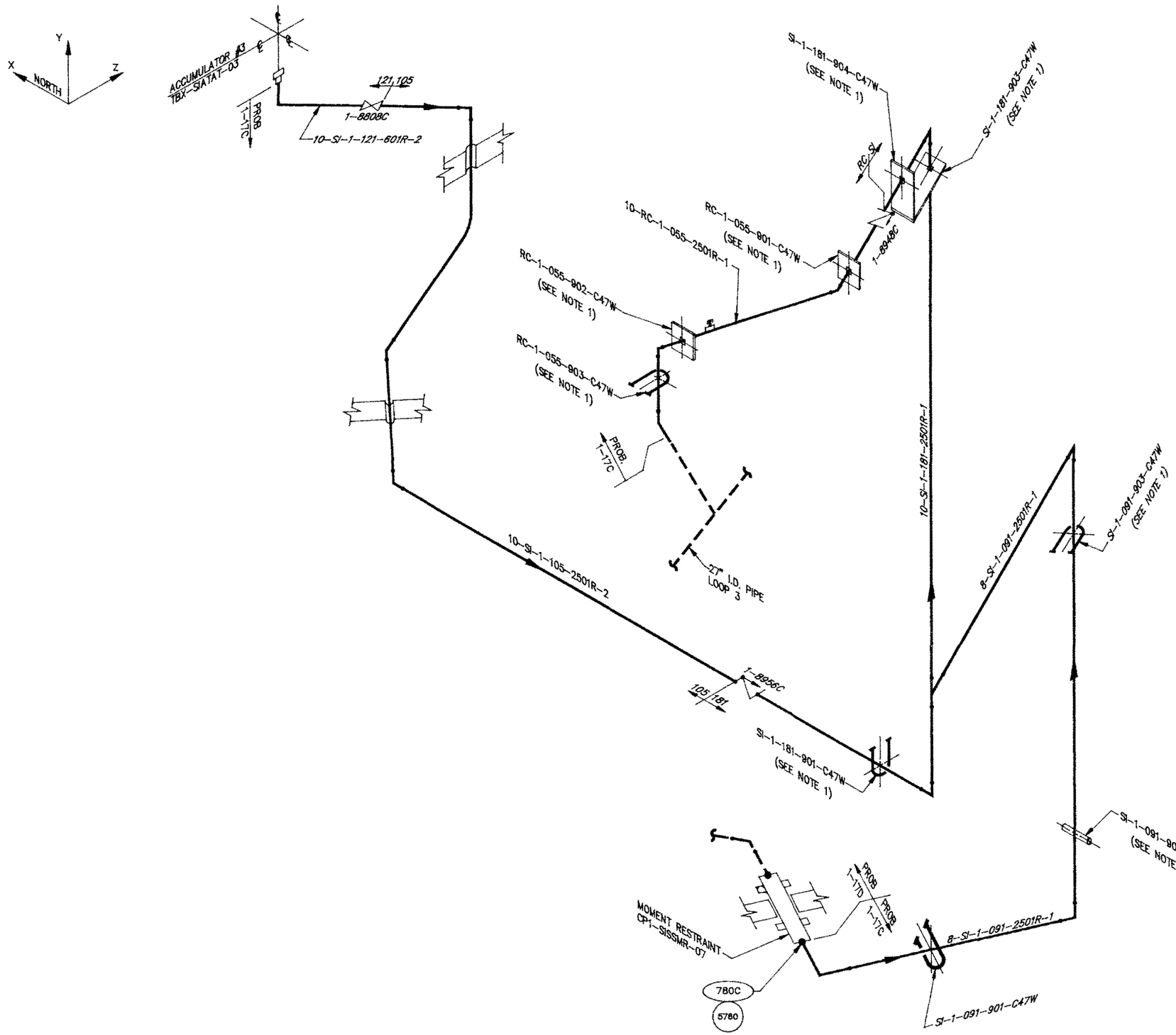
NOTE

1. THIS RESTRAINT IS INACTIVE.

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-53 PROB. 1-16



NOTE

1. THIS RESTRAINT IS INACTIVE.

LEGEND

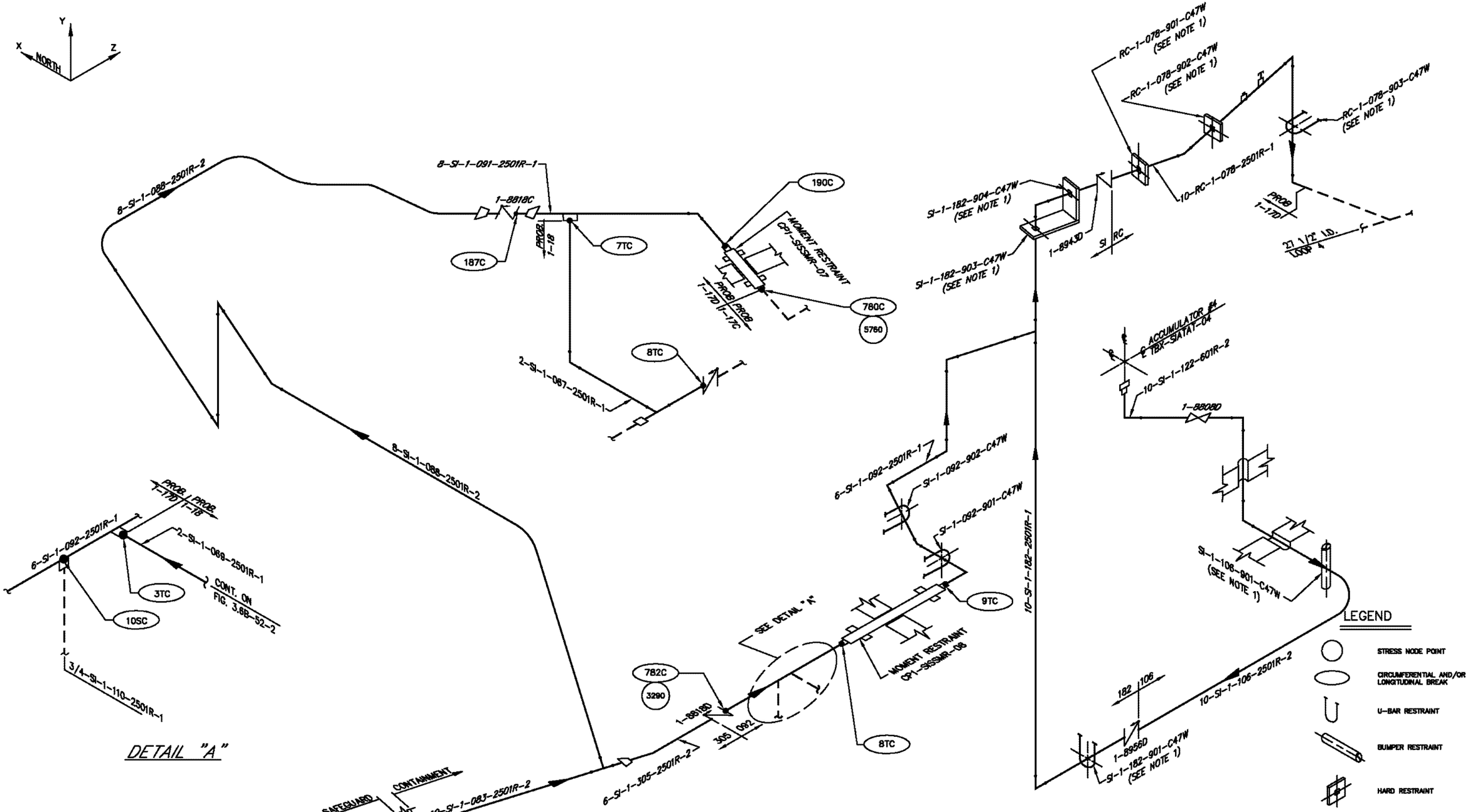
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT

AMENDMENT 78
JANUARY 15, 1990

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

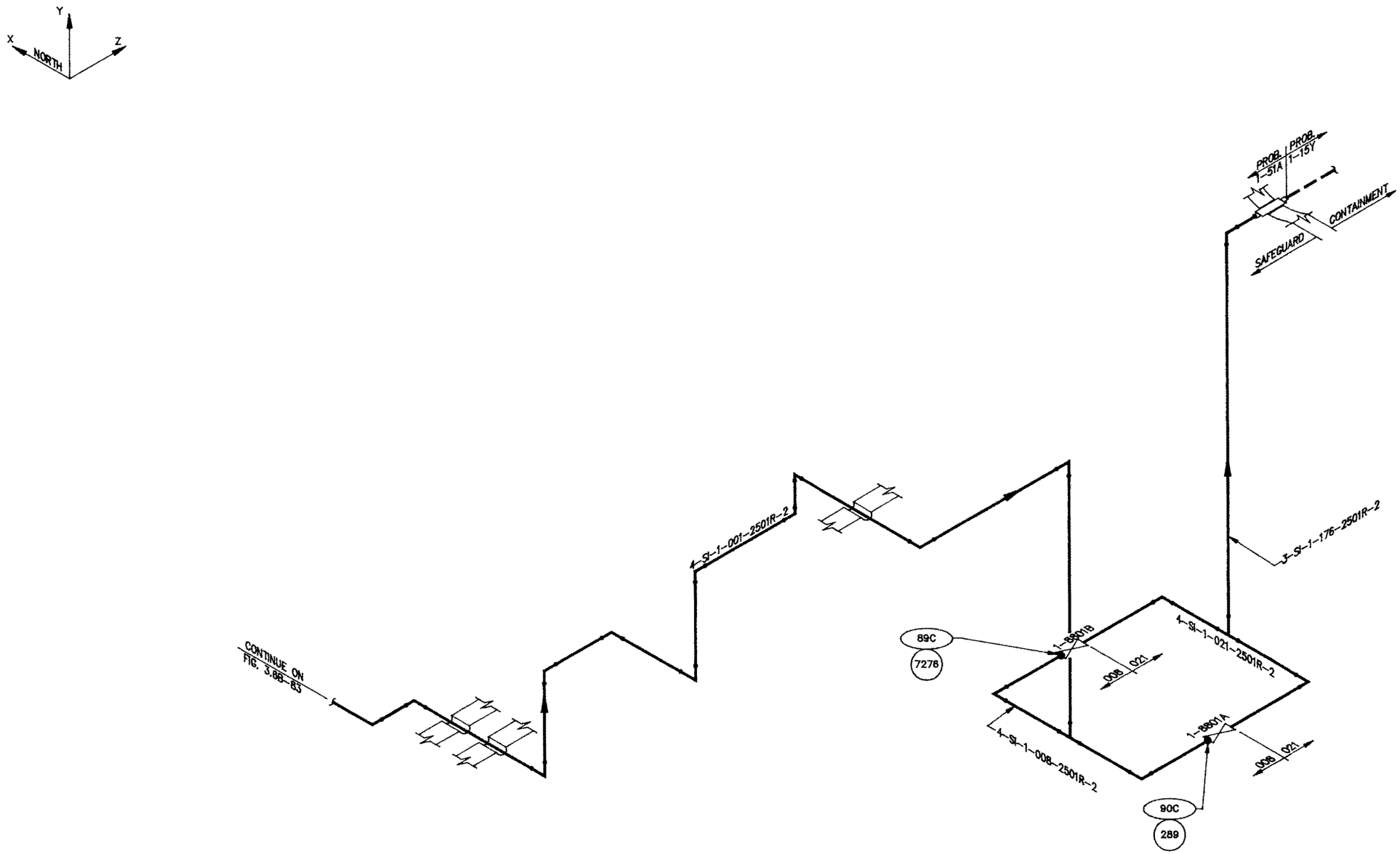
FIGURE 3.6B-54 PROB. 1-17C



COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-55 PROB. 1-17D & 1-18



LEGEND

STRESS NODE POINT

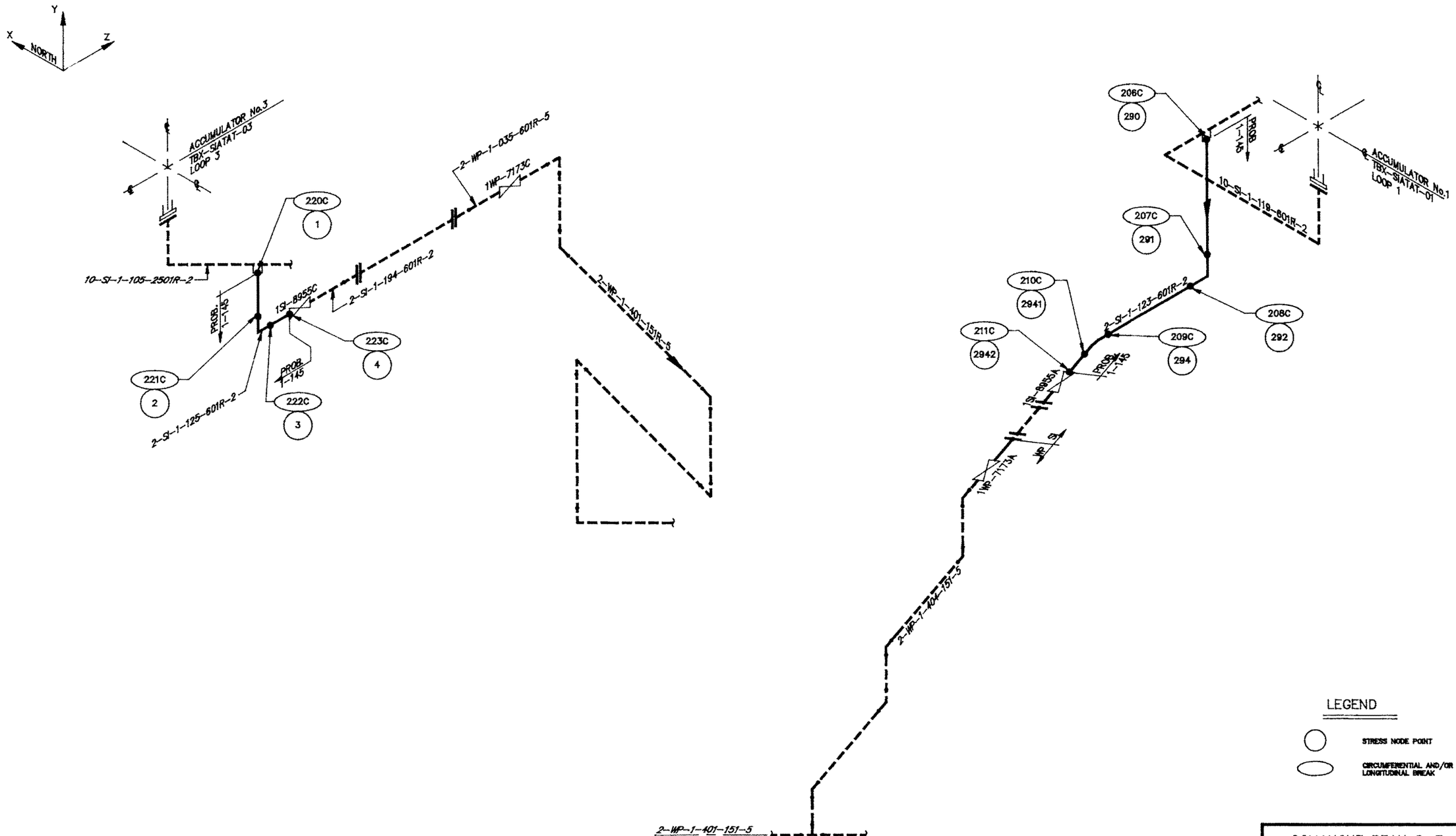
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

SAFETY INJECTION SYSTEM
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-56 PROB. 1-51A

AMENDMENT 76
MAY 1, 1989



LEGEND

STRESS NODE POINT

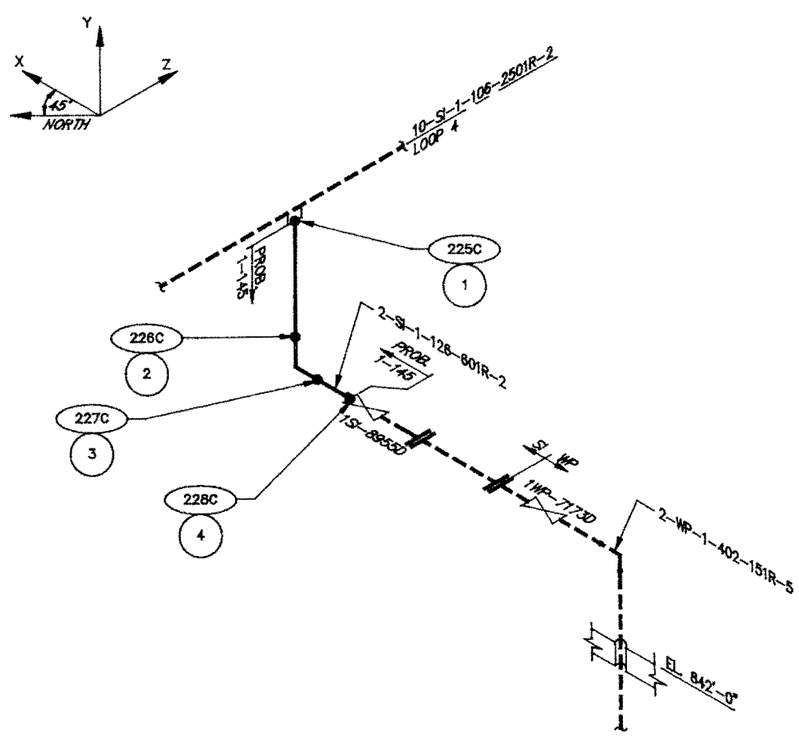
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

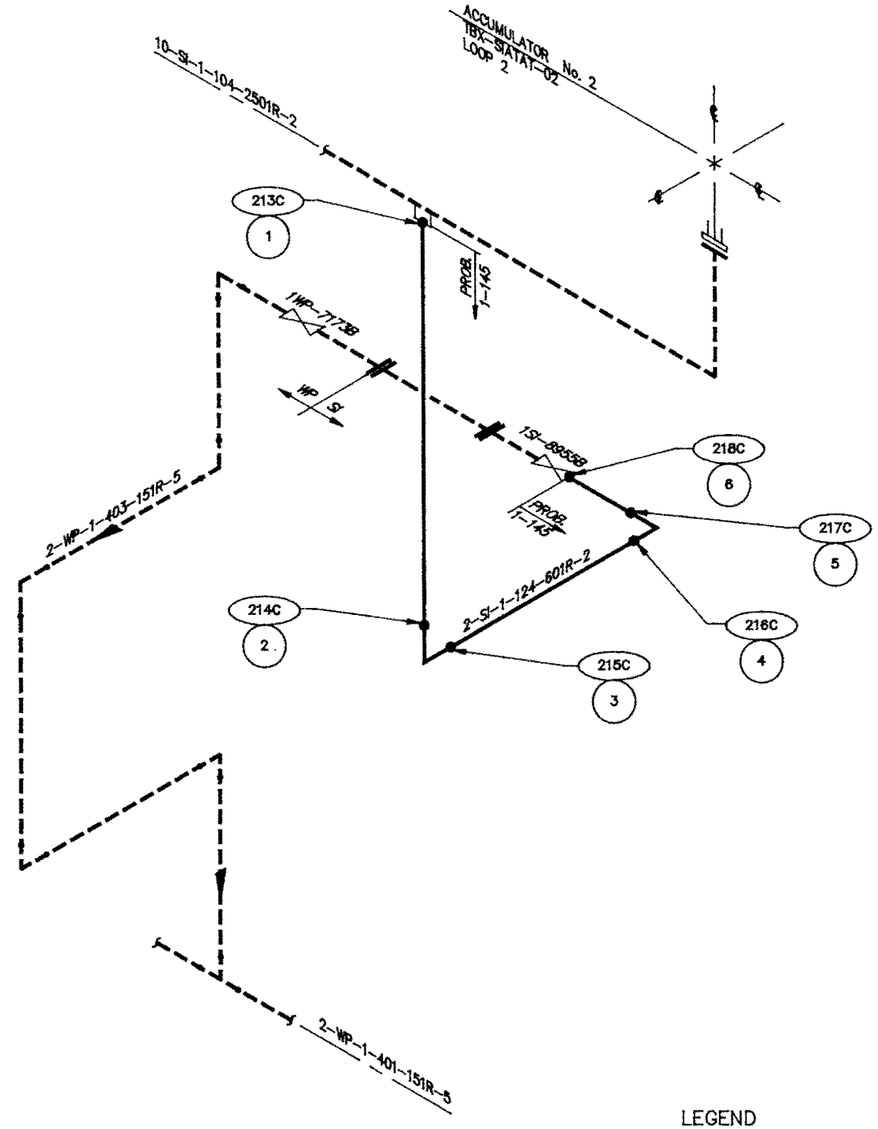
COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-57-1 PROB. 1-145

AMENDMENT 76
MAY 1, 1989





LEGEND

STRESS NODE POINT

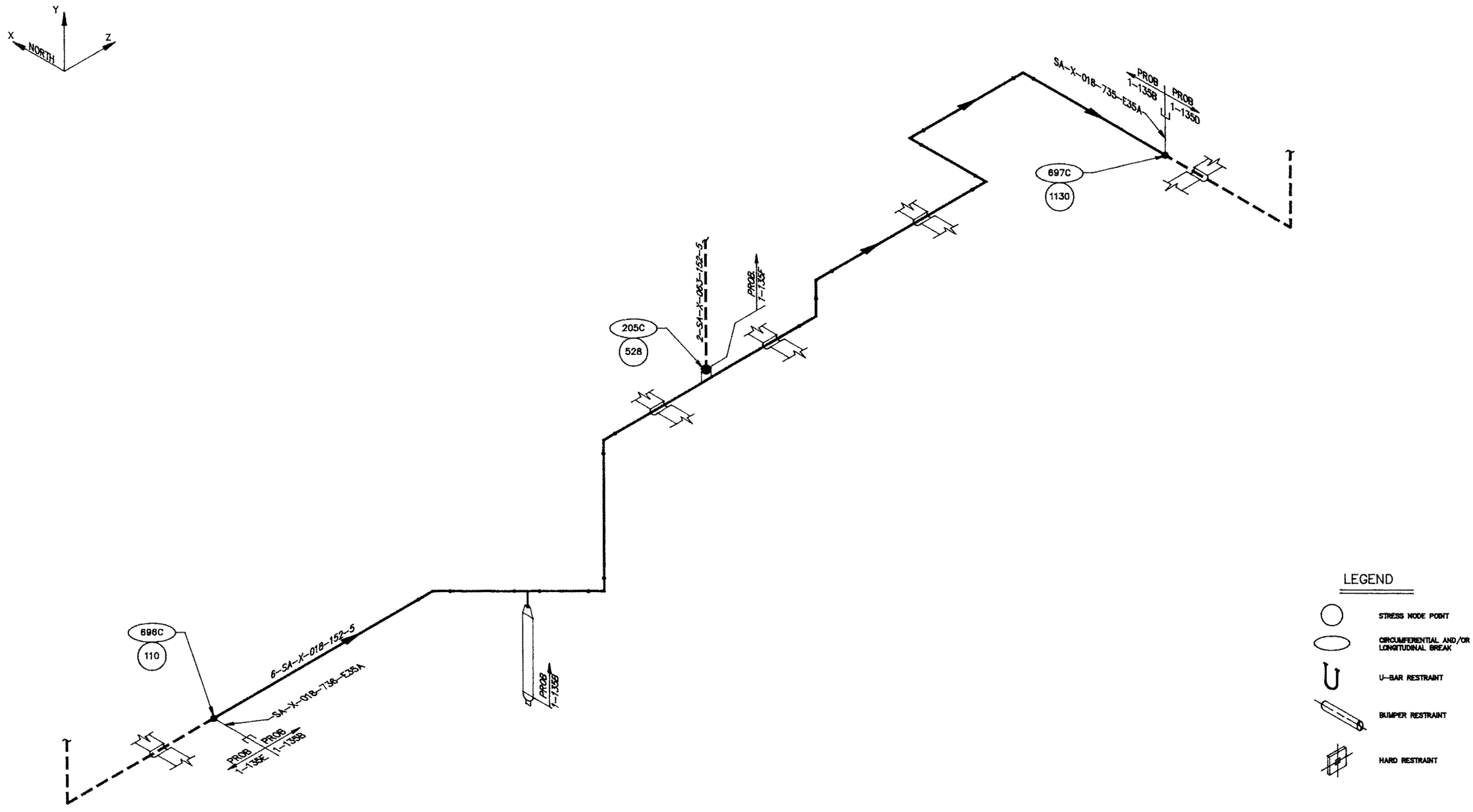
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-57-2 PROB. 1-145

AMENDMENT 76
MAY 1, 1989

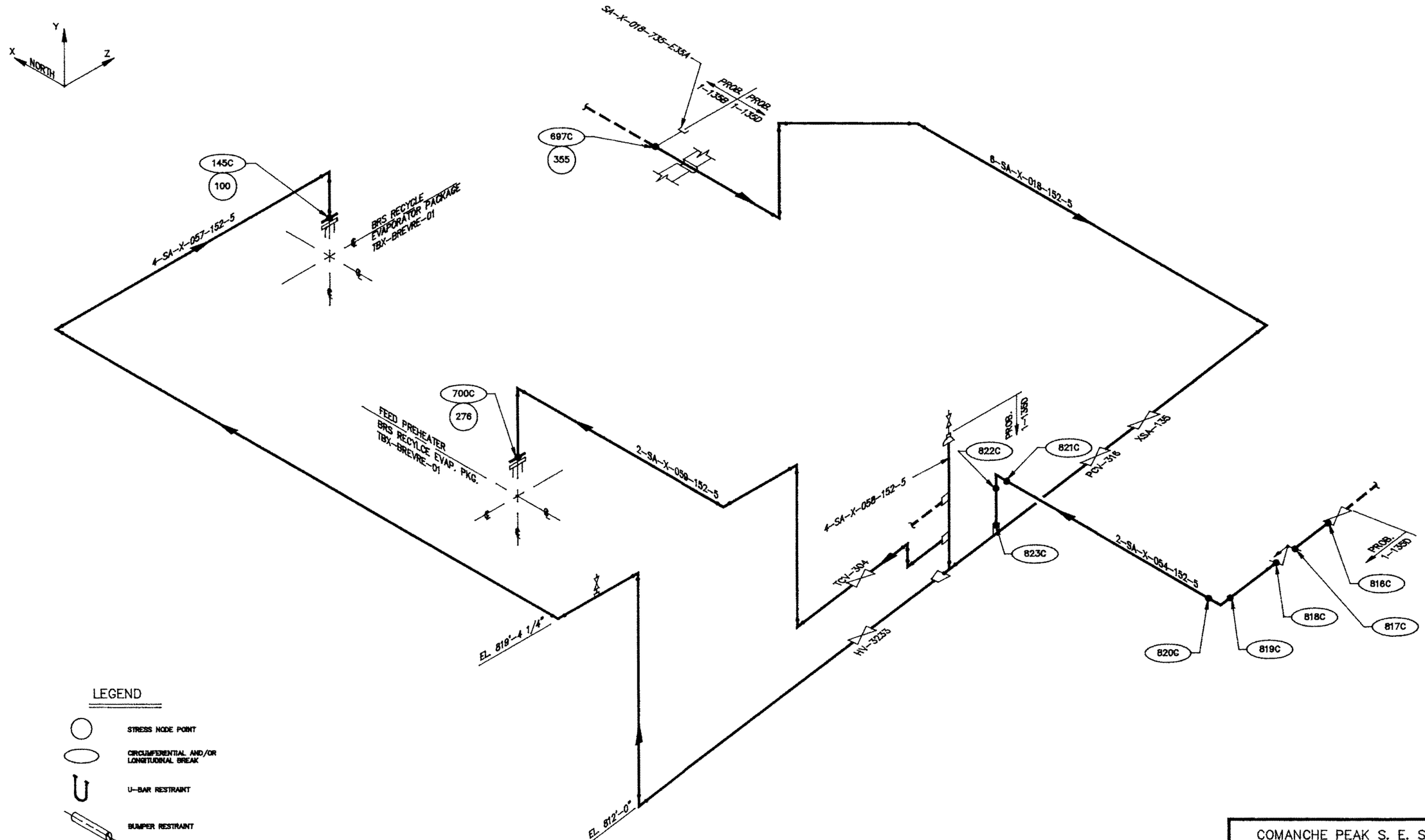


COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

AUX. STEAM SYSTEM
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-58-1 PROB. 1-135B

AMENDMENT 76
MAY 1, 1989

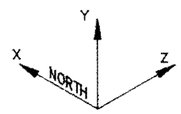


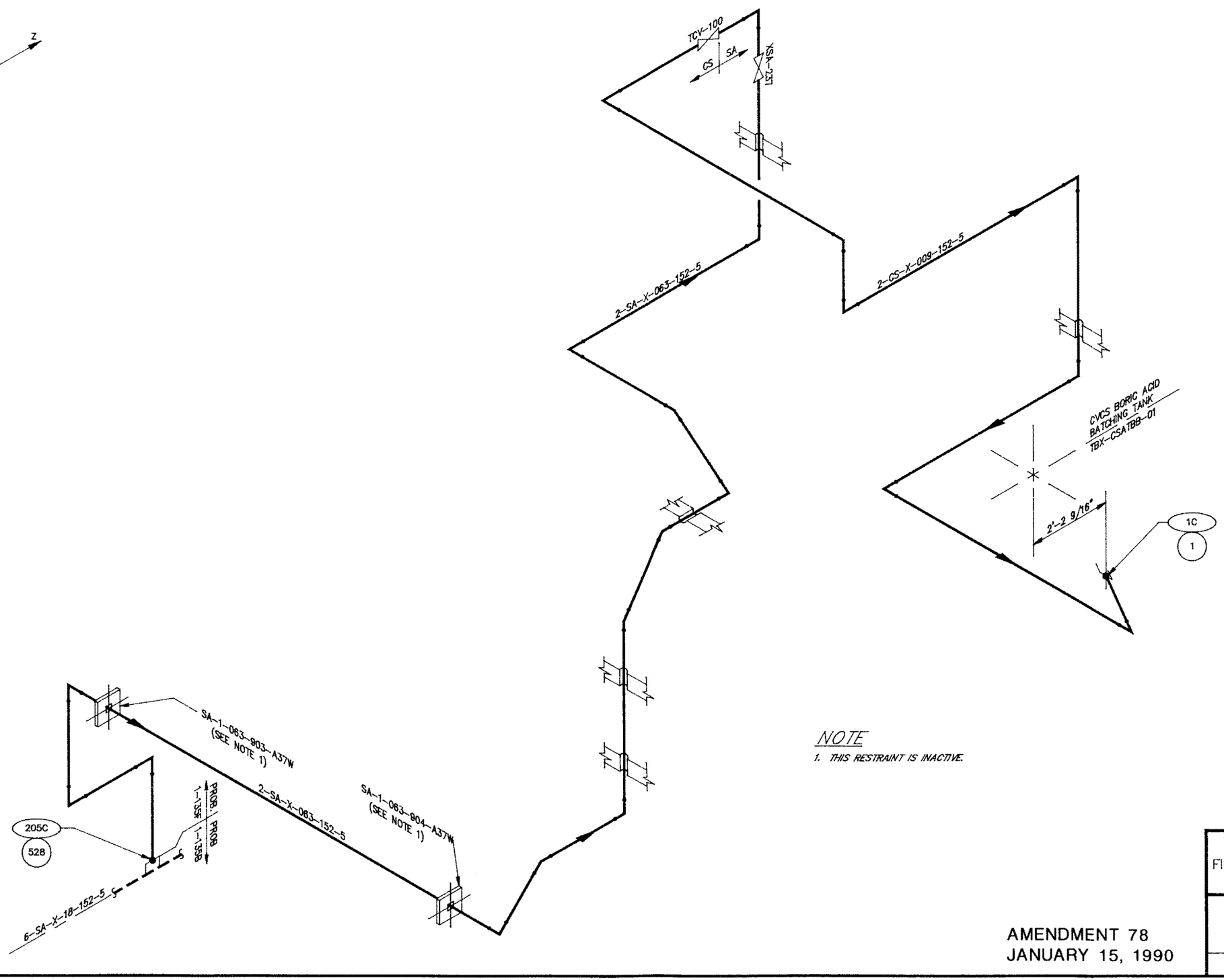
AMENDMENT 76
MAY 1, 1989

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

AUX. STEAM SYSTEM
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-58-2 PROB. 1-135D





NOTE

1. THIS RESTRAINT IS INACTIVE.

LEGEND

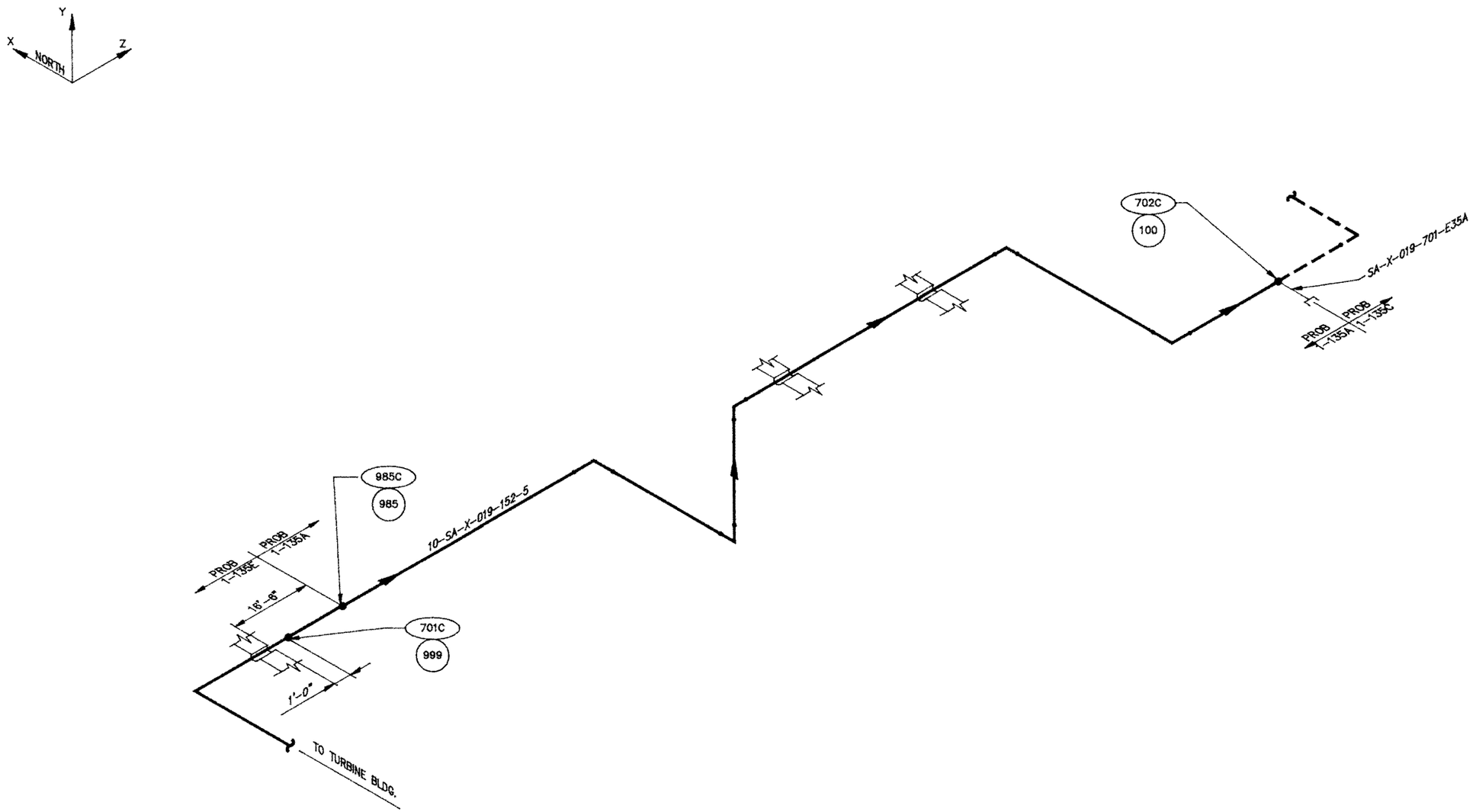
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT

AMENDMENT 78
JANUARY 15, 1990

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

AUX. STEAM SYSTEM
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-58-3 PROB. 1-135F



LEGEND

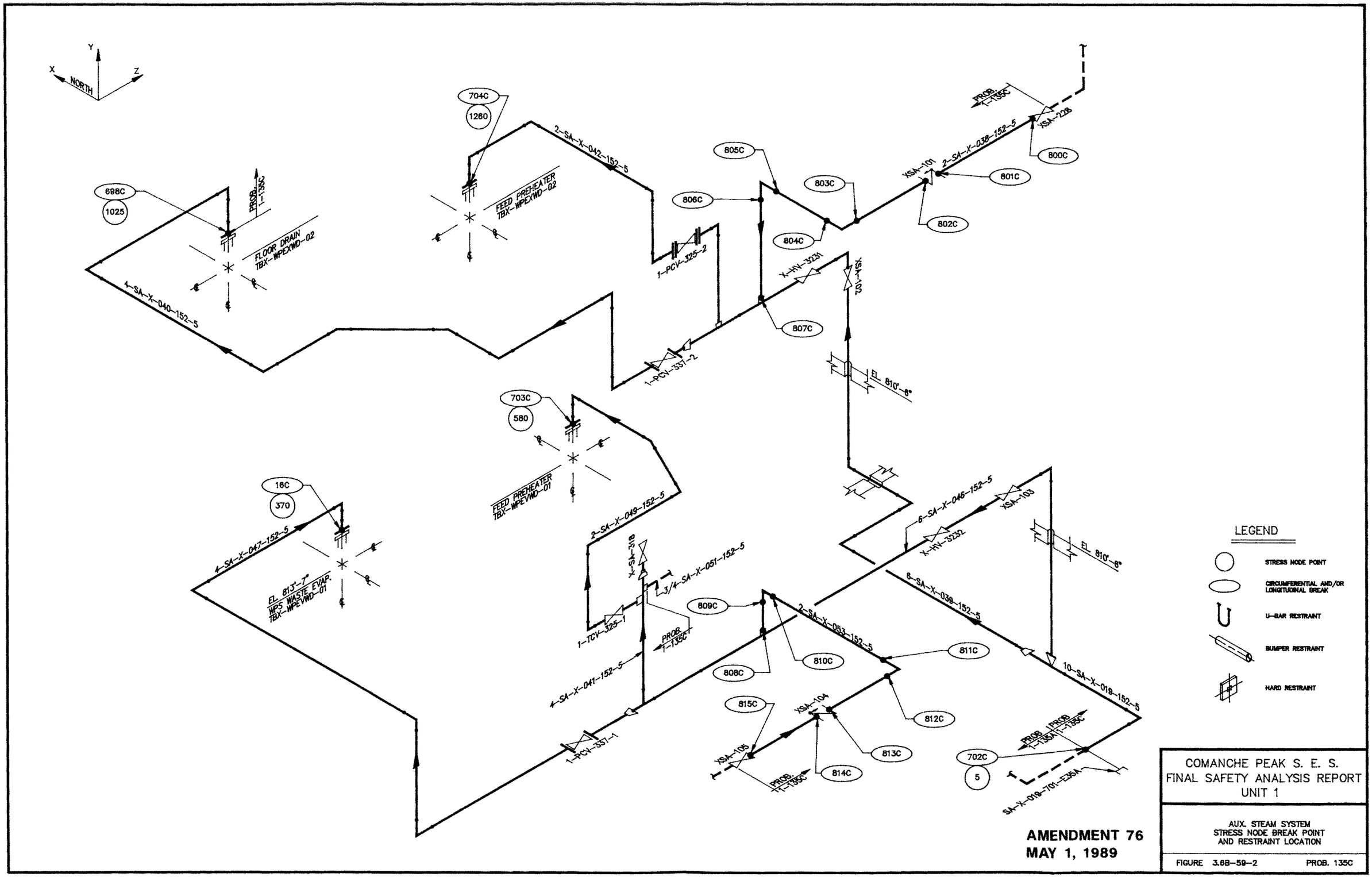
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

AUX. STEAM SYSTEM
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-59-1 PROB. 1-135A

AMENDMENT 78
JANUARY 15, 1990

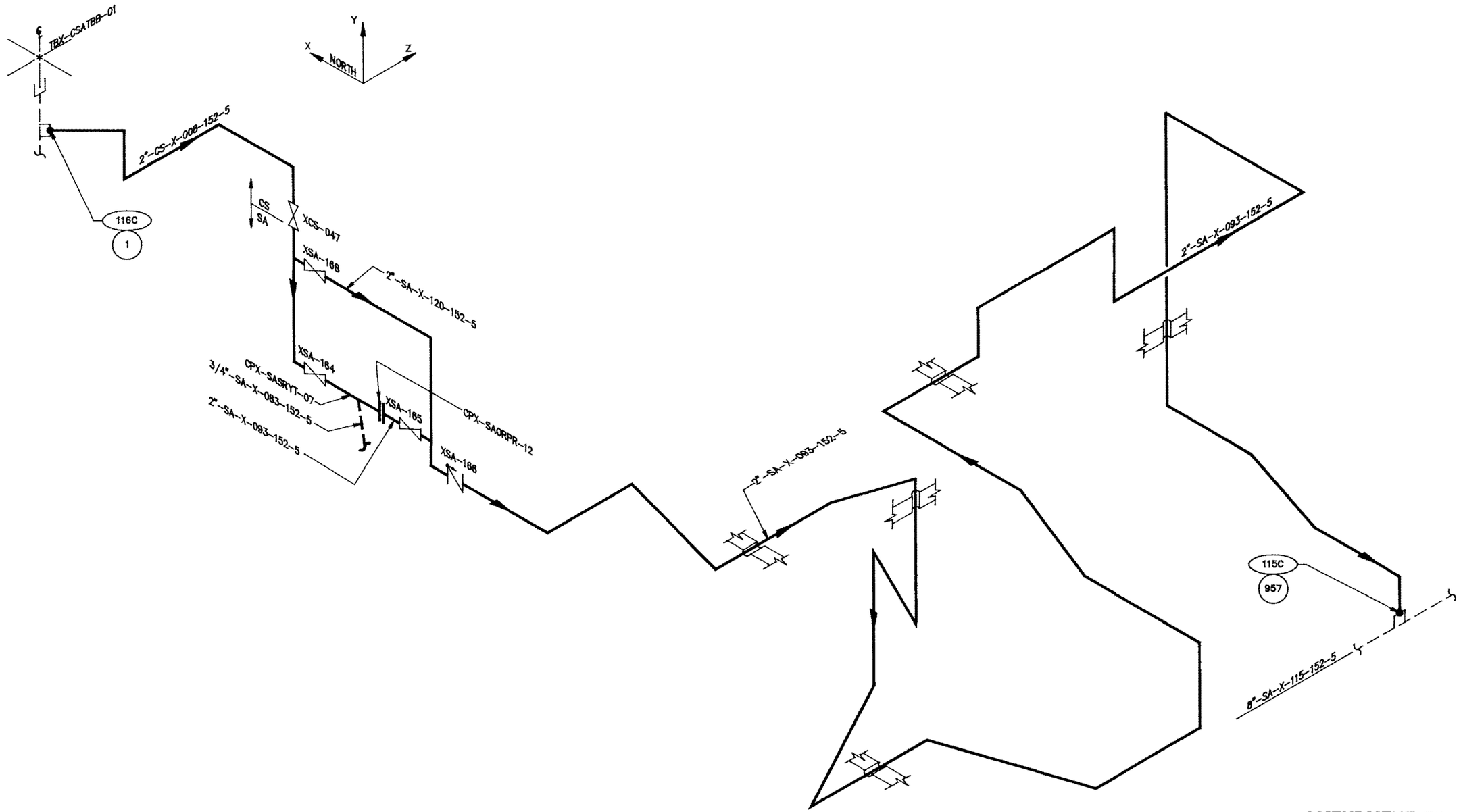


AMENDMENT 76
MAY 1, 1989

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

AUX. STEAM SYSTEM
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-59-2 PROB. 135C



AMENDMENT 76
MAY 1, 1989

LEGEND

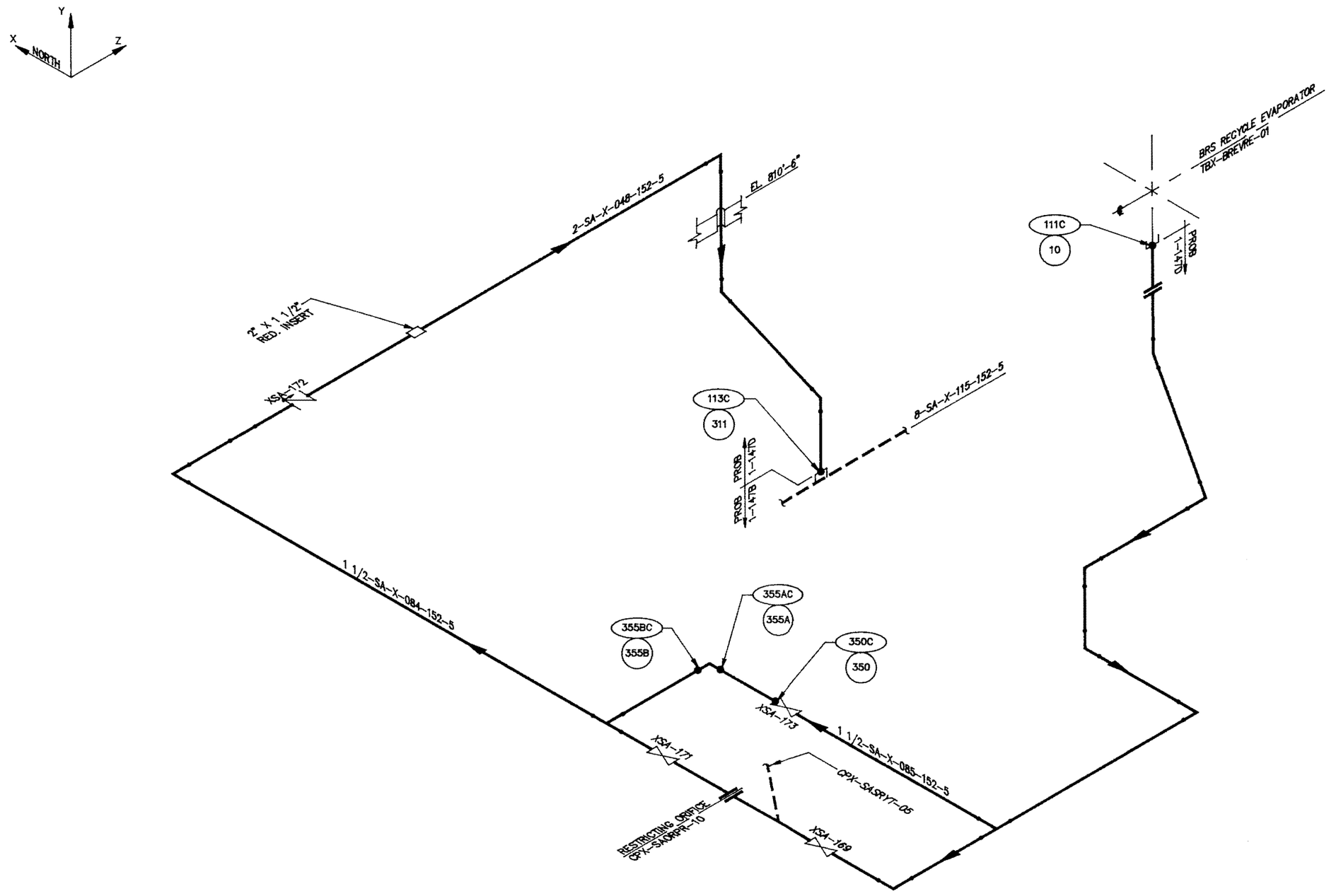
STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

AUXILIARY STEAM SYSTEM
AUX. BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-60 PROB. 1-147C

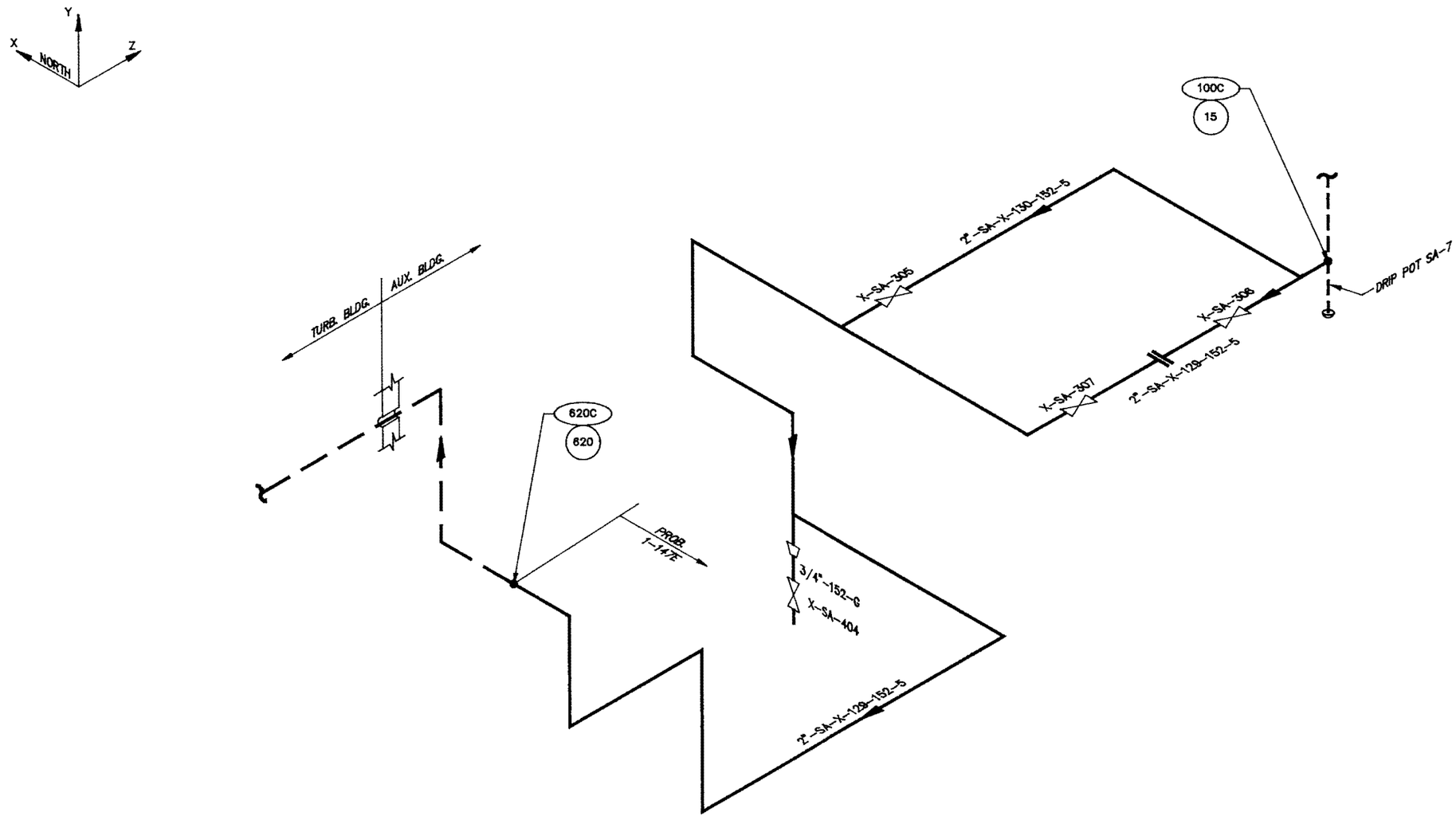


COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

AUXILIARY STEAM SYSTEM
AUX. BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-61-1 PROB. 1-147D

AMENDMENT 76
MAY 1, 1989



LEGEND

STRESS NODE POINT

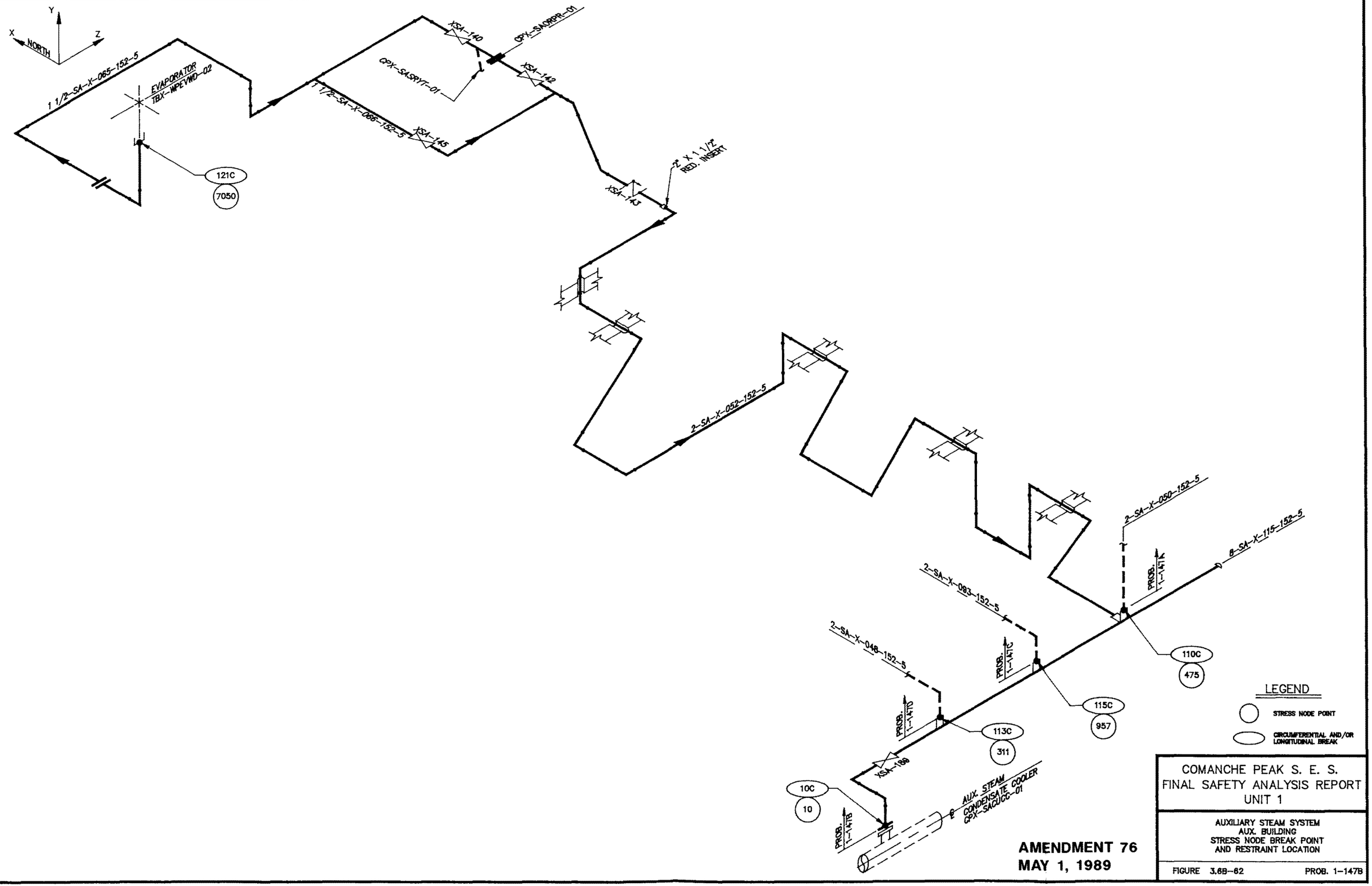
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

AUXILIARY STEAM SYSTEM
AUX. BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-61-2 PROB. 1-147E

AMENDMENT 76
MAY 1, 1989

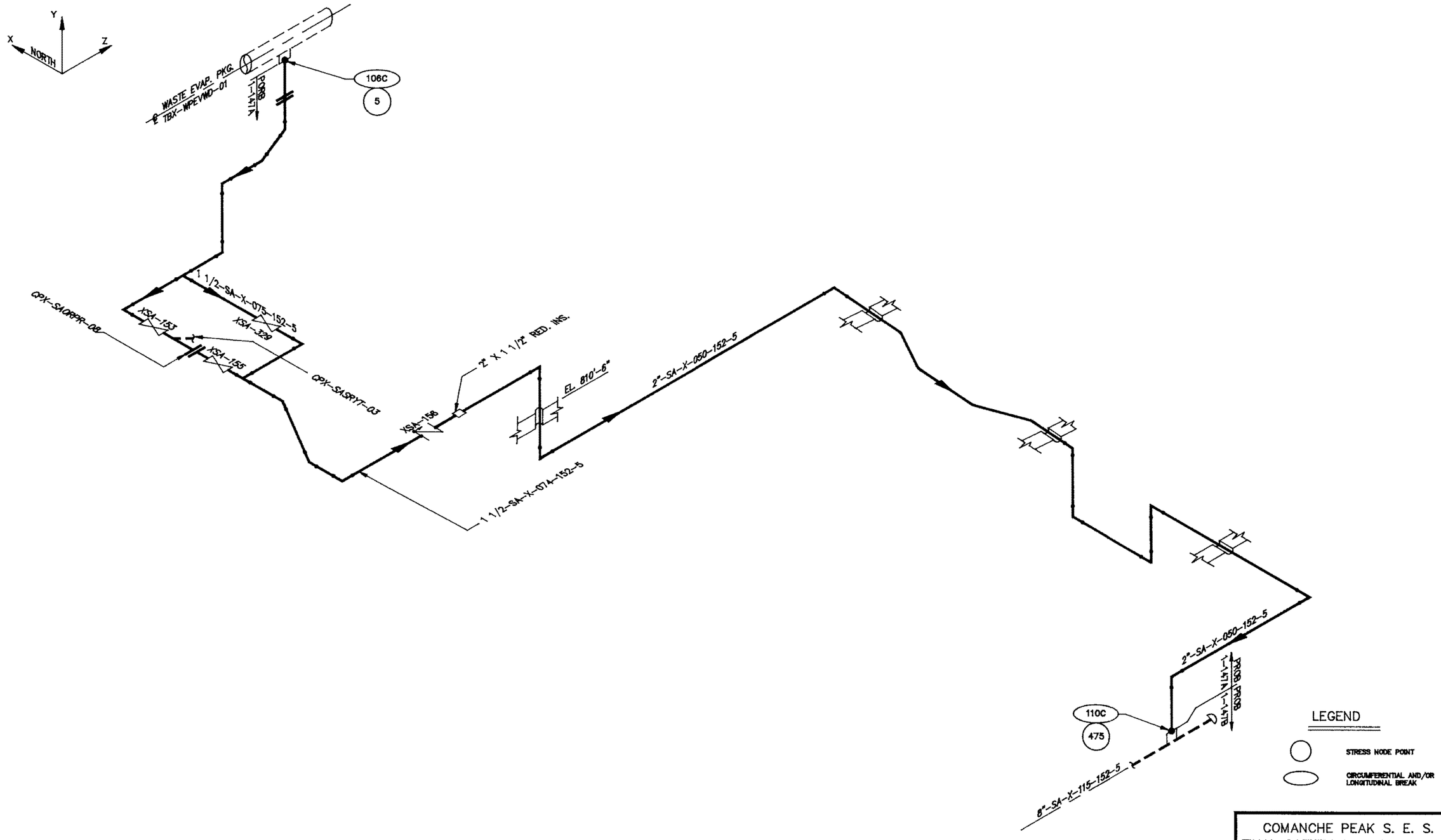


AMENDMENT 76
MAY 1, 1989

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

AUXILIARY STEAM SYSTEM
AUX. BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-62 PROB. 1-147B

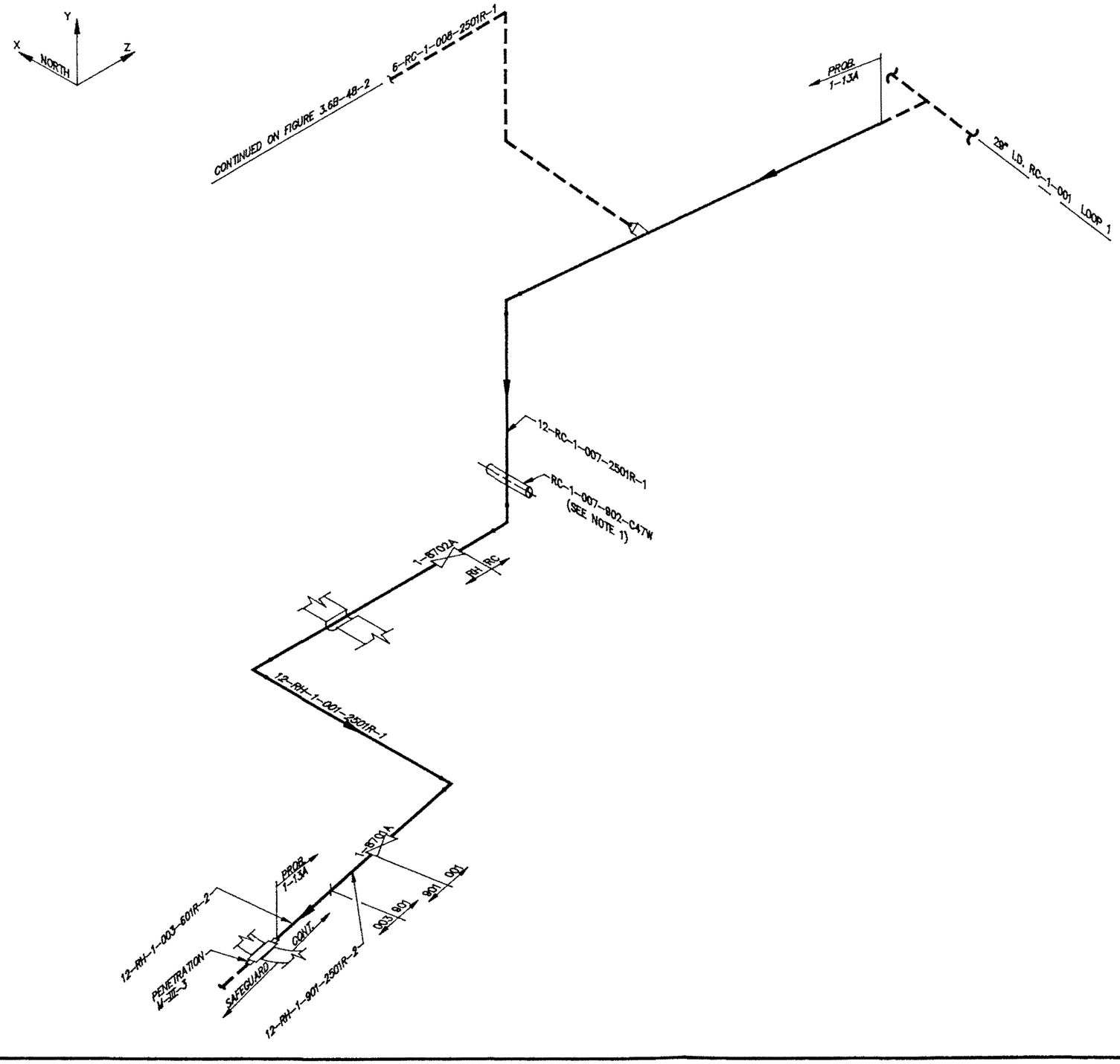


COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

AUXILIARY STEAM SYSTEM
AUX. BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-63 PROB. 1-147A

AMENDMENT 76
MAY 1, 1989



NOTE

1. THIS RESTRAINT IS INACTIVE

LEGEND

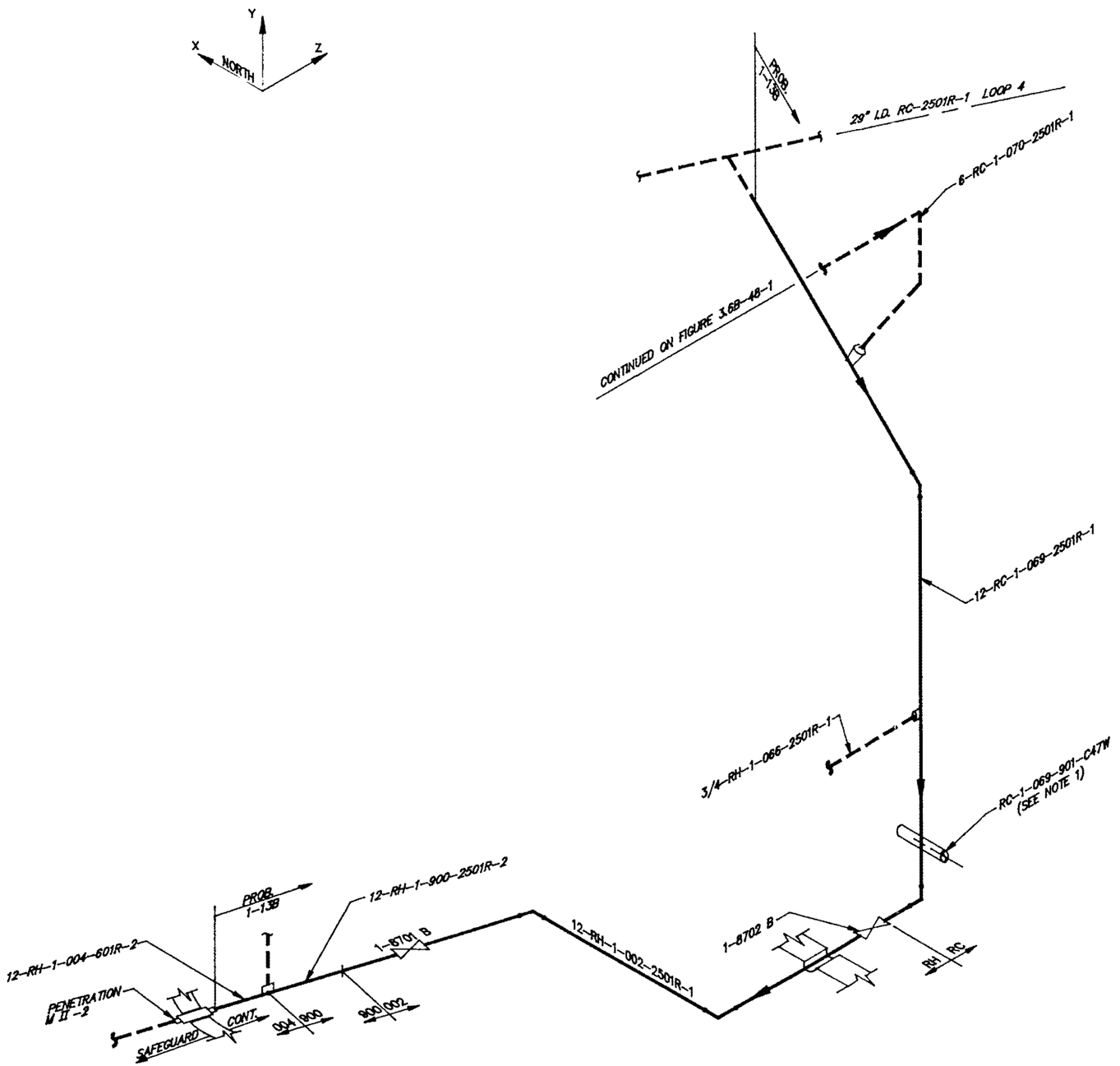
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT

AMENDMENT 80
NOVEMBER 30, 1990

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

RHR SYSTEM
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-64-1 PROB. 1-13A



NOTE

1. THIS RESTRAINT IS INACTIVE.

LEGEND

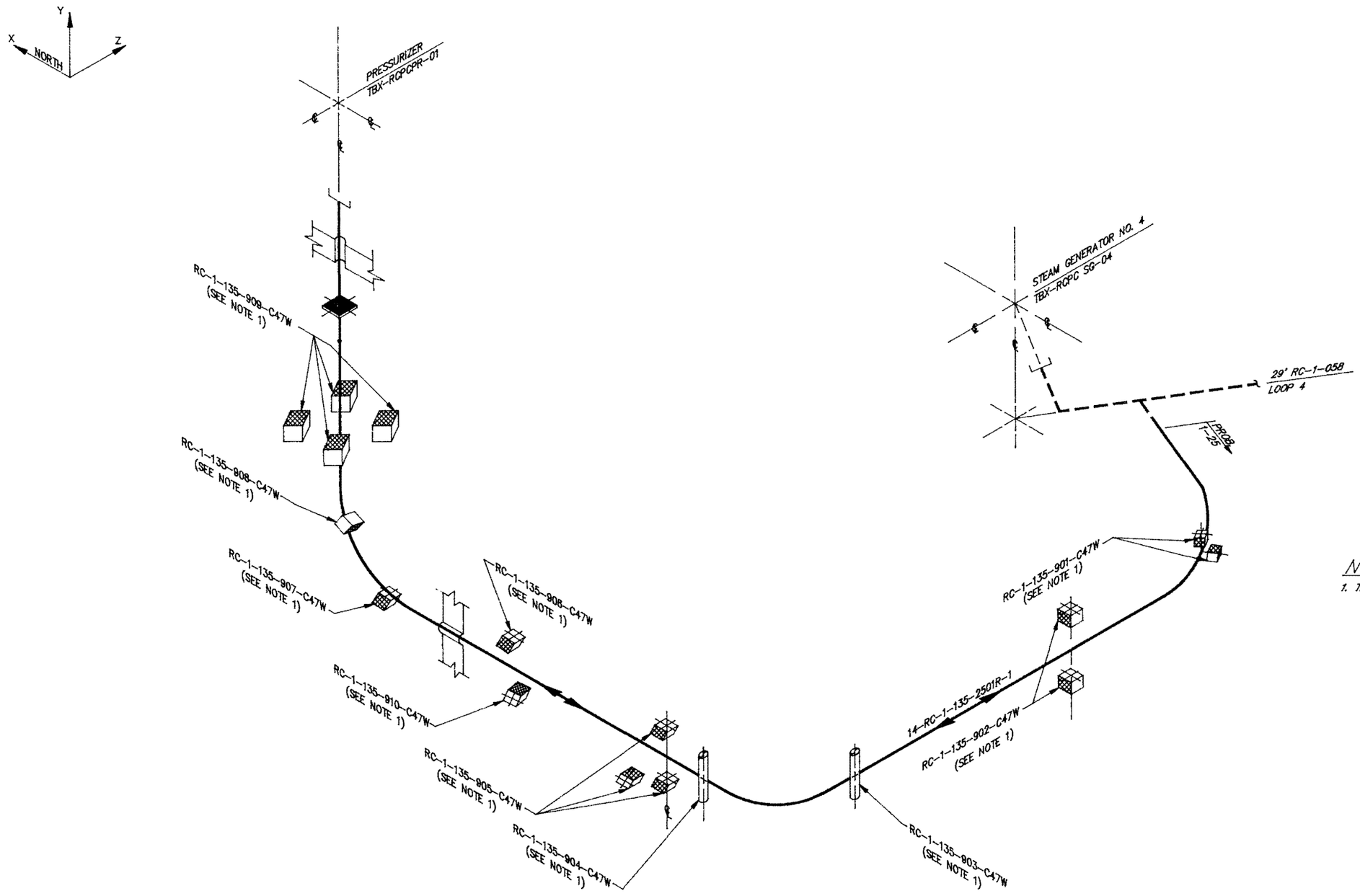
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT

AMENDMENT 80
NOVEMBER 30, 1990

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

RHR SYSTEM
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-64-2 PROB. 1-13B



NOTE

1. THIS RESTRAINT IS INACTIVE.

LEGEND

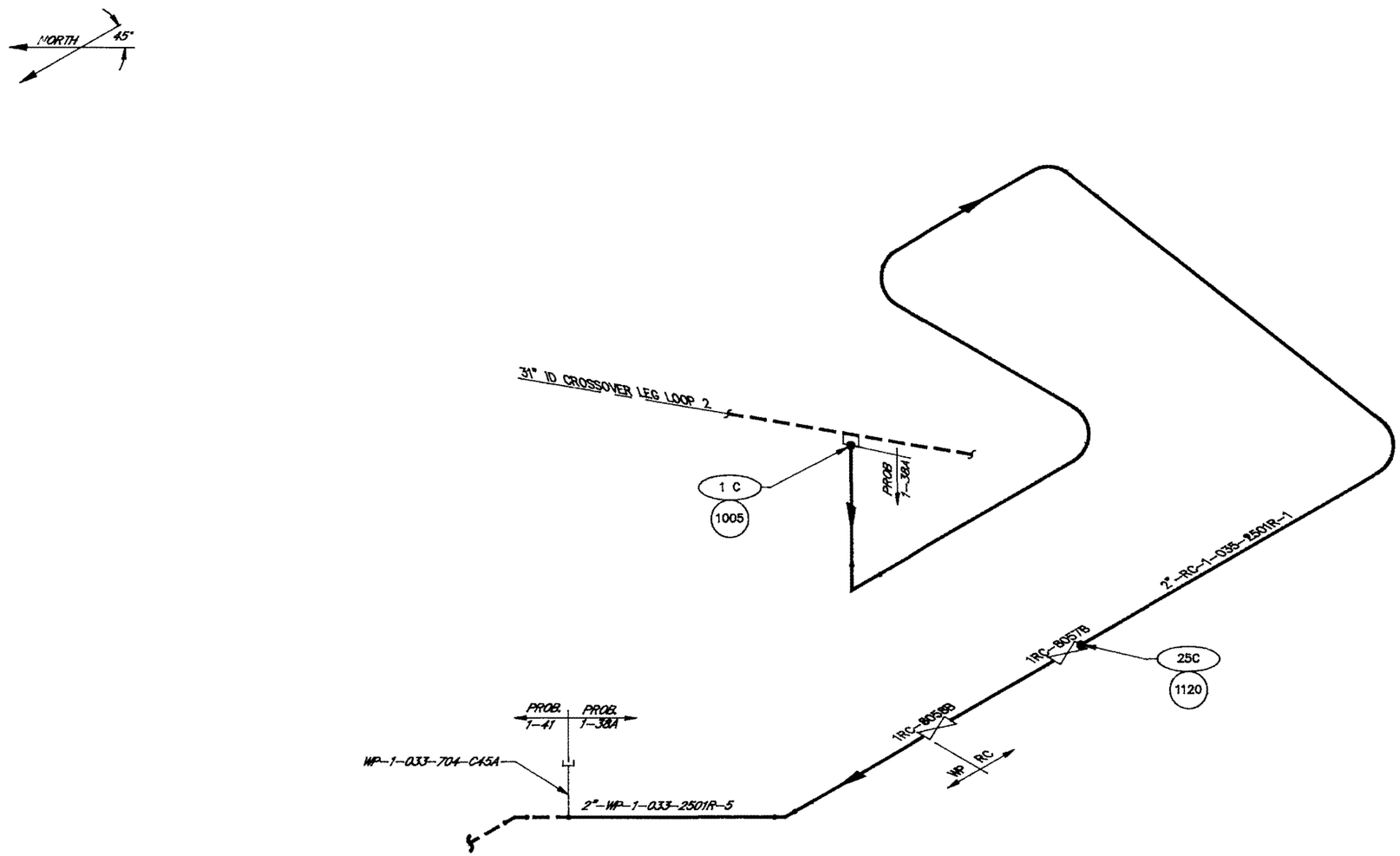
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- HONEYCOMB RESTRAINT
- BUMPER RESTRAINT

AMENDMENT 78
JANUARY 15, 1990

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

REACTOR COOLANT SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-65 PROB. 1-25



LEGEND

STRESS NODE POINT

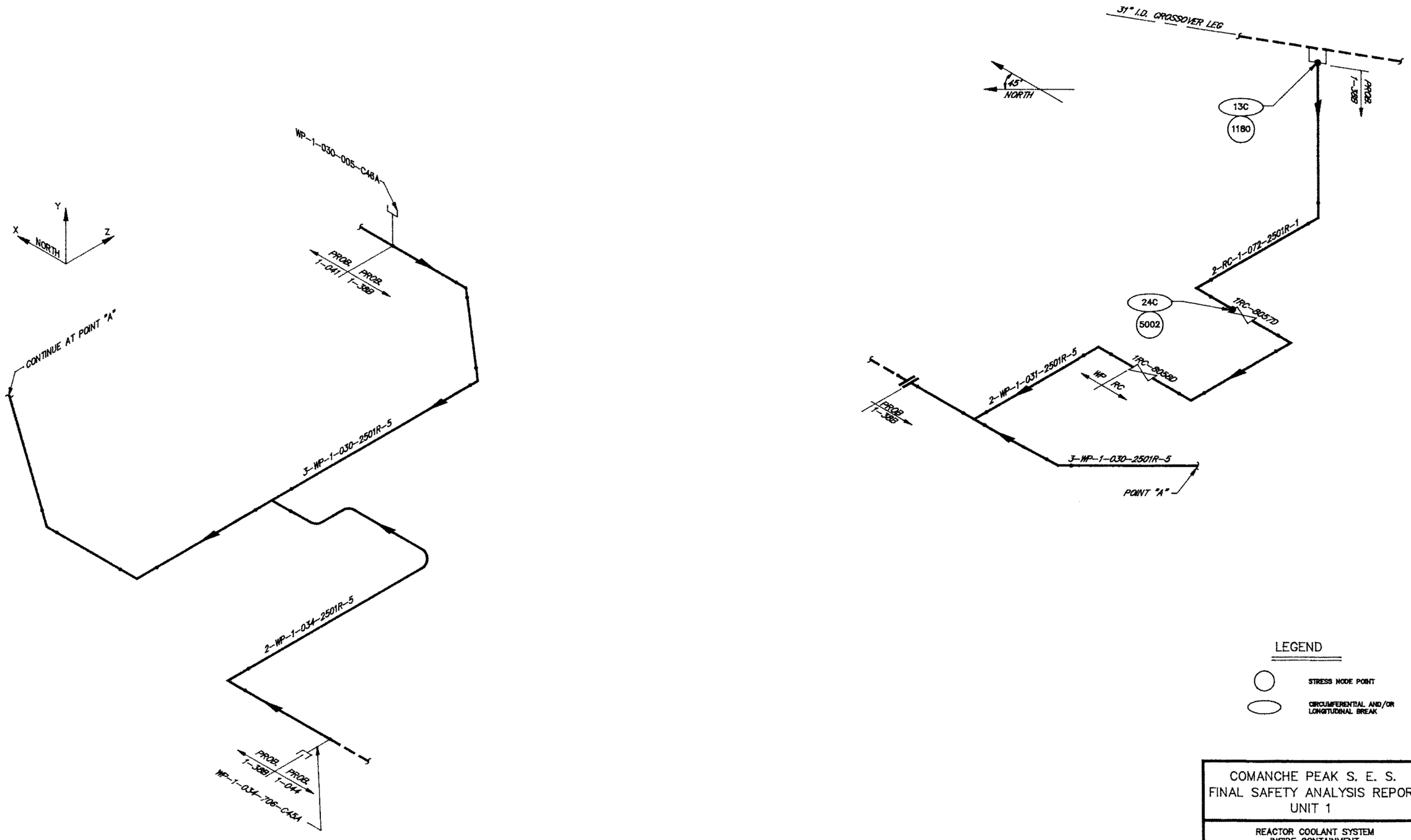
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

REACTOR COOLANT SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-66-1 PROB. 1-38A

AMENDMENT 76
MAY 1, 1989

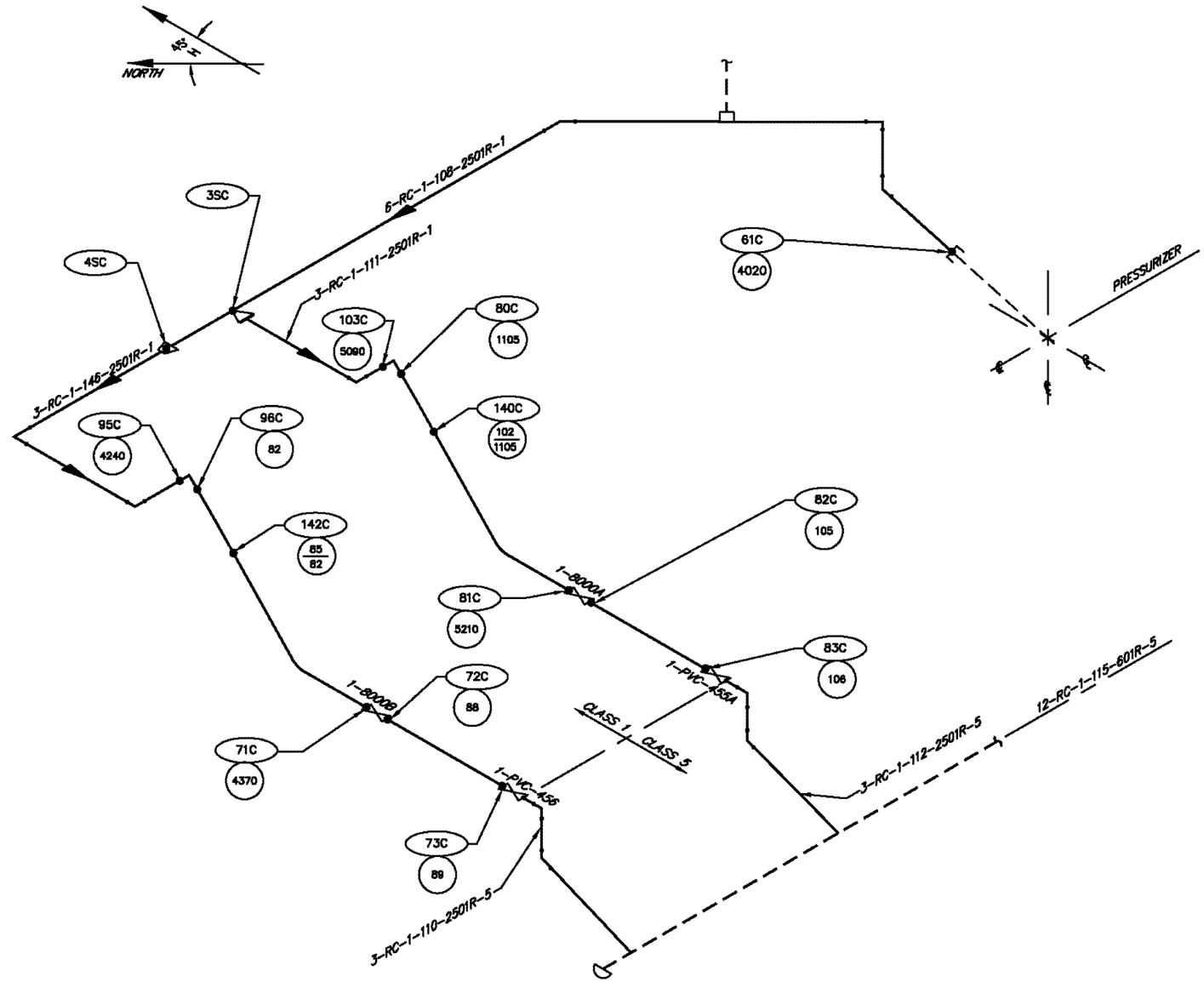


AMENDMENT 76
MAY 1, 1989

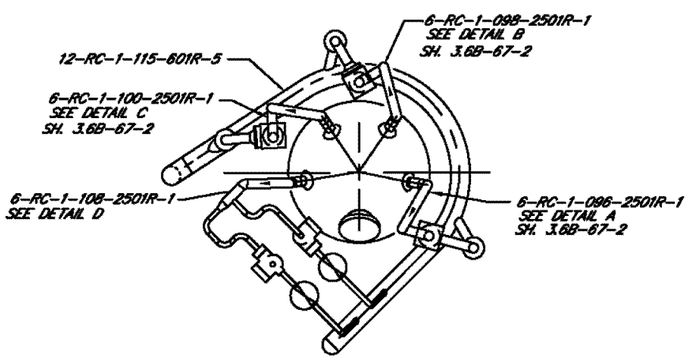
COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

REACTOR COOLANT SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-66-2 PROB. 1-38B



DETAIL D



KEY PLAN
PRESSURIZER
TBX-RCPCPR-01

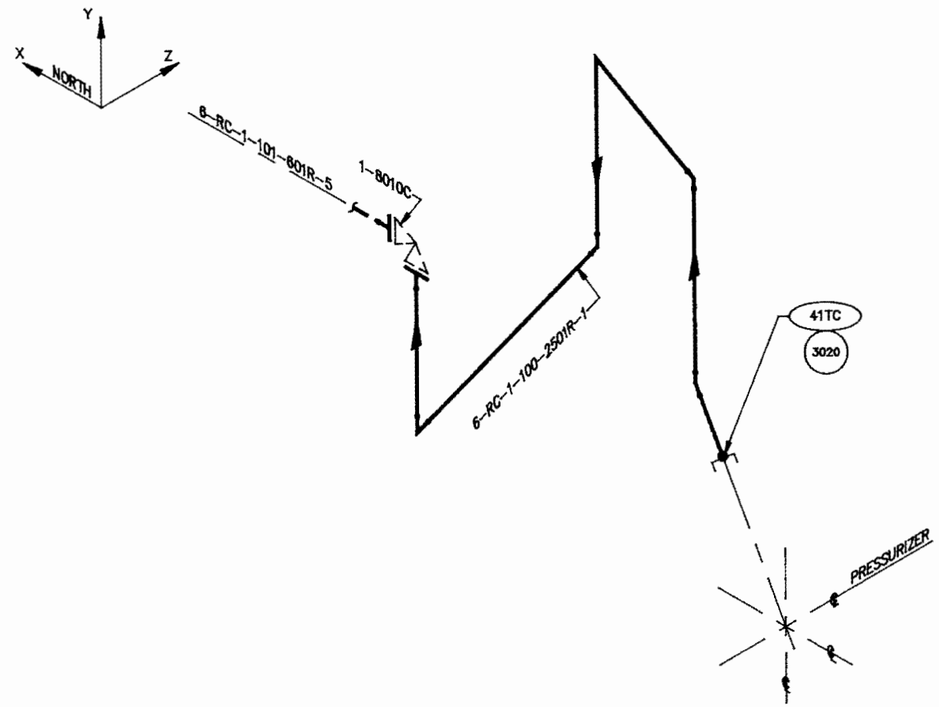
LEGEND

- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT

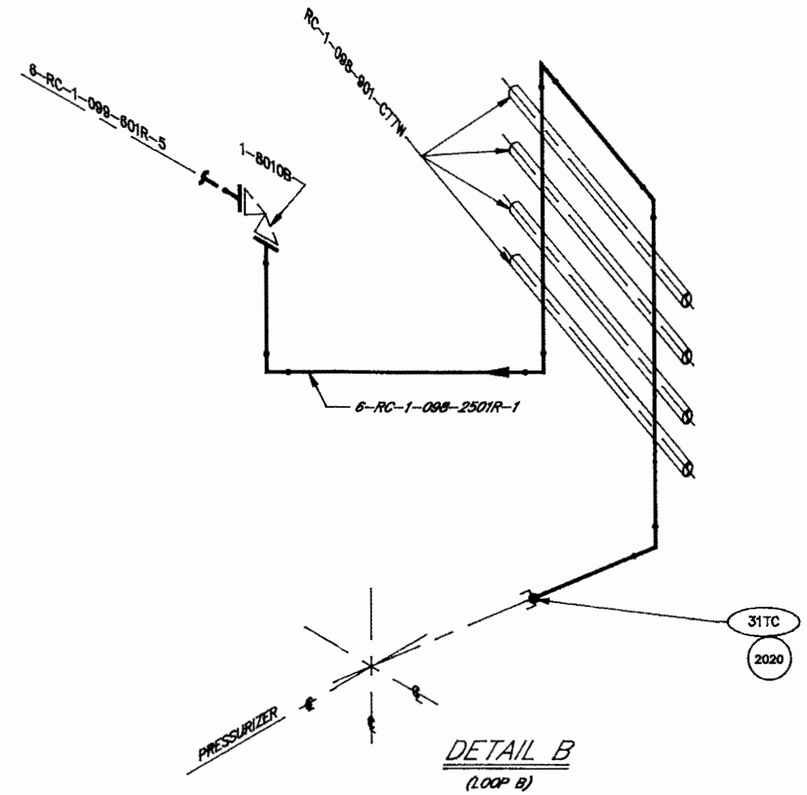
COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

REACTOR COOLANT SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

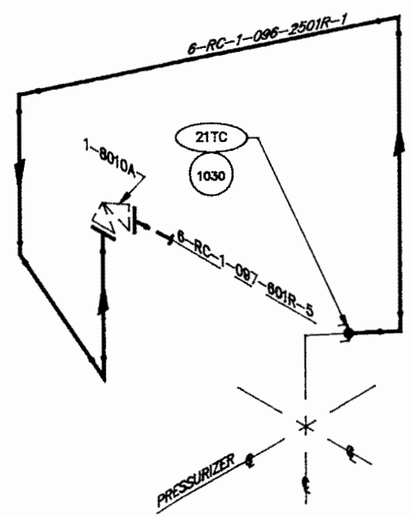
FIGURE 3.6B-67-1 PROB. 1-53



DETAIL C
(LOOP C)



DETAIL B
(LOOP B)



DETAIL A
(LOOP A)

LEGEND

- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT

AMENDMENT 76
MAY 1, 1989

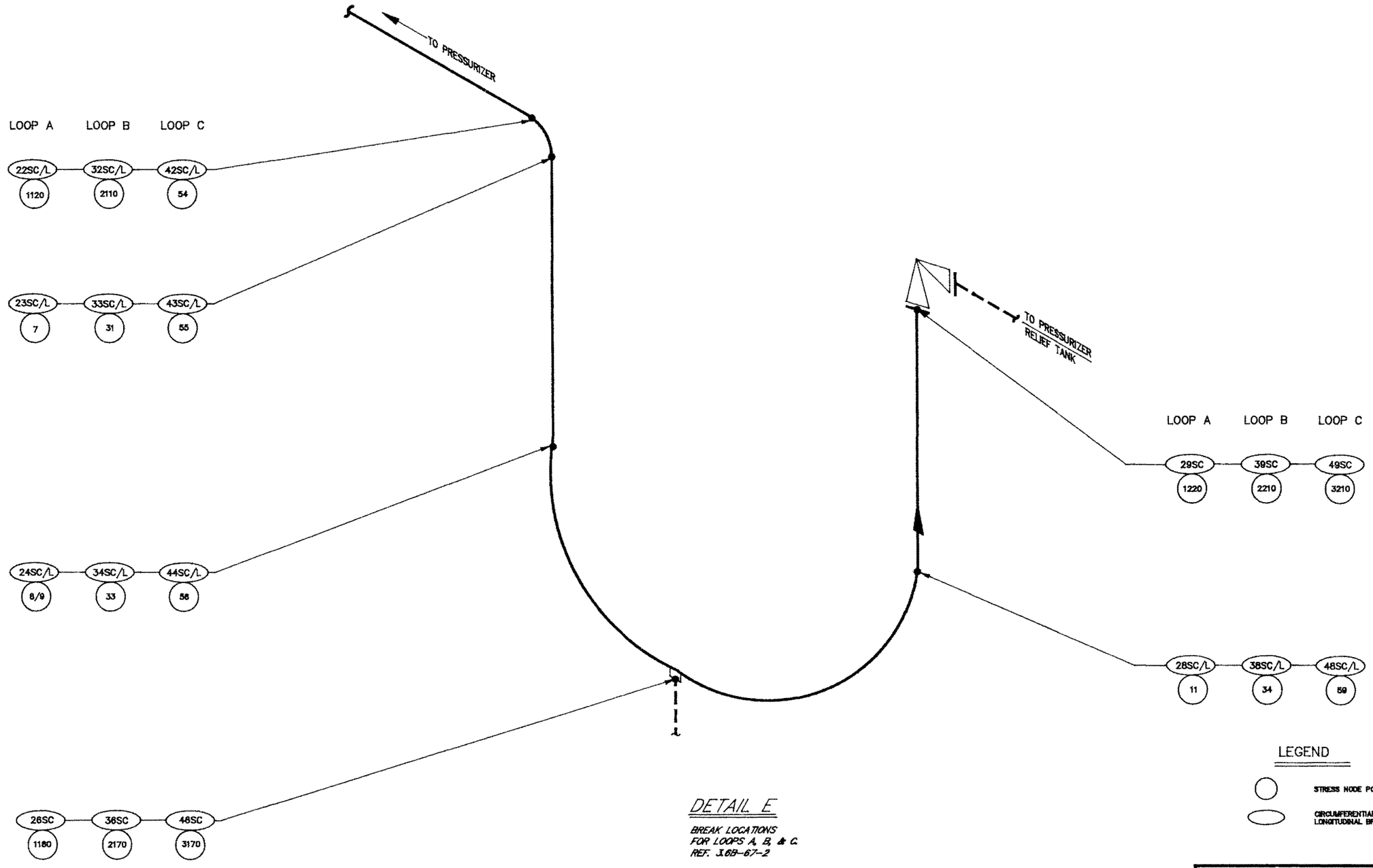
NOTES

1 FOR LOCATION OF BREAKS ON LOOPS A, B, & C SEE DETAIL E FIG. 3.6B-67-3

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

REACTOR COOLANT SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-67-2 PROB. 1-53

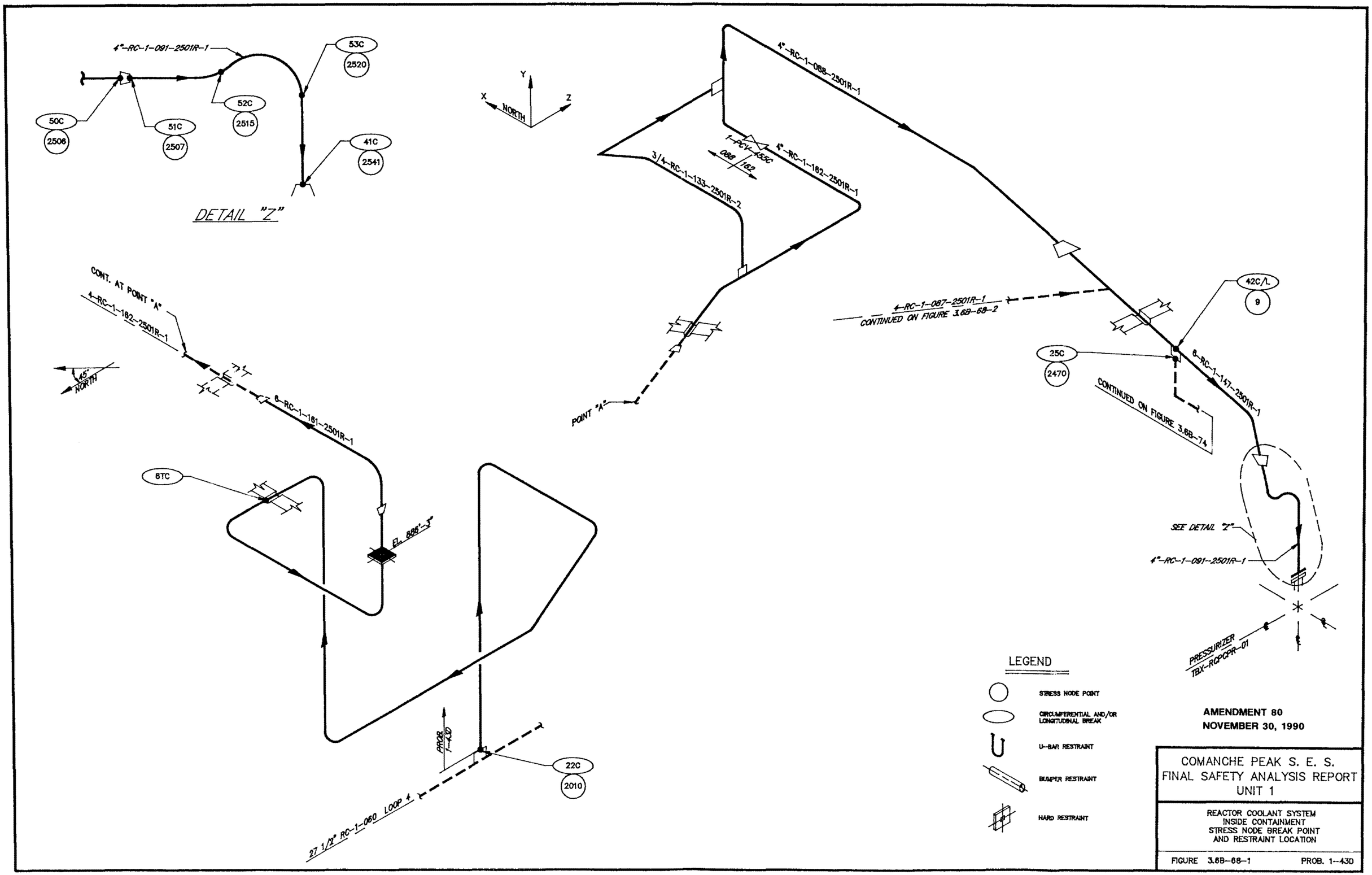


COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

REACTOR COOLANT SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-67-3 PROB. 1-53

AMENDMENT 76
MAY 1, 1989

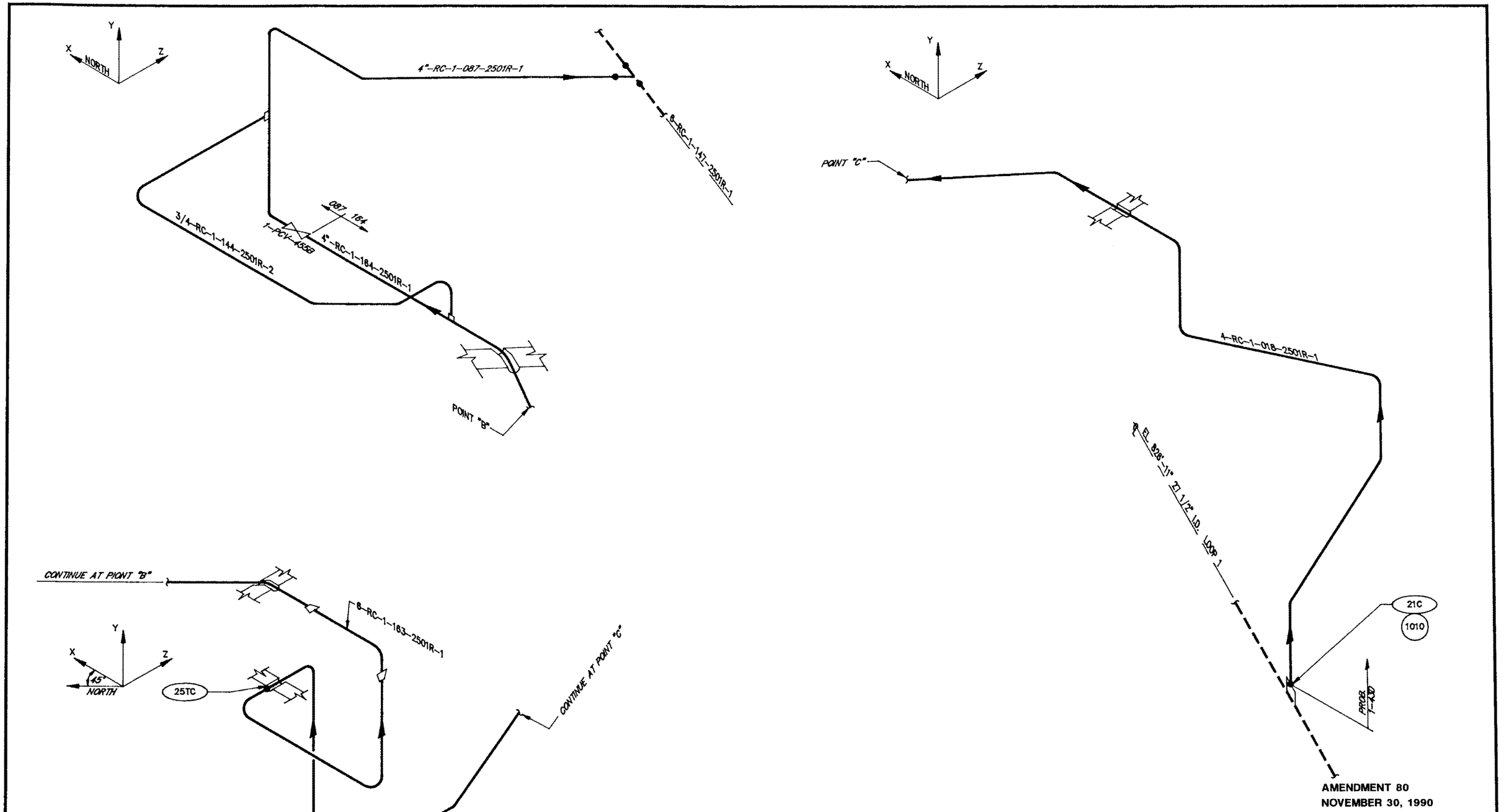


AMENDMENT 80
NOVEMBER 30, 1990

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

REACTOR COOLANT SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-68-1 PROB. 1--43D

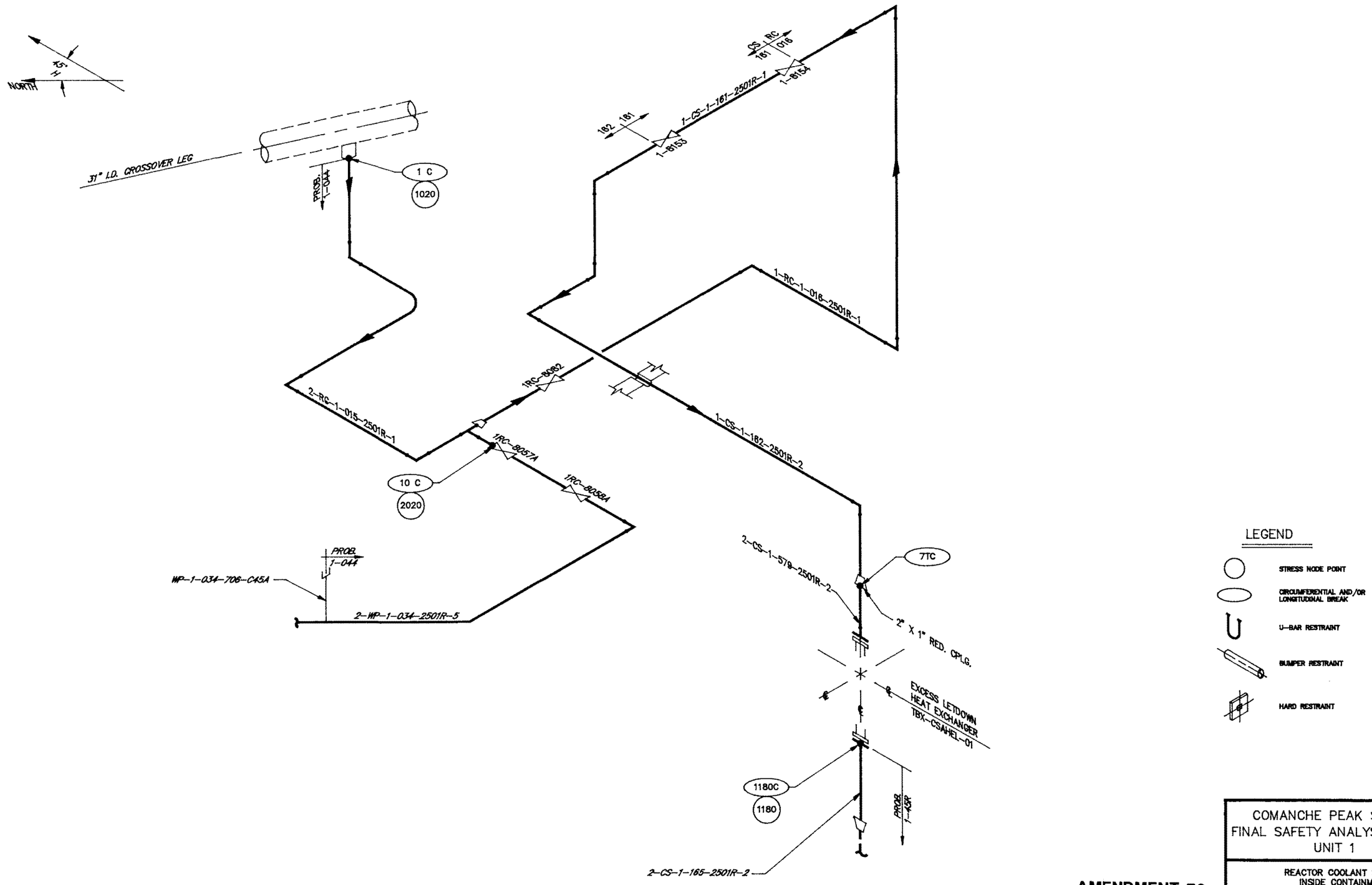


AMENDMENT 80
NOVEMBER 30, 1990

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

REACTOR COOLANT SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-68-2 PROB. 1-43D

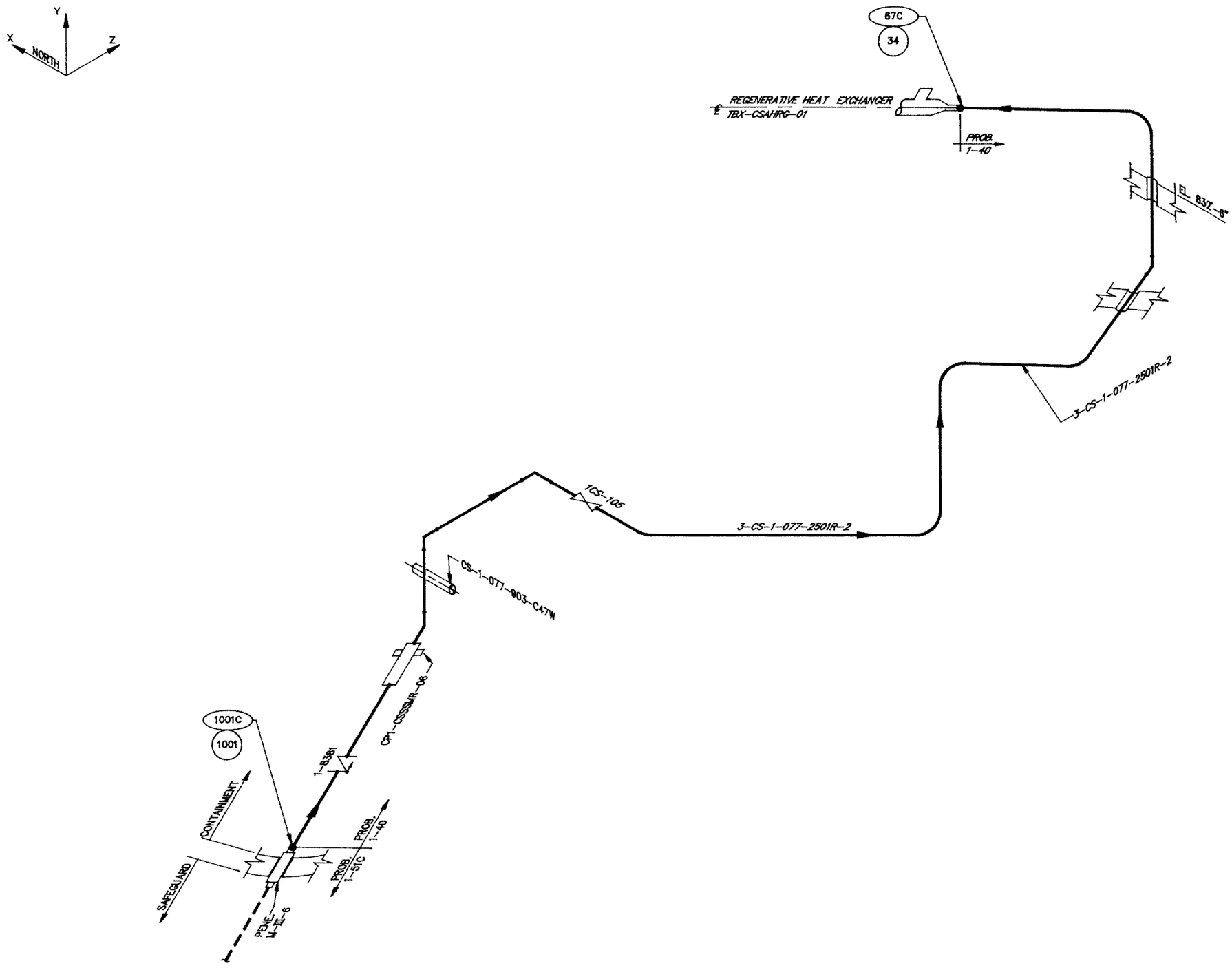


AMENDMENT 76
MAY 1, 1989

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

REACTOR COOLANT SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-69 PROB. 1-44 & 1-45R



LEGEND

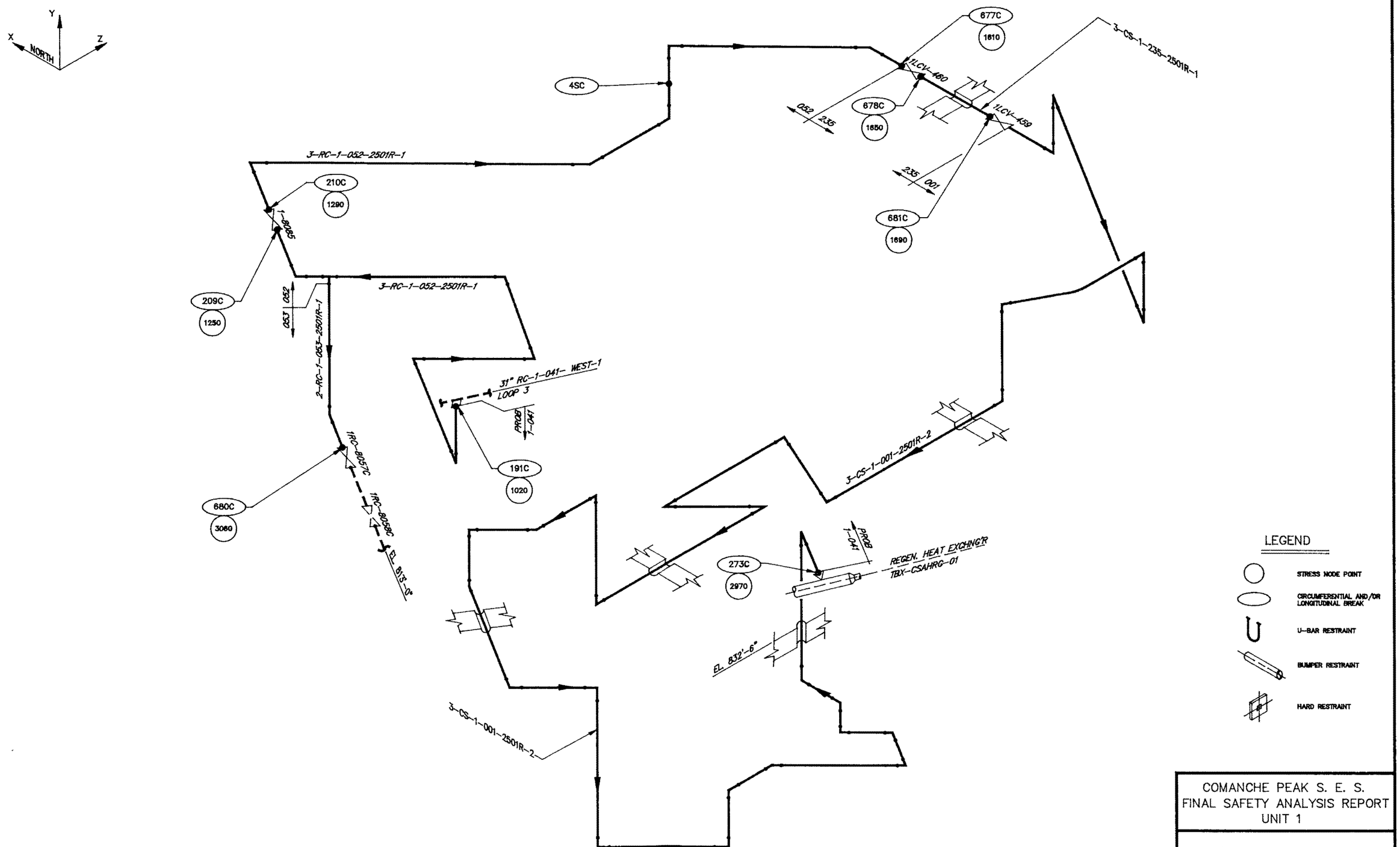
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

CVCS SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-70 PROB. 1-40

AMENDMENT 76
MAY 1, 1989

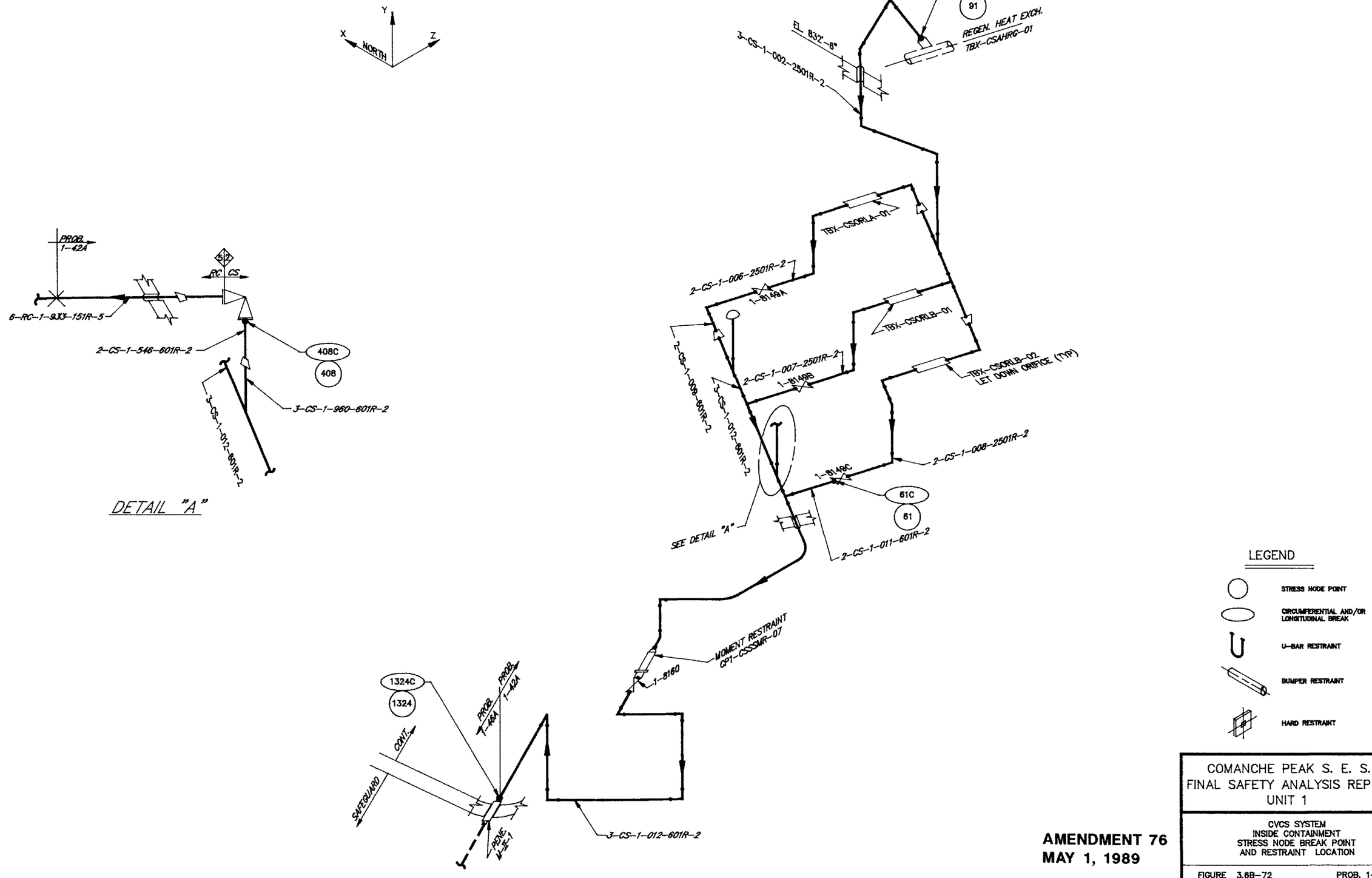


AMENDMENT 76
MAY 1, 1989

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

CVCS SYSTEM INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-71 PROB. 1-41

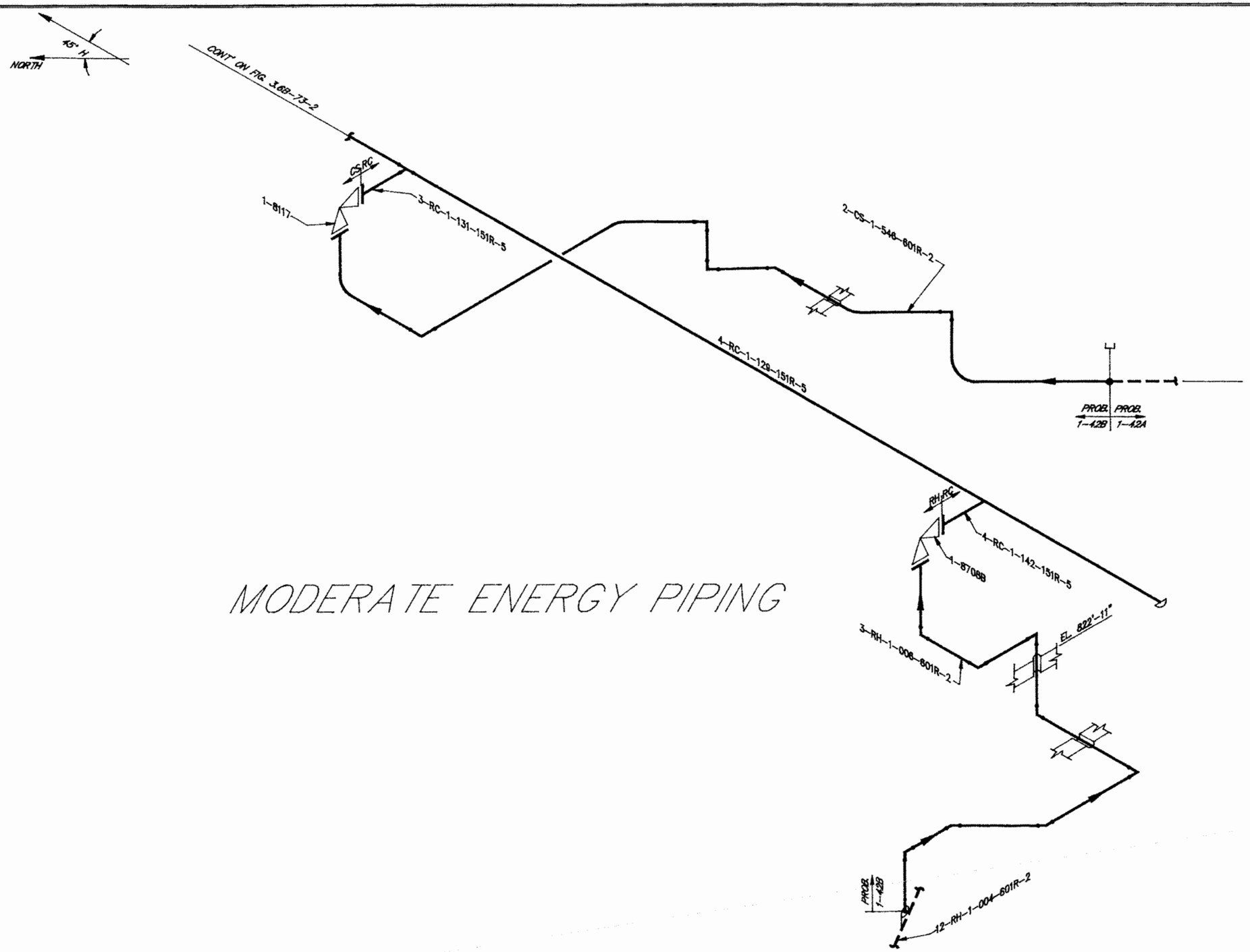


COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

CVCS SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-72 PROB. 1-42A

AMENDMENT 76
MAY 1, 1989



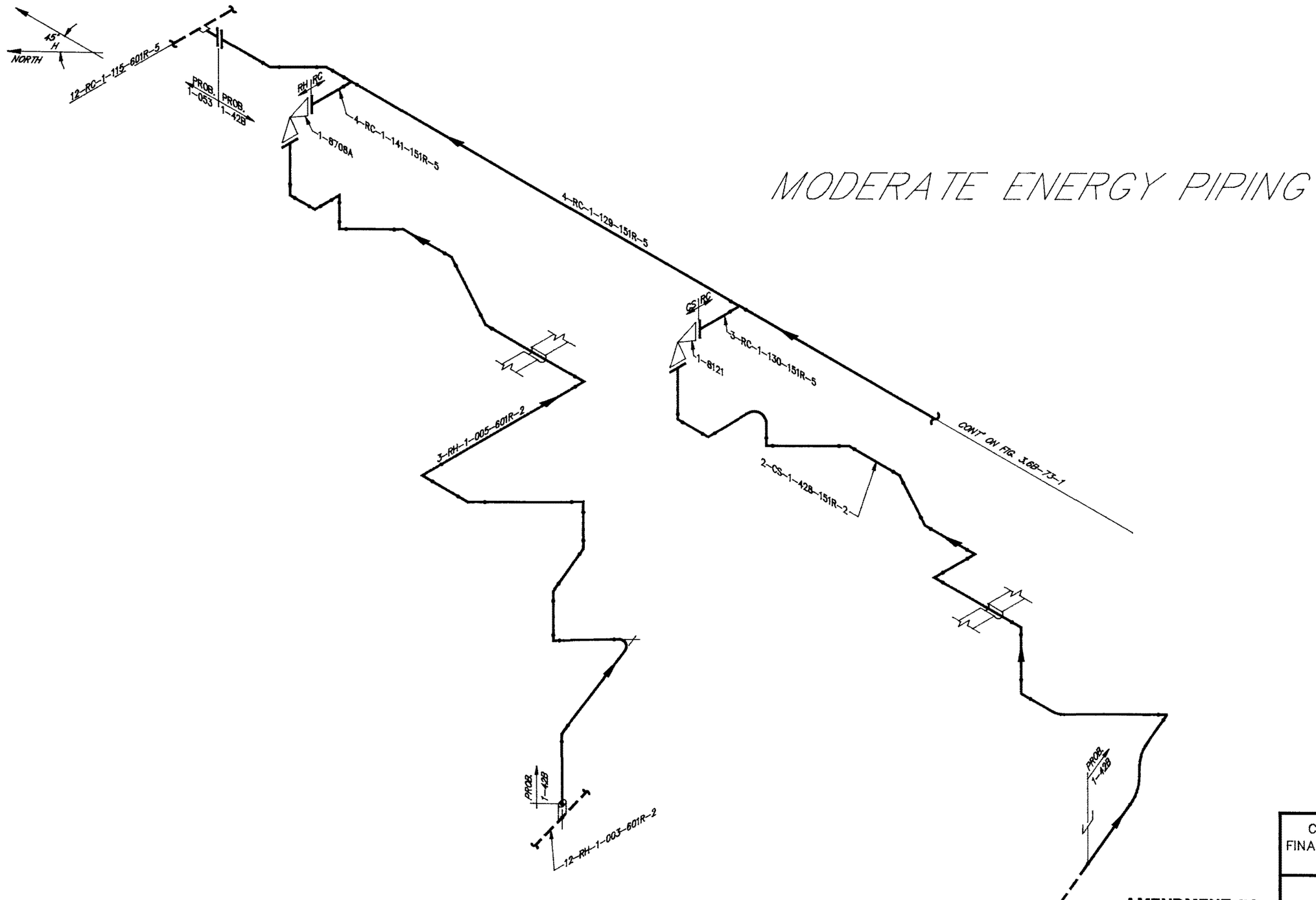
MODERATE ENERGY PIPING

AMENDMENT 76
MAY 1, 1989

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

CVCS SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-73-1 PROB. 1-42B



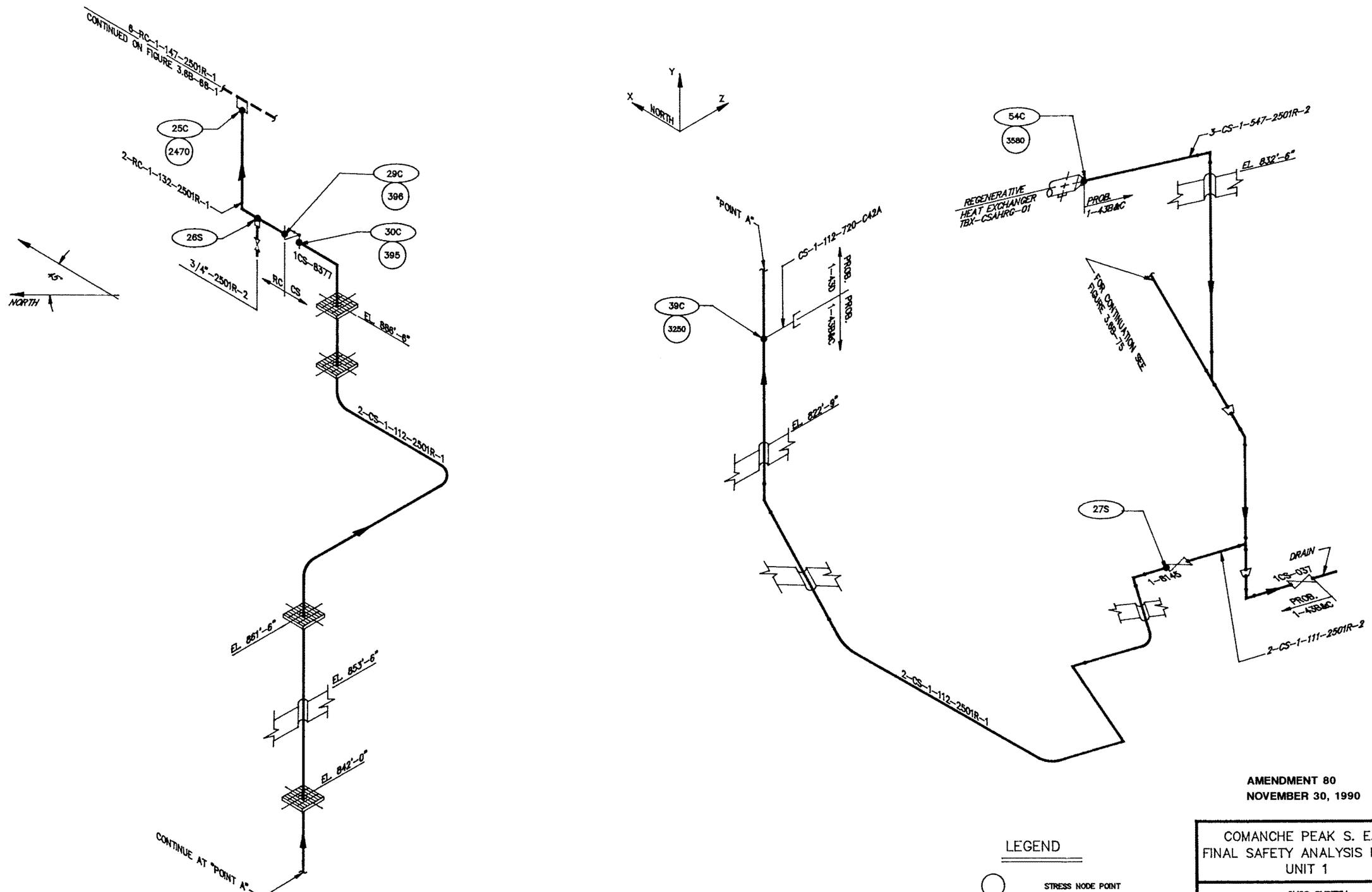
MODERATE ENERGY PIPING

AMENDMENT 76
MAY 1, 1989

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

CVCS SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-73-2 PROB. 1-42B



AMENDMENT 80
NOVEMBER 30, 1990

LEGEND

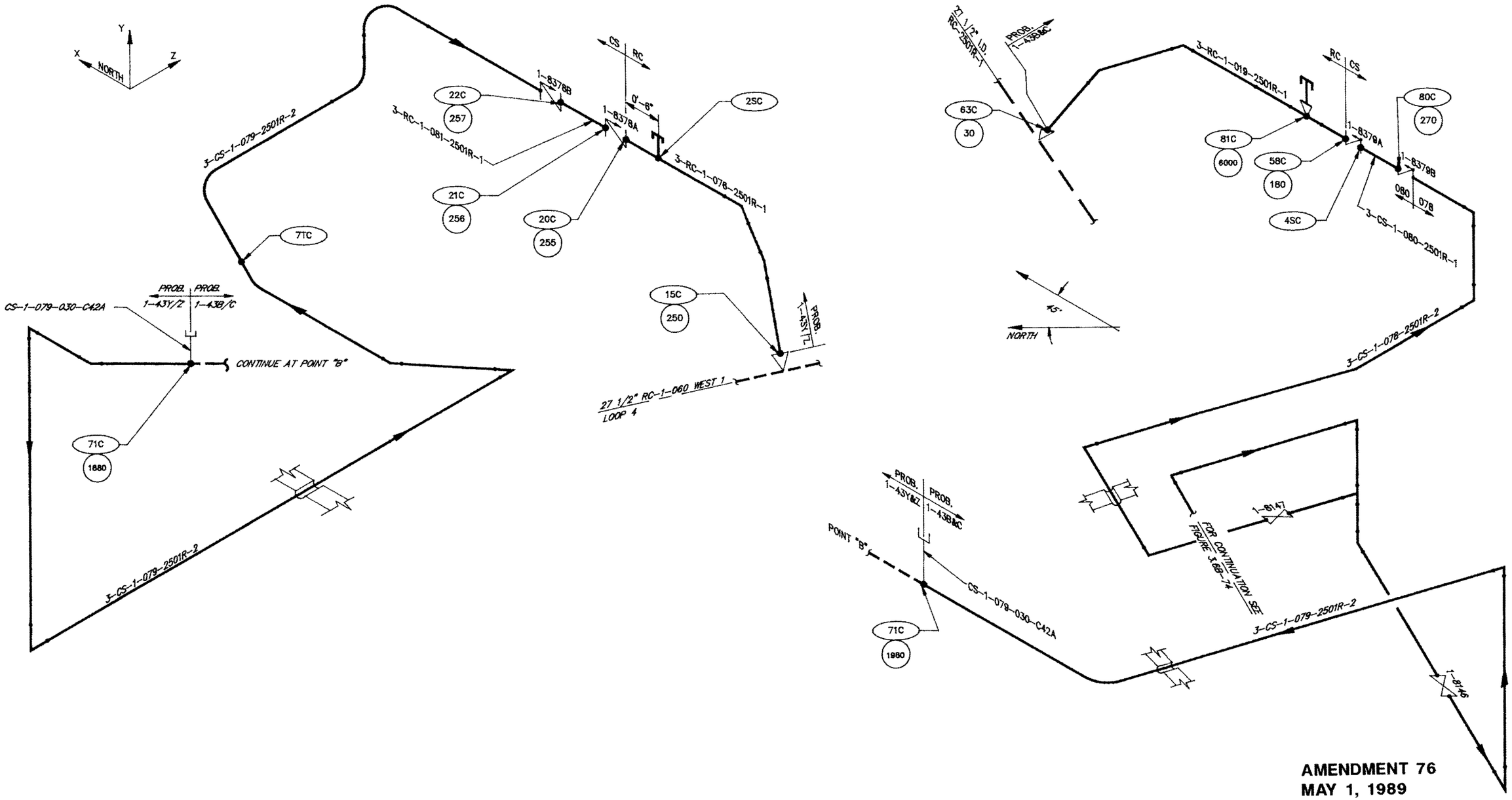
STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

CVCS SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-74 PROB. 1-43B/C & 1-43D



AMENDMENT 76
MAY 1, 1989

LEGEND

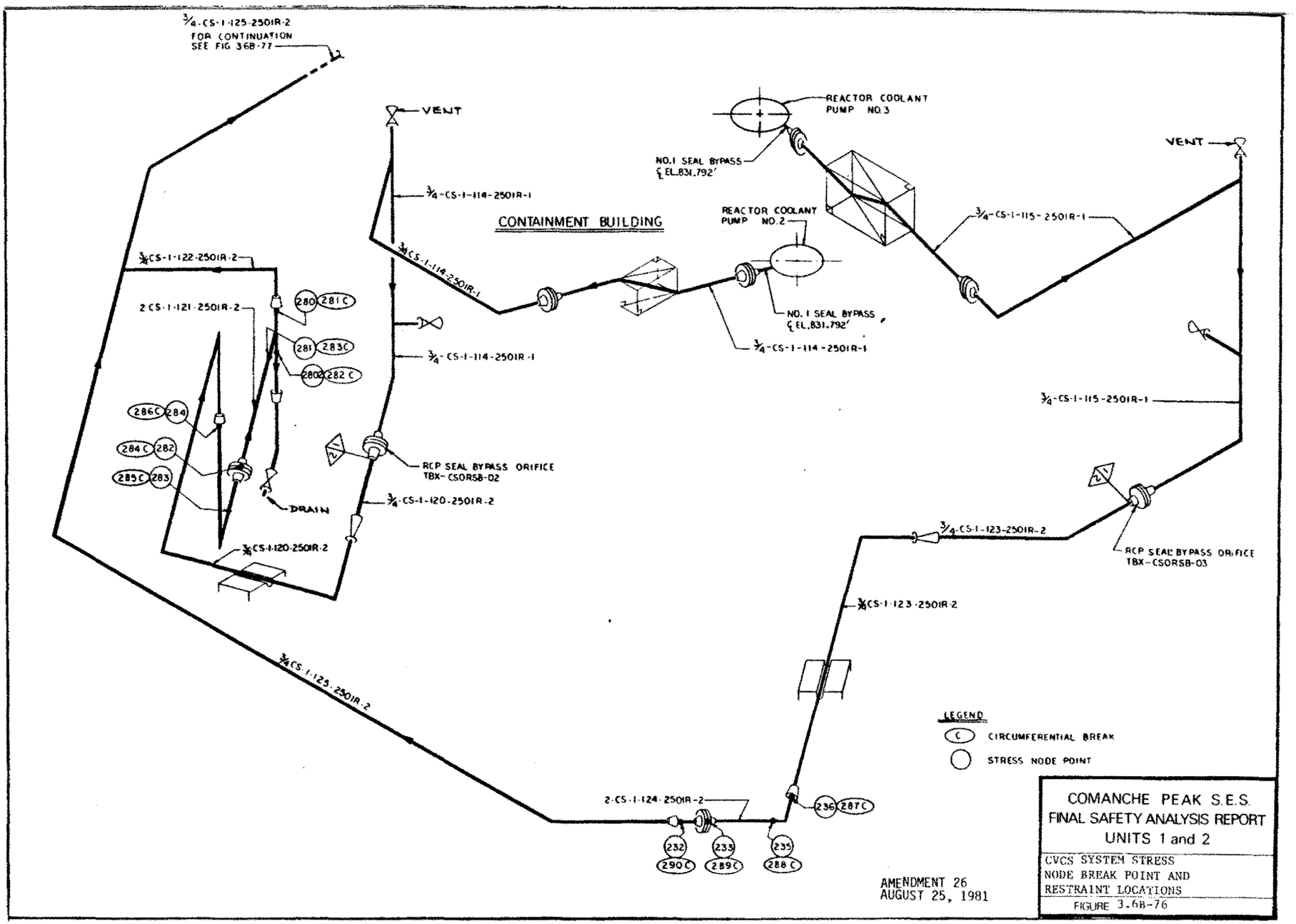
STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

CVCS SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-75 PROB. 1-43Y/Z & 1-43B/C

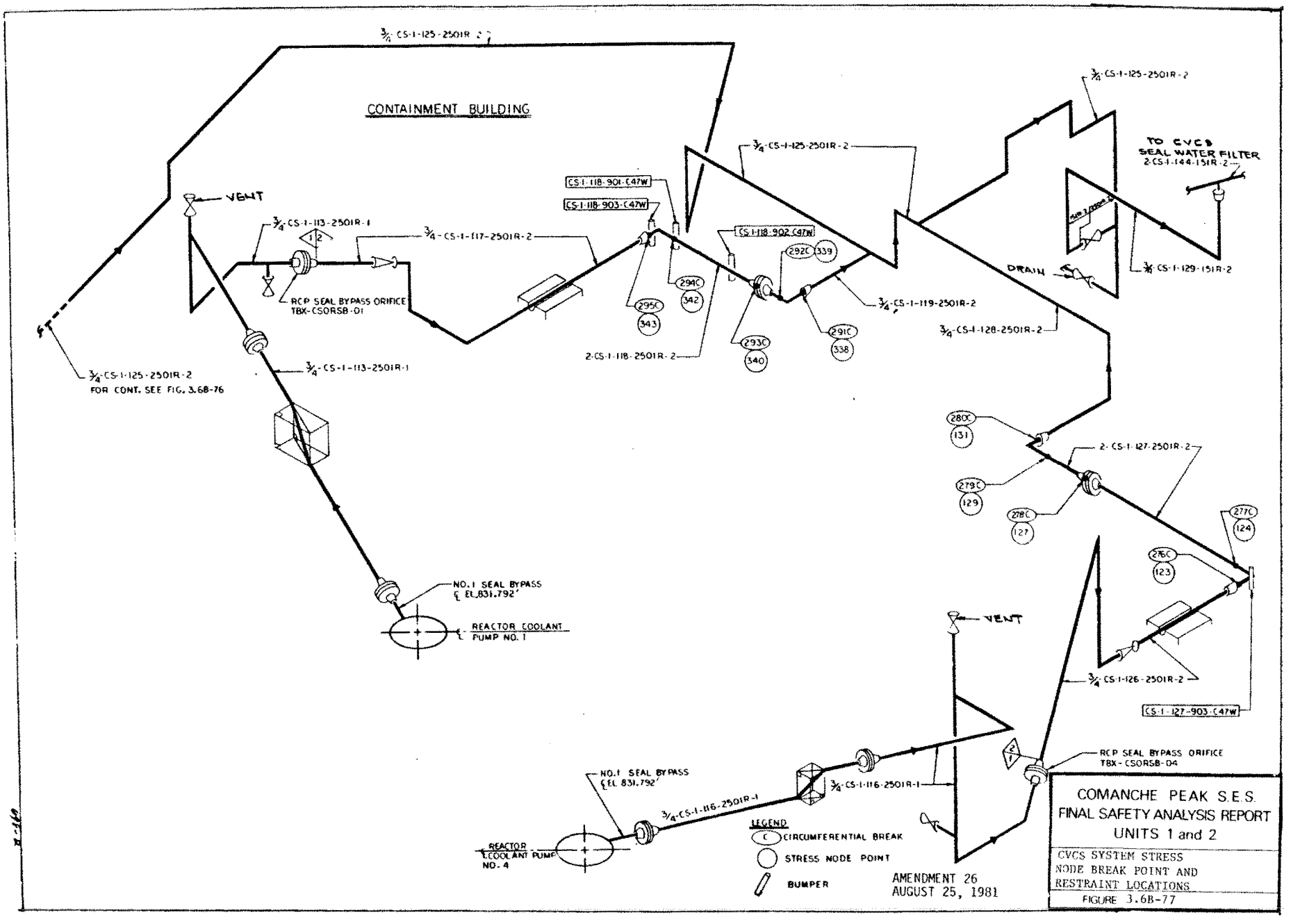


AMENDMENT 26
AUGUST 25, 1981

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

CVCS SYSTEM STRESS NODE BREAK POINT AND RESTRAINT LOCATIONS

FIGURE 3.6B-76

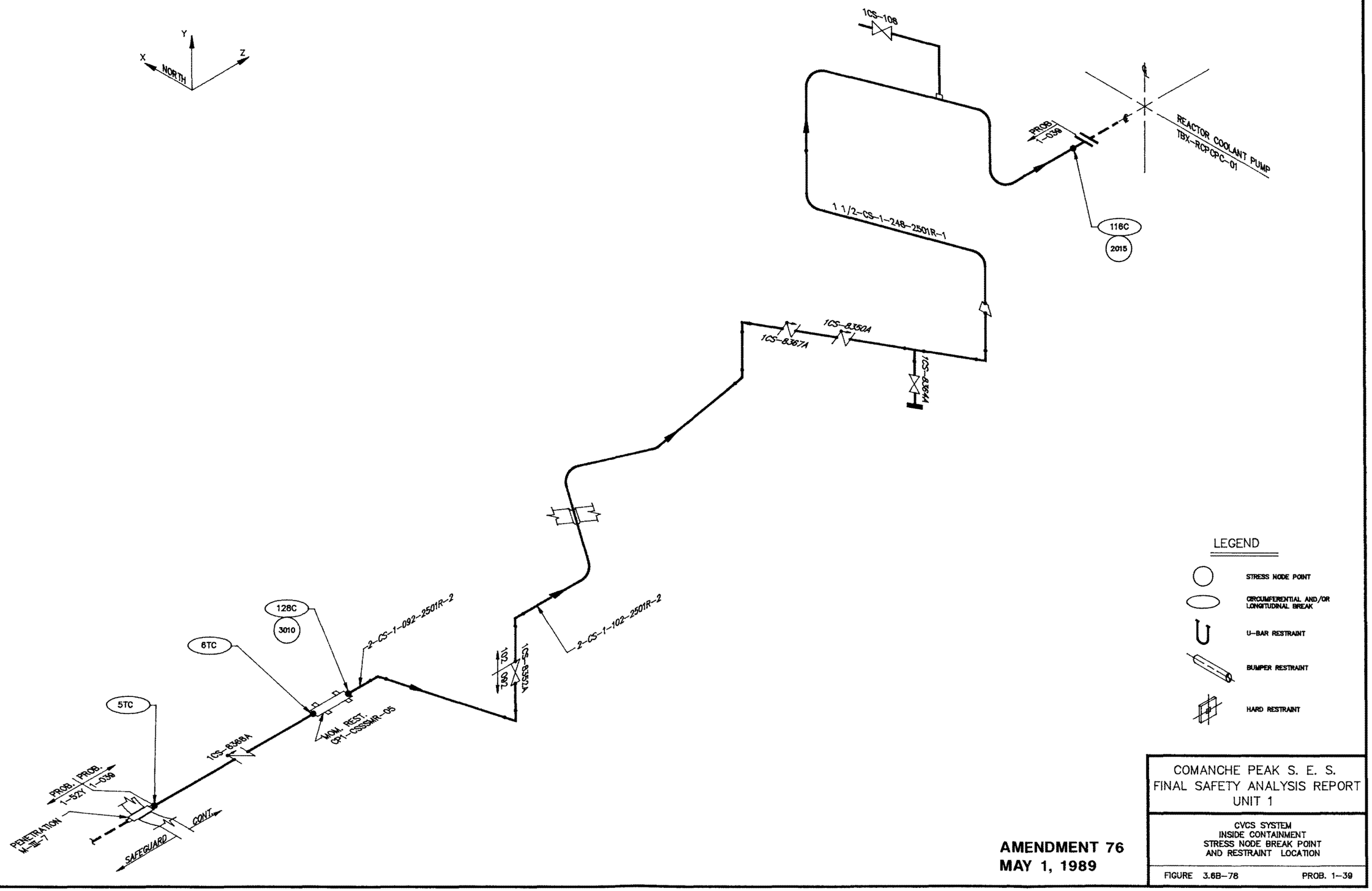


AMENDMENT 26
AUGUST 25, 1981

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

CVCS SYSTEM STRESS
NODE BREAK POINT AND
RESTRAINT LOCATIONS

FIGURE 3.6B-77

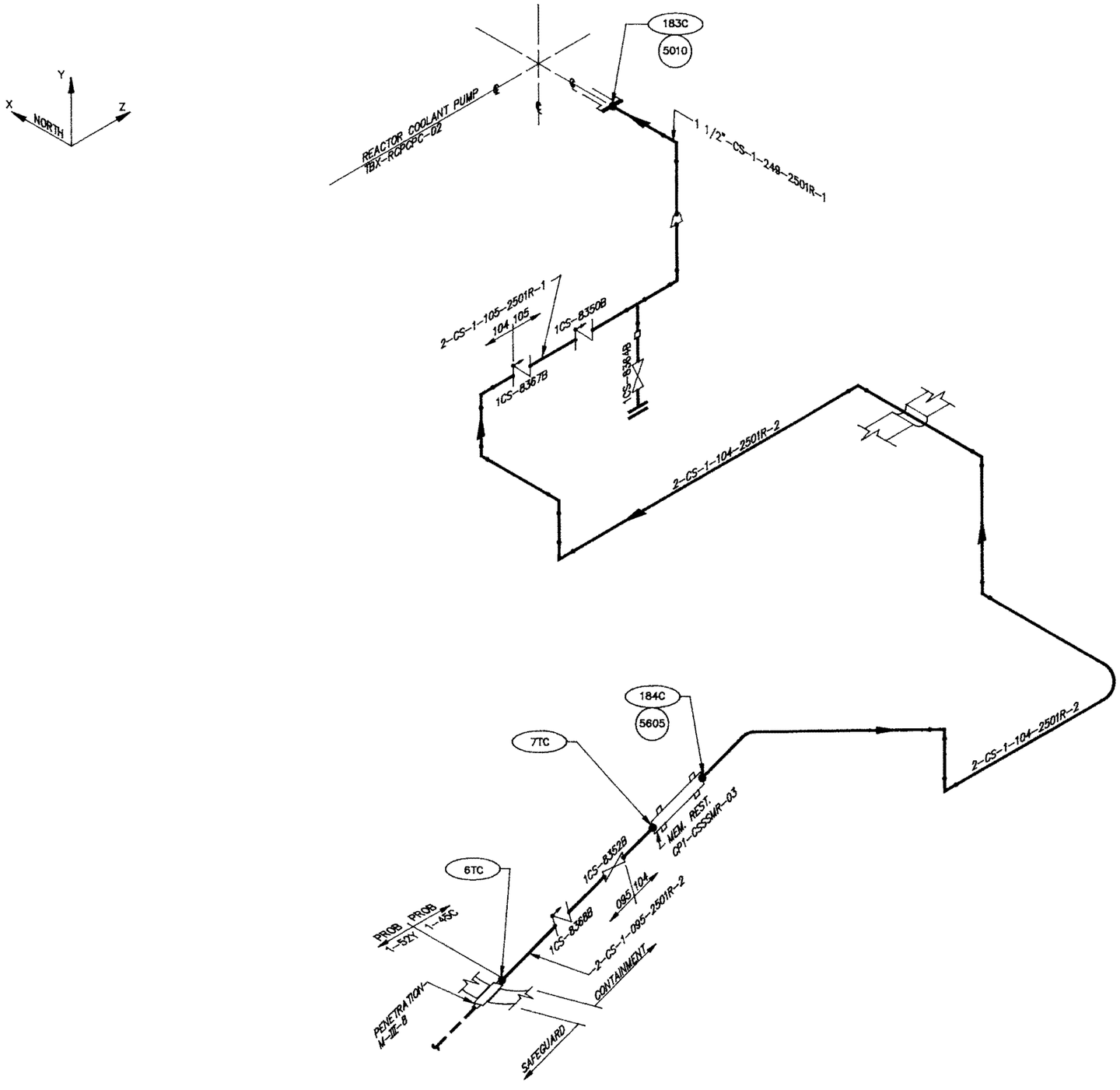


AMENDMENT 76
MAY 1, 1989

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

CVCS SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-78 PROB. 1-39



LEGEND

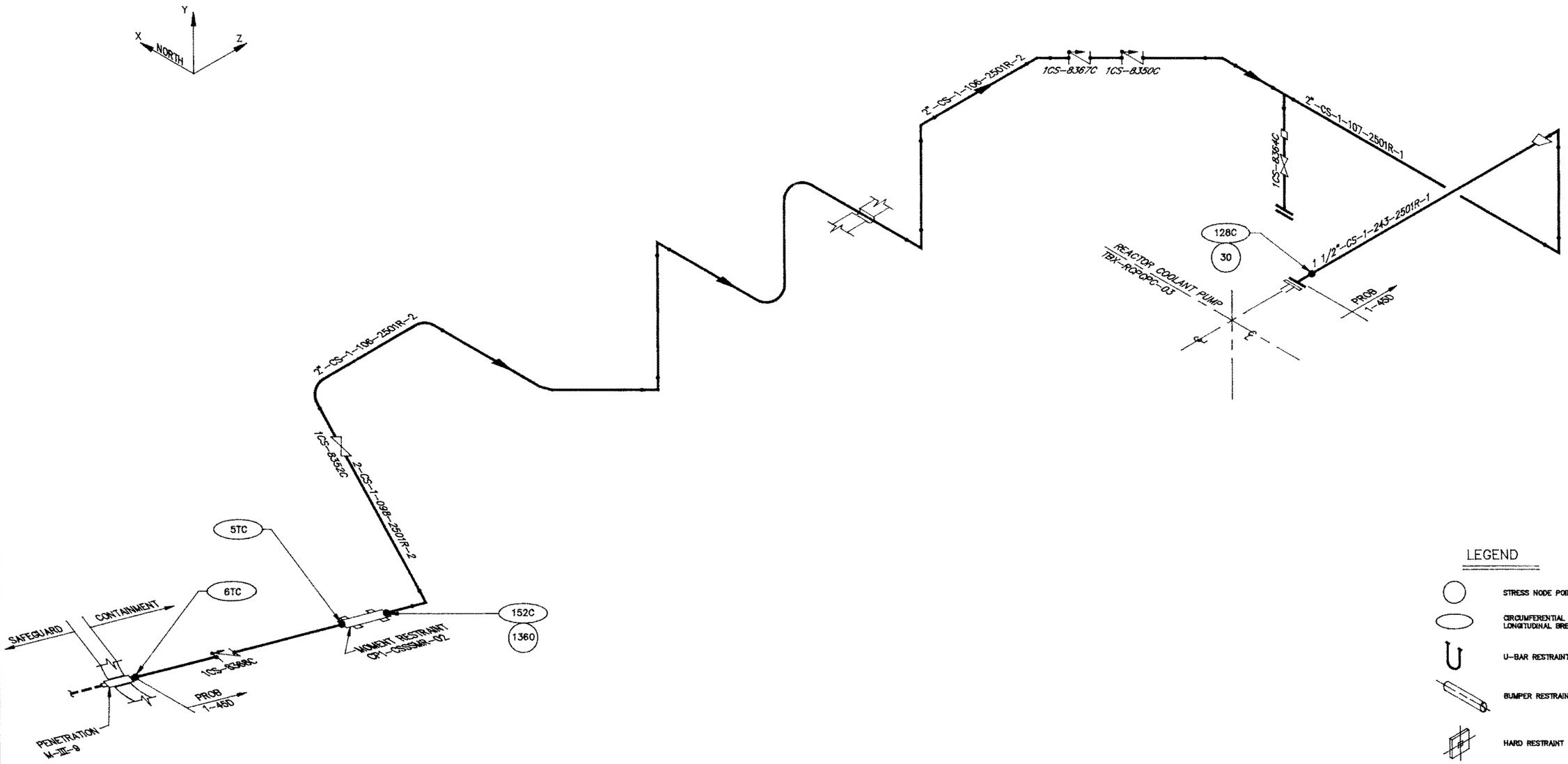
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT

AMENDMENT 76
MAY 1, 1989

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

CVCS SYSTEM INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-79 PROB. 1-45C



LEGEND

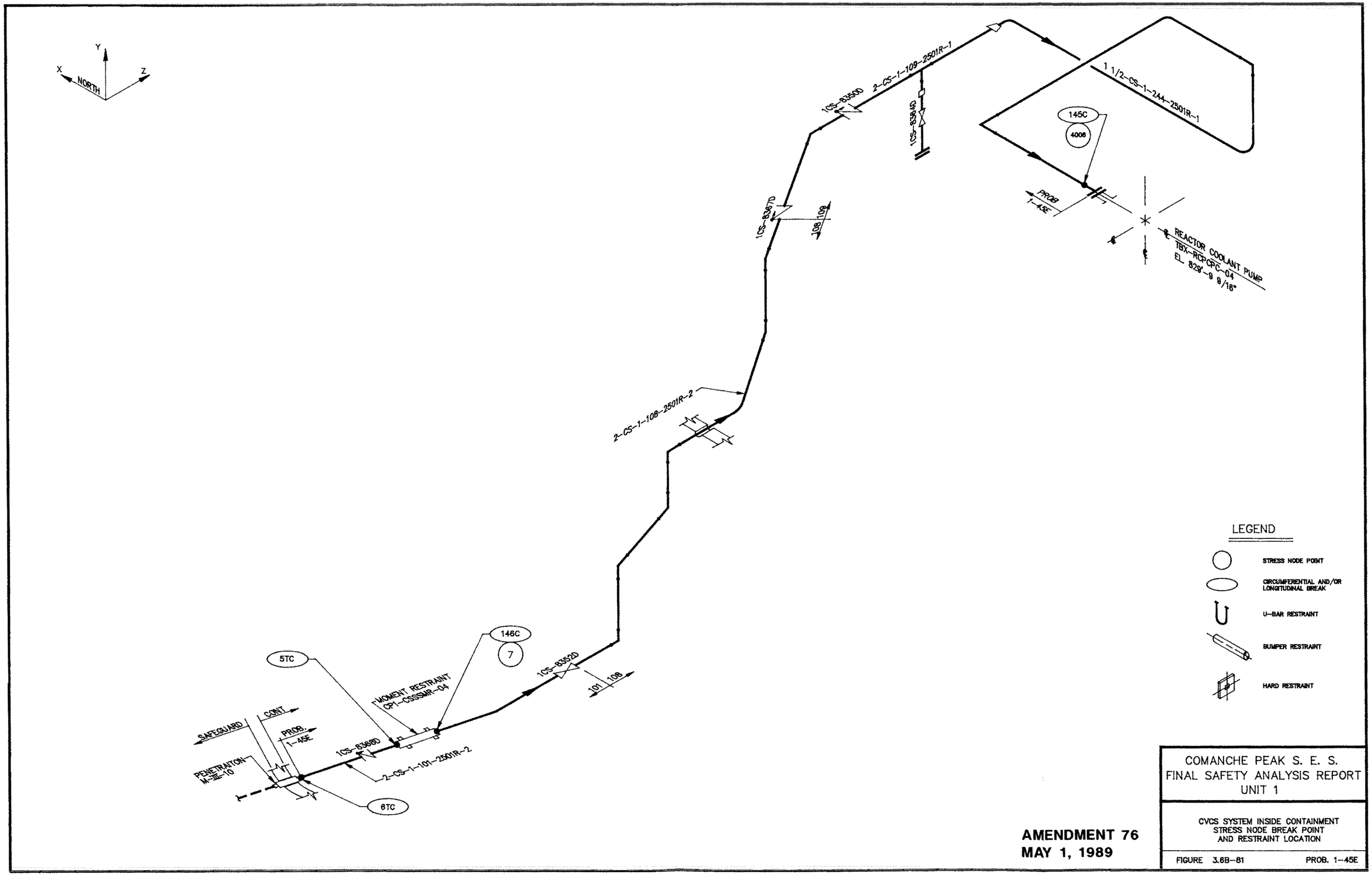
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

CVCS SYSTEM INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-80 PROB. 1-45D

AMENDMENT 78
JANUARY 15, 1990

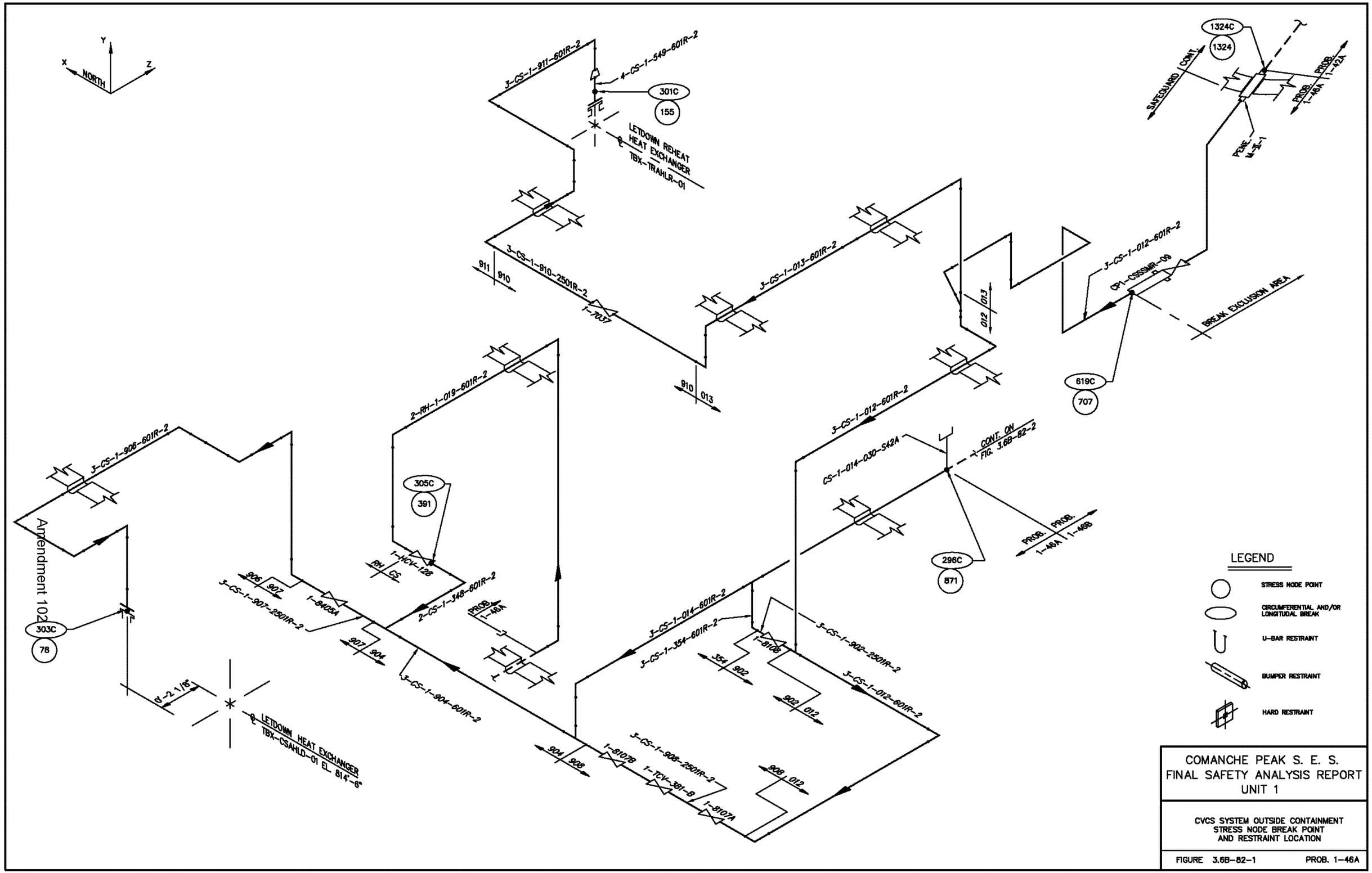


COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

CVCS SYSTEM INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-81 PROB. 1-45E

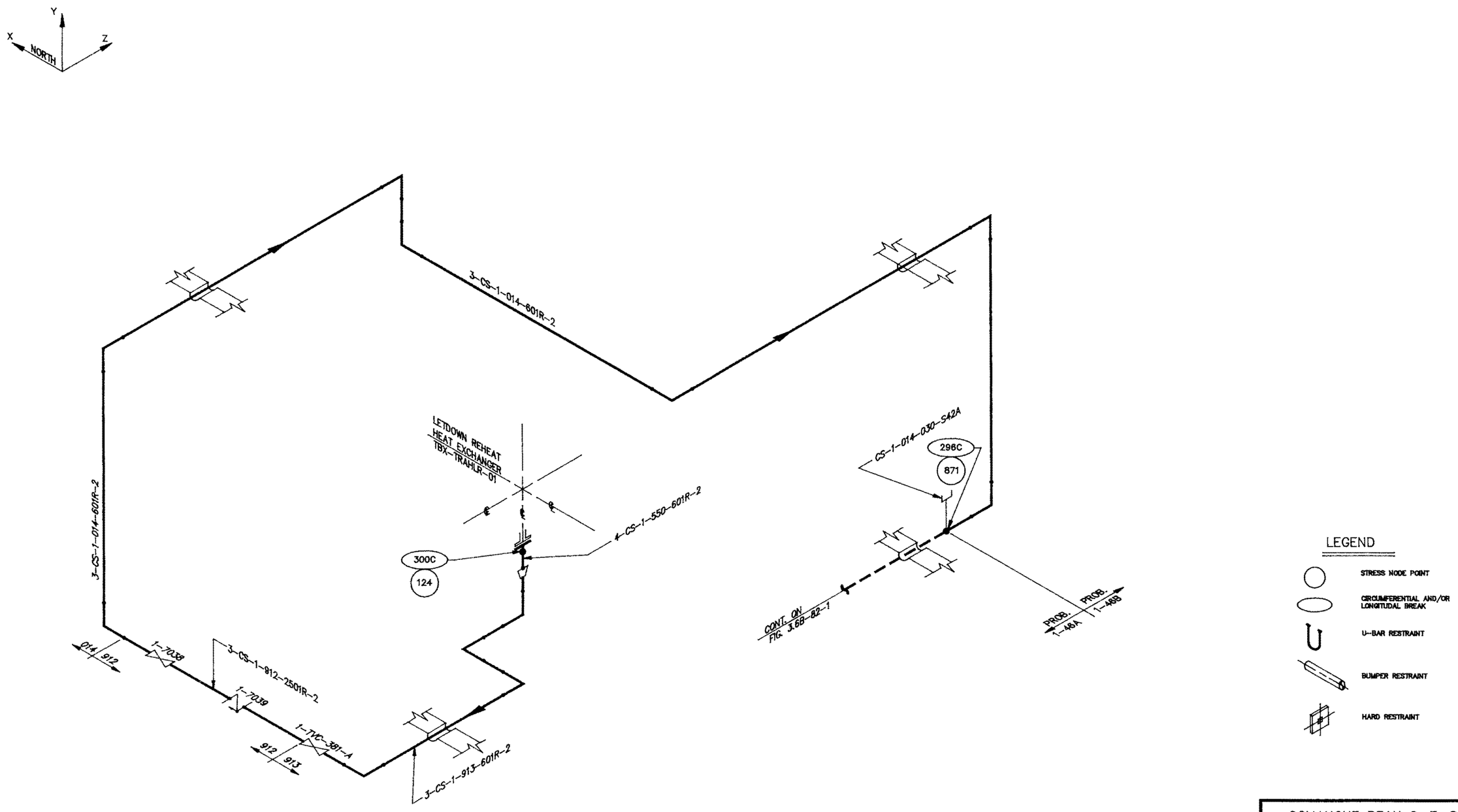
AMENDMENT 76
MAY 1, 1989



COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

CVCS SYSTEM OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-82-1 PROB. 1-46A

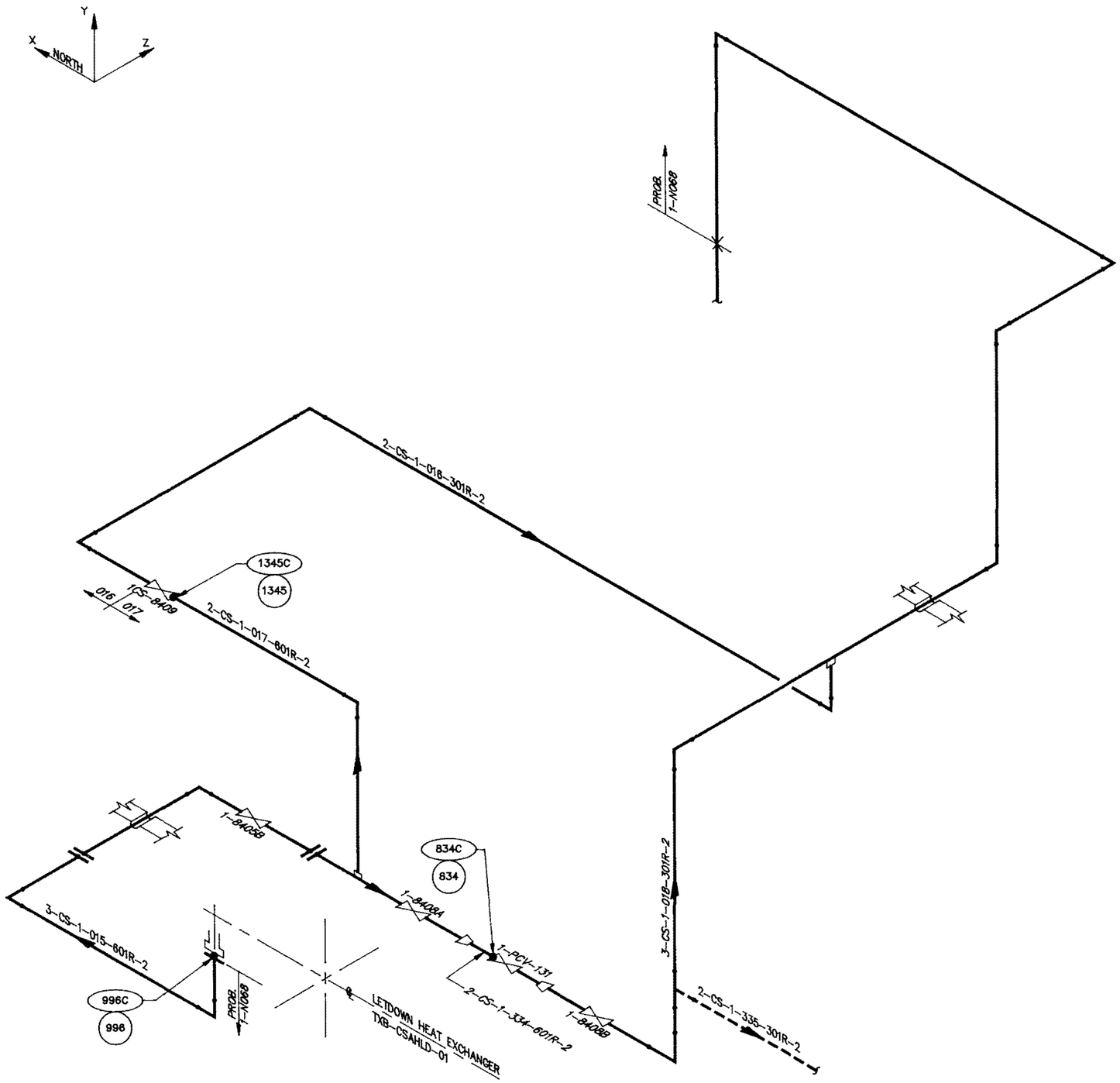


AMENDMENT 76
MAY 1, 1989

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

CVCS SYSTEM OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-82-2 PROB. 1-46B



LEGEND

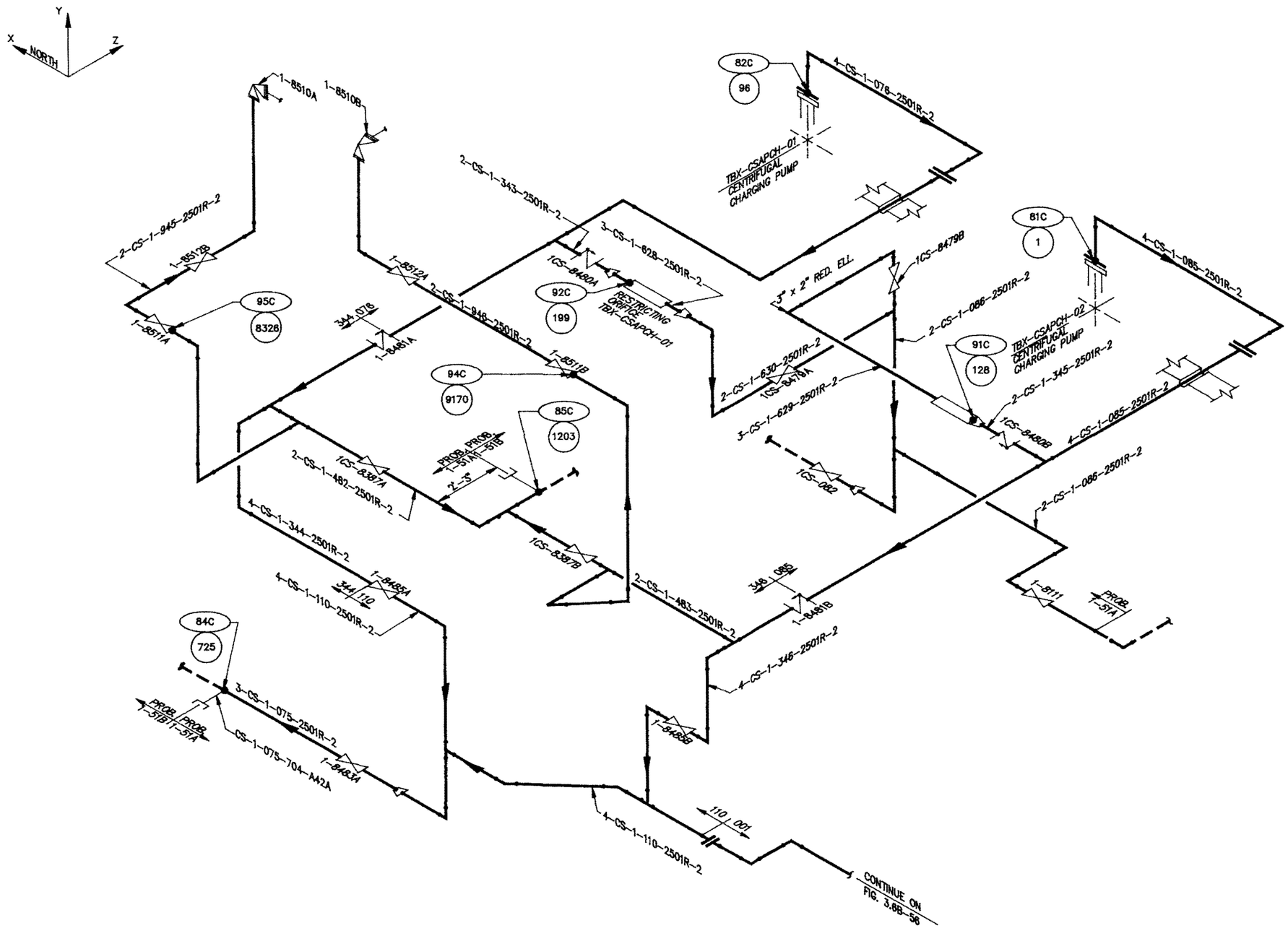
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT

AMENDMENT 76
MAY 1, 1989

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

CVCS SYSTEM
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-82-3 PROB. 1-N068



LEGEND

STRESS NODE POINT

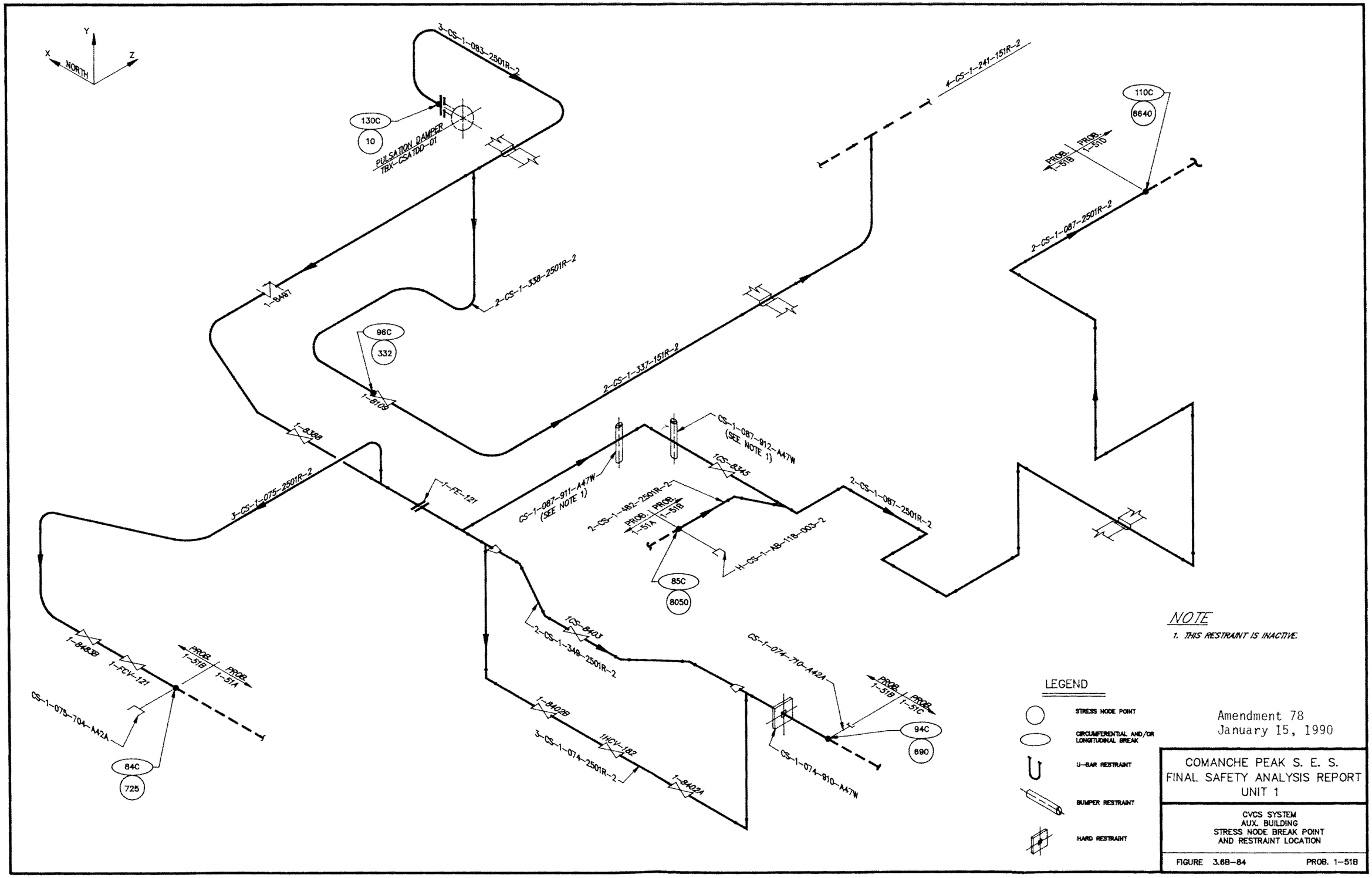
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

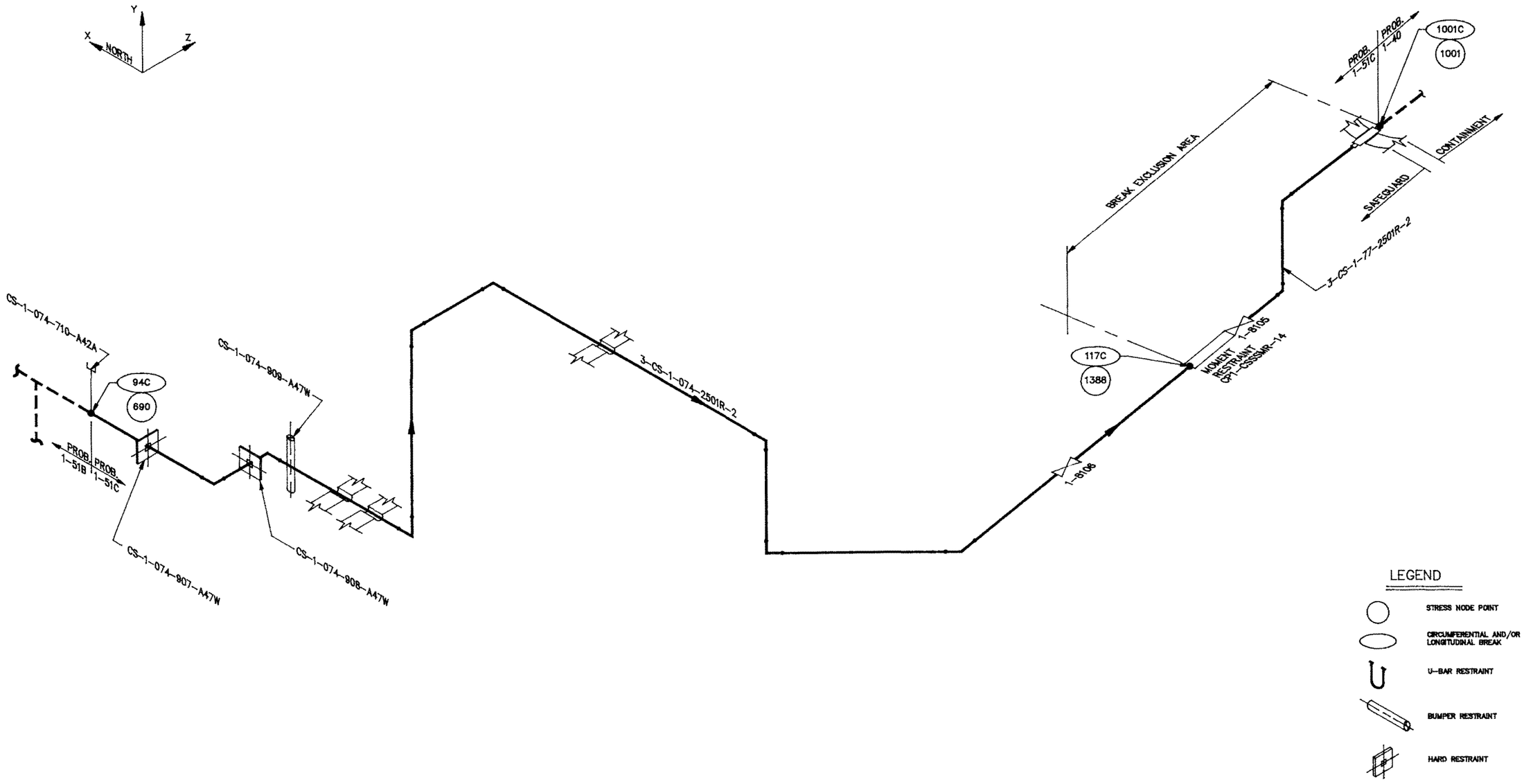
COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

CVCS SYSTEM
AUX. BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-83 PROB. 1-51A

AMENDMENT 76
MAY 1, 1989


Y
X
NORTH
Z
3-CS-1-083-2501R-2
130C
10
PULSATION DAMPER
TBX-CSATDD-01
4-CS-1-241-151R-2
110C
6640
PROB. 1-51B
PROB. 1-51D
2-CS-1-087-2501R-2
2-CS-1-338-2501R-2
1-8481
96C
332
1-8108
2-CS-1-337-151R-2
1-8388
3-CS-1-075-2501R-2
1-FE-121
CS-1-087-911-A47W
(SEE NOTE 1)
CS-1-087-912-A47W
(SEE NOTE 1)
1CS-8345
2-CS-1-482-2501R-2
PROB. 1-51A
PROB. 1-51B
H-CS-1-AB-118-003-2
2-CS-1-087-2501R-2
85C
8050
1CS-8403
2-CS-1-348-2501R-2
1-8483B
1-FCV-121
PROB. 1-51B
PROB. 1-51A
CS-1-075-704-A42A
84C
725
1-8402B
1HCV-182
3-CS-1-074-2501R-2
1-8402A
CS-1-074-710-A42A
PROB. 1-51B
PROB. 1-51C
94C
890
CS-1-074-910-A47W
NOTE
1. THIS RESTRAINT IS INACTIVE.
LEGEND
STRESS NODE POINT
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
U-BAR RESTRAINT
BUMPER RESTRAINT
HARD RESTRAINT
Amendment 78
January 15, 1990
COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1
CVCS SYSTEM
AUX. BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION
FIGURE 3.6B-84
PROB. 1-51B

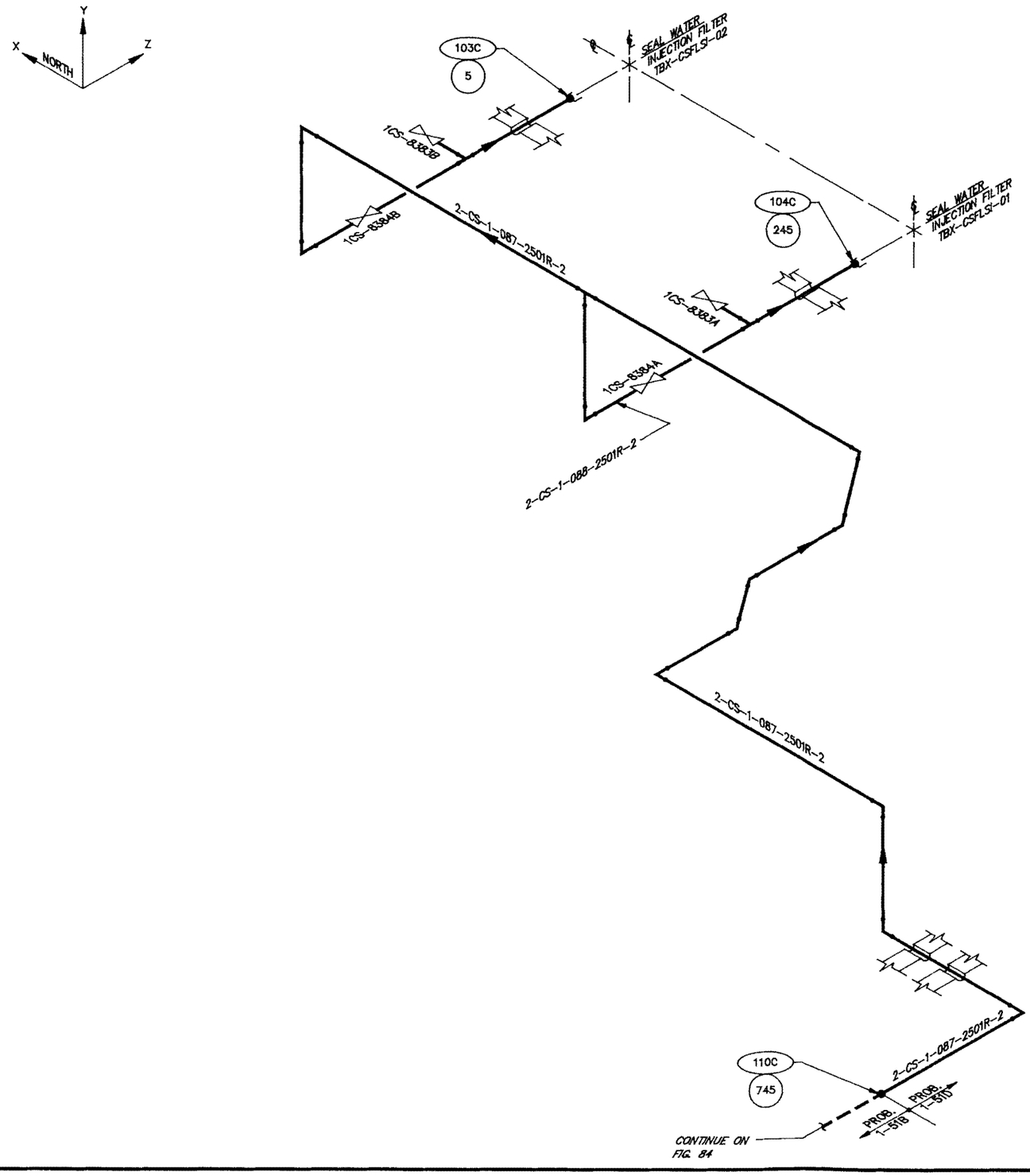


COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

CVCS SYSTEM
AUX. BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-85 PROB. 1-51C

AMENDMENT 76
MAY 1, 1989



LEGEND

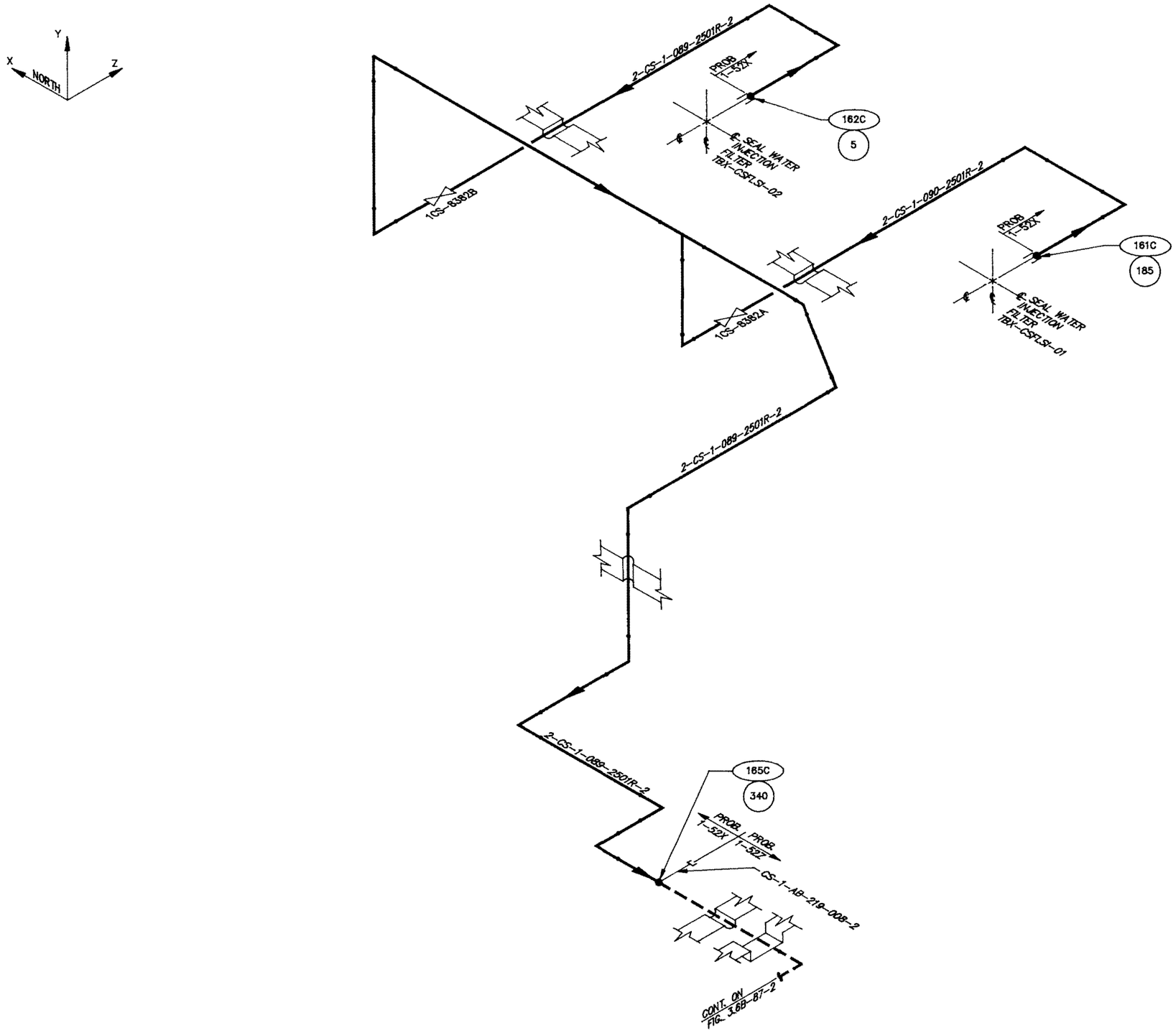
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT

AMENDMENT 76
MAY 1, 1989

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

CVCS SYSTEM
AUX. BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-86 PROB. 1-51D



LEGEND

STRESS NODE POINT

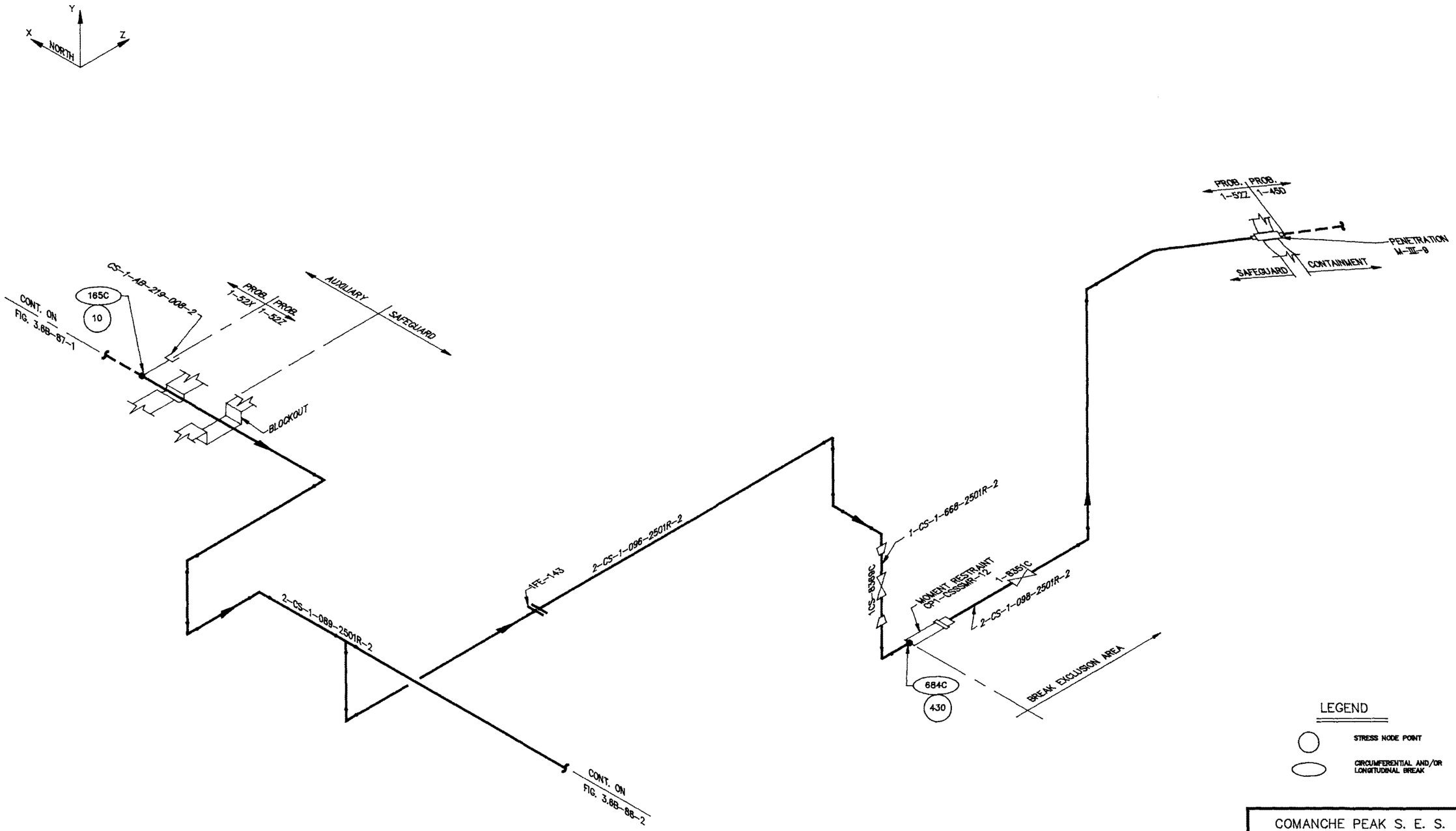
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

AMENDMENT 76
MAY 1, 1989

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

CVCS SYSTEM
AUX. BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-87-1 PROB. 1-52X



LEGEND

STRESS NODE POINT

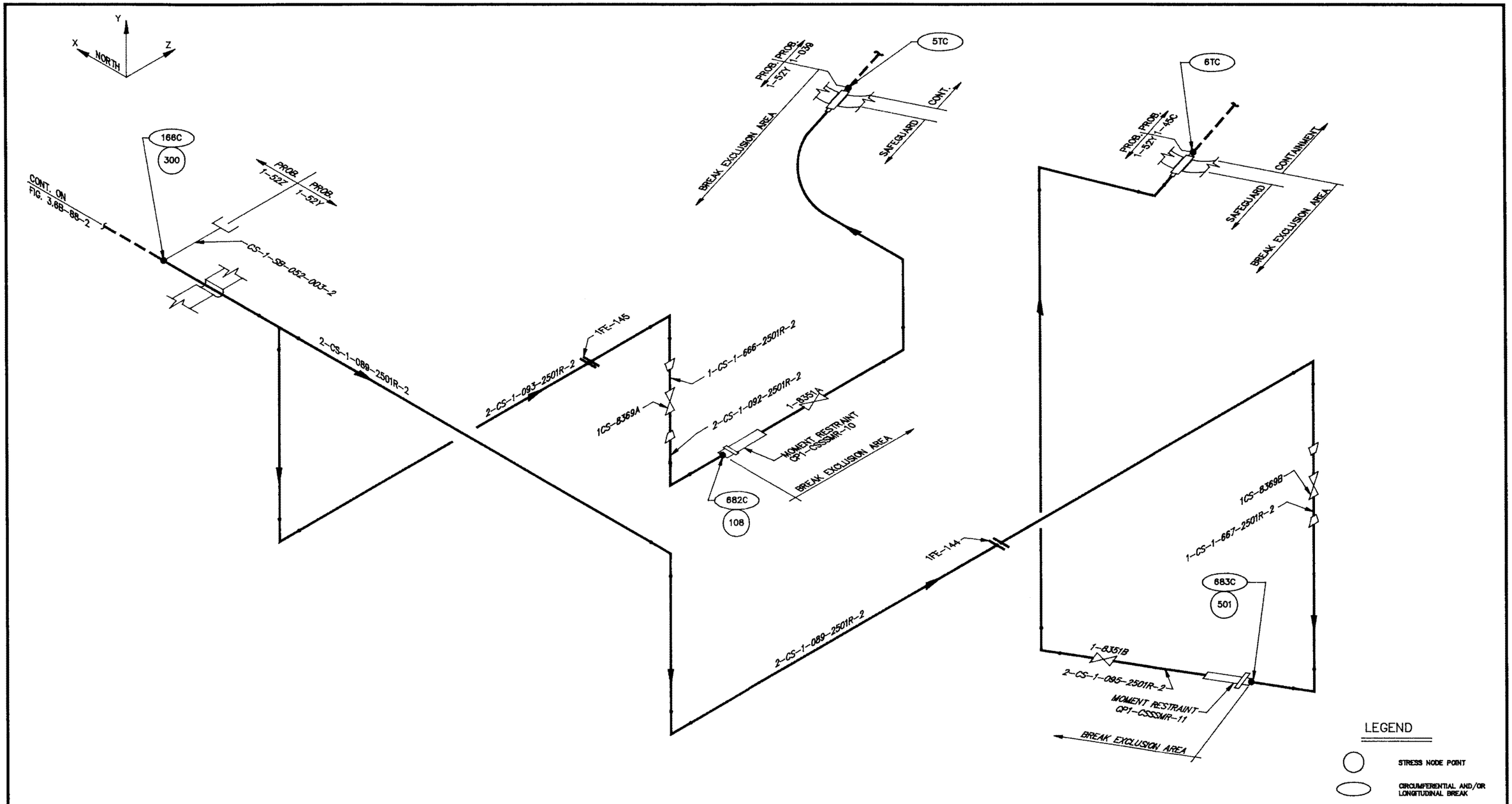
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

CVCS SYSTEM
SAFEGUARDS BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-87-2 PROB. 1-52Z

AMENDMENT 76
MAY 1, 1989

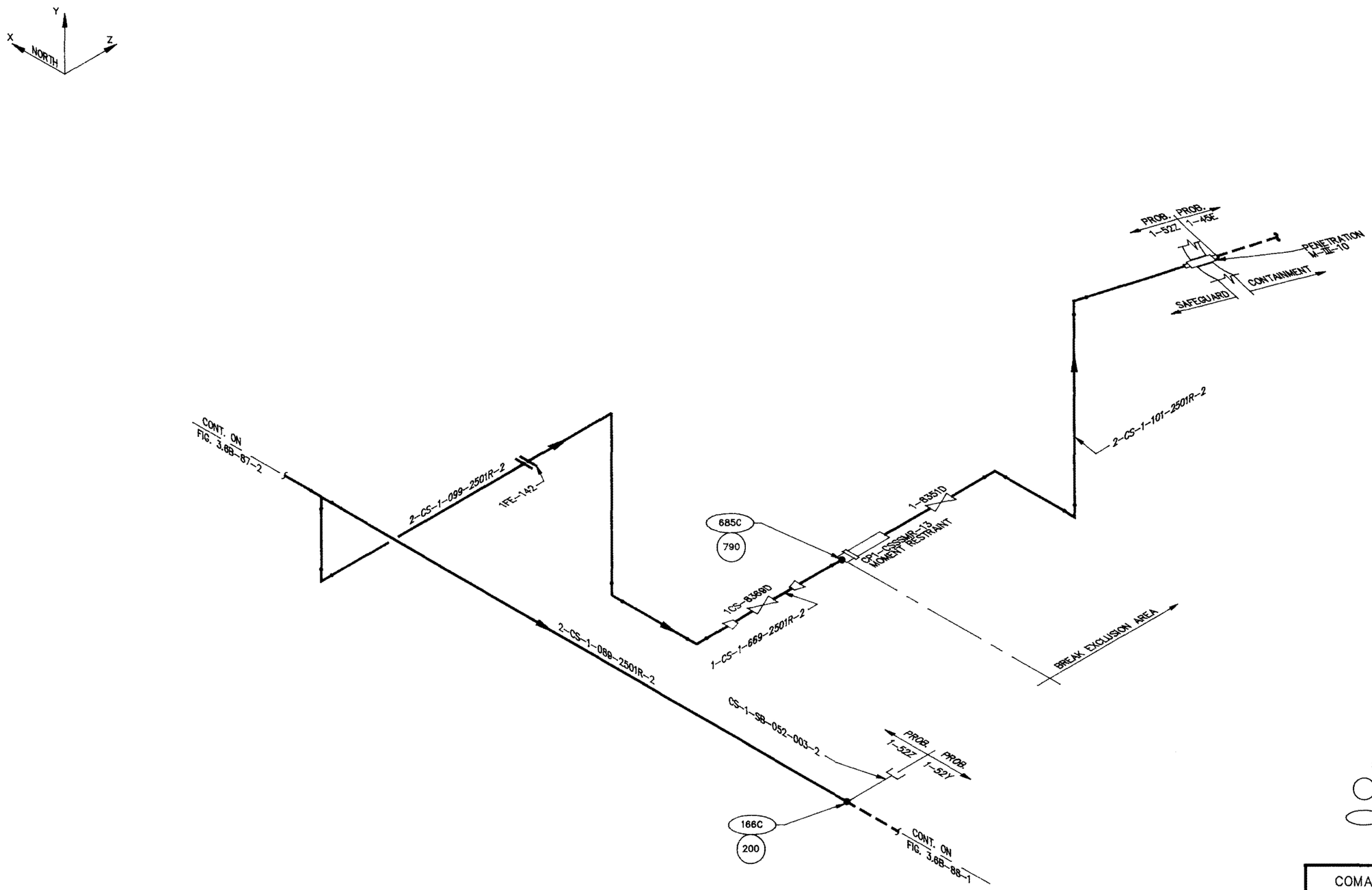


AMENDMENT 76
MAY 1, 1989

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

CVCS SYSTEM
SAFEGUARDS BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-88-1 PROB. 1-52Y



LEGEND

STRESS NODE POINT

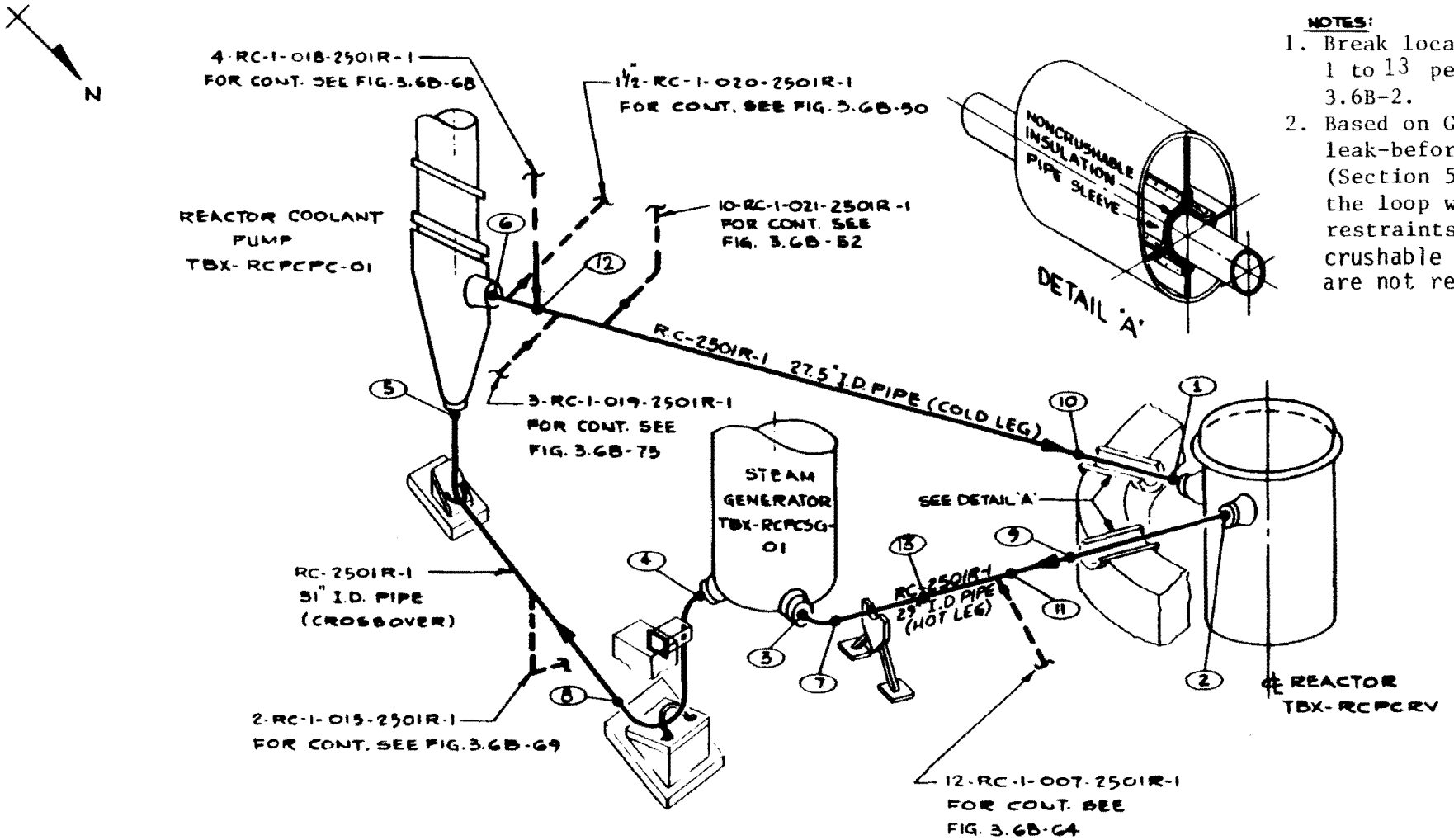
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S. E. S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

CVCS SYSTEM
SAFEGUARDS BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-88-2 PROB. 1-52Z

AMENDMENT 76
MAY 1, 1989



NOTES:

1. Break locations 1 to 13 per Table 3.6B-2.
2. Based on GDC-4, leak-before-break (Section 5.4.14) the loop whip restraints and non-crushable insulation are not required.

LEGEND

(1) - SEE NOTE 1

AMENDMENT 76
MAY 1, 1989

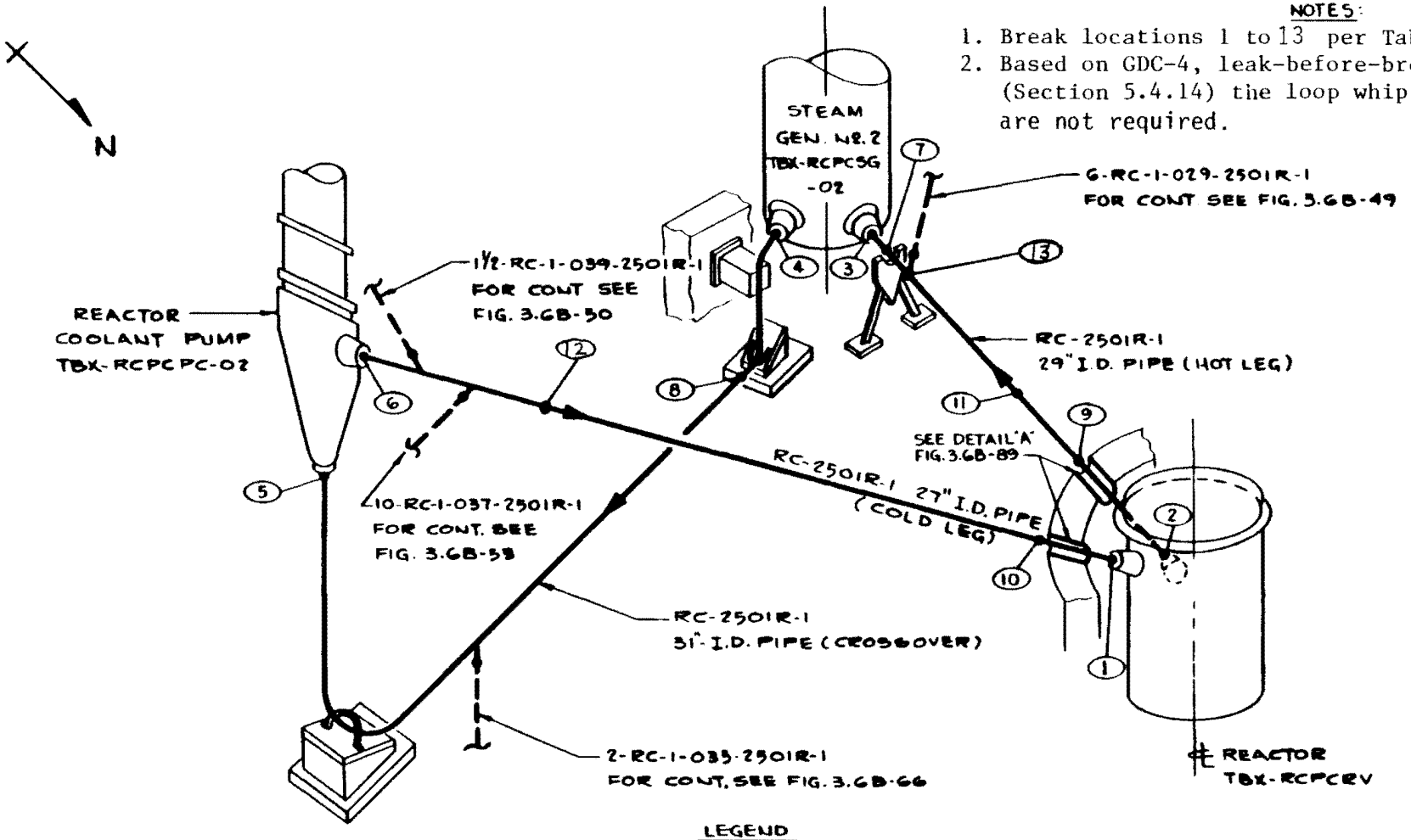
COMANCHE PEAK SES
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

REACTOR COOLANT LOOP #1
STRESS NODE & BREAK POINT
AND RESTRAINT LOCATIONS

FIGURE 3.6B-89 (LOOP #1)

NOTES:

1. Break locations 1 to 13 per Table 3.6B-2.
2. Based on GDC-4, leak-before-break (Section 5.4.14) the loop whip restraints are not required.



LEGEND

(1) = SEE NOTE 1

AMENDMENT 76
MAY 1, 1989

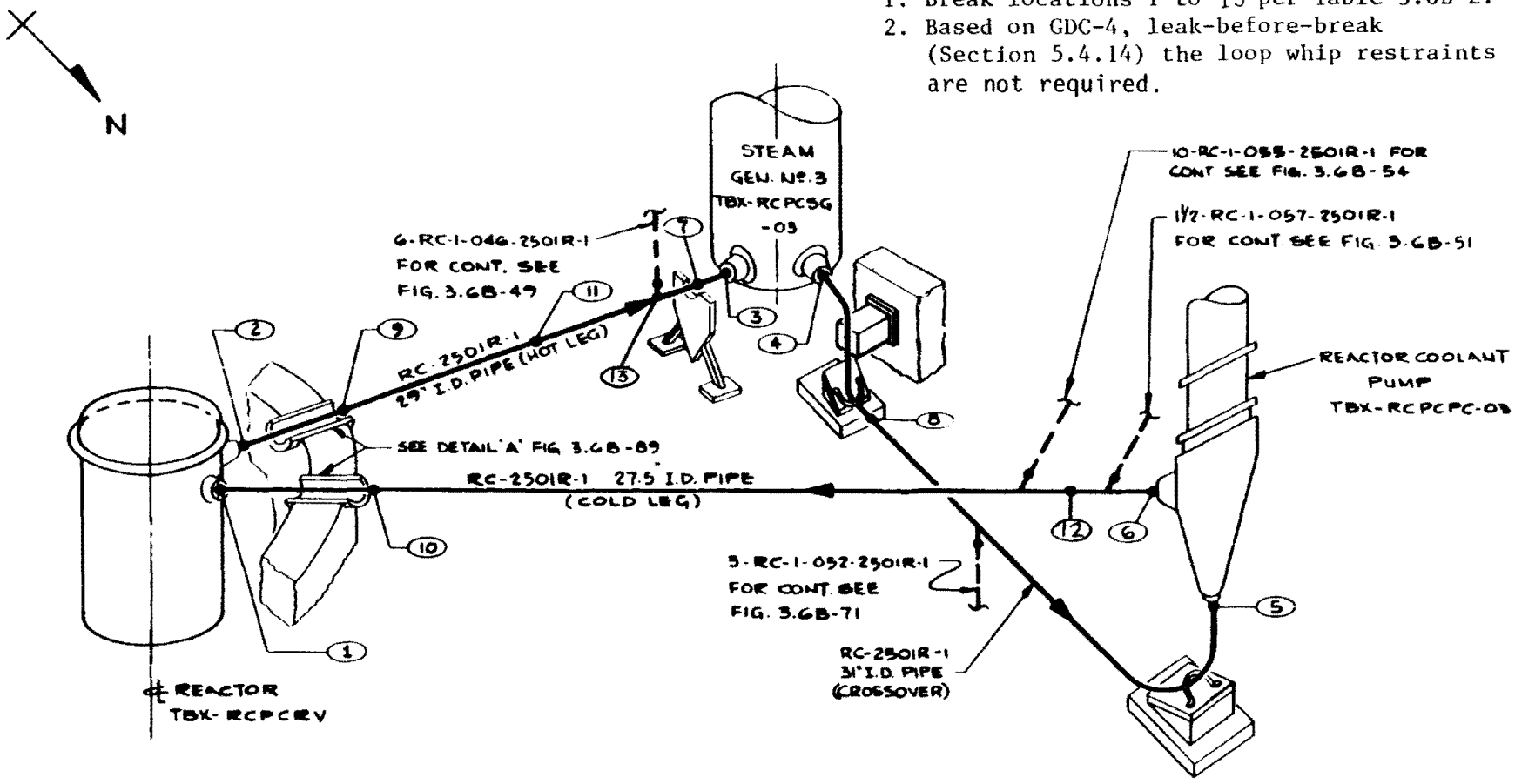
COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

REACTOR COOLANT LOOP #2
STRESS NODE & BREAK POINT
AND RESTRAINT LOCATIONS

FIGURE 3.6B-90 (LOOP #2)

NOTES:

1. Break locations 1 to 13 per Table 3.6B-2.
2. Based on GDC-4, leak-before-break (Section 5.4.14) the loop whip restraints are not required.



LEGEND

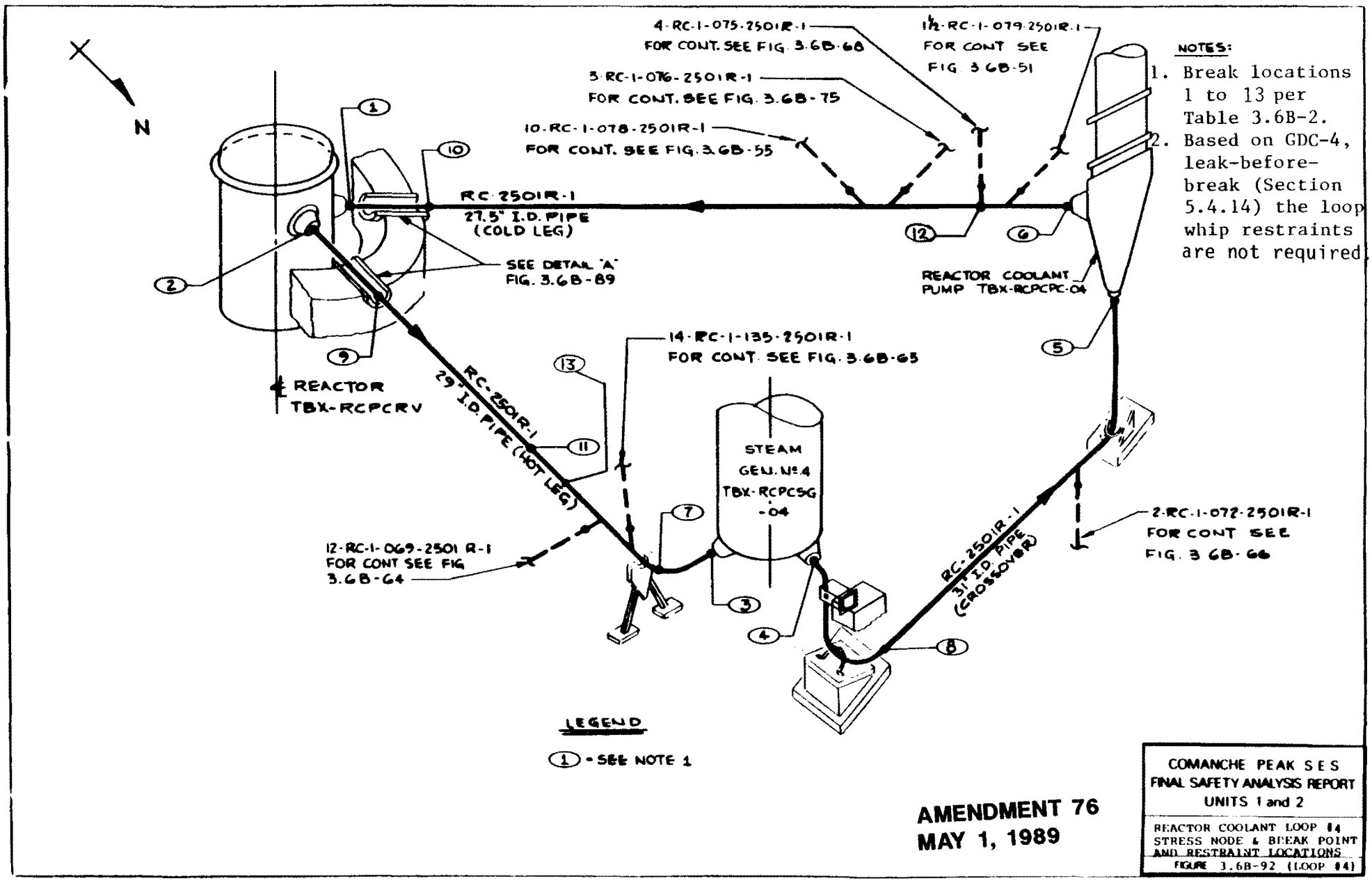
(1) = SEE NOTE 1

AMENDMENT 76
MAY 1, 1989

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

REACTOR COOLANT LOOP #3
STRESS NODE & BREAK POINT
AND RESTRAINT LOCATIONS

FIGURE 3.6B-91 (LOOP #3)



NOTES:

1. Break locations 1 to 13 per Table 3.6B-2.
2. Based on GDC-4, leak-before-break (Section 5.4.14) the loop whip restraints are not required.

AMENDMENT 76
MAY 1, 1989

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

REACTOR COOLANT LOOP #4
STRESS NODE & BREAK POINT
AND RESTRAINT LOCATIONS

FIGURE 3.6B-92 (LOOP #4)

Figure 3.6B-93-1

This figure has been deleted.

Figure 3.6B-93-2

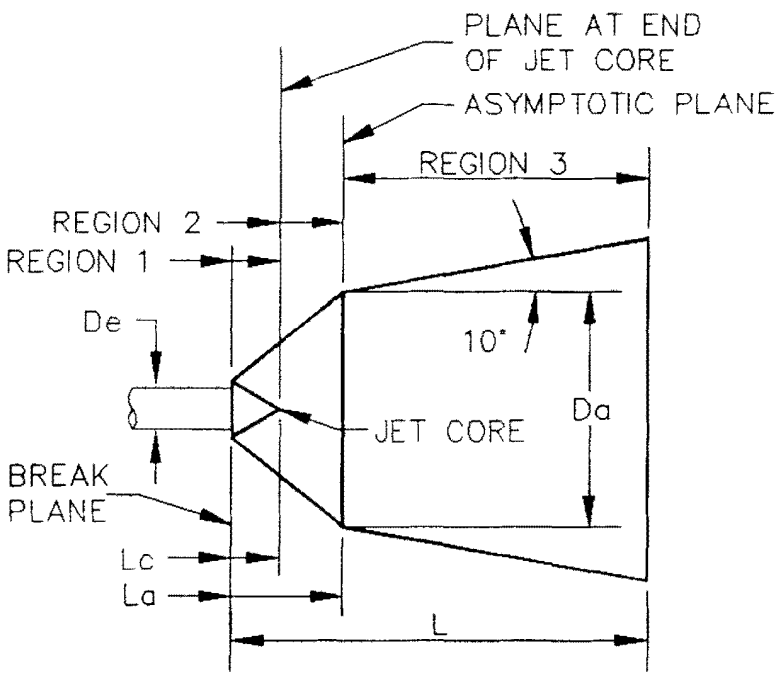
This figure has been deleted.

Figure 3.6B-94

This figure has been deleted.

Figure 3.6B-95

This figure has been deleted.

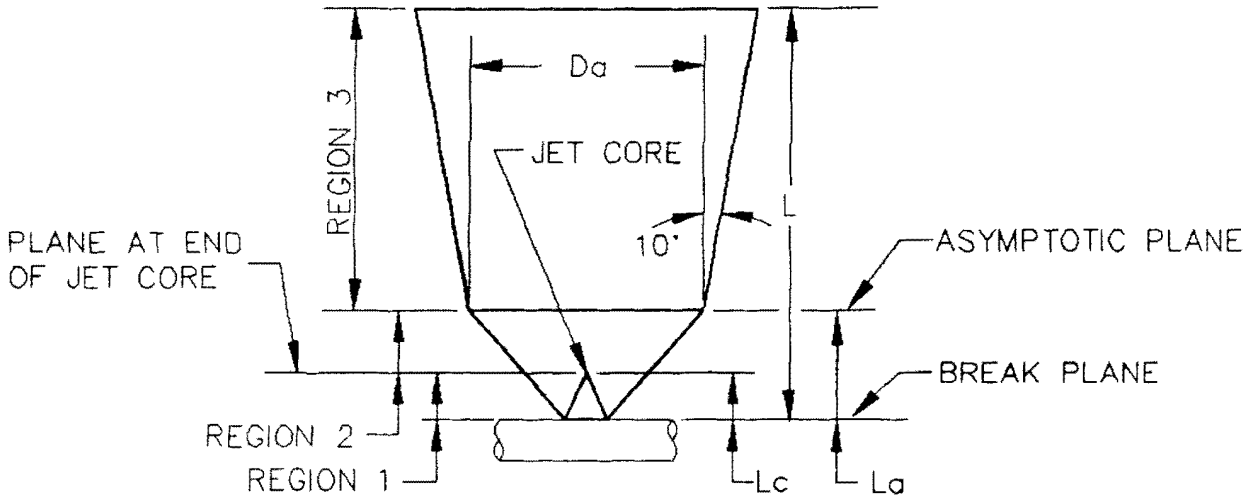


Amendment 71
May 27, 1988

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 & 2

CIRCUMFERENTIAL PIPE BREAK
WITH FULL SEPARATION
JET CONE

FIGURE 3.6B-96A

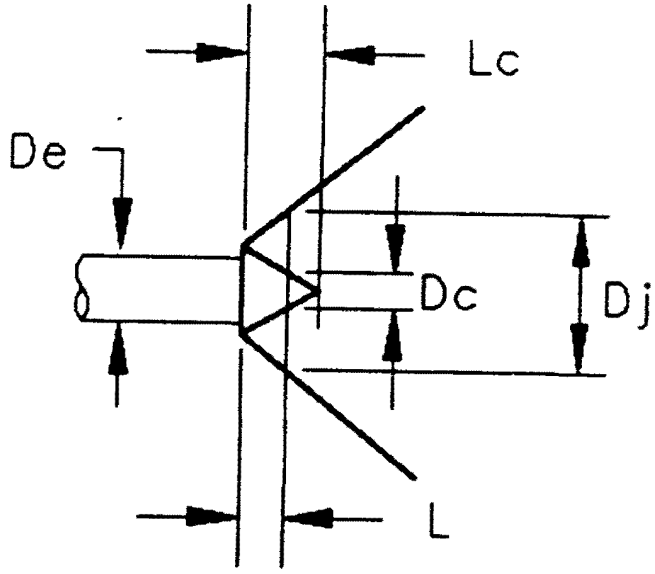


Amendment 71
May 27, 1988

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 & 2

LONGITUDINAL PIPE BREAK
JET CONE

FIGURE 3.6B-96B

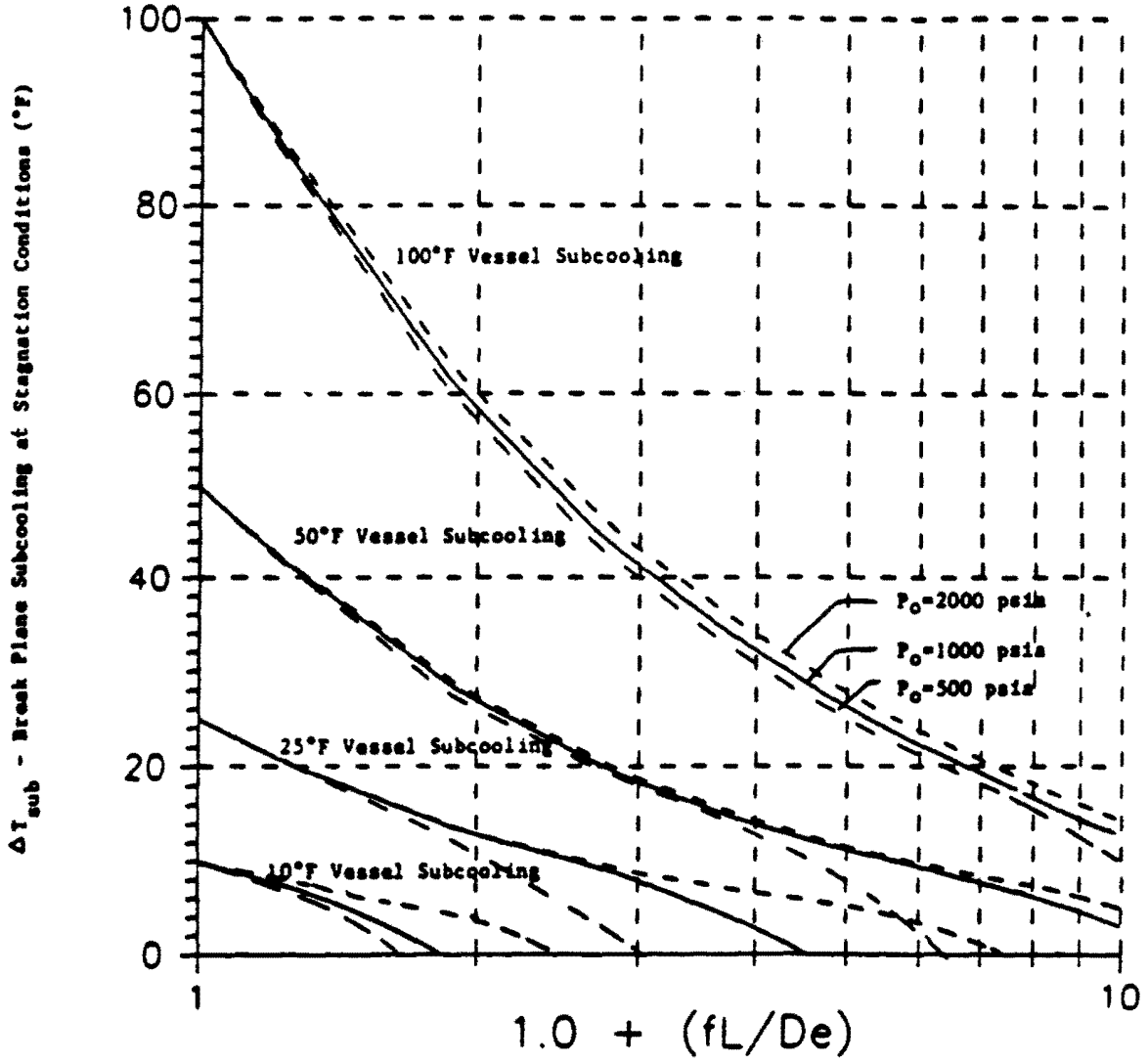


Amendment 71
May 27, 1988

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 & 2

JET CORE REGION GEOMETRY FOR
A CIRCUMFERENTIAL PIPE BREAK
WITH FULL SEPERATION

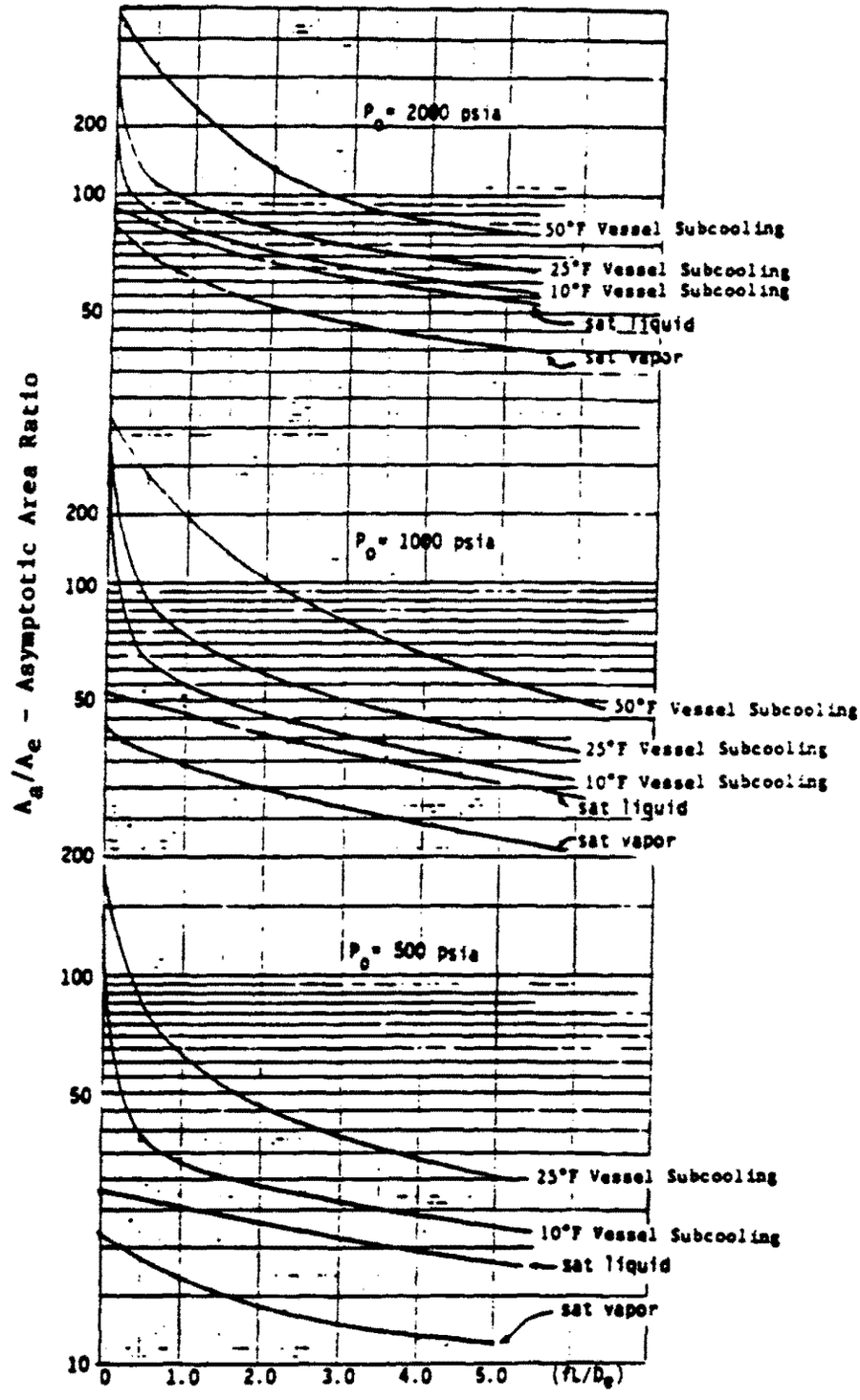
FIGURE 3.6B-96C



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

EFFECT OF IRREVERSIBLE LOSSES ON JET SUBCOOLING

FIGURE 3.6B-96D



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

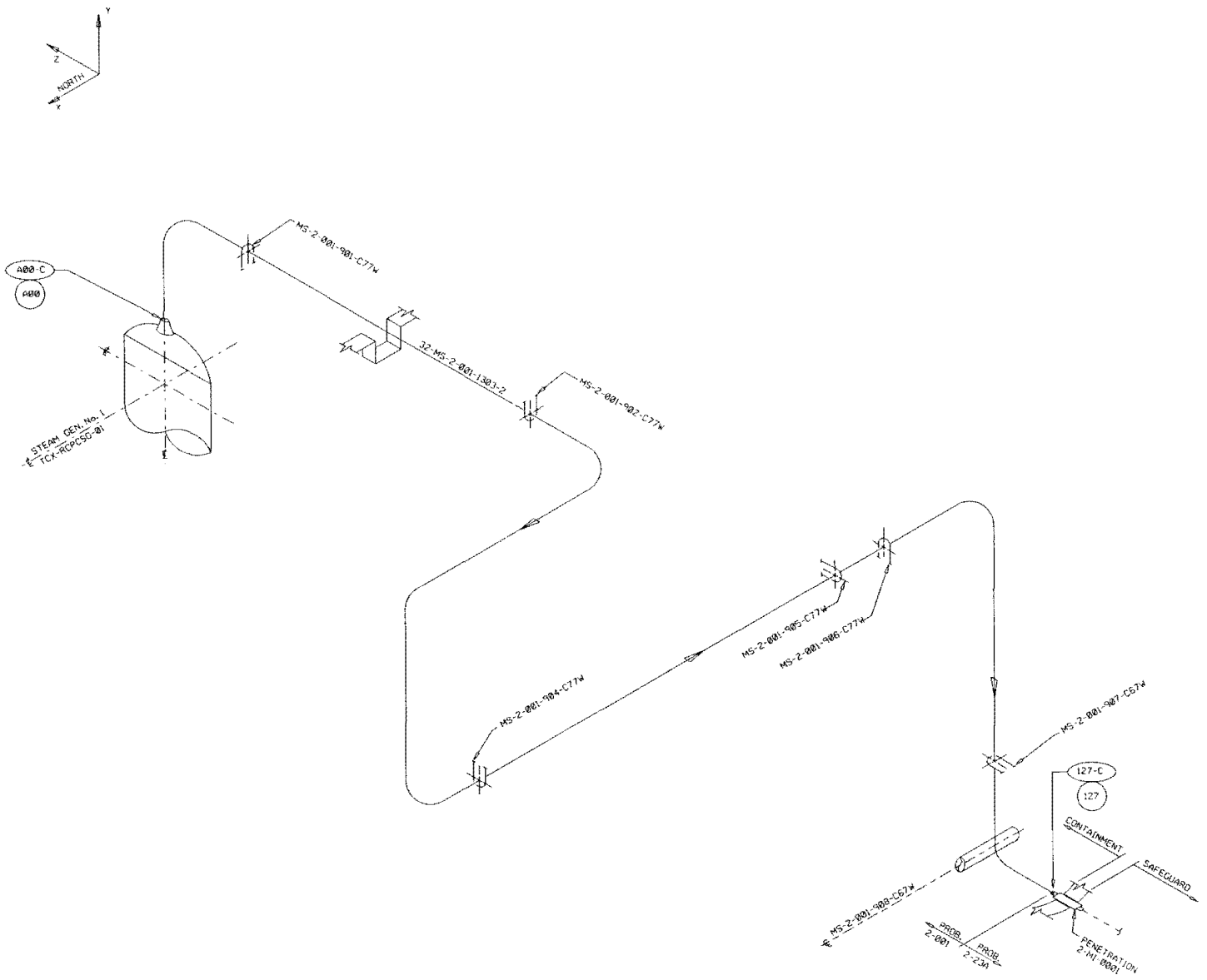
EFFECT OF IRREVERSIBLE LOSSES OF ASYMPTOTIC AREA RATIO

FIGURE 3.6B-96E

Figure 3.6B-97 thru 3.6B-99
(NOT USED)

Figure 3.6B-97 thru 3.6B-99
(NOT USED)

Figure 3.6B-97 thru 3.6B-99
(NOT USED)



AMENDMENT 86
AUGUST 31, 1992

LEGEND

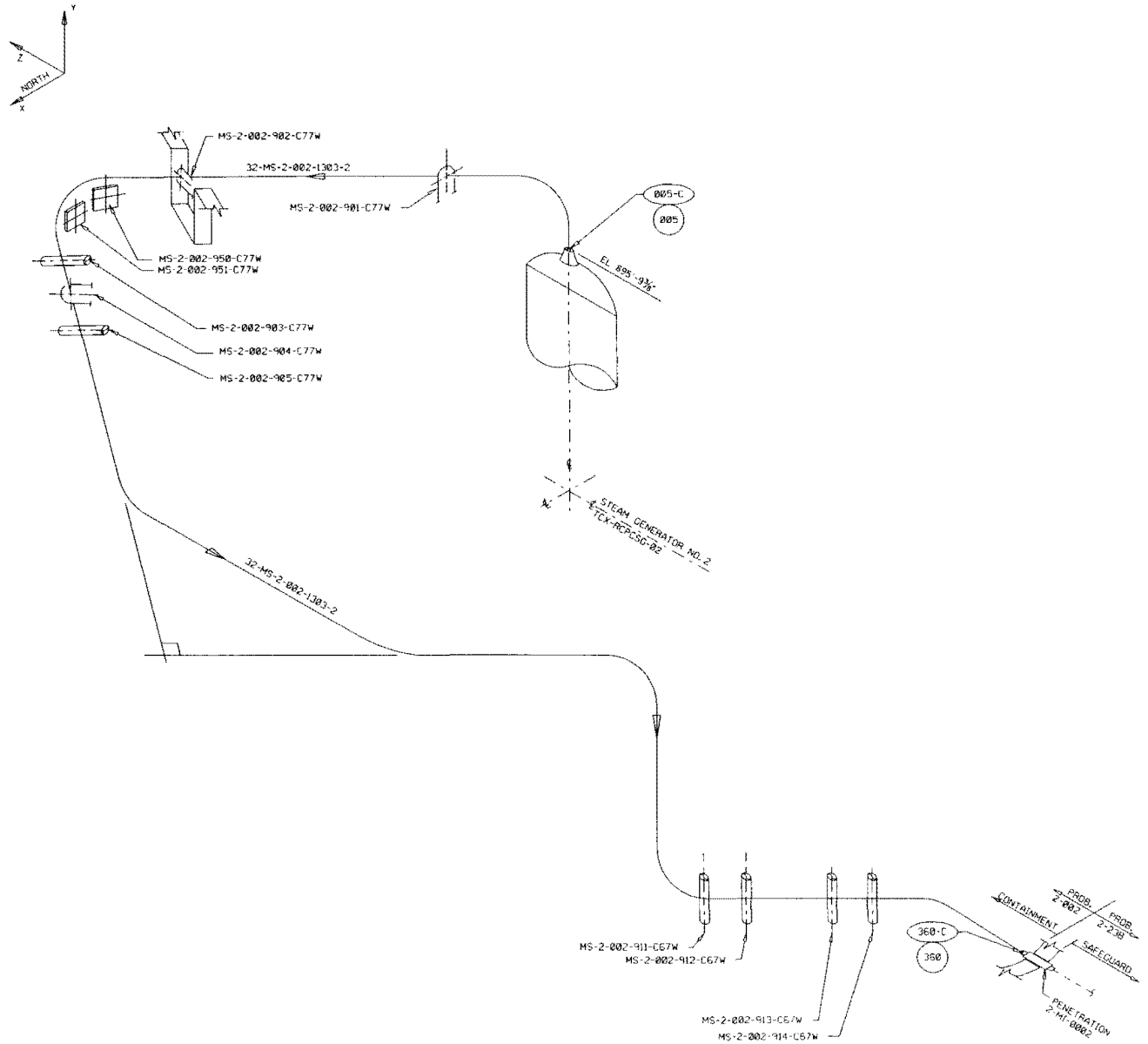
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

MAIN STEAM SYSTEM: LOOP 1
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-100 PROB 2-1

FIG100000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

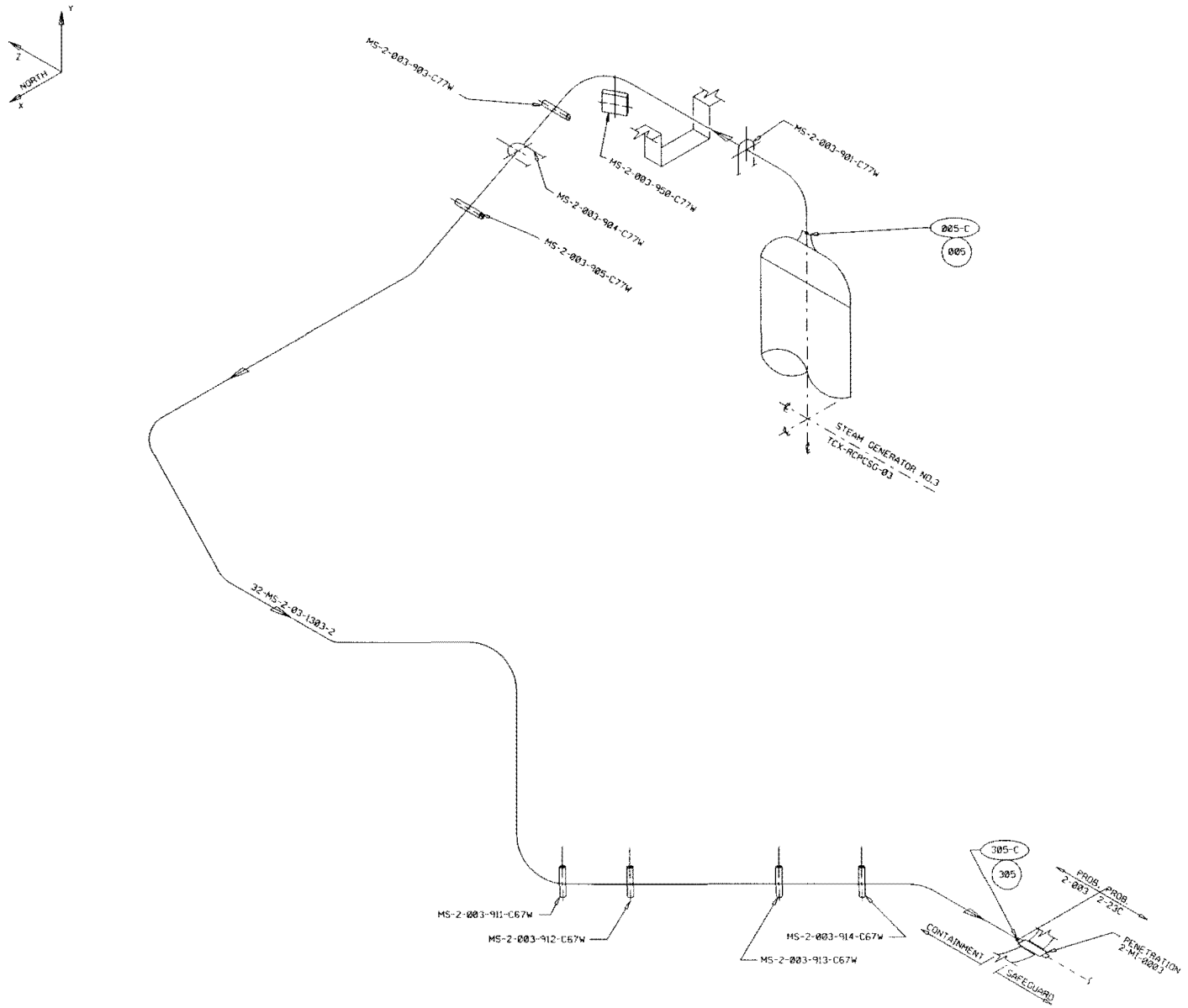
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

MAIN STEAM SYSTEM: LOOP 2
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-101 PROB 2-2

F:G101000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

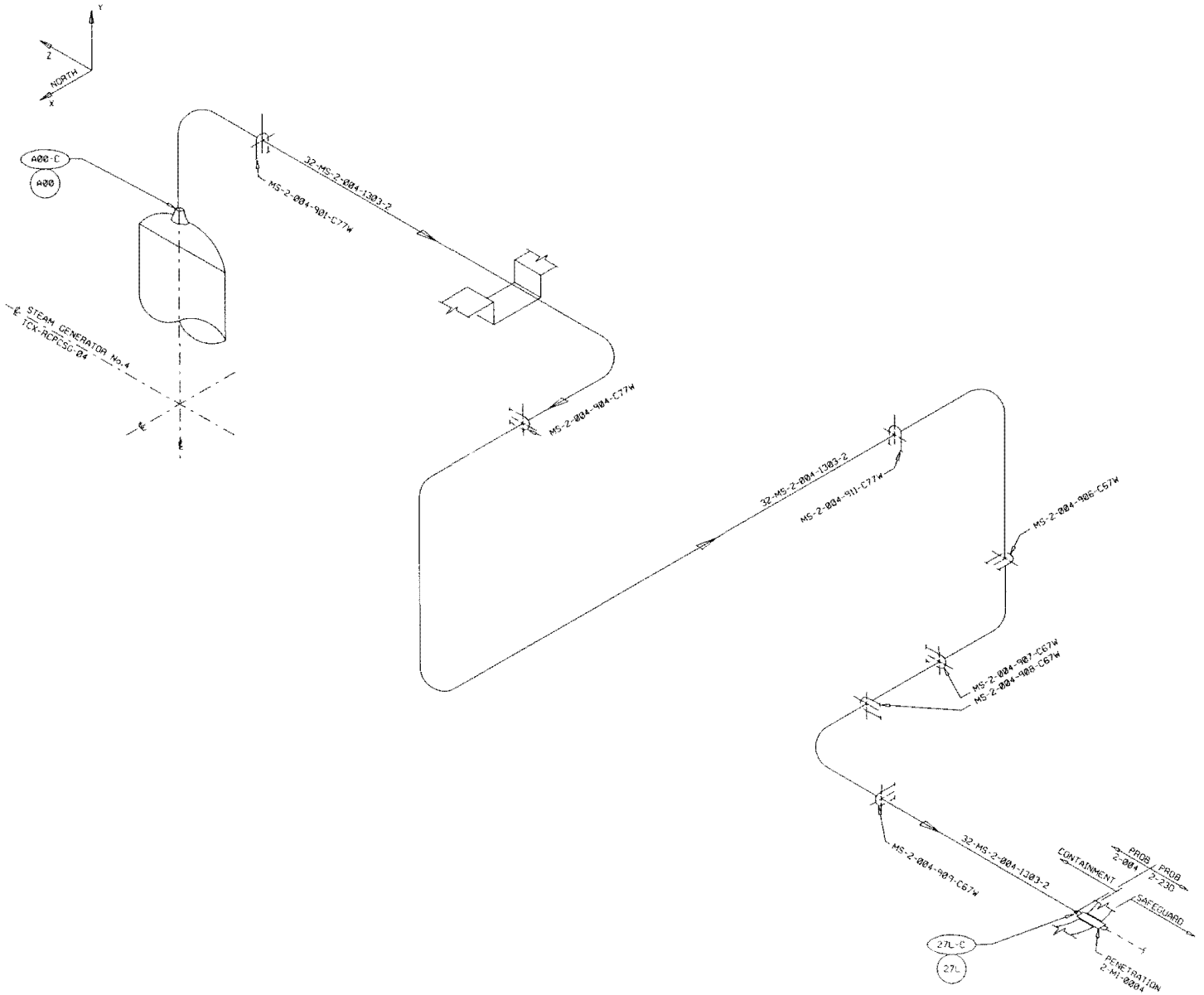
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

MAIN STEAM SYSTEM: LOOP 3
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-102 PROB 2-3

FIG102000.BLI



AMENDMENT 86
AUGUST 31, 1992

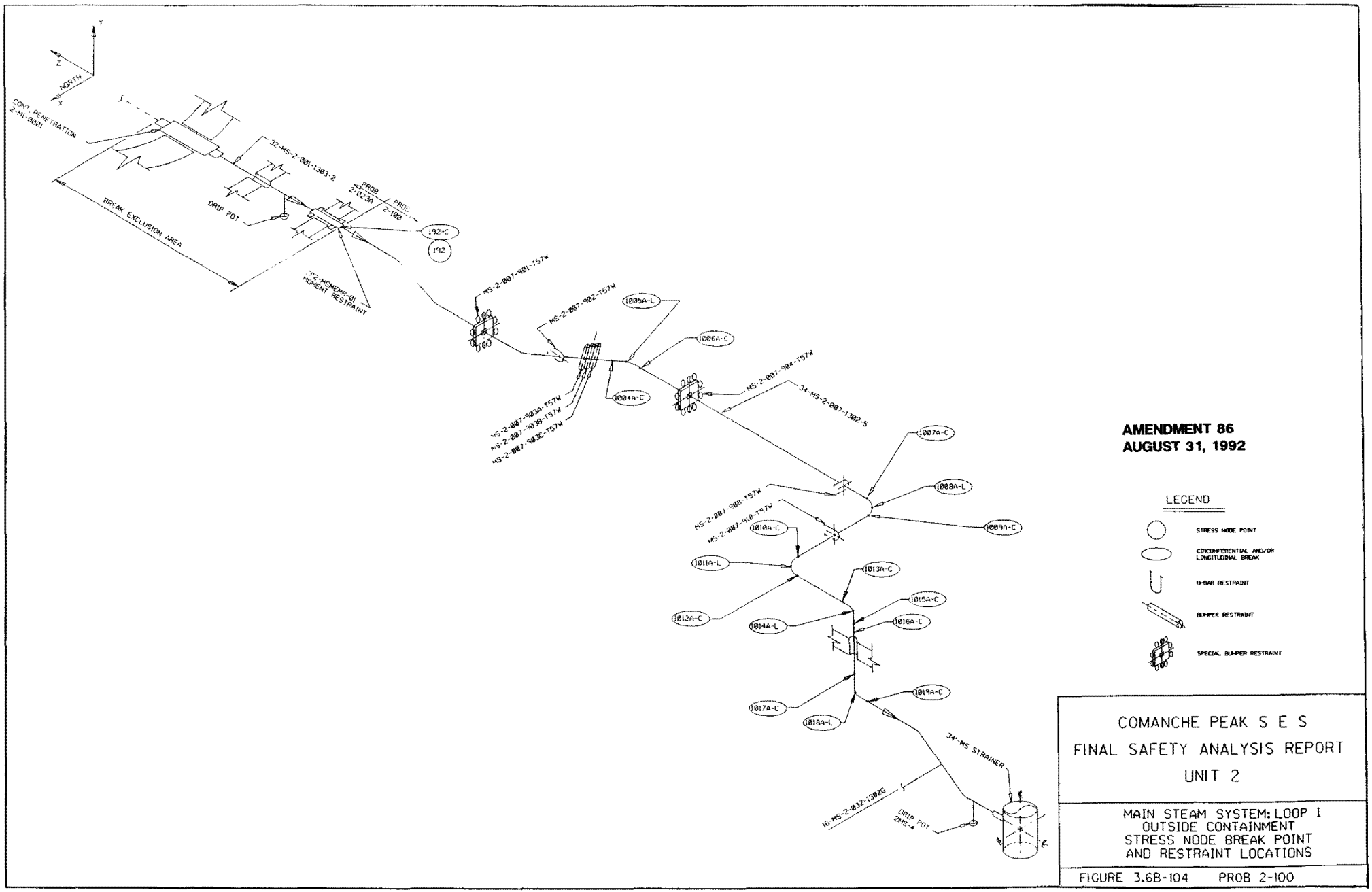
LEGEND

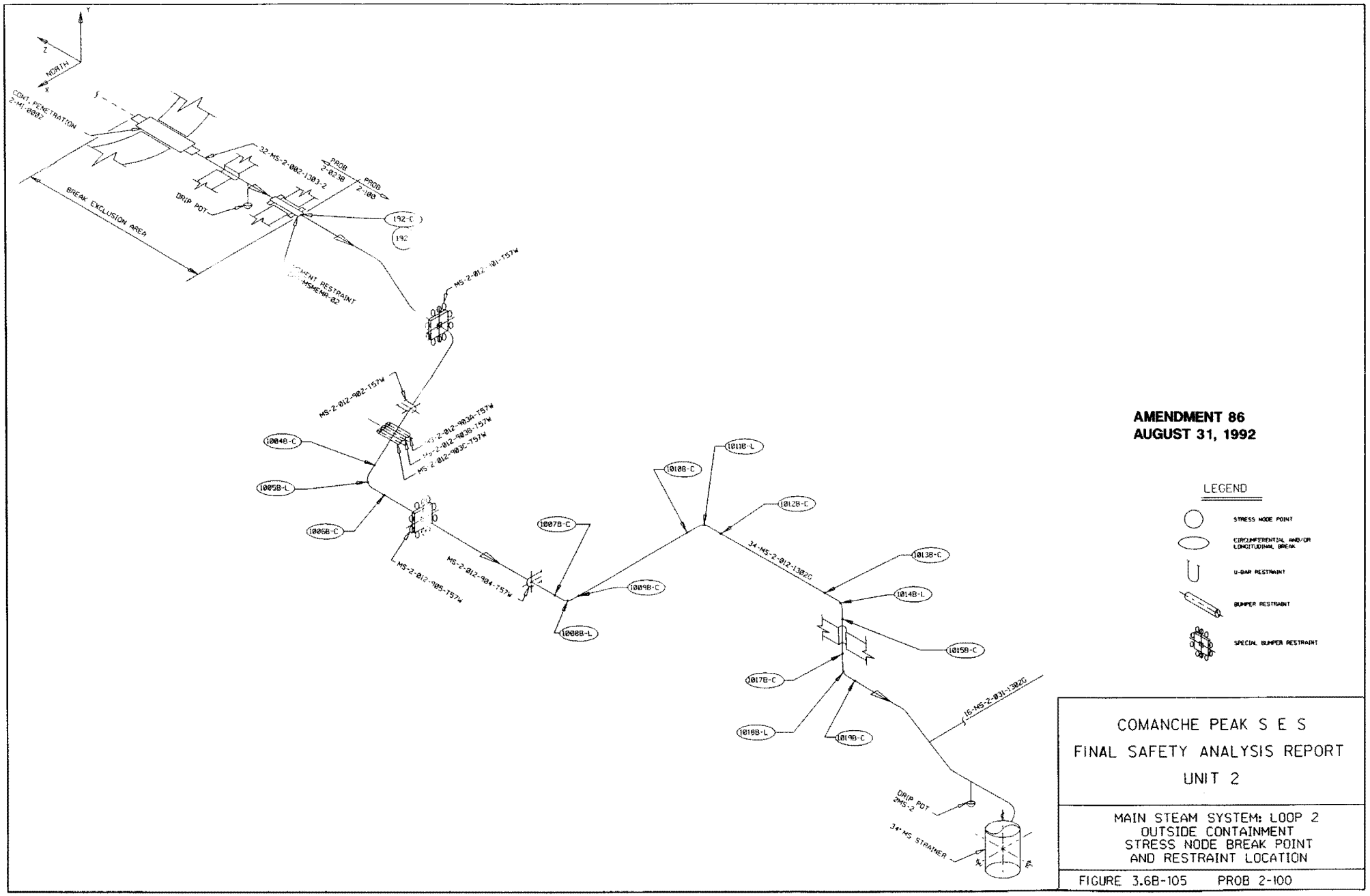
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

MAIN STEAM SYSTEM: LOOP 4
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-103 PROB 2-4


NORTH
CONT. PENETRATION 2-MS-0001
32-MS-2-001-1303-2
PROB 2-023A
PROB 2-100
192-C
192
DRIP POT
BREAK EXCLUSION AREA
P2-MSMCR1-01 MOMENT RESTRAINT
MS-2-007-901-T57W
MS-2-007-902-T57W
1005A-L
1006A-C
1004A-C
MS-2-007-903A-T57W
MS-2-007-903B-T57W
MS-2-007-903C-T57W
MS-2-007-904-T57W
34-MS-2-007-1302-5
1007A-C
1008A-L
1009A-C
MS-2-007-908-T57W
MS-2-007-910-T57W
1010A-C
1011A-L
1013A-C
1012A-C
1014A-L
1015A-C
1016A-C
1017A-C
1018A-L
1019A-C
34-MS STRAINER
16-MS-2-032-1302G
DRIP POT 2MS-4
AMENDMENT 86
AUGUST 31, 1992
LEGEND
STRESS NODE POINT
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
U-BAR RESTRAINT
BUMPER RESTRAINT
SPECIAL BUMPER RESTRAINT
COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2
MAIN STEAM SYSTEM: LOOP 1
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATIONS
FIGURE 3.6B-104 PROB 2-100

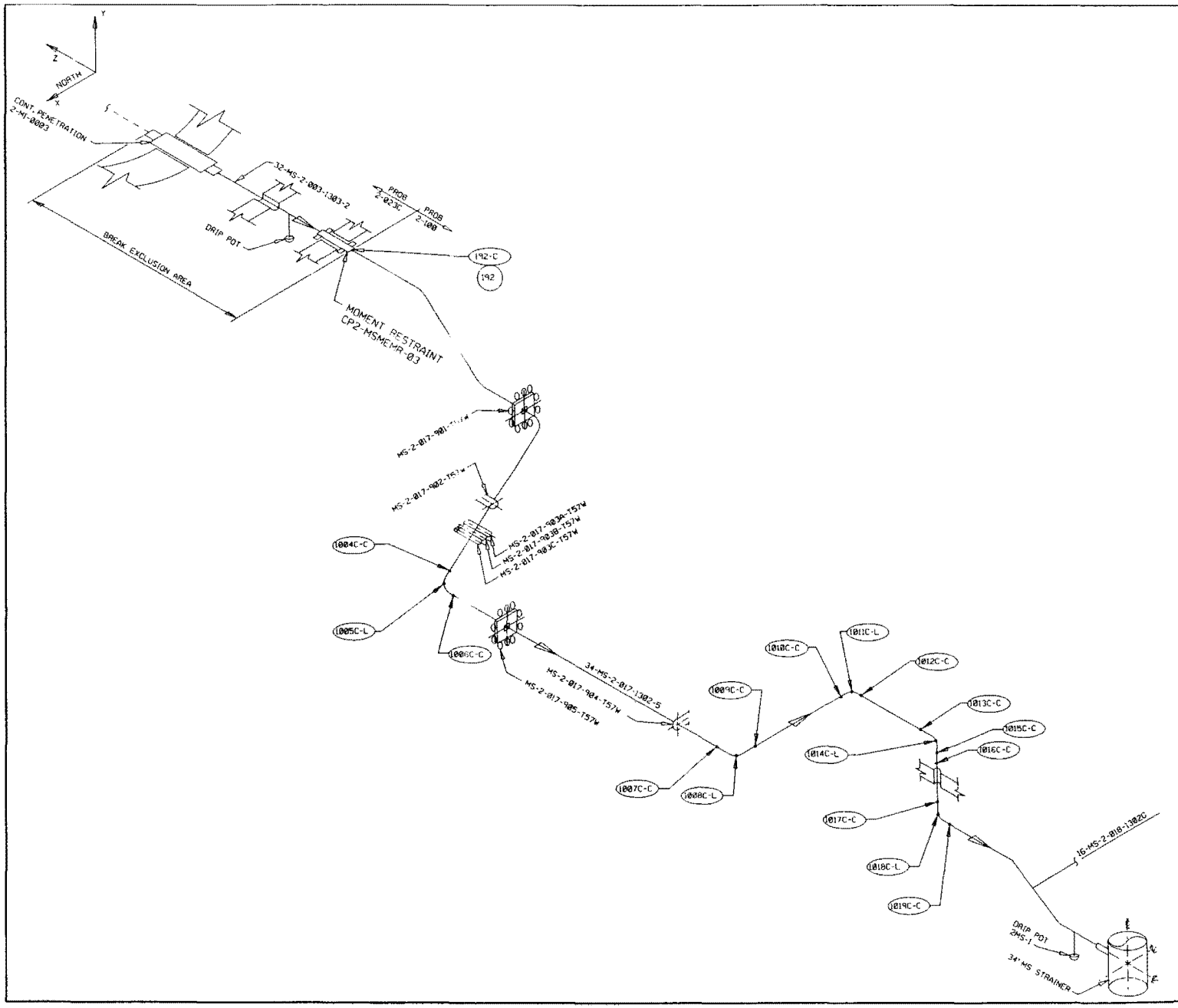


AMENDMENT 86
AUGUST 31, 1992

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

MAIN STEAM SYSTEM: LOOP 2
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-105 PROB 2-100



AMENDMENT 86
AUGUST 31, 1992

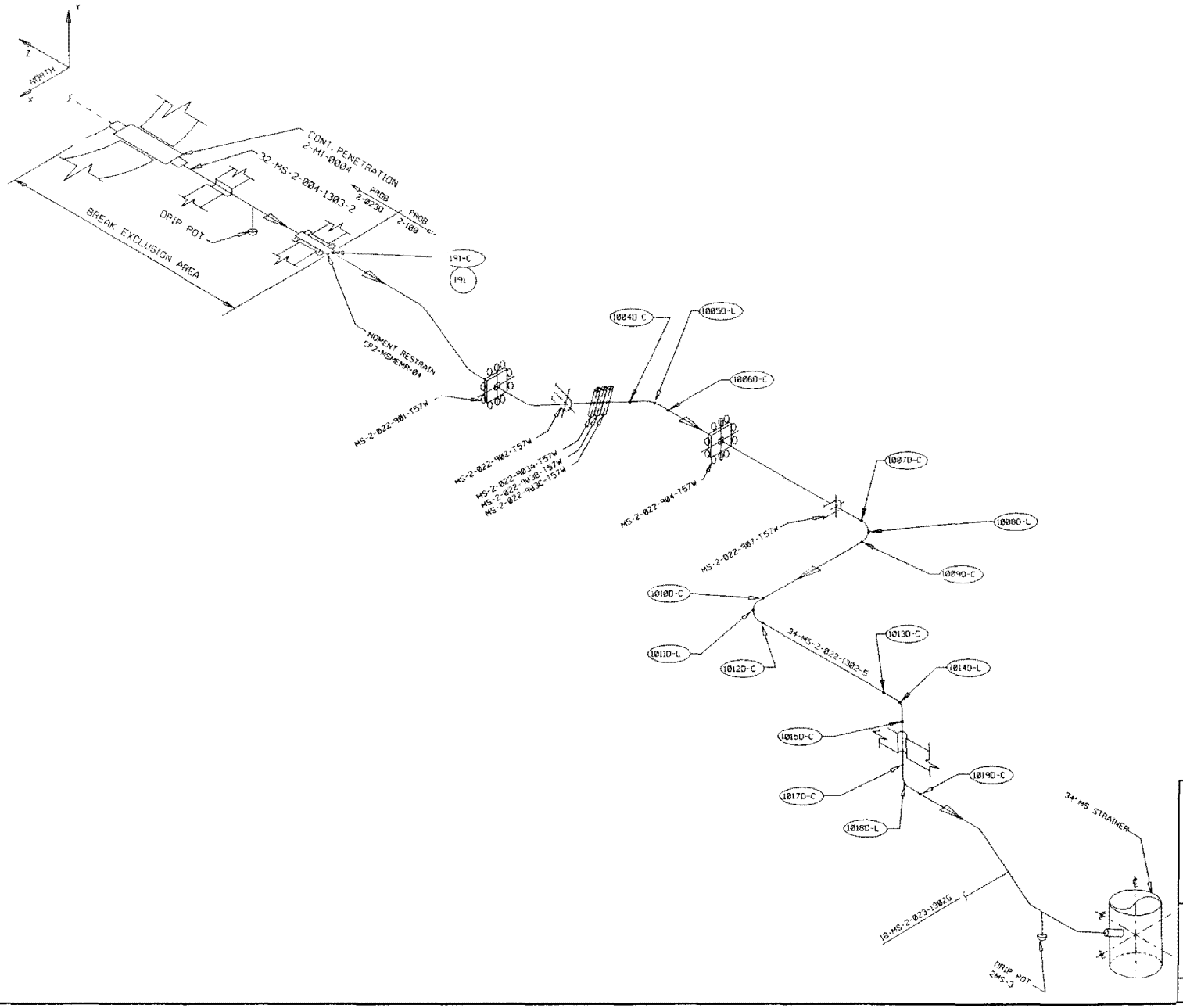
LEGEND

- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- SPECIAL BUMPER RESTRAINT

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

MAIN STEAM SYSTEM: LOOP 3
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-106 PROB 2-100



AMENDMENT 86
AUGUST 31, 1992

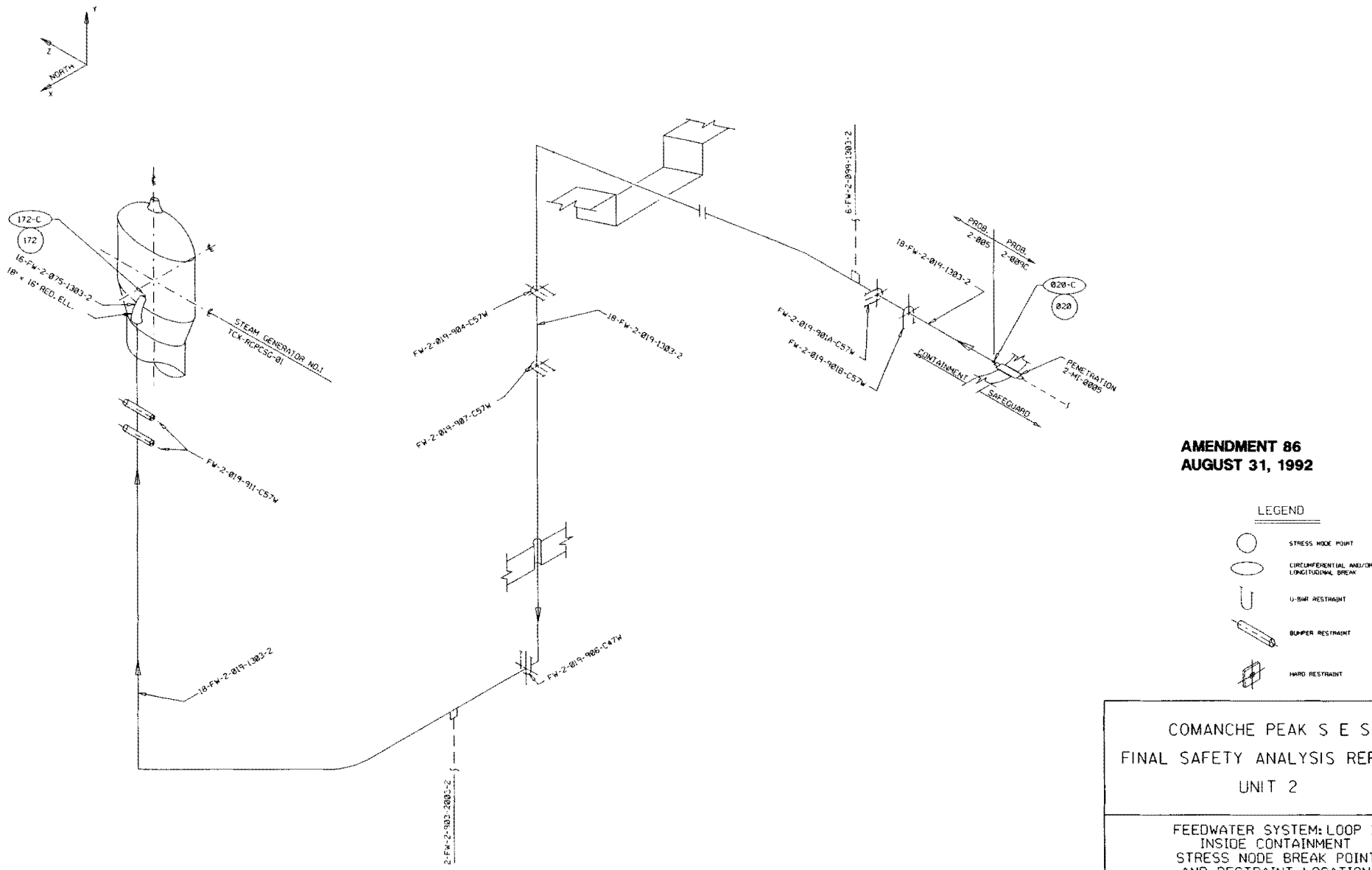
LEGEND

- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- SPECIAL BUMPER RESTRAINT

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

MAIN STEAM SYSTEM: LOOP 4
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-107 PROB 2-100



AMENDMENT 86
AUGUST 31, 1992

LEGEND

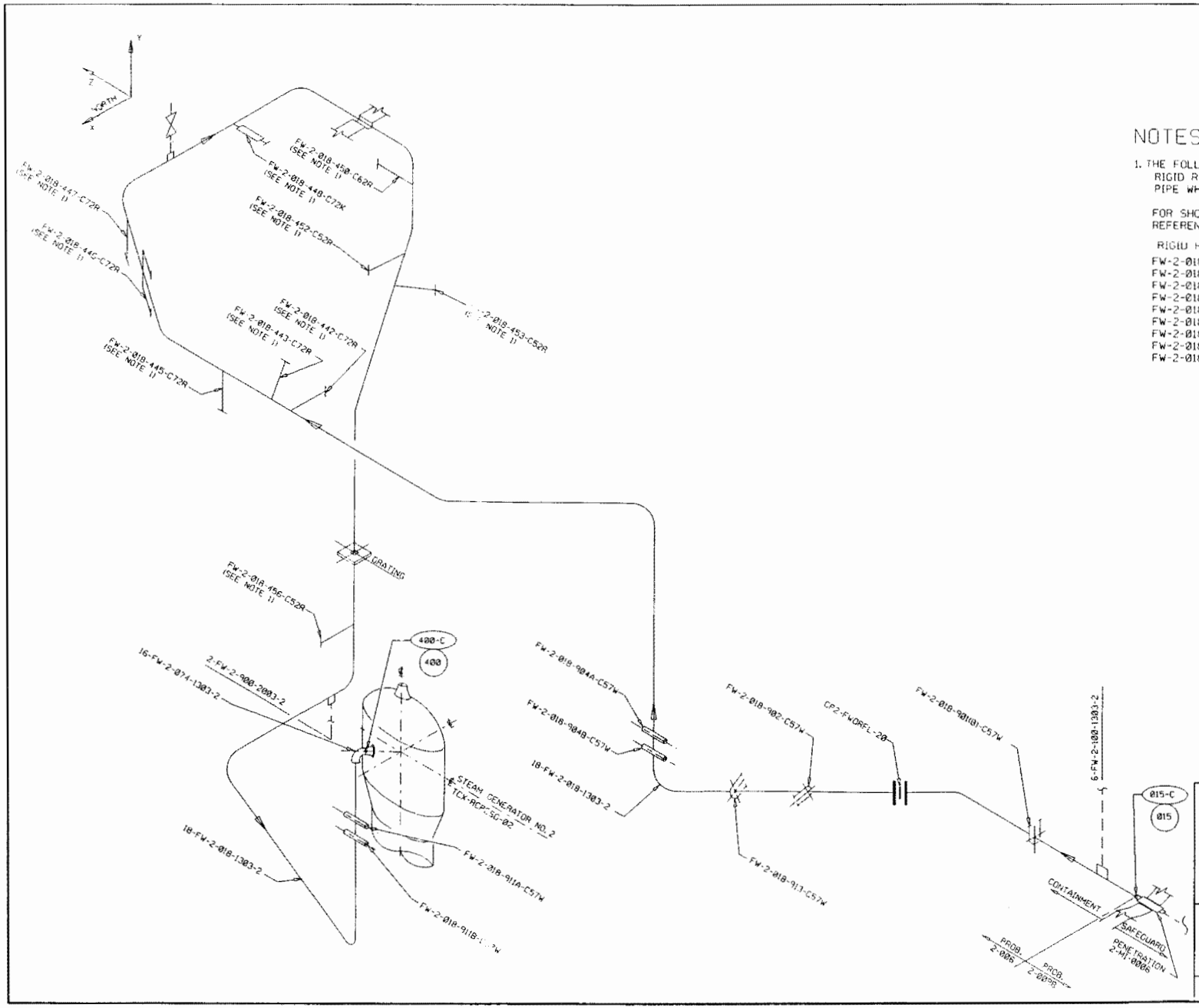
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

FEEDWATER SYSTEM: LOOP 1
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-108 PROB 2-5

FIG108000.BLT



NOTES

1. THE FOLLOWING LIST OF SHOCK SUPPRESSORS AND RIGID RESTRAINTS HAVE BEEN ACTIVATED AS PIPE WHIP RESTRAINTS.

   FOR SHOCK SUPPRESSOR AND RIGID RESTRAINT LOCATIONS REFERENCE DRAWING.

RIGID RESTRAINTS	SHOCK SUPPRESSORS
FW-2-018-442-C72R	FW-2-018-448-C52K
FW-2-018-443-C72R	
FW-2-018-445-C72R	
FW-2-018-446-C72R	
FW-2-018-447-C72R	
FW-2-018-450-C62R	
FW-2-018-452-C52R	
FW-2-018-453-C52R	
FW-2-018-456-C52R	

AMENDMENT 86
AUGUST 31, 1992

LEGEND

- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT
- RIGID RESTRAINT
- MECHANICAL SHOCK SUPPRESSOR

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

FEEDWATER SYSTEM: LOOP 2
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

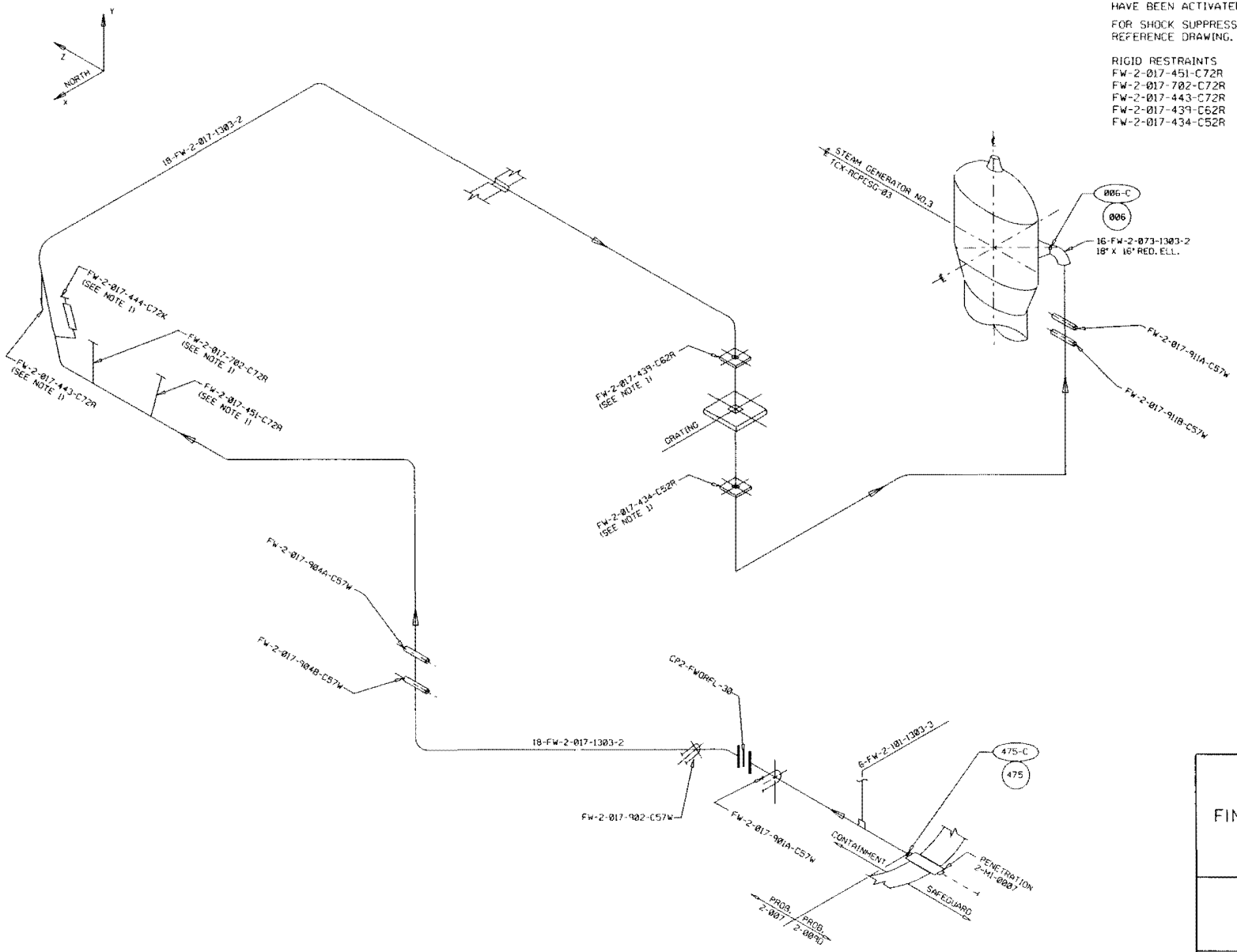
FIGURE 3.6B-109 PROB 2-6

NOTE

1. THE FOLLOWING LIST OF SHOCK SUPPRESSORS AND RIGID RESTRAINTS HAVE BEEN ACTIVATED AS PIPE WHIP RESTRAINTS.

   FOR SHOCK SUPPRESSOR AND RIGID RESTRAINT LOCATIONS REFERENCE DRAWING.

RIGID RESTRAINTS	SHOCK SUPPRESSORS
FW-2-017-451-C72R	FW-2-017-444-C72K
FW-2-017-702-C72R	
FW-2-017-443-C72R	
FW-2-017-439-C62R	
FW-2-017-434-C52R	



AMENDMENT 86
AUGUST 31, 1992

LEGEND

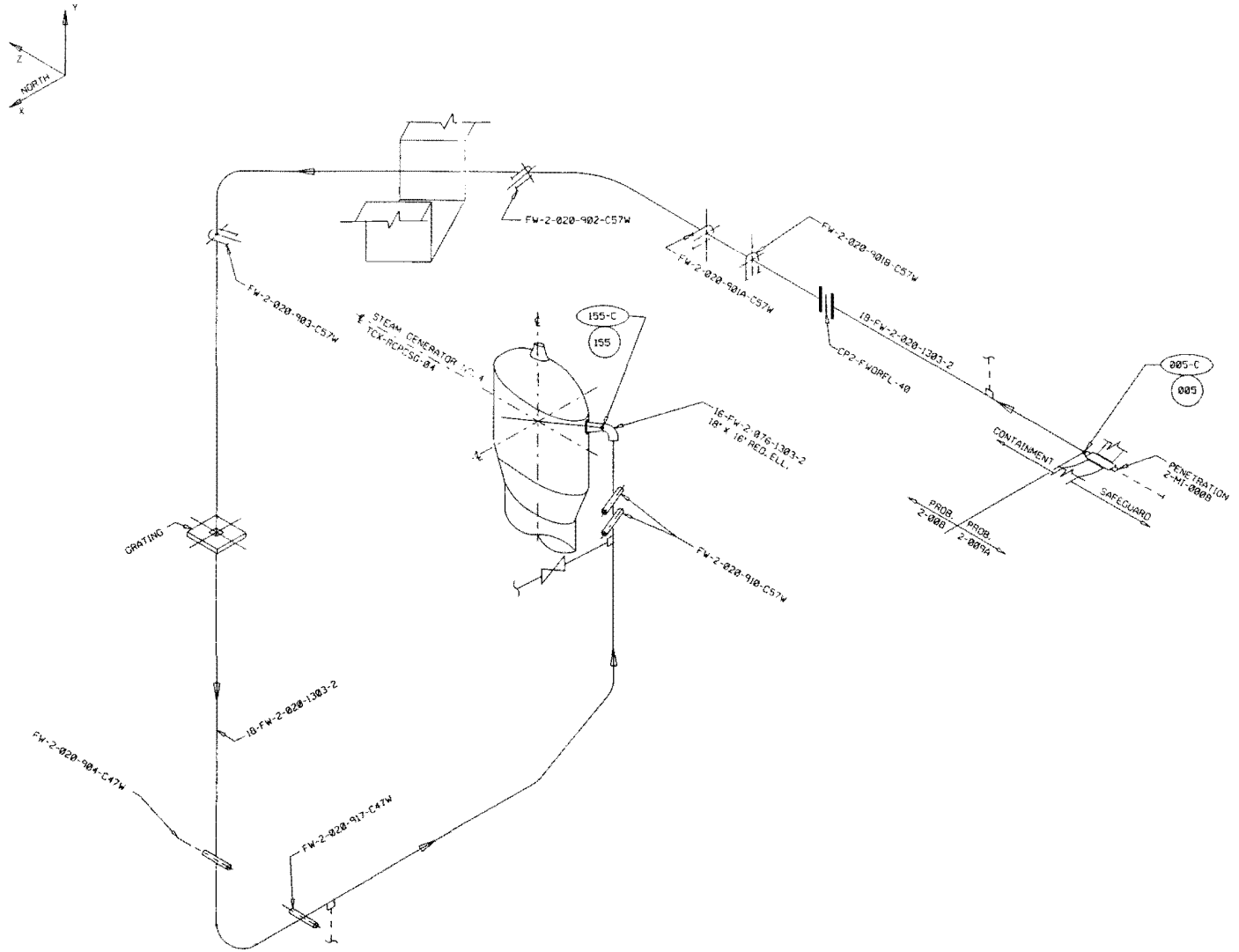
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT
- RIGID RESTRAINT
- MECHANICAL SHOCK SUPPRESSOR

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

FEEDWATER SYSTEM: LOOP 3
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-110 PROB 2-7

FIG110000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

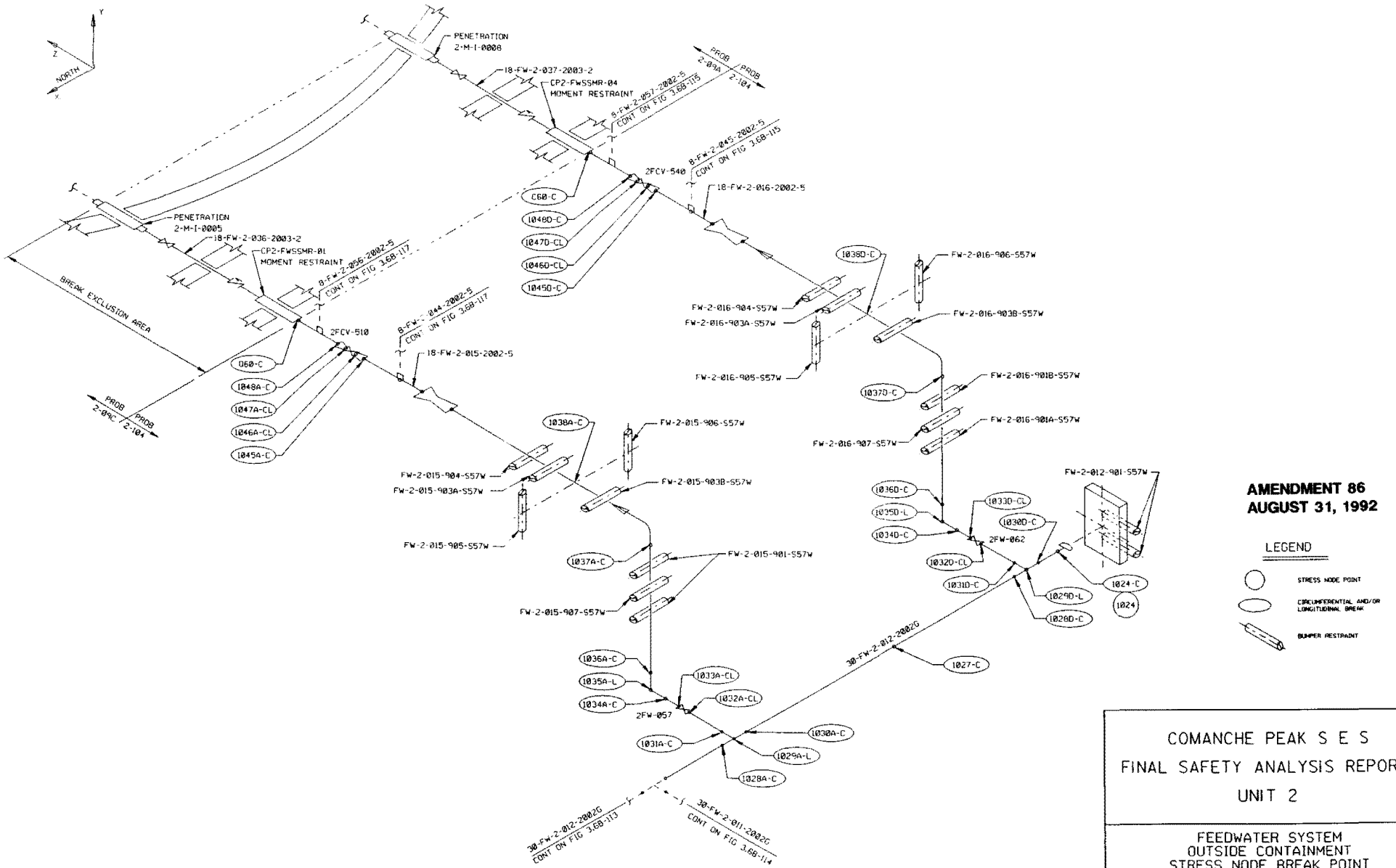
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

FEEDWATER SYSTEM: LOOP 4
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-111 PROB 2-8

F6111000.BLI



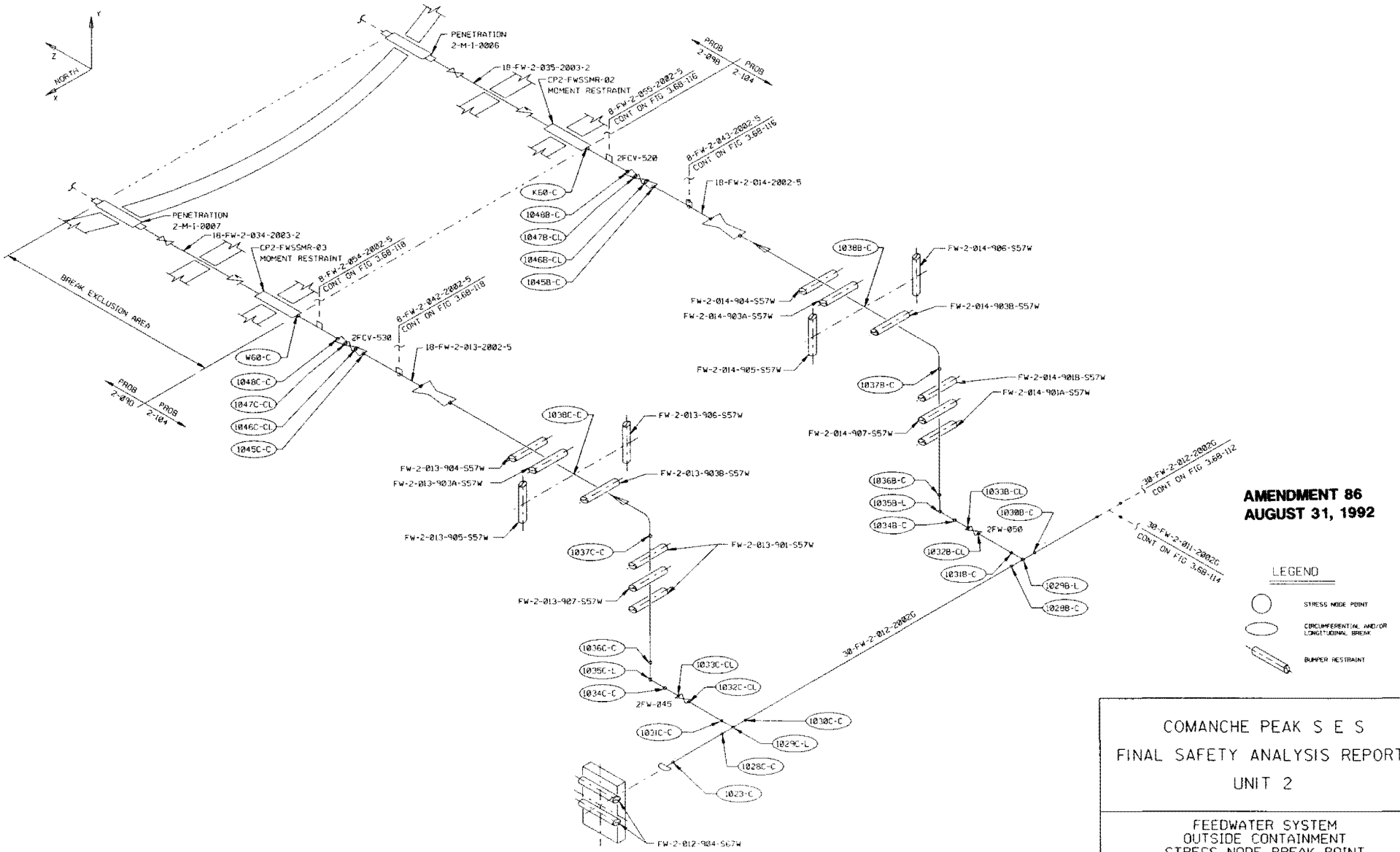
AMENDMENT 86
AUGUST 31, 1992

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

FEEDWATER SYSTEM
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-112 PROB 2-104 & 2-9A, 9C

FIG112000.BLI



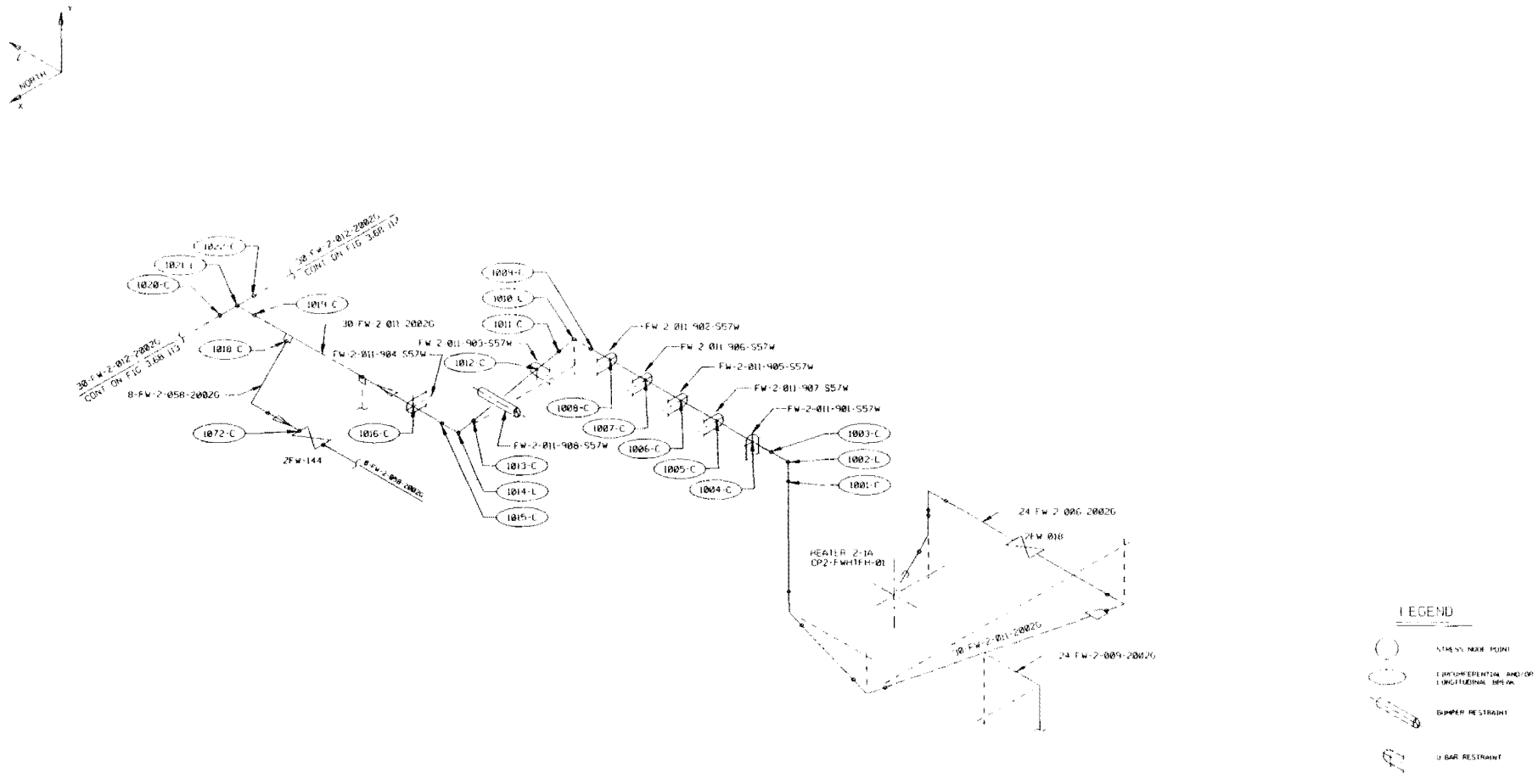
AMENDMENT 86
AUGUST 31, 1992

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

FEEDWATER SYSTEM
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-113 PROB 2-104 & 2-9B, 9D

FIG113000.BLT



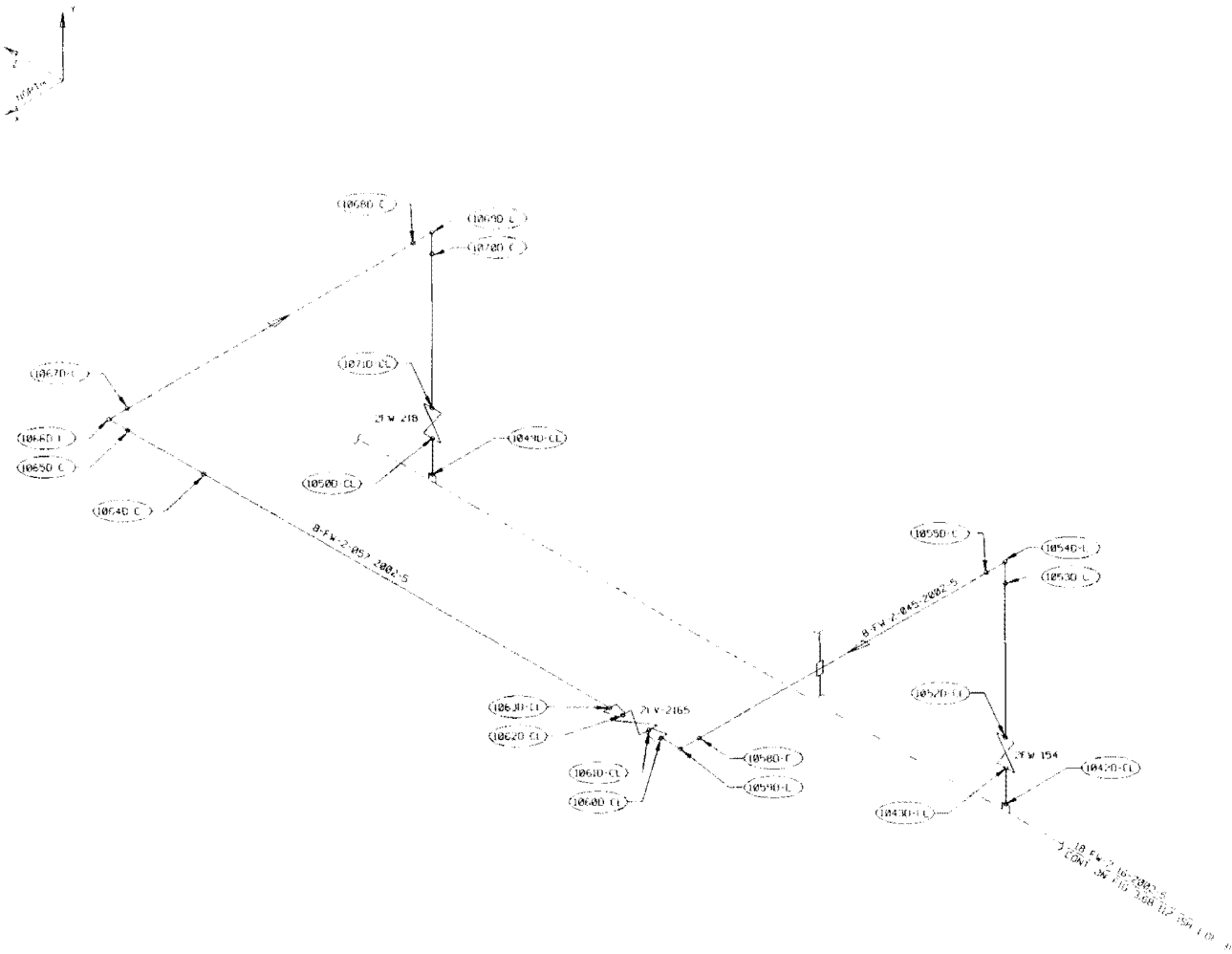
COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

FEEDWATER SYSTEM
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-114 PROB 2-104

AMENDMENT 87
DECEMBER 18, 1992

FIG114000.PLT



LEGEND

STRESS NODE POINT

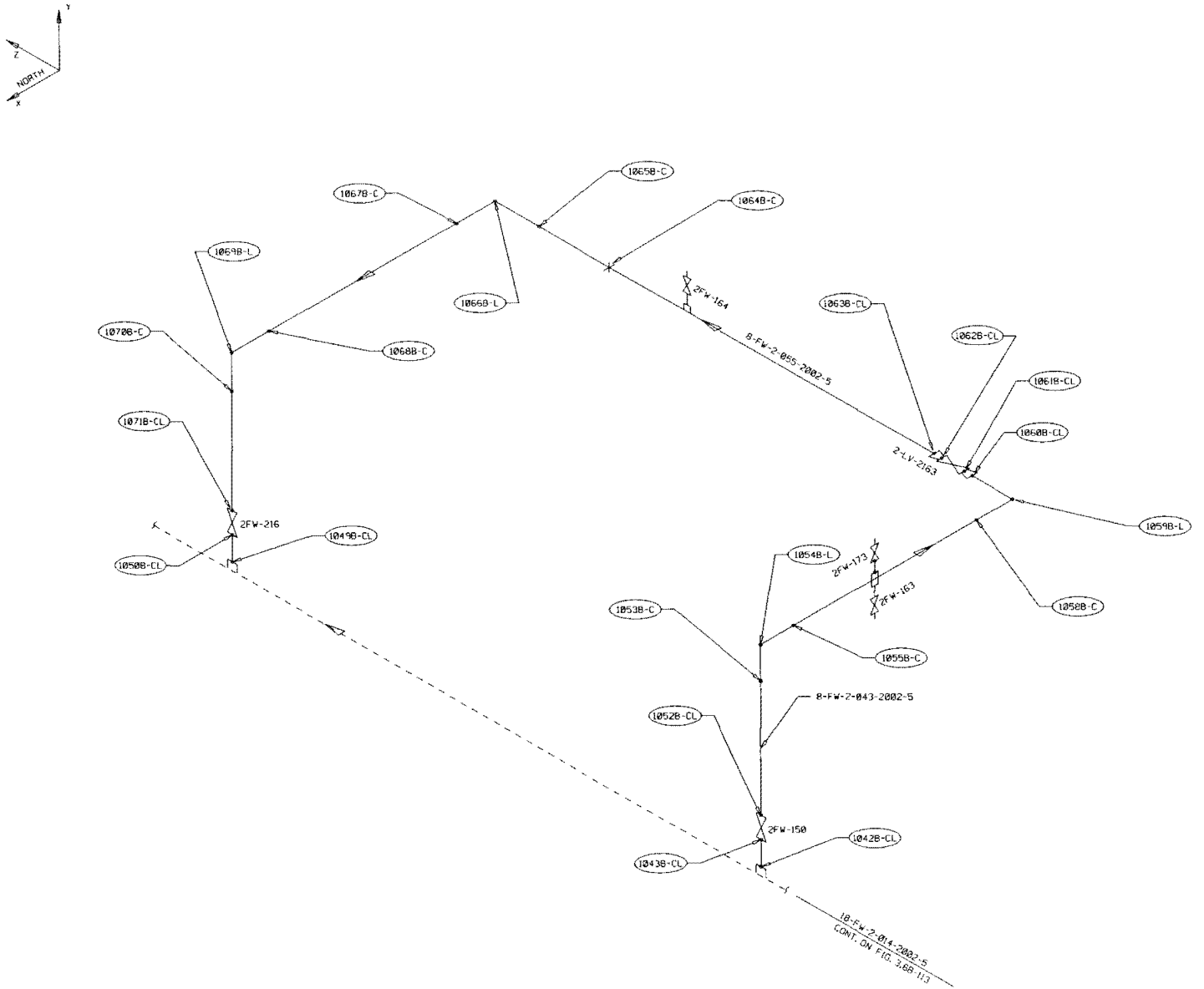
CIRCUMFERENTIAL AND/OR LONGITUDINAL WELD

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

FEEDWATER SYSTEM: FW BY-PASS
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-115 PROB 2-104

AMENDMENT 87
DECEMBER 18, 1992



AMENDMENT 86
AUGUST 31, 1992

LEGEND

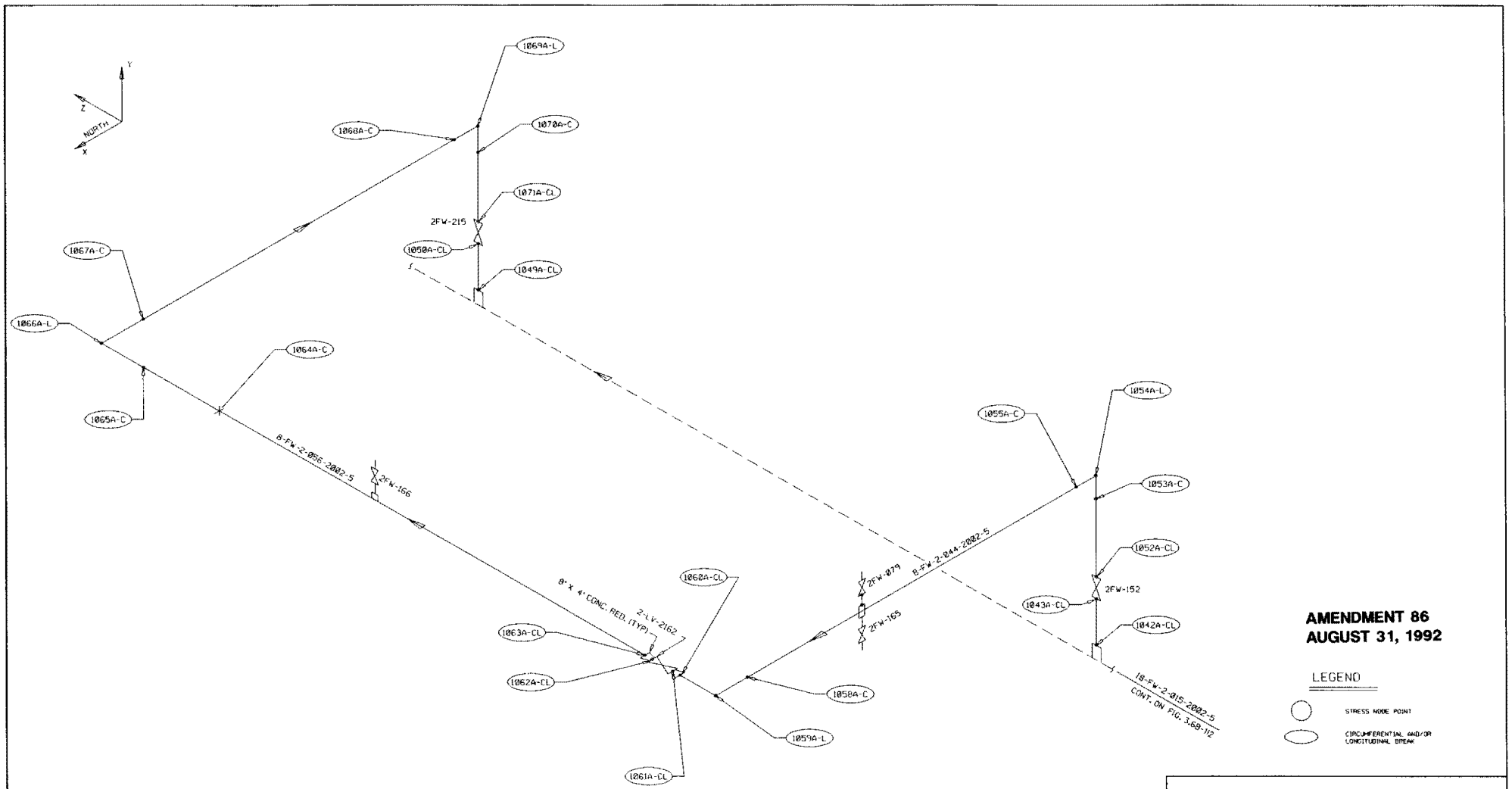
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT
- BUMPER RESTRAINT
- HARD RESTRAINT

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

FEEDWATER SYSTEM: F.W. BY-PASS
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-116 PROB 2-104

FIG116000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

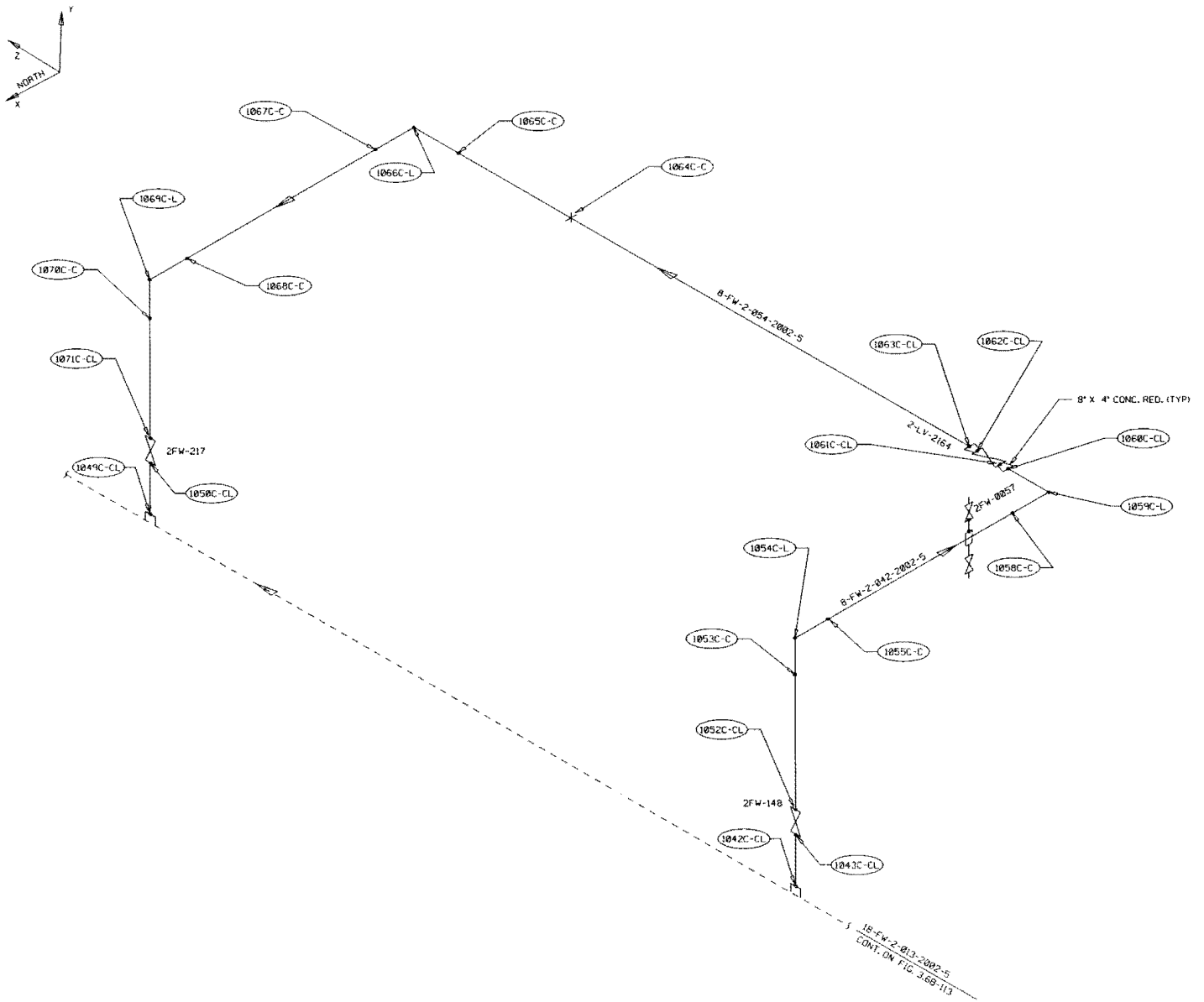
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

FEEDWATER SYSTEM: F.W. BY-PASS
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-117 PROB 2-104

FIG117000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

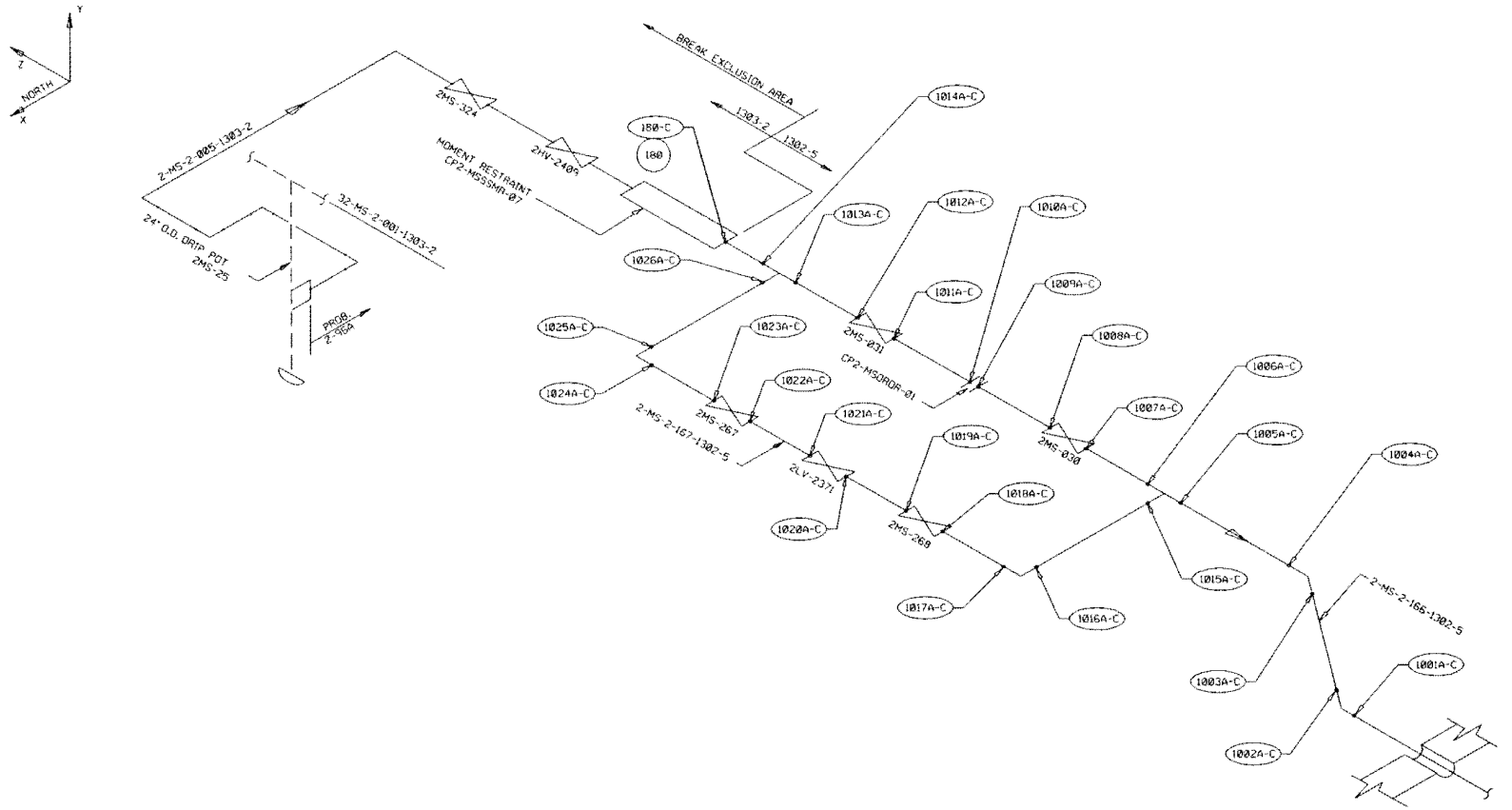
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

FEEDWATER SYSTEM: F.W. BY-PASS
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-118 PROB 2-104

FIG118000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S

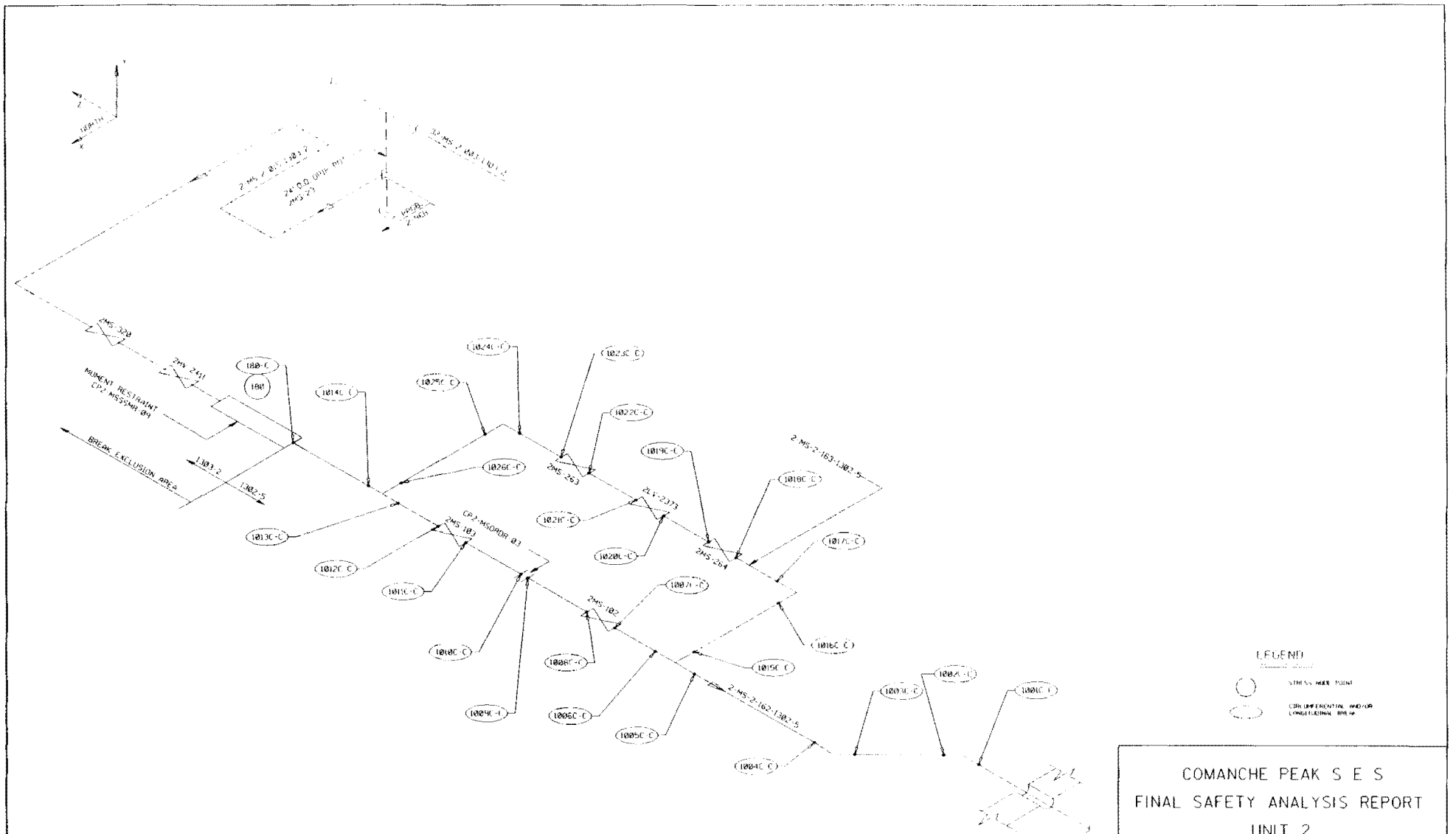
FINAL SAFETY ANALYSIS REPORT

UNIT 2

MAIN STEAM SYSTEM: M.S. BLOWDOWN
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCTION

FIGURE 3.6B-119 PROB 2-96A

FIG119000.BLI



COMANCHE PEAK S E S

FINAL SAFETY ANALYSIS REPORT

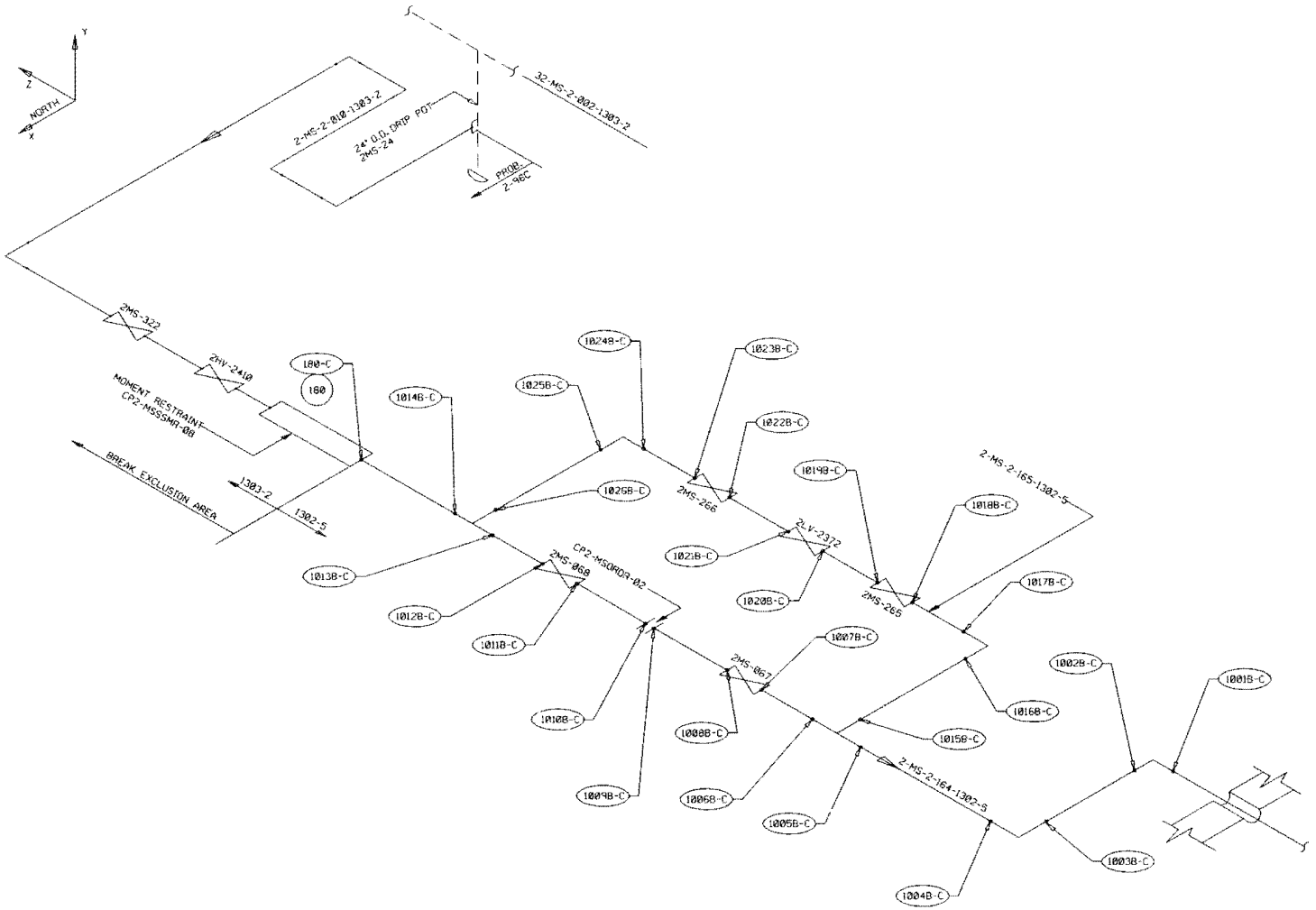
UNIT 2

MAIN STEAM SYSTEM: M.S. BLOWDOWN OUTSIDE CONTAINMENT STRESS NODE BREAK POINT AND RESTRAINT LOCATION

FIGURE 3.6B-120 PROB 2-96B

AMENDMENT 87
DECEMBER 18, 1992

FIG20000.BLT



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

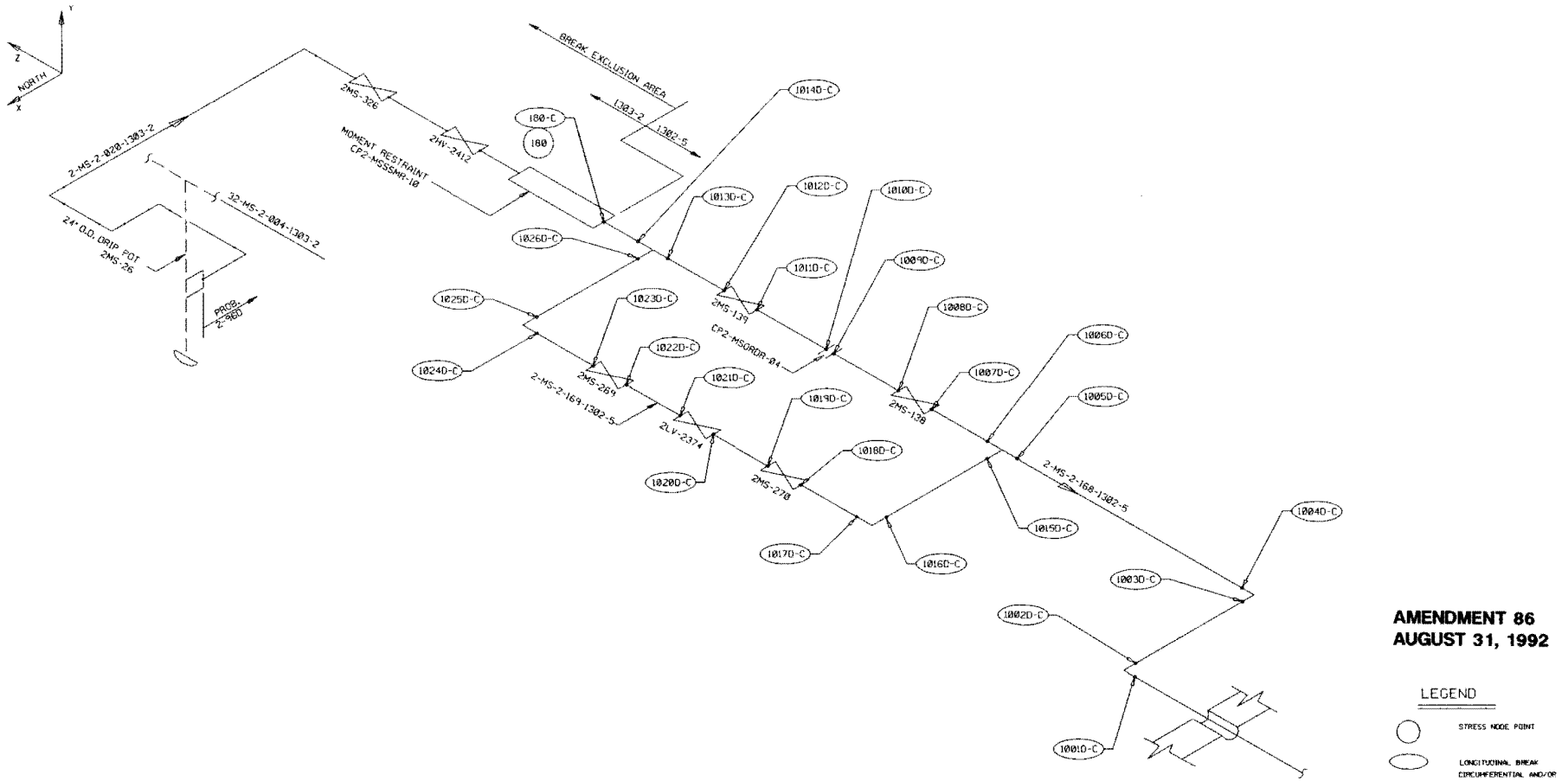
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

MAIN STEAM SYSTEM: M.S. BLOWDOWN
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-121 PROB 2-96C

FIG121000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

LONGITUDINAL BREAK
CIRCUMFERENTIAL AND/OR

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

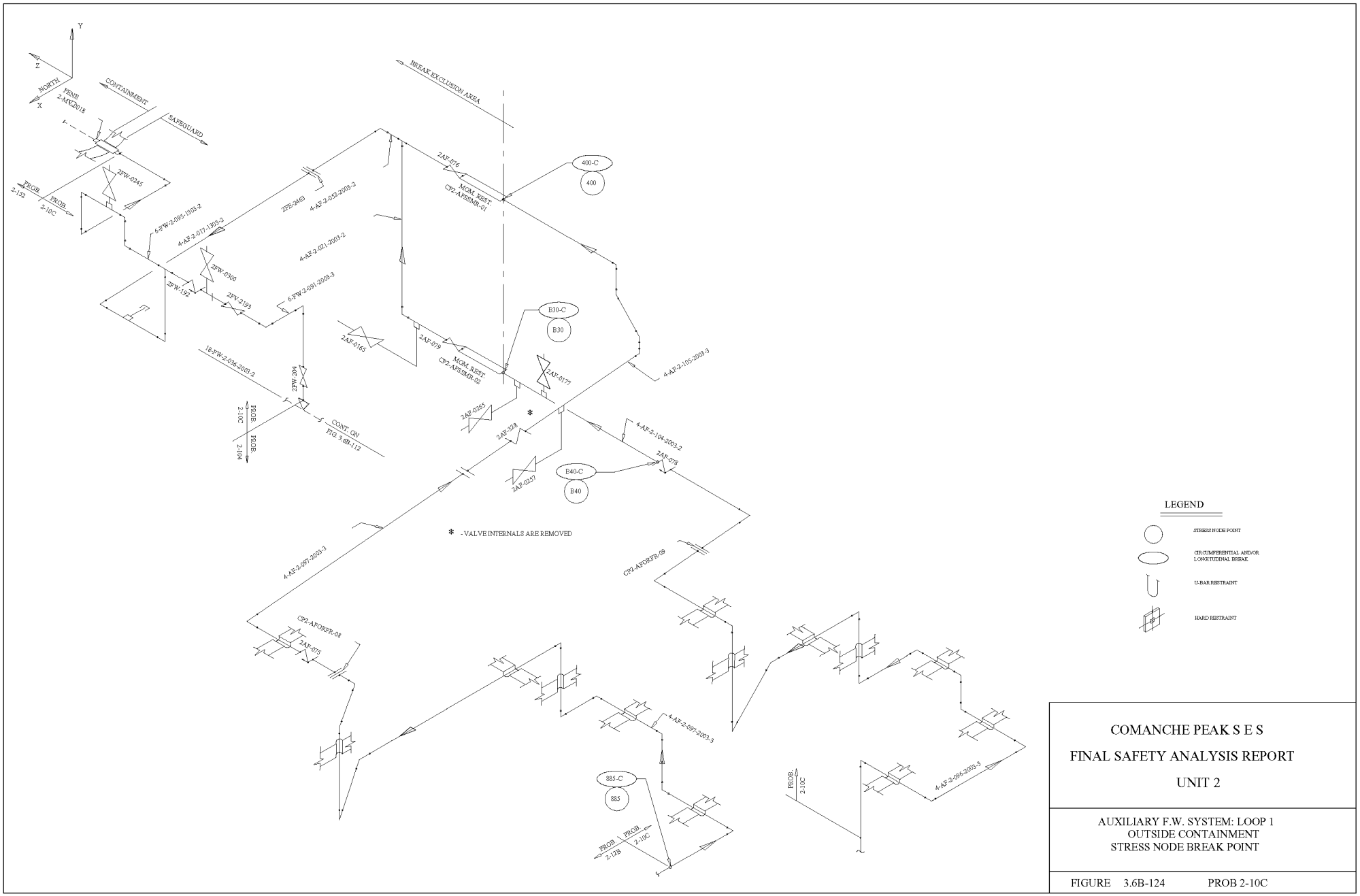
MAIN STEAM SYSTEM: M.S. BLOWDOWN
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-122 PROB 2-96D

FIG122000.BLI

Figure 3.6B-123
(NOT USED)

CPE



COMANCHE PEAK S E S

FINAL SAFETY ANALYSIS REPORT

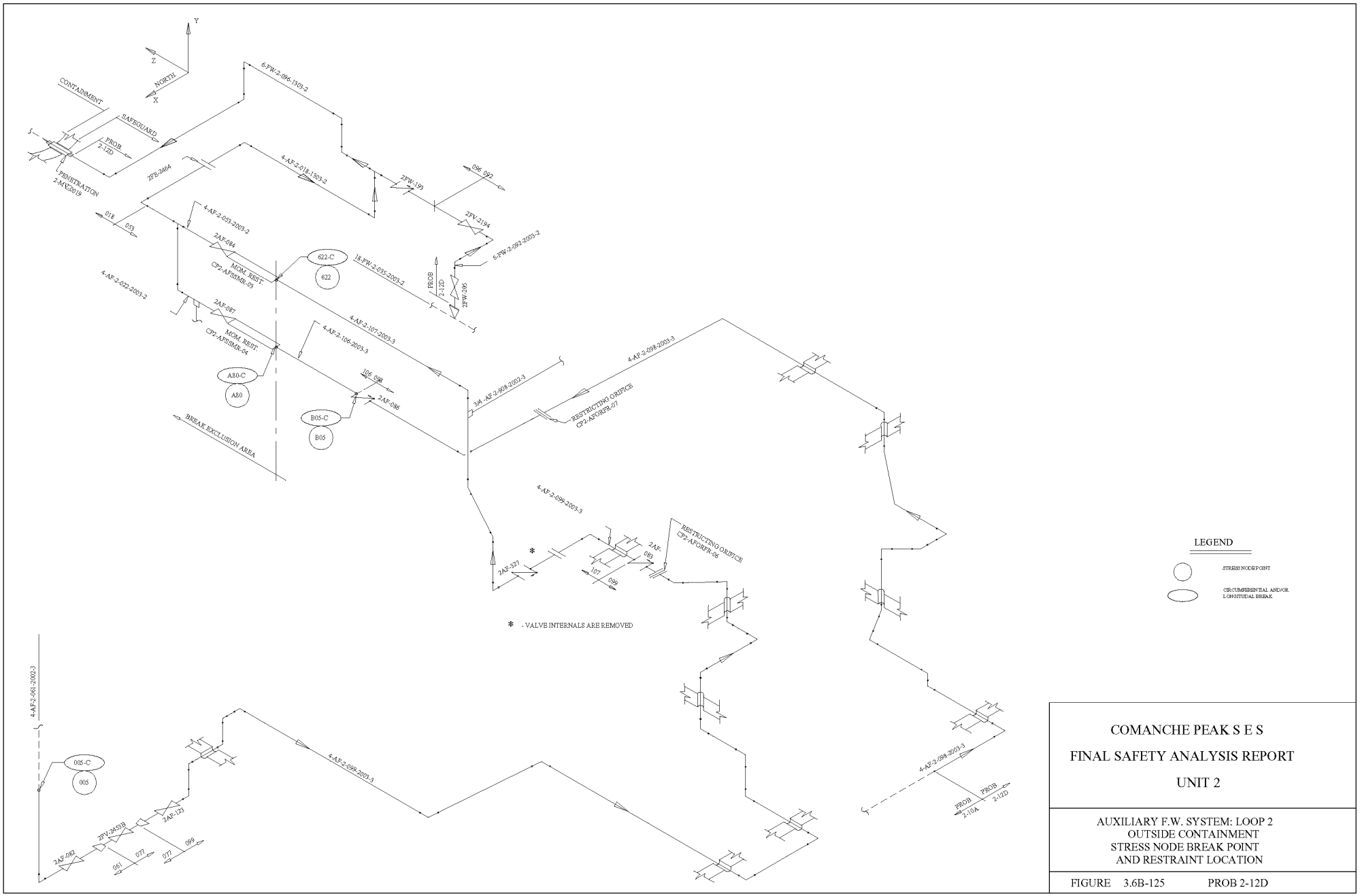
UNIT 2

AUXILIARY F.W. SYSTEM: LOOP 1
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT

FIGURE 3.6B-124 PROB 2-10C

ve0002fr.dgn

CPE



COMANCHE PEAK S E S

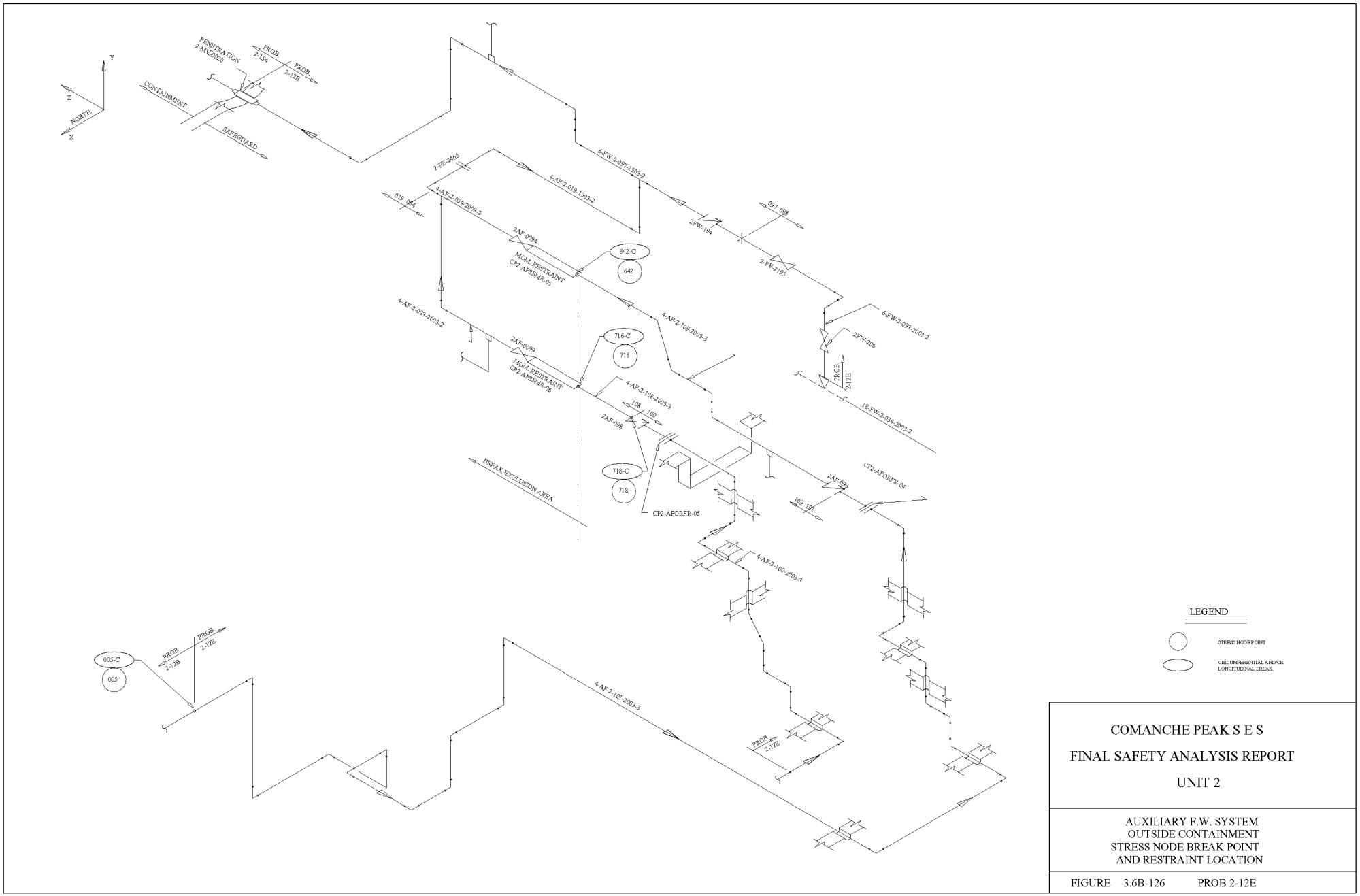
FINAL SAFETY ANALYSIS REPORT

UNIT 2

AUXILIARY F.W. SYSTEM: LOOP 2
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-125 PROB 2-12D

ve0002fs.dgn



LEGEND

STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S

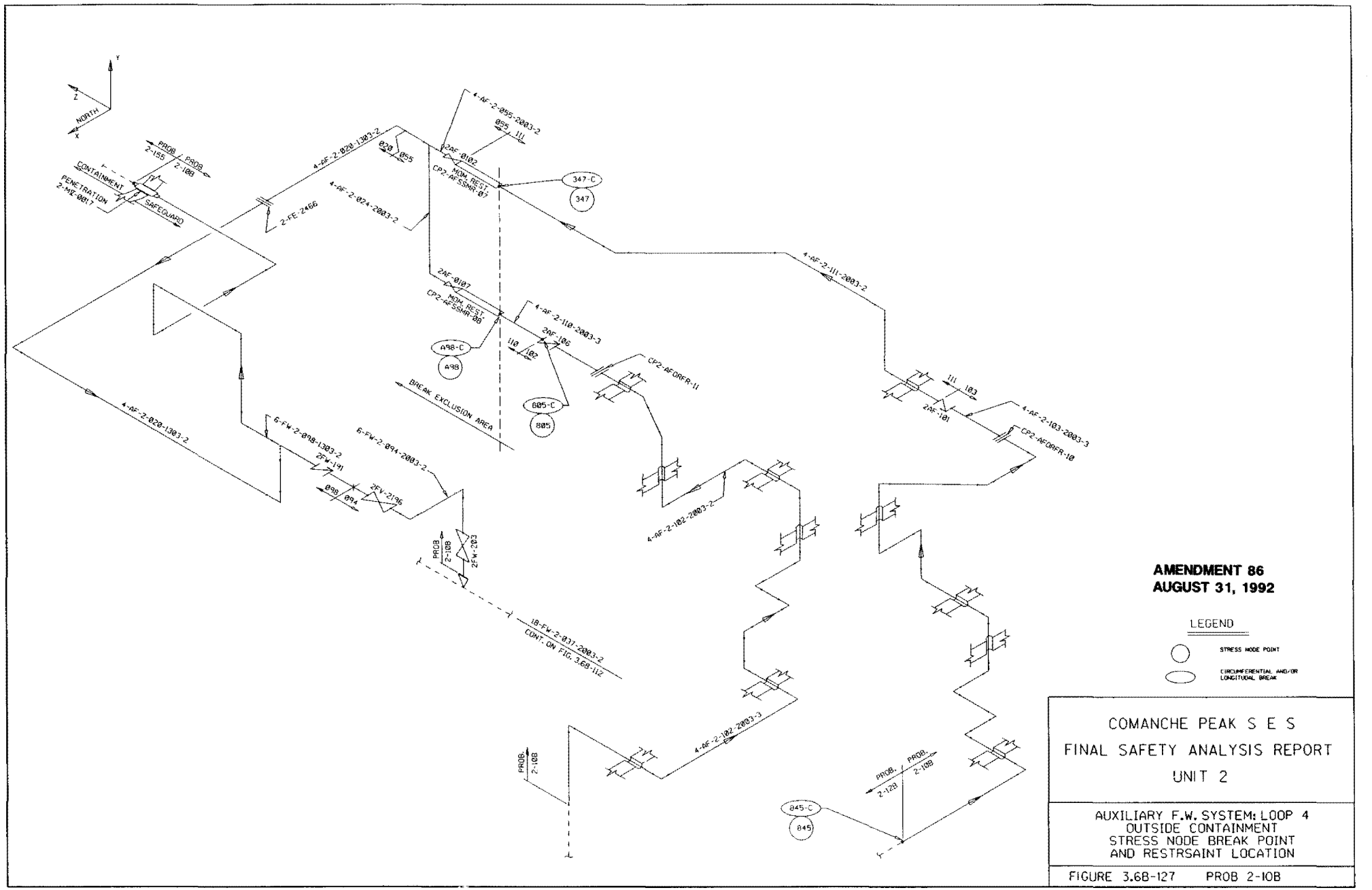
FINAL SAFETY ANALYSIS REPORT

UNIT 2

AUXILIARY F.W. SYSTEM
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-126 PROB 2-12E

ve0002fp.dgn



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDAL BREAK

COMANCHE PEAK S E S

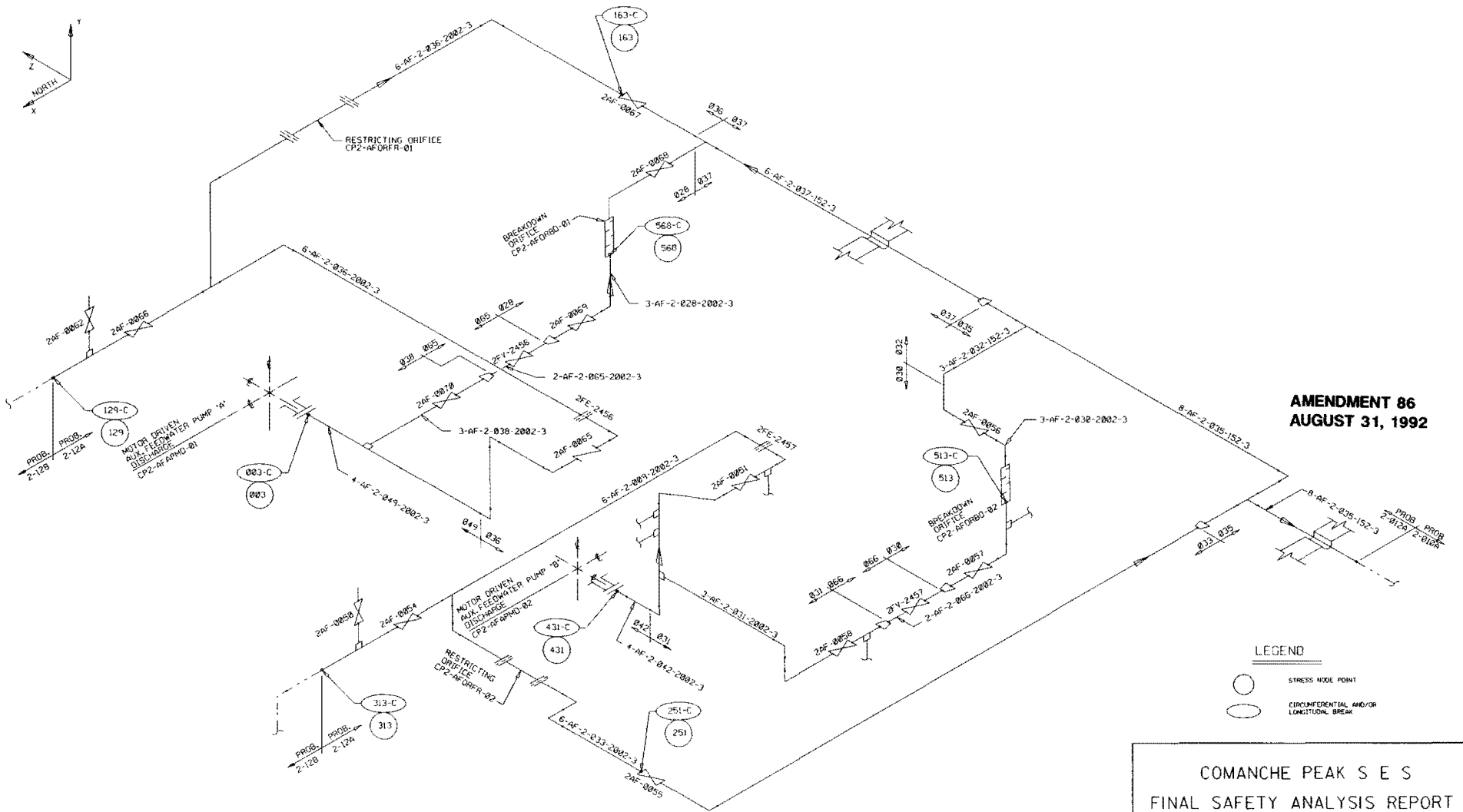
FINAL SAFETY ANALYSIS REPORT

UNIT 2

AUXILIARY F.W. SYSTEM: LOOP 4
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRSAINT LOCATION

FIGURE 3.6B-127 PROB 2-10B

FIG127000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S

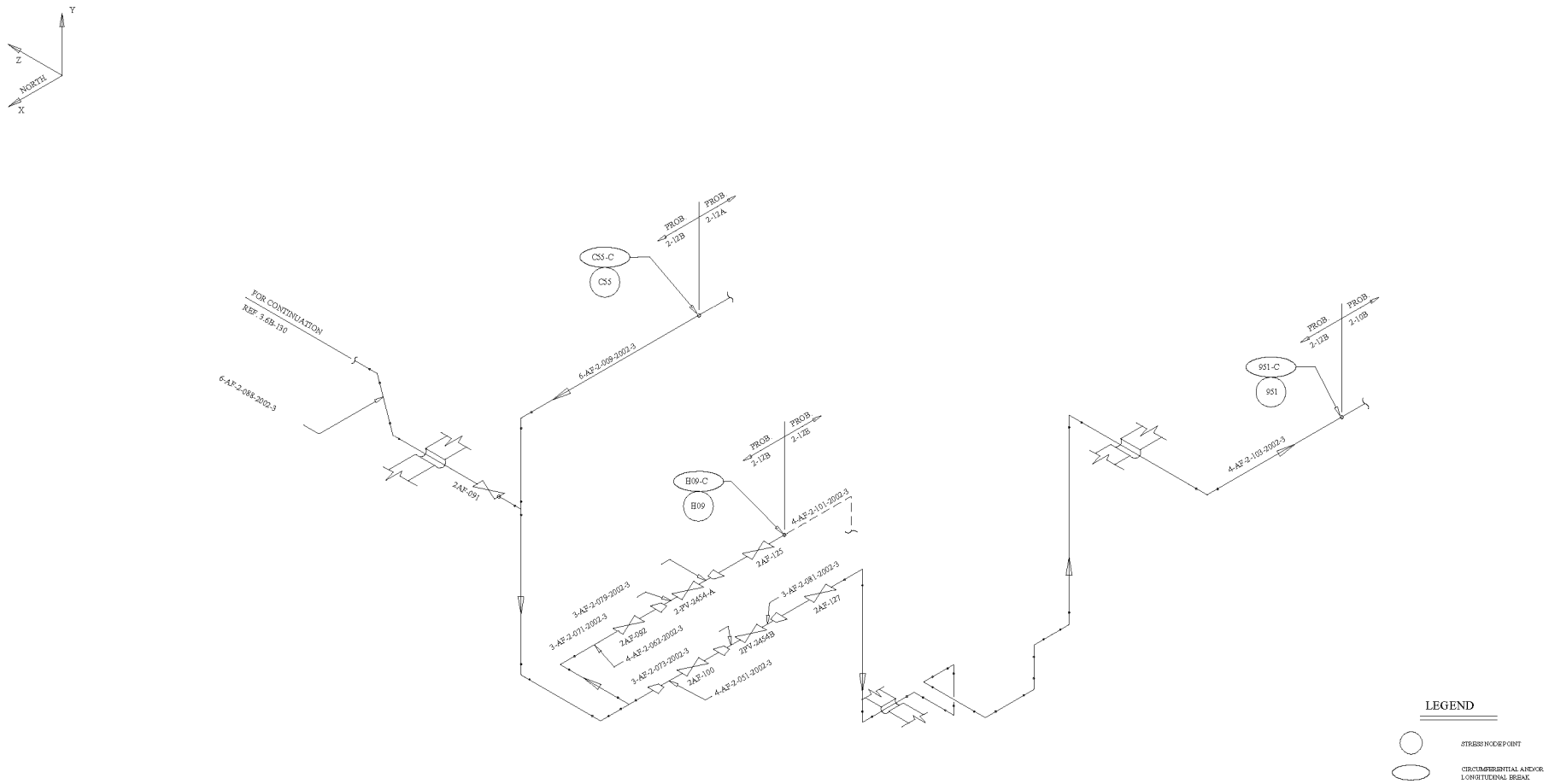
FINAL SAFETY ANALYSIS REPORT

UNIT 2

AUXILIARY F.W. SYSTEM
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-128 PROB 2-12A

FIG128000.BLI



COMANCHE PEAK S E S

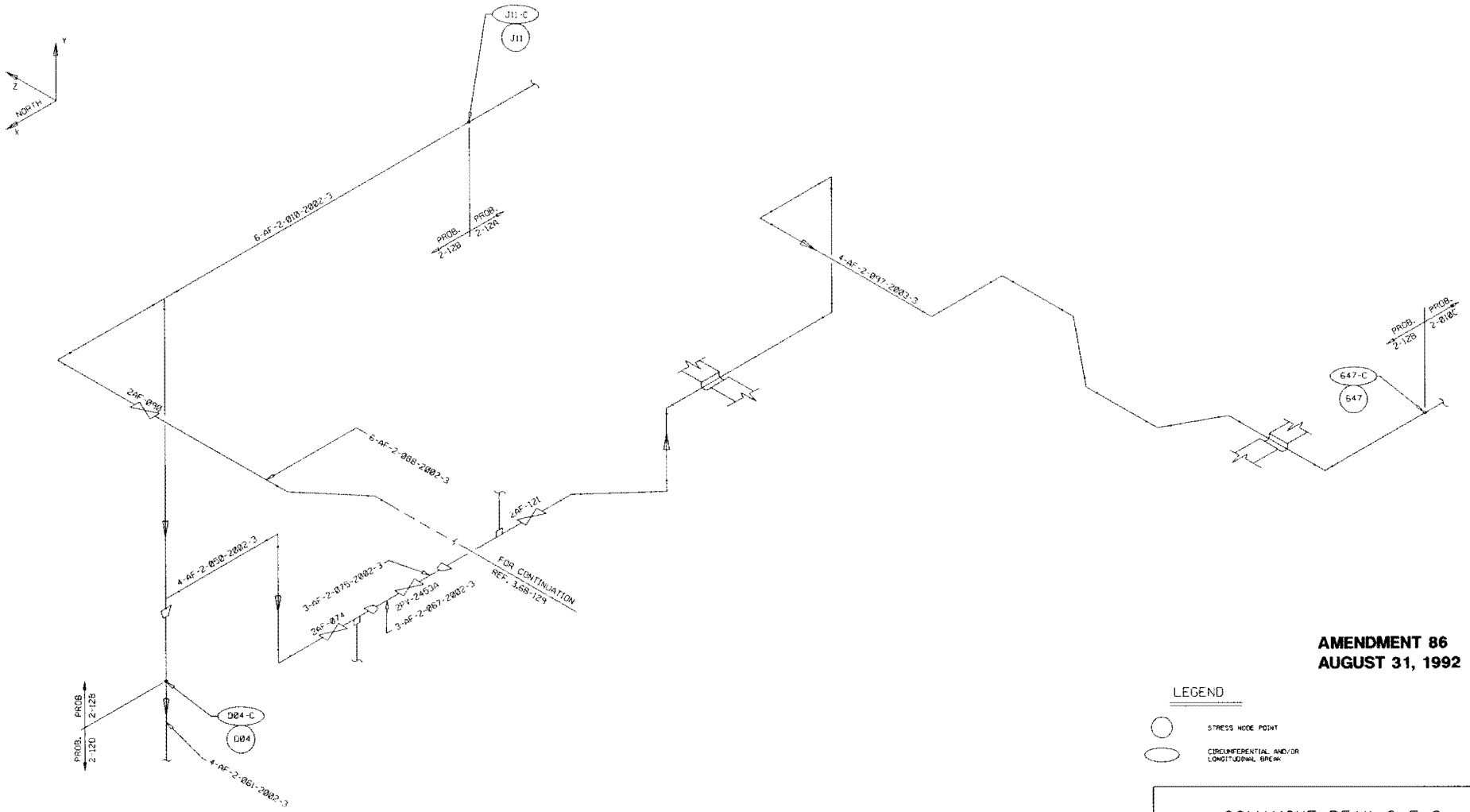
FINAL SAFETY ANALYSIS REPORT

UNIT 2

AUXILIARY F.W. SYSTEM
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-129 PROB 2-12B SHT 1 OF 2

ve0002fq.dgn



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S

FINAL SAFETY ANALYSIS REPORT

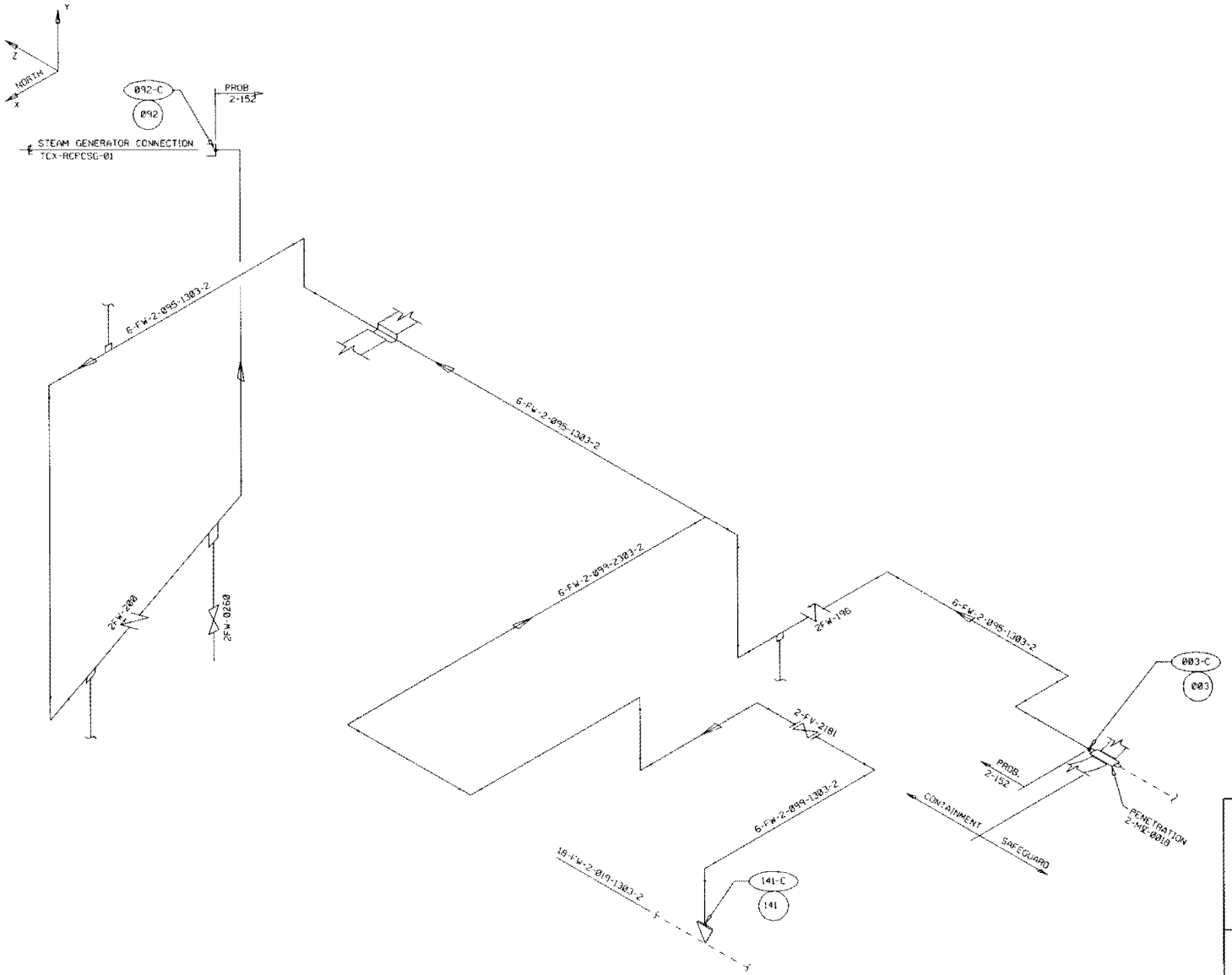
UNIT 2

AUXILIARY F.W. SYSTEM
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-130 PROB 2-12B SHT 2 OF 2

FIG130000.BLT

Figure 3.6B-131
(NOT USED)



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

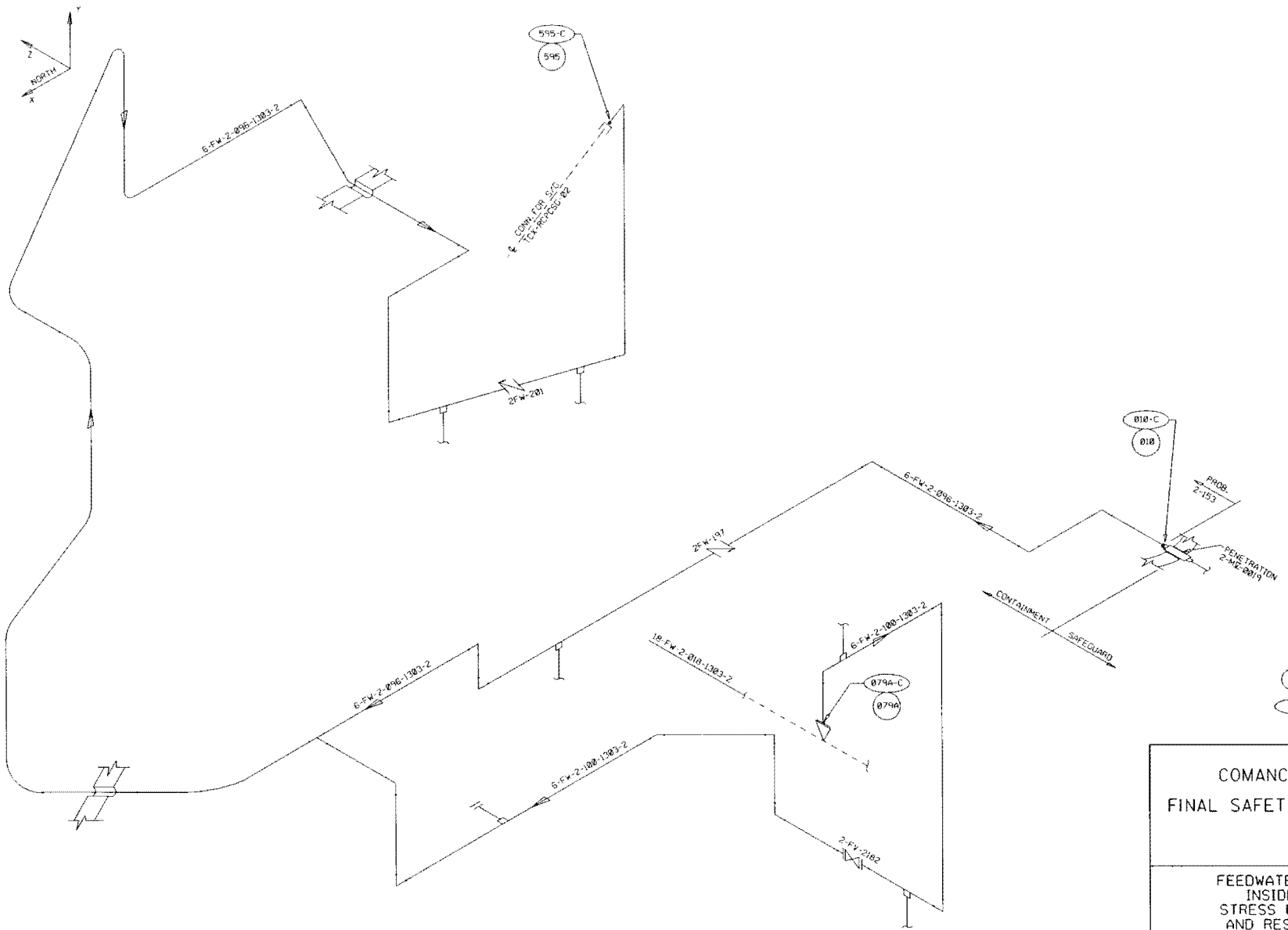
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

FEEDWATER SYSTEM: LOOP 1
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-132 PROB 2-152

FIG132000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

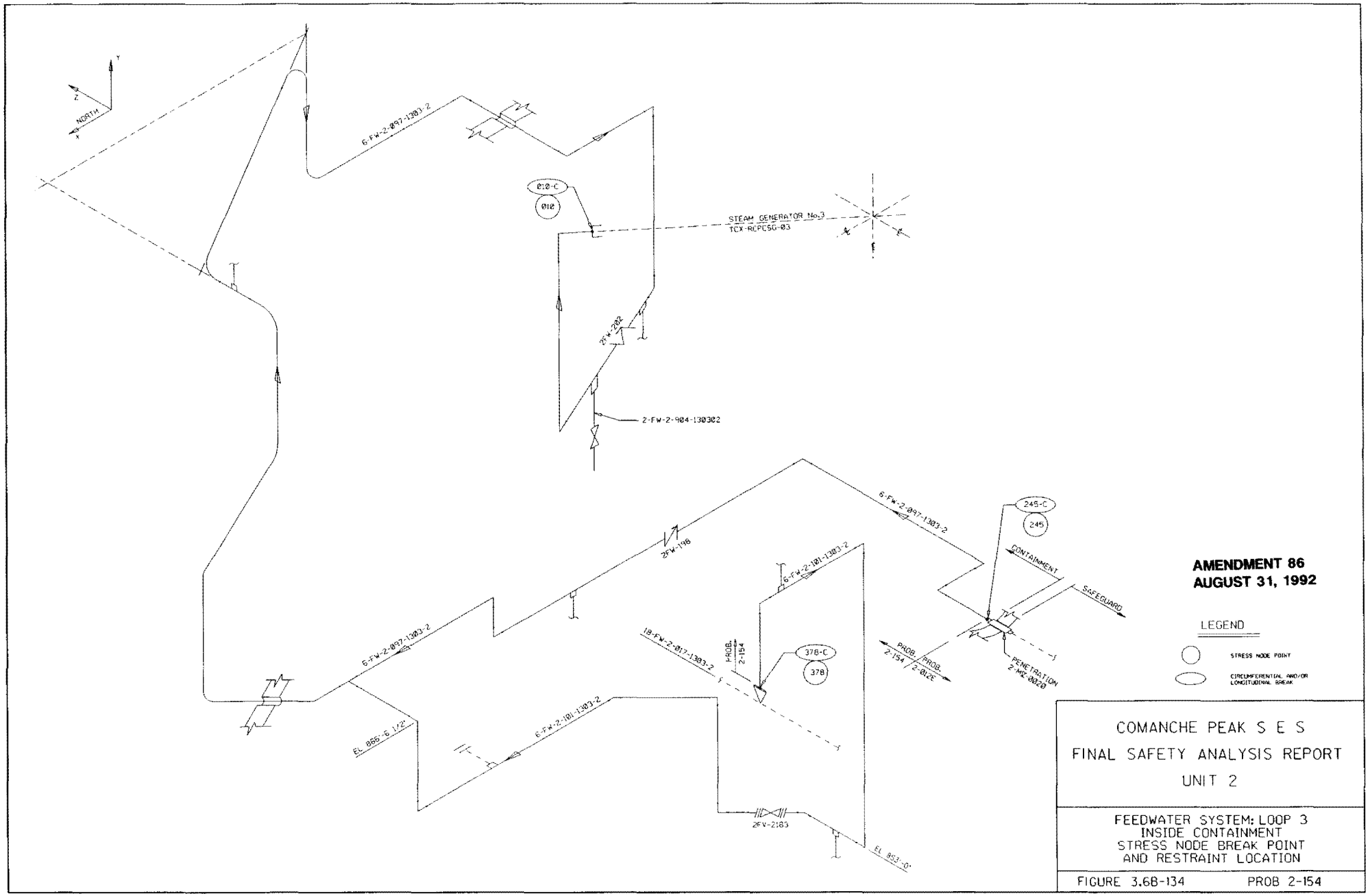
CIRCUMFERENTIAL AND/OR LONGITUDAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

FEEDWATER SYSTEM: LOOP 2
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-133 PROB 2-153

FIG133000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S

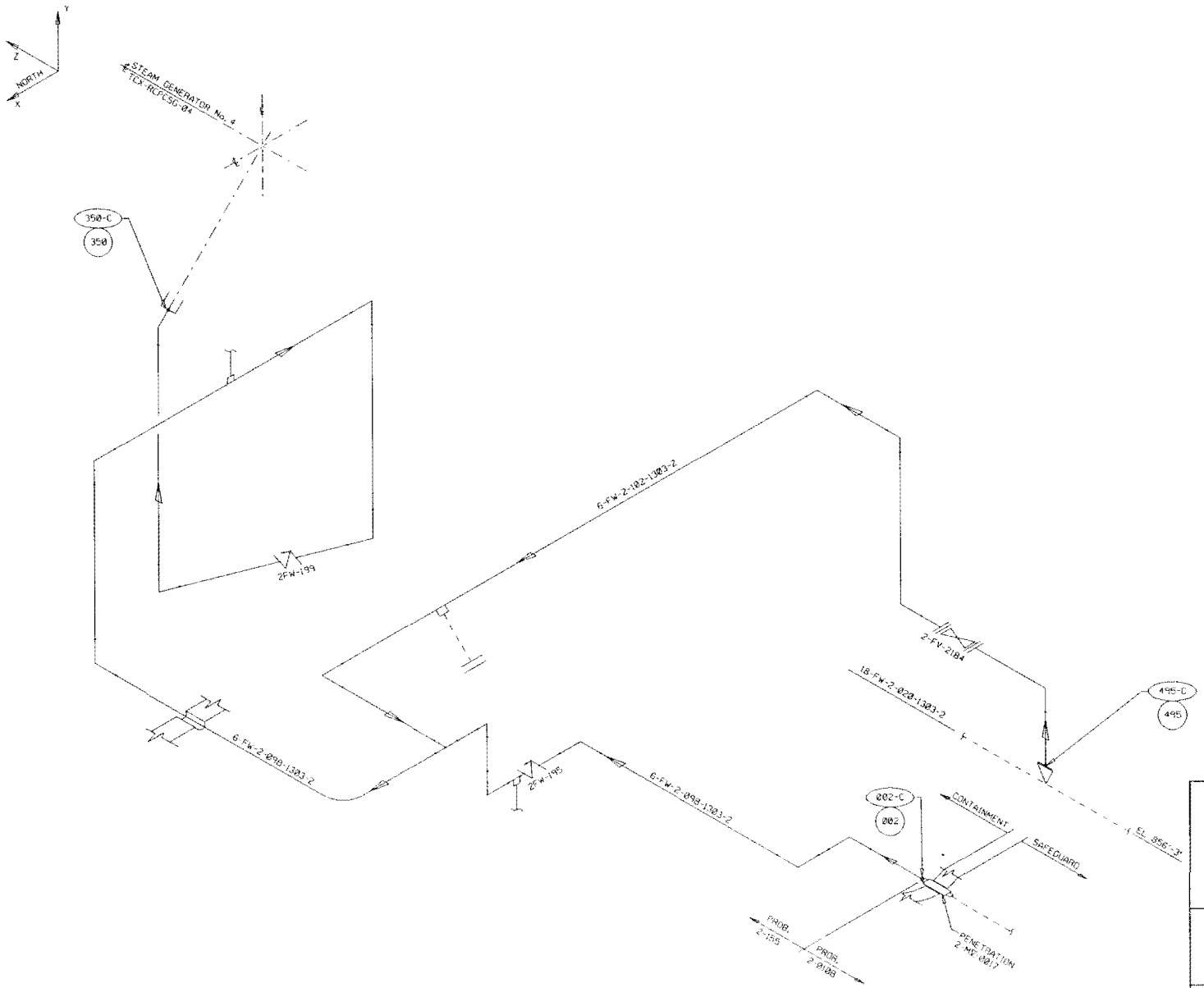
FINAL SAFETY ANALYSIS REPORT

UNIT 2

FEEDWATER SYSTEM: LOOP 3
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-134 PROB 2-154

FIG134000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

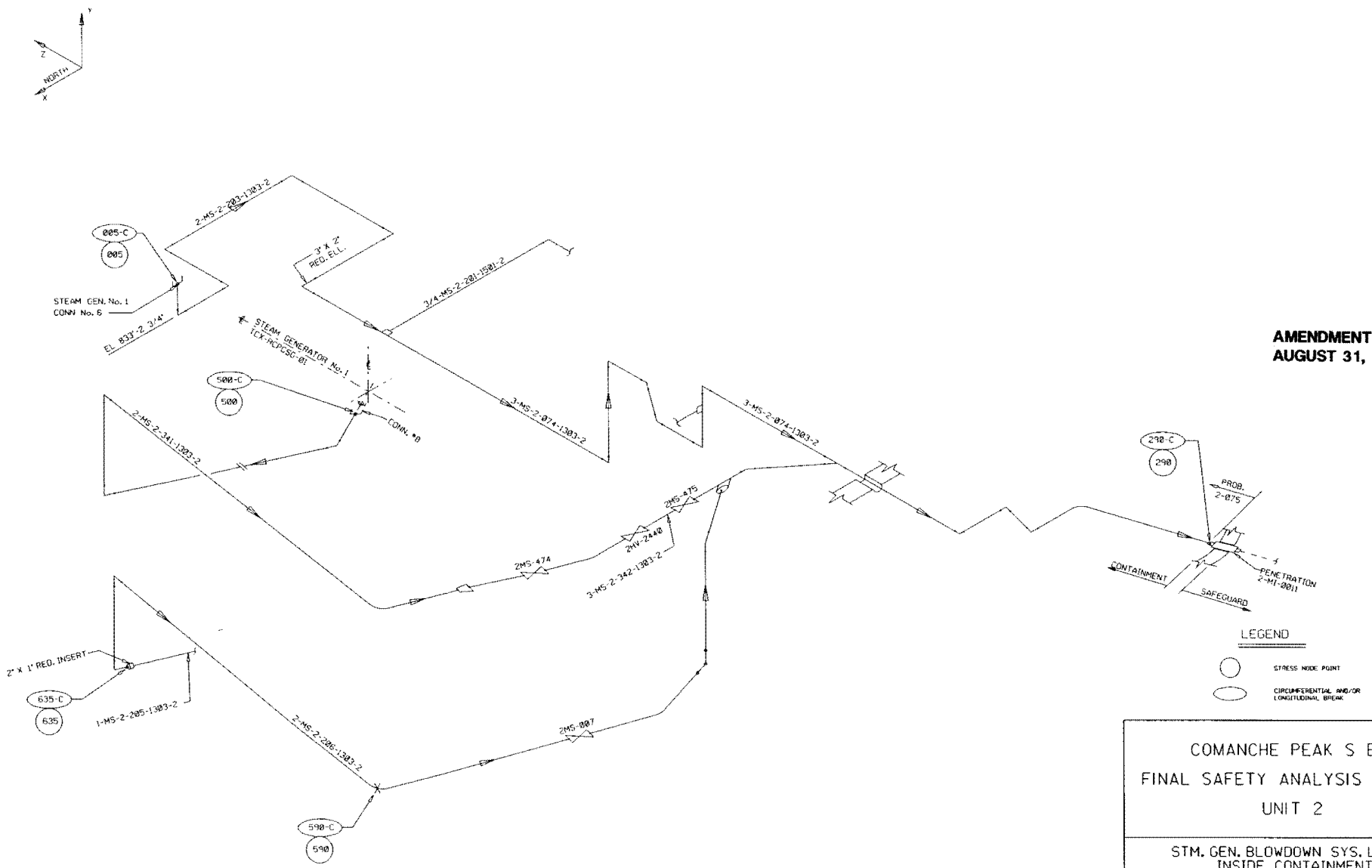
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- U-BAR RESTRAINT

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

FEEDWATER SYSTEM: LOOP 4
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-135 PROB 2-155

FIG135000.BLI



AMENDMENT 86
AUGUST 31, 1992

COMANCHE PEAK S E S

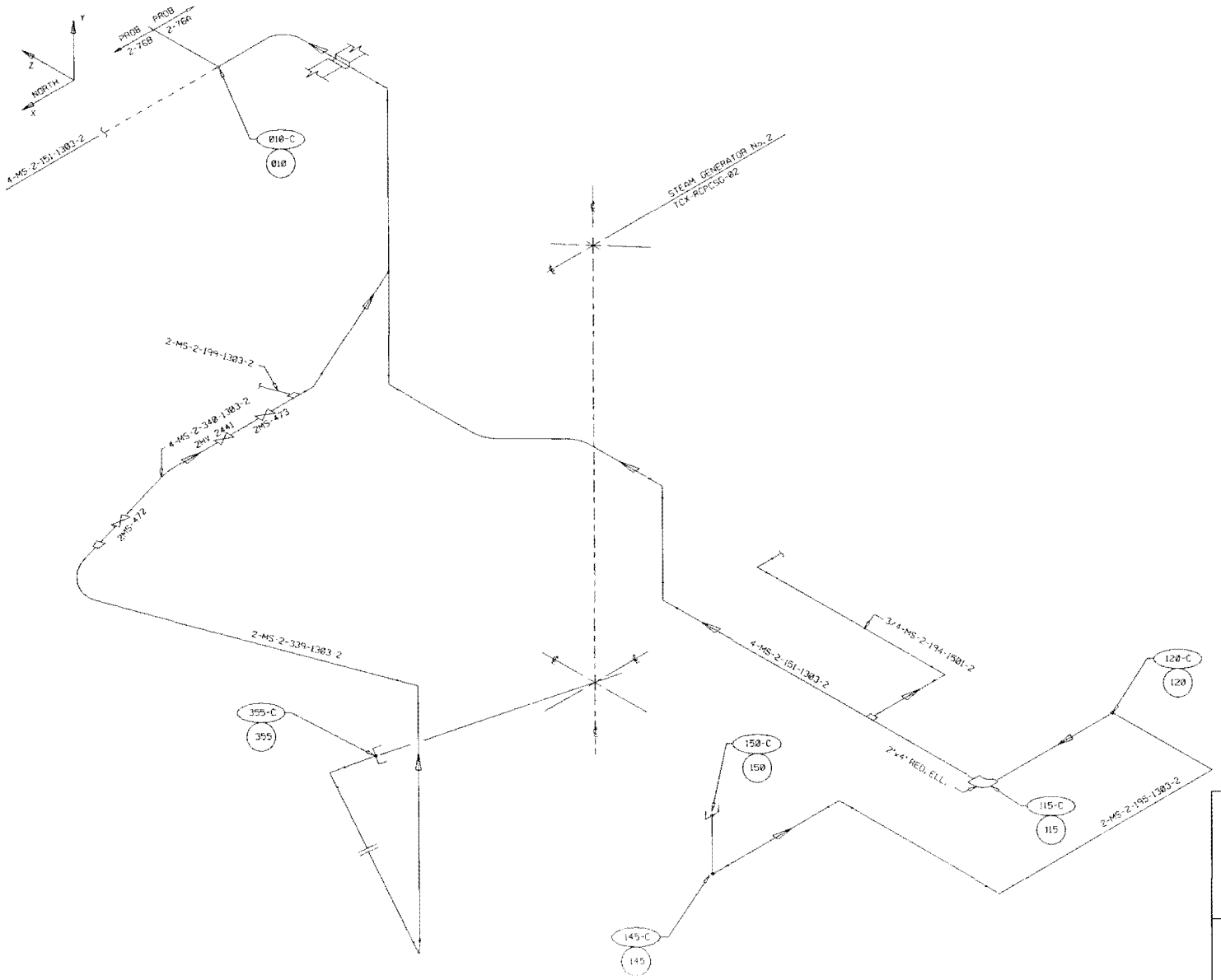
FINAL SAFETY ANALYSIS REPORT

UNIT 2

STM. GEN. BLOWDOWN SYS. LOOP 1
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-136 PROB 2-75

FIG136000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

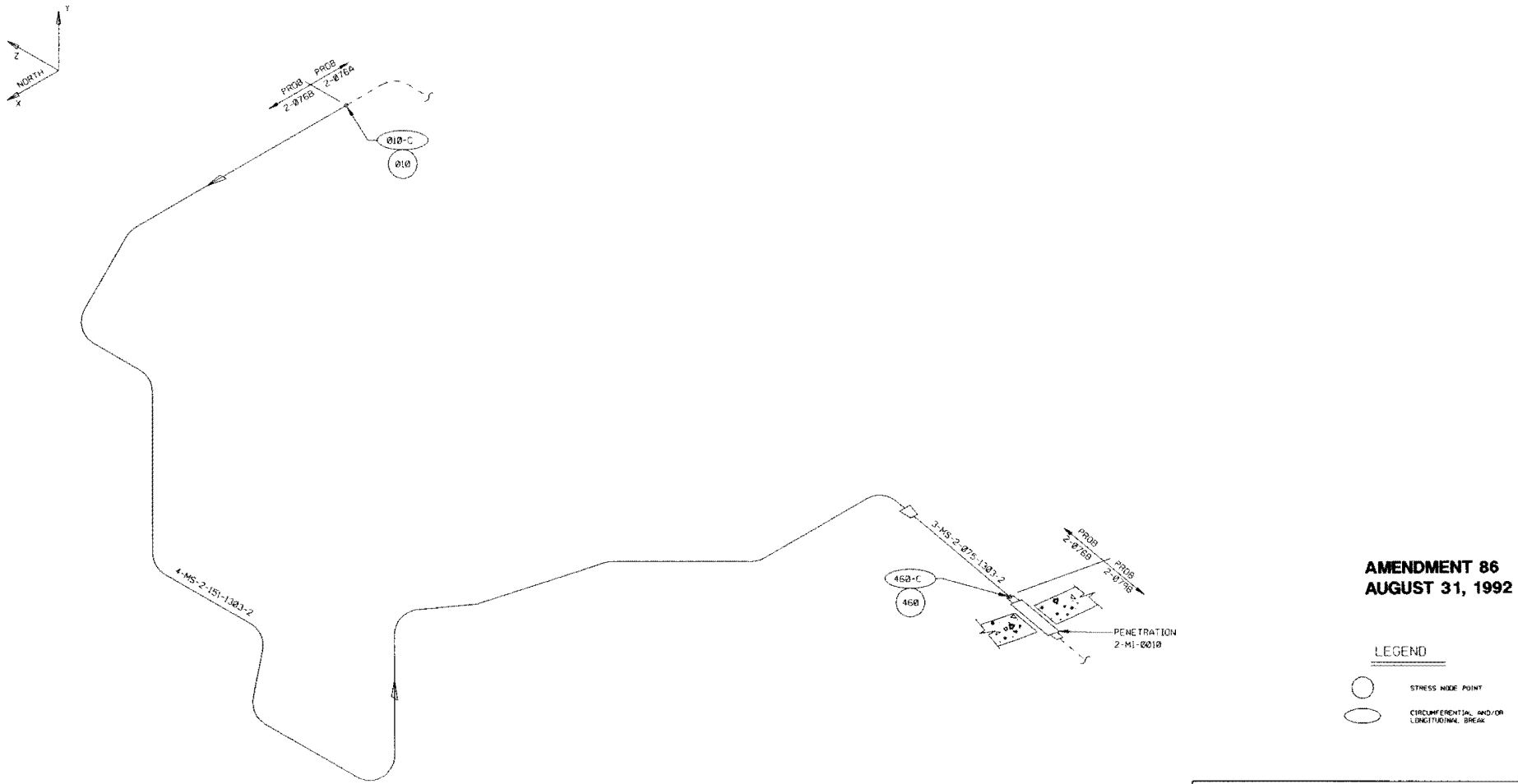
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

STM. GEN. BLOWDOWN SYS. LOOP 2
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-137 PROB 2-76A

FIG137000.BLI



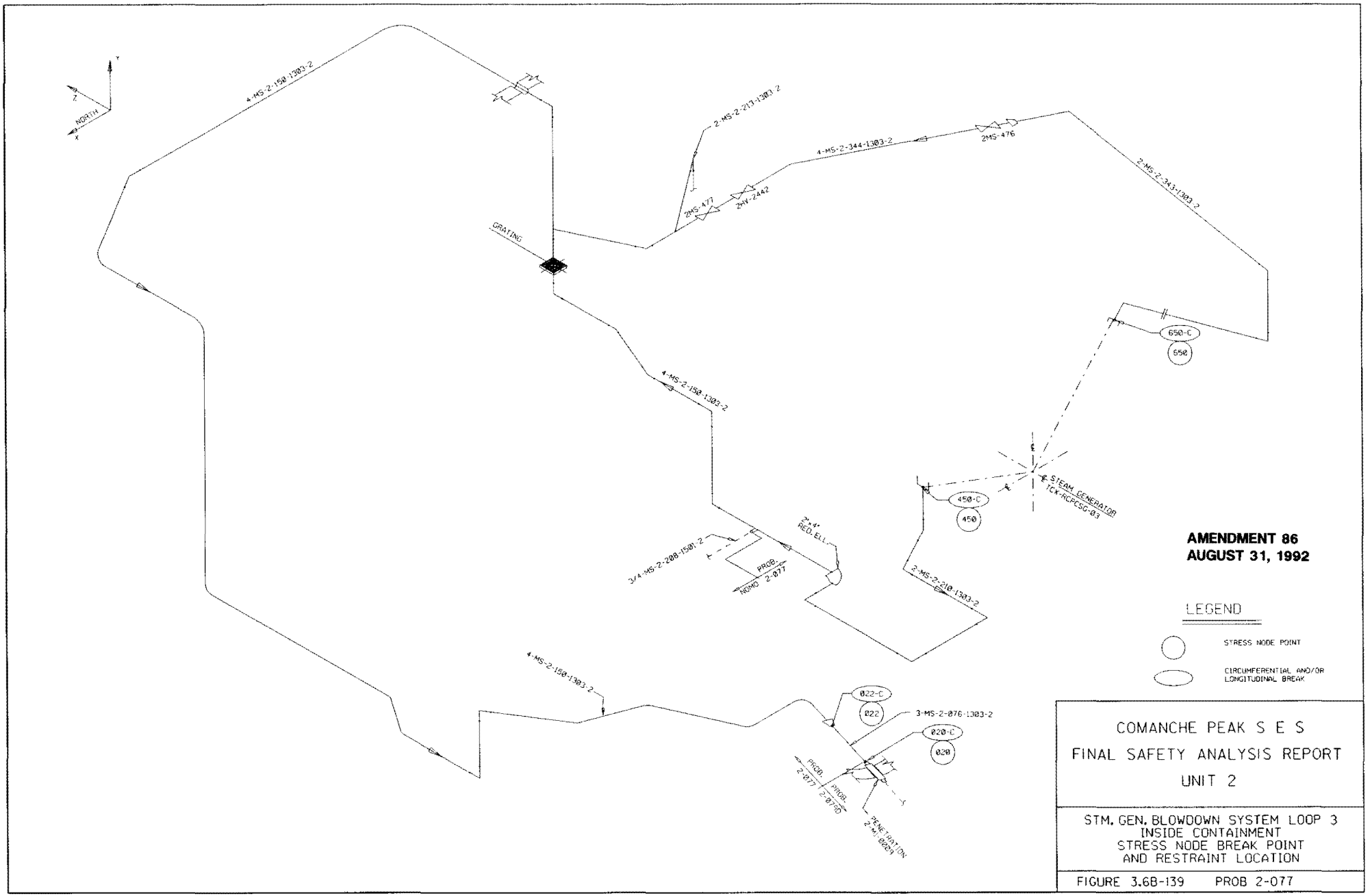
AMENDMENT 86
AUGUST 31, 1992

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

STM GEN BLOWDOWN SYS LOOP 2
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-138 PROB 2-076B

FIG138000.BLT



COMANCHE PEAK S E S

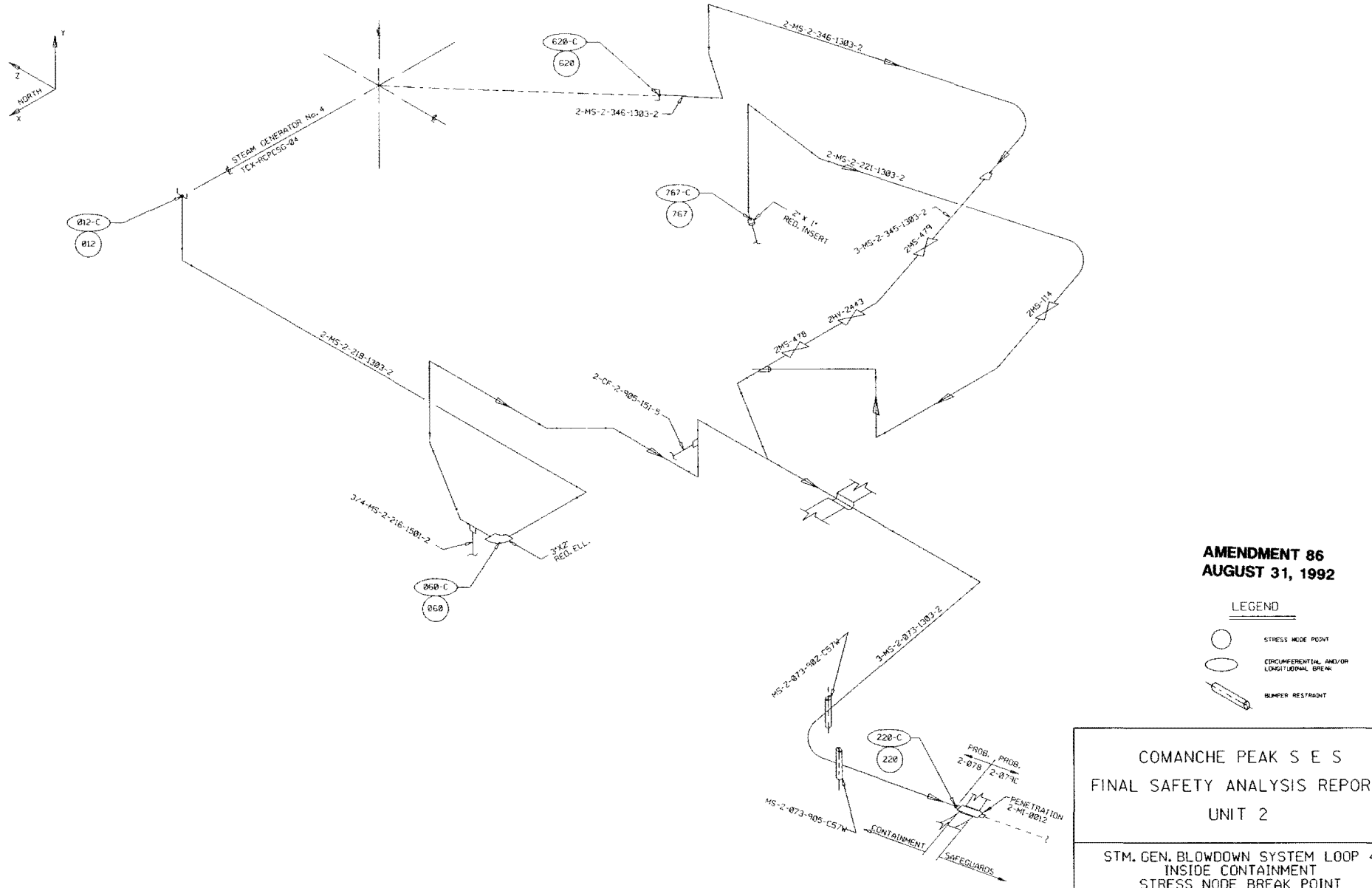
FINAL SAFETY ANALYSIS REPORT

UNIT 2

STM. GEN. BLOWDOWN SYSTEM LOOP 3
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-139 PROB 2-077

FIG139000.BI1



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

BUMPER RESTRAINT

COMANCHE PEAK S E S

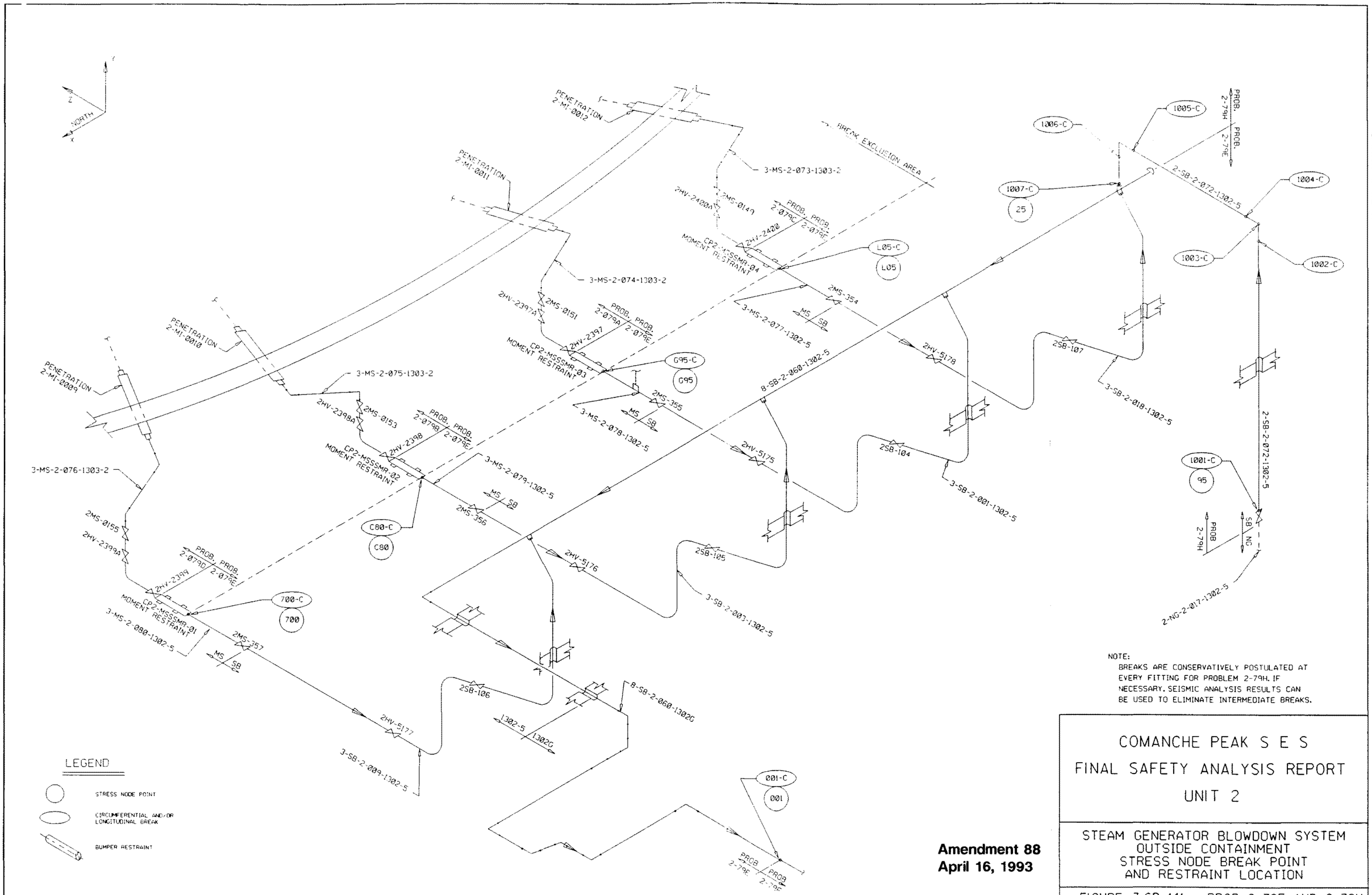
FINAL SAFETY ANALYSIS REPORT

UNIT 2

STM. GEN. BLOWDOWN SYSTEM LOOP 4
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-140 PROB 2-078

FIG140000.BLI



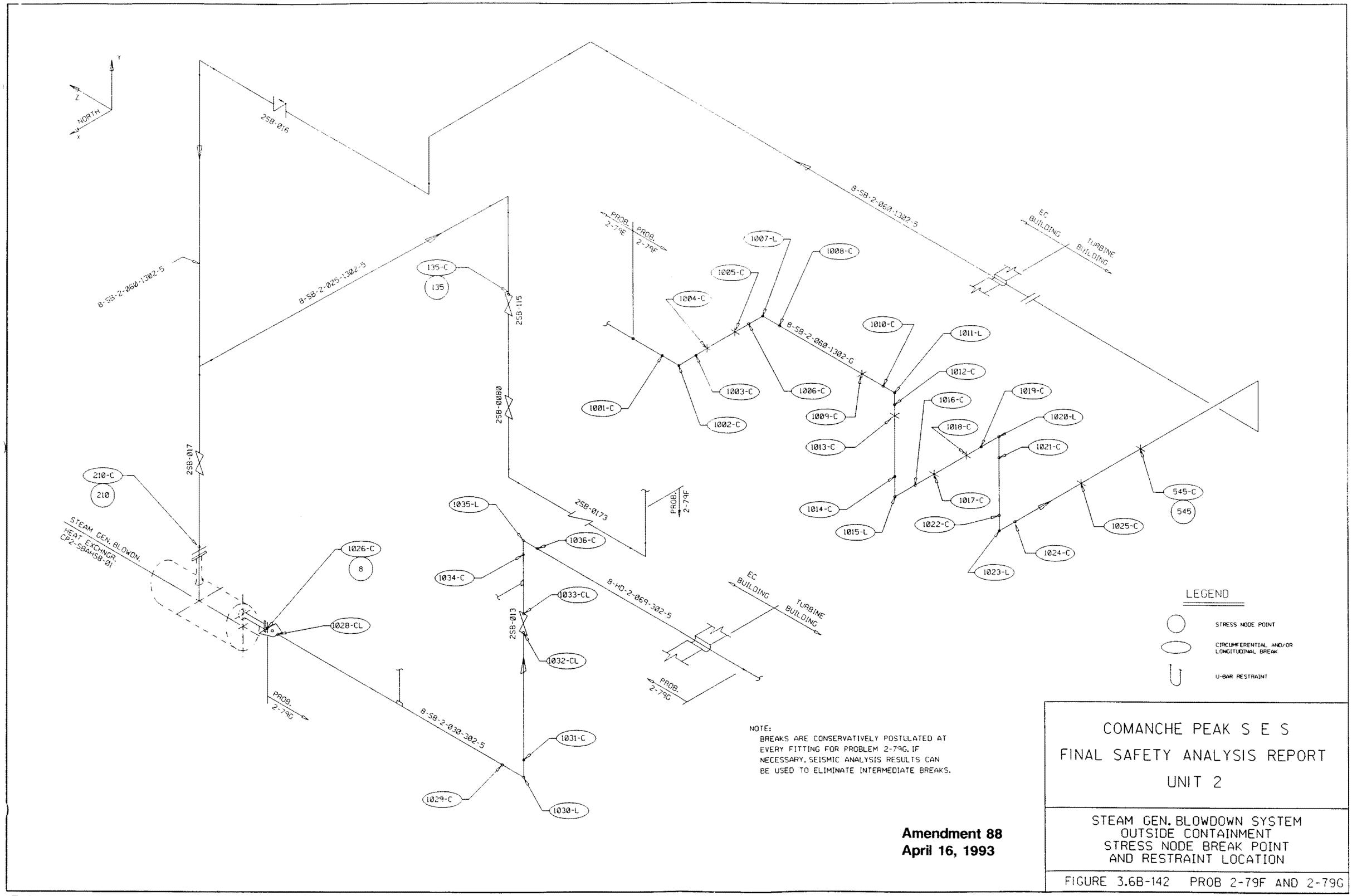
NOTE:
BREAKS ARE CONSERVATIVELY POSTULATED AT EVERY FITTING FOR PROBLEM 2-79H. IF NECESSARY. SEISMIC ANALYSIS RESULTS CAN BE USED TO ELIMINATE INTERMEDIATE BREAKS.

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

STEAM GENERATOR BLOWDOWN SYSTEM
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-141 PROB 2-79E AND 2-79H

Amendment 88
April 16, 1993



NOTE:
BREAKS ARE CONSERVATIVELY POSTULATED AT EVERY FITTING FOR PROBLEM 2-79G. IF NECESSARY, SEISMIC ANALYSIS RESULTS CAN BE USED TO ELIMINATE INTERMEDIATE BREAKS.

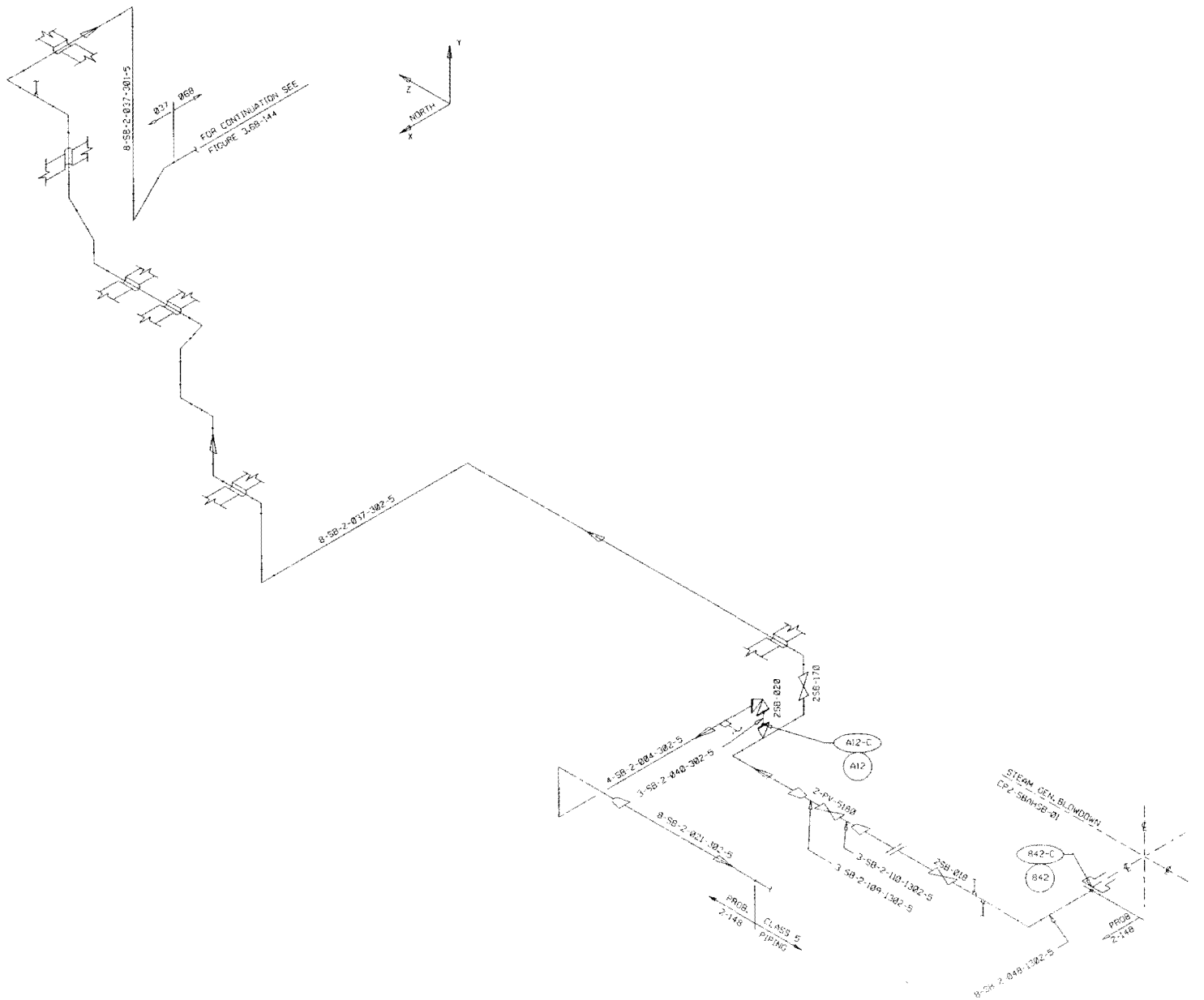
Amendment 88
April 16, 1993

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

STEAM GEN. BLOWDOWN SYSTEM
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-142 PROB 2-79F AND 2-79G

FIG142000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

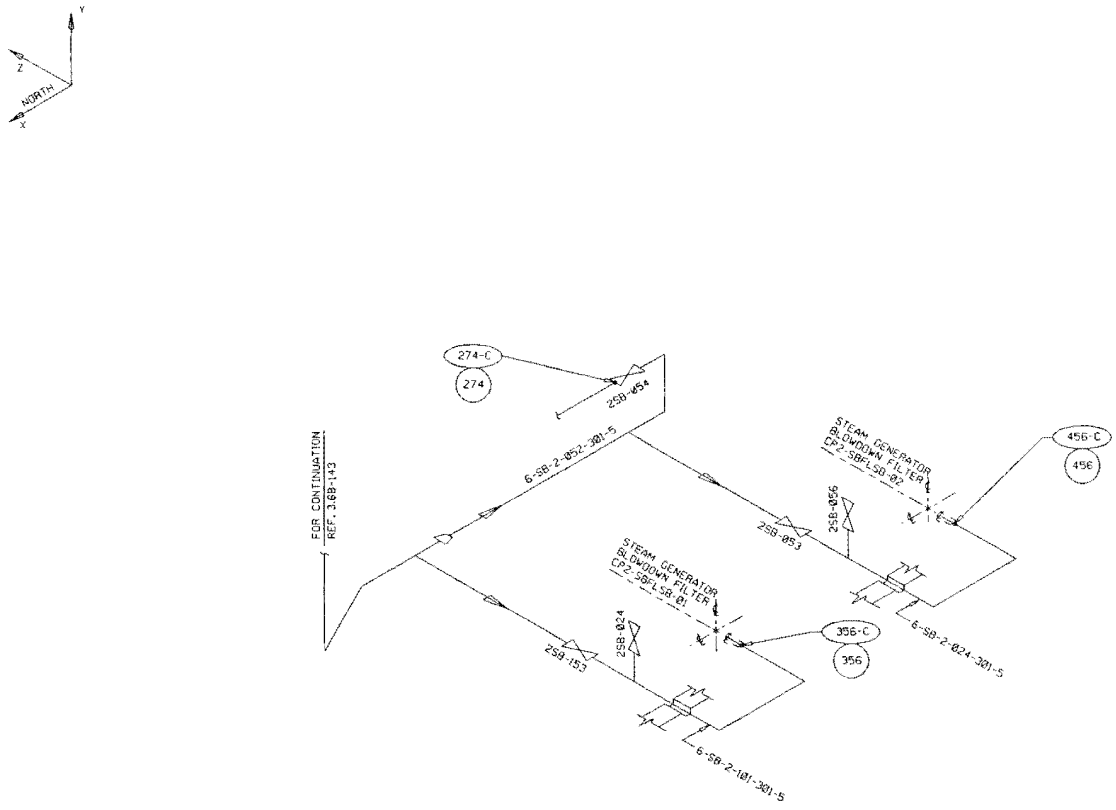
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

STEAM GEN. BLOWDOWN SYSTEM
AUX. BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-143 PROB 2-148 SH 1 OF 2

FIG143000.BIT



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

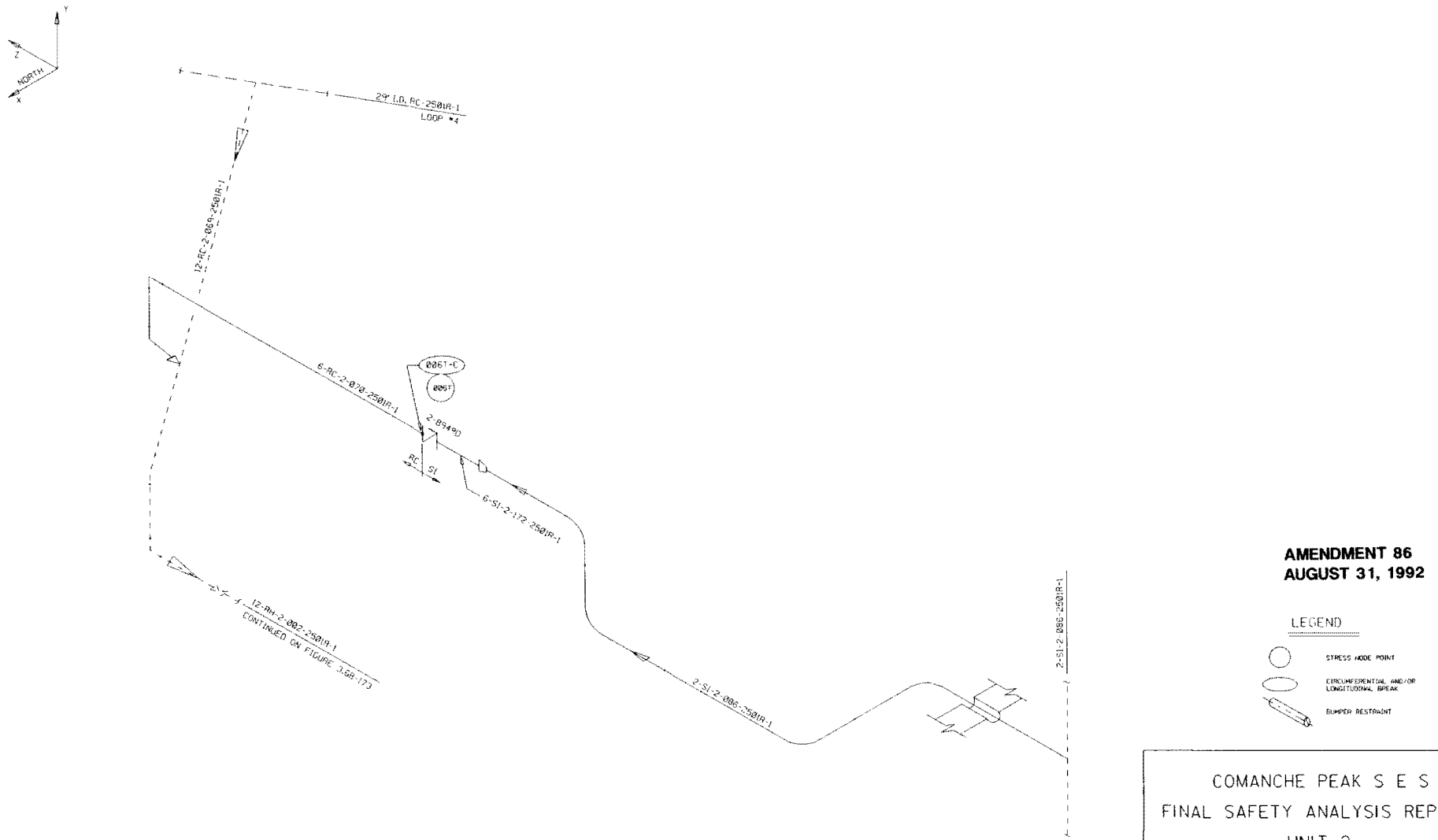
STEAM GEN. BLOWDOWN SYSTEM
AUX. BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-144 PROB 2-148 SH 2 OF 2

FIG144000.BLI

Figure 3.6B-145
(NOT USED)

Figure 3.6B-146
(NOT USED)



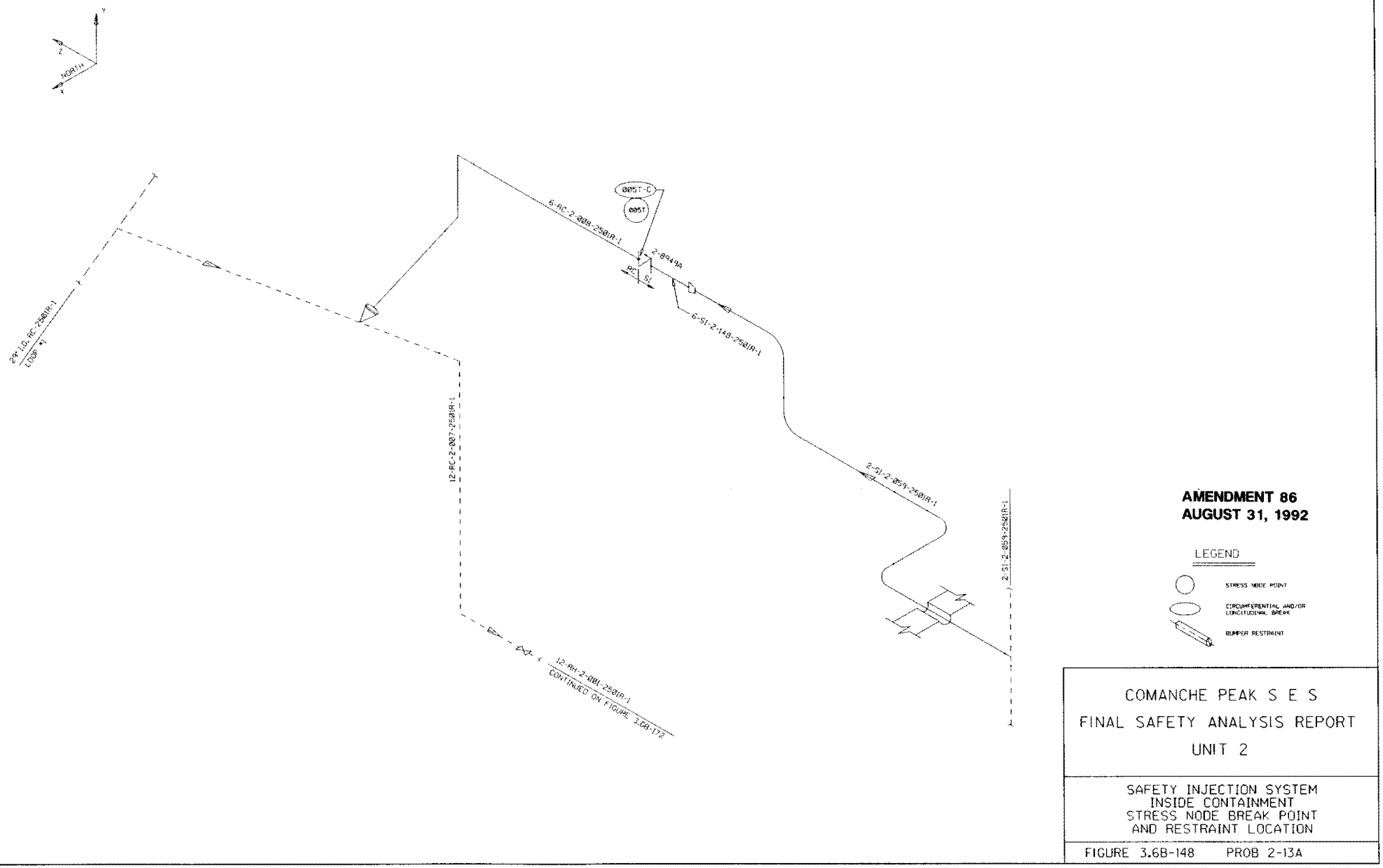
AMENDMENT 86
AUGUST 31, 1992

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-147 PROB 2-13B

FIG147000.BLI



COMANCHE PEAK S E S

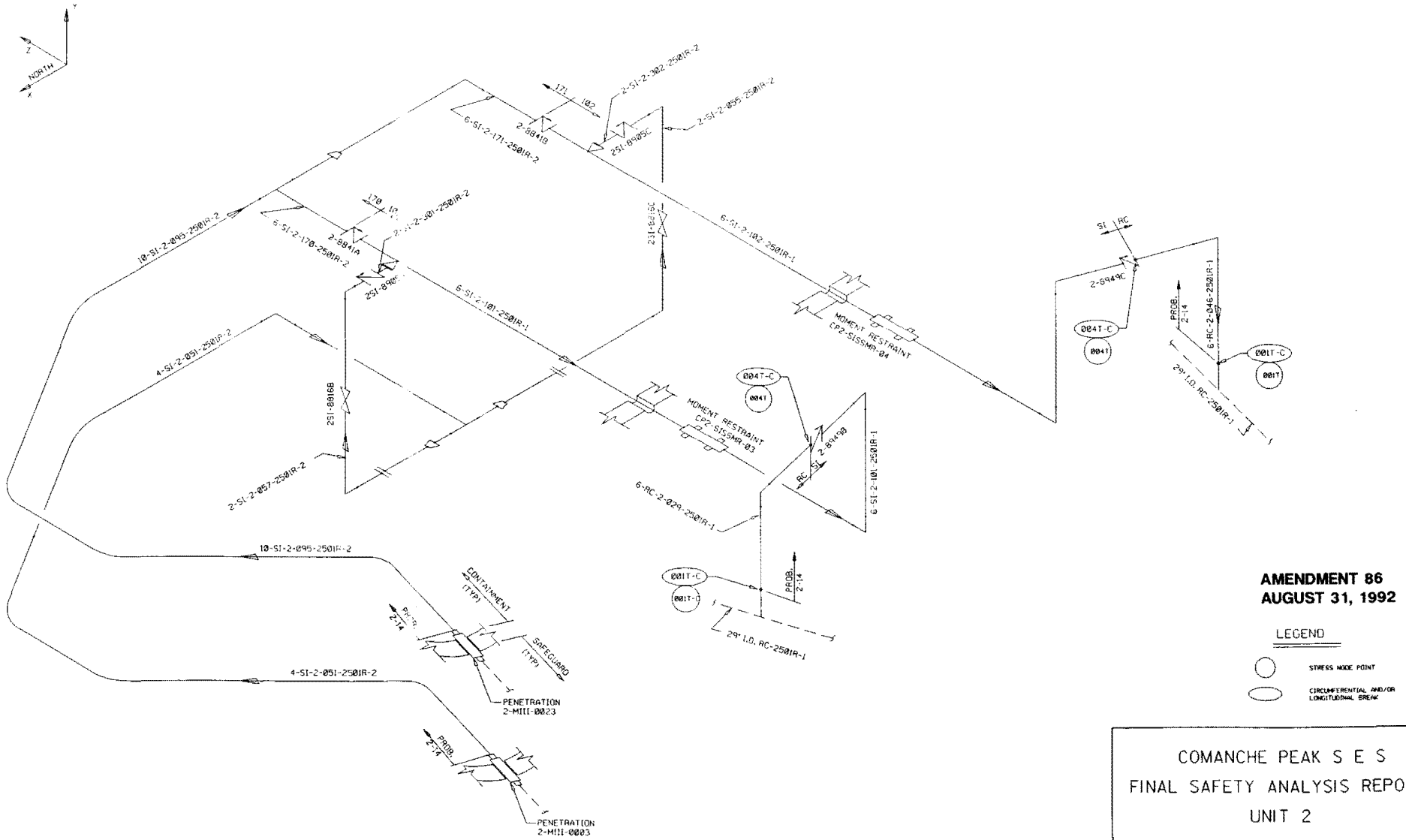
FINAL SAFETY ANALYSIS REPORT

UNIT 2

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-148 PROB 2-13A

FIG148000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

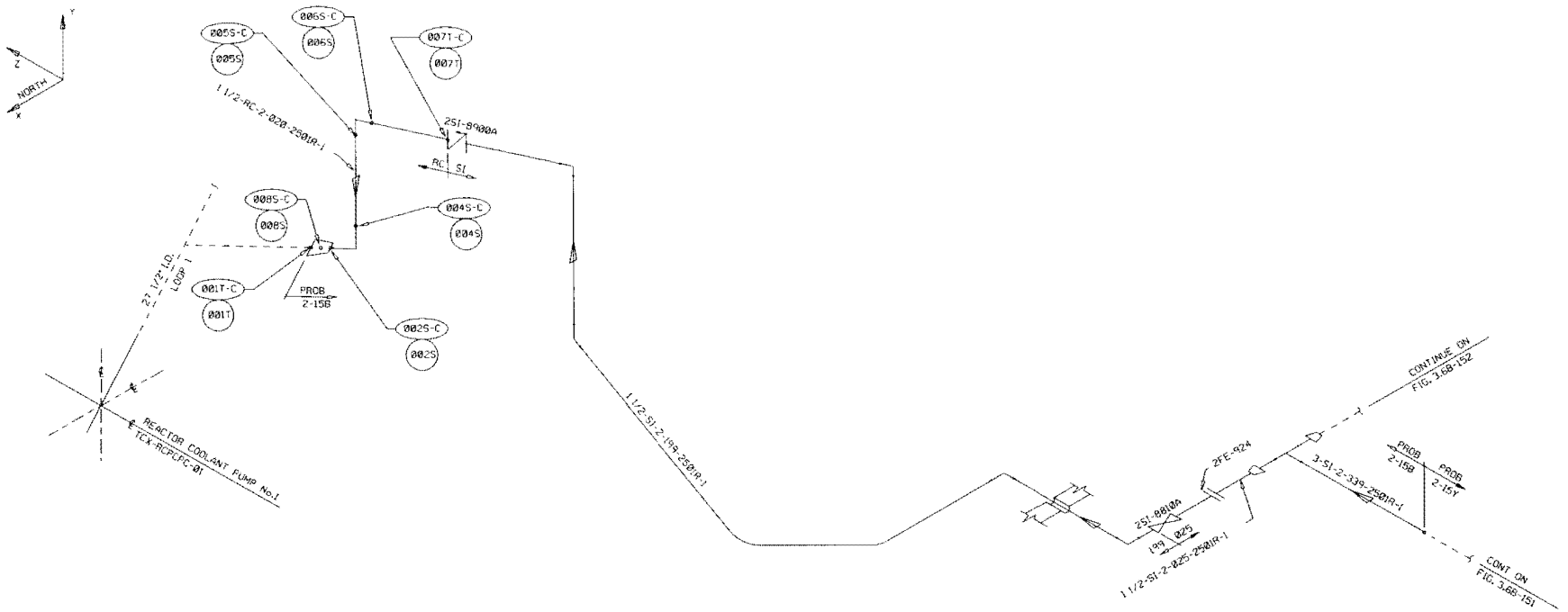
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-149 PROB 2-14

FIG149000.BIT



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

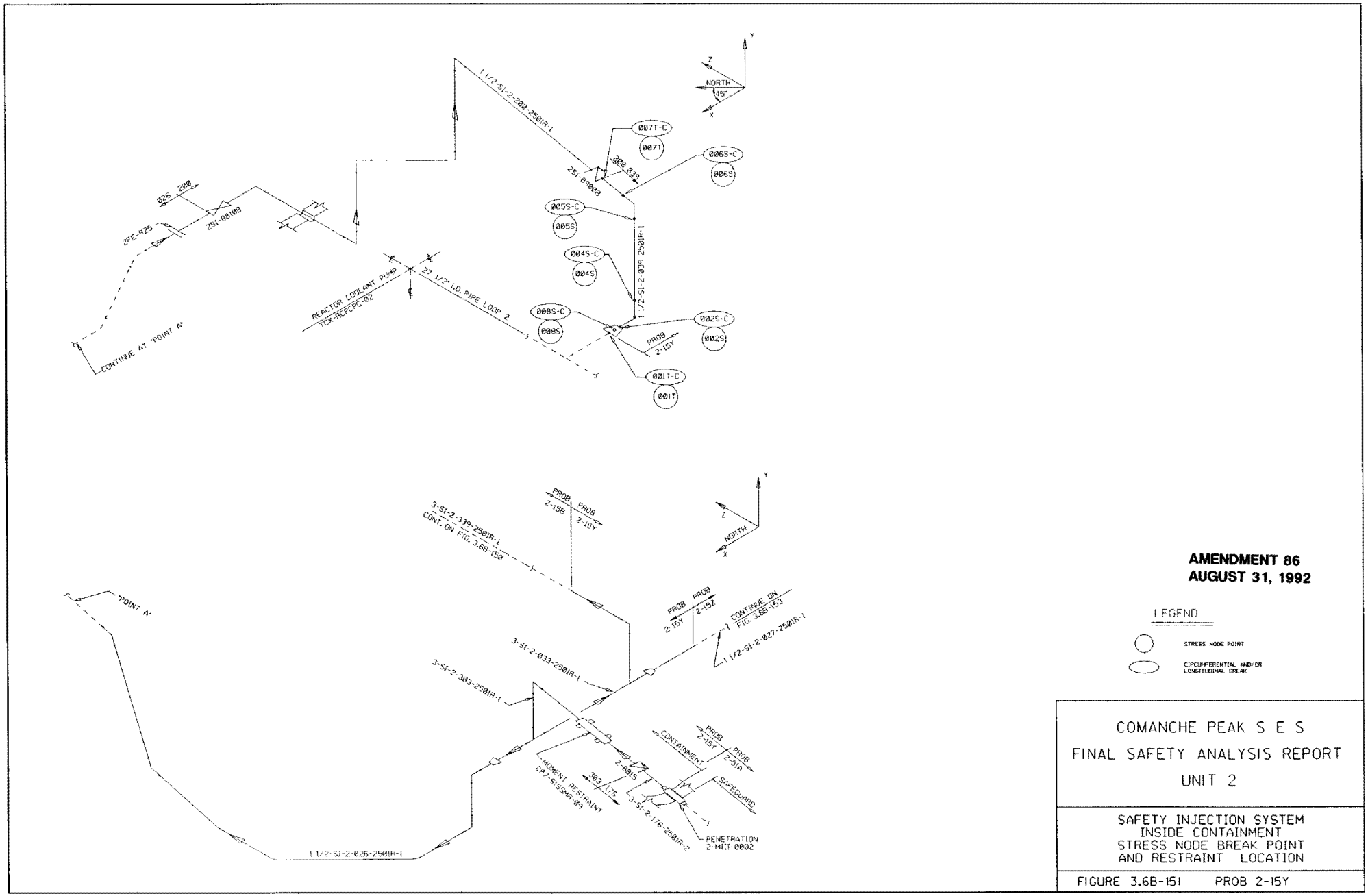
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-150 PROB 2-15B

FIG150000.BIT



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S

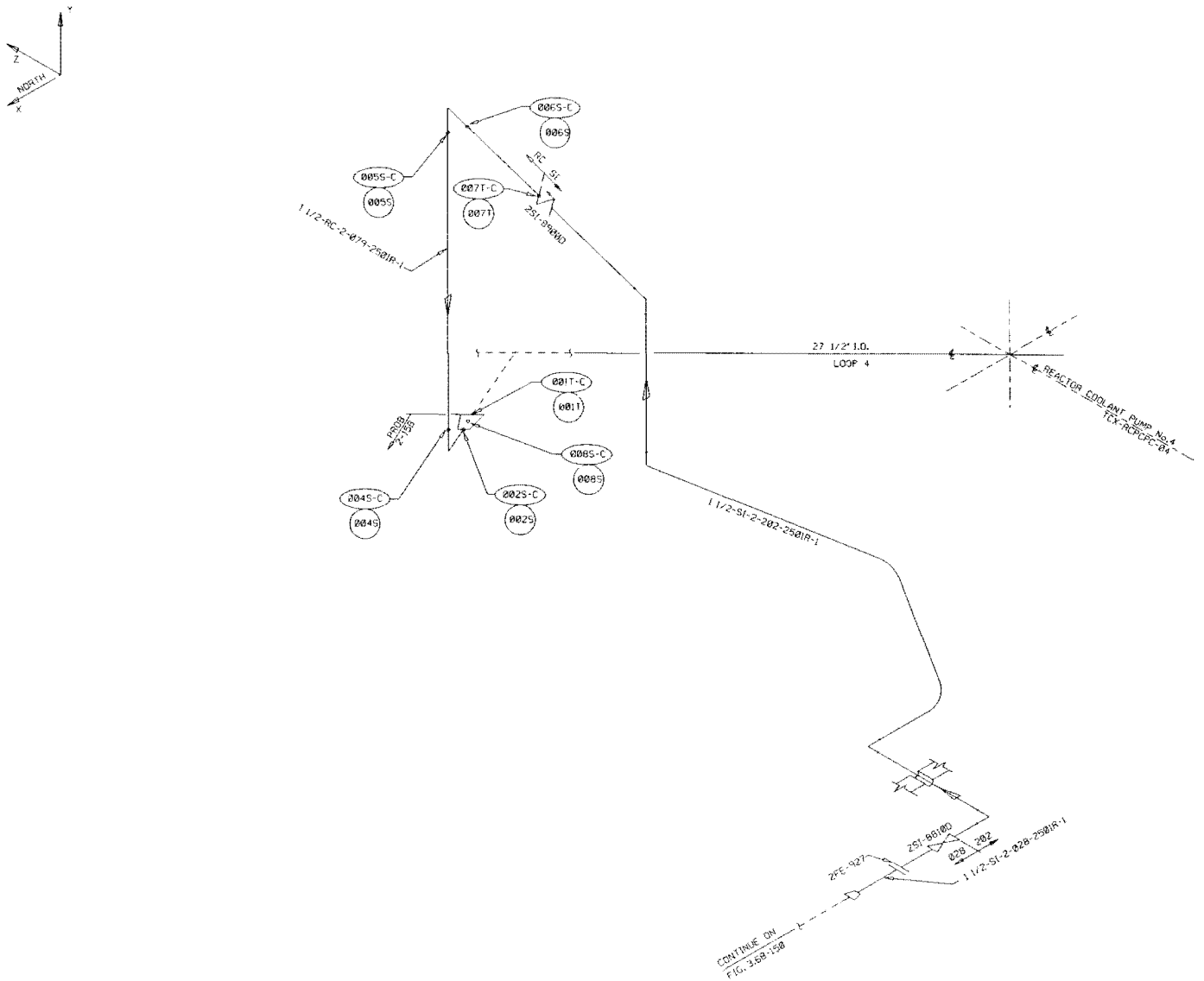
FINAL SAFETY ANALYSIS REPORT

UNIT 2

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-151 PROB 2-15Y

FIG151000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S

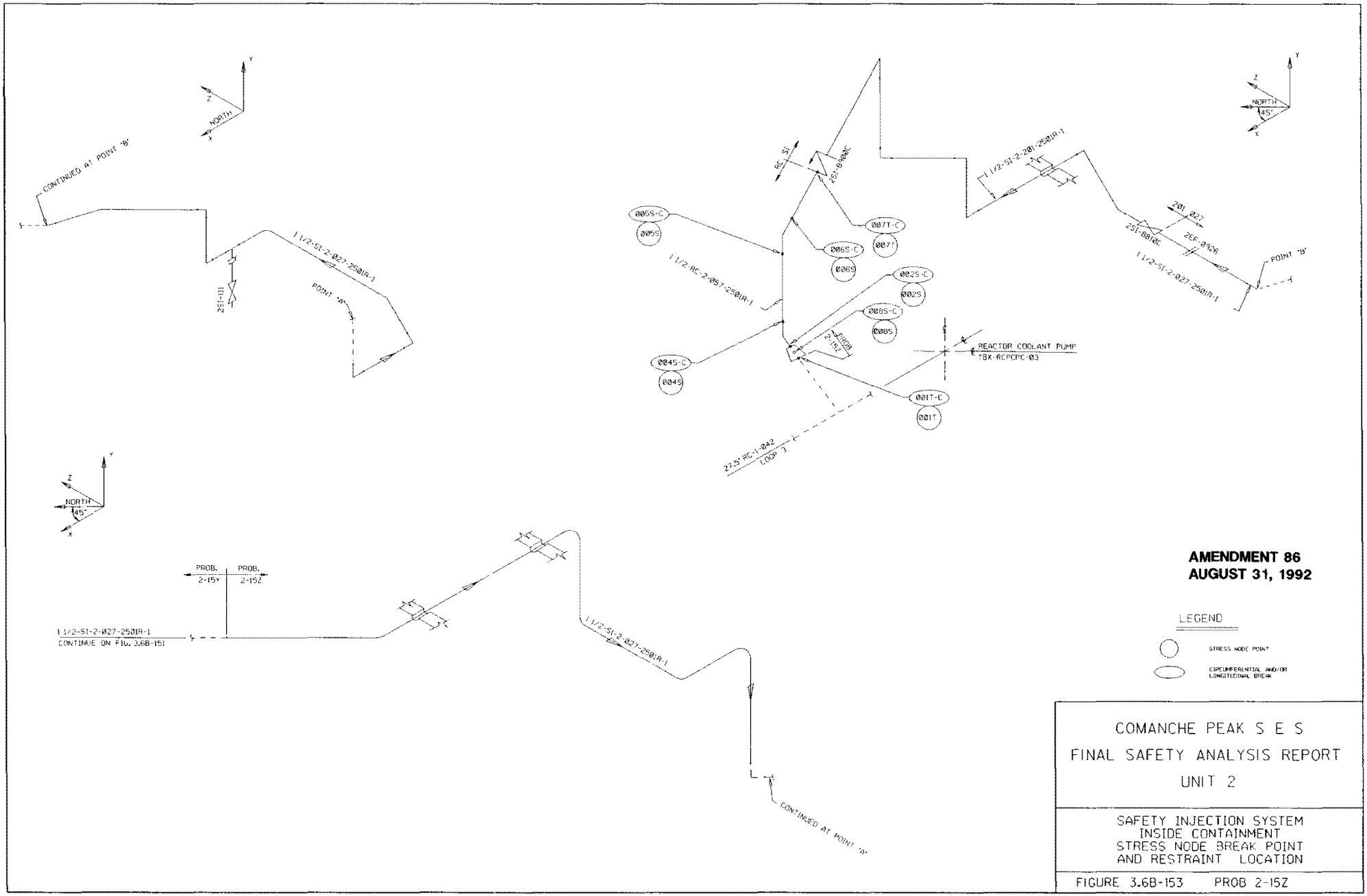
FINAL SAFETY ANALYSIS REPORT

UNIT 2

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-152 PROB 2-15B

FIG152000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S

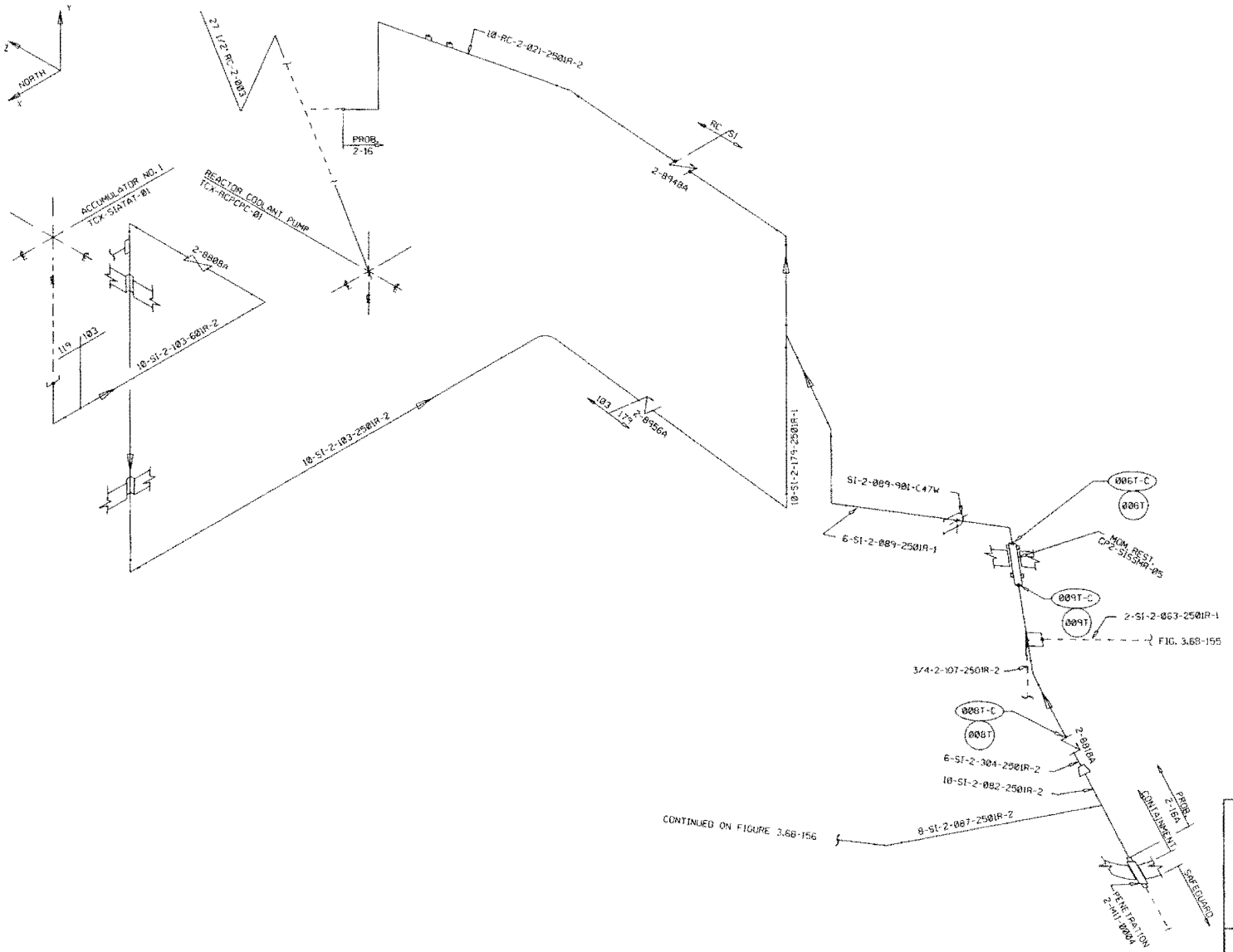
FINAL SAFETY ANALYSIS REPORT

UNIT 2

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-153 PROB 2-15Z

FIG153000.BIT



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

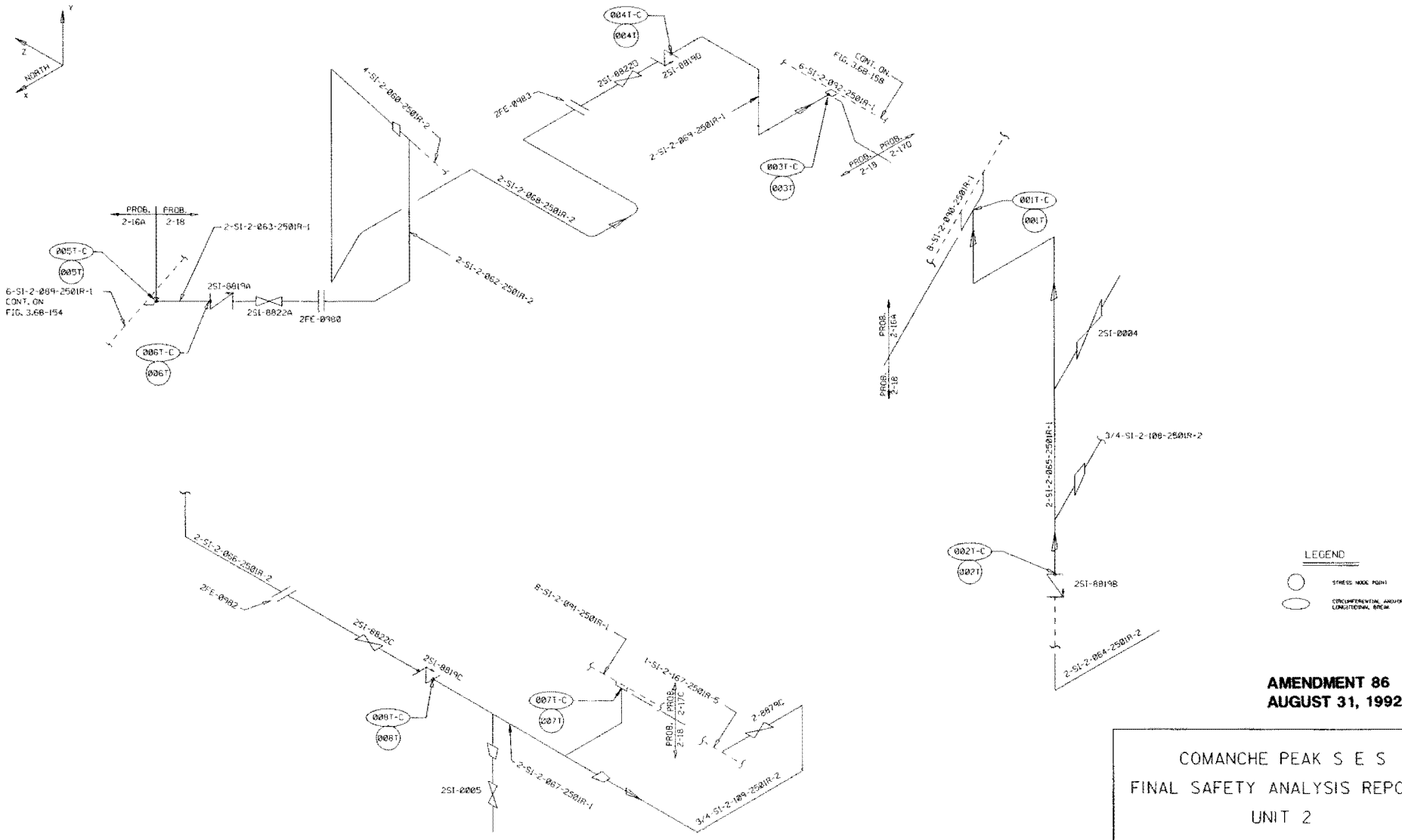
U-BAR RESTRAINT

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-154 PROB. 2-16A

FIG154000.BIT



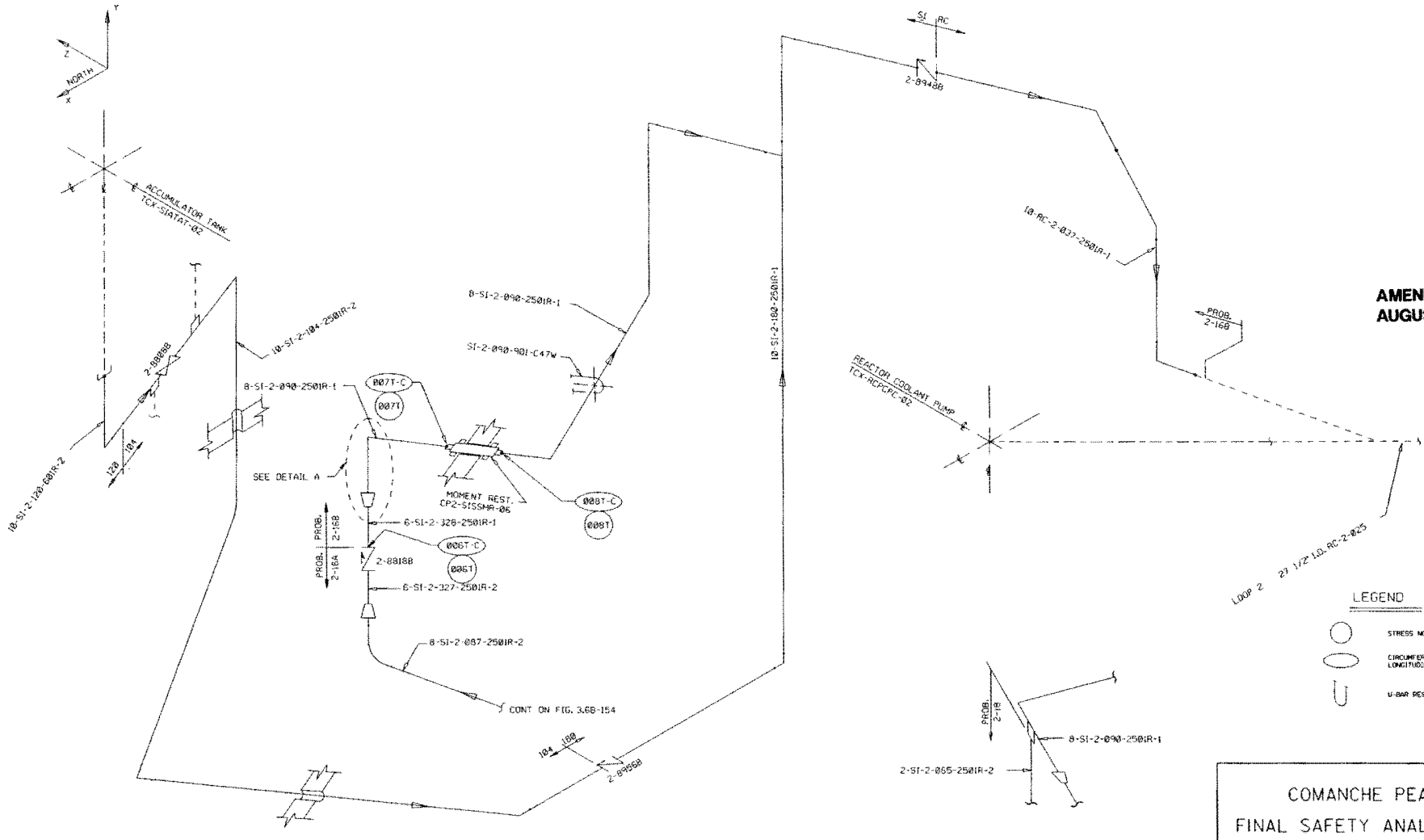
AMENDMENT 86
AUGUST 31, 1992

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-155 PROB. 2-18

FIG155000.BLI



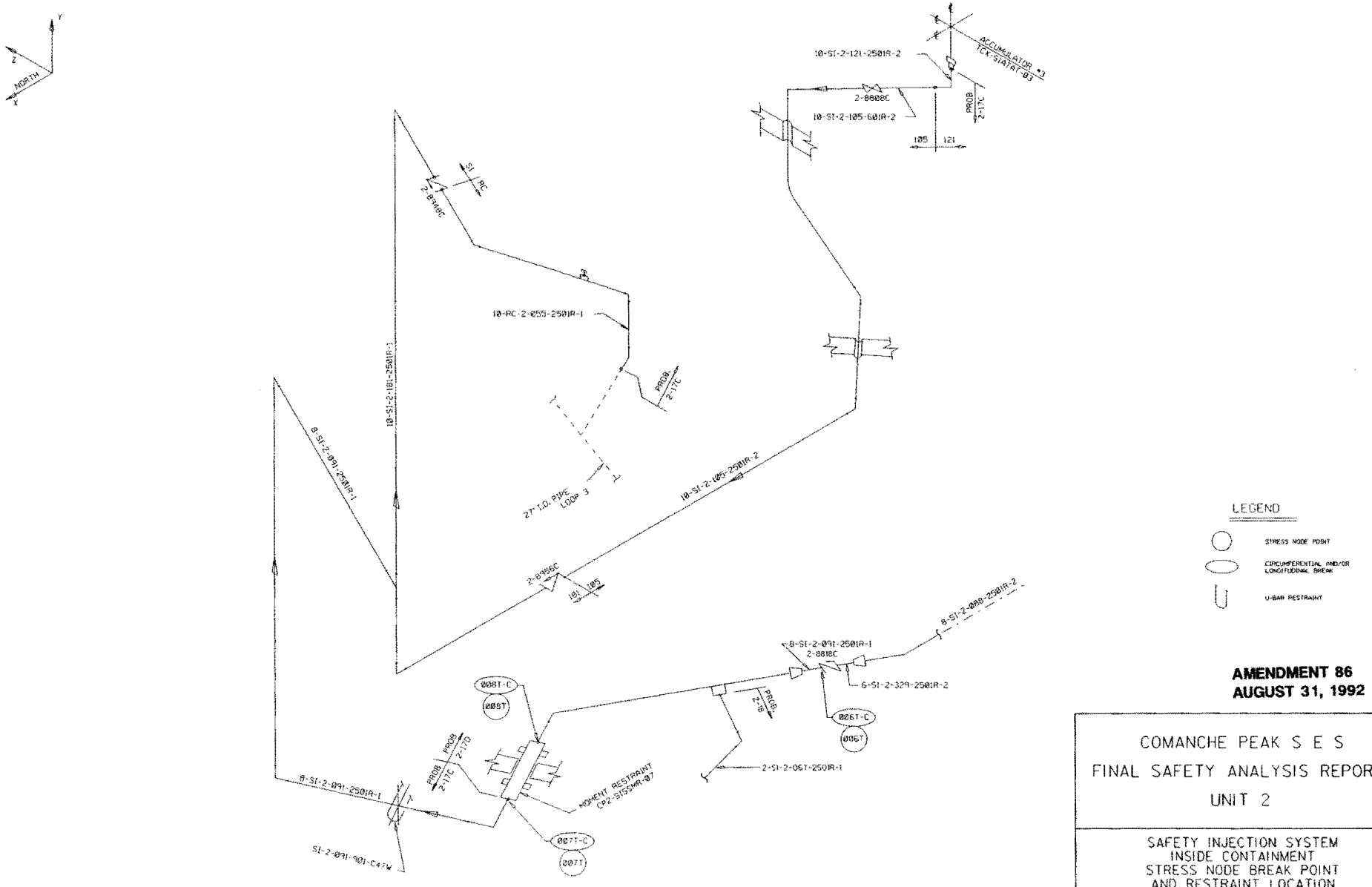
AMENDMENT 86
AUGUST 31, 1992

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-156 PROB. 2-16B

FIG156000.BLI



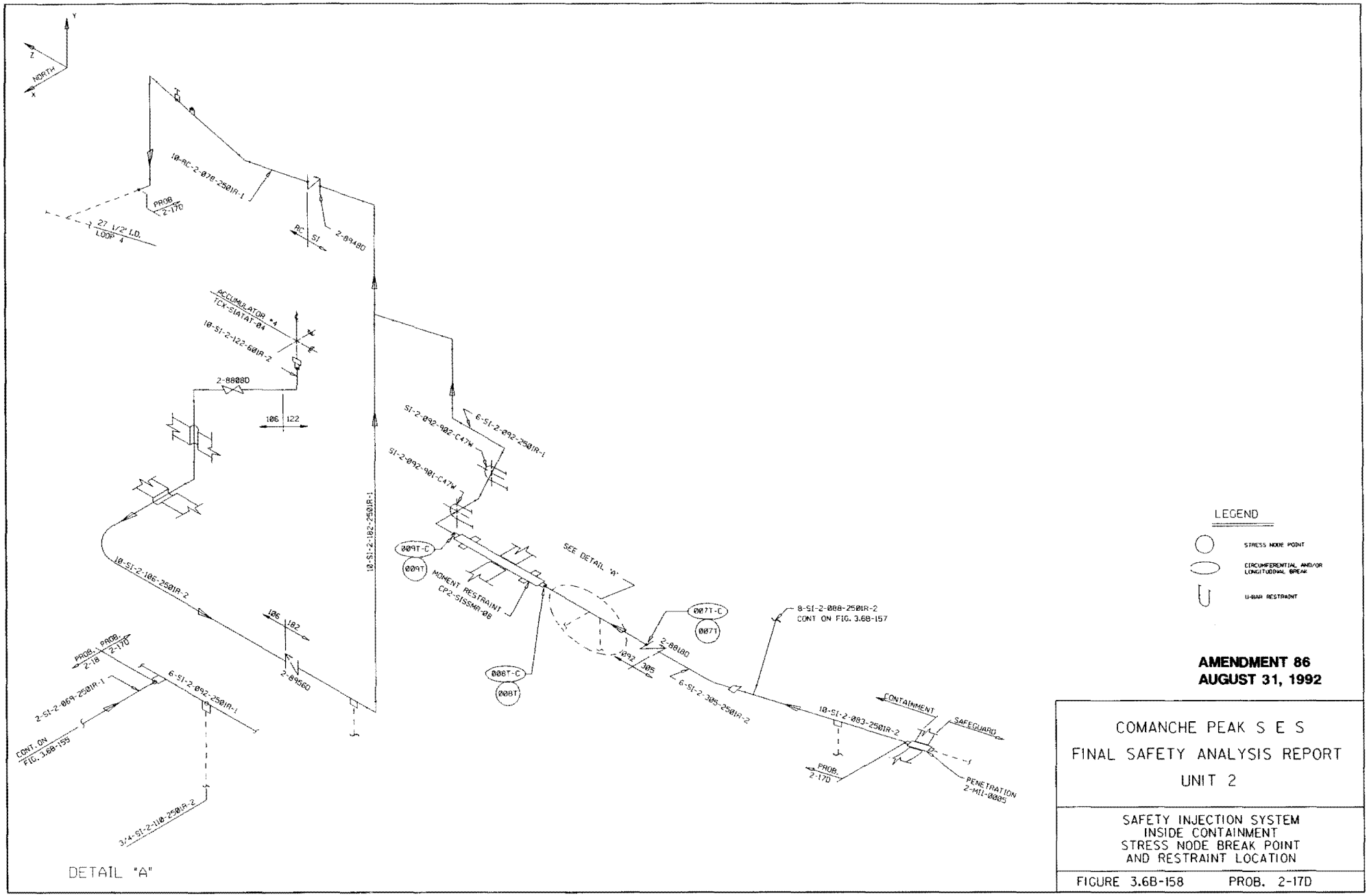
AMENDMENT 86
AUGUST 31, 1992

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-157 PROB. 2-17C

FIG157000.BLI



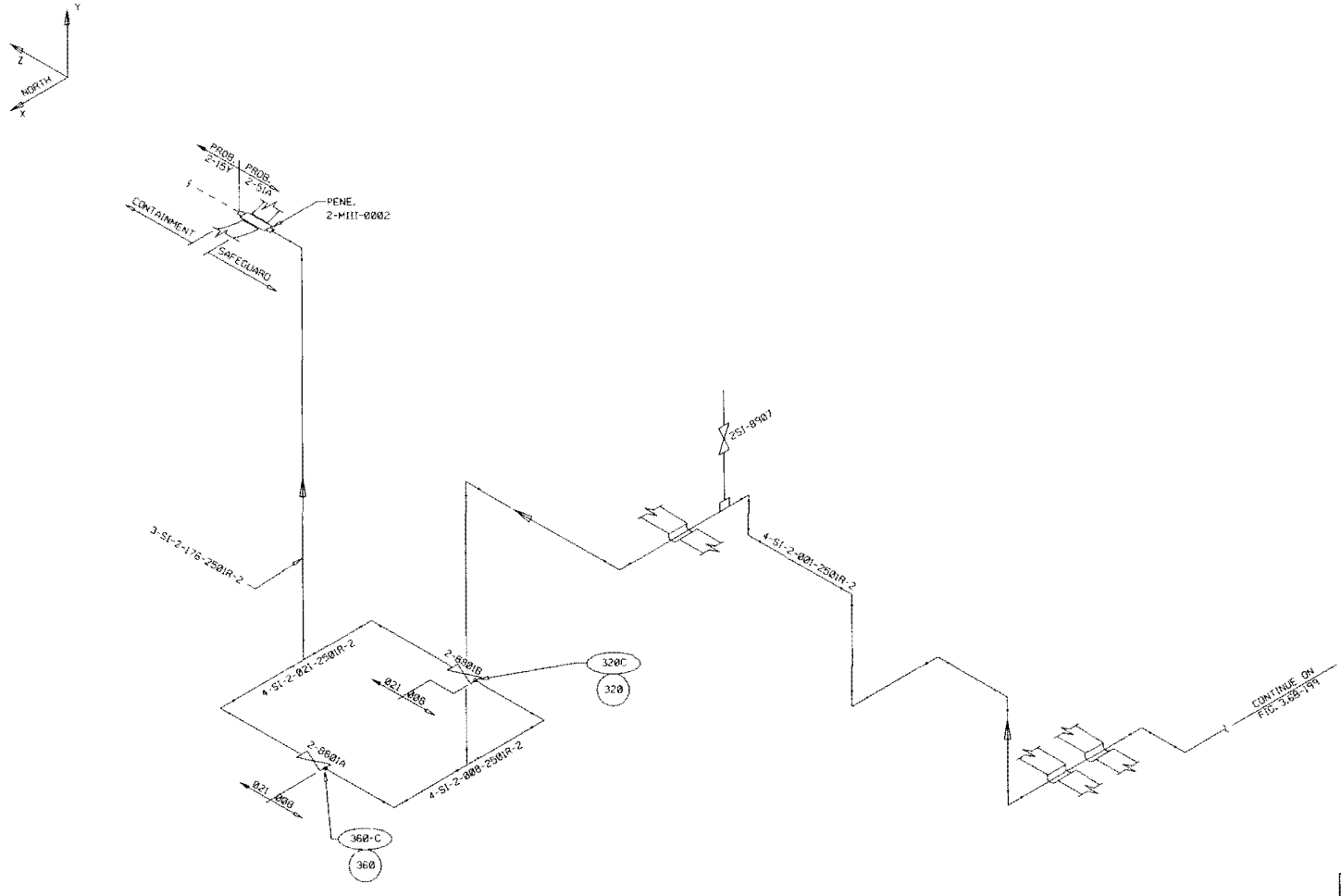
AMENDMENT 86
AUGUST 31, 1992

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-158 PROB. 2-17D

FIG158000.BIT



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

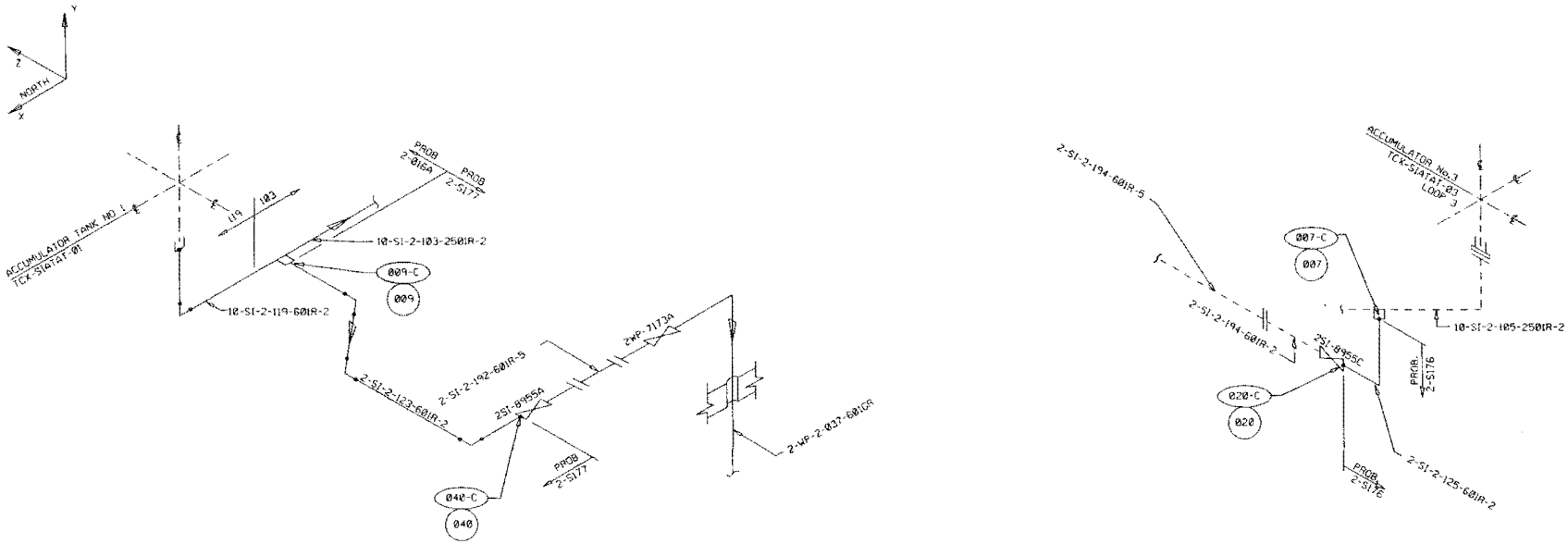
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

SAFETY INJECTION SYSTEM
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-159 PROB. 2-51A

FIG159000.RI1



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

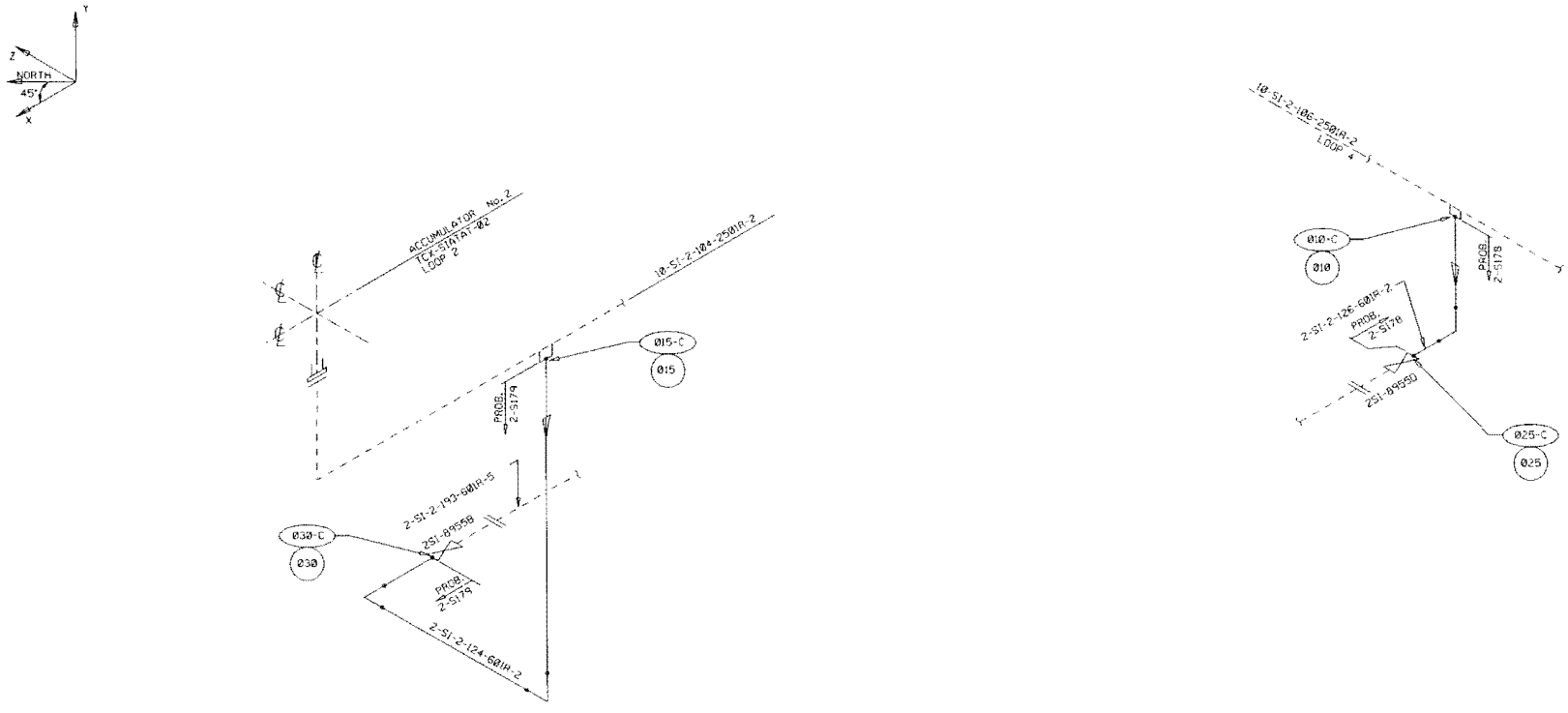
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-160 PROB. 2-S176 & 2-S177

FIG160000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

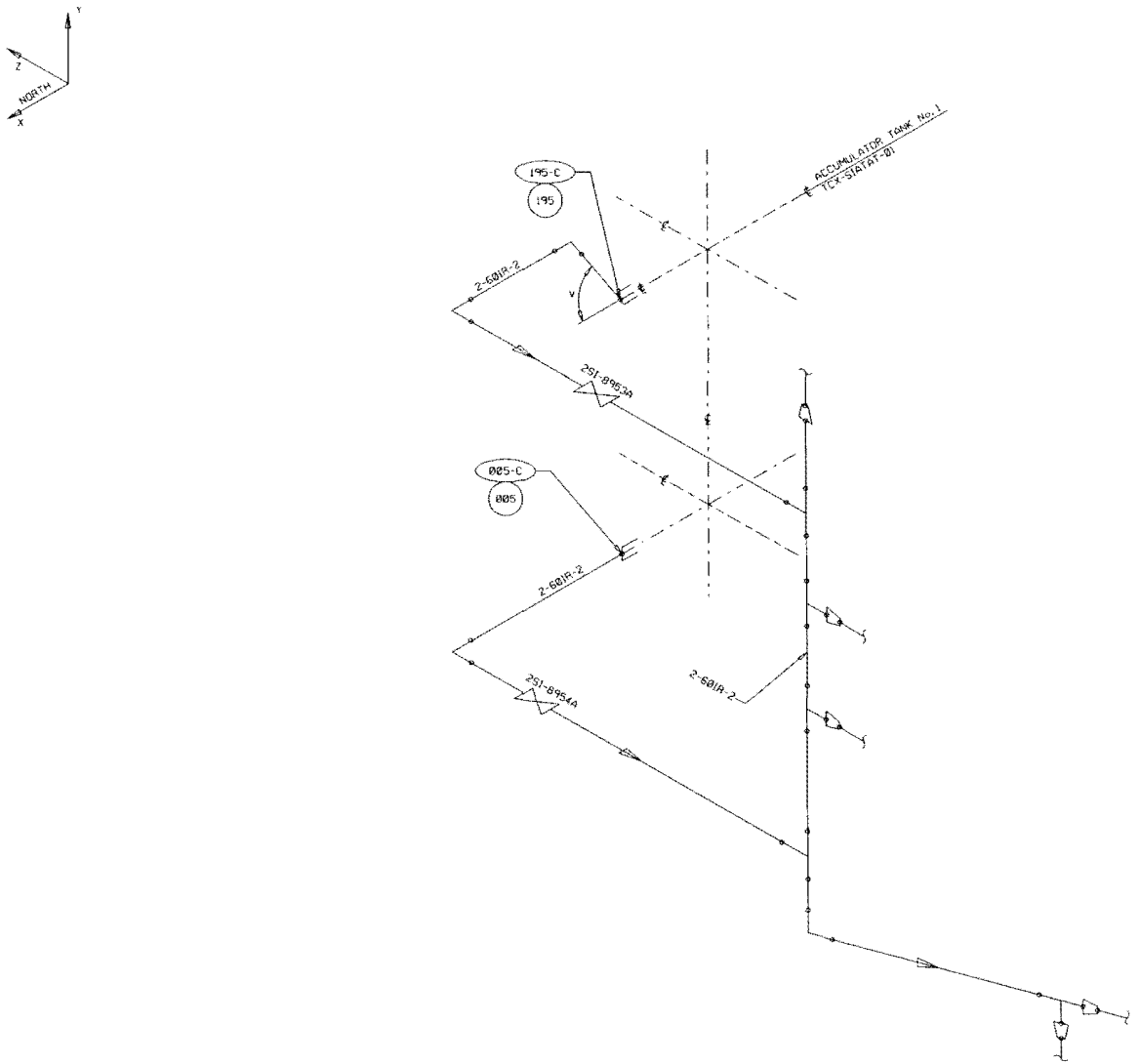
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-161 PROB. 2-S178 & 2-S179

FIG161000.BI1



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S

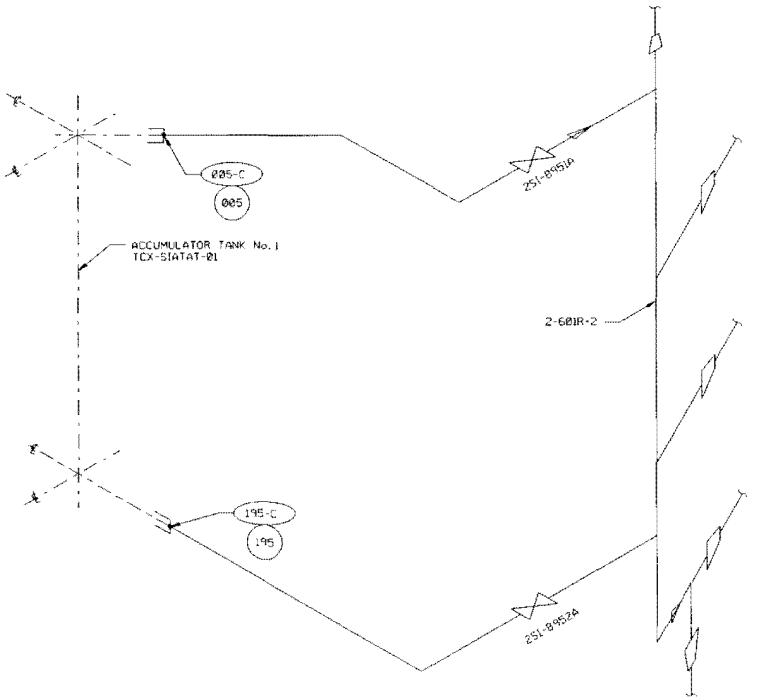
FINAL SAFETY ANALYSIS REPORT

UNIT 2

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-162 PROB. 2-S116

FIG162000.BI I



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

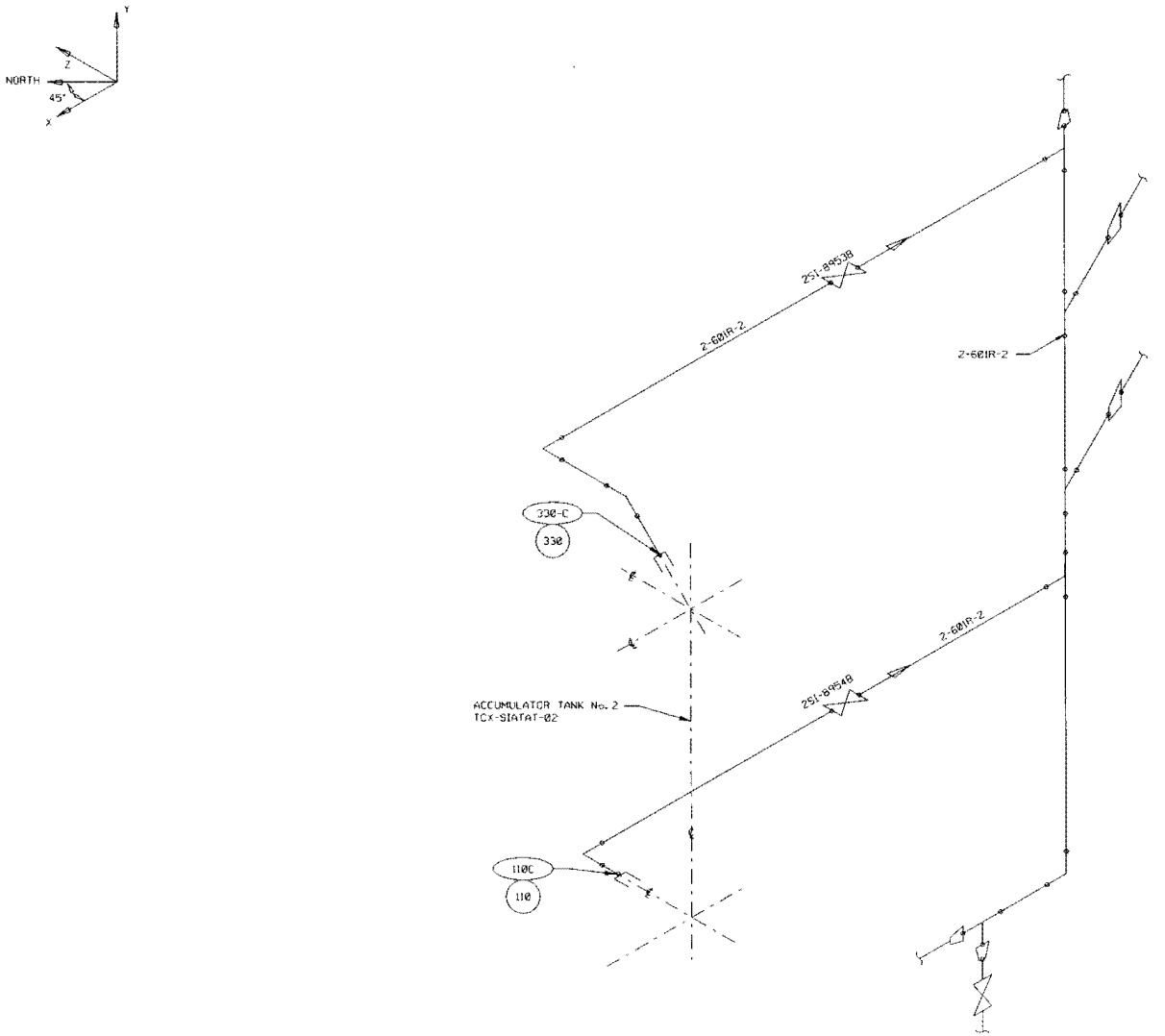
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-163 PROB. 2-S086

FIG163000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S

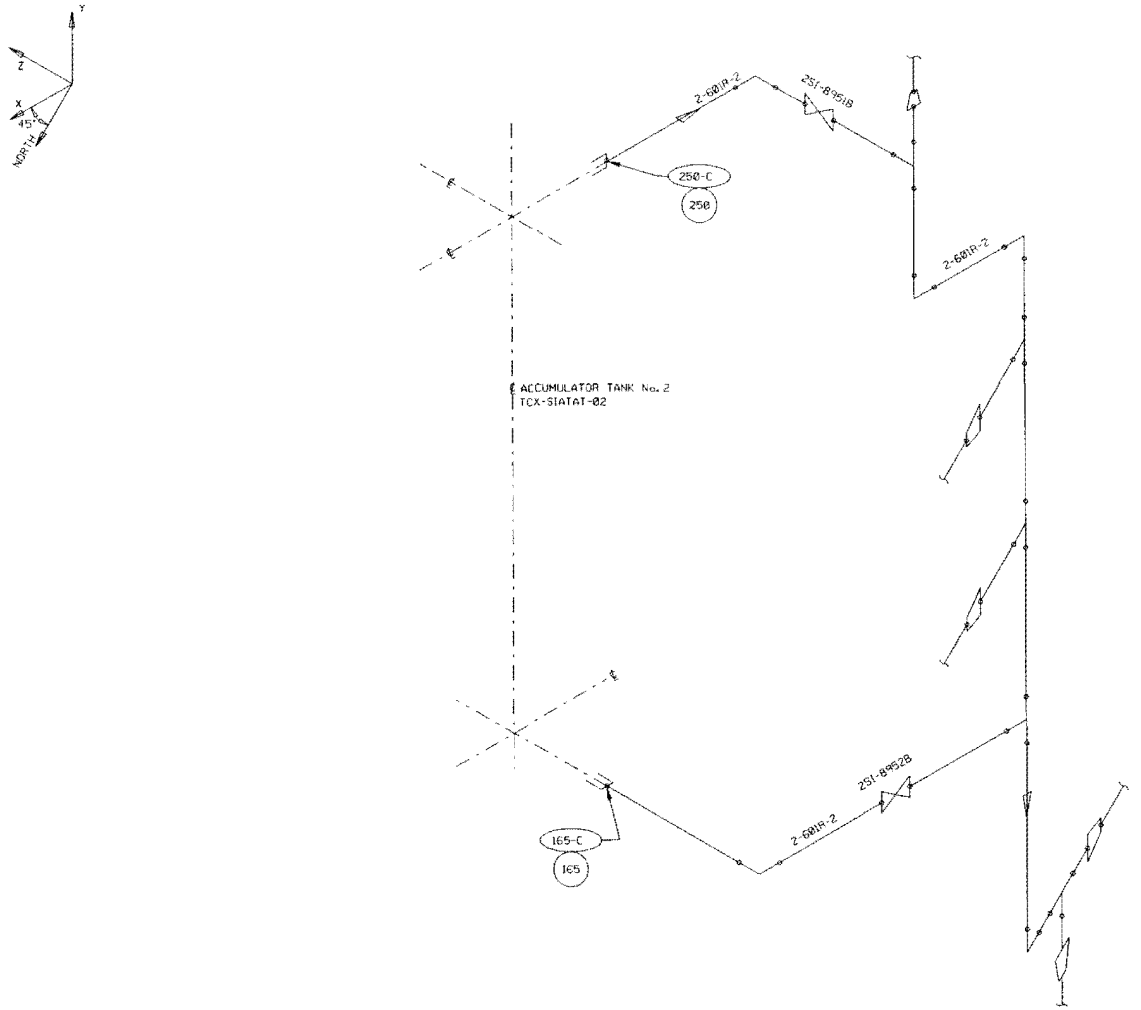
FINAL SAFETY ANALYSIS REPORT

UNIT 2

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-164 PROB. 2-S095

FIG164000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

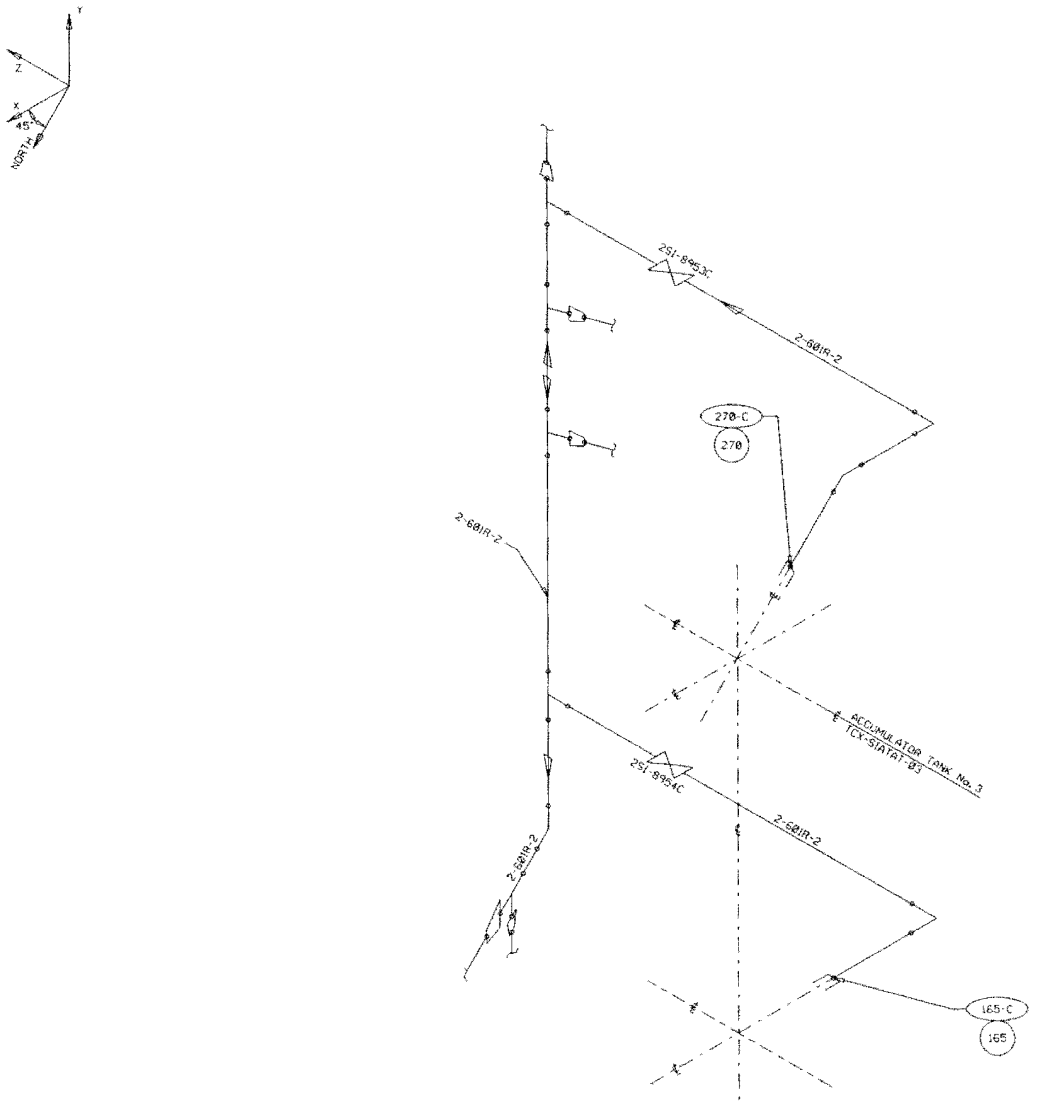
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-165 PROB. 2-S119

FIG165000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

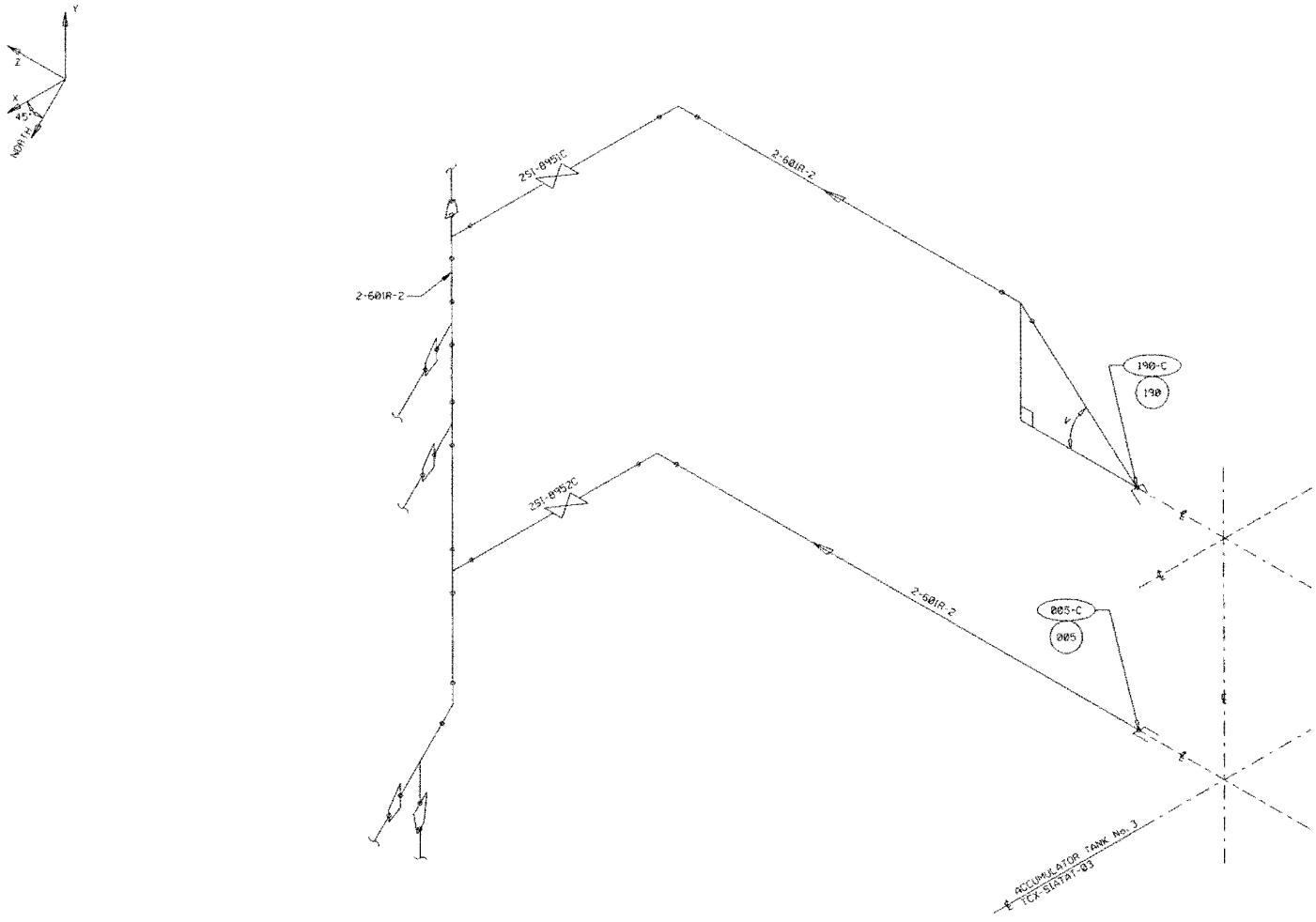
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-166 PROB. 2-S088

FIG166000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S

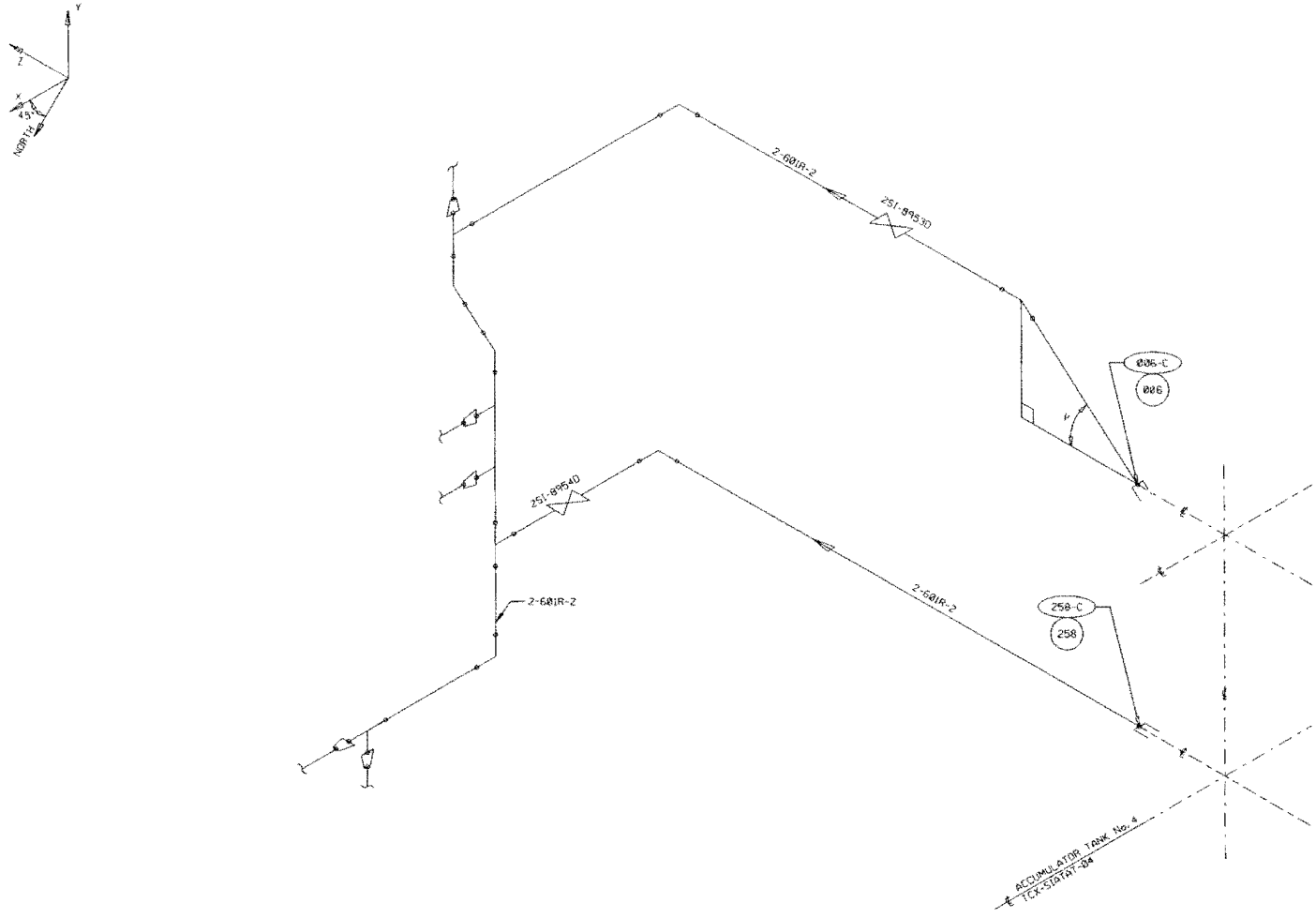
FINAL SAFETY ANALYSIS REPORT

UNIT 2

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-167 PROB. 2-S121

FIG167000.BLT



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S

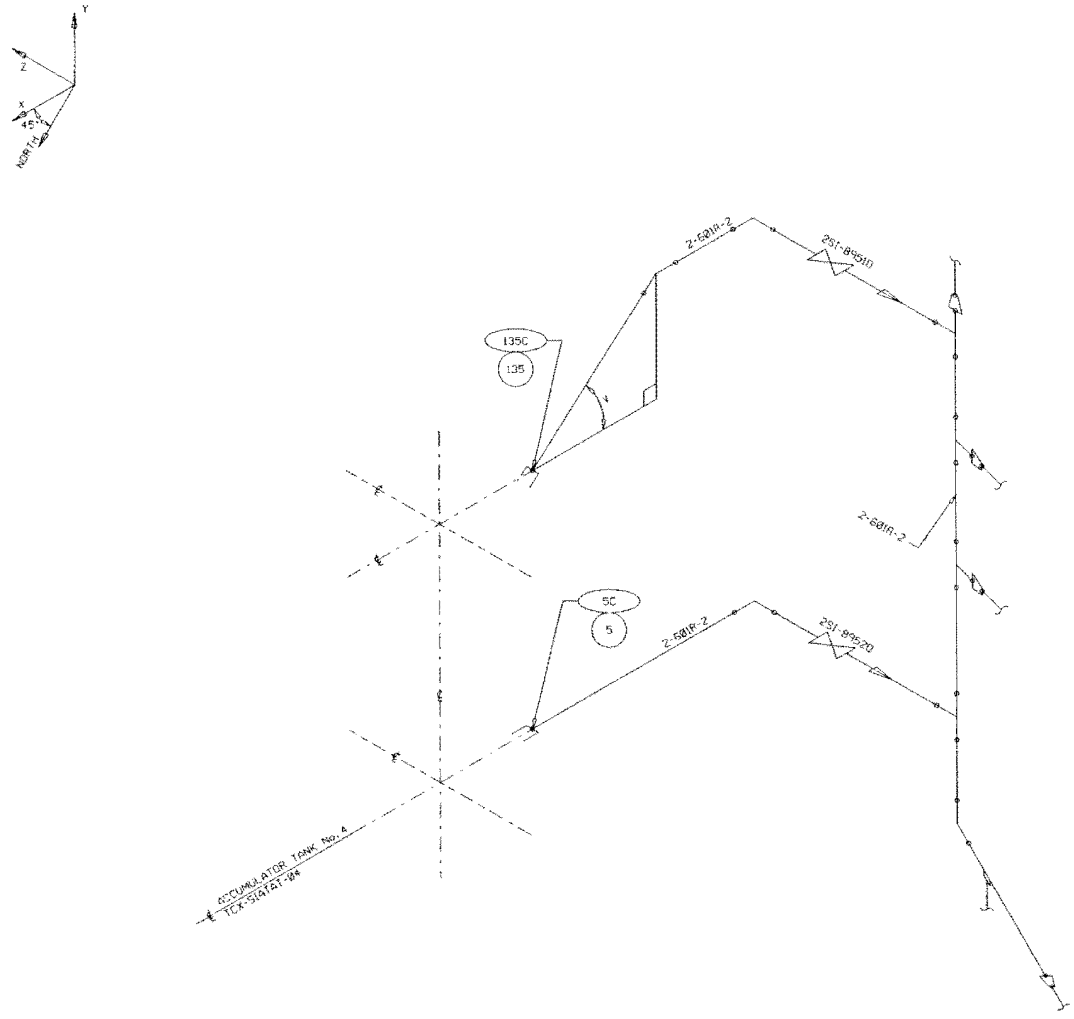
FINAL SAFETY ANALYSIS REPORT

UNIT 2

SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-168 PROB. 2-S090

FIG168000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S

FINAL SAFETY ANALYSIS REPORT

UNIT 2

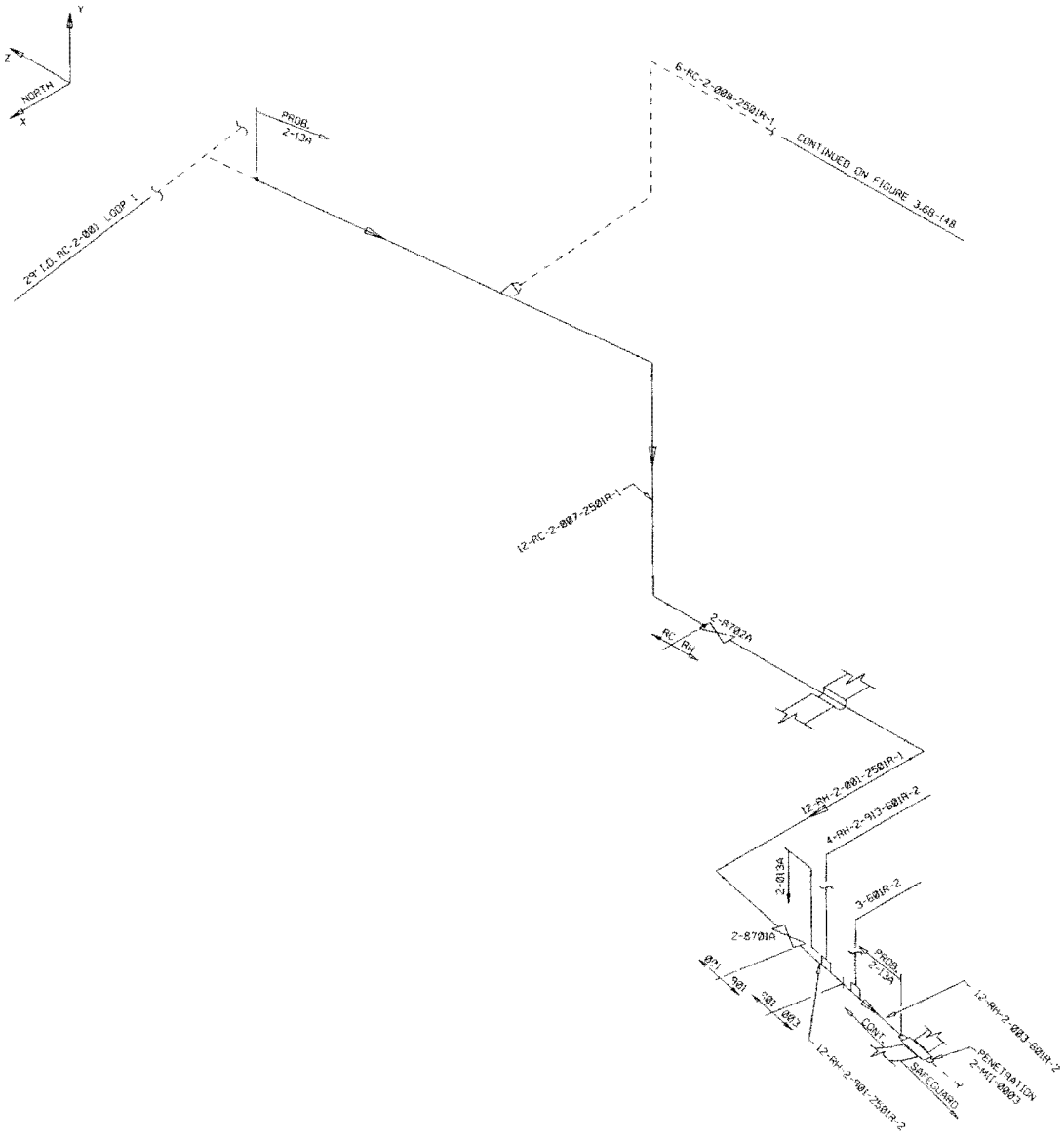
SAFETY INJECTION SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-169 PROB. 2-S089

FIG169000.BLI

Figure 3.6B-170 thru 3.6B-171
(NOT USED)

Figure 3.6B-170 thru 3.6B-171
(NOT USED)



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

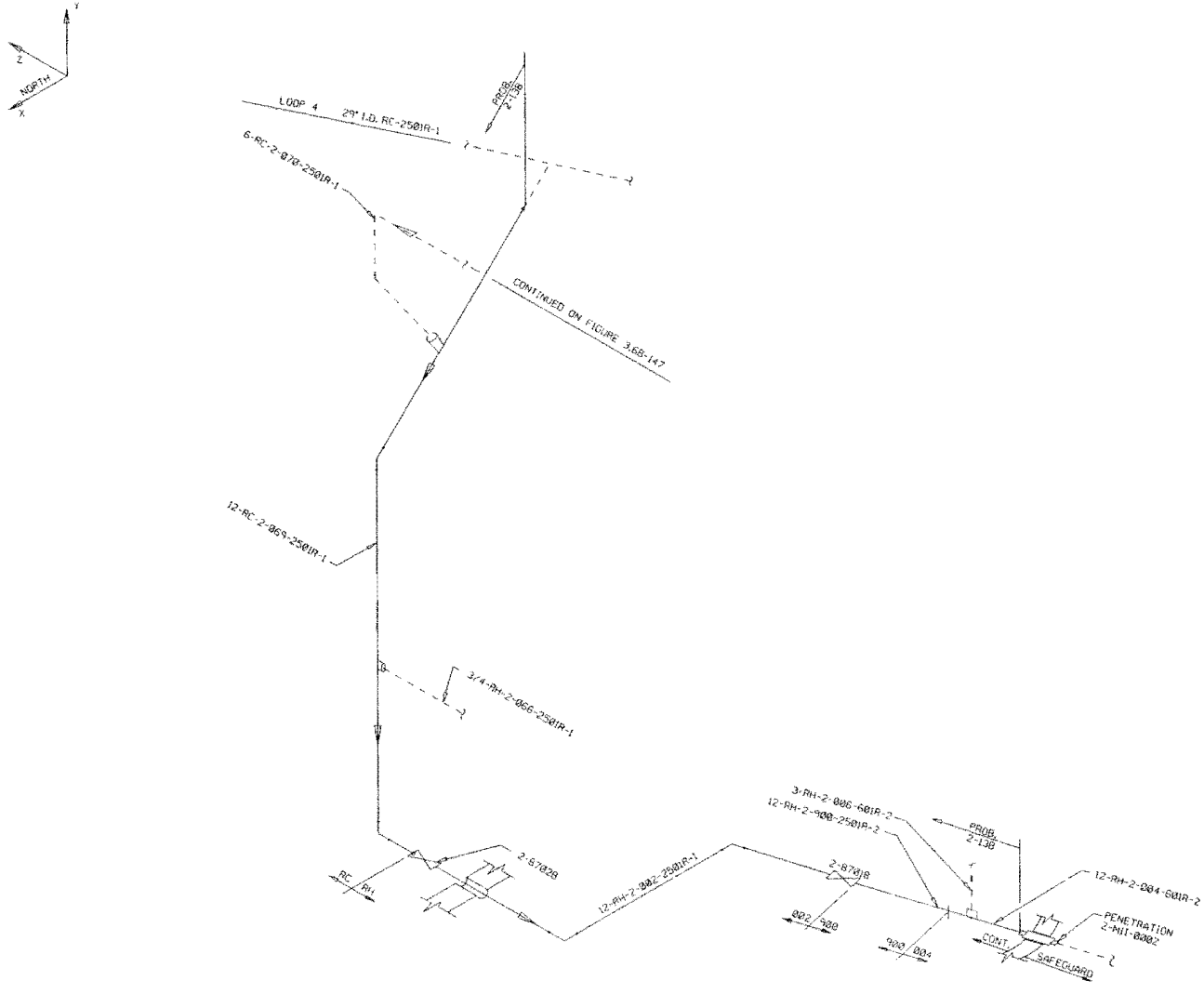
CIRCUMFERENTIAL AND/OR LONGITUDAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

RHR SYSTEM
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-172 PROB 2-13A

FIG172000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

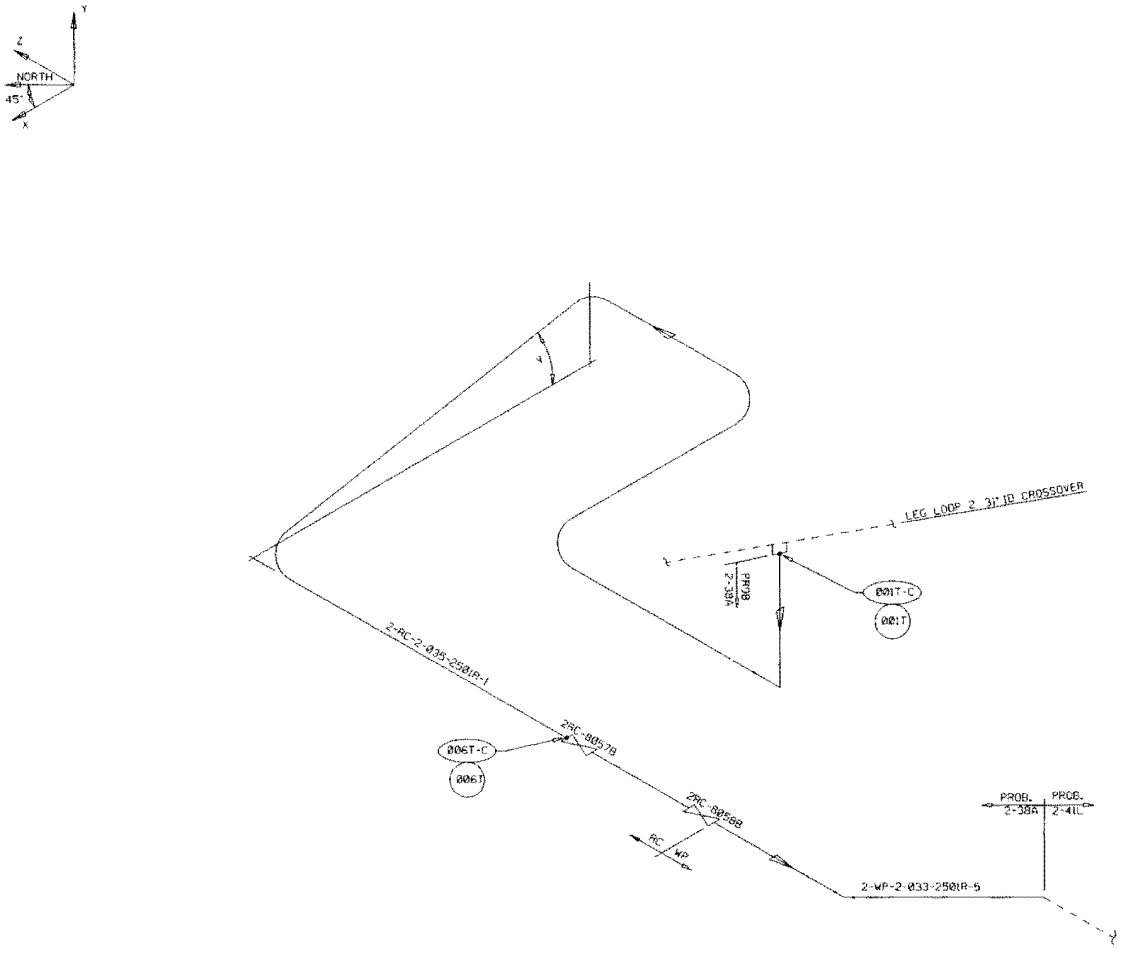
COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

RHR SYSTEM
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-173 PROB 2-13B

FIG173000.RH

Figure 3.6B-174
(NOT USED)



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S

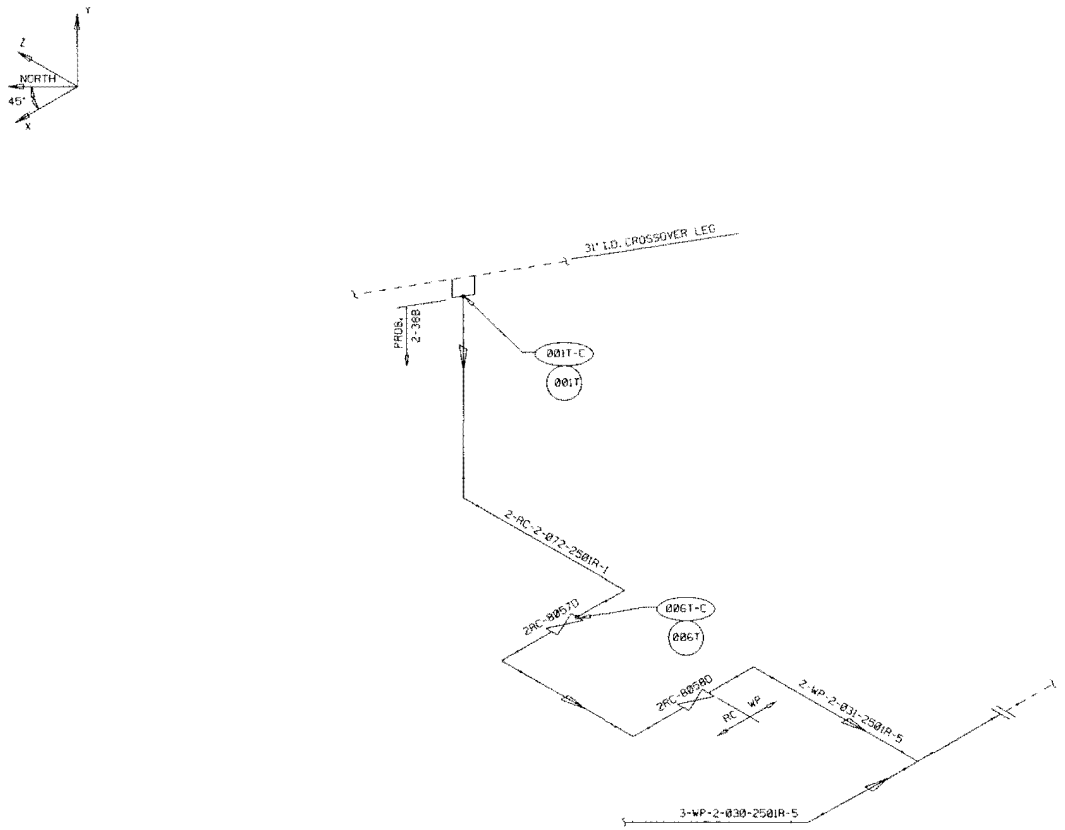
FINAL SAFETY ANALYSIS REPORT

UNIT 2

REACTOR COOLANT SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-175 PROB. 2-38A

FIG175000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

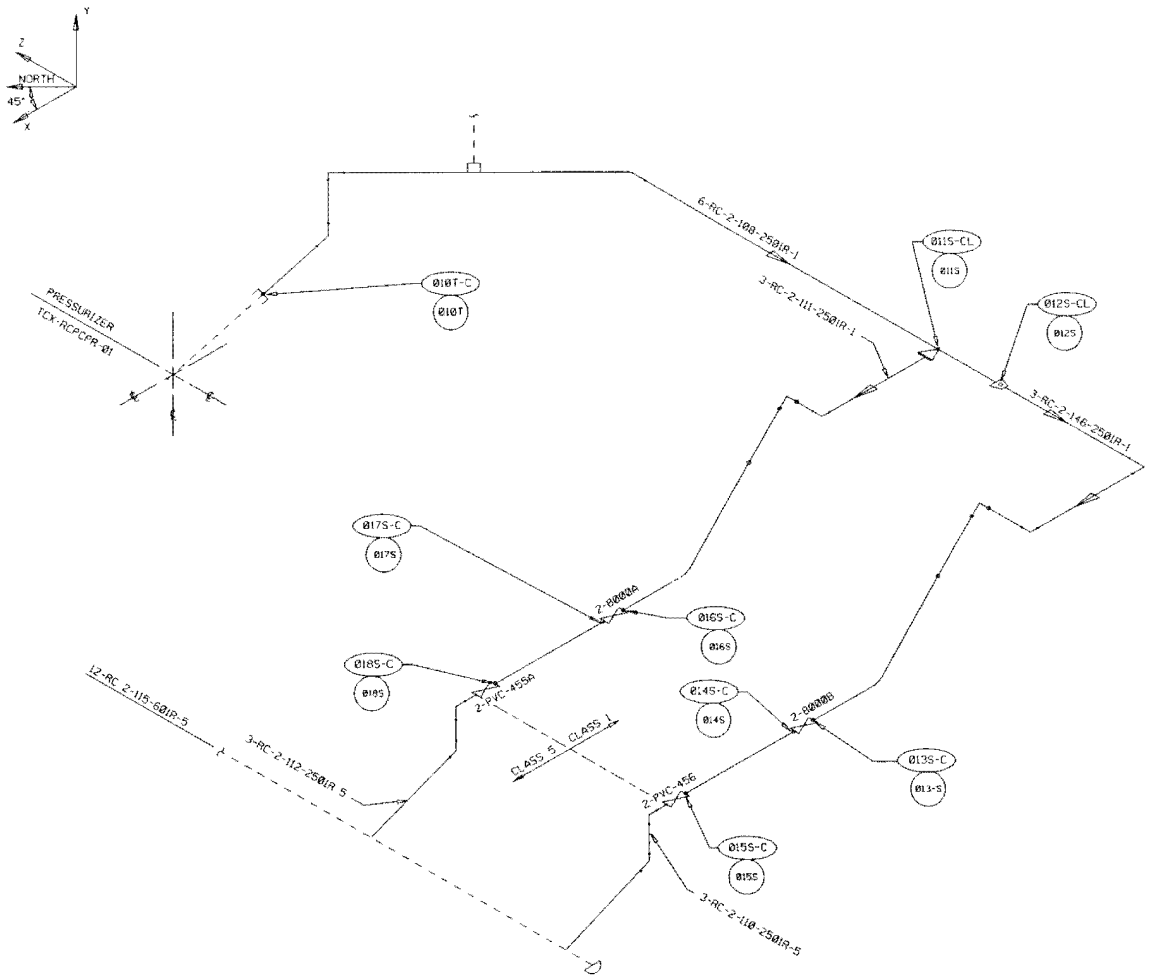
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

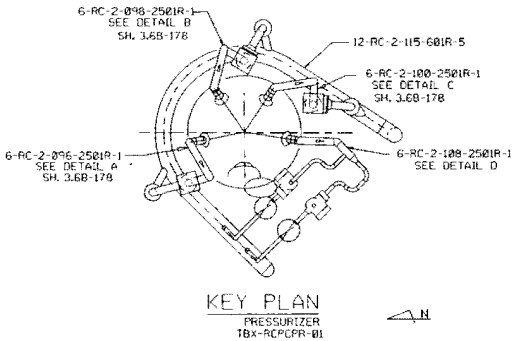
REACTOR COOLANT SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-176 PROB. 2-38B

FIG176000.BLI



DETAIL D



KEY PLAN
PRESSURIZER
TBX-RCPCPR-01

AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

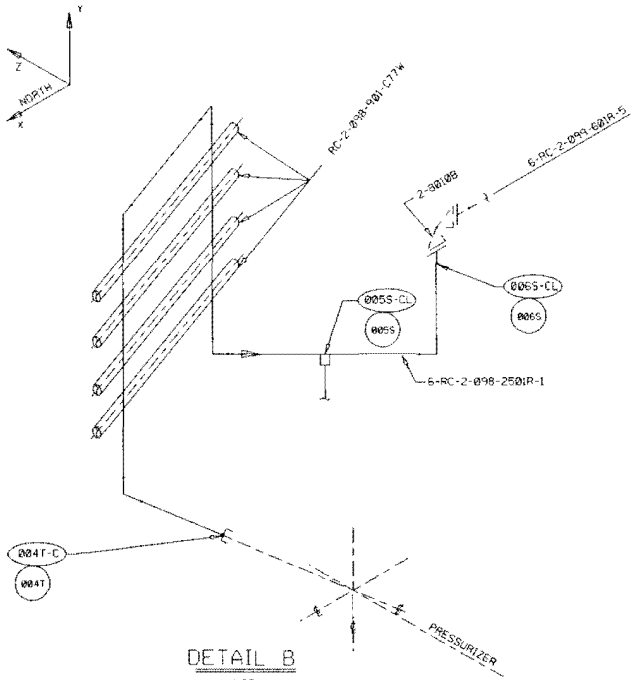
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

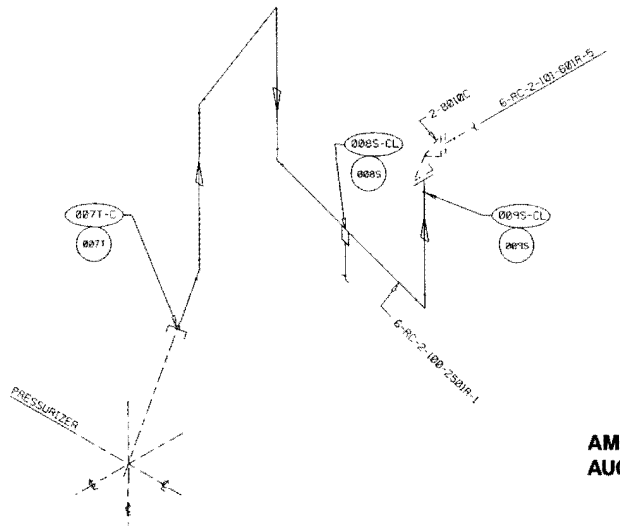
REACTOR COOLANT SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-177 PROB. 2-53 SH 1 OF 3

FIG177000.BI1



DETAIL B
(LOOP B)

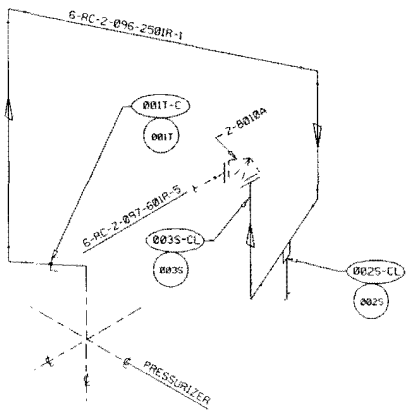


DETAIL C
(LOOP C)

AMENDMENT 86
AUGUST 31, 1992

NOTES

1. FOR LOCATION OF BREAKS ON LOOPS A, B, & C SEE DETAIL E FIG. 3.6B-179.



DETAIL A
(LOOP A)

LEGEND

STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

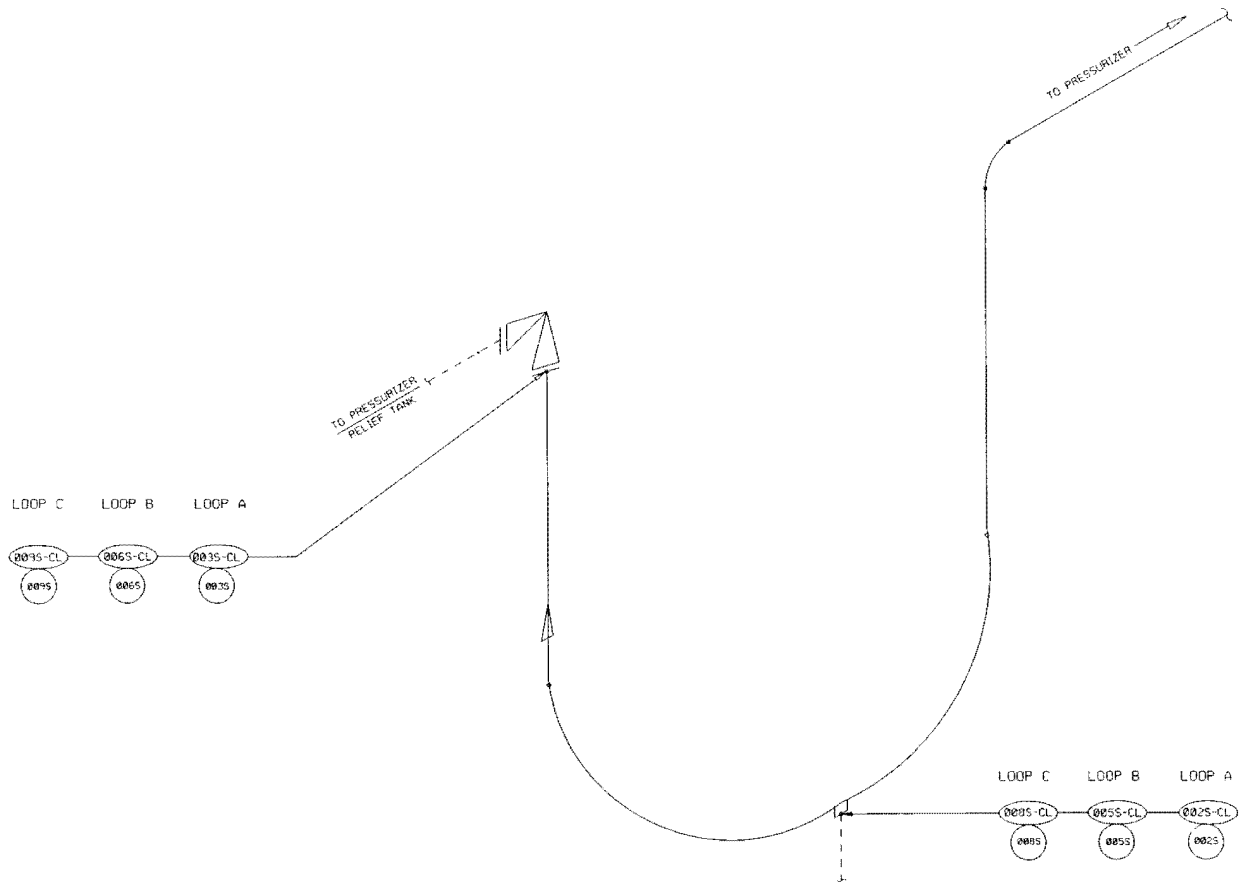
BUMPER RESTRAINT

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

REACTOR COOLANT SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-178 PROB. 2-53 SH 2 OF 3

FIG178000.BH



DETAIL E

BREAK LOCATIONS
FOR LOOPS A, B, & C.
REF. 3.6B-178

AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

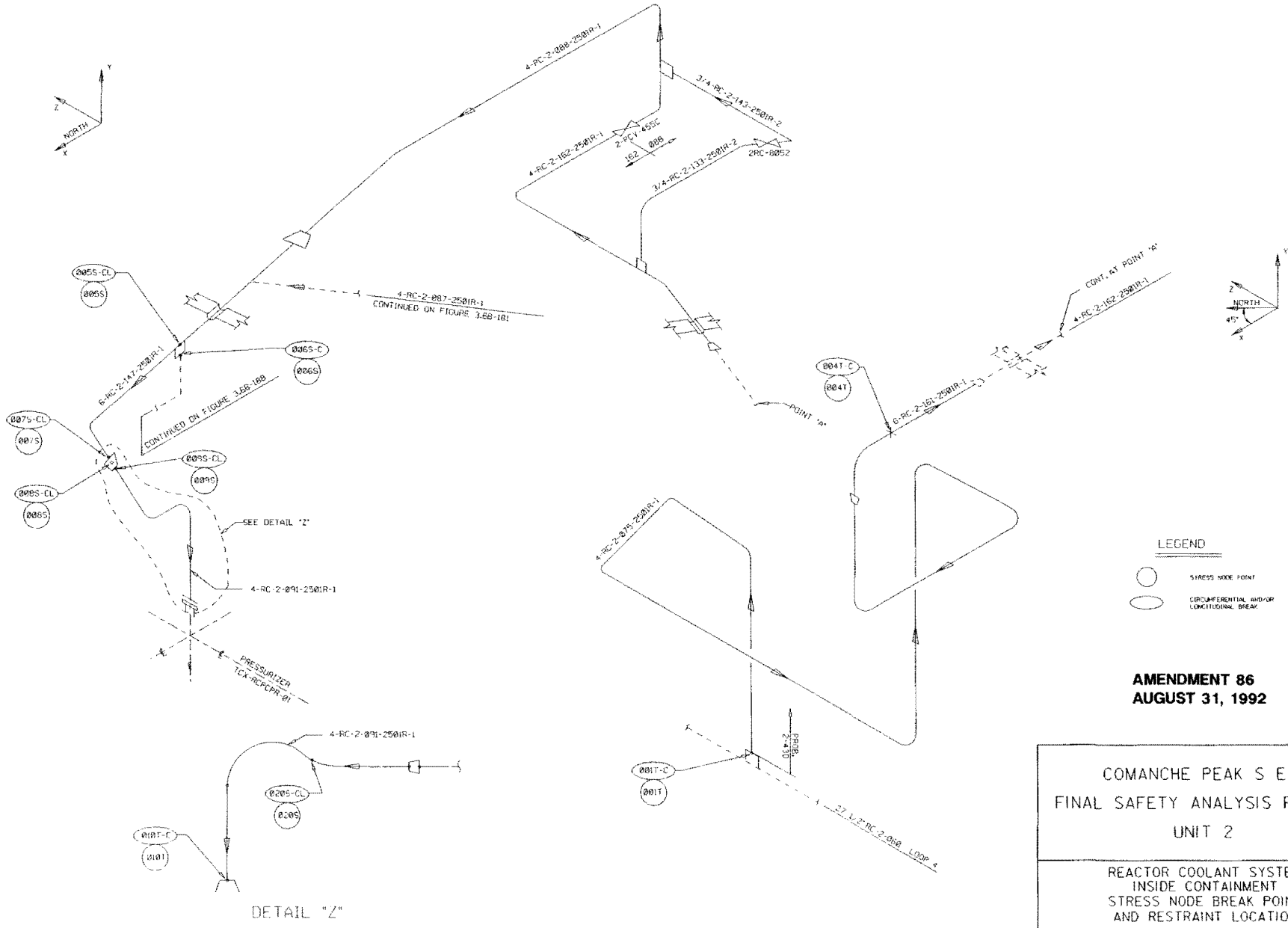
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

REACTOR COOLANT SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-179 PROB. 2-53 SH 3 OF 3

FIG179000.BLI



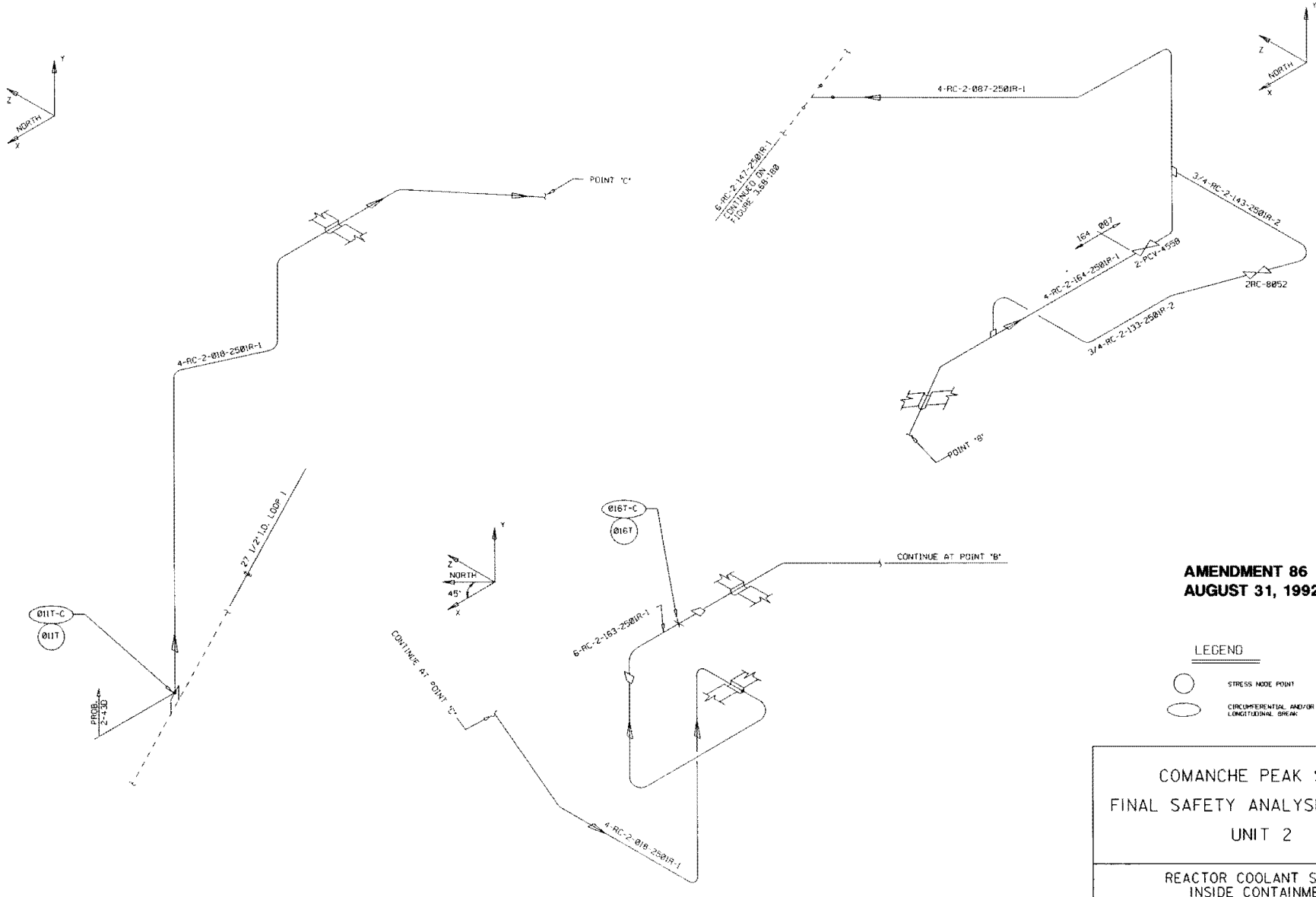
AMENDMENT 86
AUGUST 31, 1992

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

REACTOR COOLANT SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-180 PROB. 2-43D

FIG180000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

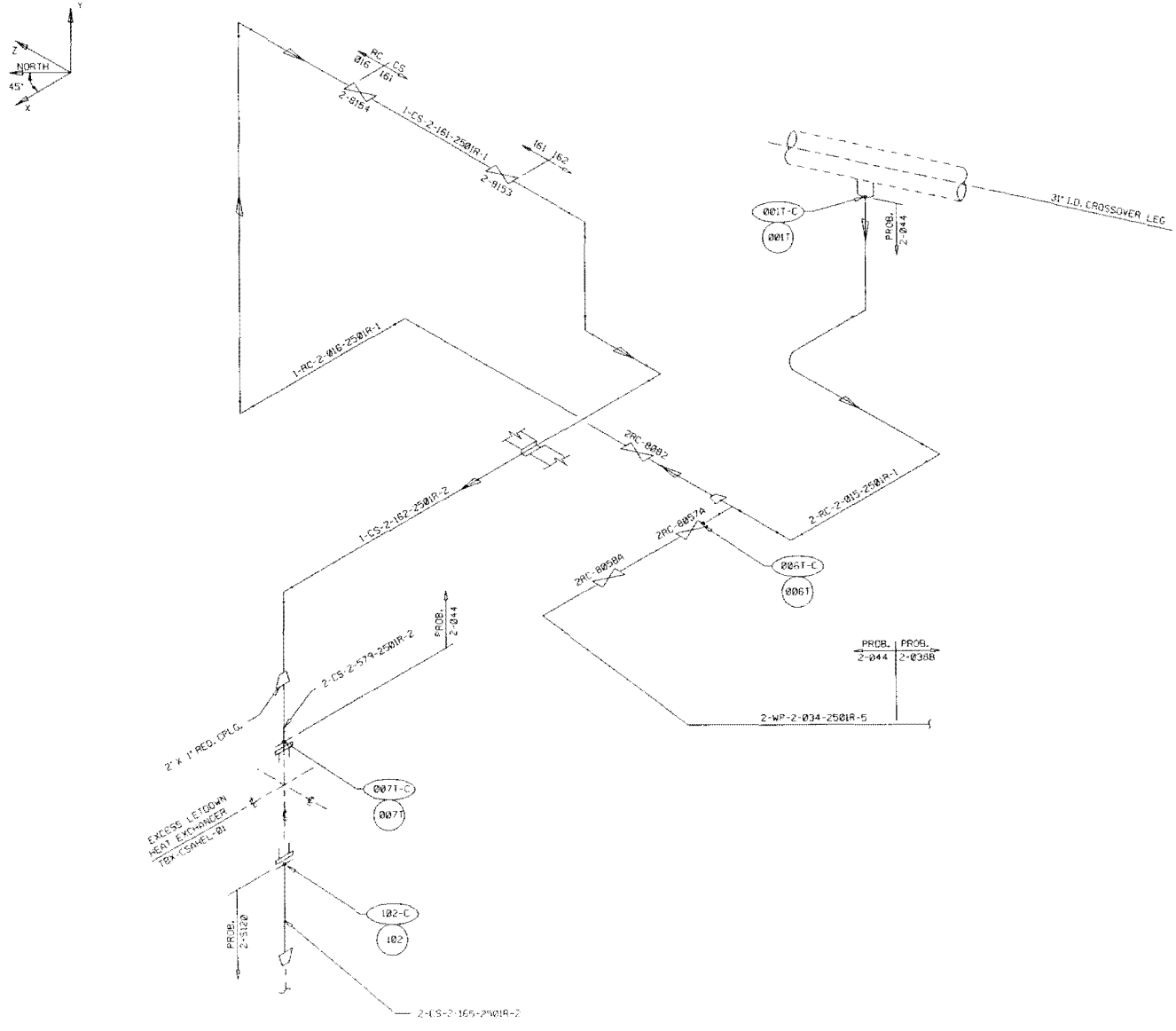
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

REACTOR COOLANT SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-181 PROB. 2-43D

FIG181000.BI1



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S

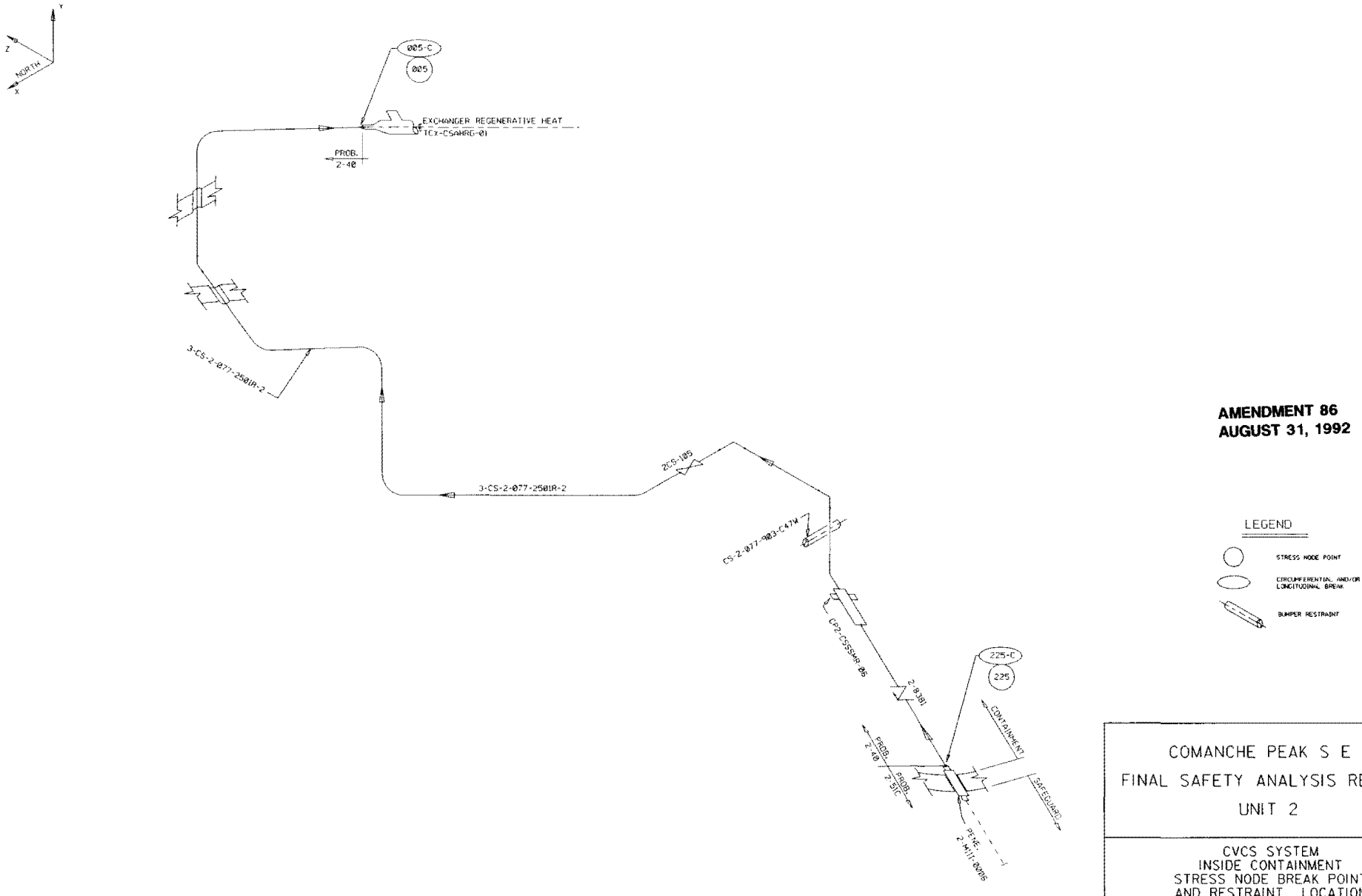
FINAL SAFETY ANALYSIS REPORT

UNIT 2

REACTOR COOLANT SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-182 PROB 2-44 & 2-S120

FIG182000.RI1



AMENDMENT 86
AUGUST 31, 1992

LEGEND

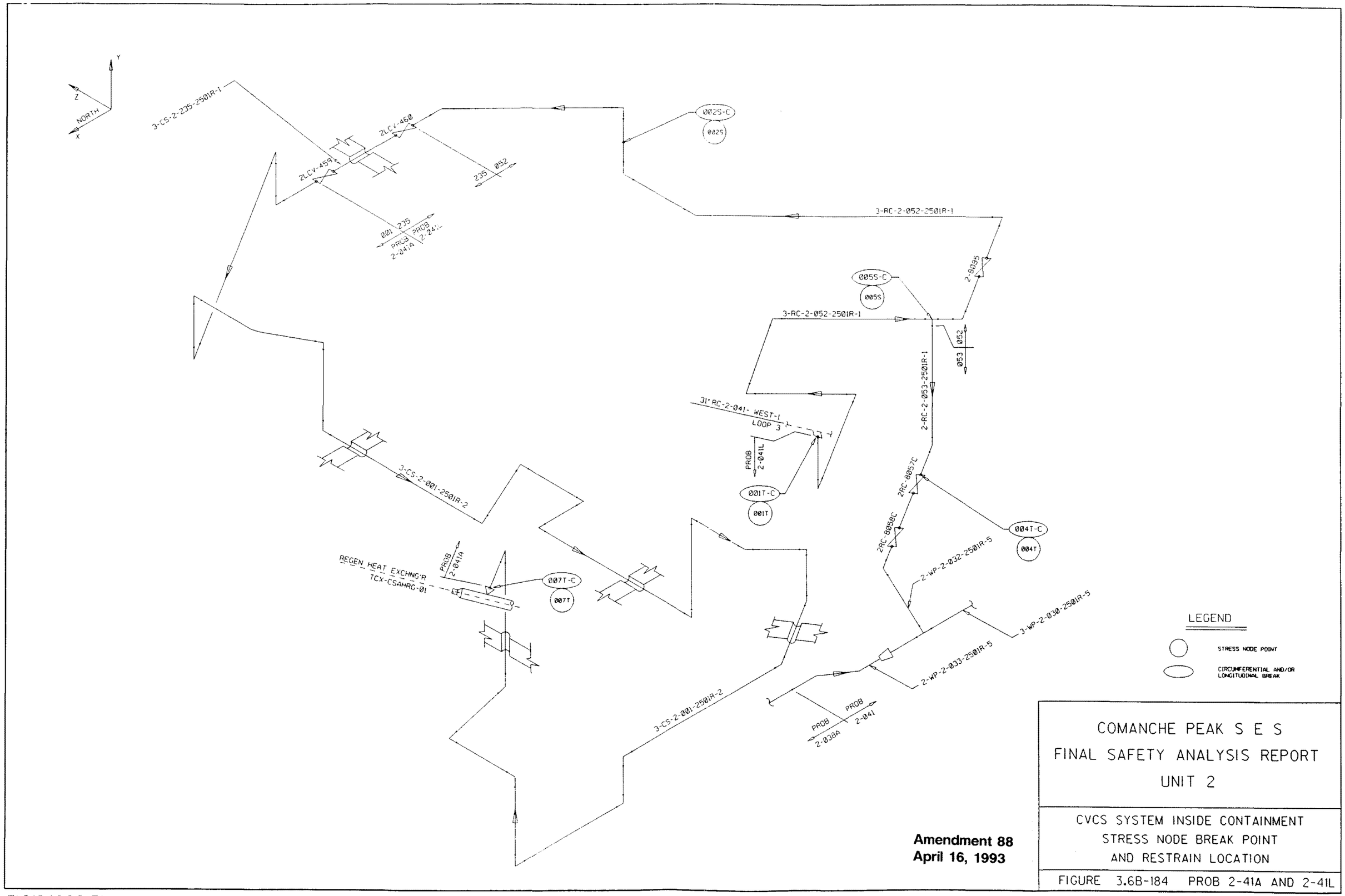
- STRESS NODE POINT
- CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK
- BUMPER RESTRAINT

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

CVCS SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-183 PROB. 2-40

FIG183000.BLI

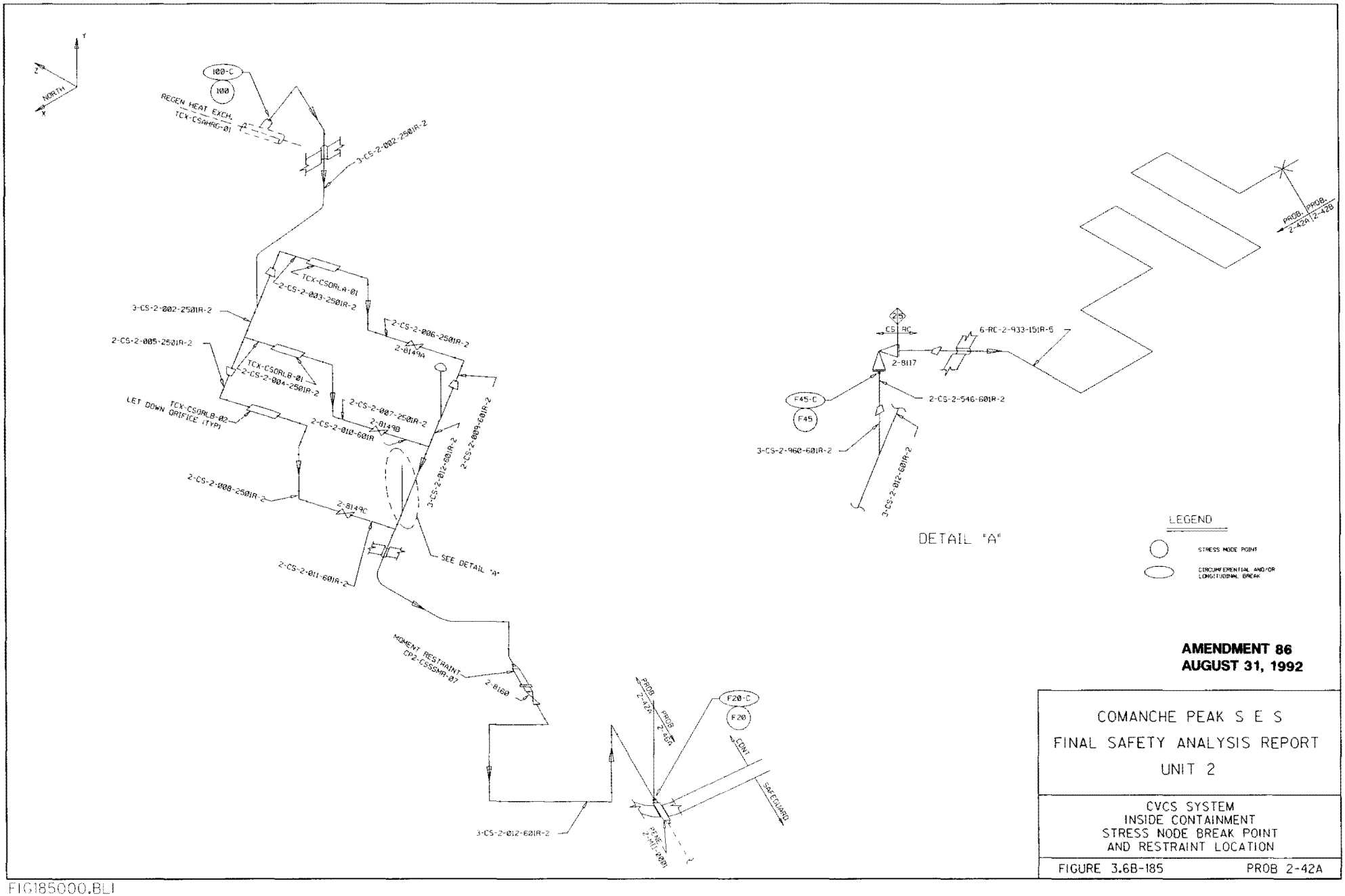


Amendment 88
April 16, 1993

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

CVCS SYSTEM INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAIN LOCATION

FIGURE 3.6B-184 PROB 2-41A AND 2-41L



AMENDMENT 86
AUGUST 31, 1992

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

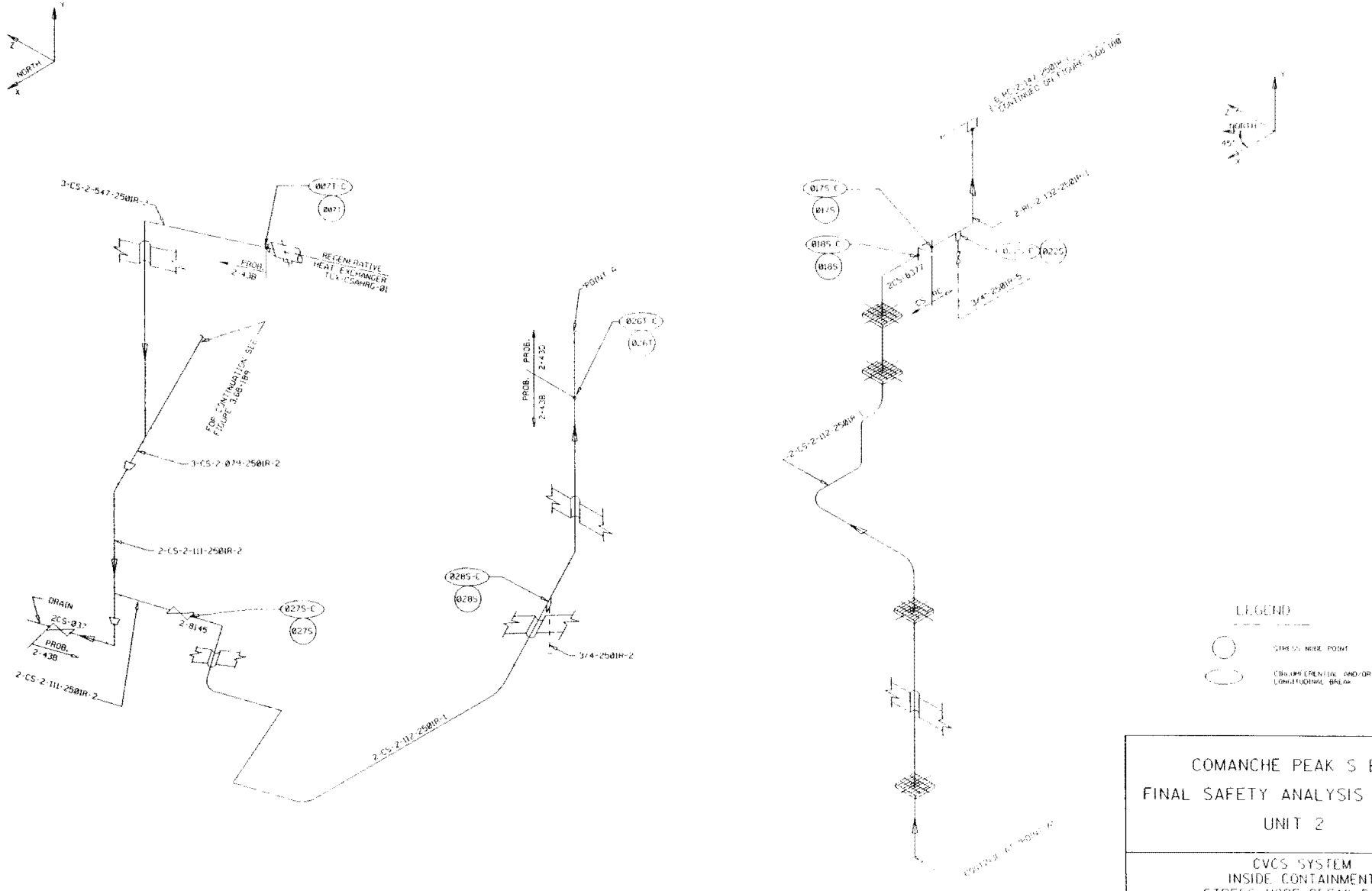
CVCS SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-185 PROB 2-42A

FIG185000.BLI

Figure 3.6B-186
(NOT USED)

Figure 3.6B-187
(NOT USED)

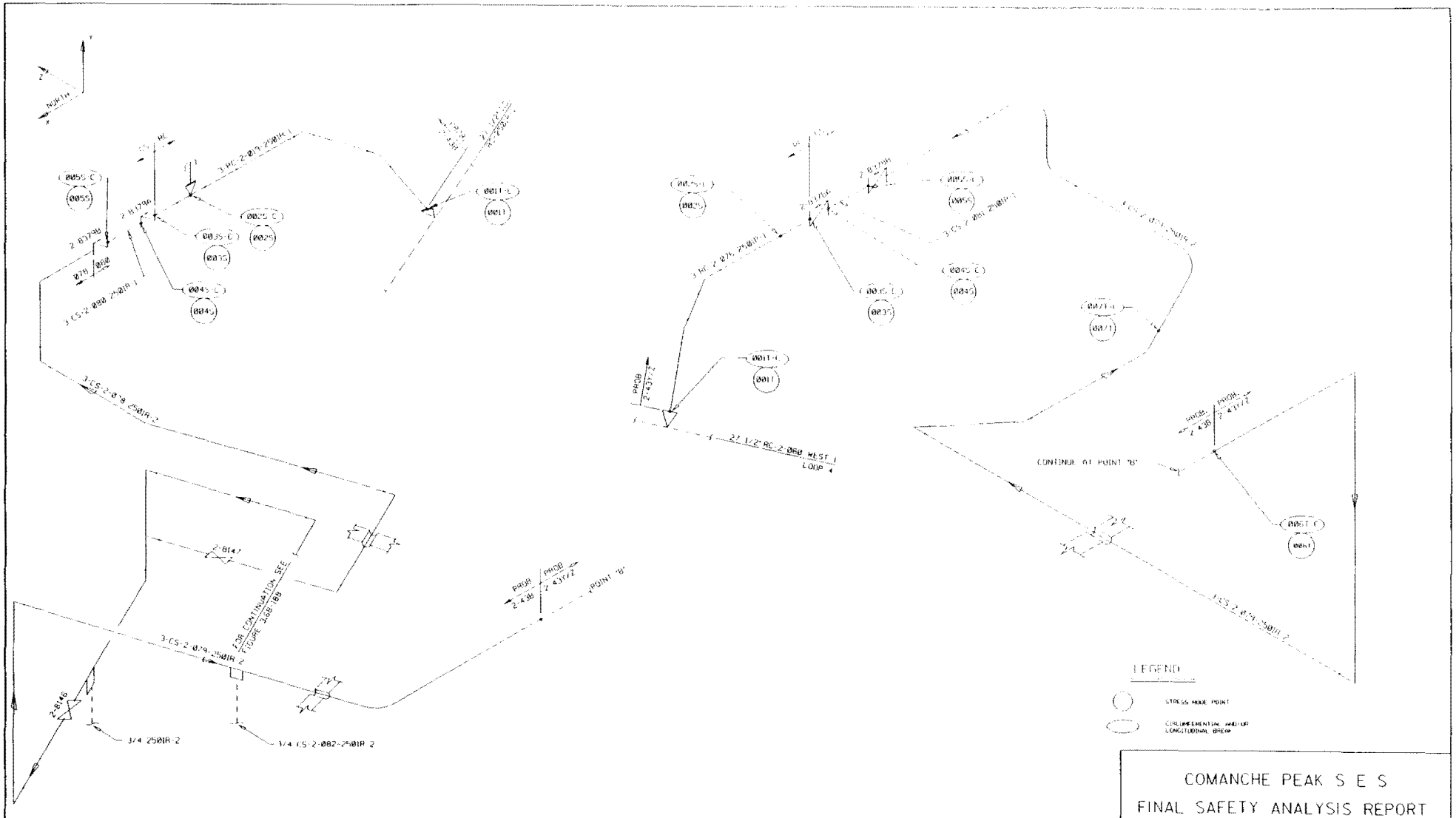


AMENDMENT 87
DECEMBER 18, 1992

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

CVCS SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATIONS

FIGURE 3.6B-188 PROB 2-43B & 2-43D



COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

CVCS SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

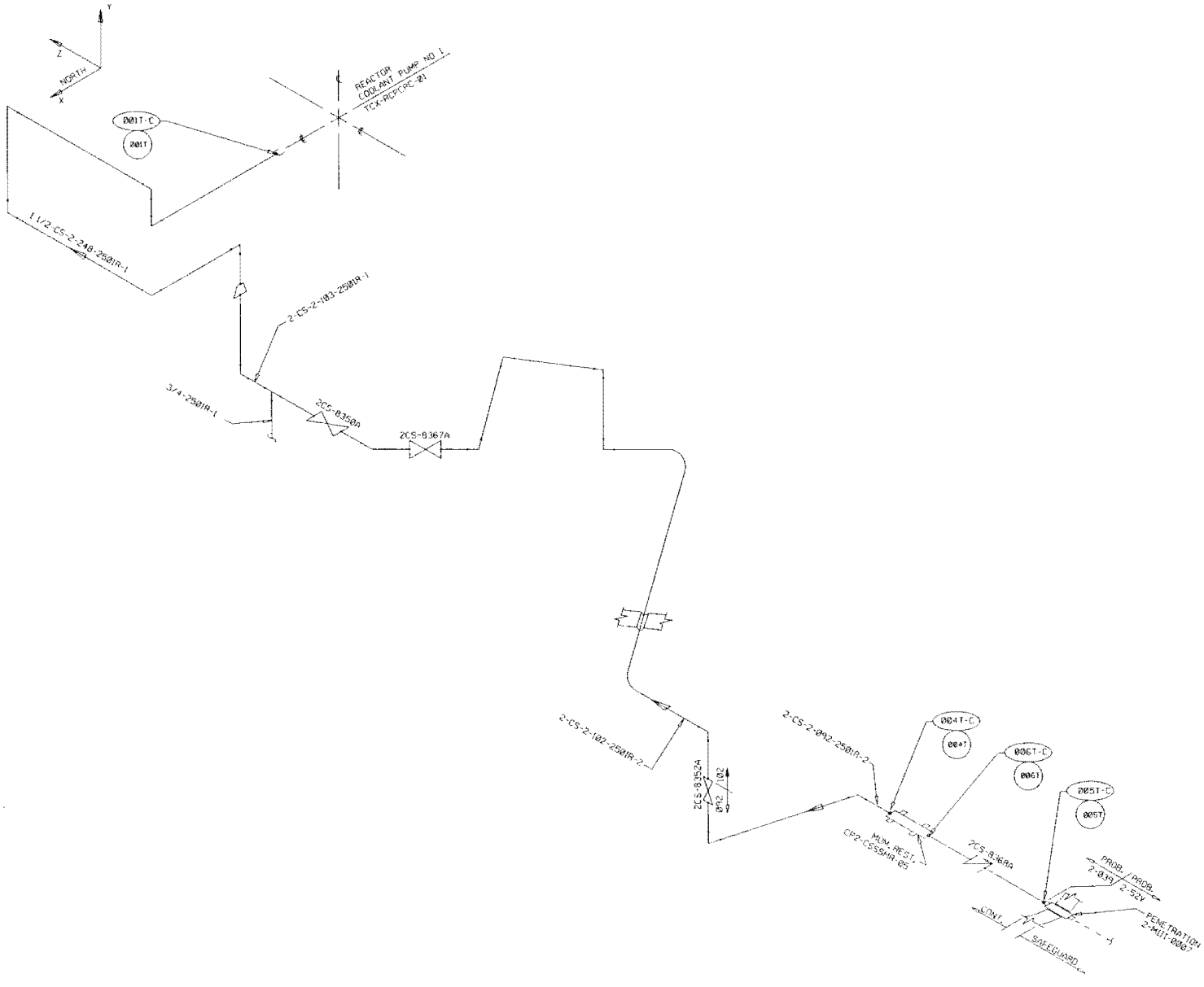
FIGURE 3.6B-189 PROB 2-43Y/Z AND 2-43B

AMENDMENT 87
DECEMBER 18, 1992

FIG189000.BLI

Figure 3.6B-190 thru 3.6B-191
(NOT USED)

Figure 3.6B-190 thru 3.6B-191
(NOT USED)



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

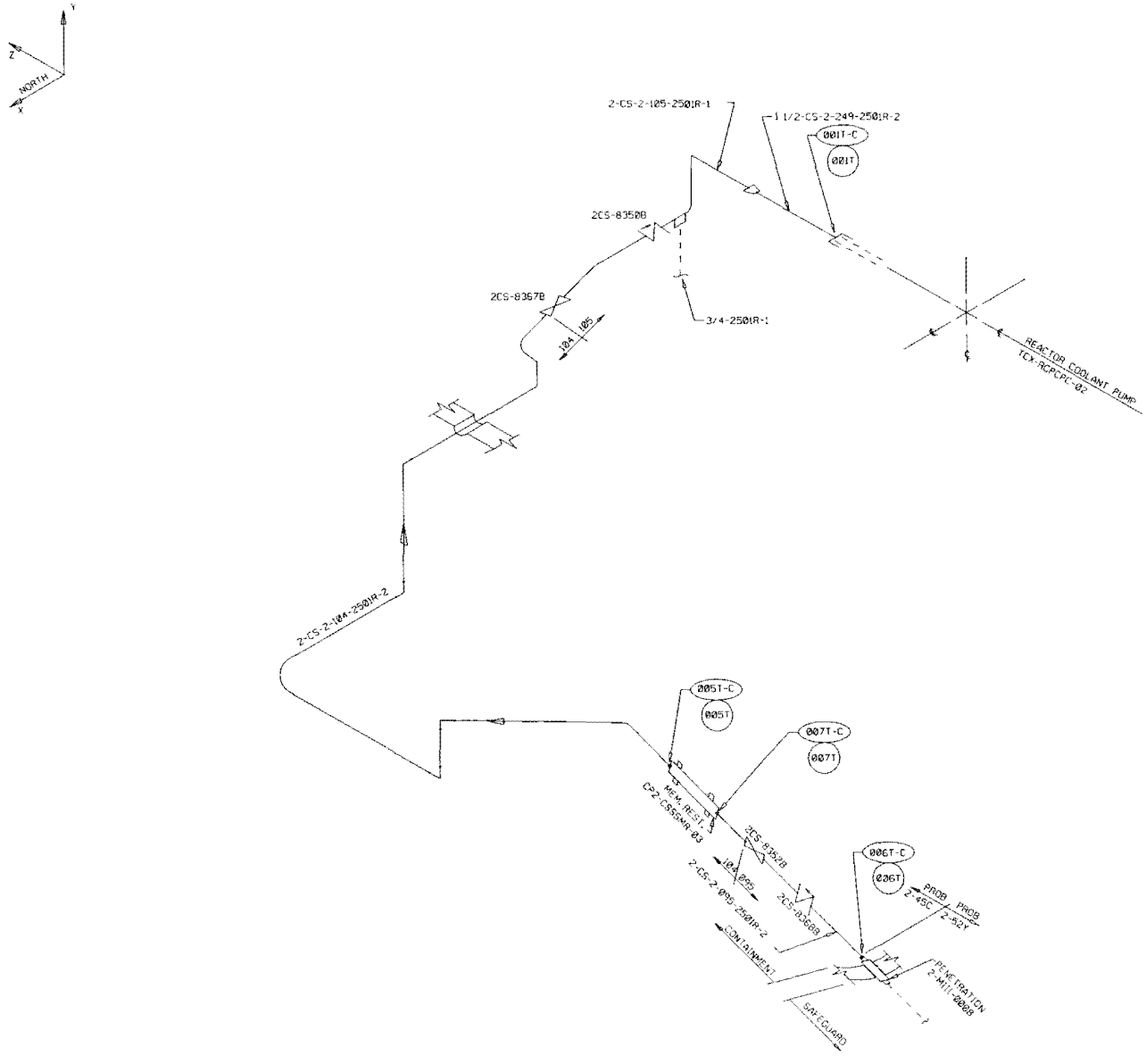
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

CVCS SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-192 PROB 2-39

FIG192000.BLI



LEGEND

STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

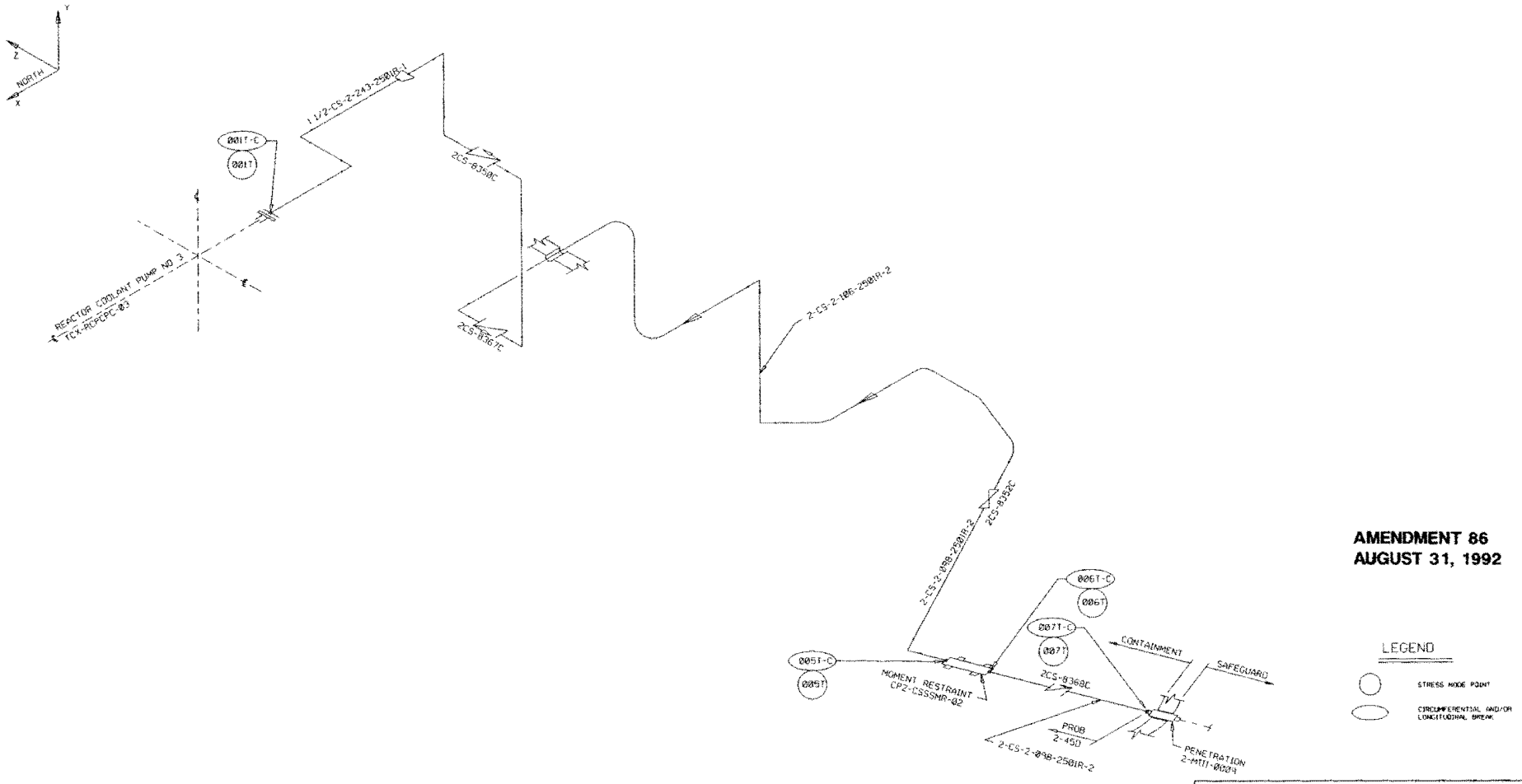
AMENDMENT 86
AUGUST 31, 1992

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

CVCS SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-193 PROB 2-45C

FIG193000.BLI



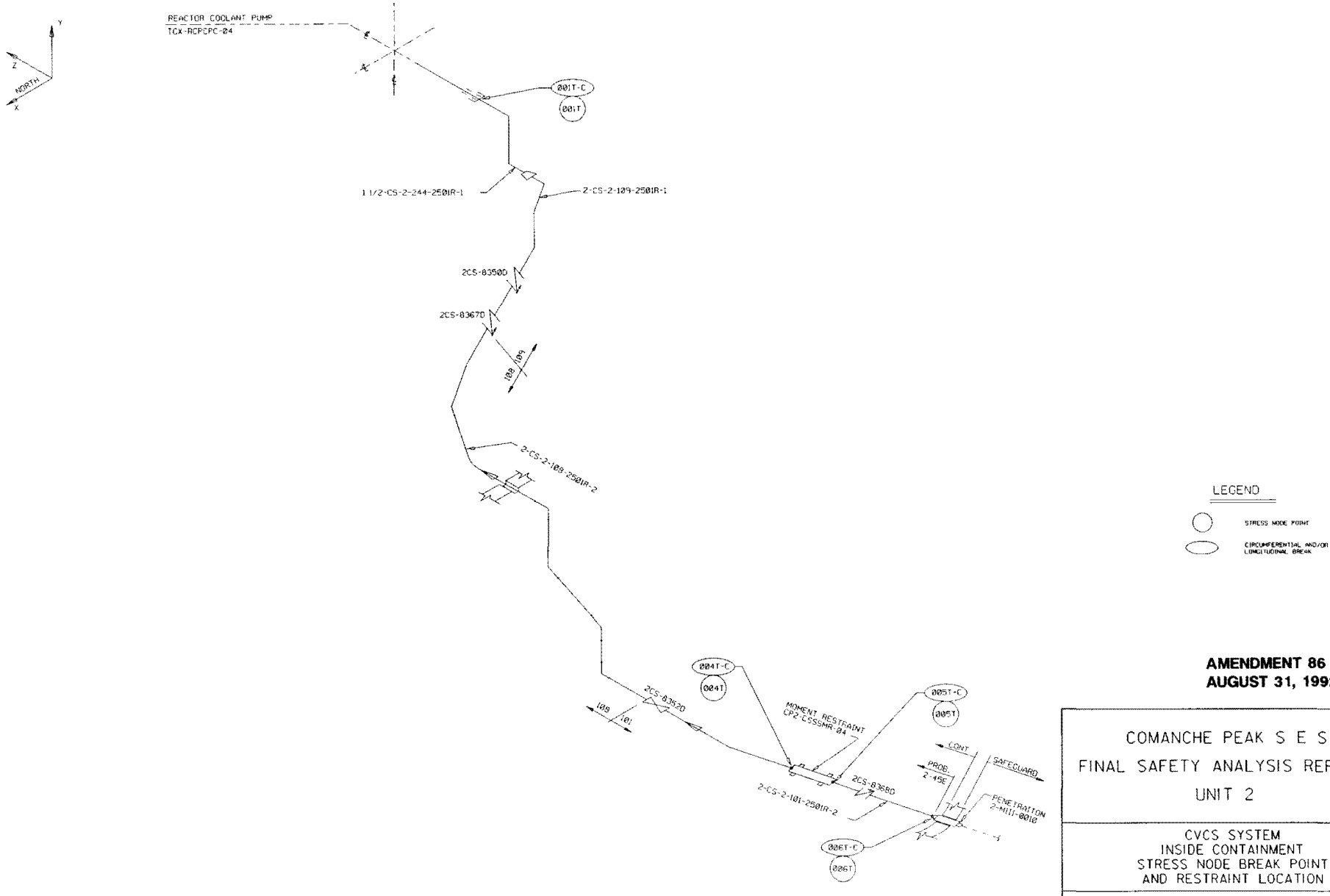
AMENDMENT 86
AUGUST 31, 1992

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

CVCS SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-194 PROB 2-45D

FIG194000.BL1



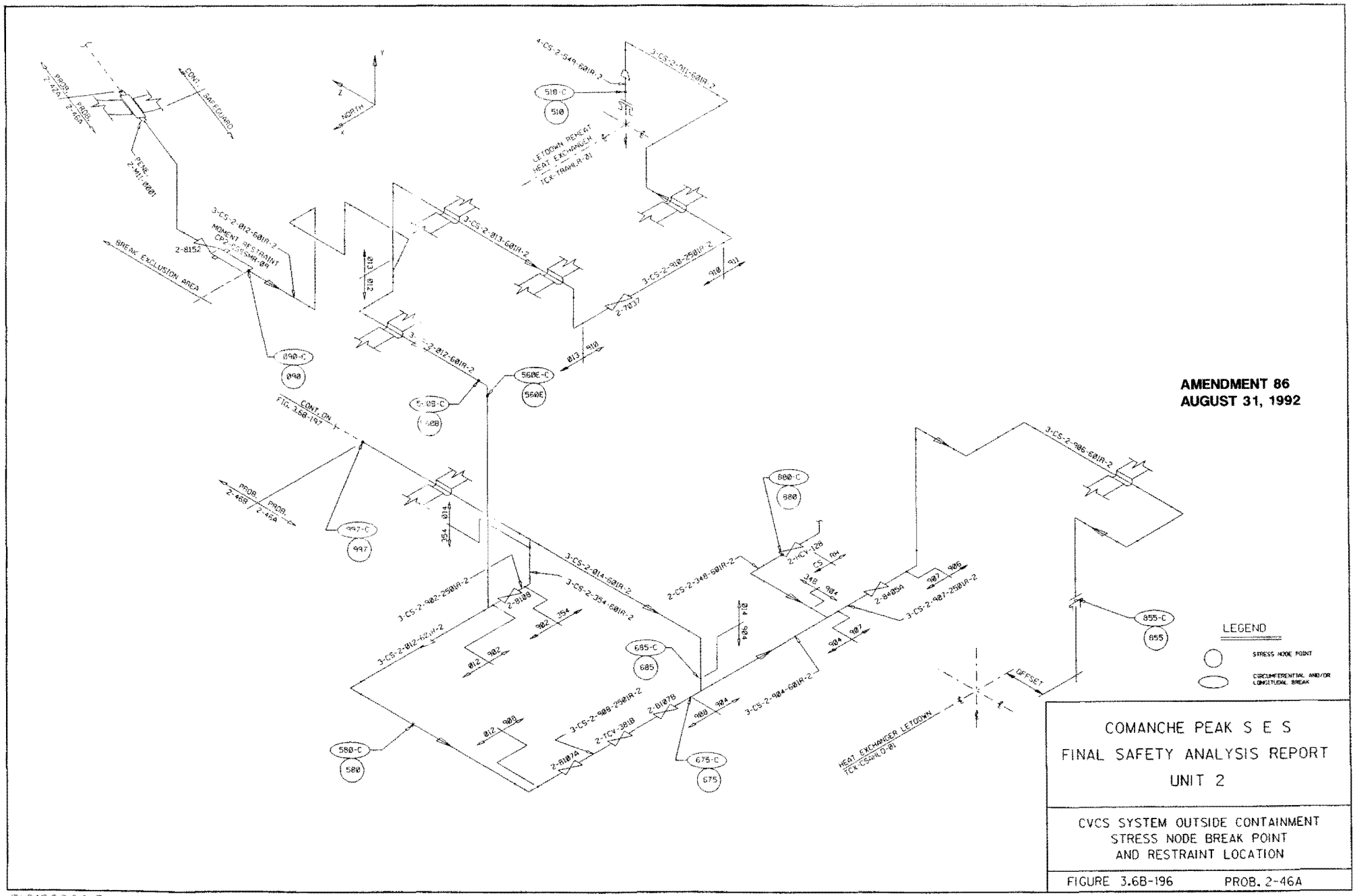
AMENDMENT 86
AUGUST 31, 1992

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

CVCS SYSTEM
INSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-195 PROB 2-45E

FIG195000.BLI



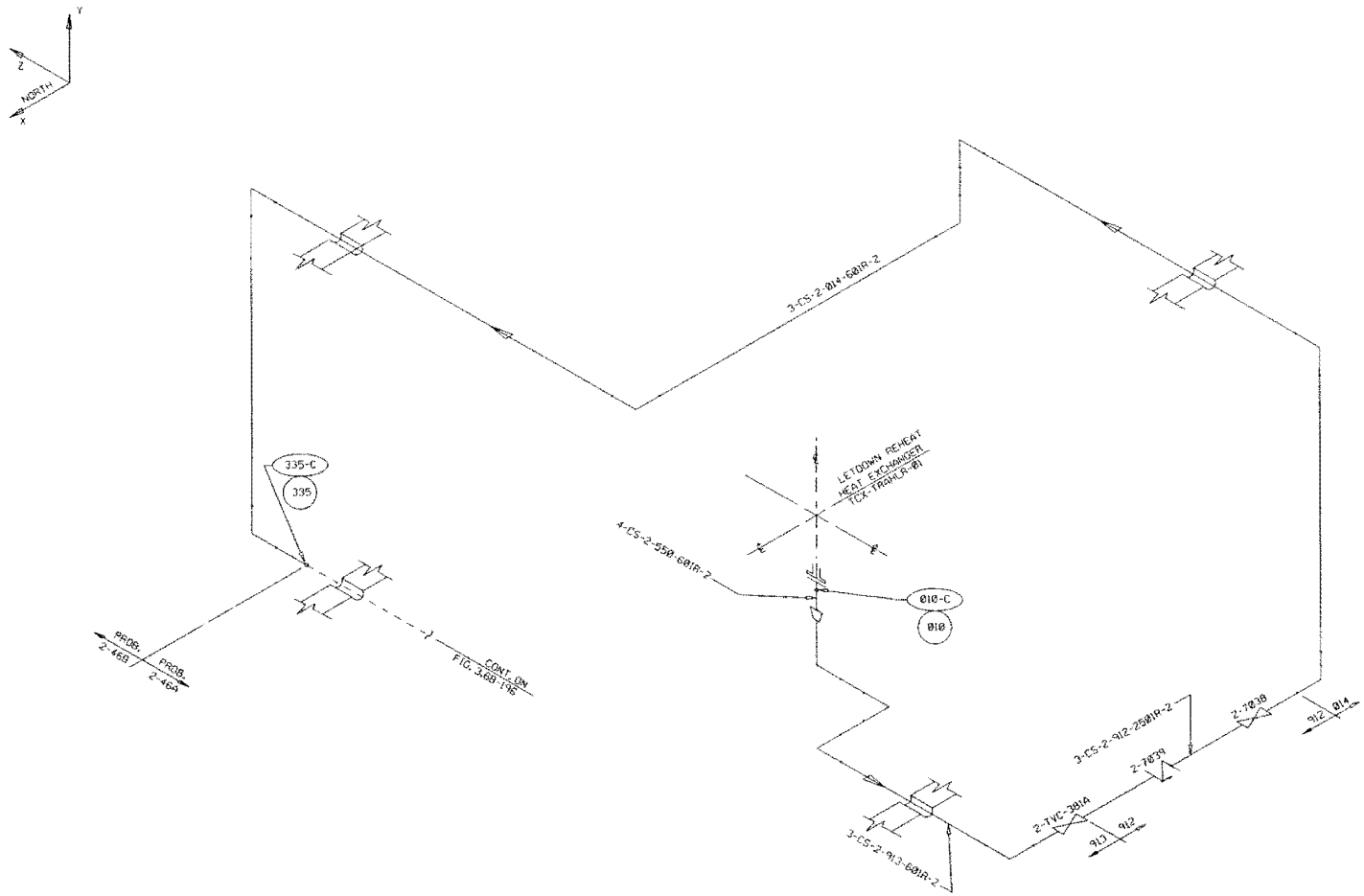
AMENDMENT 86
AUGUST 31, 1992

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

CVCS SYSTEM OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-196 PROB. 2-46A

FIG196000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

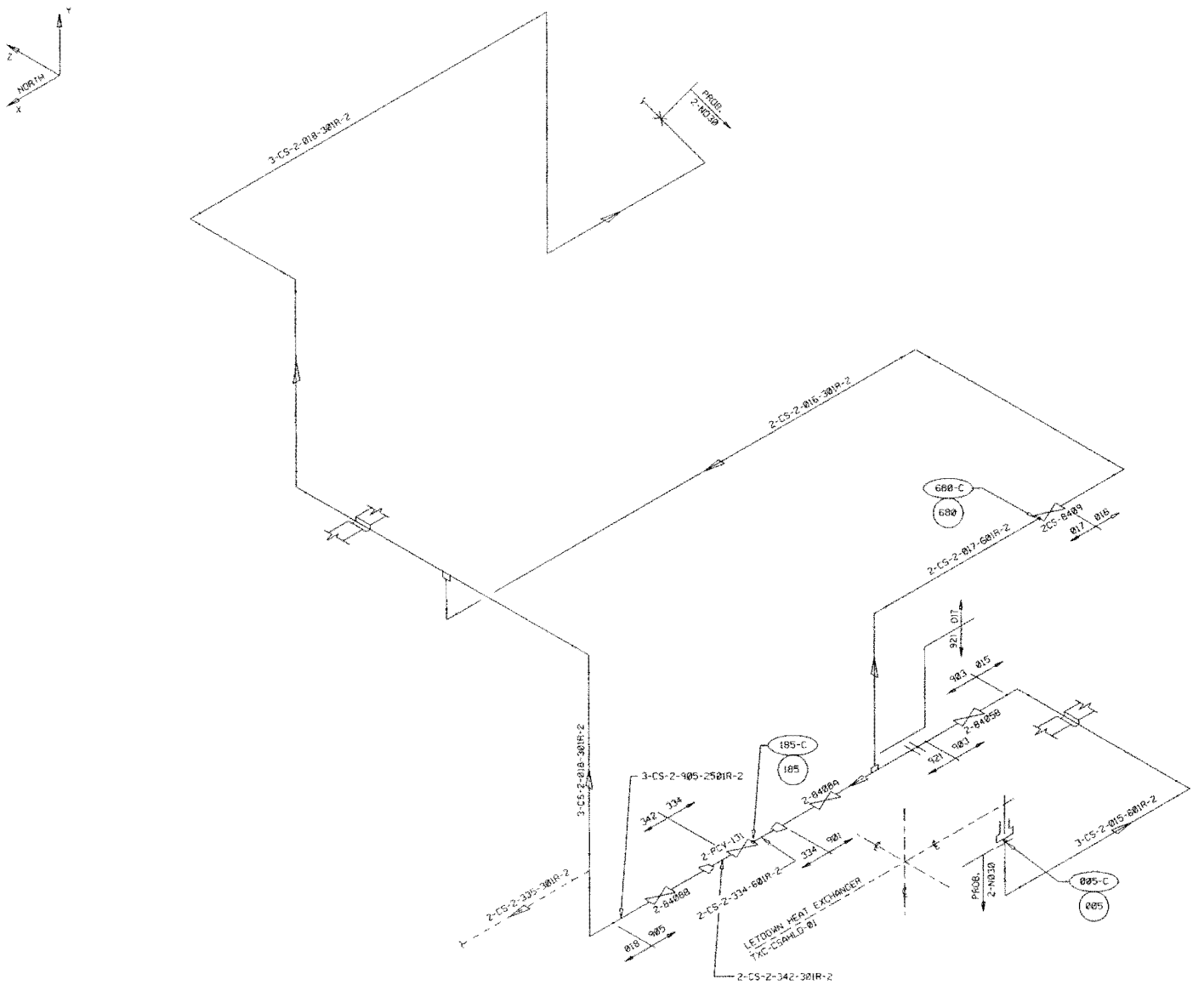
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

CVCS SYSTEM OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-197 PROB. 2-46B

FIG197000.BLI



LEGEND

STRESS NODE POINT

CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

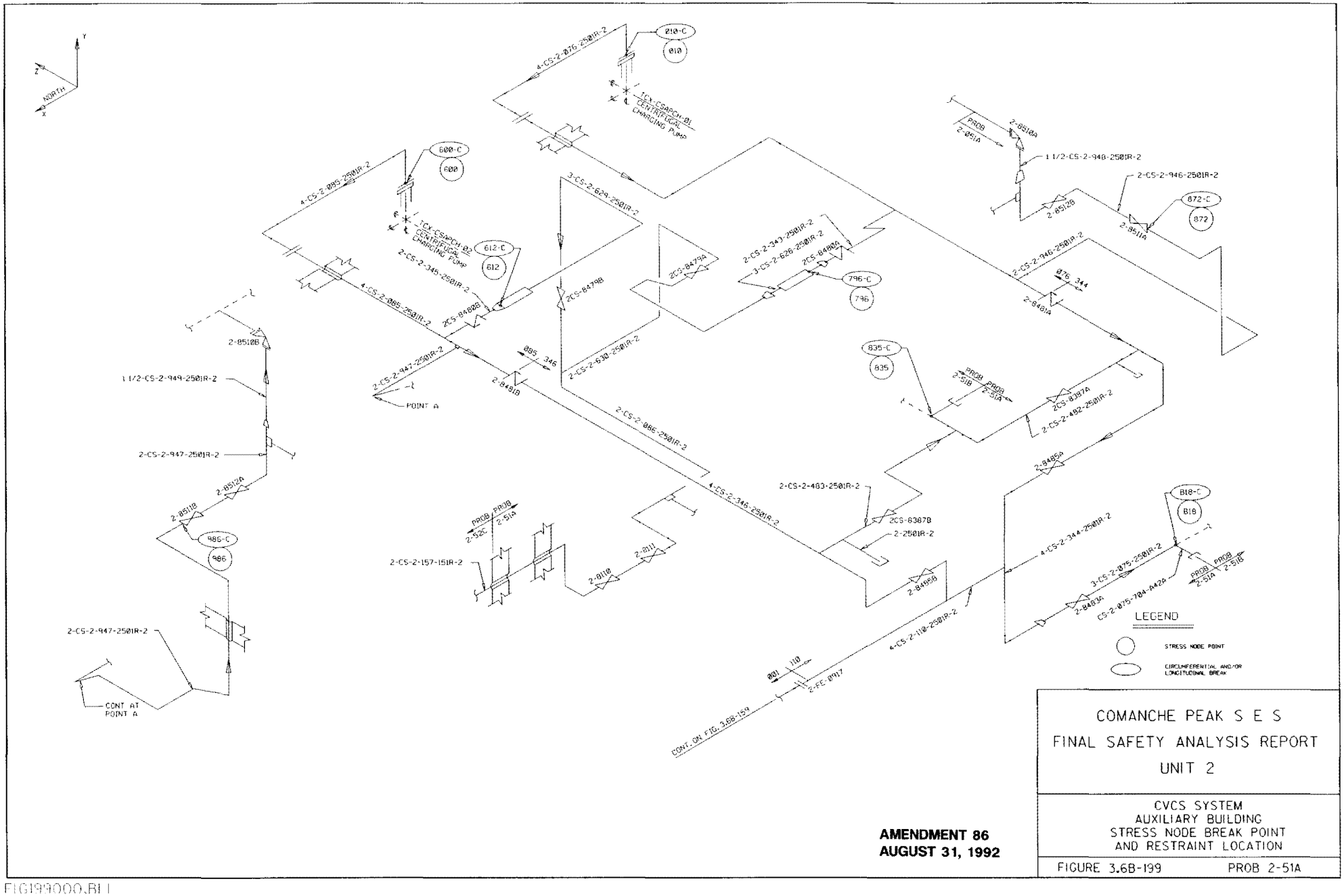
AMENDMENT 86
AUGUST 31, 1992

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

CVCS SYSTEM
OUTSIDE CONTAINMENT
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-198 PROB. 2-N030

FIG198000.RI1



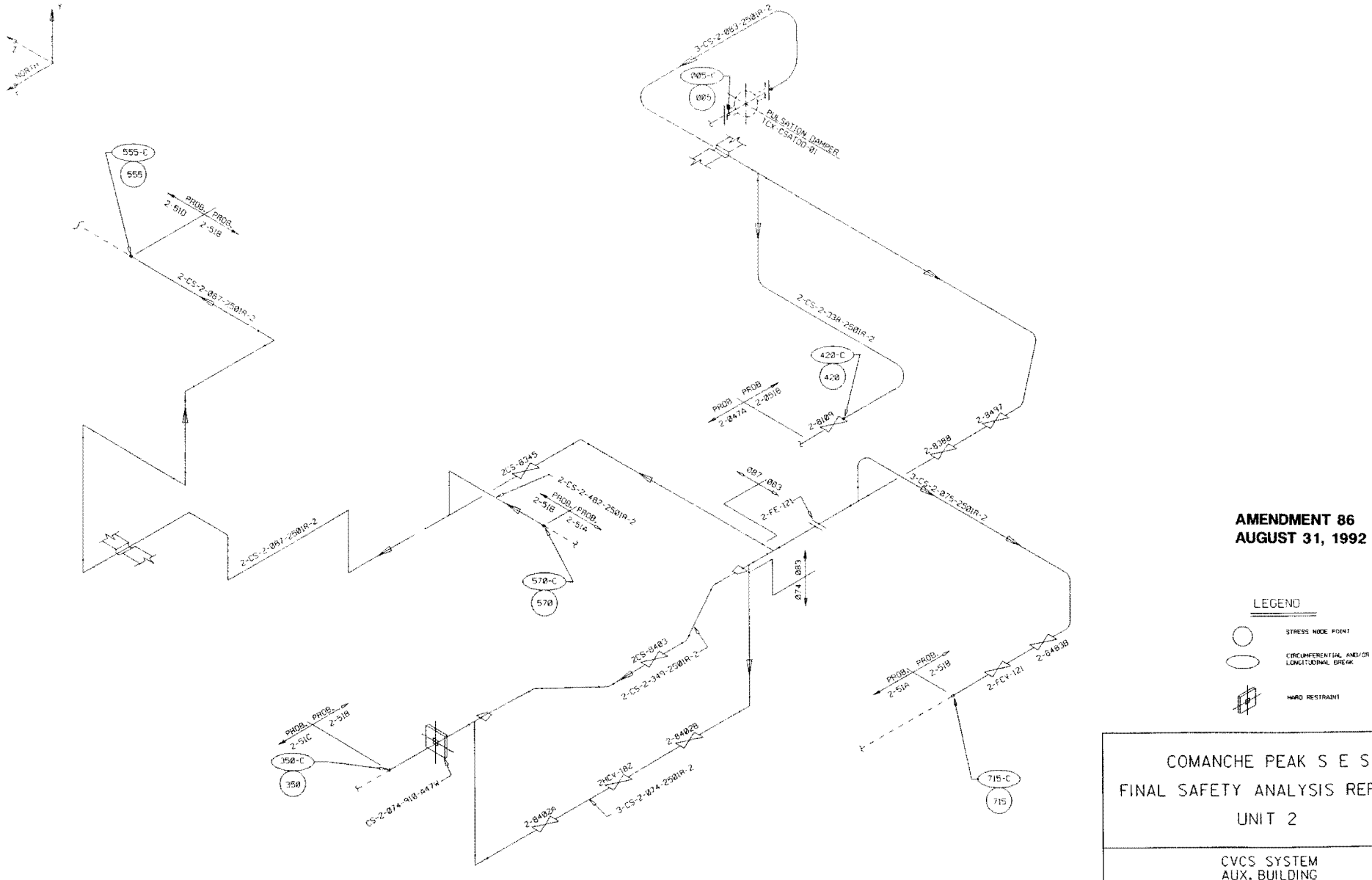
AMENDMENT 86
AUGUST 31, 1992

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

CVCS SYSTEM
AUXILIARY BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-199 PROB 2-51A

FIG199000.BLI

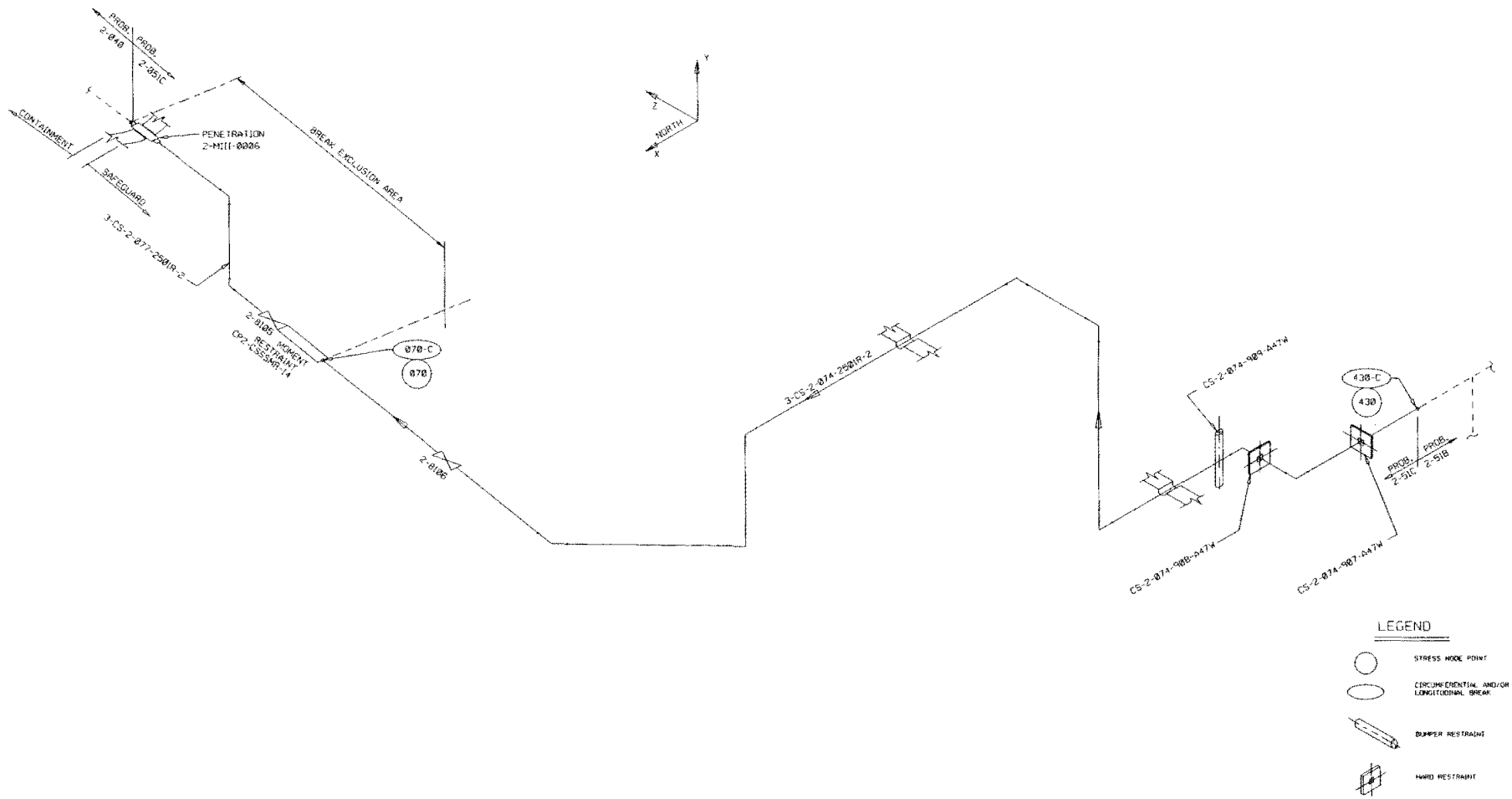


AMENDMENT 86
AUGUST 31, 1992

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

CVCS SYSTEM
AUX. BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-200 PROB. 2-51B



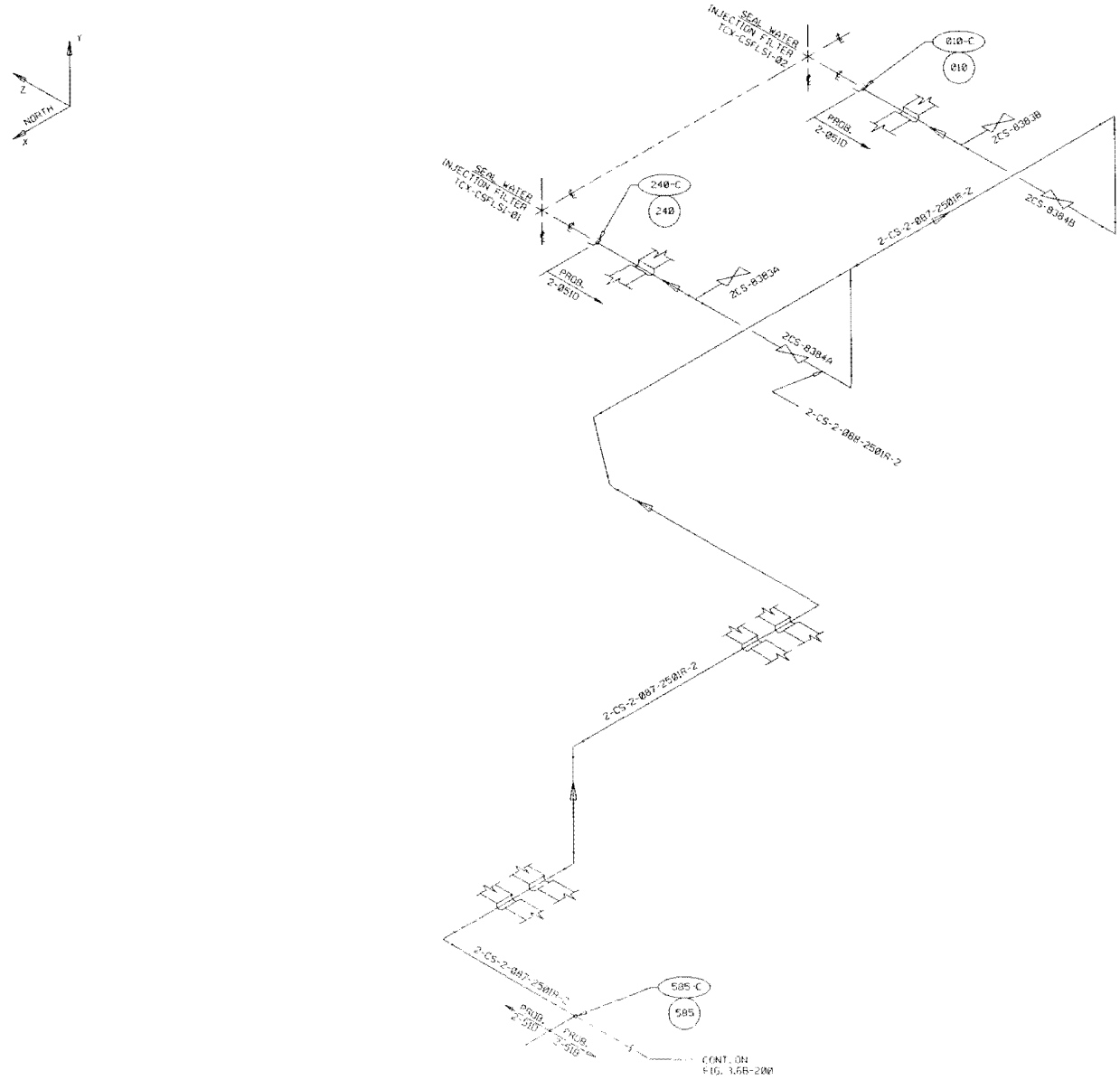
COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

CVCS SYSTEM
AUX. BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-201 PROB. 2-51C

AMENDMENT 86
AUGUST 31, 1992

FIG201000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

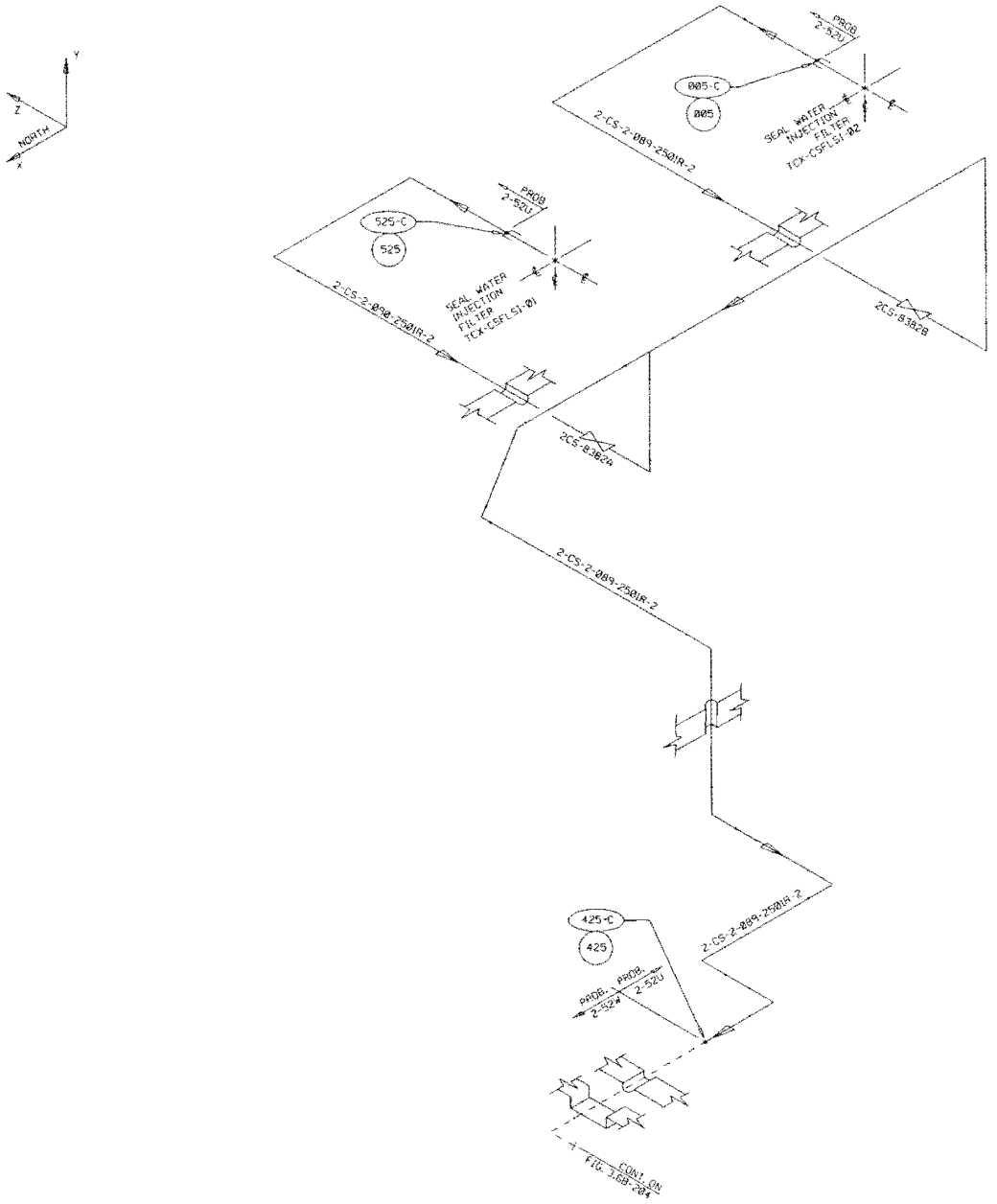
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

CVCS SYSTEM
AUX. BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-202 PROB. 2-51D

FIG202000.BI1



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

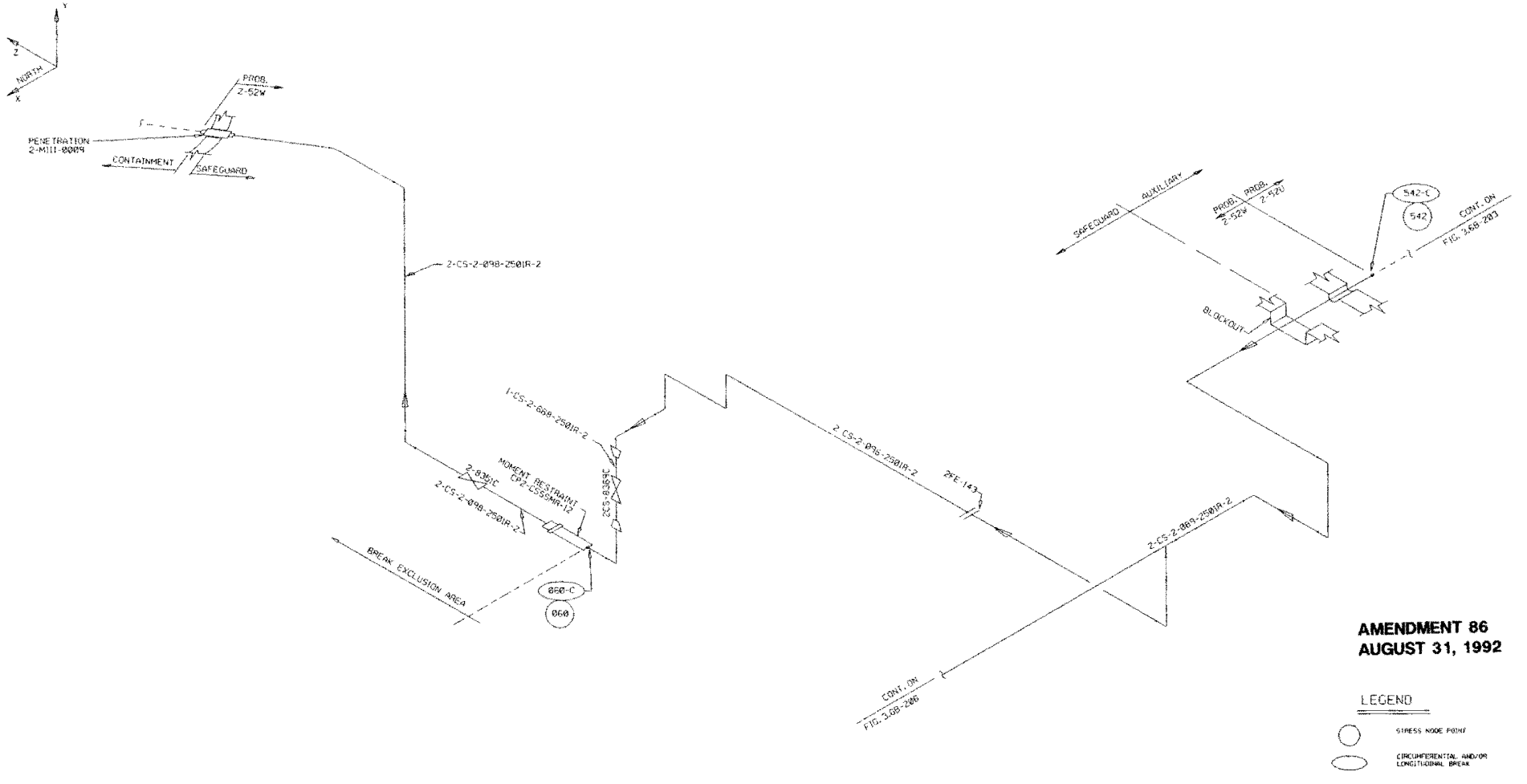
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

CVCS SYSTEM
AUX. BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-203 PROB. 2-52U

FIG203000.BLI



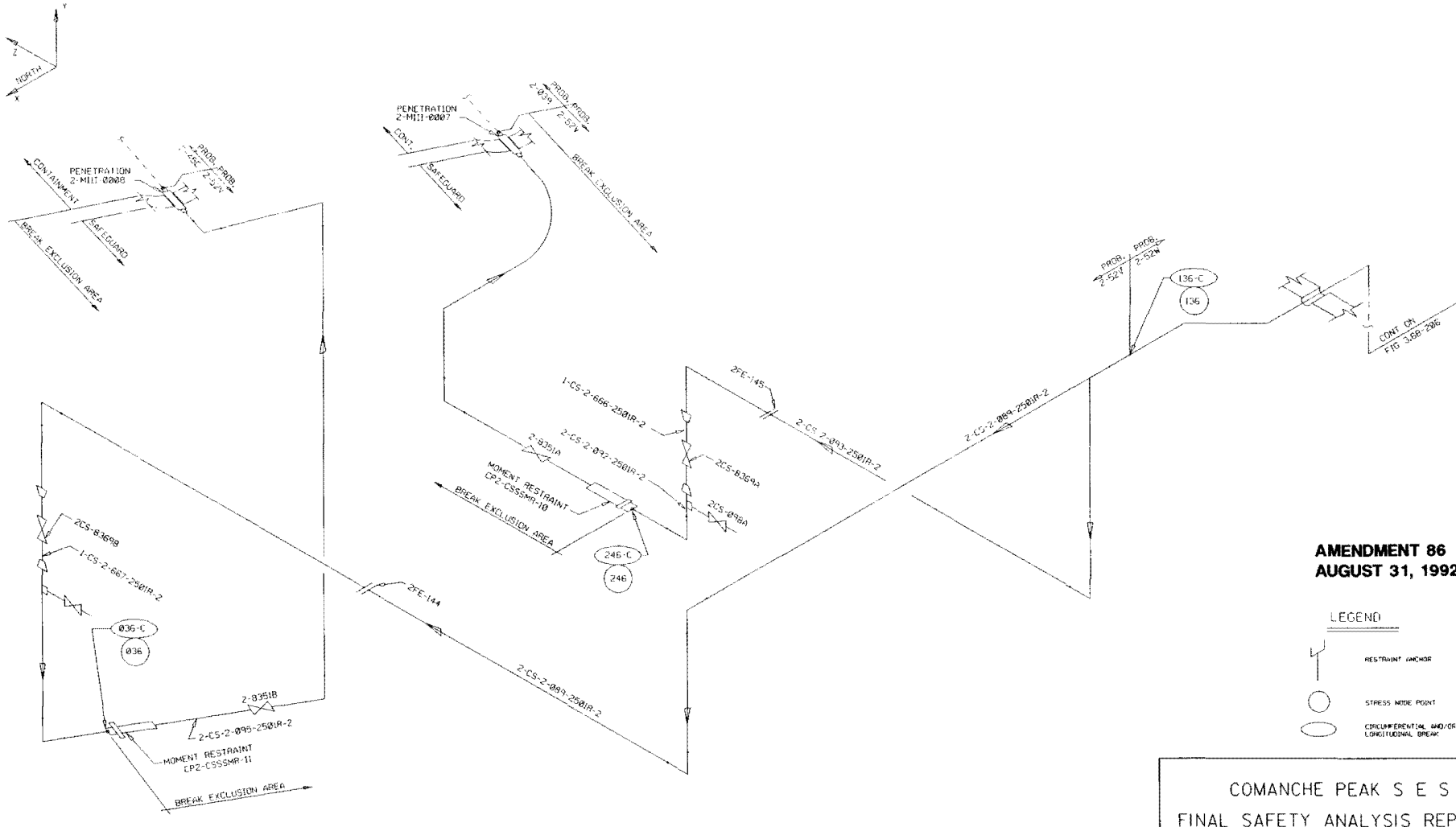
AMENDMENT 86
AUGUST 31, 1992

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

CVCS SYSTEM
SAFEGUARDS BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-204 PROB. 2-52W

FIG204000.RI1



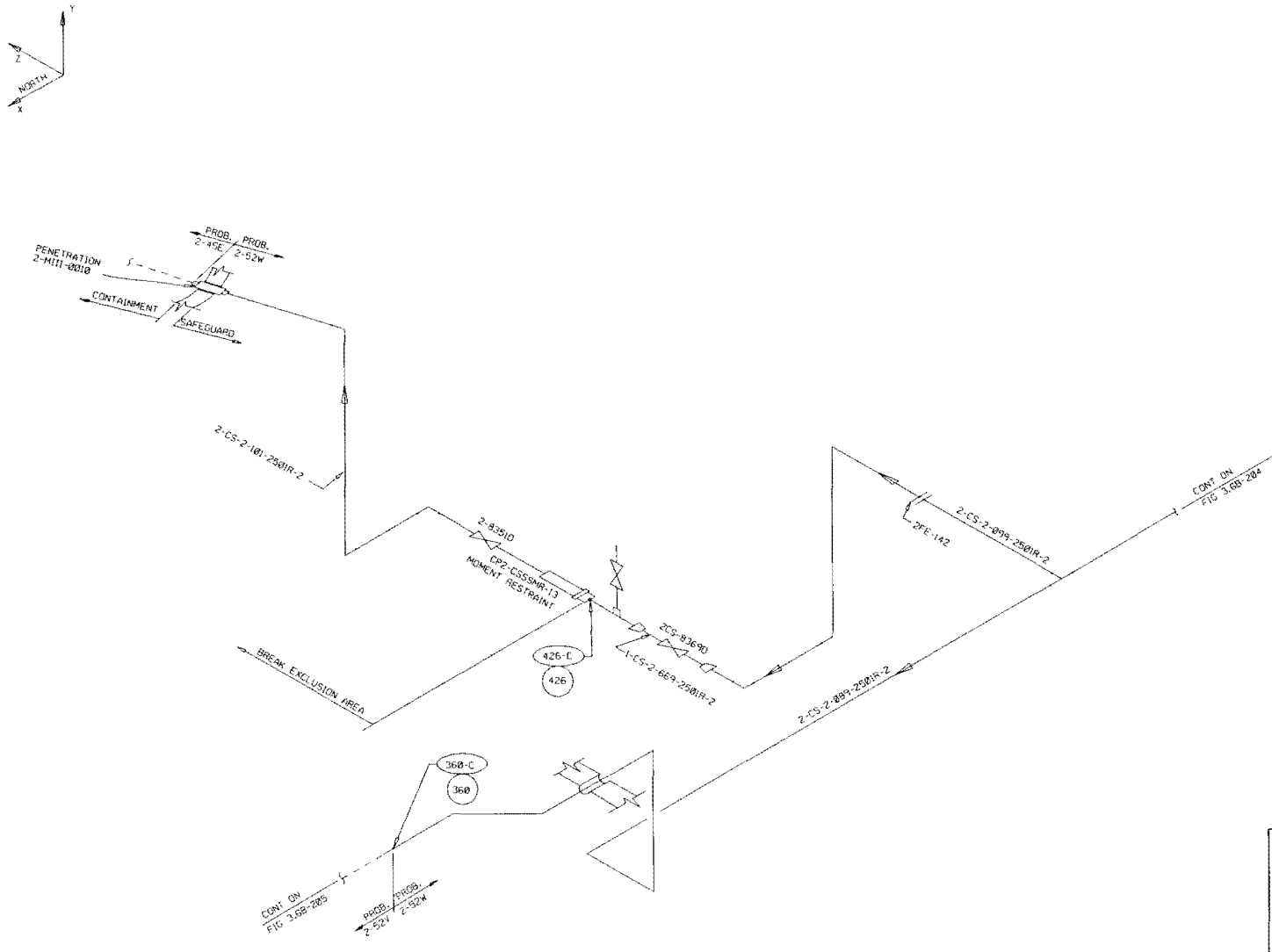
AMENDMENT 86
AUGUST 31, 1992

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

CVCS SYSTEM
SAFEGUARDS BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-205 PROB 2-52V

FIG205000.BLI



AMENDMENT 86
AUGUST 31, 1992

LEGEND

STRESS NODE POINT

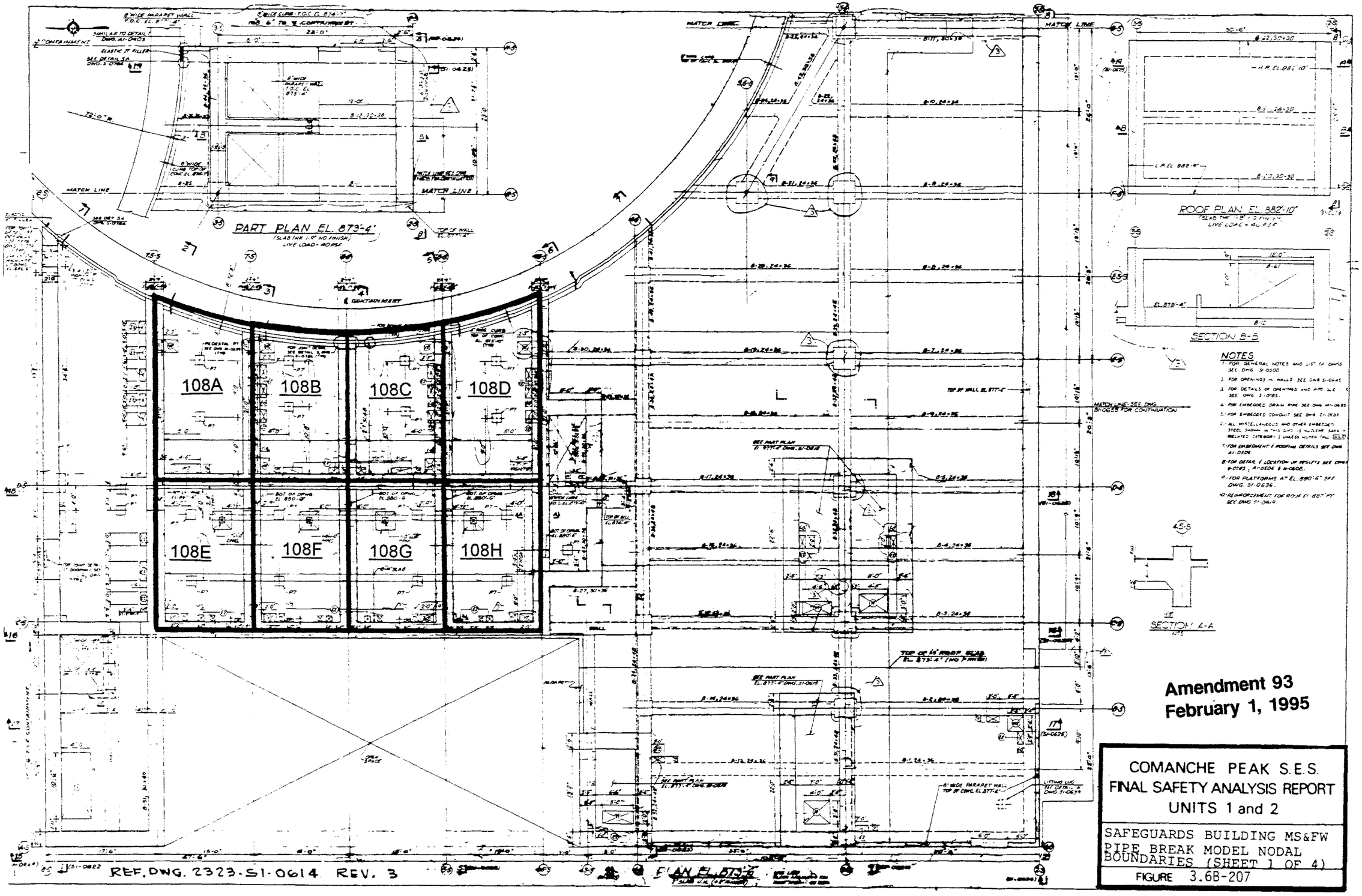
CIRCUMFERENTIAL AND/OR LONGITUDINAL BREAK

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

CVCS SYSTEM
SAFEGUARDS BUILDING
STRESS NODE BREAK POINT
AND RESTRAINT LOCATION

FIGURE 3.6B-206 PROB 2-52W

FIG206000.BLI

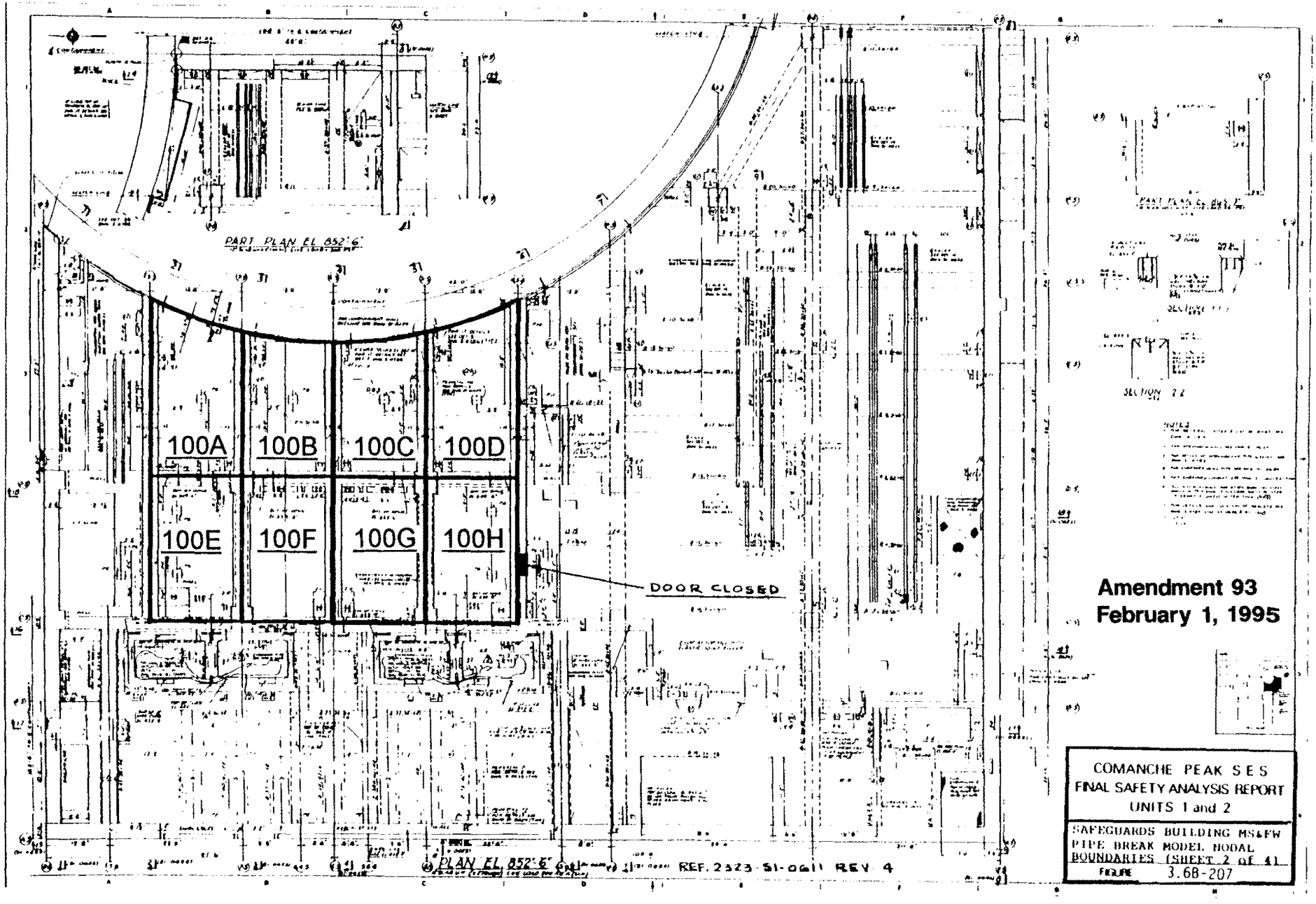


Amendment 93
February 1, 1995

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

SAFEGUARDS BUILDING MS&FW PIPE BREAK MODEL NODAL BOUNDARIES (SHEET 1 OF 4)

FIGURE 3.6B-207

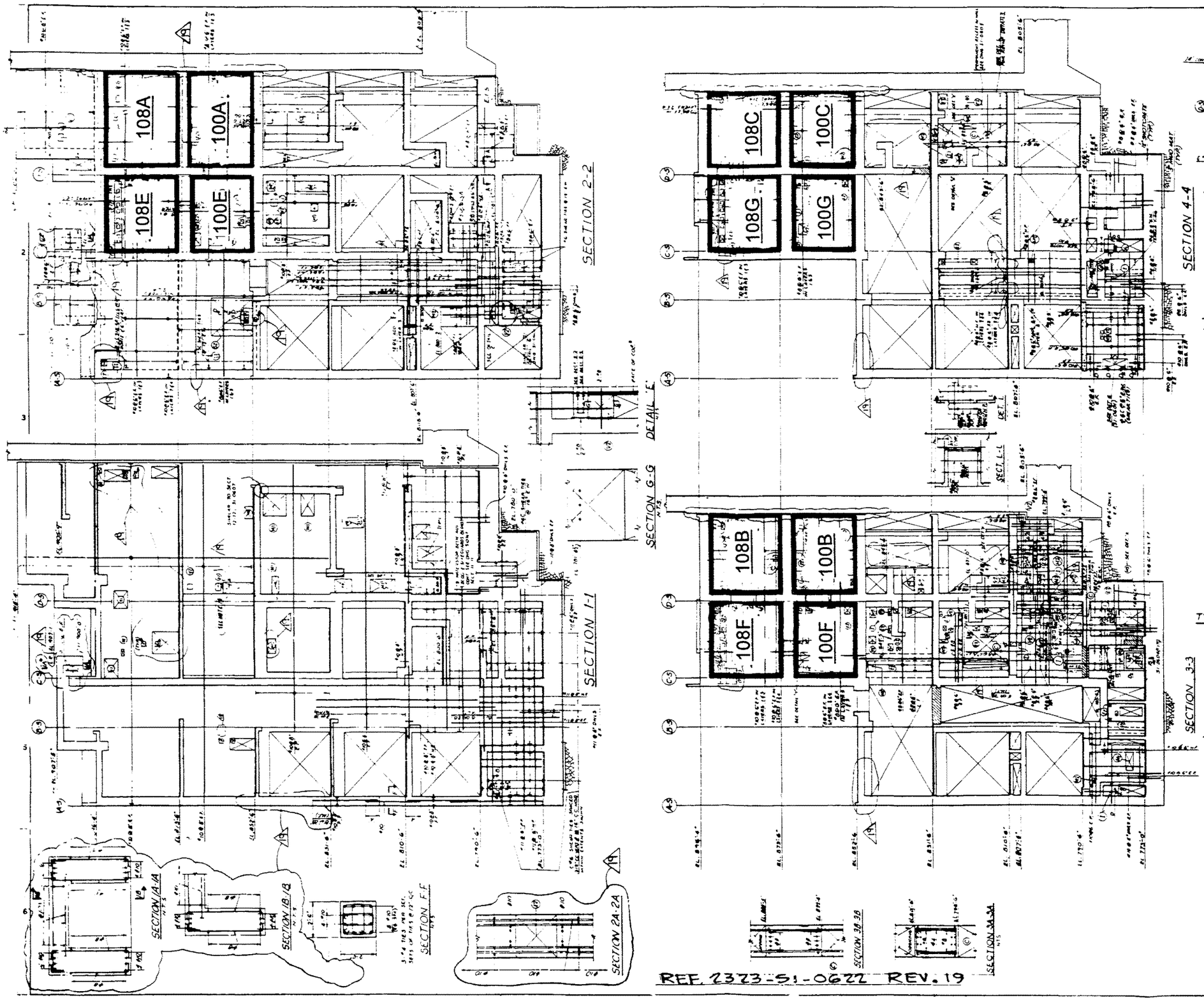


Amendment 93
February 1, 1995

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

SAFEGUARDS BUILDING MS&FW
PIPE BREAK MODEL NODAL
BOUNDARIES (SHEET 2 of 41)

FIGURE 3.6B-207

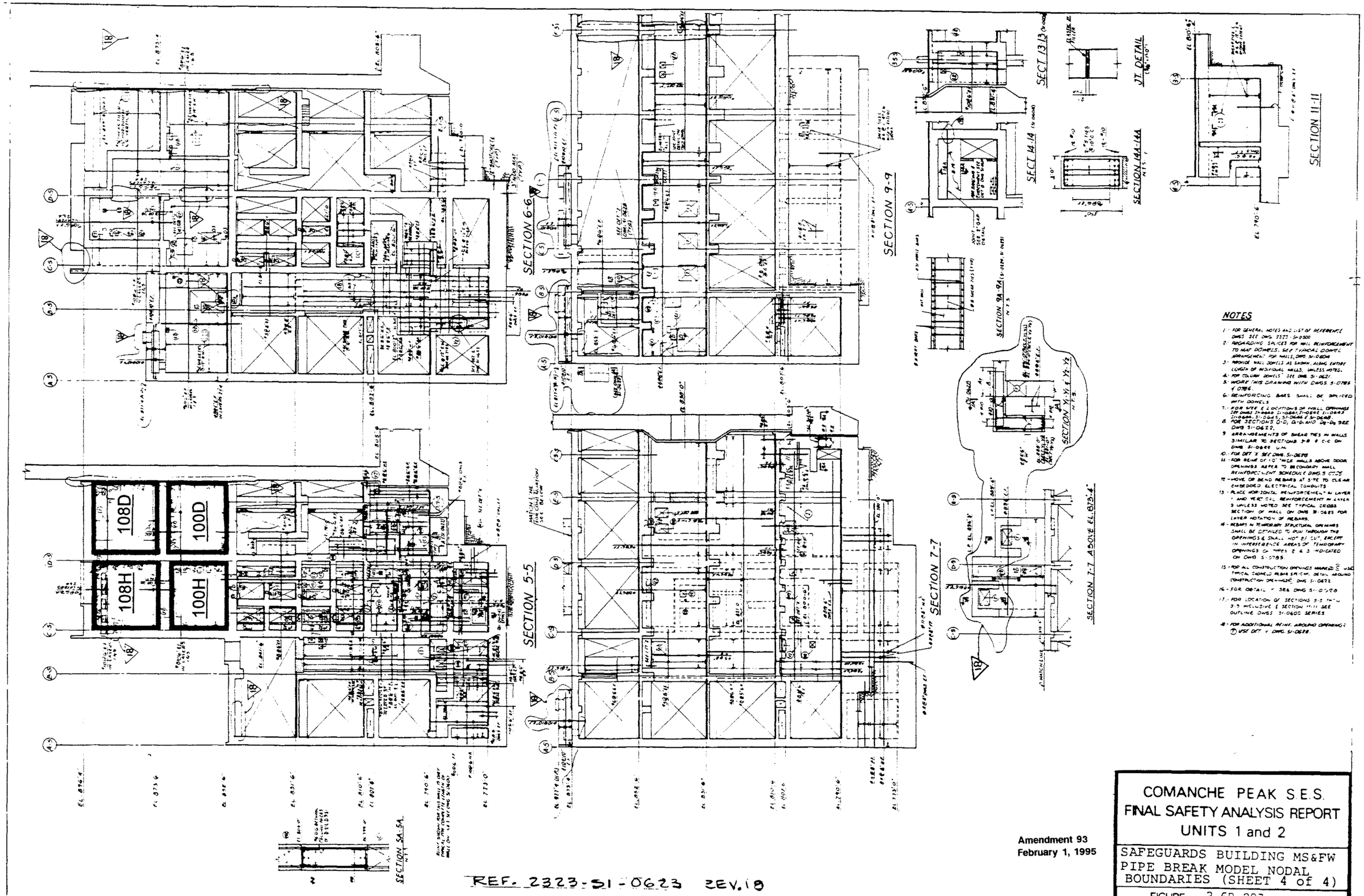


Amendment 93
February 1, 1995

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

SAFEGUARDS BUILDING MS&FW PIPE BREAK MODEL NODAL BOUNDARIES (SHEET 3 OF 4)

FIGURE 3.6B-207



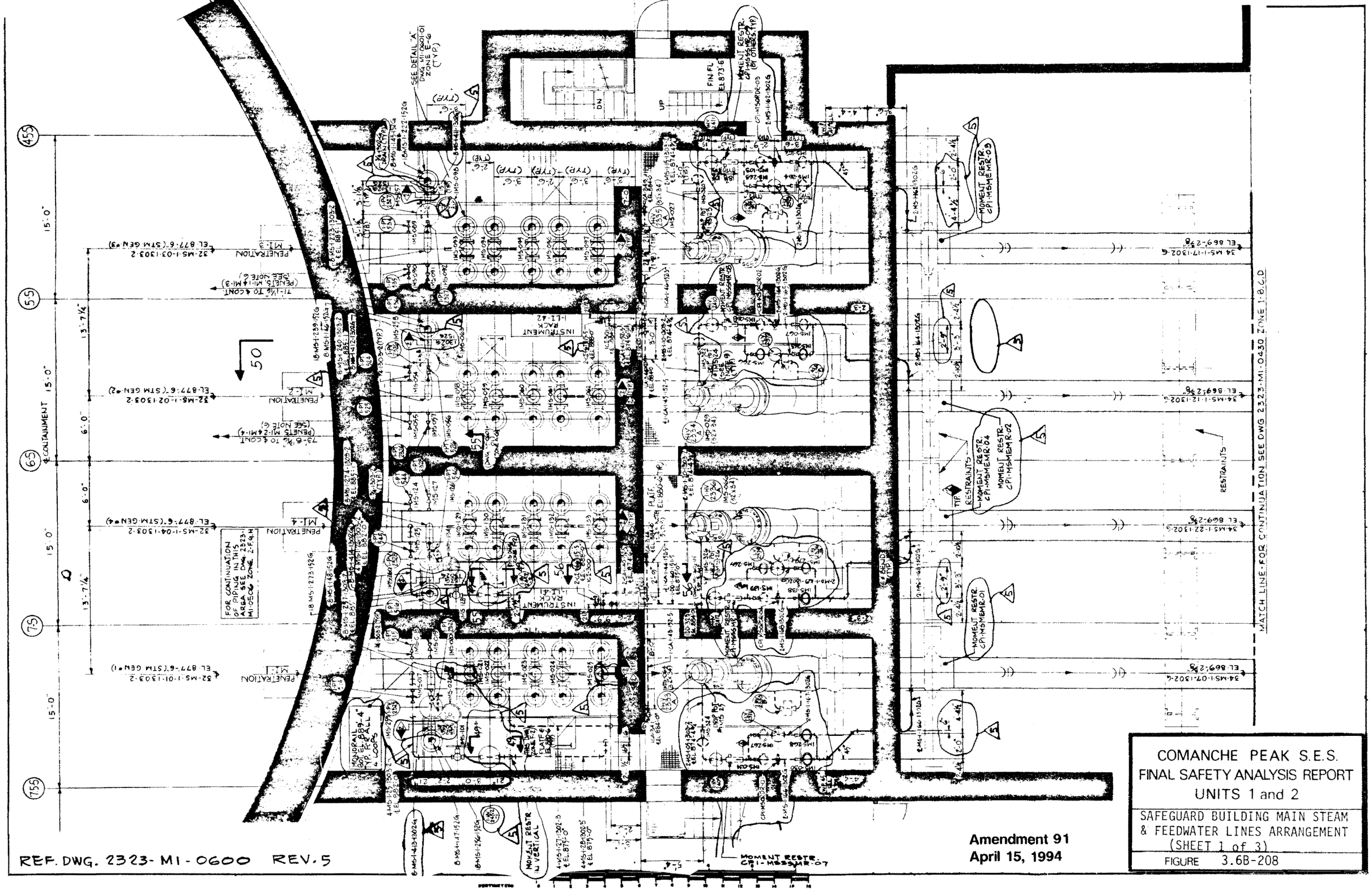
REF. 2323-S1-0623 REV. 18

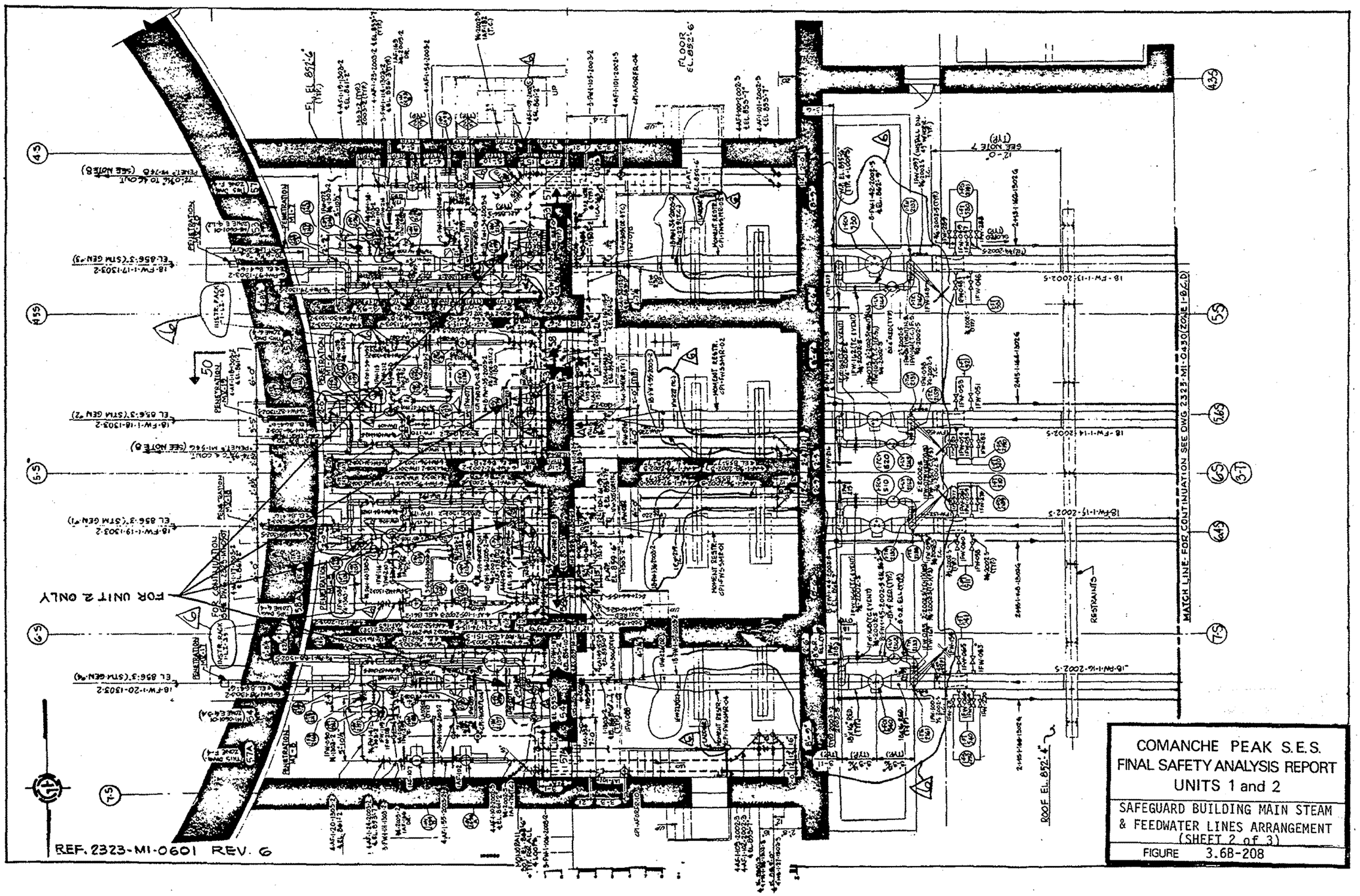
Amendment 93
February 1, 1995

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

SAFEGUARDS BUILDING MS&FW PIPE BREAK MODEL NODAL BOUNDARIES (SHEET 4 of 4)

FIGURE 3.6B-207


REF. DWG. 2323-MI-0600 REV. 5
MATCH LINE - FOR CONTINUATION SEE DWG 2323-MI-0430 ZONE 1-B,C,D
COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2
SAFEGUARD BUILDING MAIN STEAM & FEEDWATER LINES ARRANGEMENT (SHEET 1 of 3)
FIGURE 3.6B-208
Amendment 91
April 15, 1994



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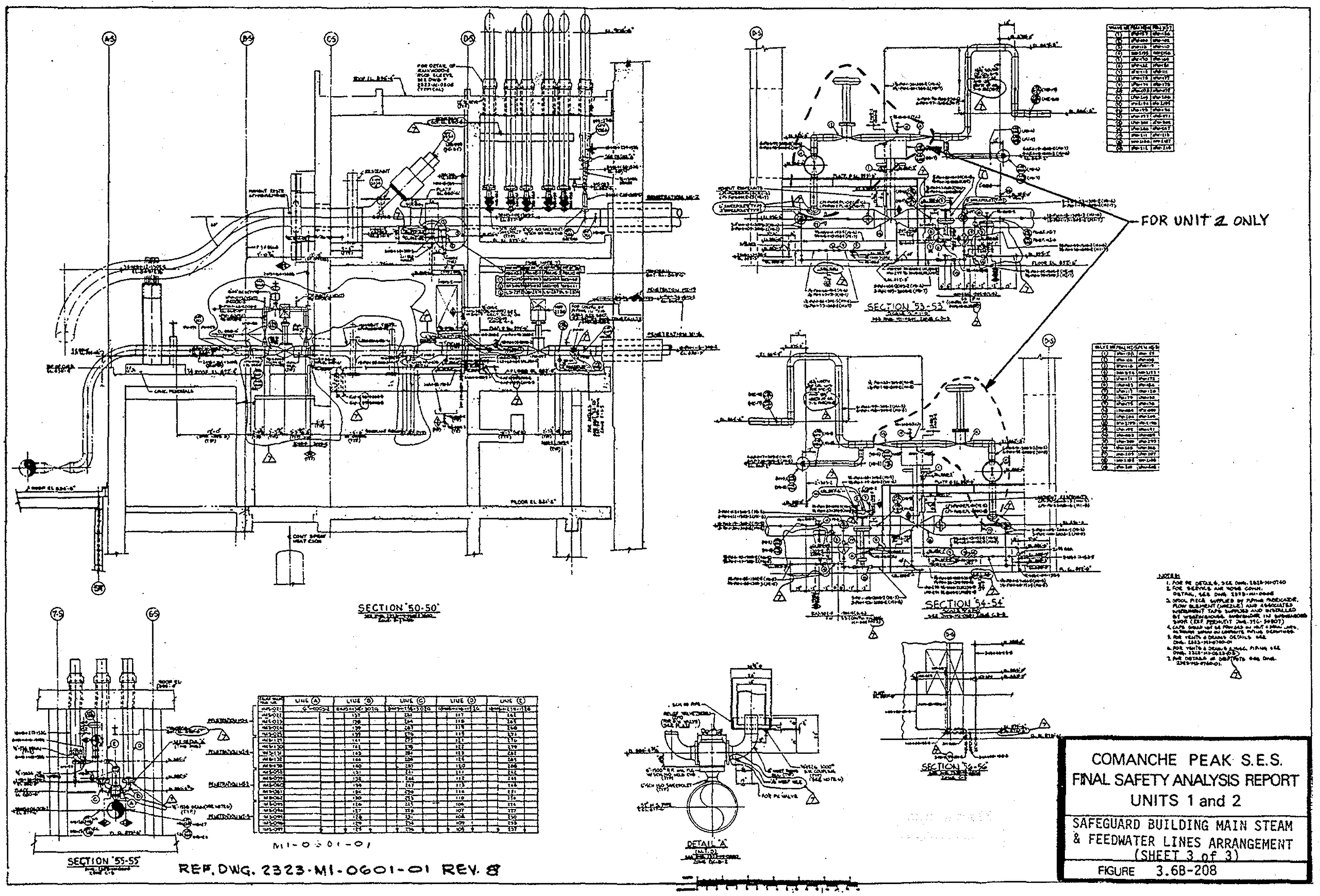
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

SAFEGUARD BUILDING MAIN STEAM & FEEDWATER LINES ARRANGEMENT (SHEET 2 of 3)

FIGURE 3.6B-208



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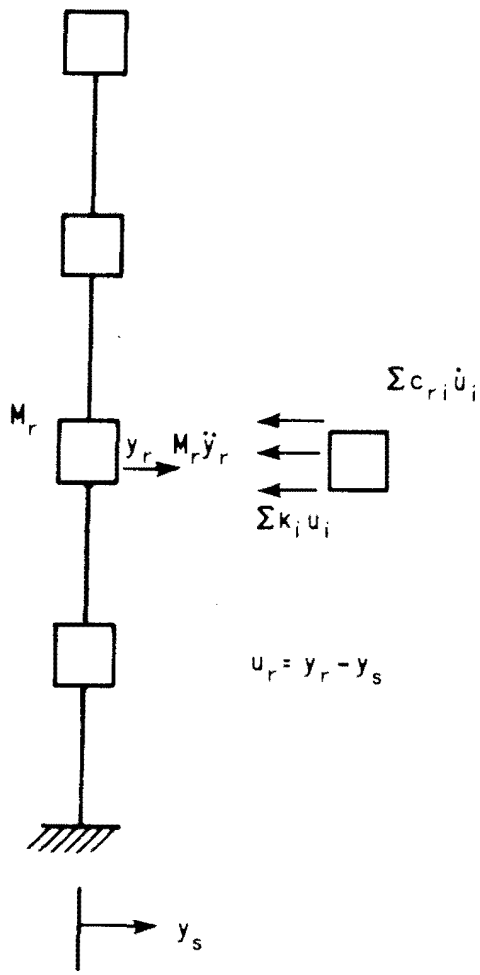
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

SAFEGUARD BUILDING MAIN STEAM & FEEDWATER LINES ARRANGEMENT (SHEET 3 of 3)

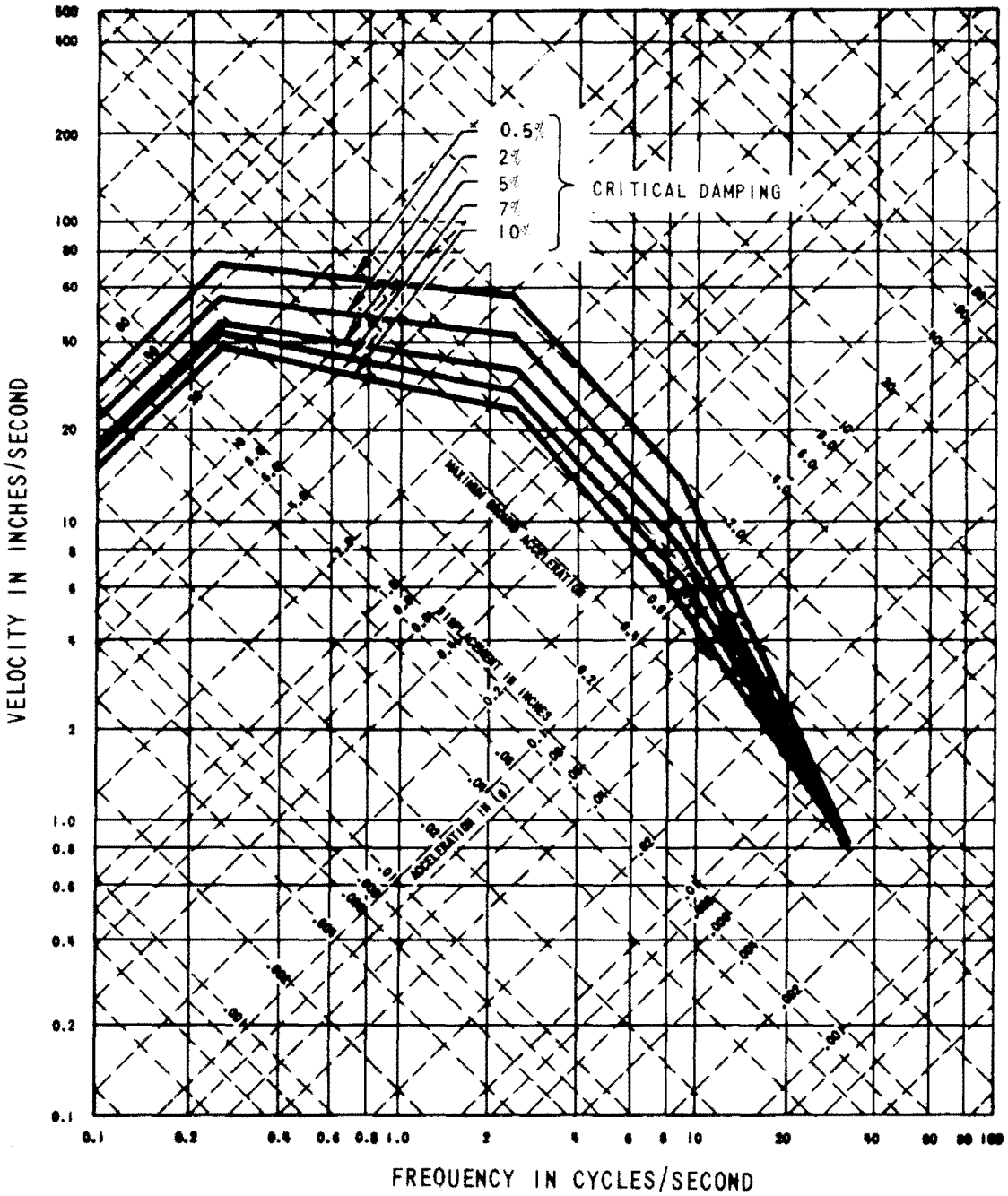
FIGURE 3.6B-208



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Multi-Degree of Freedom System

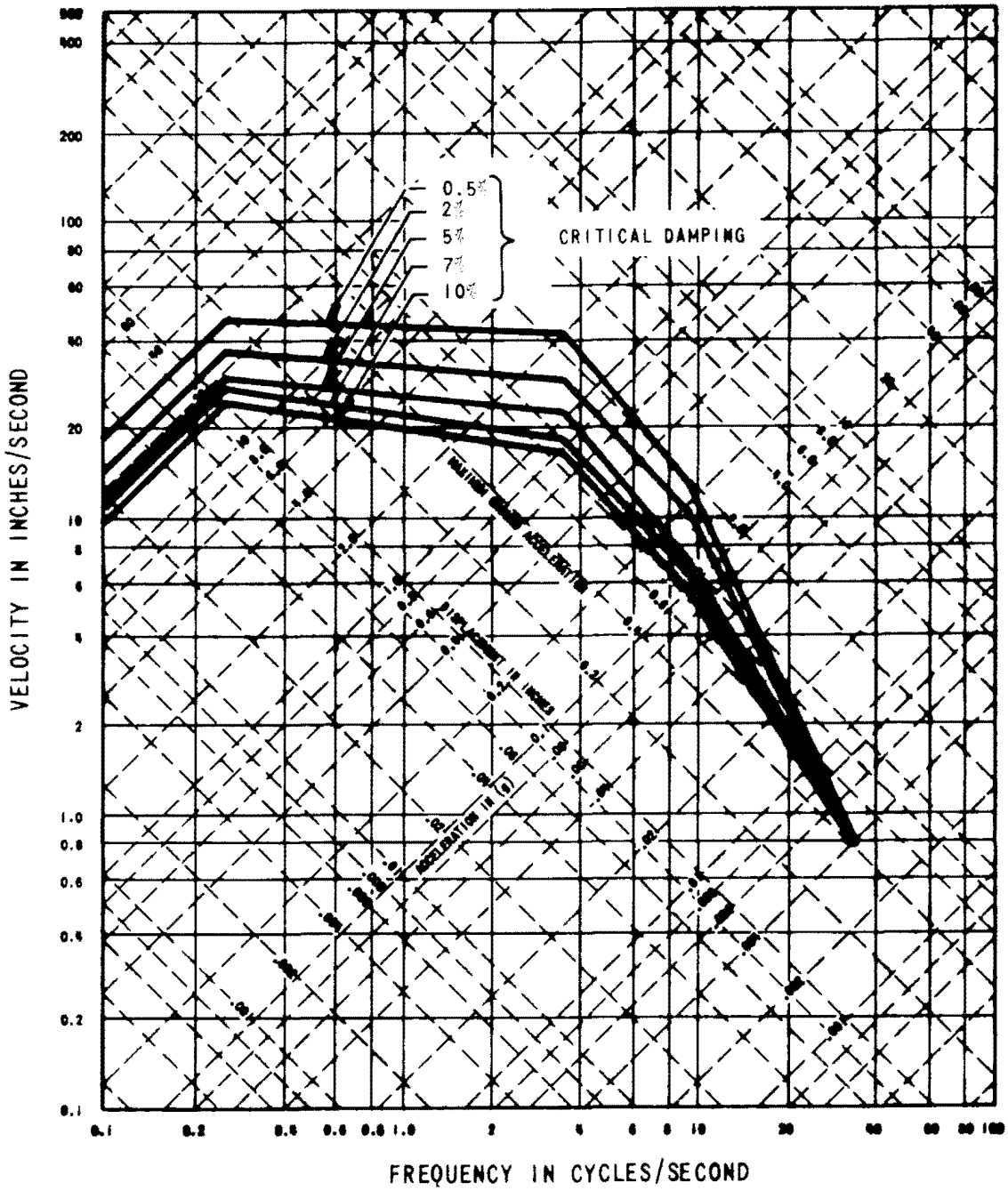
FIGURE 3.7N-1



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Horizontal Design Response Spectra-Scaled to 0.4g Horizontal Ground Acceleration

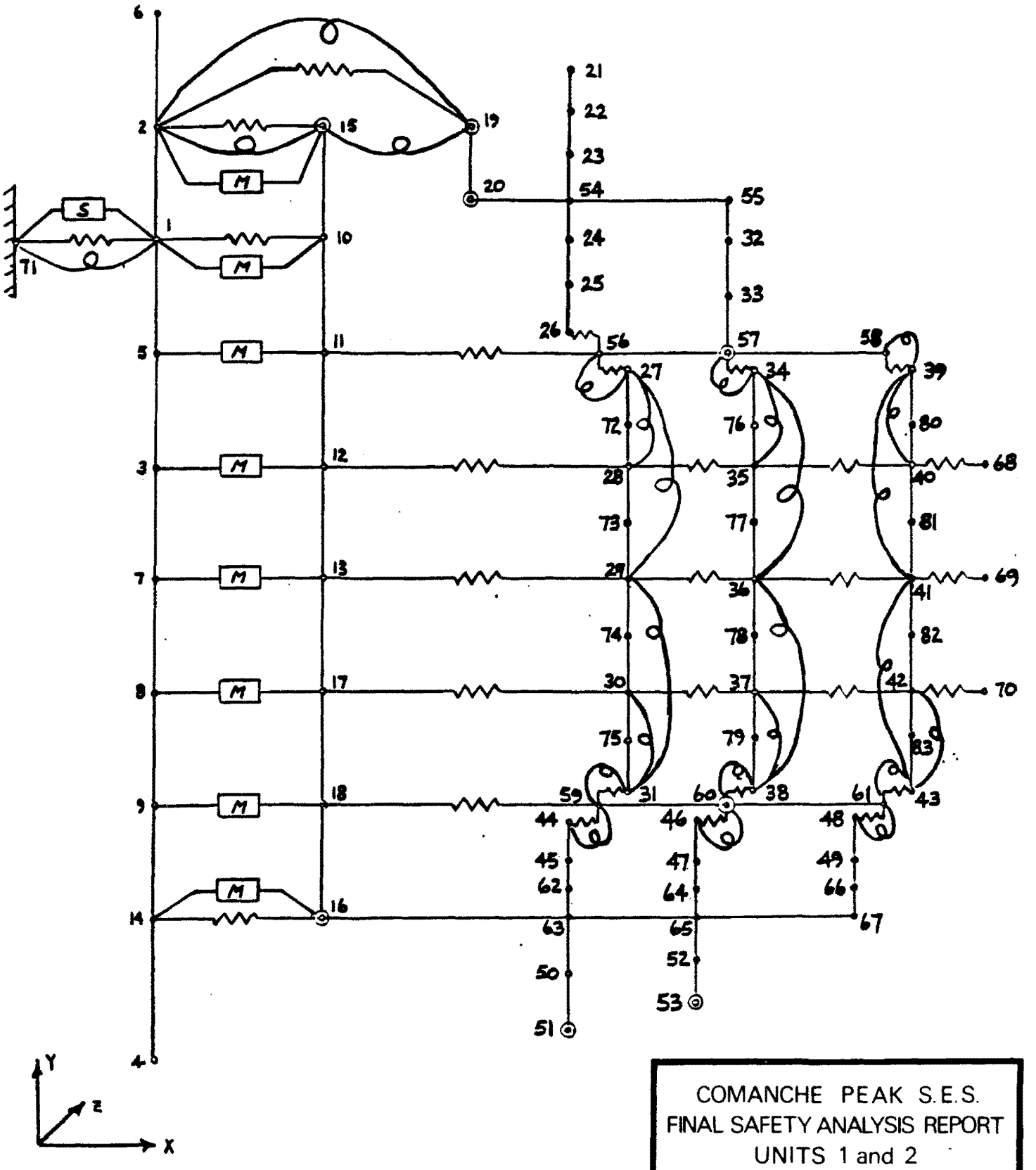
FIGURE 3.7N-2



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Vertical Design Response Spectra-Scaled to 0.4g Horizontal Ground Acceleration

FIGURE 3.7N-3

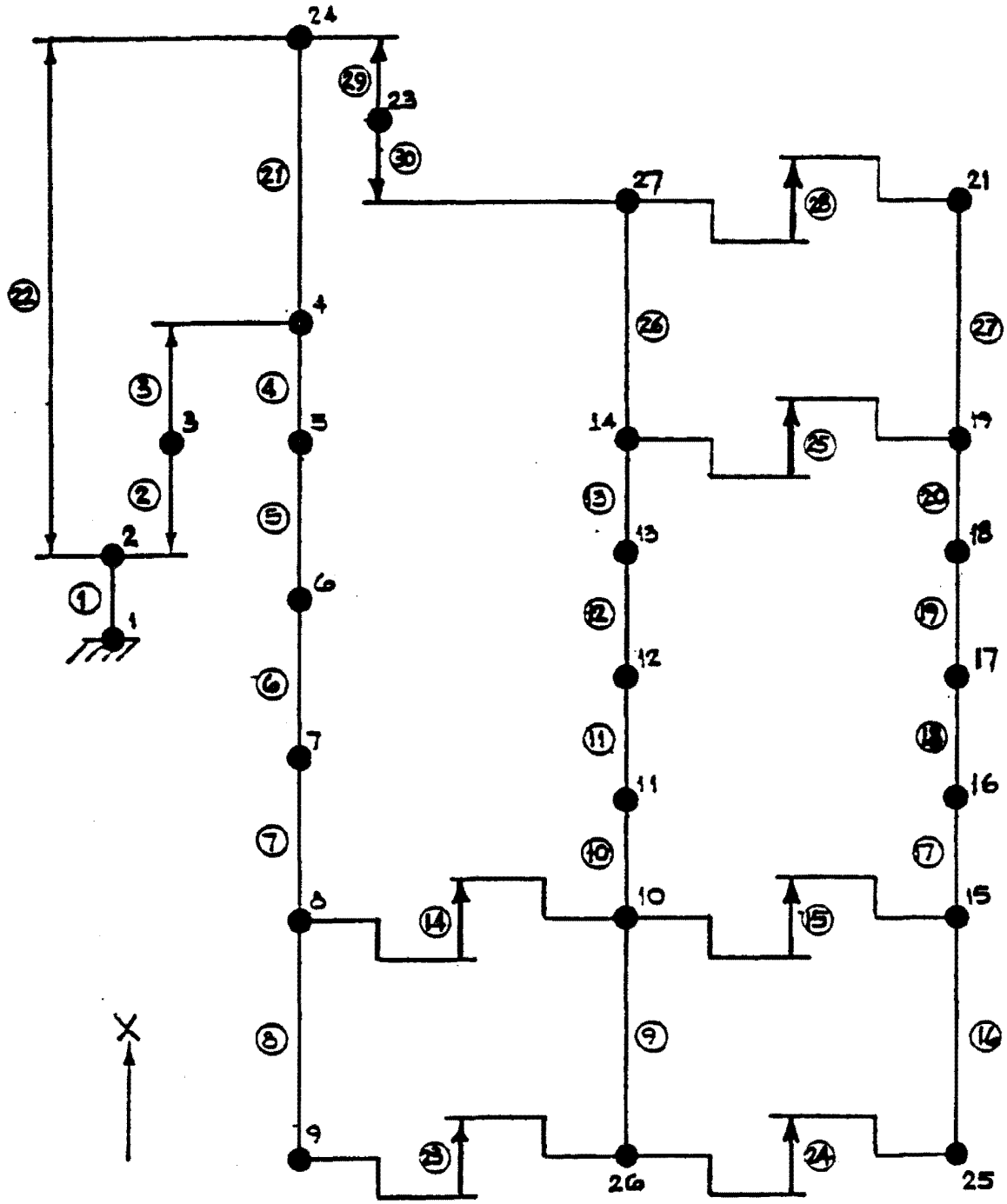


COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Typical Reactor Internals Horizontal Seismic Model (Response Spectrum Analysis Method)

FIGURE 3.7N-4

AMENDMENT 20
MAY 7, 1981

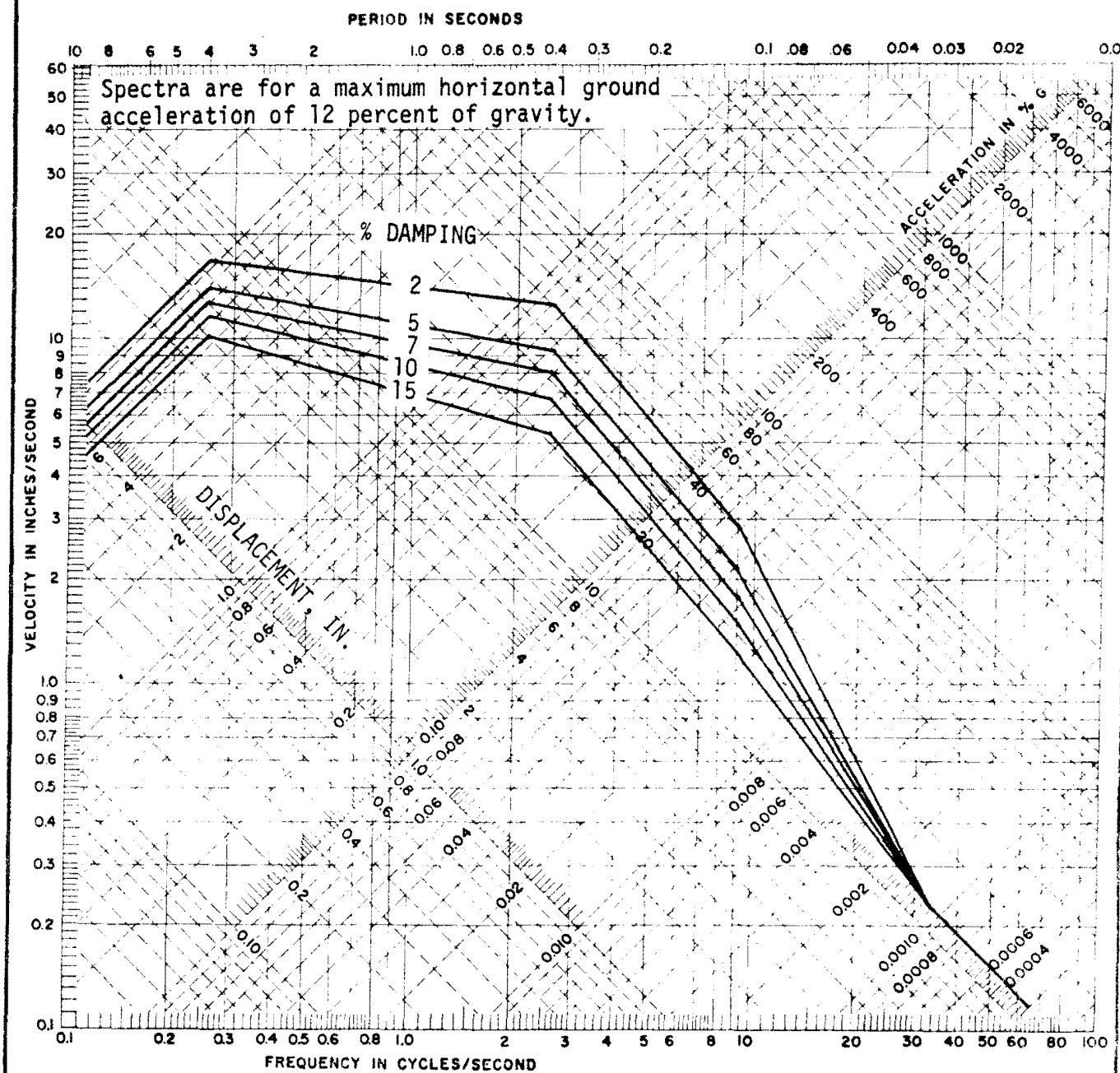


COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Typical Reactor Internals
Vertical Seismic
Structural Model
(Response Spectrum
Analysis Method)

FIGURE 3.7N-5

AMENDMENT 20
MAY 7, 1981



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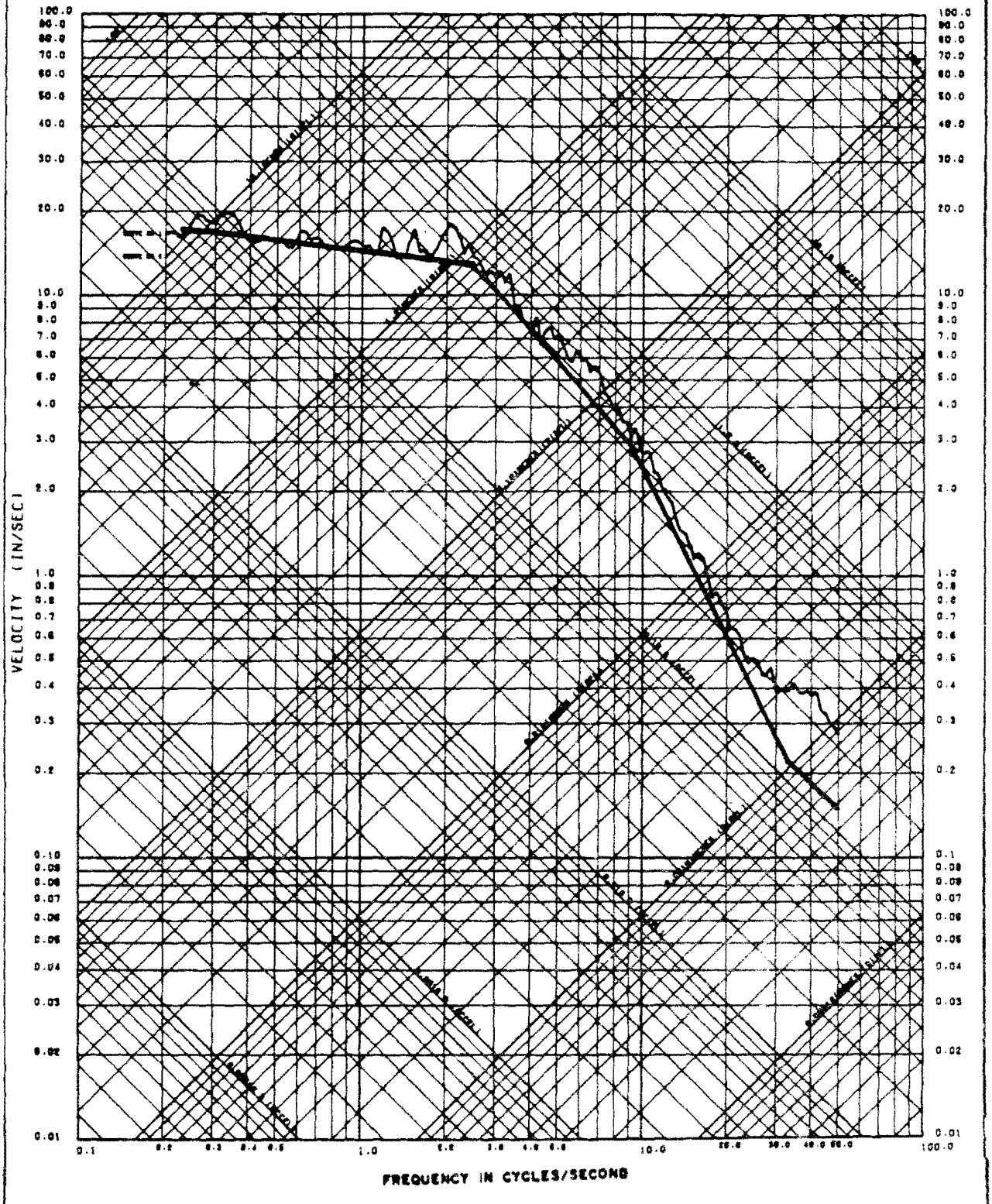
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

DESIGN RESPONSE SPECTRA
FOR HORIZONTAL SAFE
SHUTDOWN EARTHQUAKE

FIGURE 3.7B-1

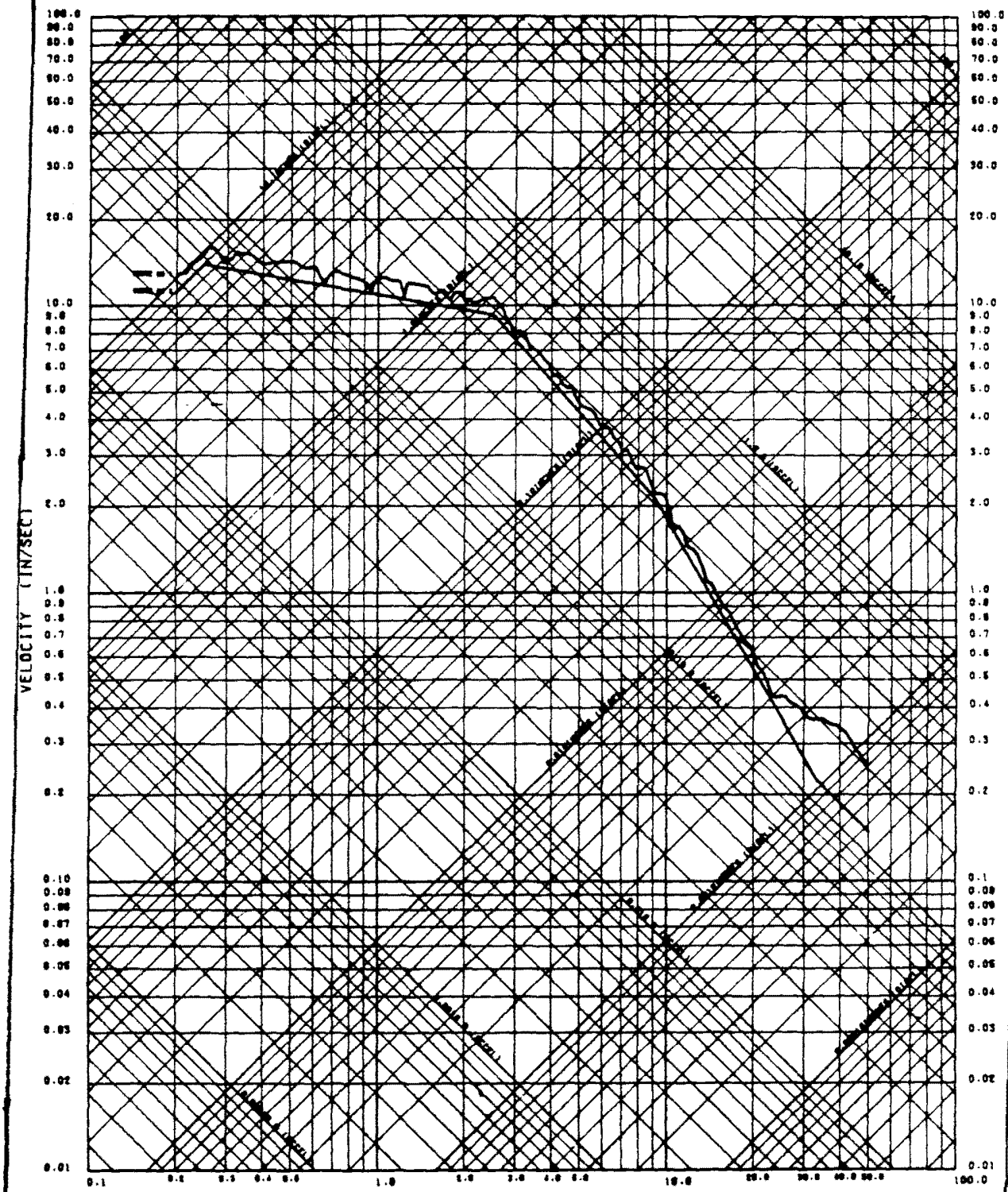


COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

HORIZONTAL RESPONSE SPECTRA
SAFE SHUTDOWN EARTHQUAKE
2 PERCENT DAMPING

FIGURE 3.7B-2

Amendment 68
February 15, 1988



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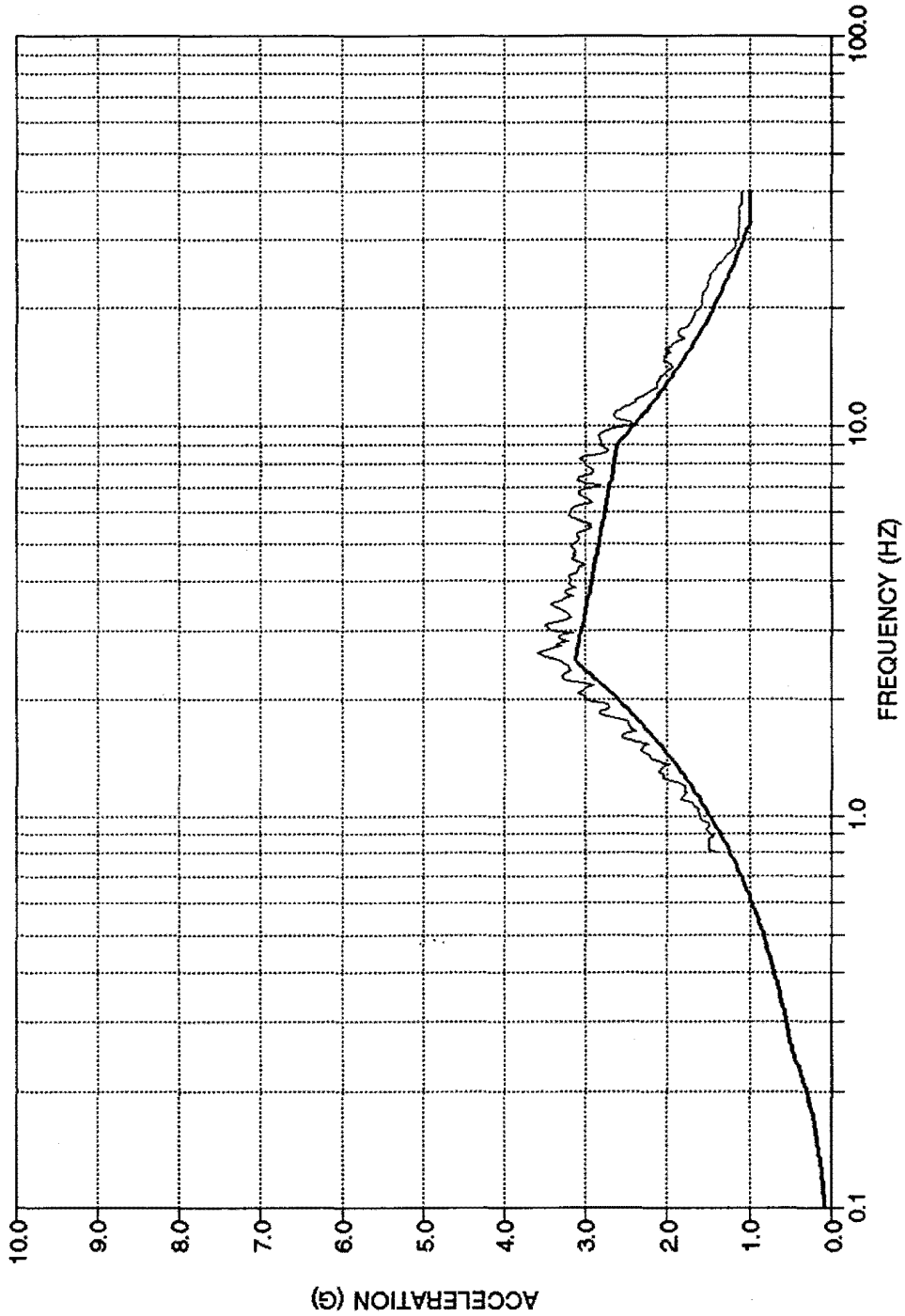
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

HORIZONTAL RESPONSE SPECTRA
SAFE SHUTDOWN EARTHQUAKE
5 PERCENT DAMPING

FIGURE 3.7B-3

Amendment 68
February 15, 1988



Amendment 98

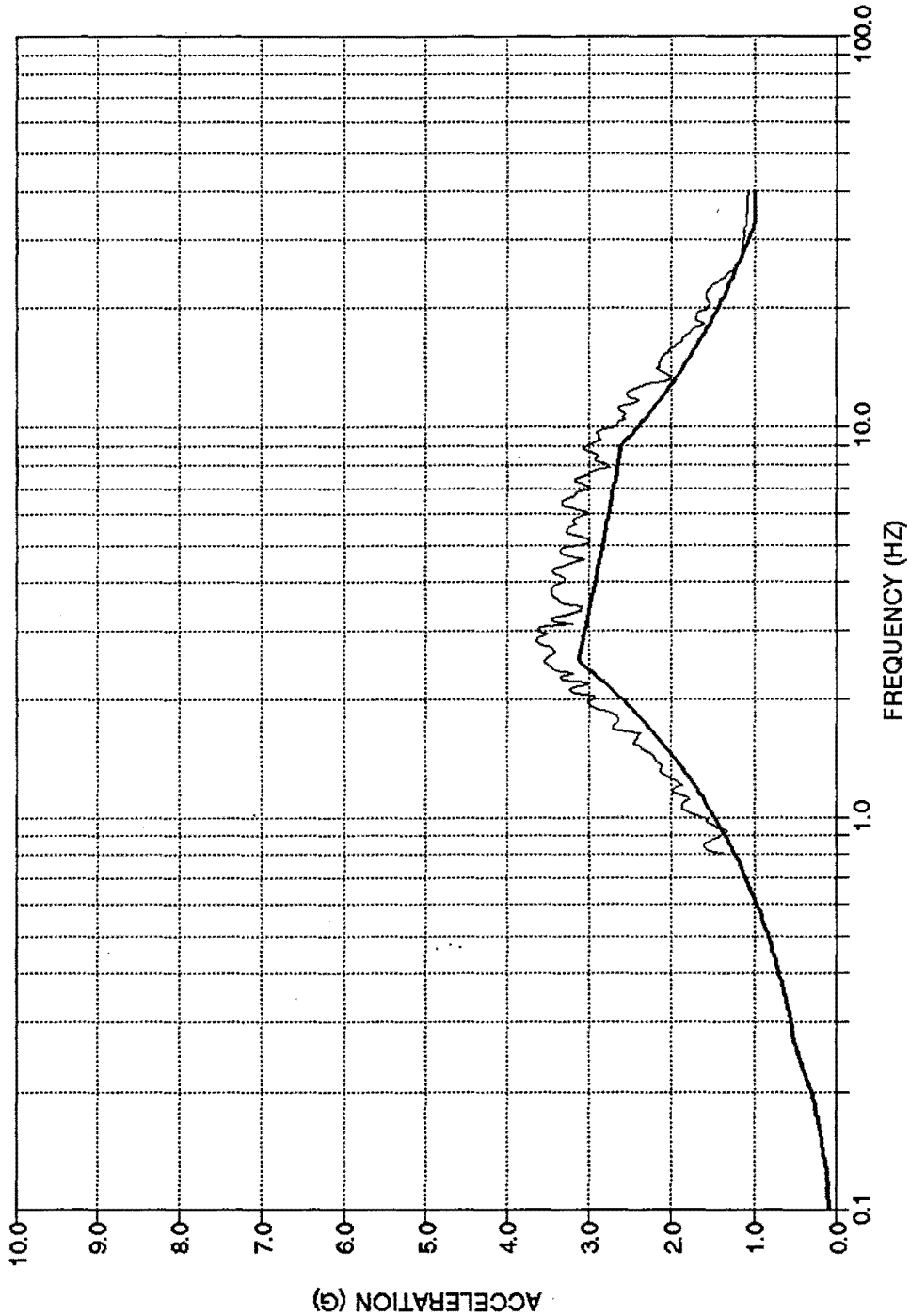
COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

FUEL BUILDING RE-ANALYSIS
EAST-WEST RESPONSE SPECTRA
SAFE SHUTDOWN EARTHQUAKE
5 PERCENT DAMPING

FIGURE 3.7B-3A

CPE

CPE

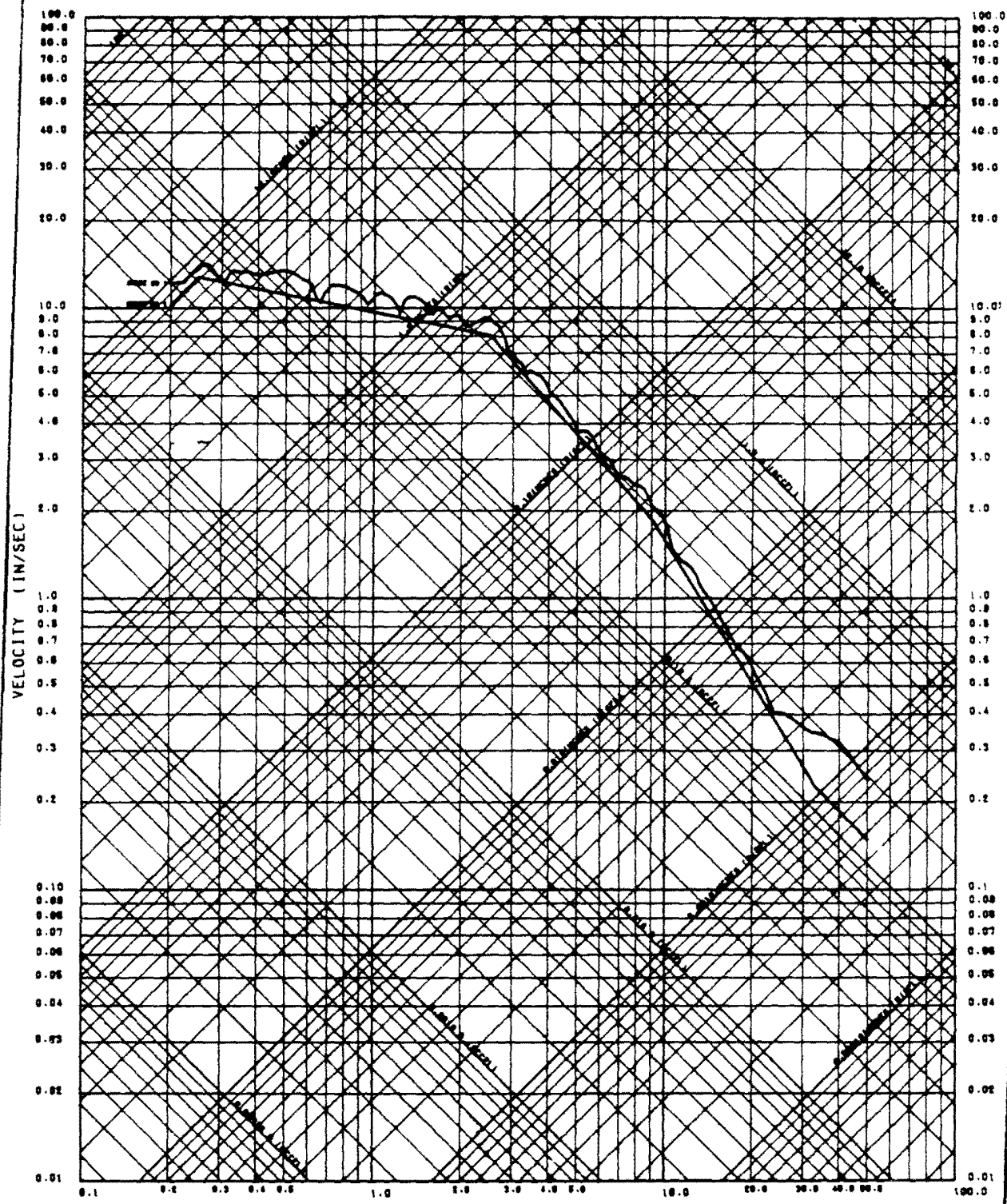


Amendment 98

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

FUEL BUILDING RE-ANALYSIS
NORTH-SOUTH RESPONSE SPECTRA
SAFE SHUTDOWN EARTHQUAKE
5 PERCENT DAMPING

FIGURE 3.7B-3B



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FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

HORIZONTAL RESPONSE SPECTRA
SAFE SHUTDOWN EARTHQUAKE
7 PERCENT DAMPING

FIGURE 3.78-4

Amendment 68
February 15, 1988

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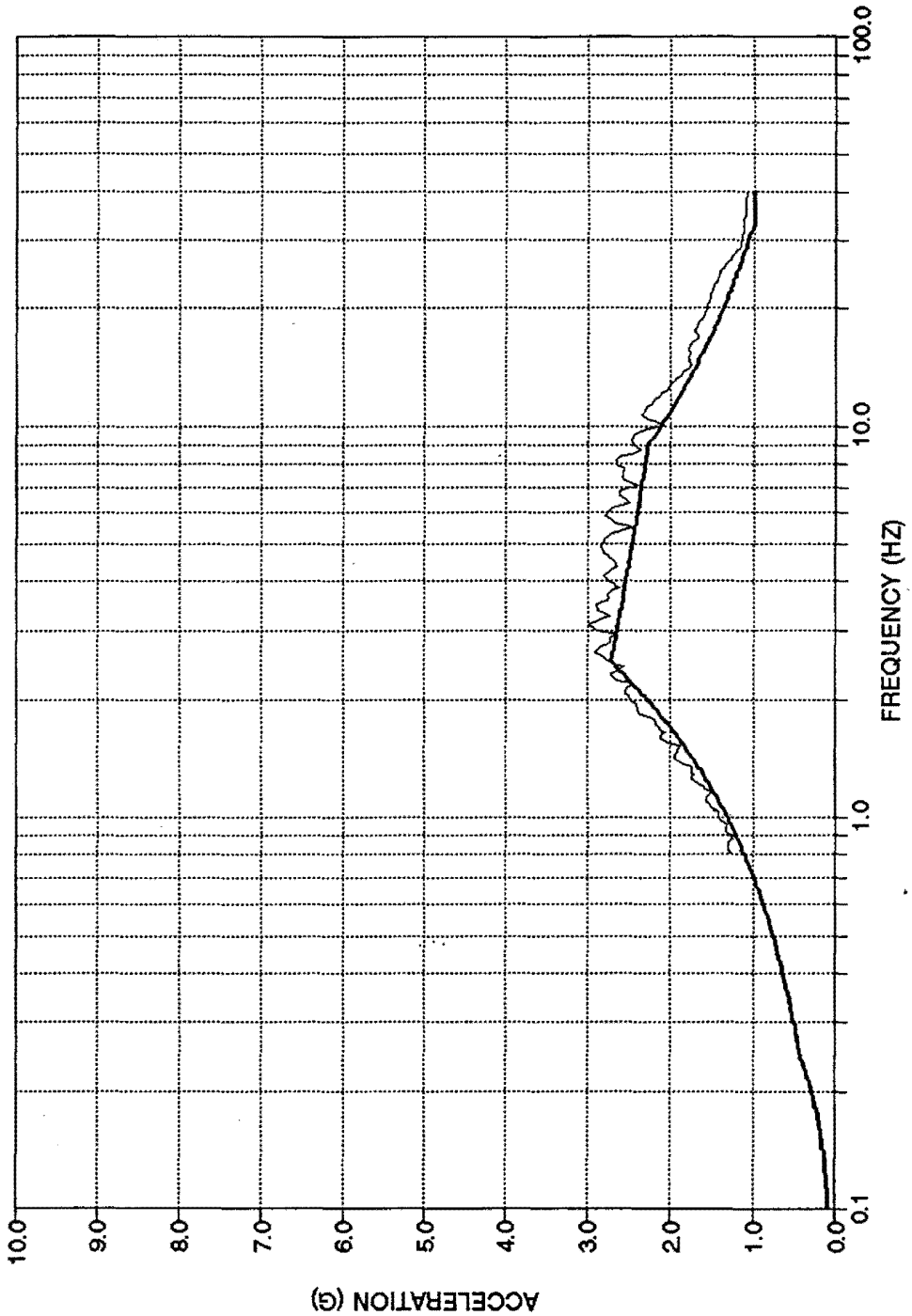

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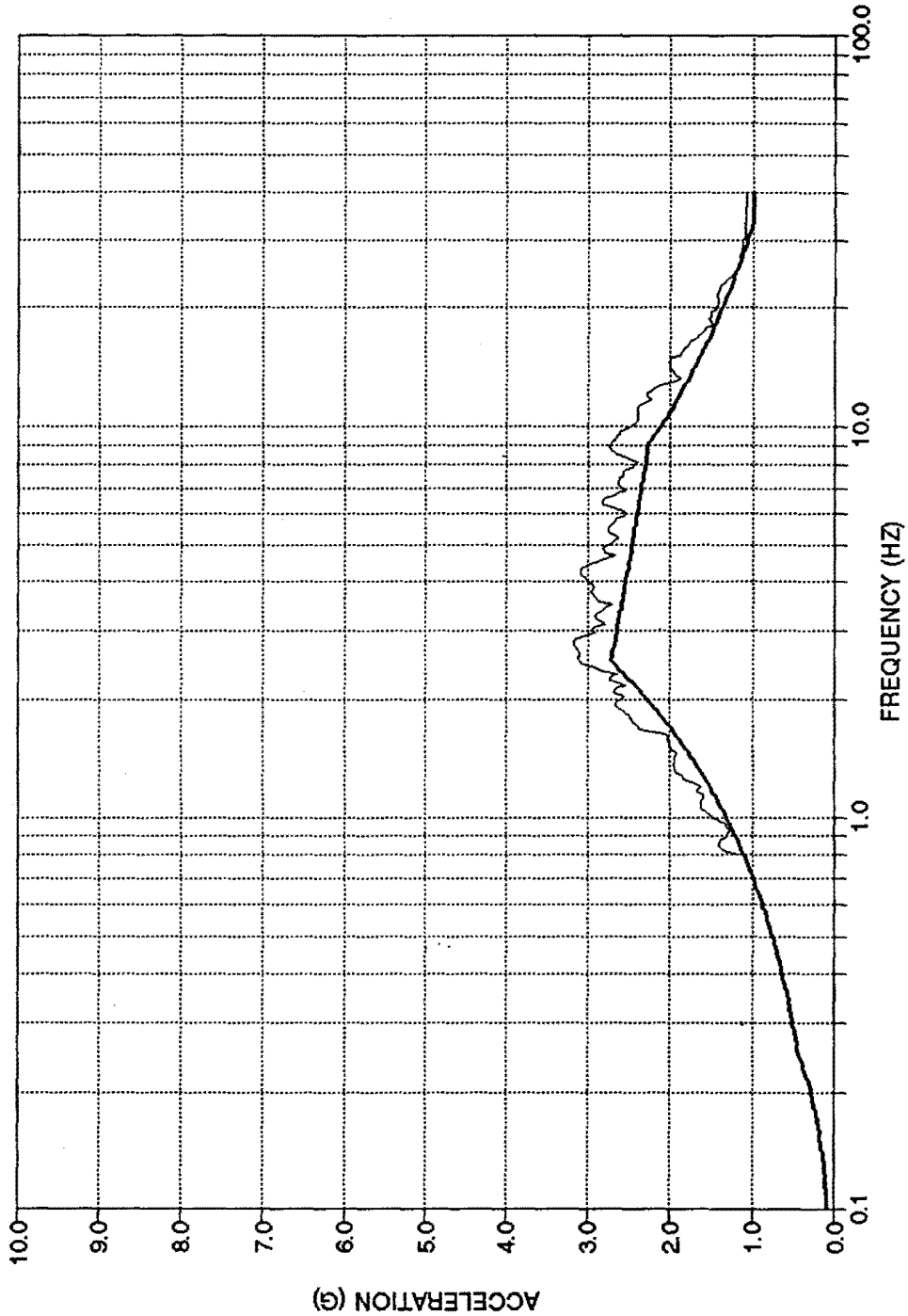
COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

FUEL BUILDING RE-ANALYSIS
EAST-WEST RESPONSE SPECTRA
SAFE SHUTDOWN EARTHQUAKE
7 PERCENT DAMPING

FIGURE 3.7B-4A



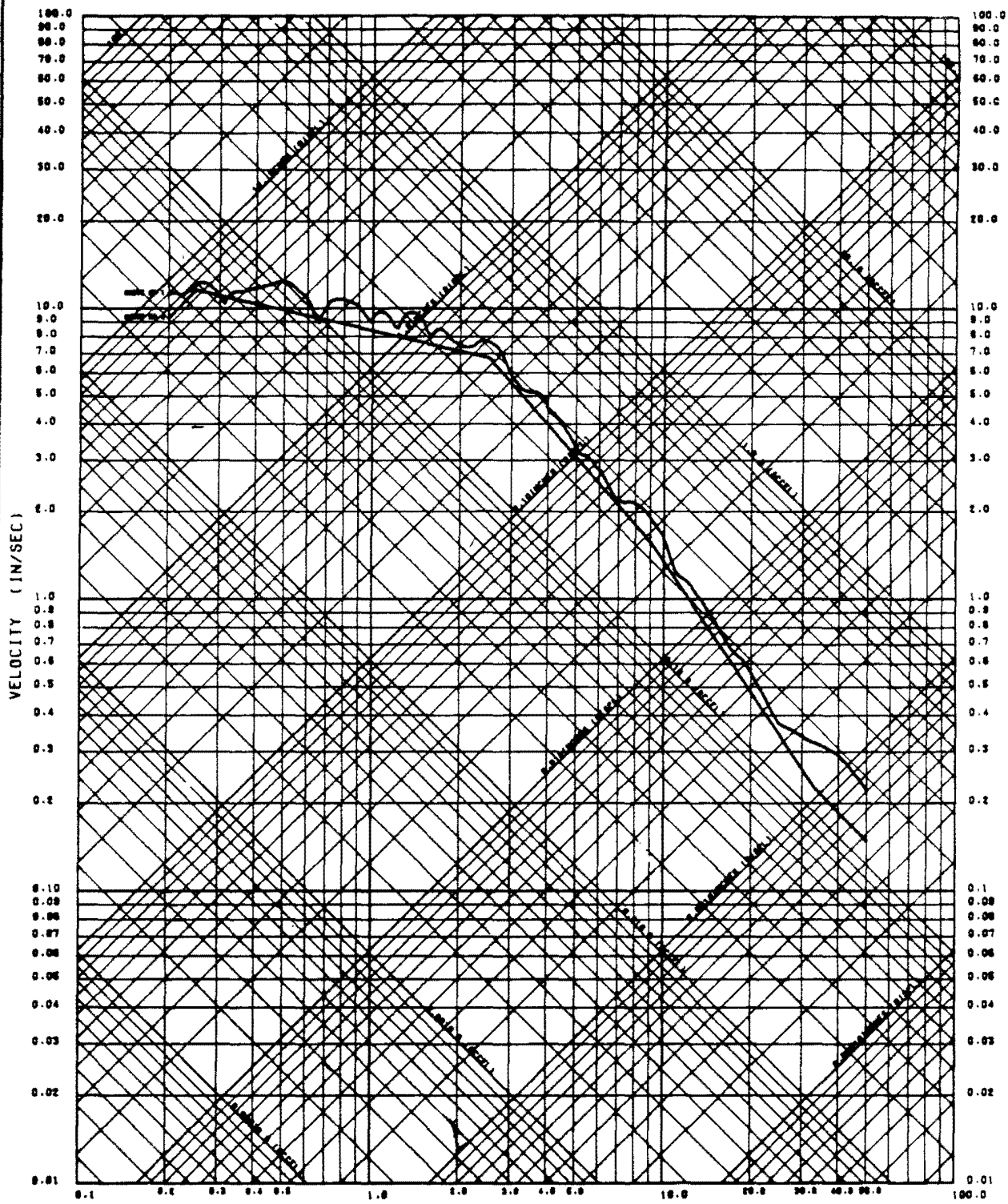
Amendment 98

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

FUEL BUILDING RE-ANALYSIS
NORTH-SOUTH RESPONSE SPECTRA
SAFE SHUTDOWN EARTHQUAKE
7 PERCENT DAMPING

FIGURE 3.7B-4B

CPE



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

HORIZONTAL RESPONSE SPECTRA
SAFE SHUTDOWN EARTHQUAKE
10 PERCENT DAMPING

FIGURE 3.7B-5

Amendment 68
February 15, 1988

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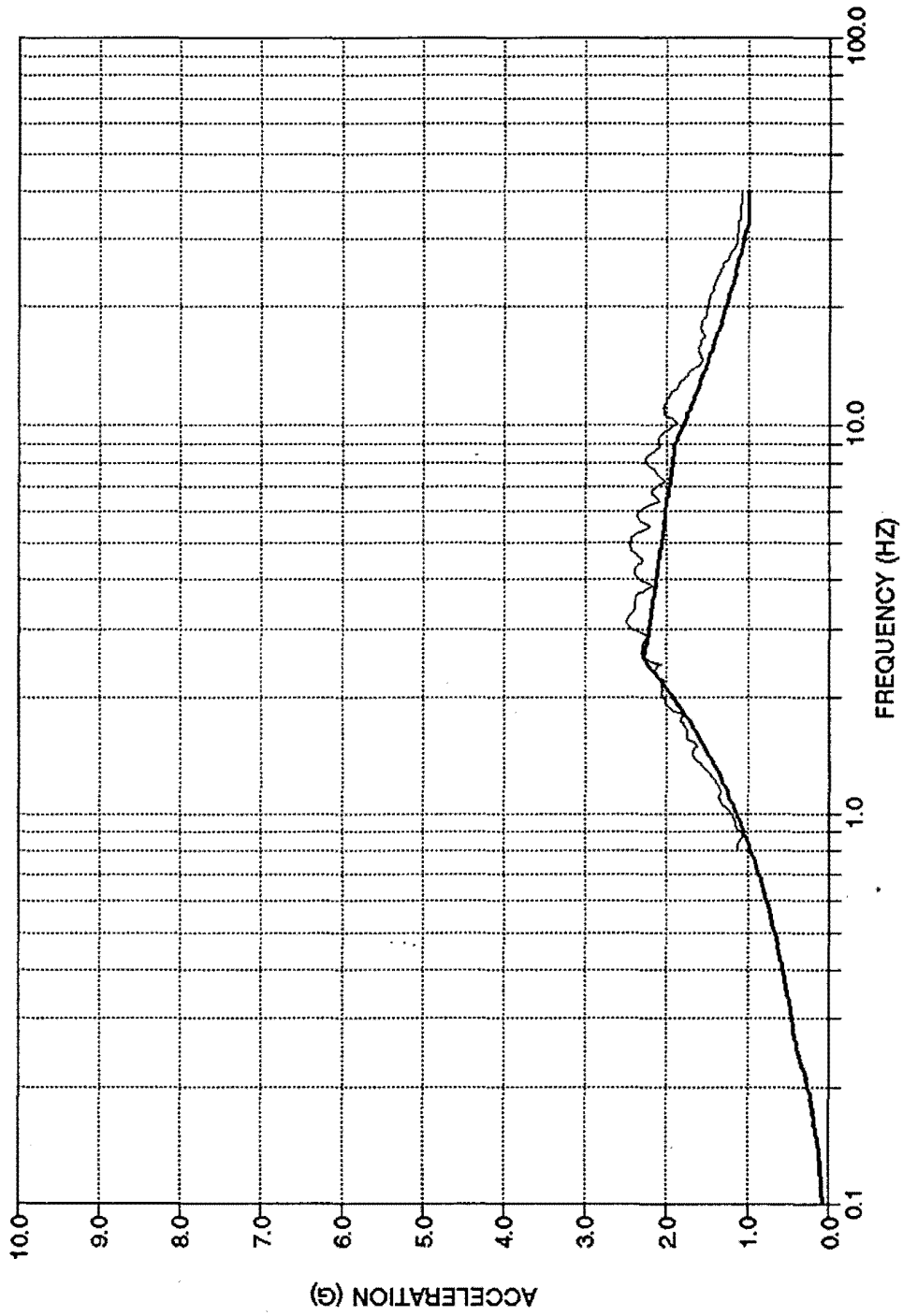
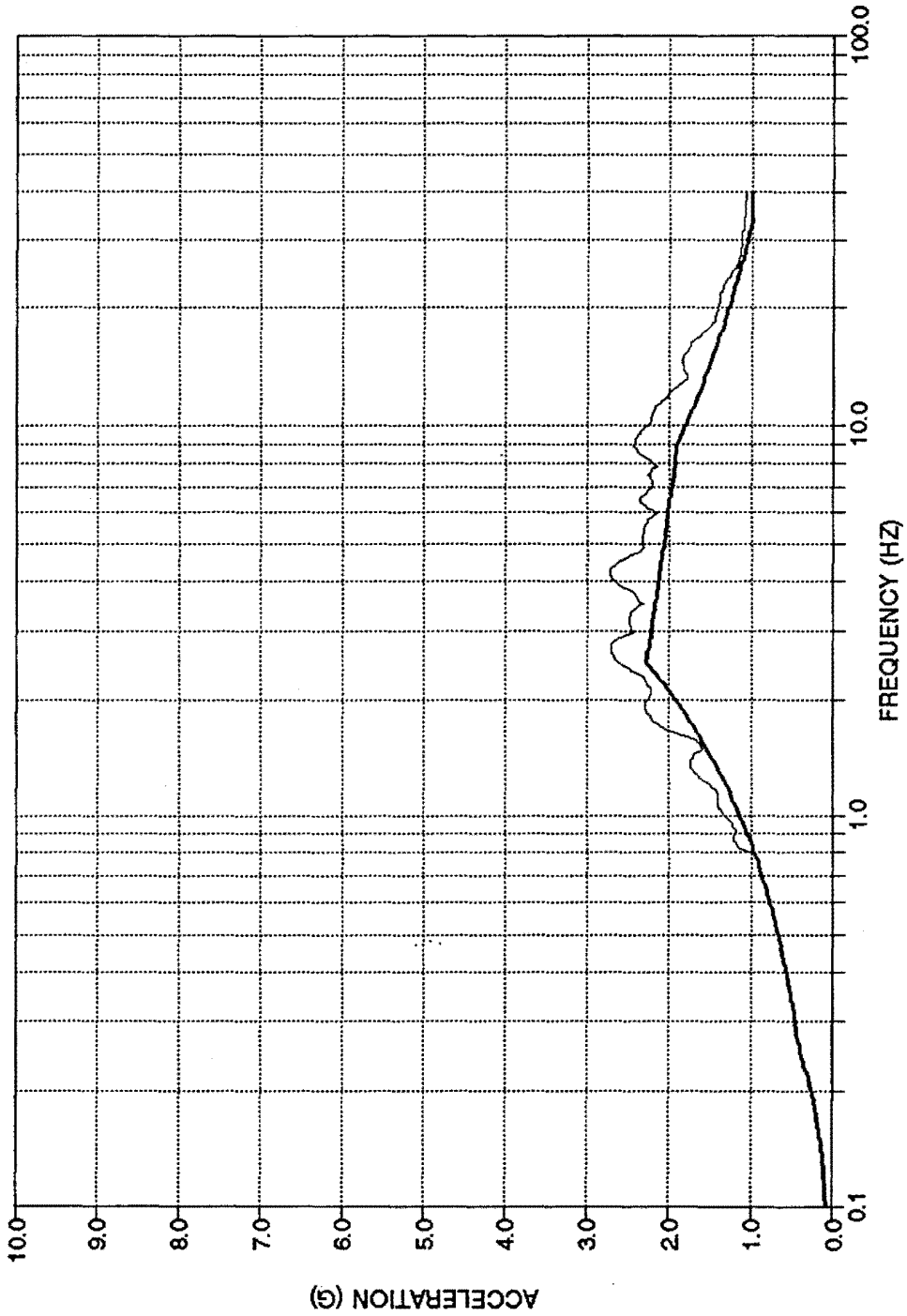


COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

FUEL BUILDING RE-ANALYSIS
EAST-WEST RESPONSE SPECTRA
SAFE SHUTDOWN EARTHQUAKE
10 PERCENT DAMPING

FIGURE 3.7B-5A

CPE



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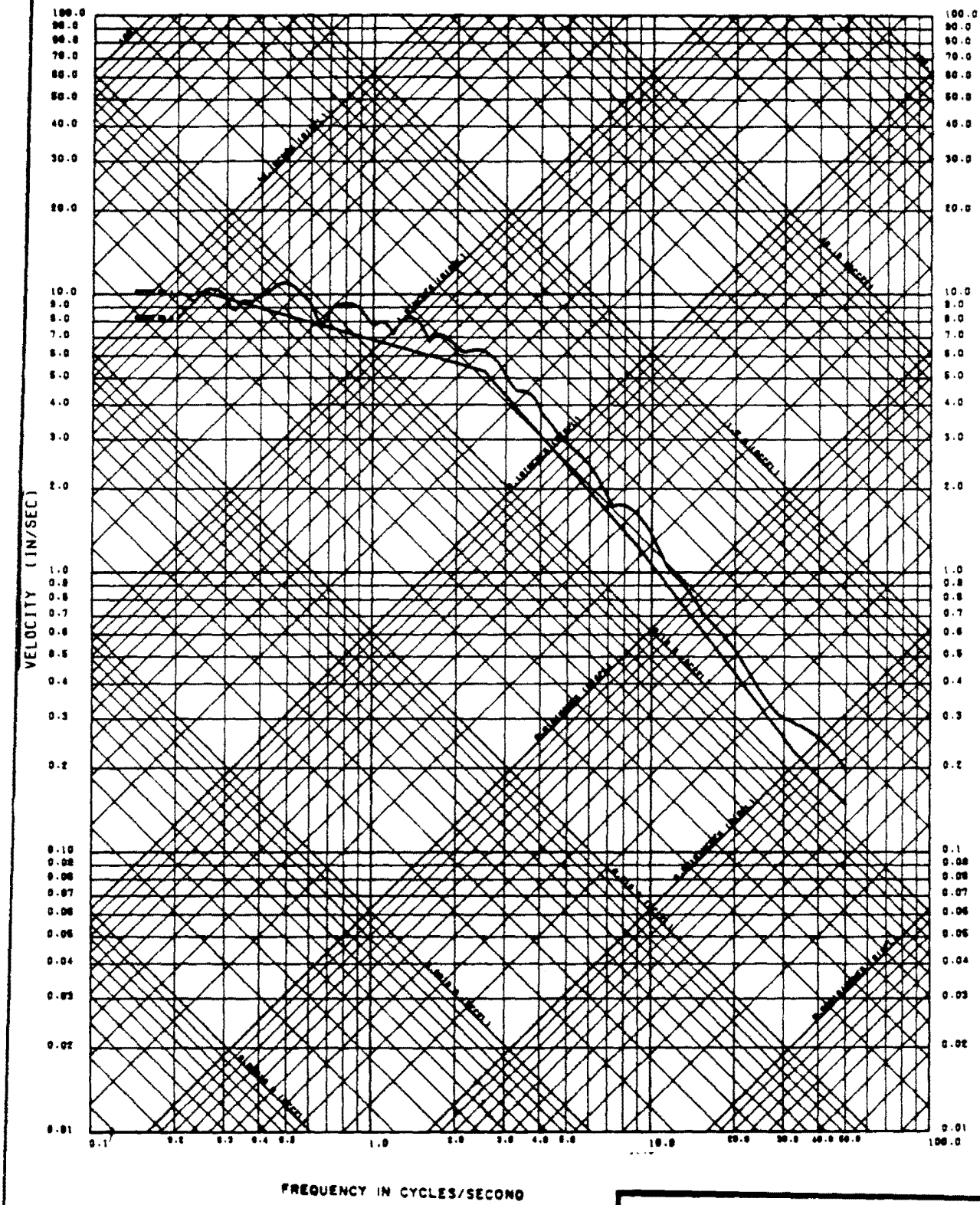
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

FUEL BUILDING RE-ANALYSIS
NORTH-SOUTH RESPONSE SPECTRA
SAFE SHUTDOWN EARTHQUAKE
10 PERCENT DAMPING

FIGURE 3.7B-5B



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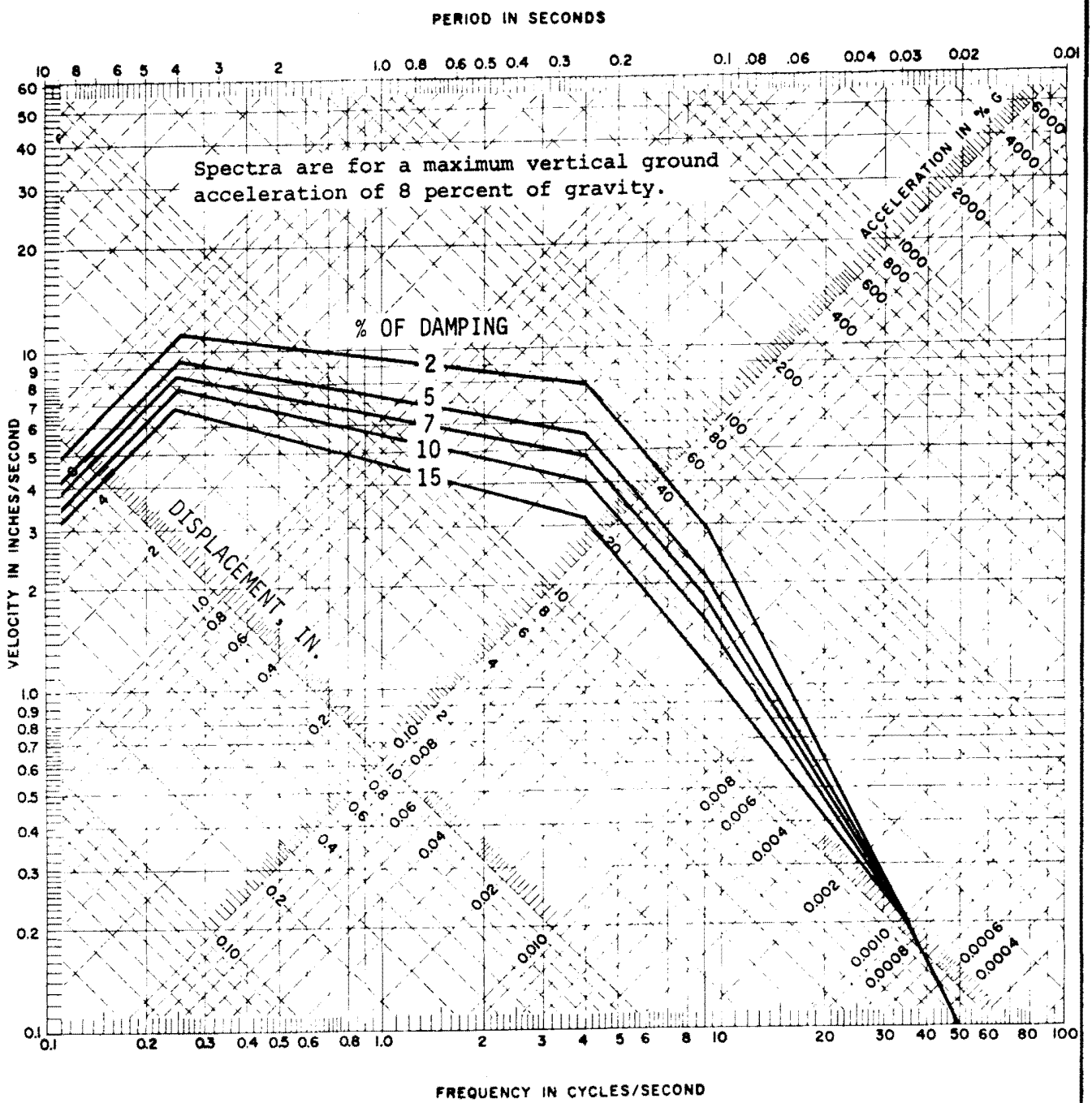
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

HORIZONTAL RESPONSE SPECTRA
SAFE SHUTDOWN EARTHQUAKE
15 PERCENT DAMPING

FIGURE 3.7B-6

Amendment 68
February 15, 1988



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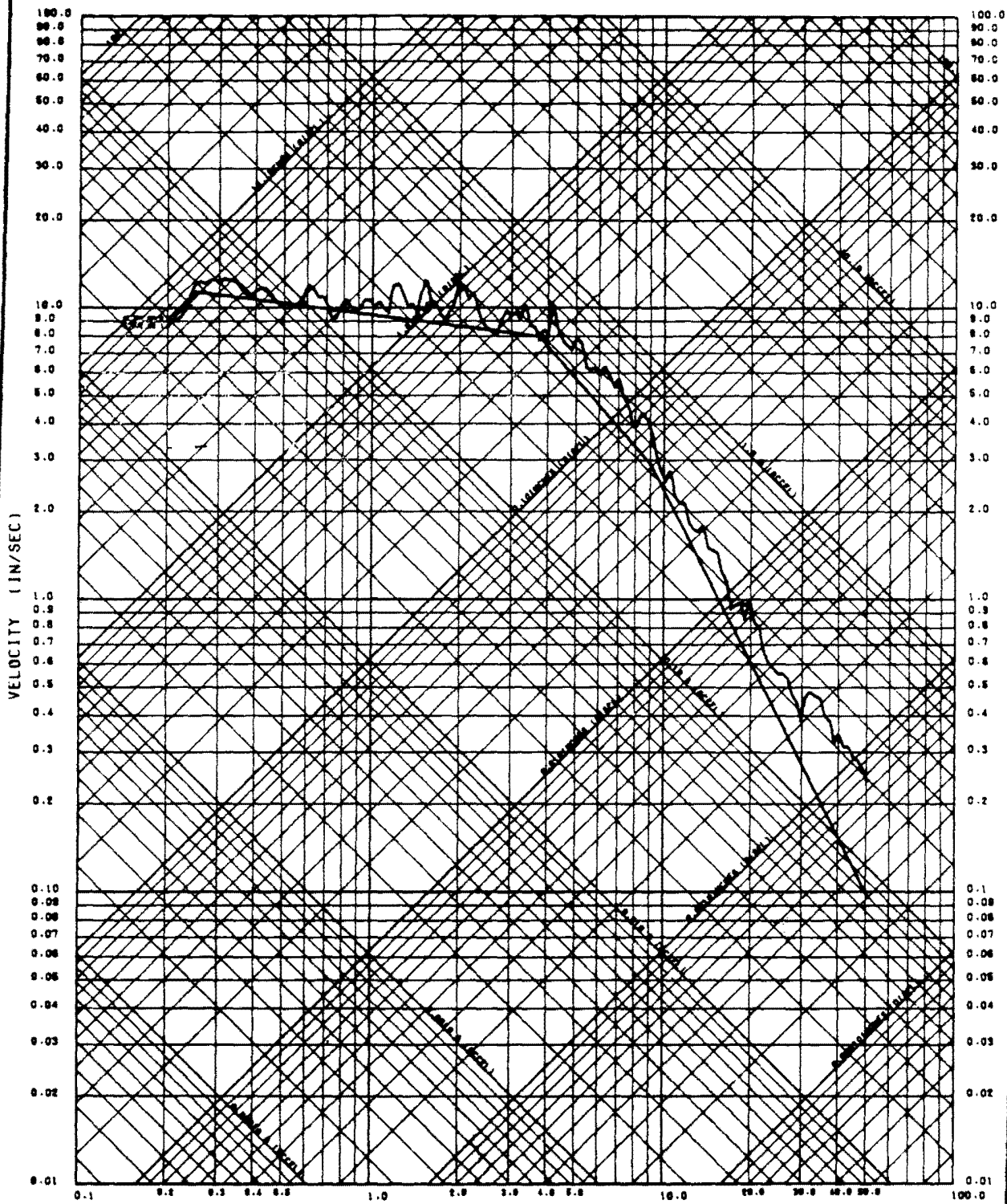
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

DESIGN RESPONSE SPECTRA
FOR VERTICAL SAFE
SHUTDOWN EARTHQUAKE

FIGURE 3.7B-7



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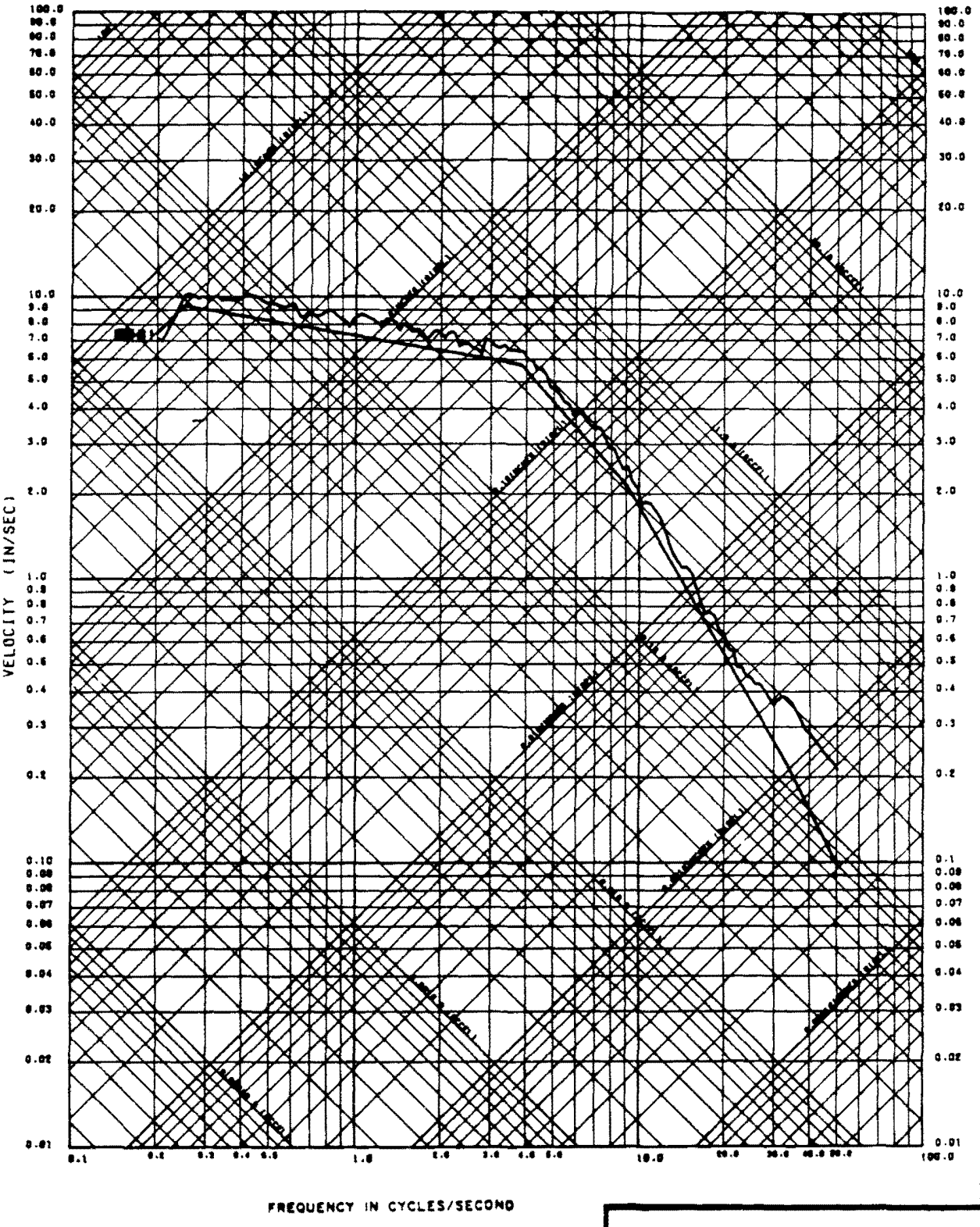
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

VERTICAL RESPONSE SPECTRA
SAFE SHUTDOWN EARTHQUAKE
2 PERCENT DAMPING

FIGURE 3.7B-8

Amendment 68
February 15, 1988



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FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

VERTICAL RESPONSE SPECTRA
SAFE SHUTDOWN EARTHQUAKE
5 PERCENT DAMPING

FIGURE 3.7B-9

Amendment 68
February 15, 1988

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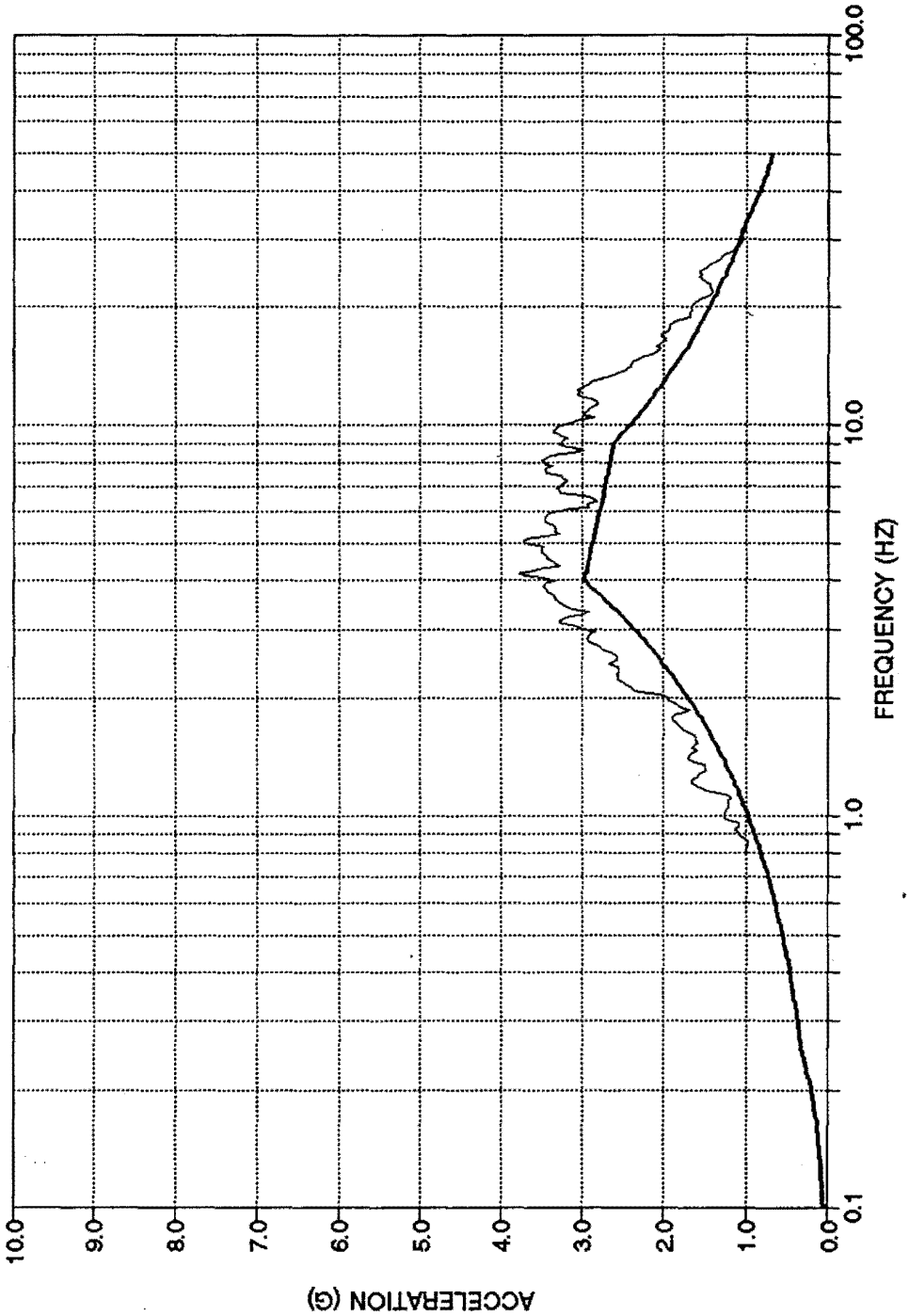
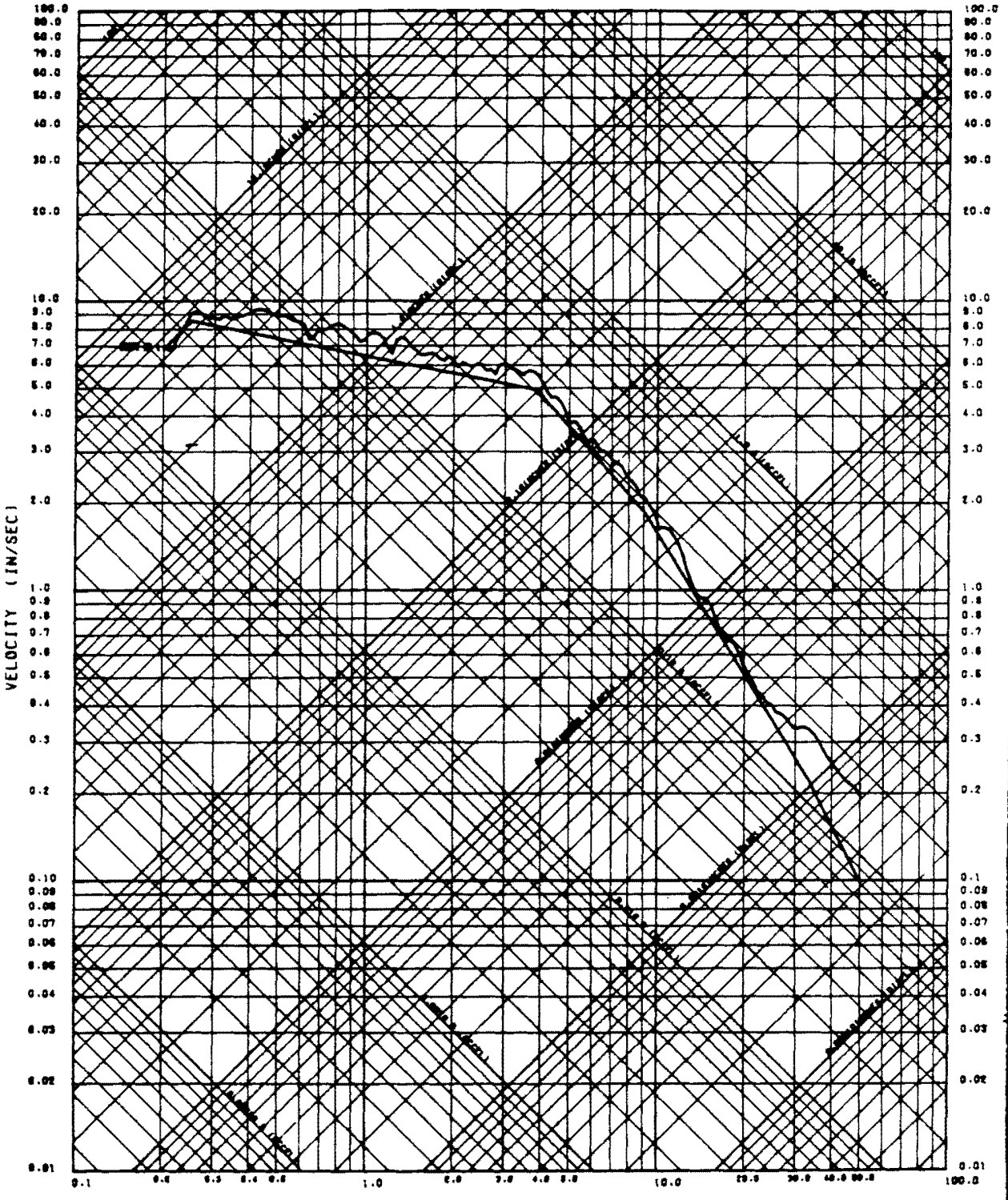


Amendment 98

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

FUEL BUILDING RE-ANALYSIS
VERTICAL RESPONSE SPECTRA
SAFE SHUTDOWN EARTHQUAKE
5 PERCENT DAMPING

FIGURE 3.7B-9A



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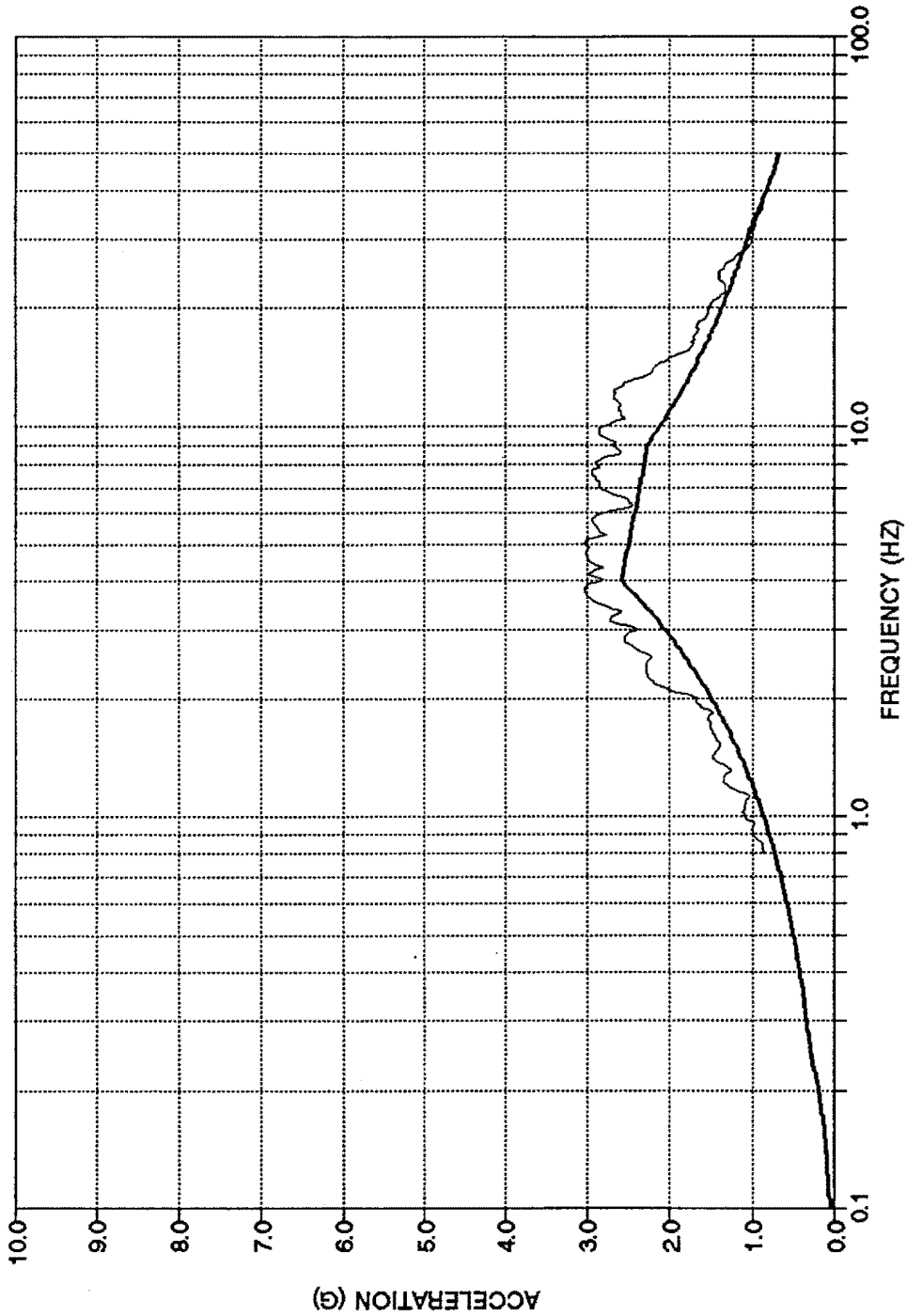
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

VERTICAL RESPONSE SPECTRA
SAFE SHUTDOWN EARTHQUAKE
7 PERCENT DAMPING

FIGURE 3.7B-10

Amendment 68
February 15, 1988

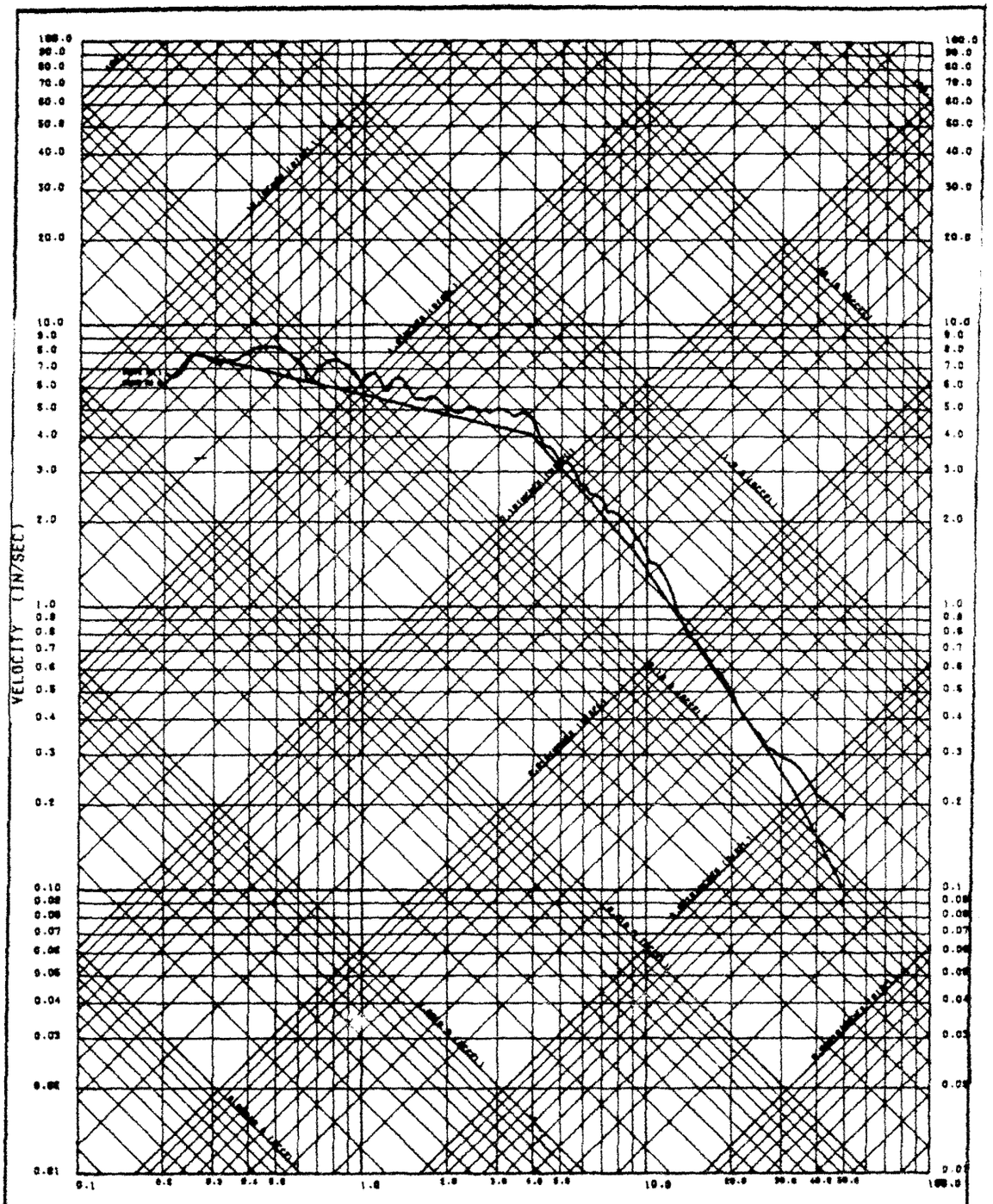


Amendment 98

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

FUEL BUILDING RE-ANALYSIS
VERTICAL RESPONSE SPECTRA
SAFE SHUTDOWN EARTHQUAKE
7 PERCENT DAMPING

FIGURE 3.7B-10A



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FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

VERTICAL RESPONSE SPECTRA
SAFE SHUTDOWN EARTHQUAKE
10 PERCENT DAMPING

FIGURE 3.7B-11

Amendment 68
February 15, 1988

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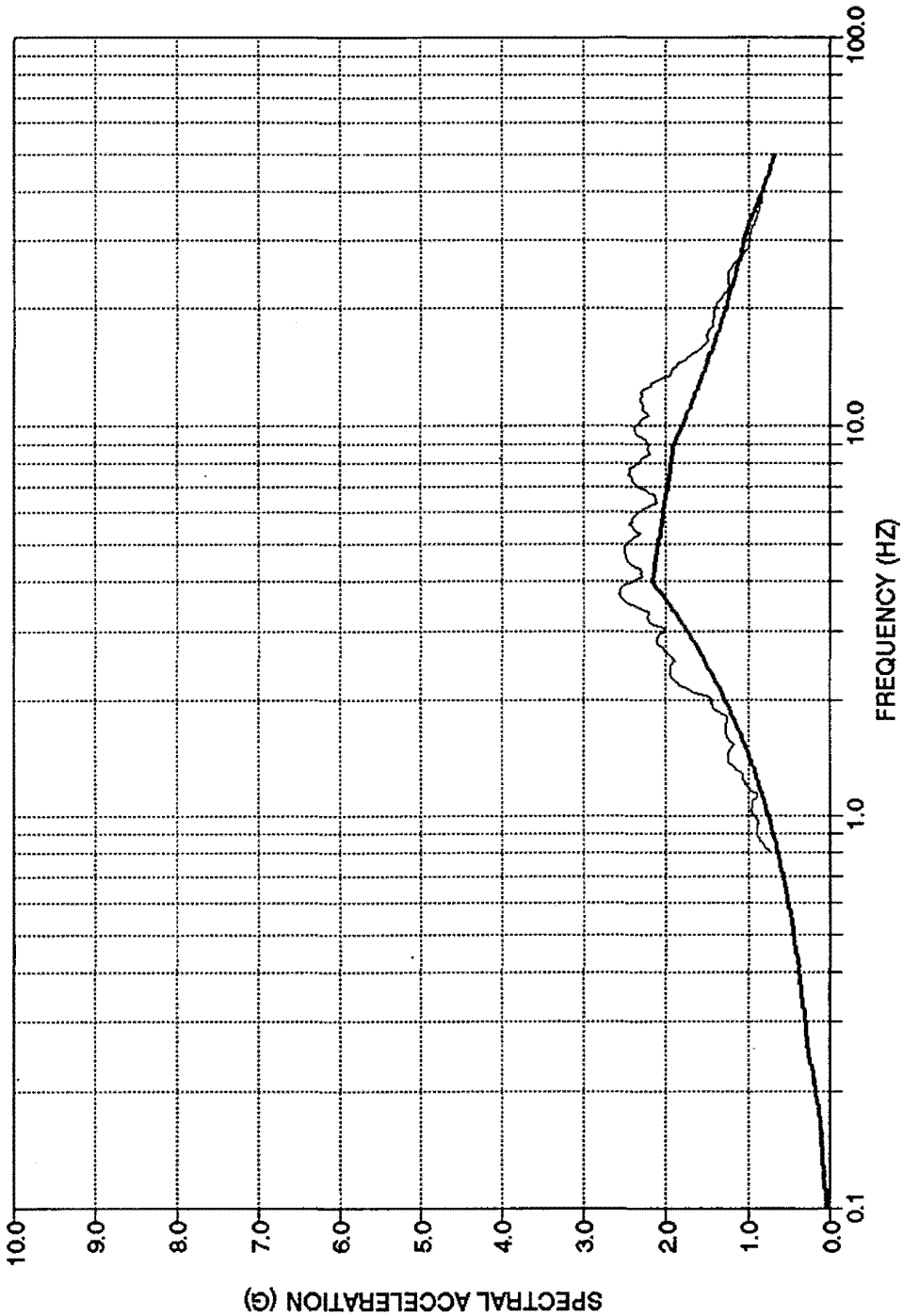
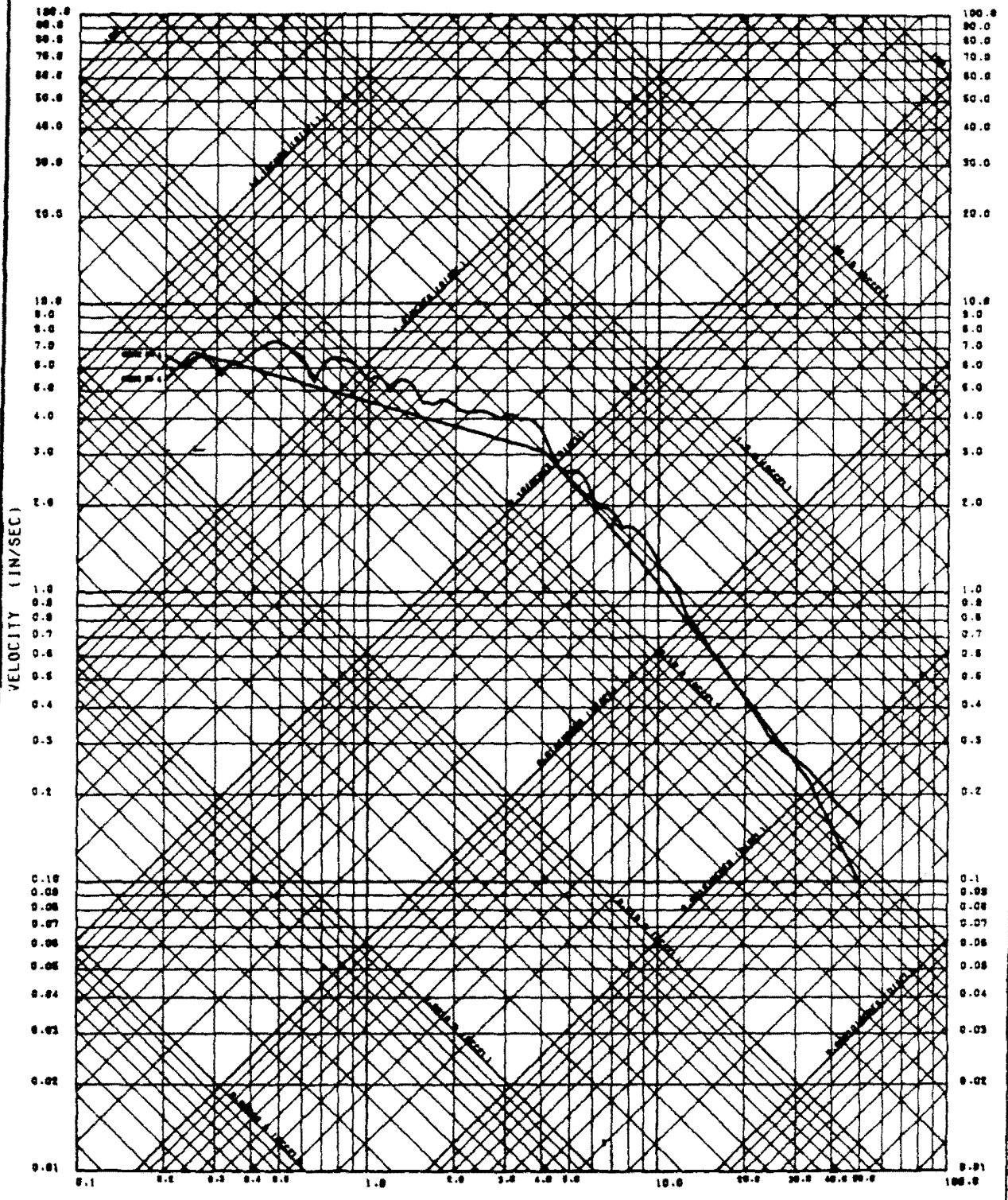


Amendment 98

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

FUEL BUILDING RE-ANALYSIS
VERTICAL RESPONSE SPECTRA
SAFE SHUTDOWN EARTHQUAKE
10 PERCENT DAMPING

FIGURE 3.7B-11A



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FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

VERTICAL RESPONSE SPECTRA
SAFE SHUTDOWN EARTHQUAKE
15 PERCENT DAMPING

FIGURE 3.7B-12

Amendment 68
February 15, 1988

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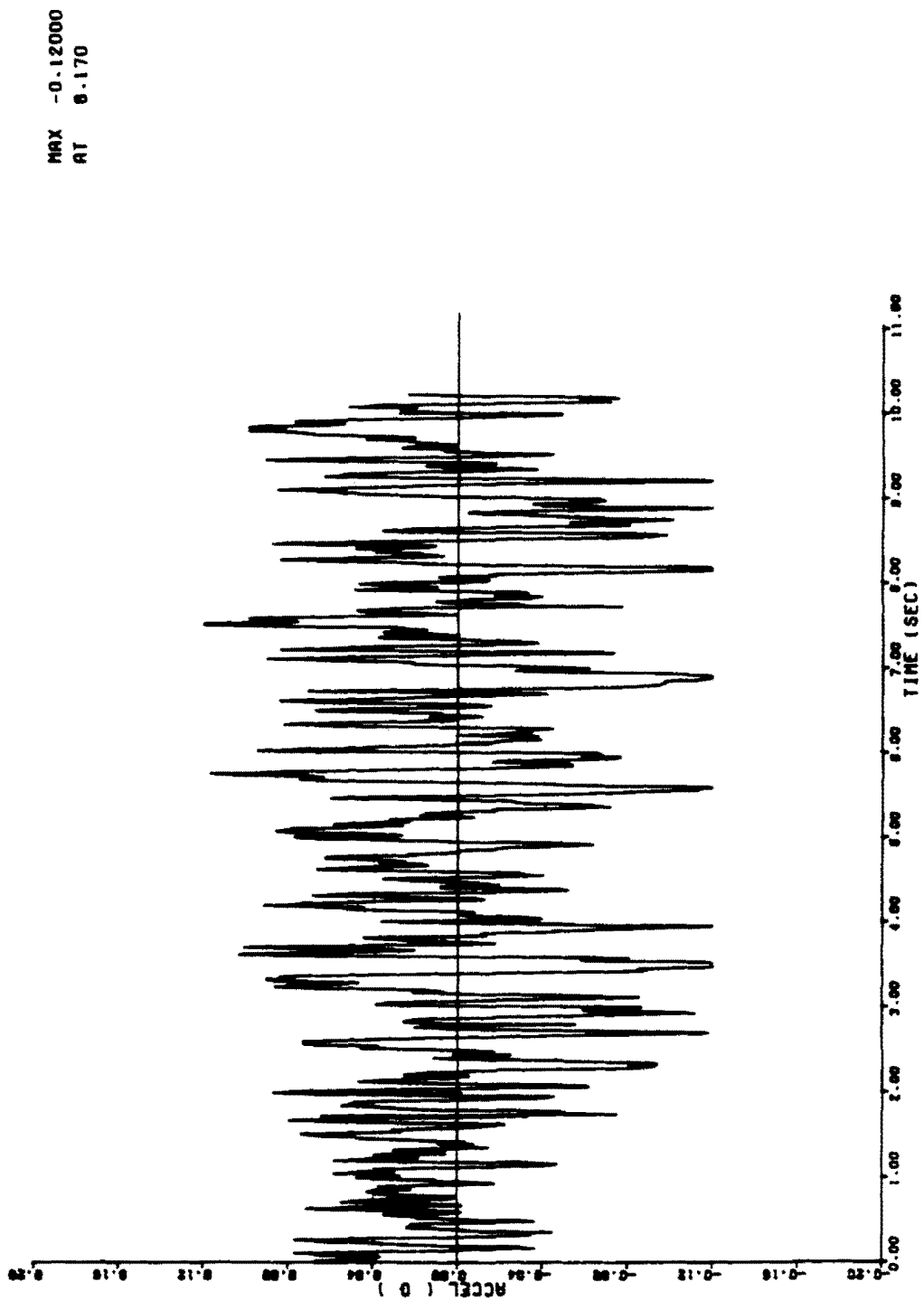
UNITS 1 and 2

FIGURE 3.7B-13



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FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

HORIZONTAL ARTIFICIAL
ACCELERATION TIME HISTORY

FIGURE 3.7B-14

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February 15, 1988

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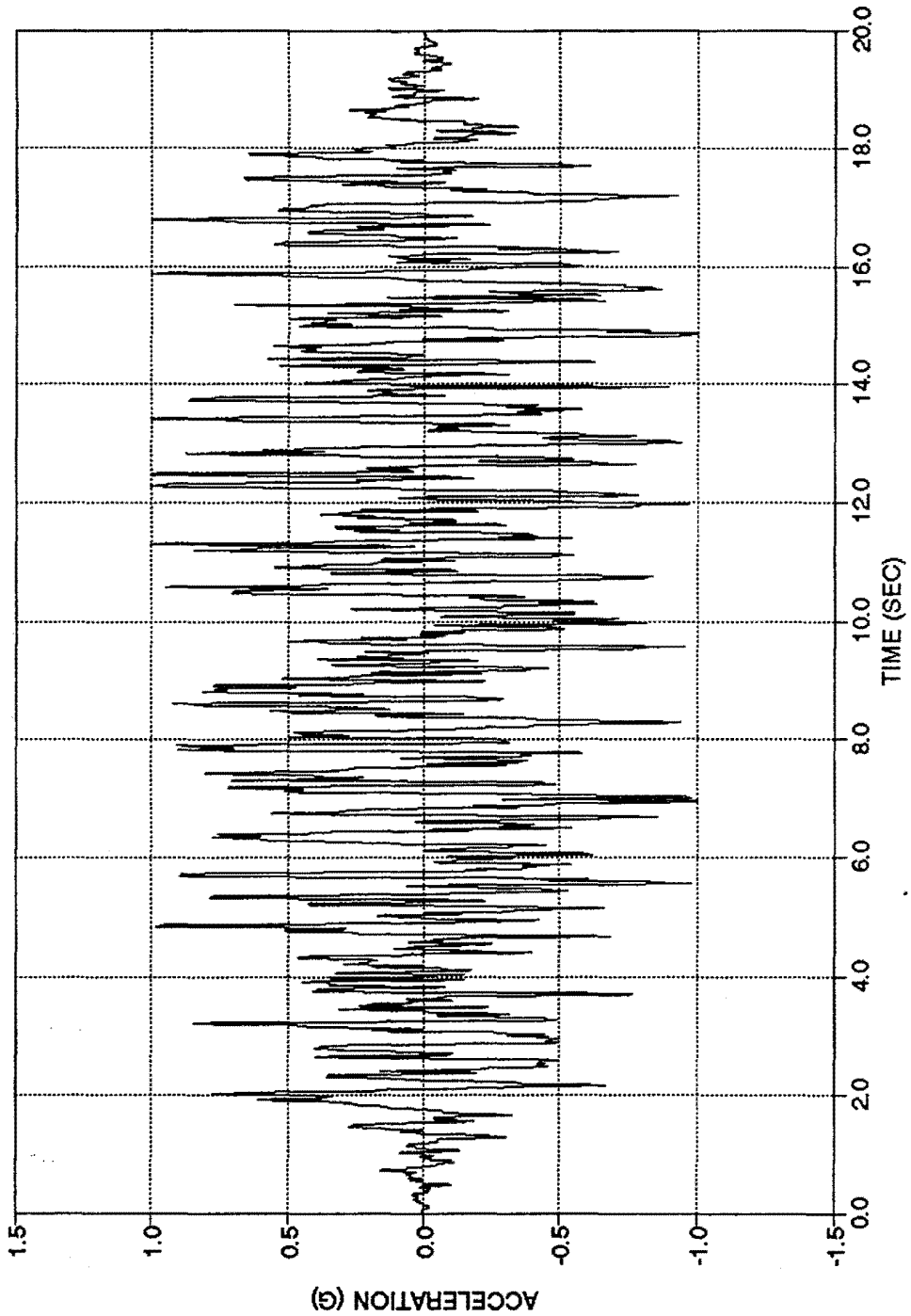

Amendment 98

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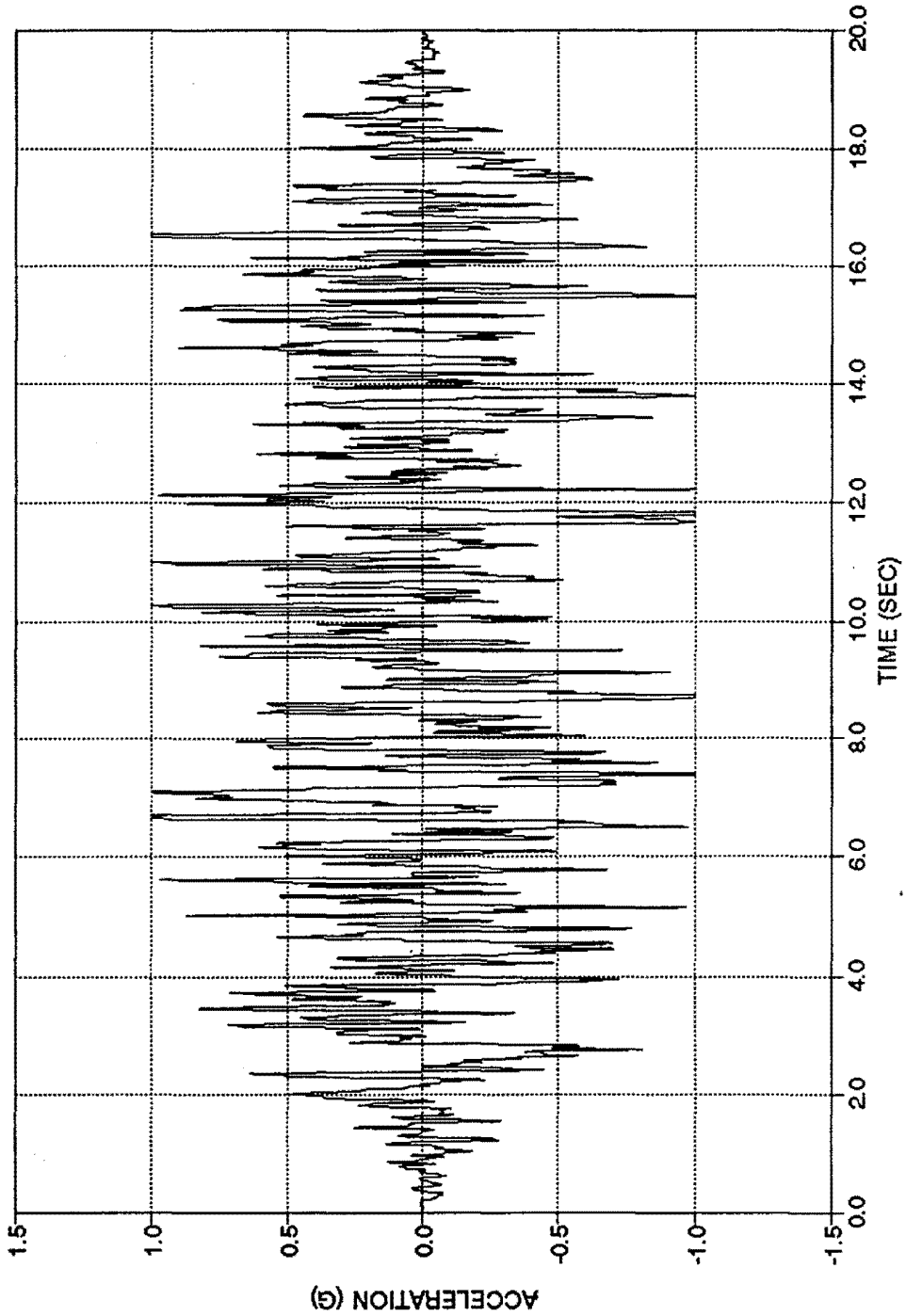
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

FUEL BUILDING RE-ANALYSIS
EAST-WEST ARTIFICAL
ACCELERATION TIME HISTORY

FIGURE 3.7B-14A

CPE



Amendment 98

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

FUEL BUILDING RE-ANALYSIS
NORTH-SOUTH ARTIFICAL
ACCELERATION TIME HISTORY

FIGURE 3.7B-14B

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COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

FIGURE 3.7B-17

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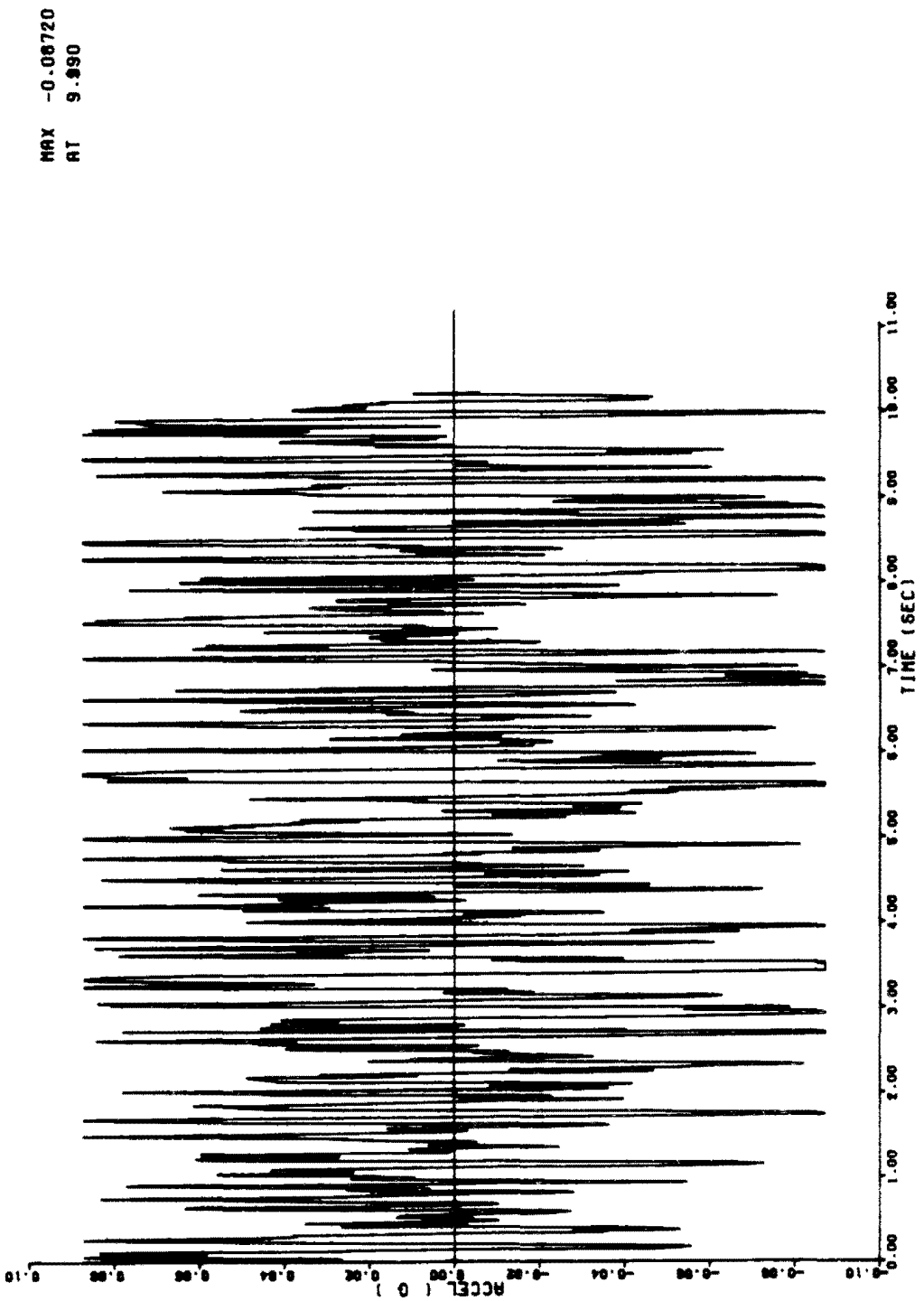


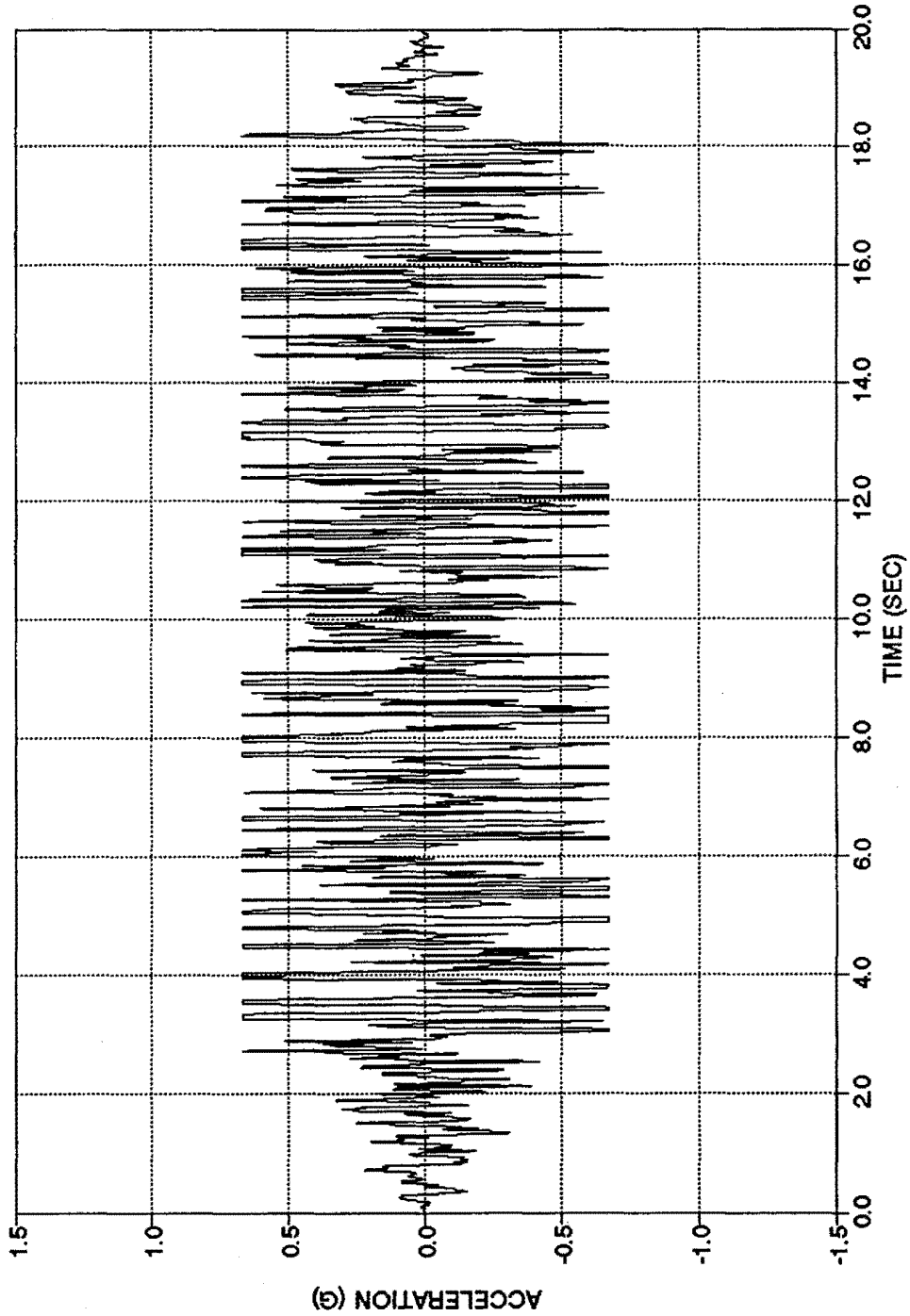
COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

VERTICAL ARTIFICIAL
ACCELERATION TIME HISTORY

FIGURE 3.7B-19

Amendment 68
February 15, 1988

CPE



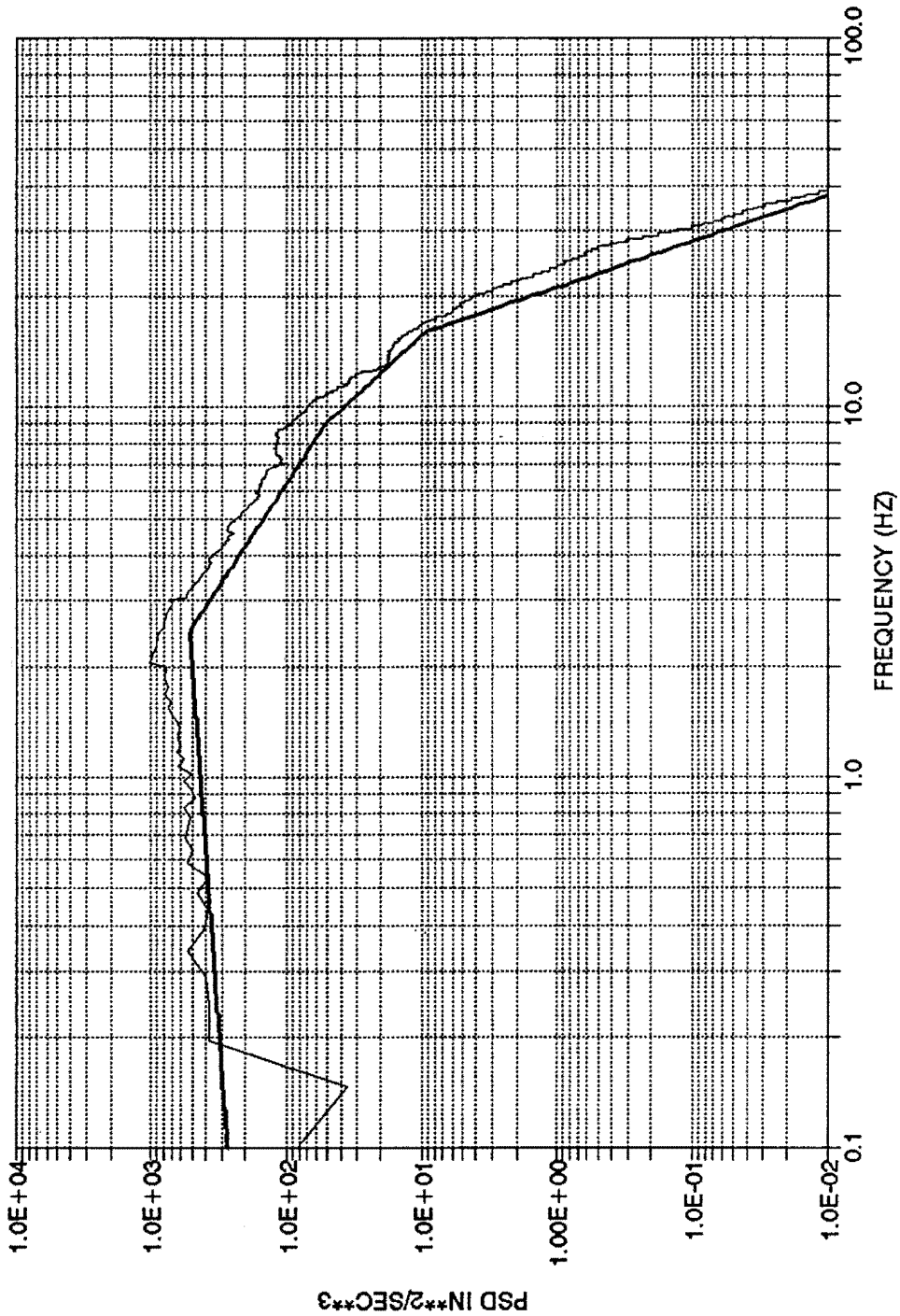
Amendment 98

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

FUEL BUILDING RE-ANALYSIS
VERTICAL ARTIFICAL
ACCELERATION TIME HISTORY

FIGURE 3.7B-19A

CPE



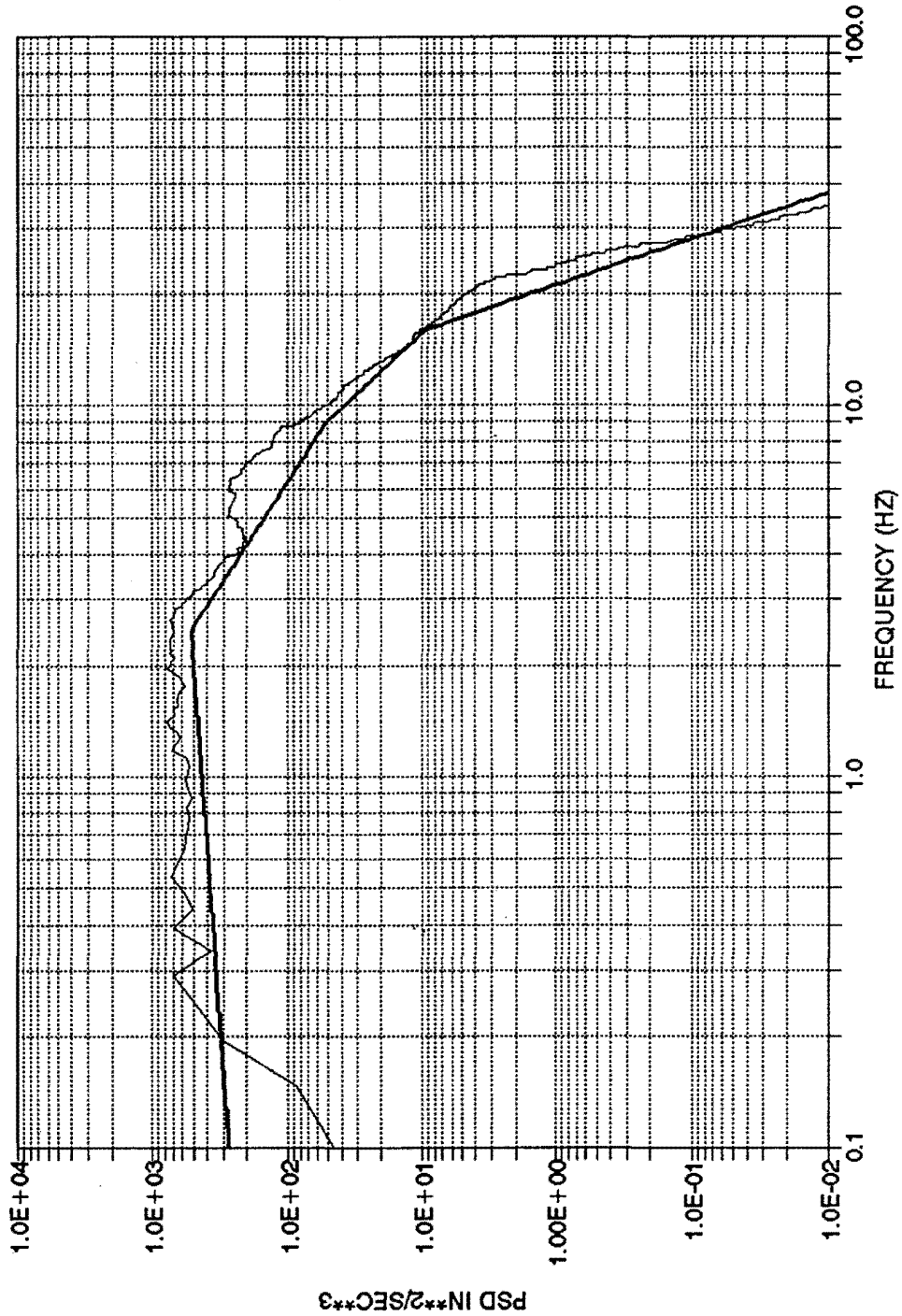
Amendment 98

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

FUEL BUILDING RE-ANALYSIS
EAST-WEST
POWER SPECTRAL DENSITY

FIGURE 3.7B-20

CPE



Amendment 98

COMANCHE PEAK S E S FINAL SAFETY ANALYSIS REPORT UNITS 1 AND 2
FUEL BUILDING RE-ANALYSIS NORTH-SOUTH POWER SPECTRAL DENSITY
FIGURE 3.7B-21

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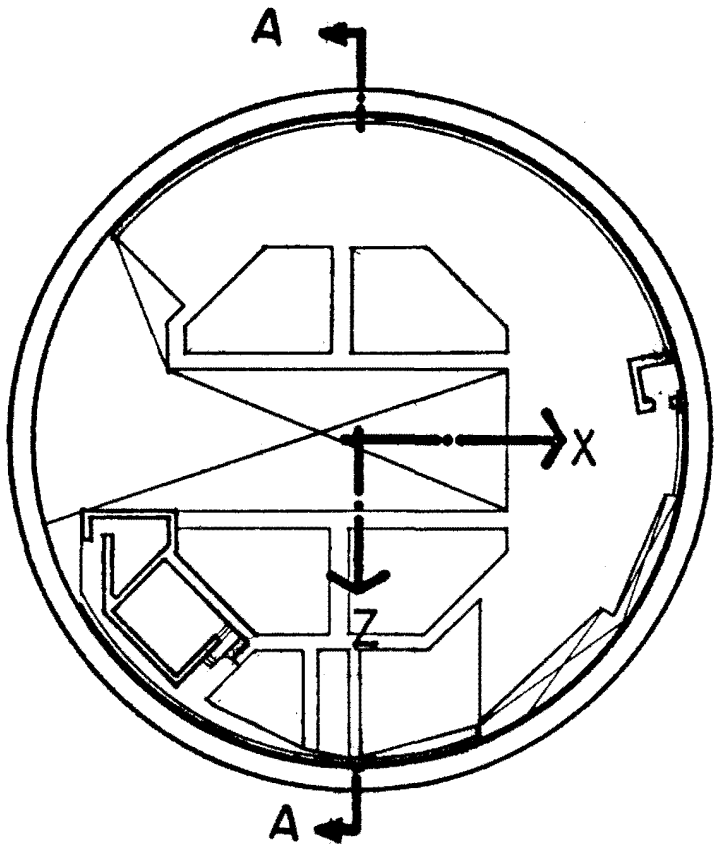


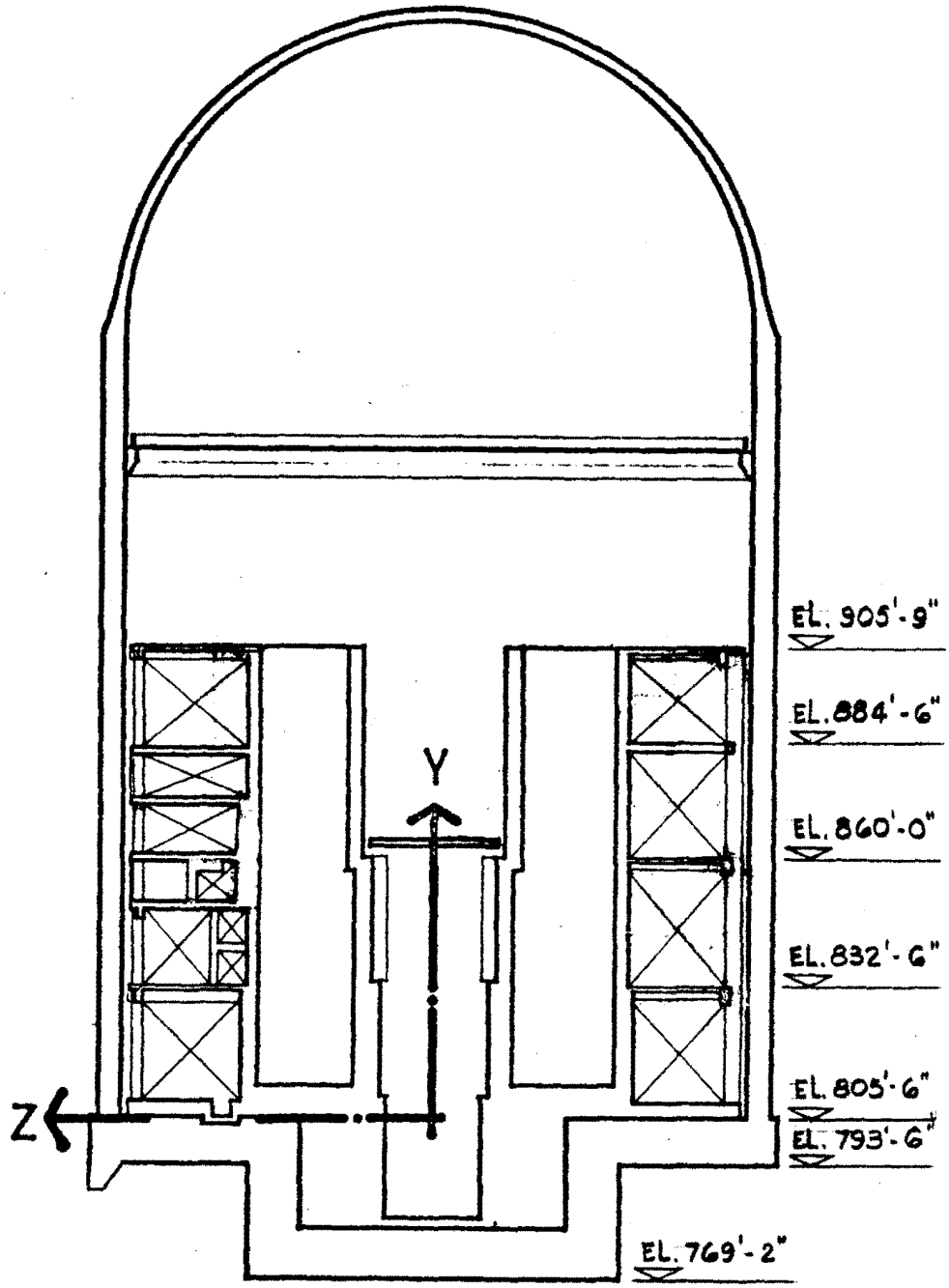
PLAN EL. 905'-9"

NOTE: ORIGIN OF COORDINATES IS AT EL. 805'-6"

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

PLAN VIEW
CONTAINMENT & INTERNAL STRUCTURES

FIGURE 3.7B-23

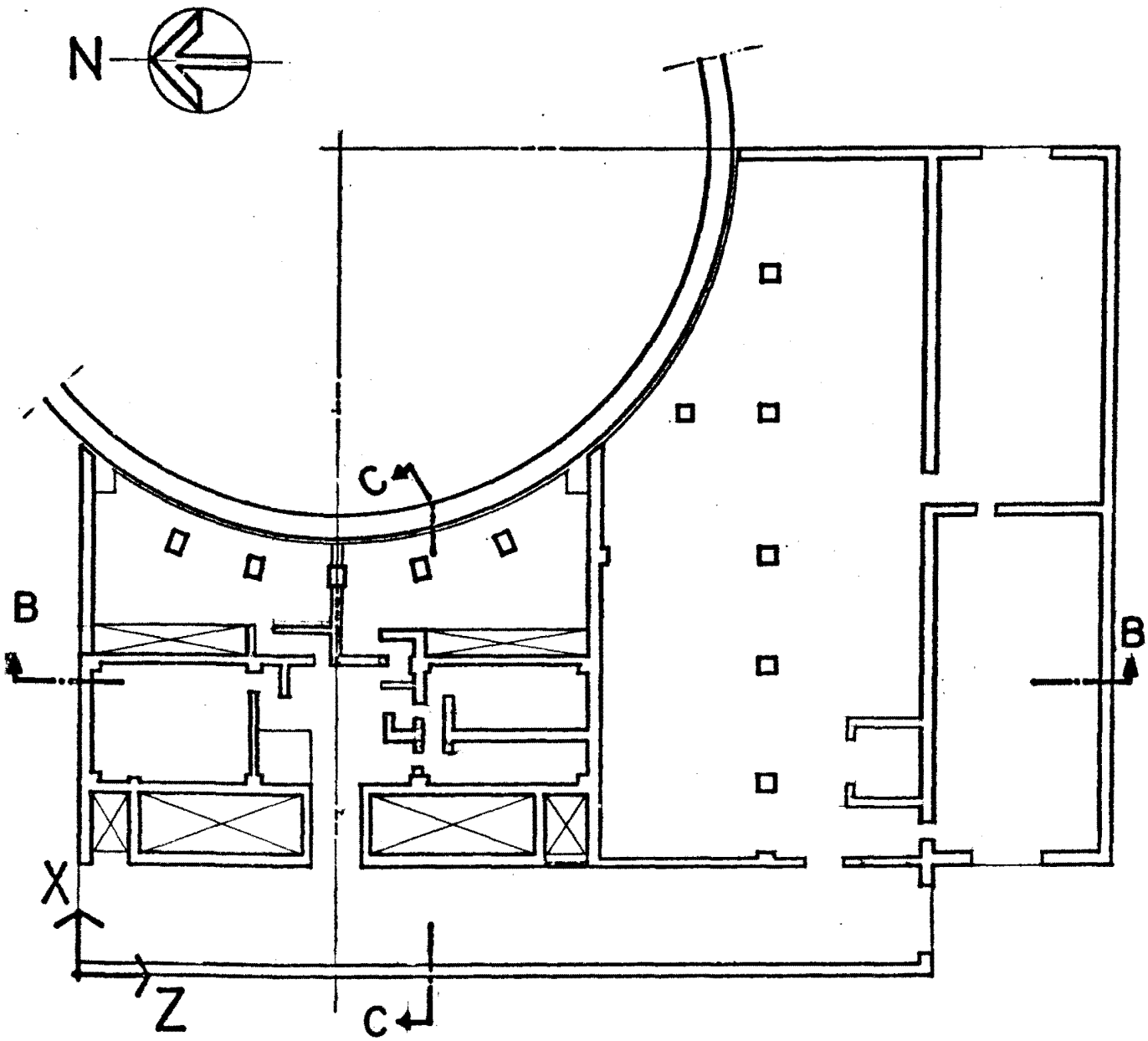


SECTION A-A

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

ELEVATION VIEW
CONTAINMENT & INTERNAL
STRUCTURES

FIGURE 3.7B-24



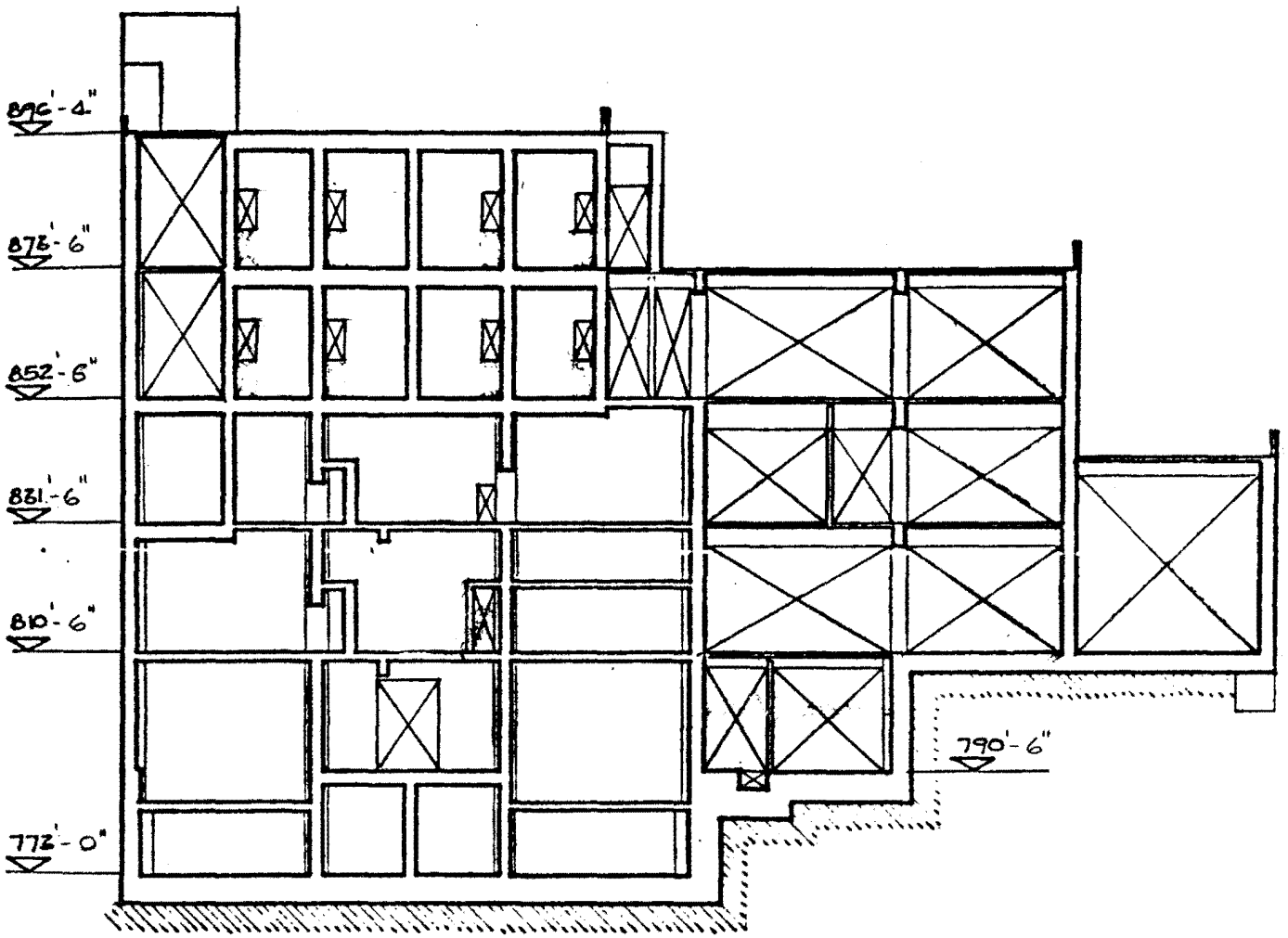
PLAN EL. 810'-6"

NOTE: ORIGIN OF COORDINATES IS AT EL. 0.00'

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

PLAN VIEW
SAFEGUARDS BUILDING

FIGURE 3.7B-25

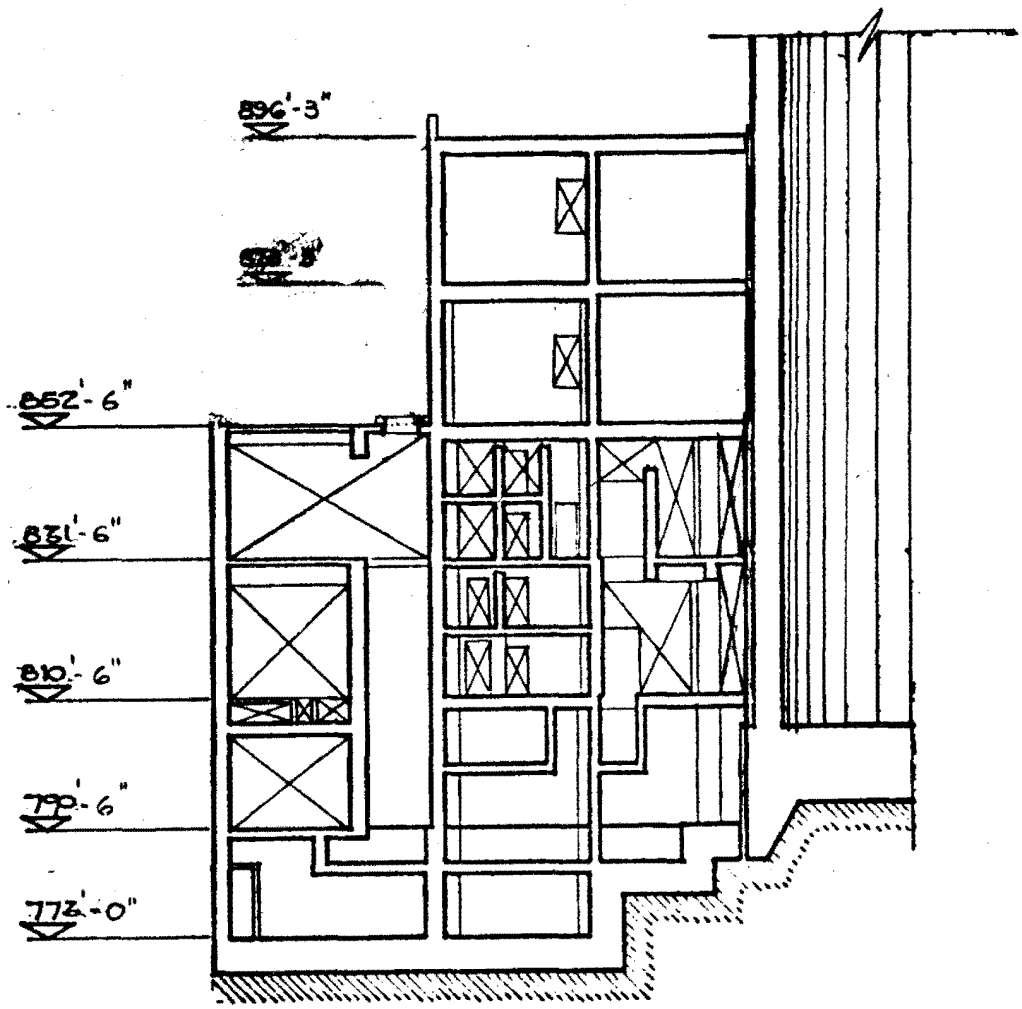


SECTION B-B

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

ELEVATION VIEW (1)
SAFEGUARDS BUILDING

FIGURE 3.7B-26

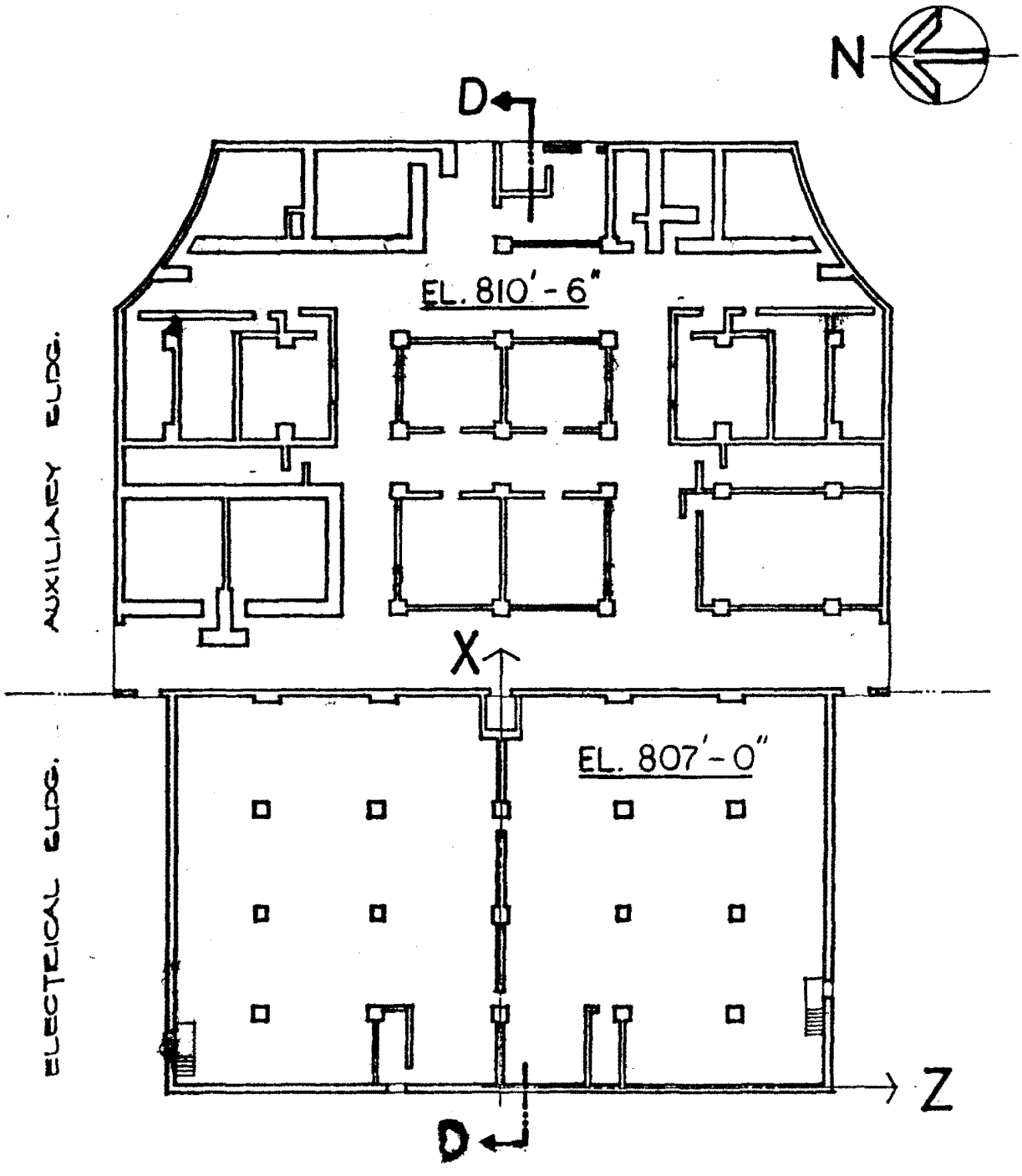


SECTION C-C

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

ELEVATION VIEW (2)
SAFEGUARDS BUILDING

FIGURE 3.7B-27



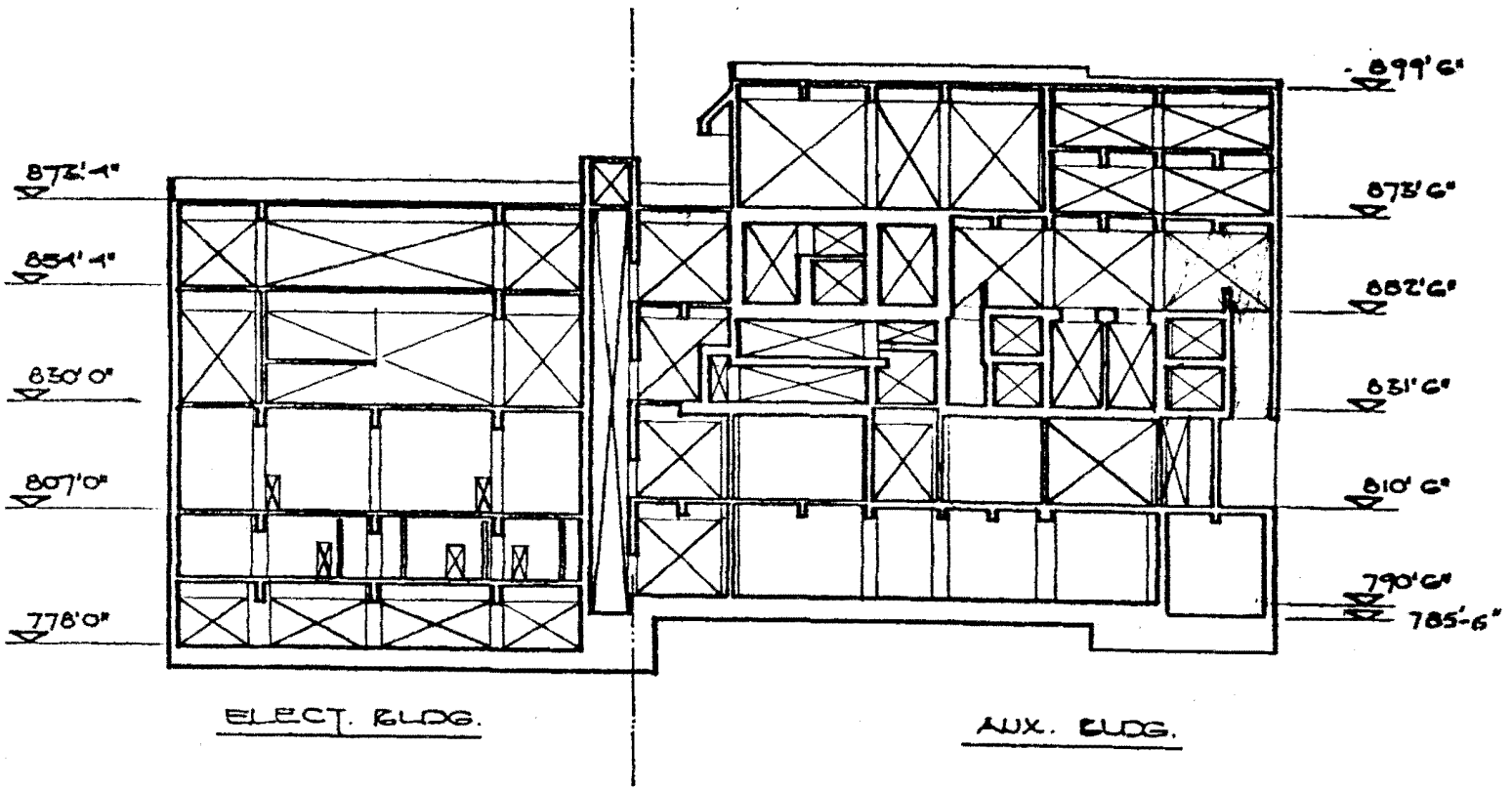
PLAN EL. 810'-6" & 807'-0"

NOTE: ORIGIN OF COORDINATES IS AT EL. 0.00

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

PLAN VIEW
ELECTRICAL & AUXILIARY
BUILDINGS

FIGURE 3.7B-28

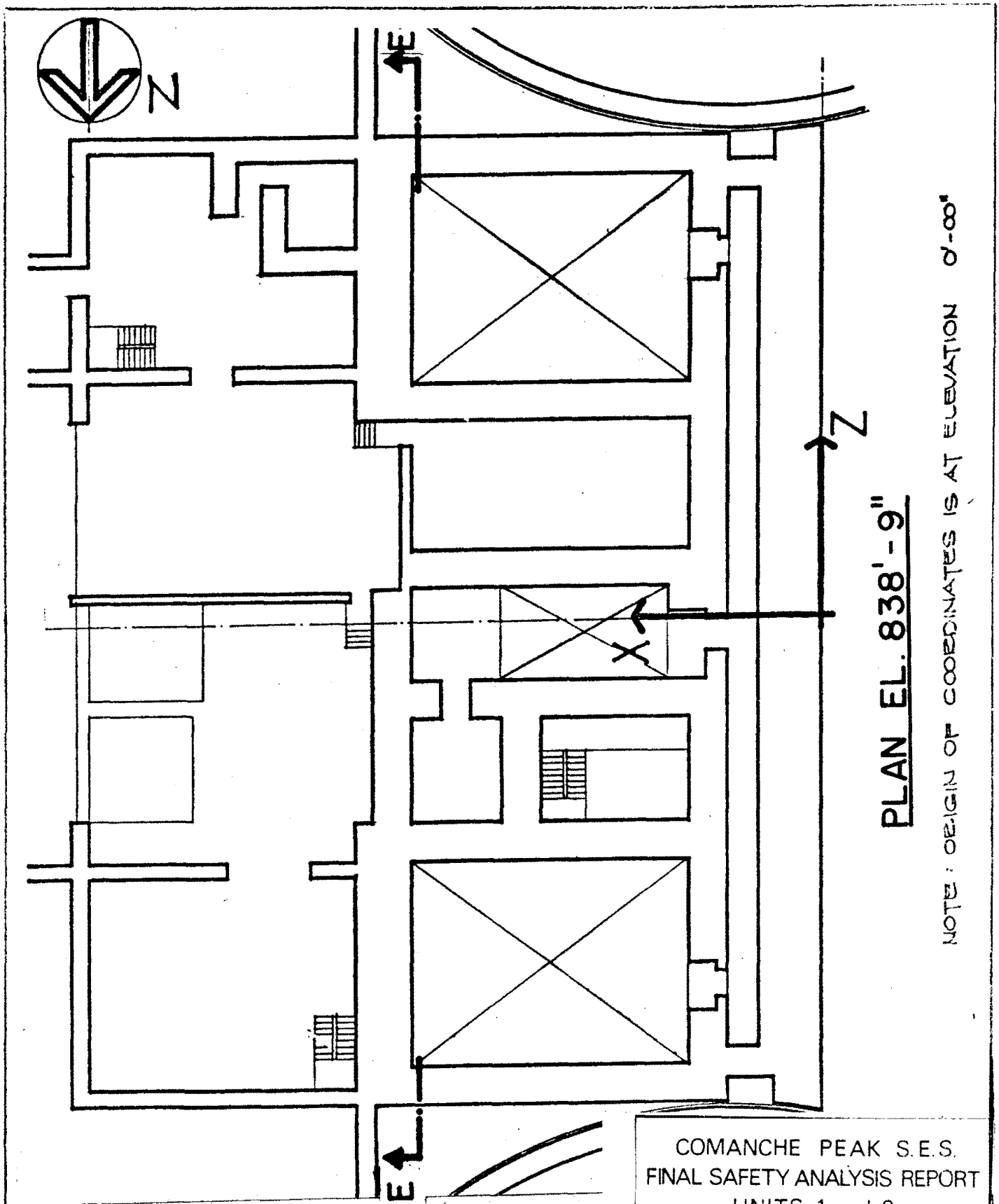


SECTION D-D

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

ELEVATION VIEW
ELECTRICAL & AUXILIARY
BUILDINGS

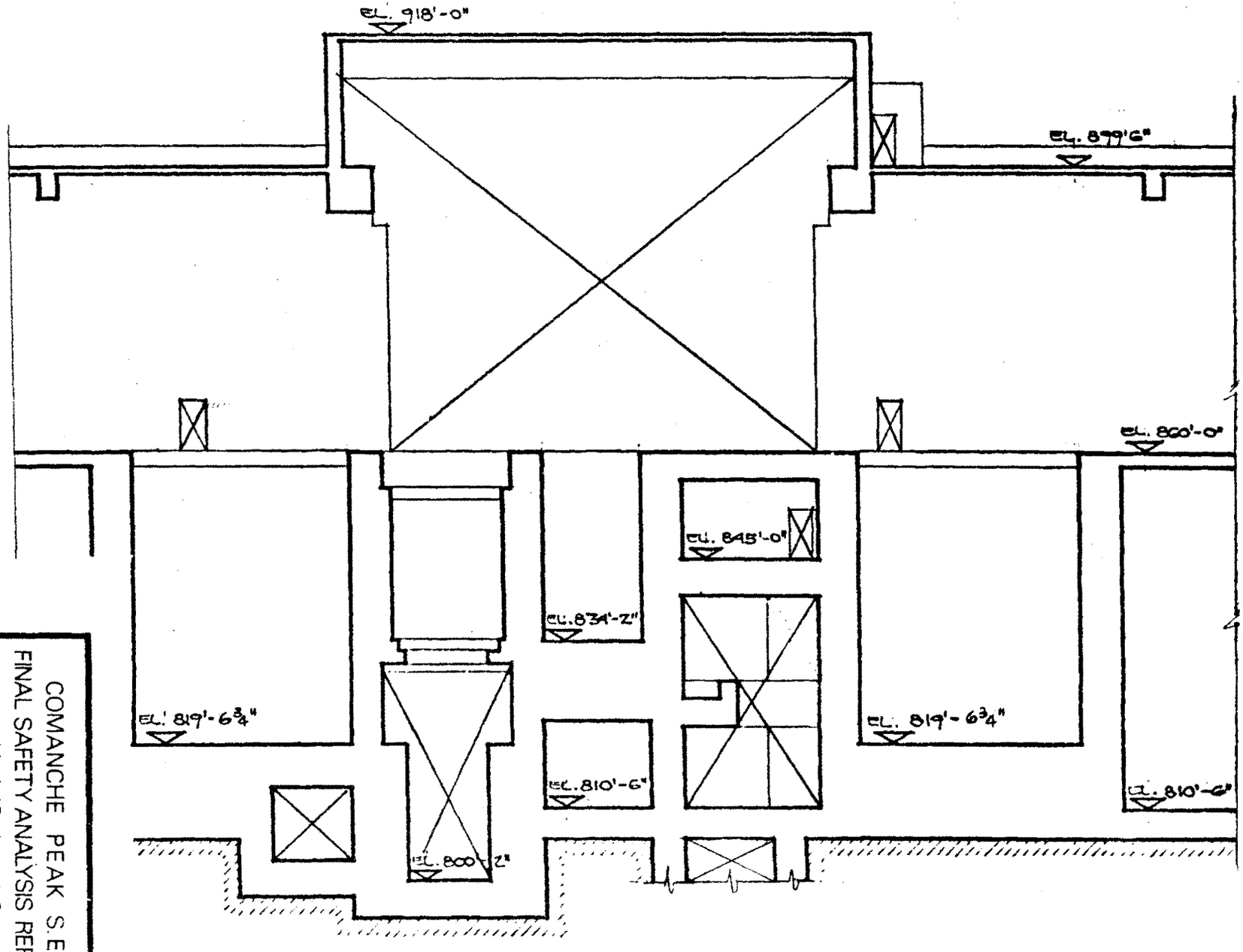
FIGURE 3.7B-29



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

PLAN VIEW
FUEL BUILDING

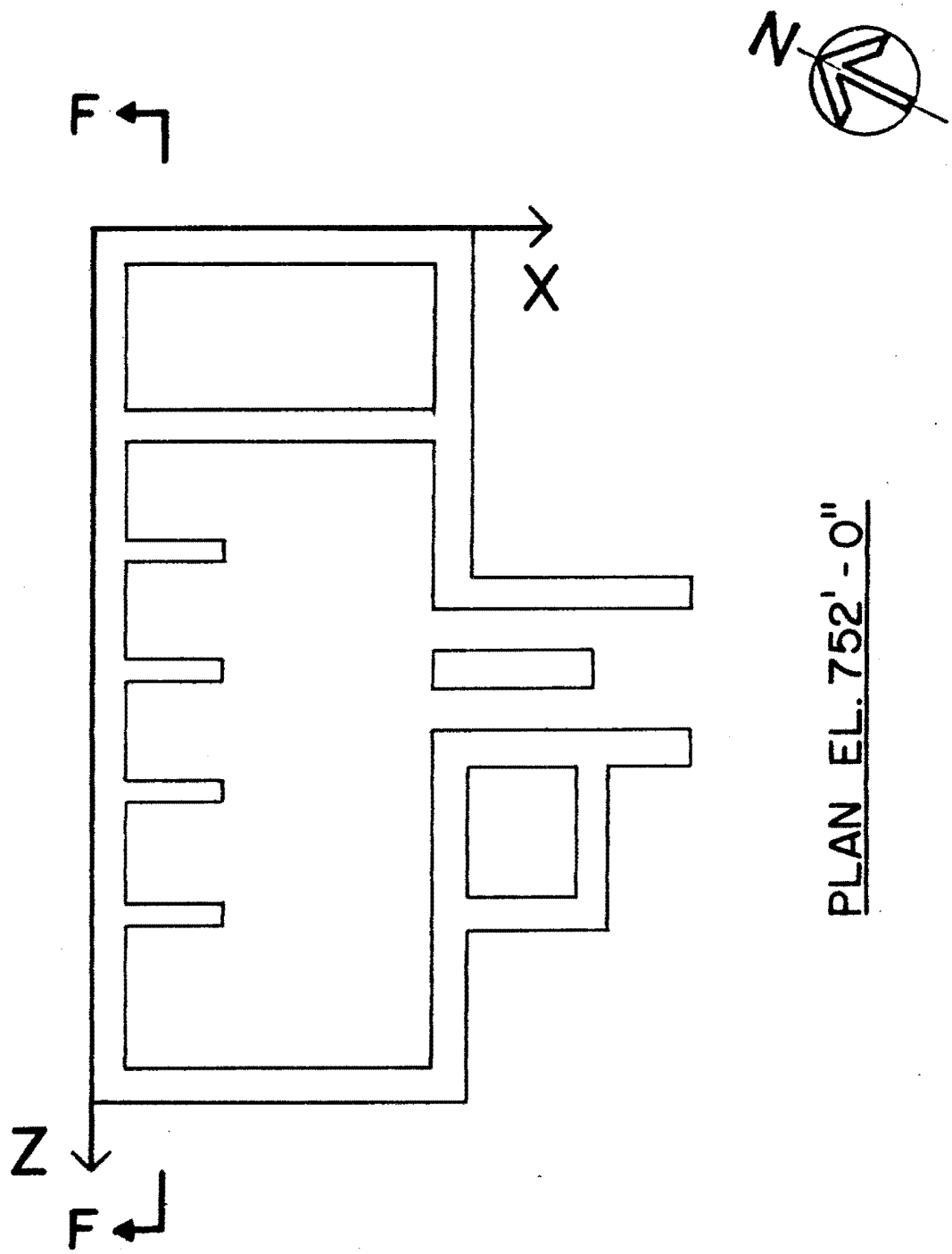
FIGURE 3.7B-30



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

ELEVATION VIEW
FUEL BUILDING

FIGURE 3.7B-31

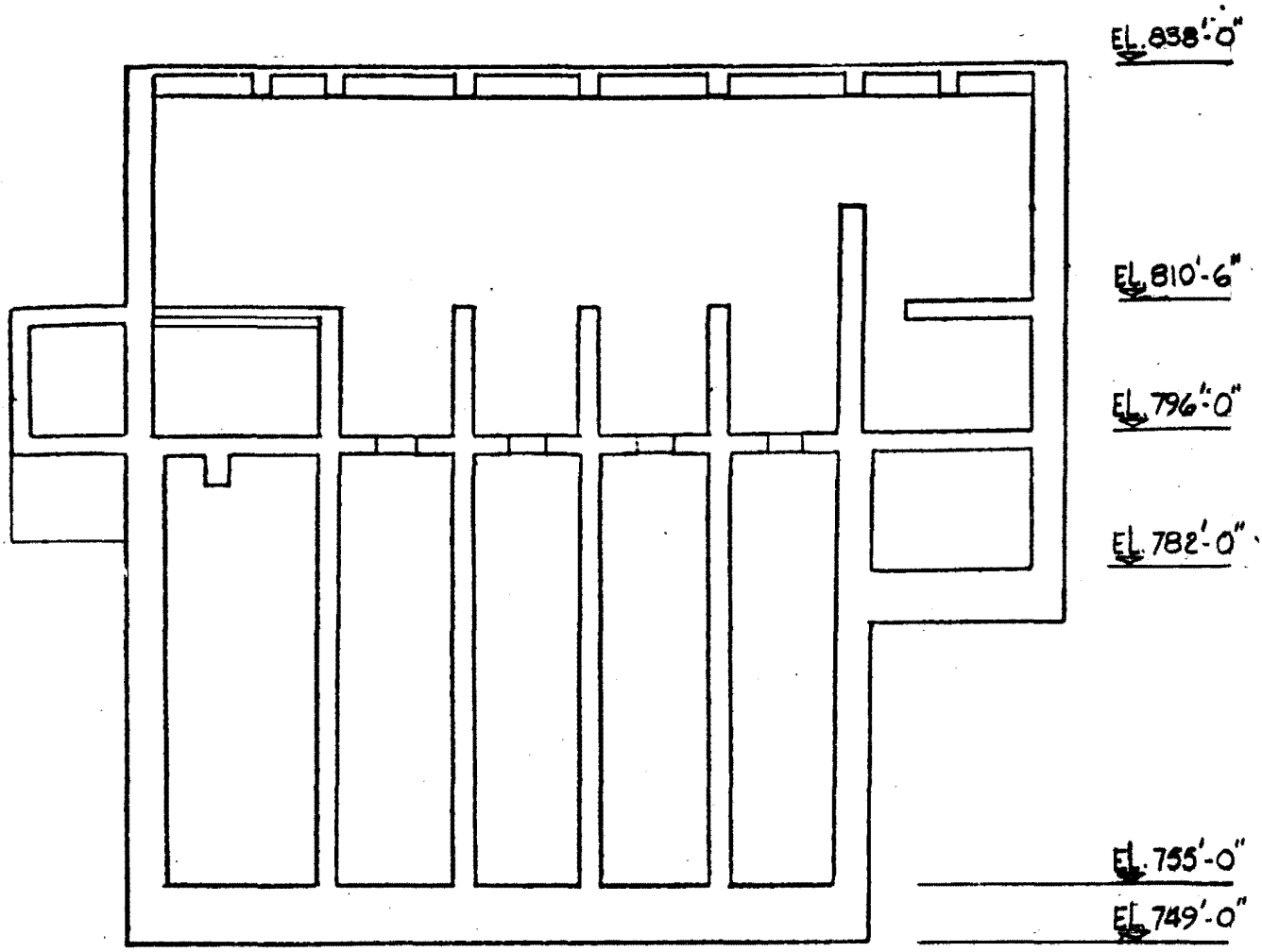


NOTE: ORIGIN OF COORDINATES IS AT EL. 752'-0"

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

PLAN VIEW
SERVICE WATER
INTAKE STRUCTURE

FIGURE 3.7B-32

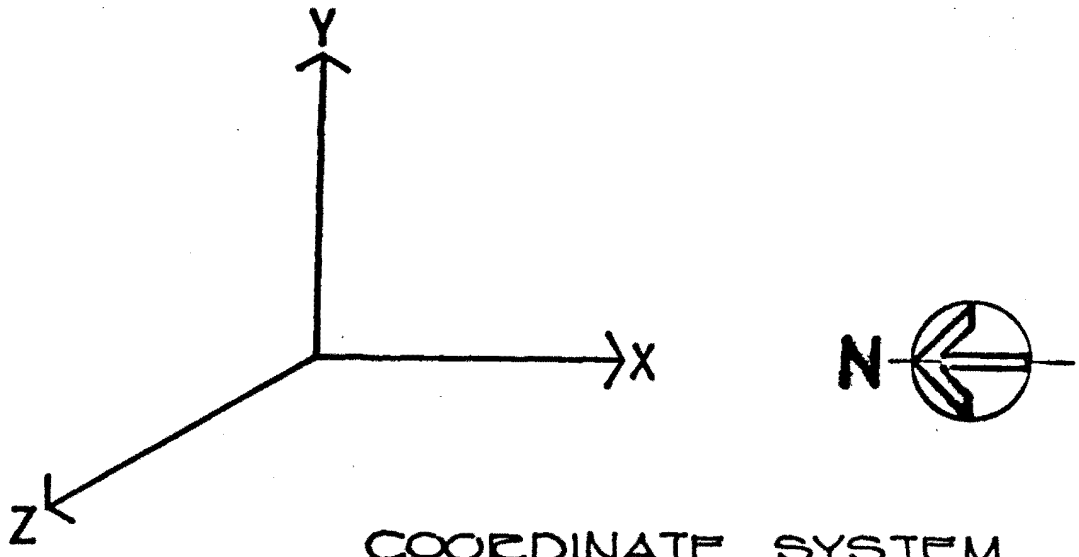


SECTION F-F

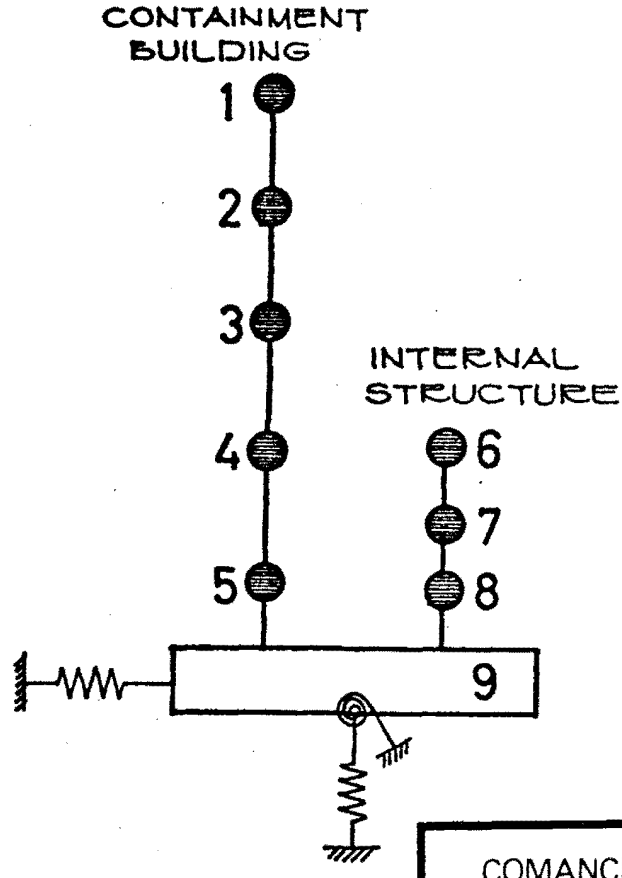
COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

ELEVATION VIEW
SERVICE WATER
INTAKE STRUCTURE

FIGURE 3.7B-33



COORDINATE SYSTEM

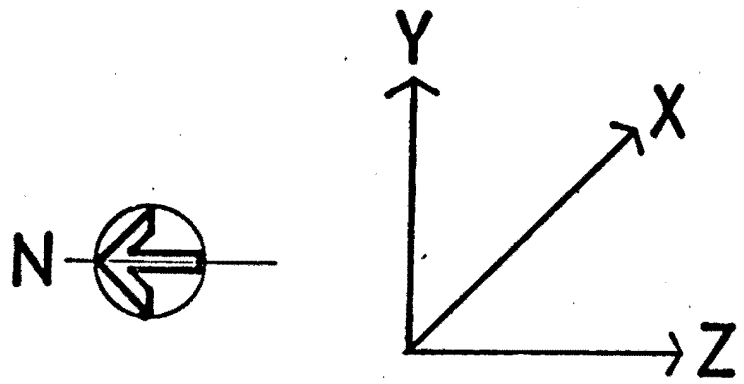


DYNAMIC MODEL

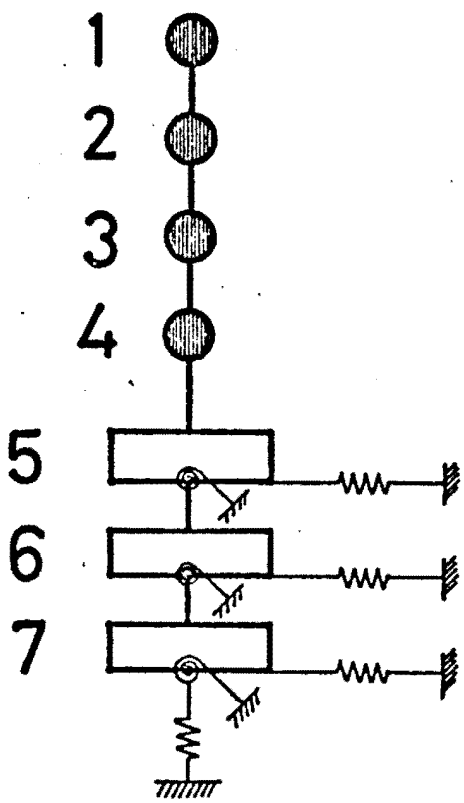
COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

DYNAMIC MODEL
CONTAINMENT & INTERNAL STRUCTURES

FIGURE 3.7B-34



COORDINATE SYSTEM

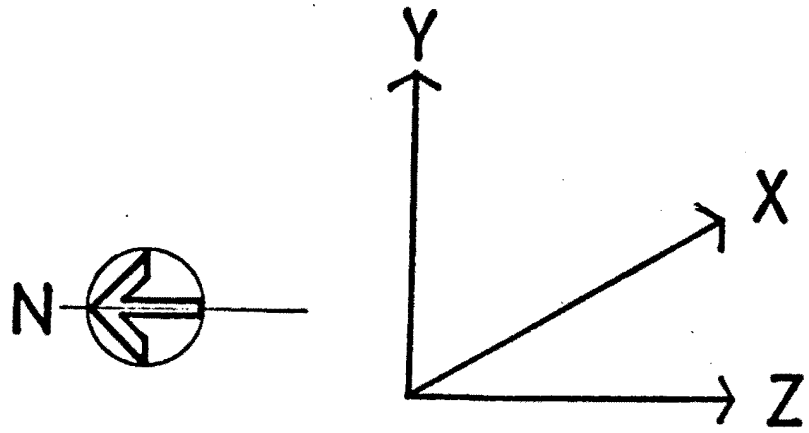


DYNAMIC MODEL

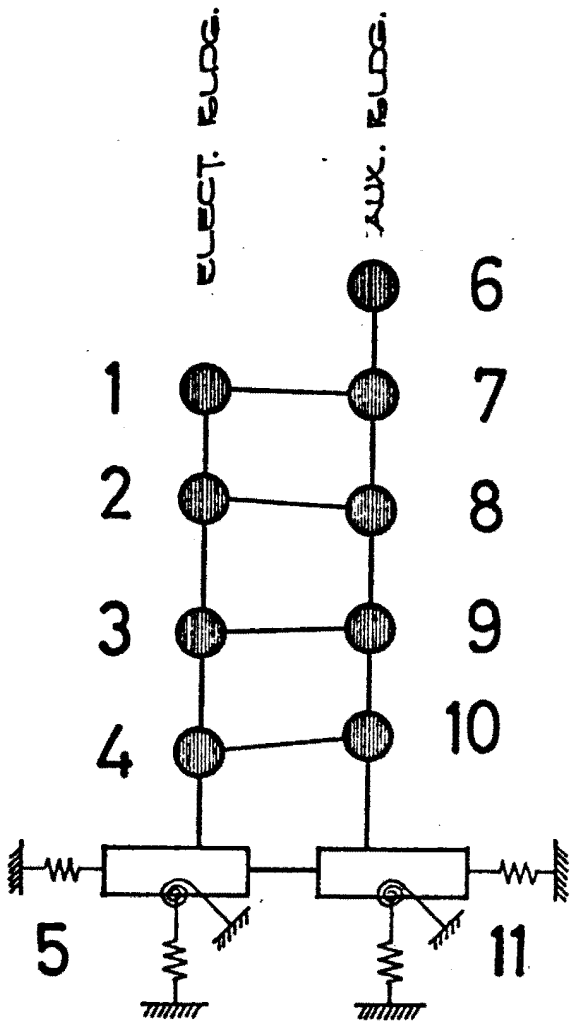
COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

DYNAMIC MODEL
SAFEGUARDS BUILDING

FIGURE 3.7B-35



COORDINATE SYSTEM

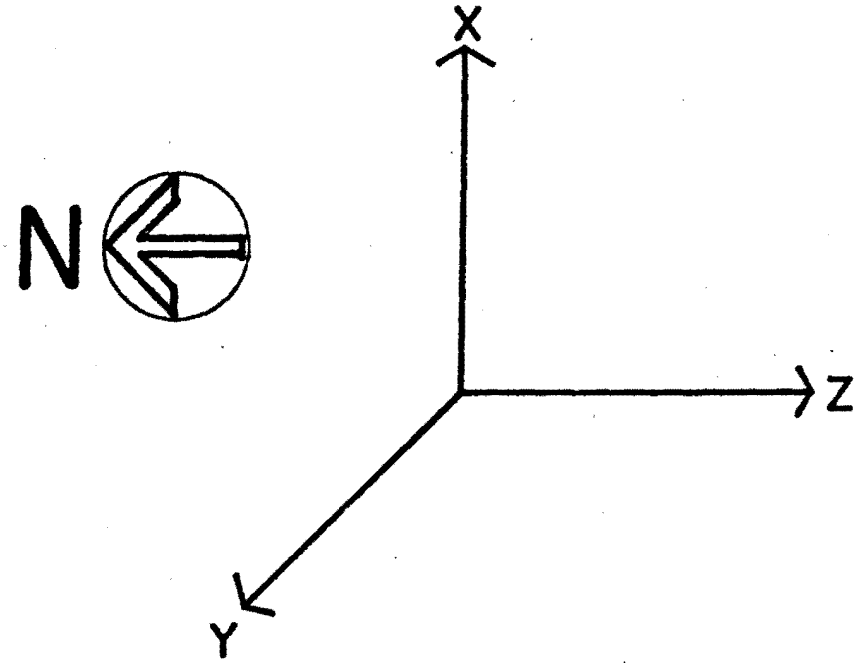


DYNAMIC MODEL

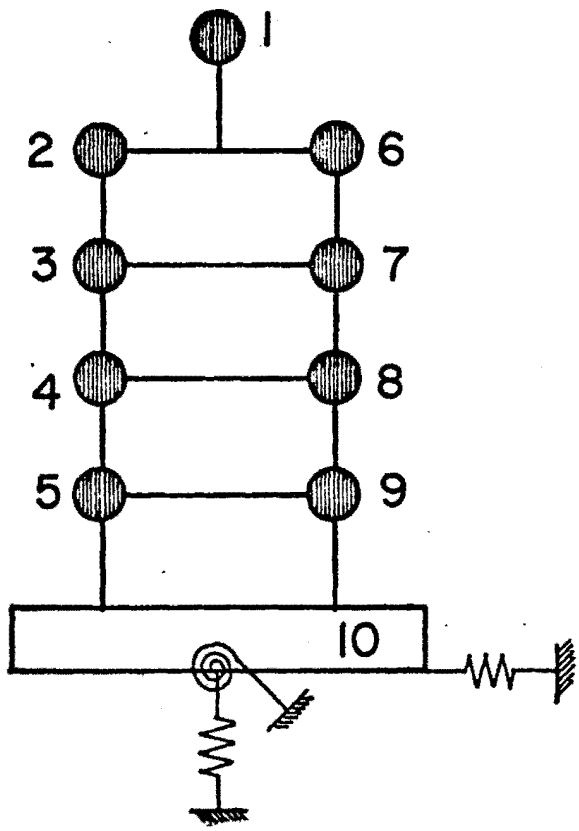
COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

DYNAMIC MODEL
ELECTRICAL & AUXILIARY
BUILDINGS

FIGURE 3.7B-36



COORDINATE SYSTEM



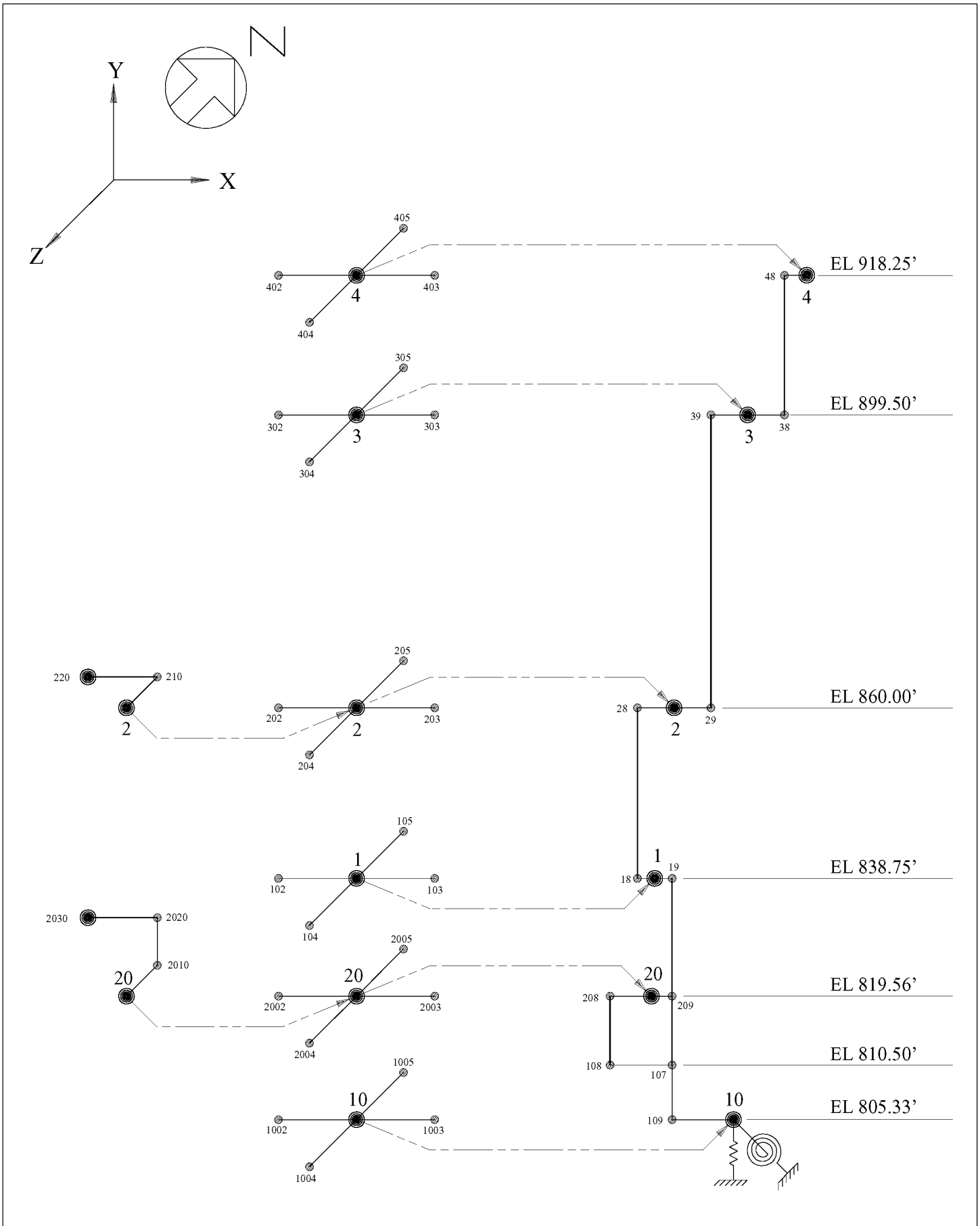
DYNAMIC MODEL

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

DYNAMIC MODEL
FUEL BUILDING

FIGURE 3.7B-37

CPE

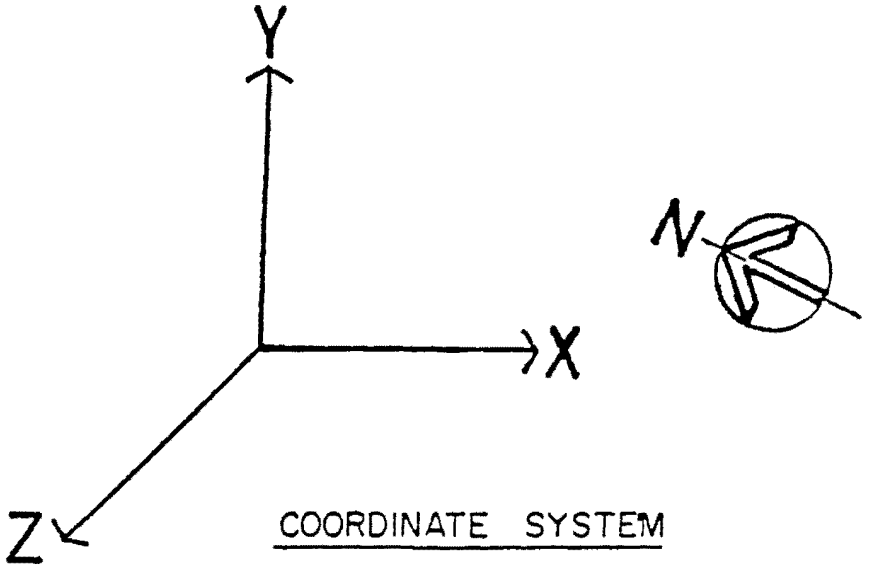


COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

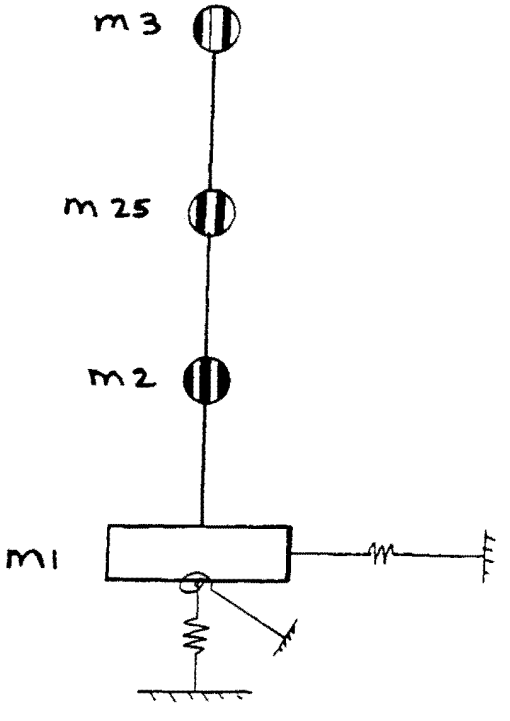
DYNAMIC MODEL
FUEL BUILDING RE-ANALYSIS

FIGURE 3.7B-37A

ds000010.dgn



COORDINATE SYSTEM



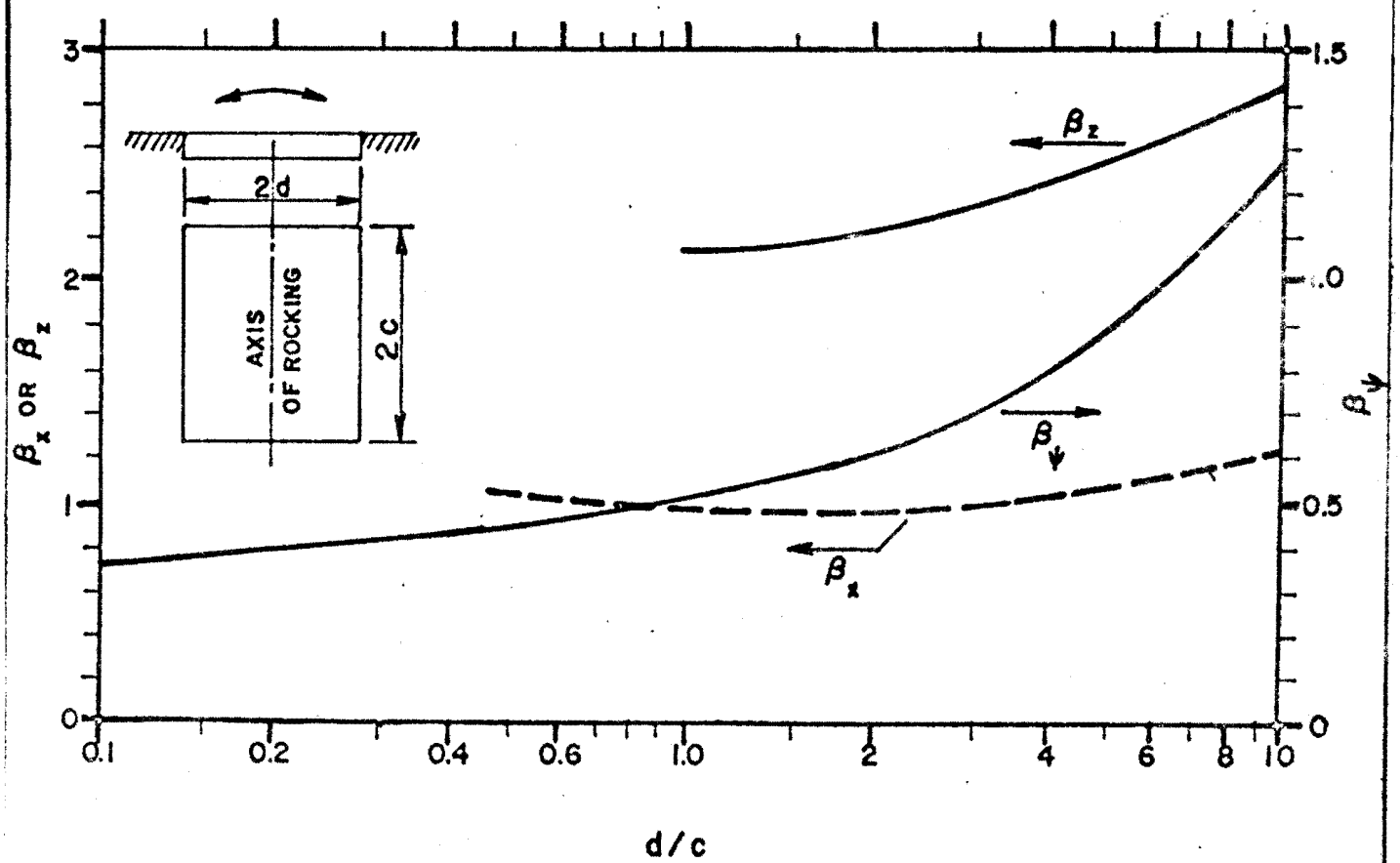
DYNAMIC MODEL

Amendment 68
February 15, 1988

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

DYNAMIC MODEL
SERVICE WATER
INTAKE STRUCTURE

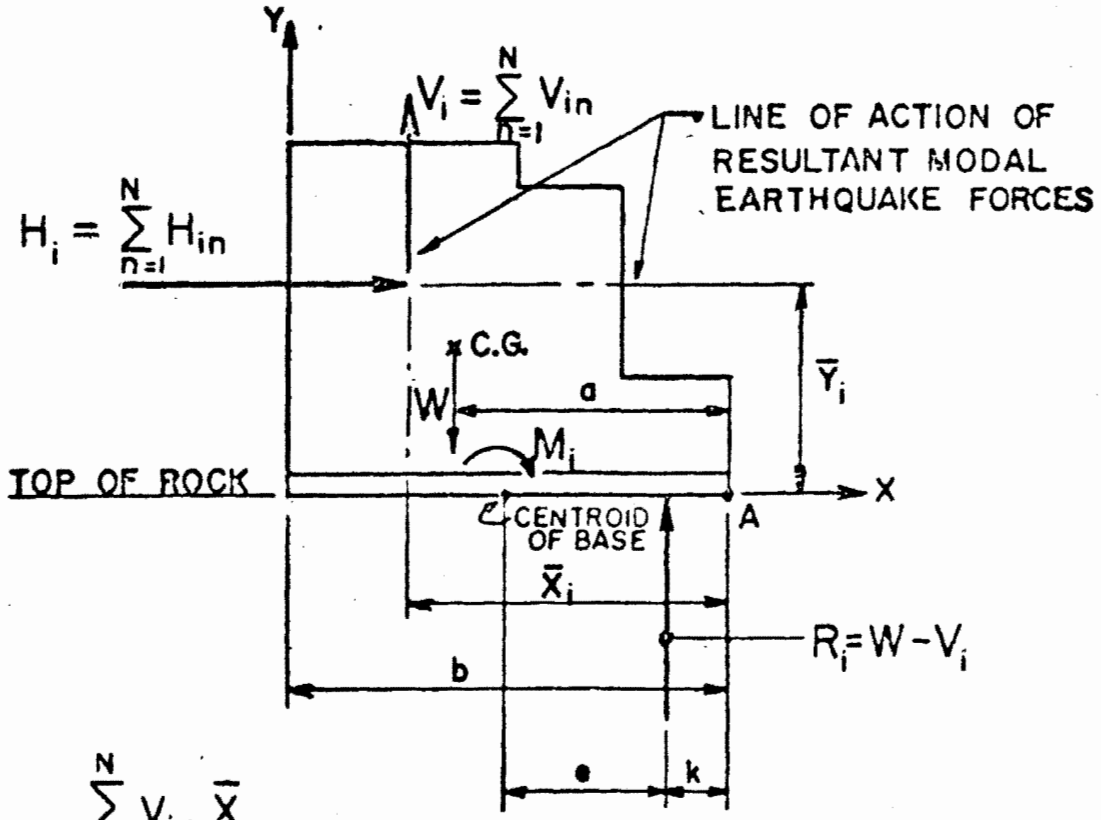
FIGURE 3.7B-38



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

COEFFICIENTS βx, βz AND $\beta\psi$ FOR RECTANGULAR FOOTINGS

FIGURE 3.7B-39



$$\bar{X}_i = \frac{\sum_{n=1}^{N} V_{in} \bar{X}_n}{V_i}$$

$$\bar{Y}_i = \frac{\sum_{n=1}^{N} H_{in} \bar{Y}_n}{H_i}$$

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

DETERMINATION OF OVERTURNING MOVEMENT

FIGURE 3.7B-40

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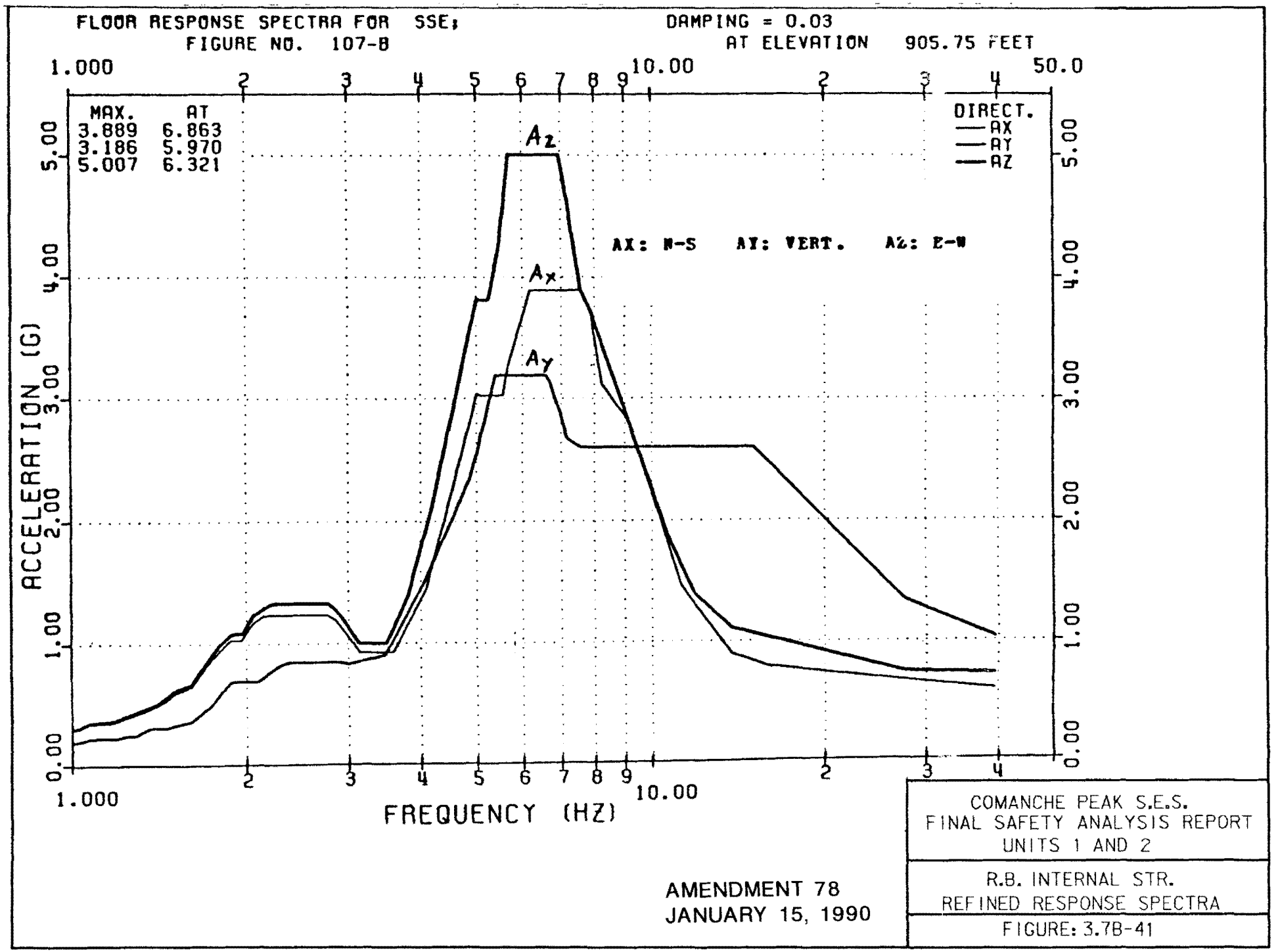


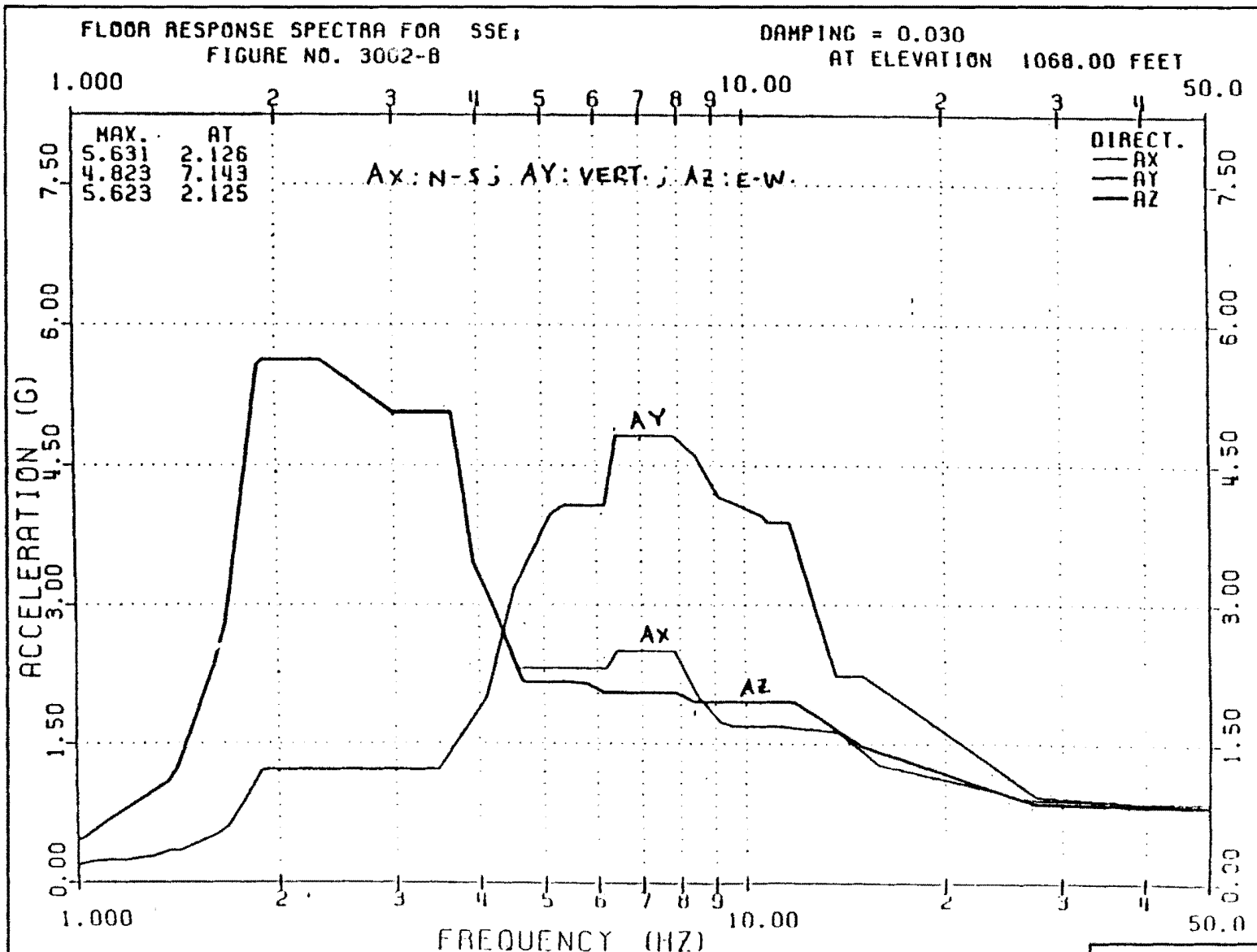
AMENDMENT 78
JANUARY 15, 1990

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

R.B. INTERNAL STR.
REFINED RESPONSE SPECTRA

FIGURE: 3.7B-41

DS1589020.DGN

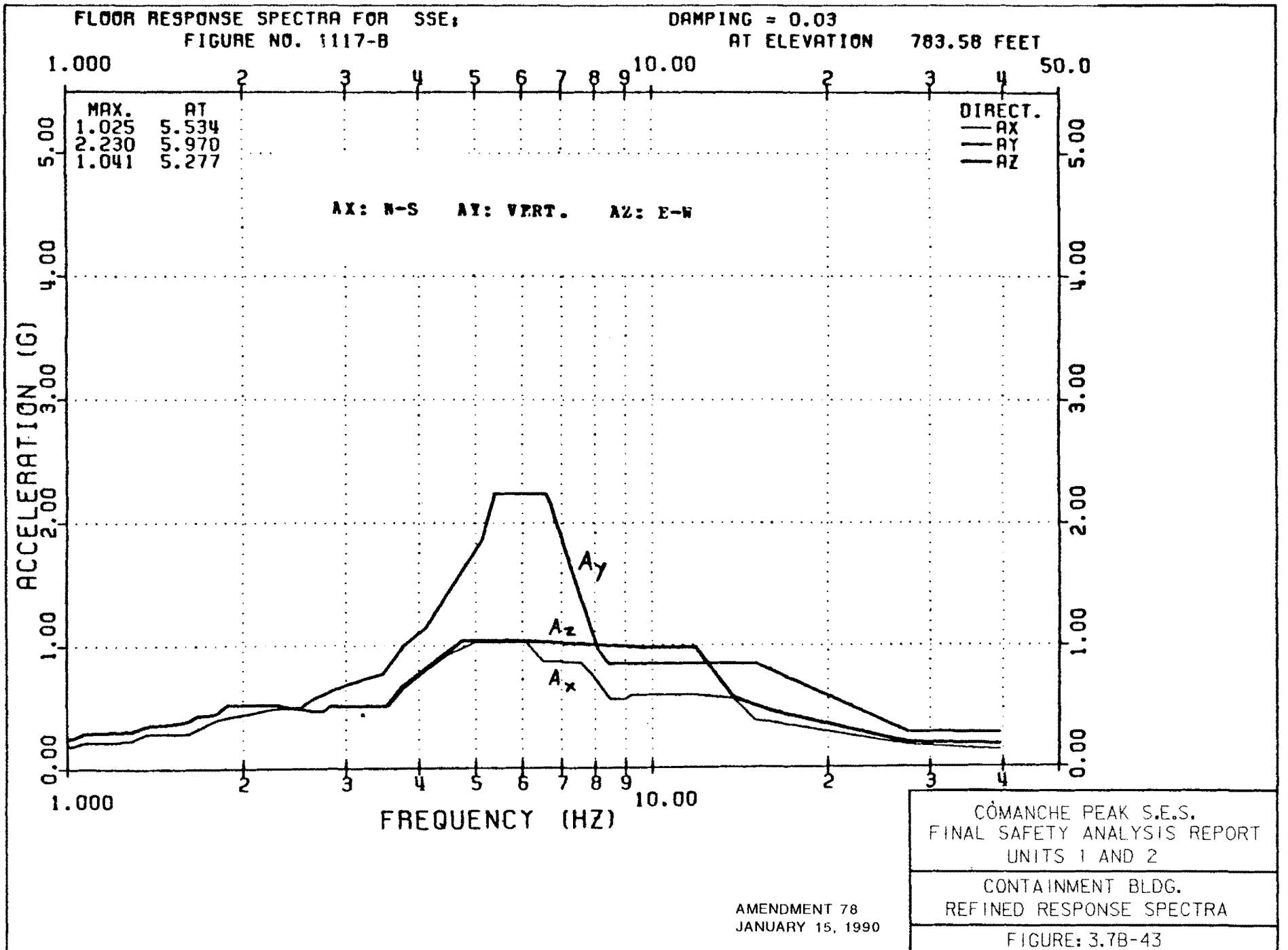


COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

CONTAINMENT BLDG.
REFINED RESPONSE SPECTRA

FIGURE: 3.7B-42

AMENDMENT 78
JANUARY 15, 1990



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

CONTAINMENT BLDG.
REFINED RESPONSE SPECTRA

FIGURE: 3.7B-43

AMENDMENT 78
JANUARY 15, 1990

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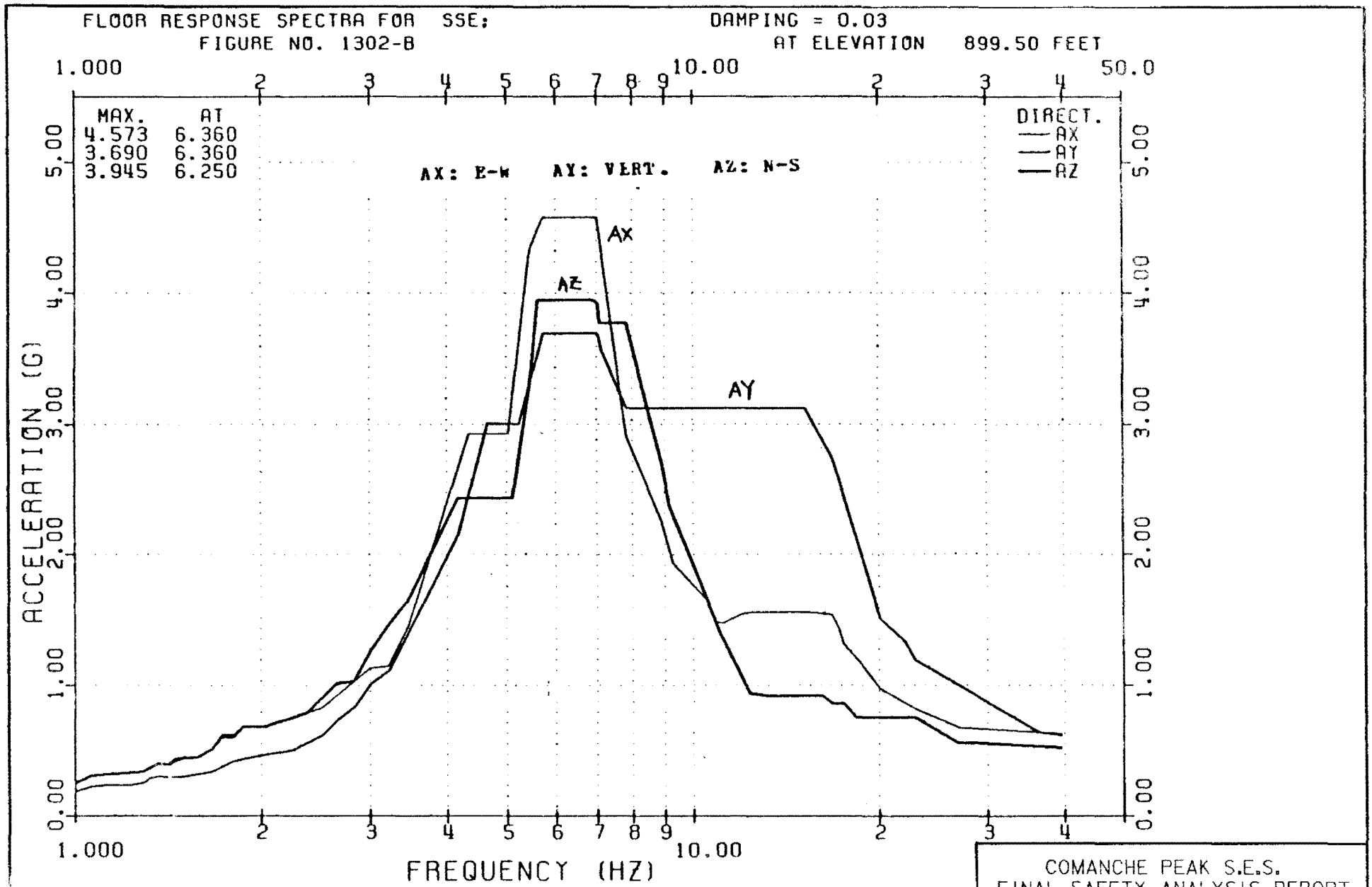
DS1589020.DGN

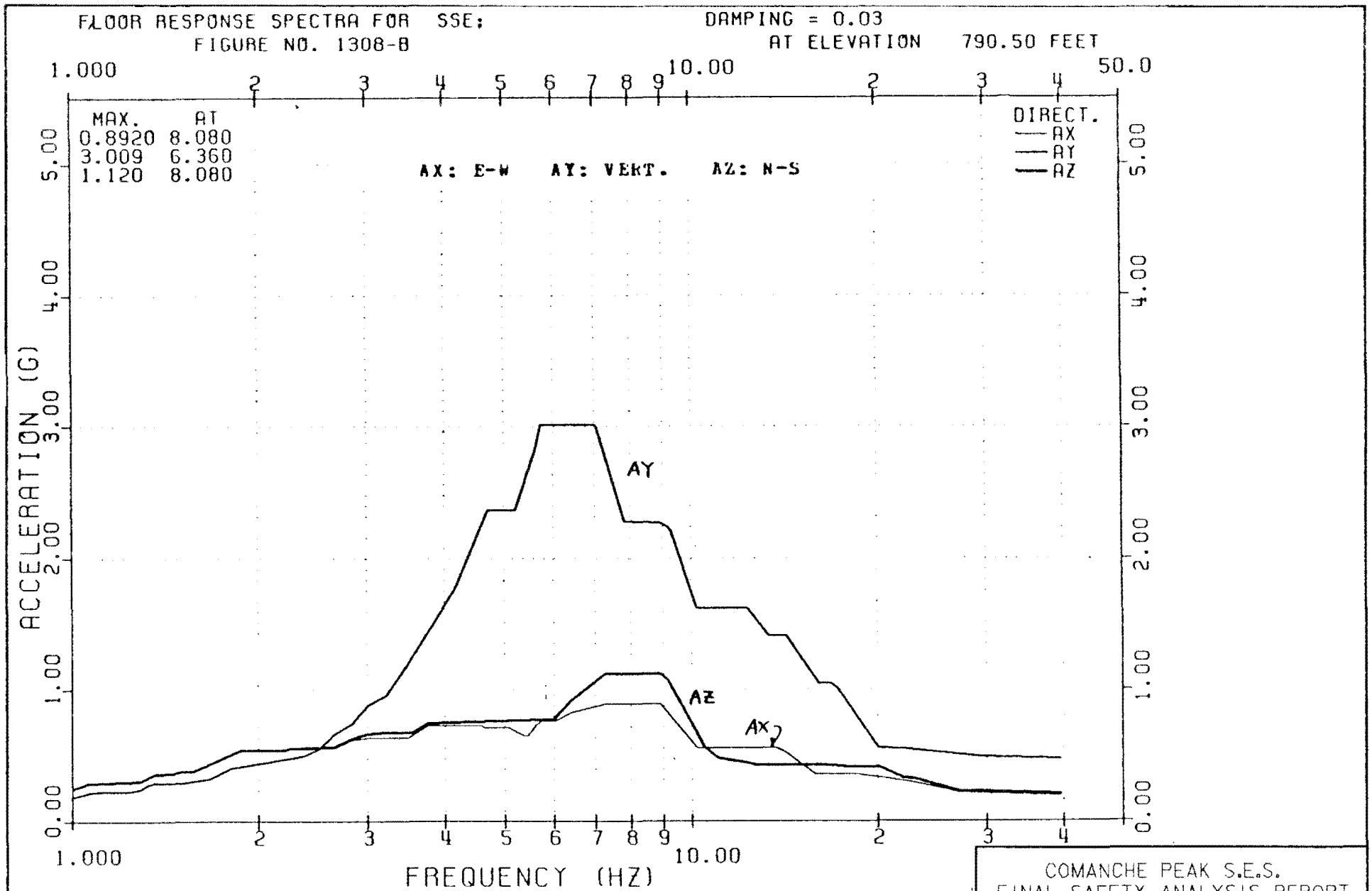


AMENDMENT 78
JANUARY 15, 1990

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

AUXILIARY BLDG.
REFINED RESPONSE SPECTRA

FIGURE: 3.7B-44



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

AUXILIARY BLDG.
REFINED RESPONSE SPECTRA

FIGURE: 3.7B-45

AMENDMENT 78
JANUARY 15, 1990

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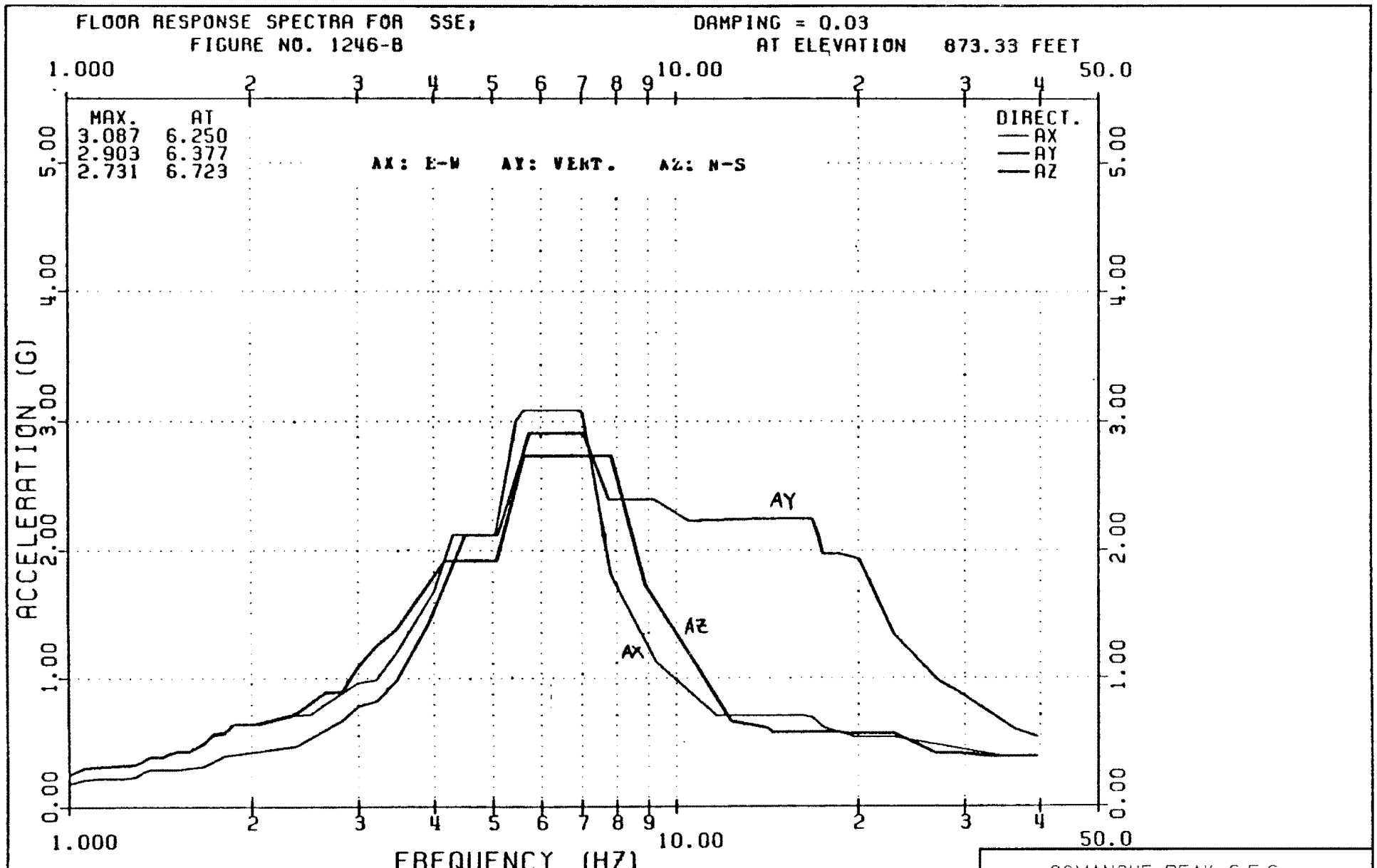
DS1589020.DGN



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

ELECTRICAL BLDG.
REFINED RESPONSE SPECTRA

FIGURE: 3.7B-46

AMENDMENT 78
JANUARY 15, 1990

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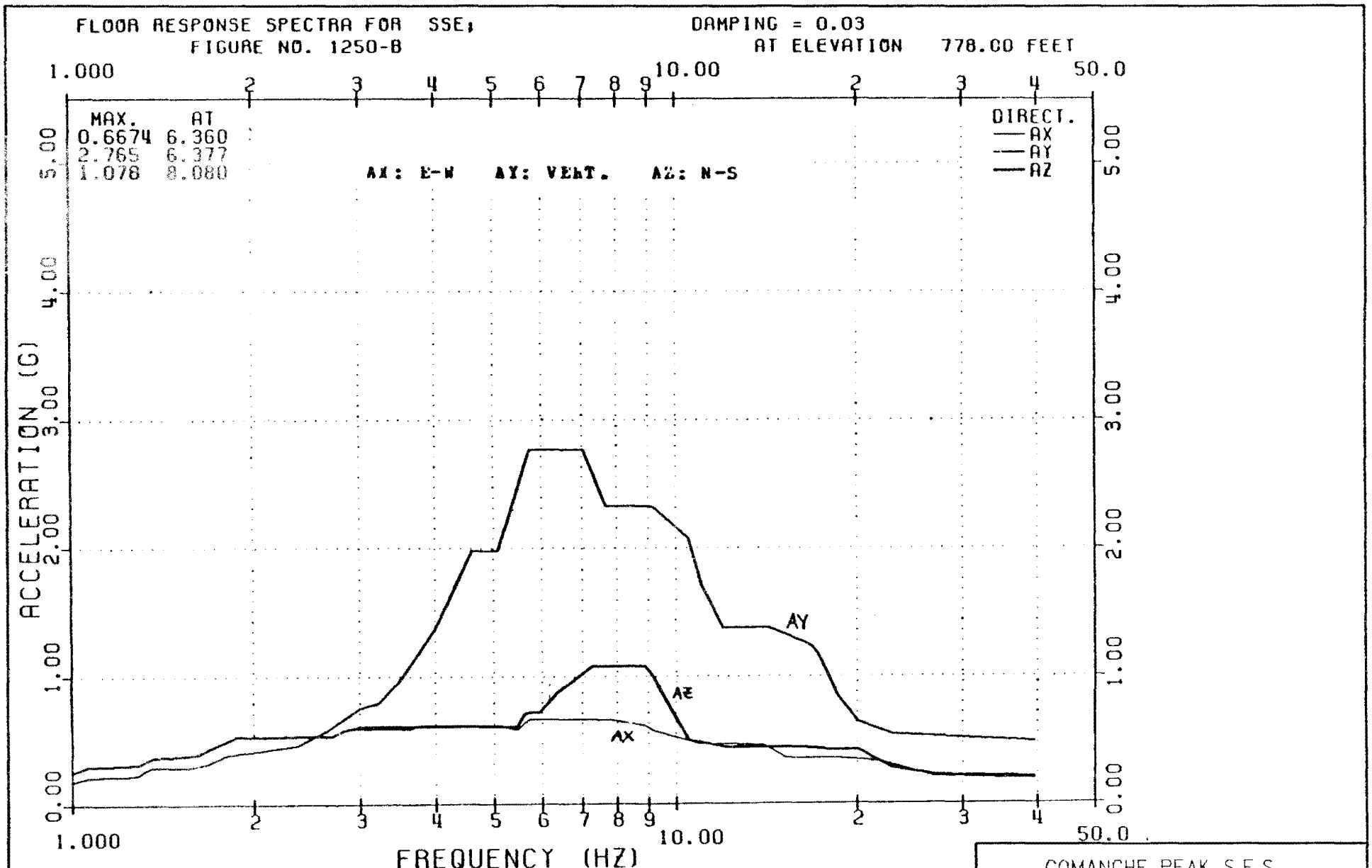


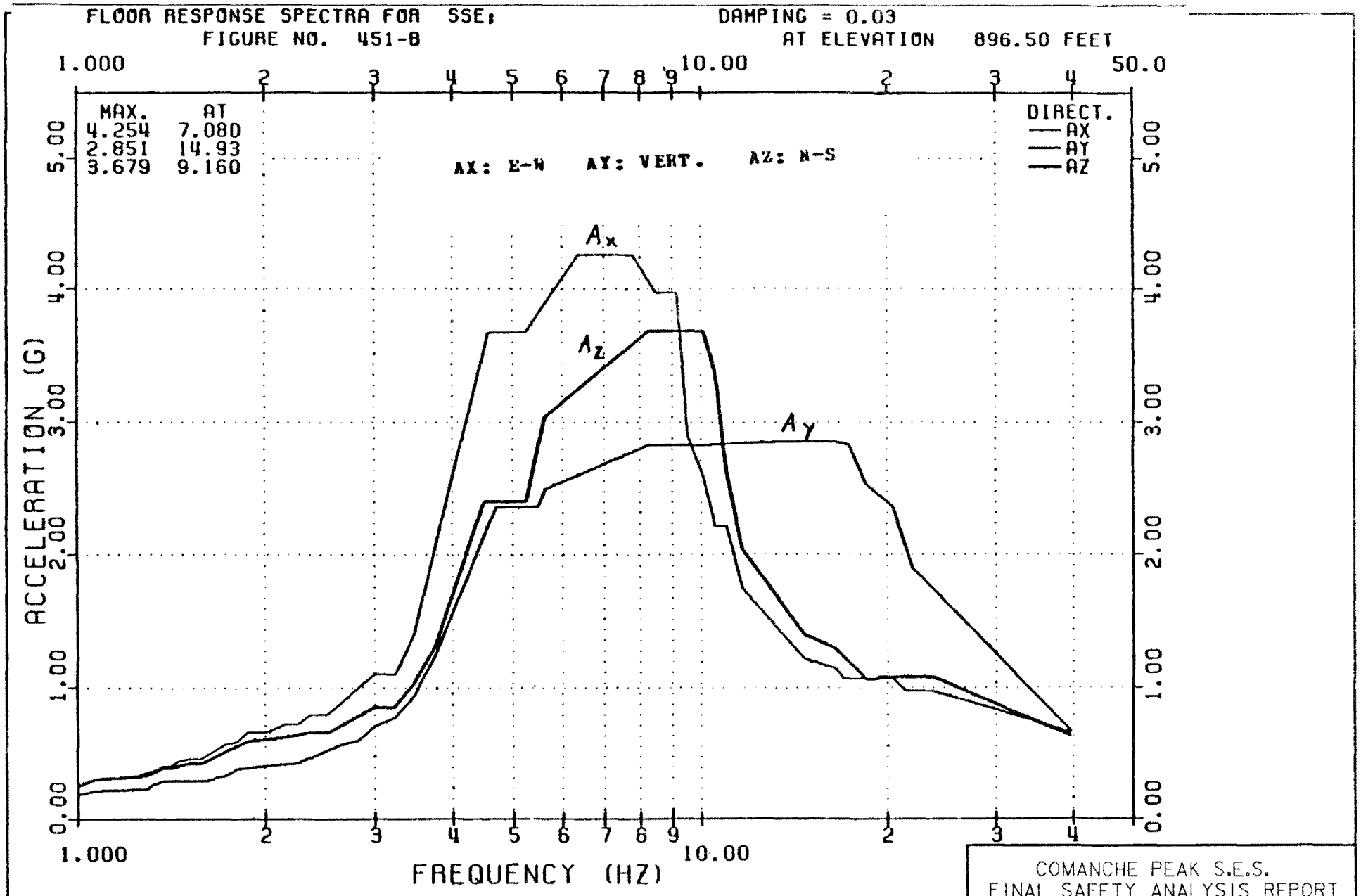
COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

ELECTRICAL BLDG.
REFINED RESPONSE SPECTRA

FIGURE: 3.7B-47

AMENDMENT 78
JANUARY 15, 1990

DS1589020.DGN



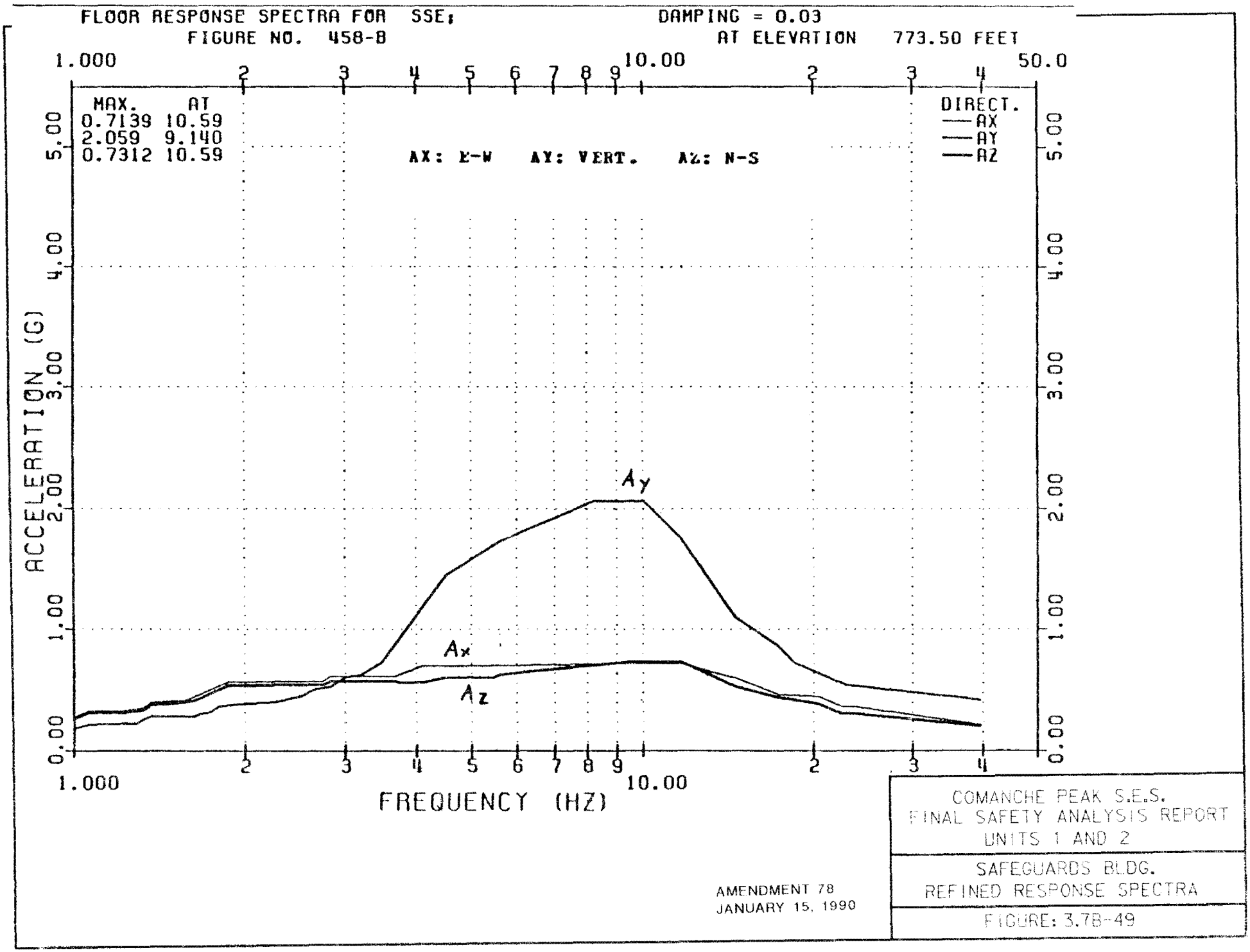
AMENDMENT 78
JANUARY 15, 1990

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

SAFEGUARDS BLDG.
REFINED RESPONSE SPECTRA

FIGURE: 3.7B-48

DS1589020.DGN

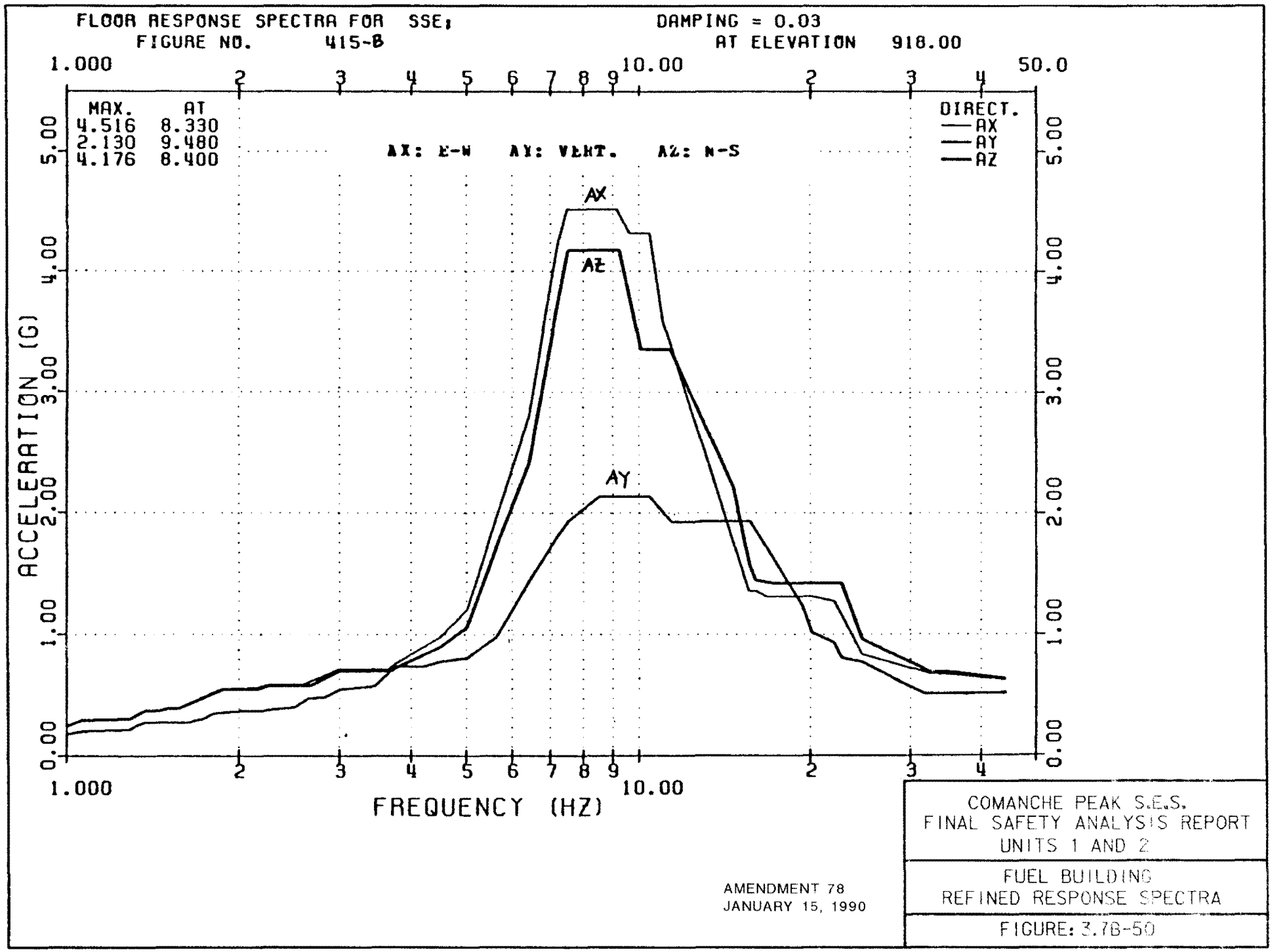


COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

SAFEGUARDS BLDG.
REFINED RESPONSE SPECTRA

FIGURE: 3.7B-49

AMENDMENT 78
JANUARY 15, 1990



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

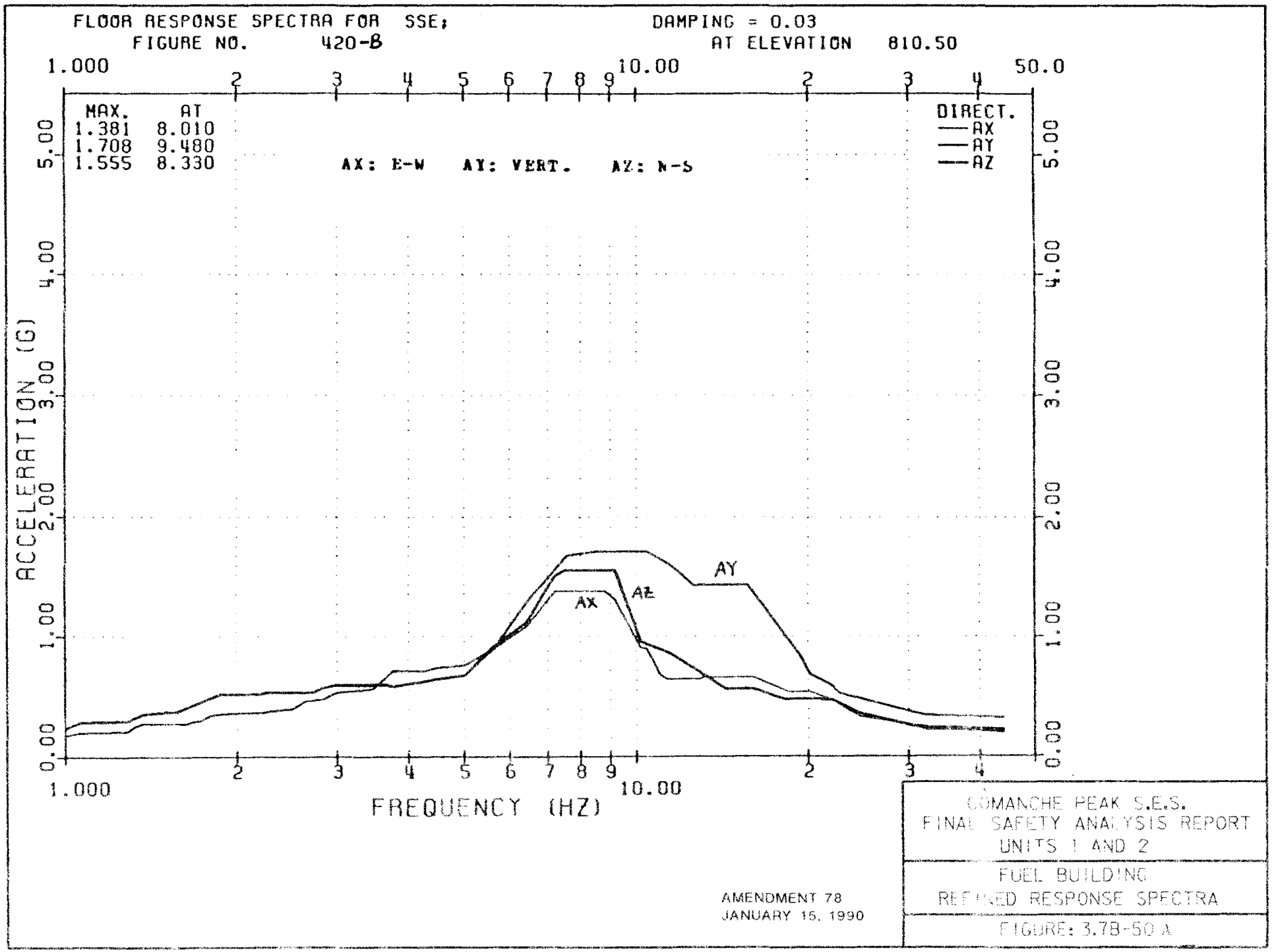
FUEL BUILDING
REFINED RESPONSE SPECTRA

FIGURE: 3.7B-50

AMENDMENT 78
JANUARY 15, 1990

DS1589020.DGN

DS1589020.DGN

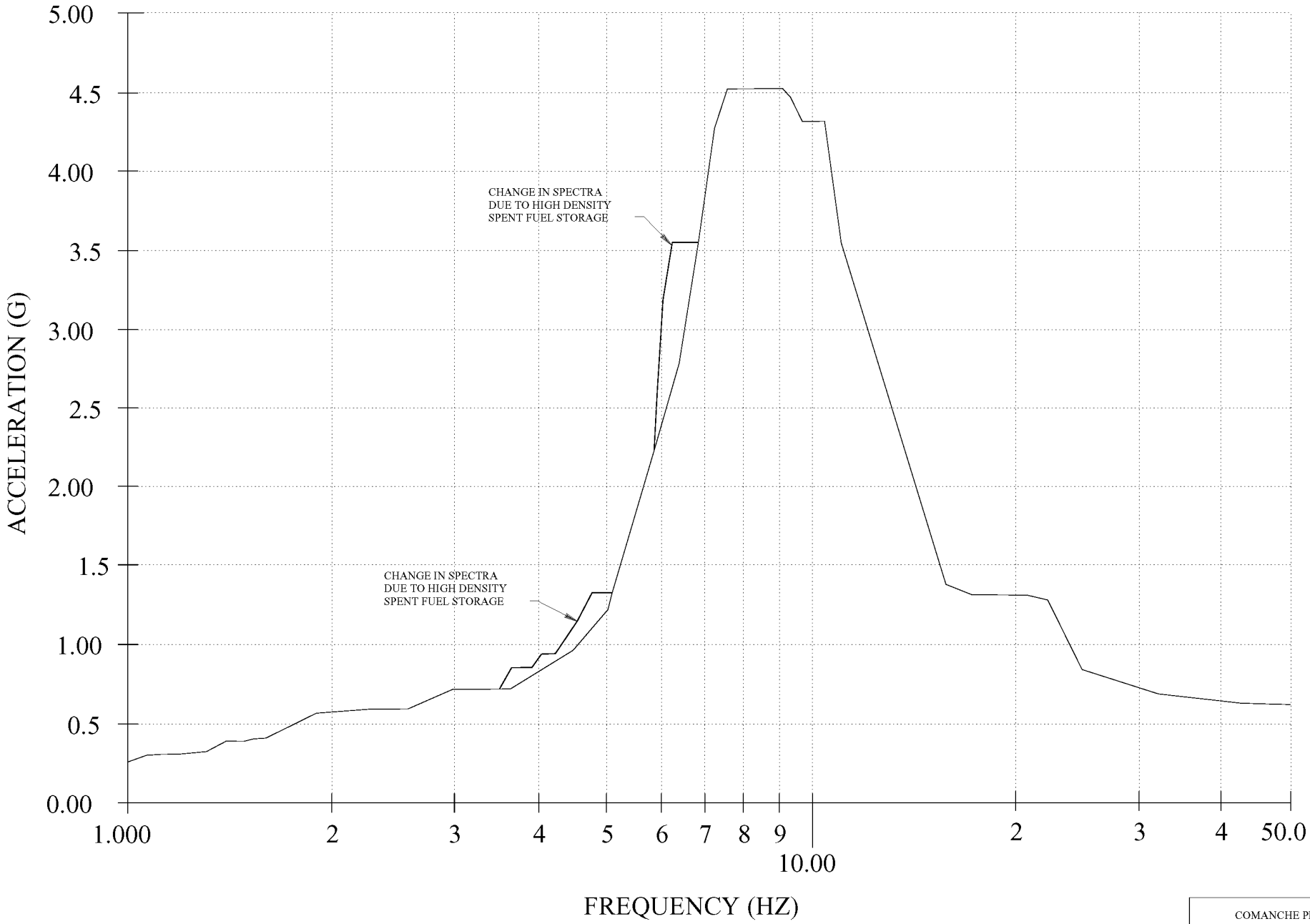


COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

FUEL BUILDING
REFINED RESPONSE SPECTRA

FIGURE: 3.7B-50 A

AMENDMENT 78
JANUARY 15, 1990



SSE FLOOR RESPONSE SPECTRA

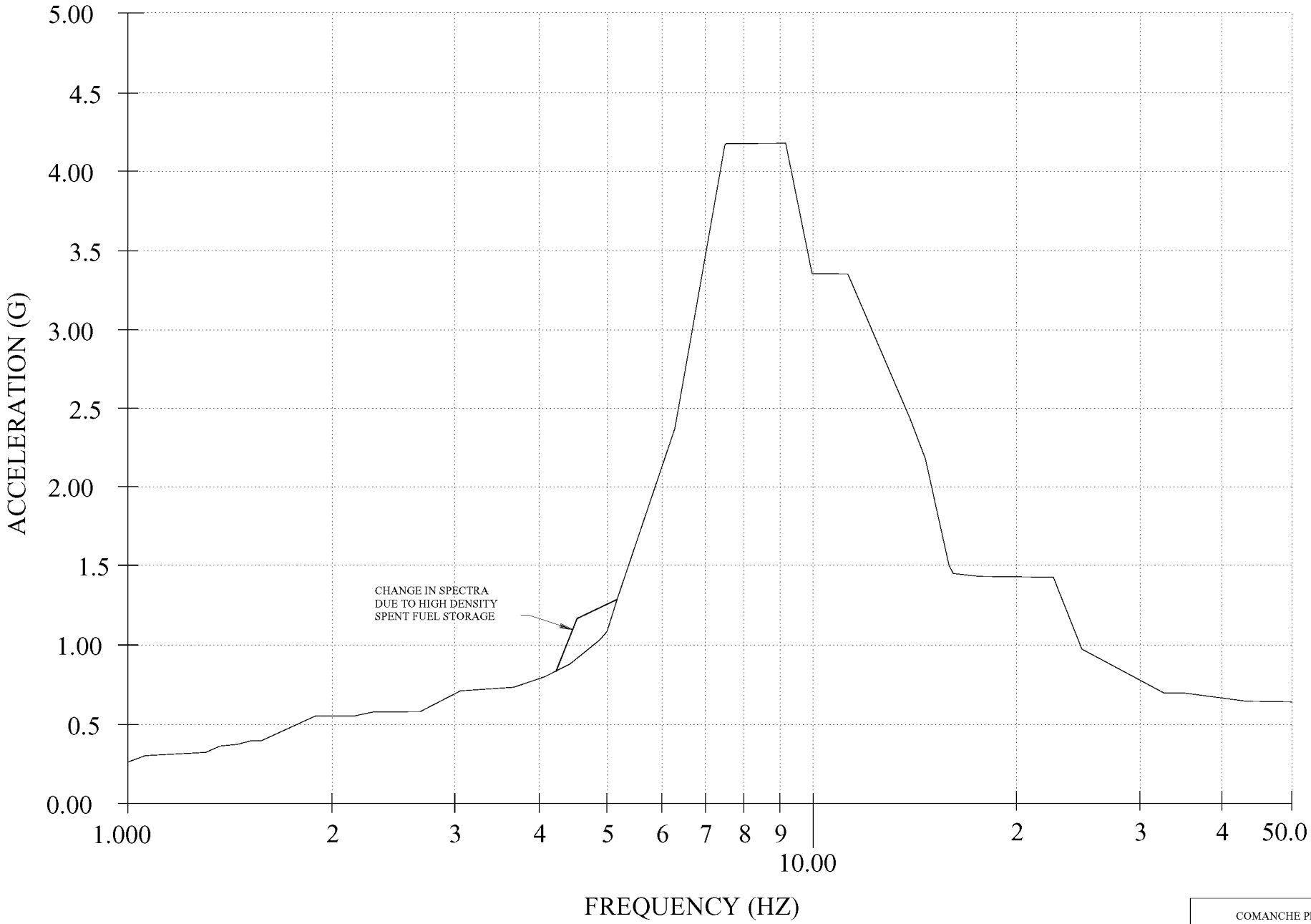
EL 918.25', EAST-WEST (AX), 3% DAMPING

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

FUEL BUILDING
REFINED RESPONSE SPECTRA

FIGURE 3.7B-50AA

ds0000kv.dgn



SSE FLOOR RESPONSE SPECTRA

EL 918.25', NORTH-SOUTH (AY), 3% DAMPING

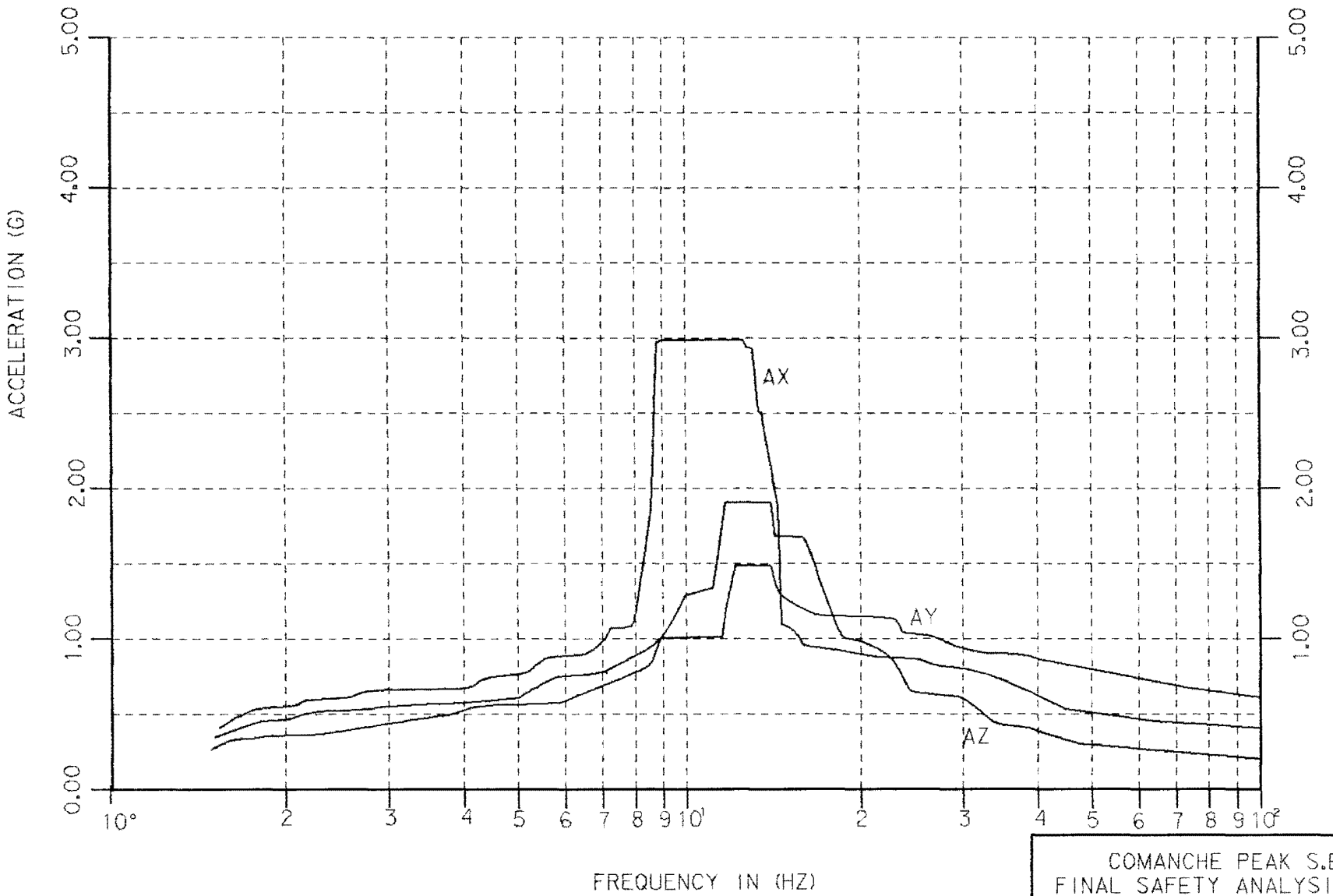
COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

FUEL BUILDING
REFINED RESPONSE SPECTRA

FIGURE 3.7B-50AB

ds0000kw.dgn

DS1589020.DGN



AMENDMENT 78
JANUARY 15, 1990

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

SERVICE WATER INTAKE STRUCTURE
REFINED RESPONSE SPECTRA

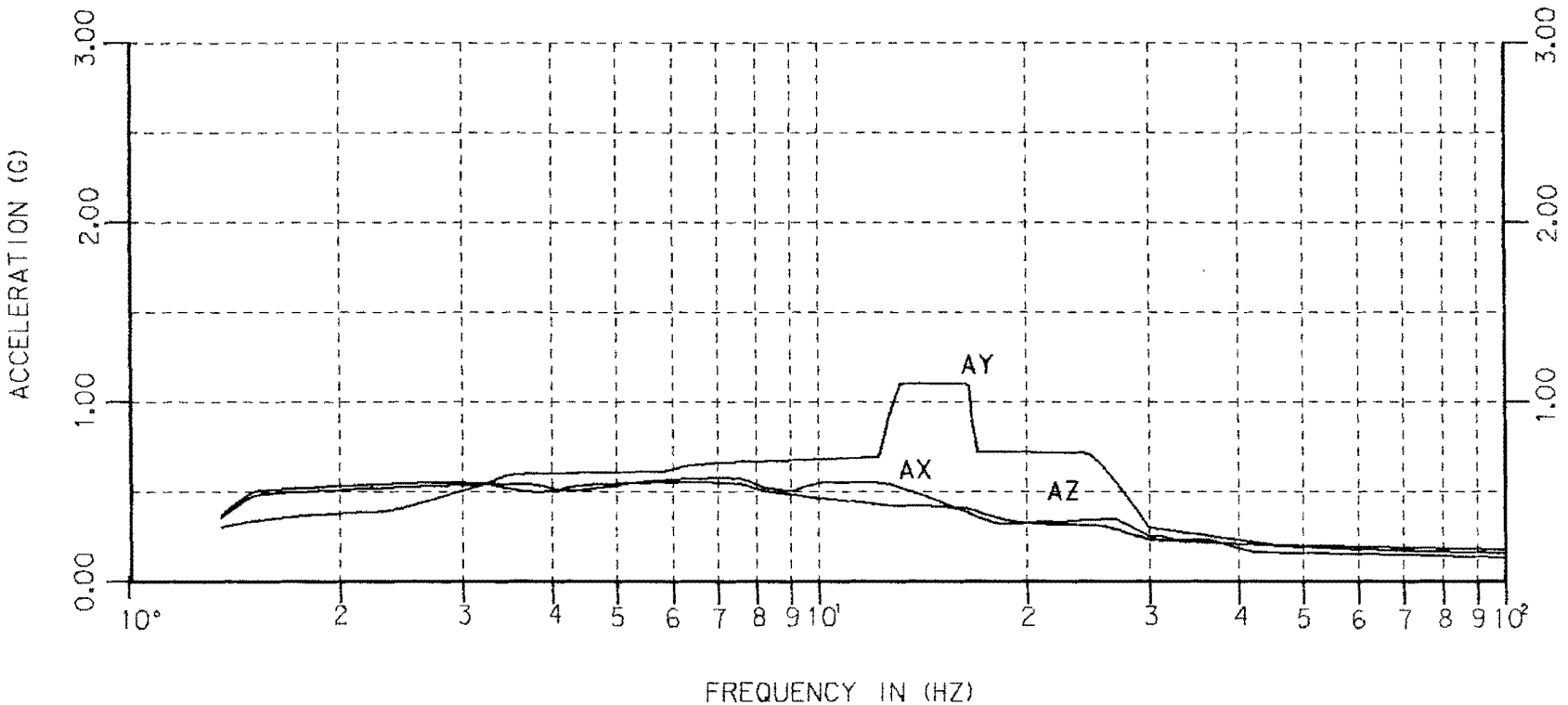
FIGURE: 3.7B-50B

DS1589020.DGN

FLOOR RESPONSE SPECTRA: SSE

AX: N-S AY: VERT AZ: E-W

DAMPING VALUE = 0.030
AT ELEVATION 782.0 FT



AMENDMENT 78
JANUARY 15, 1990

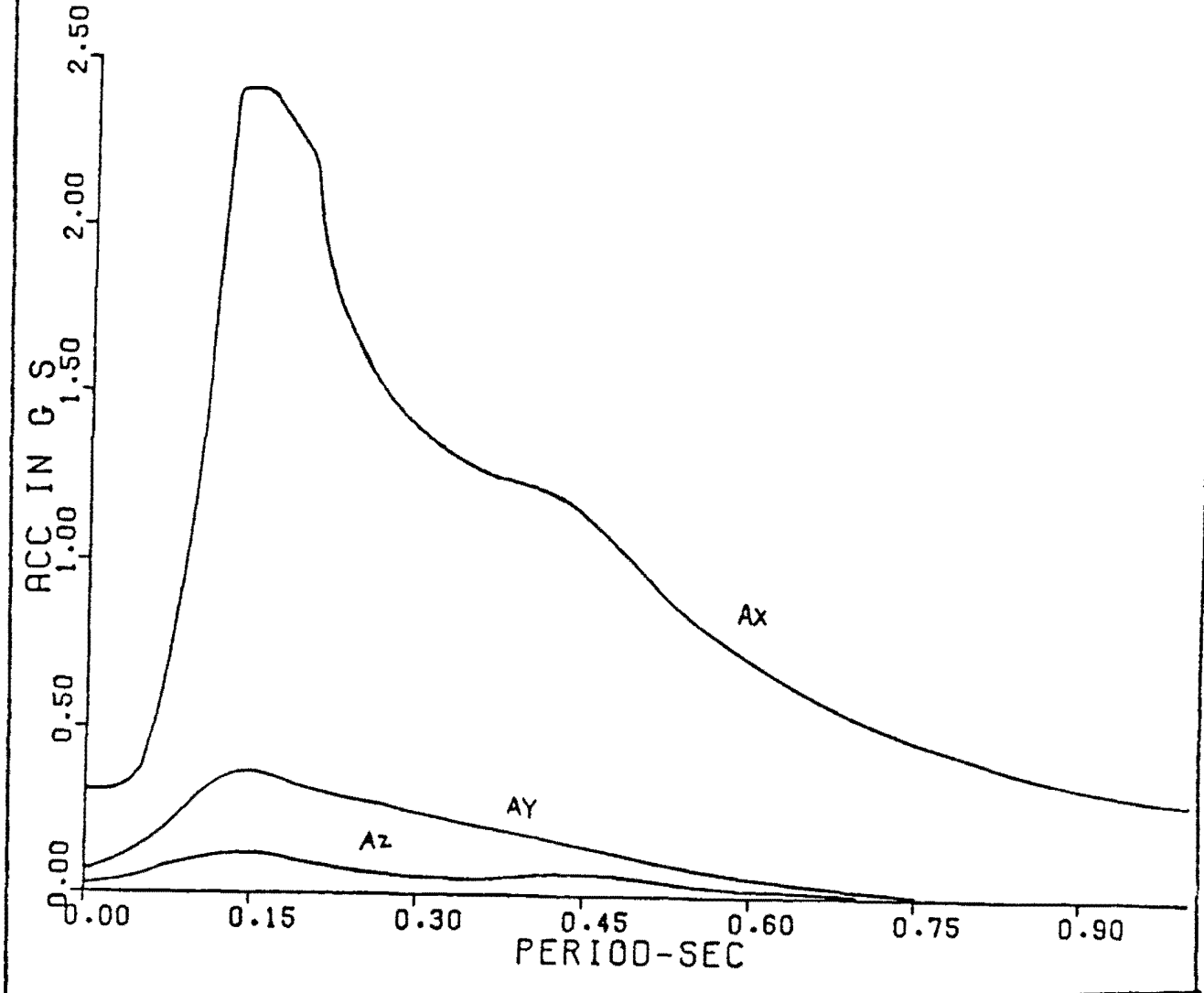
COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

SERVICE WATER INTAKE STRUCTURE
REFINED RESPONSE SPECTRA

FIGURE: 3.7B-50C

INSTRUCTURE RESPONSE SPECTRA FOR:

STEAM GENERATOR SUPPORT
SSE EARTHQUAKE DIRECTION: X
EQUIPMENT DAMPING: 0.02
RESPONSE SPECTRA DUE TO NODAL TRANSLATION:
AX: N-S AY: VERT. AZ: E-W



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

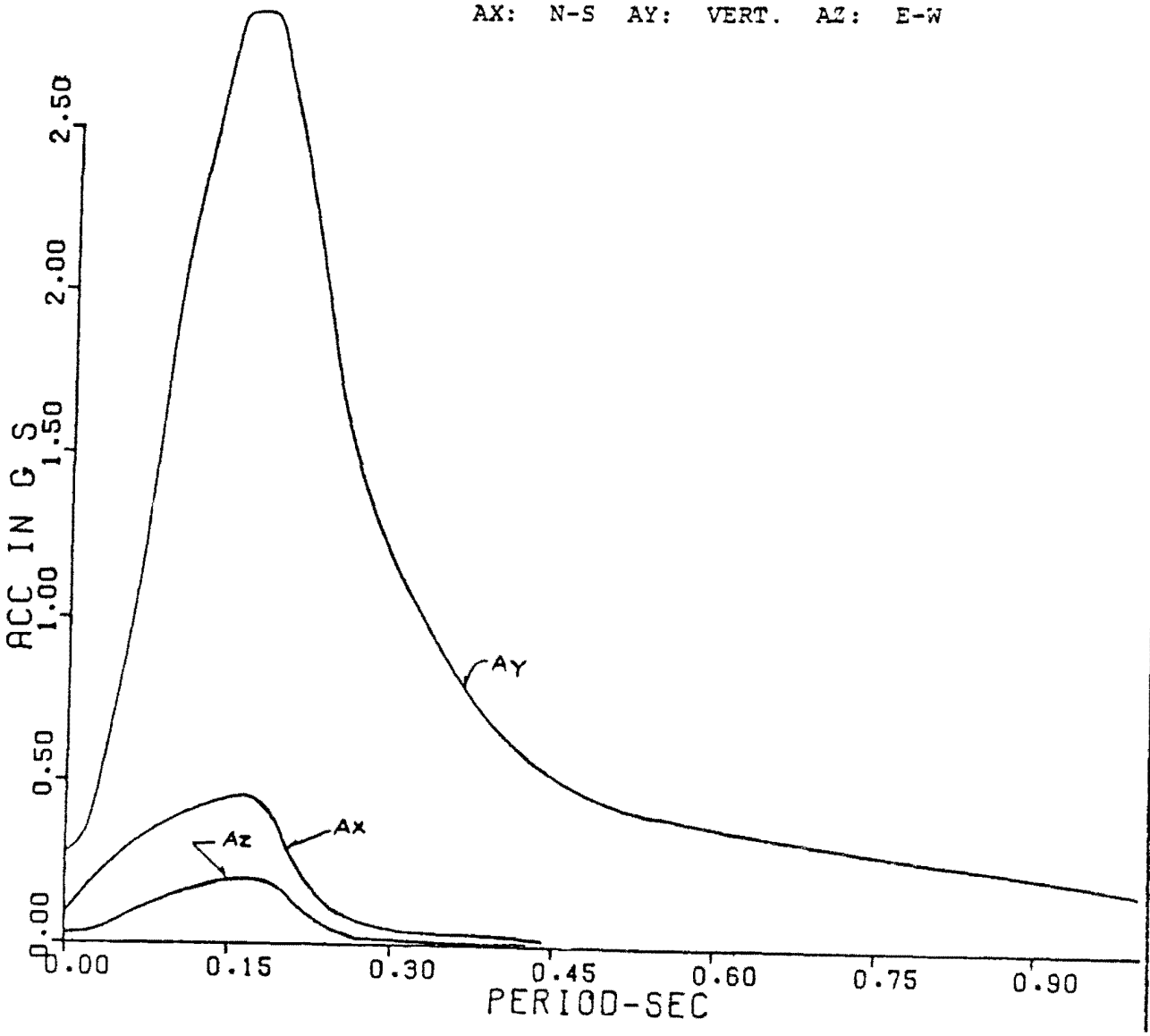
INSTRUCTURE RESPONSE SPECTRA
STEAM GENERATOR SUPPORT
X-EARTHQUAKE
SSE, 2 PERCENT DAMPING

FIGURE 3.7B-51

Amendment 68
February 15, 1988

INSTRUCTURE RESPONSE SPECTRA FOR:

STEAM GENERATOR SUPPORT
SSE EARTHQUAKE DIRECTION: Y
EQUIPMENT DAMPING: 0.02
RESPONSE SPECTRA DUE TO NODAL TRANSLATION:
AX: N-S AY: VERT. AZ: E-W



Amendment 68
February 15, 1988

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

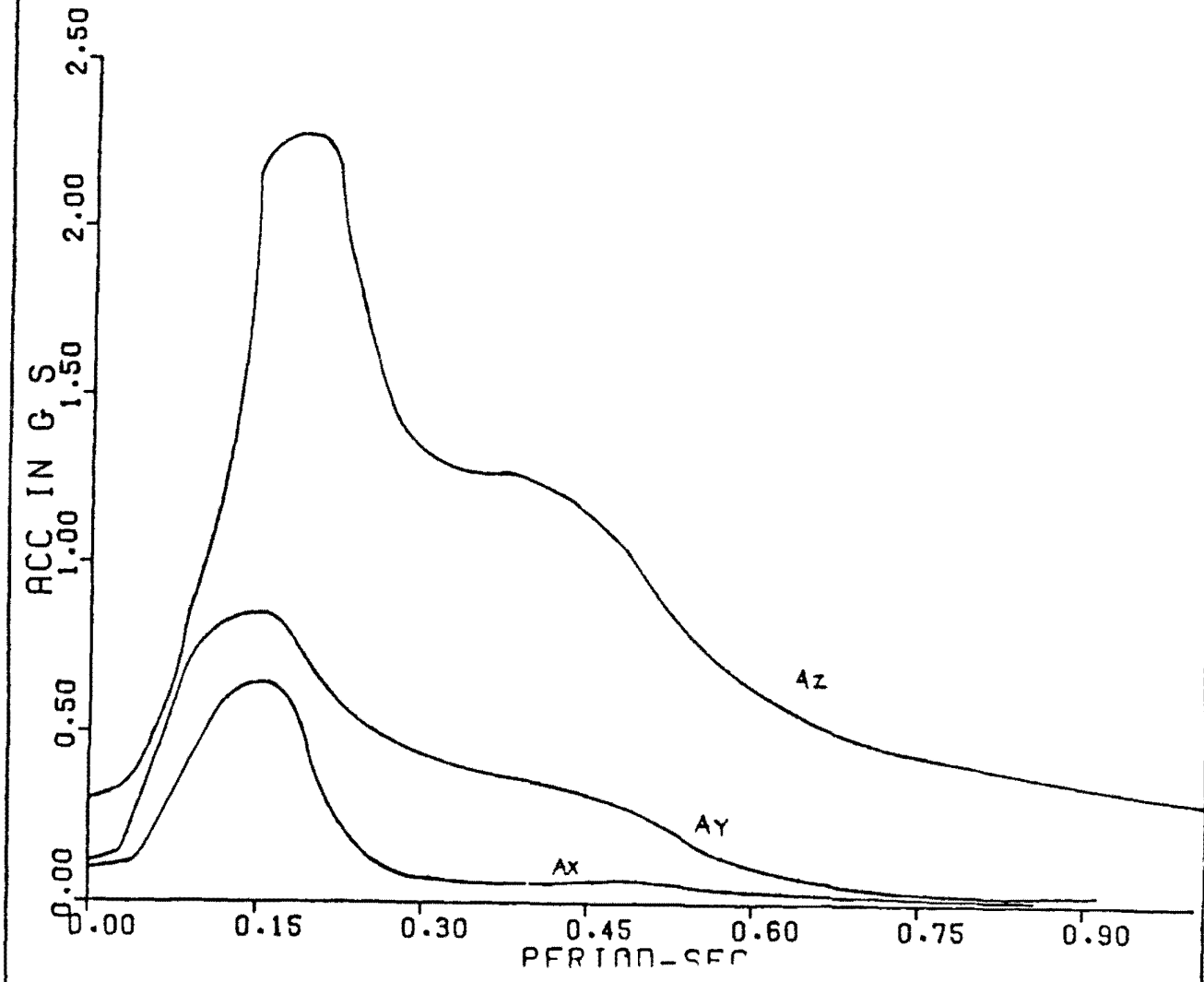
INSTRUCTURE RESPONSE SPECTRA
STEAM GENERATOR SUPPORT
Y-EARTHQUAKE
SSE, 2 PERCENT DAMPING

FIGURE 3.7B-52

INSTRUCTURE RESPONSE SPECTRA FOR:

STEAM GENERATOR SUPPORT

SSE EARTHQUAKE DIRECTION: Z
EQUIPMENT DAMPING: 0.02
RESPONSE SPECTRA DUE TO NODAL TRANSLATION:
AX: N-S AY: VERT. AZ: E-W



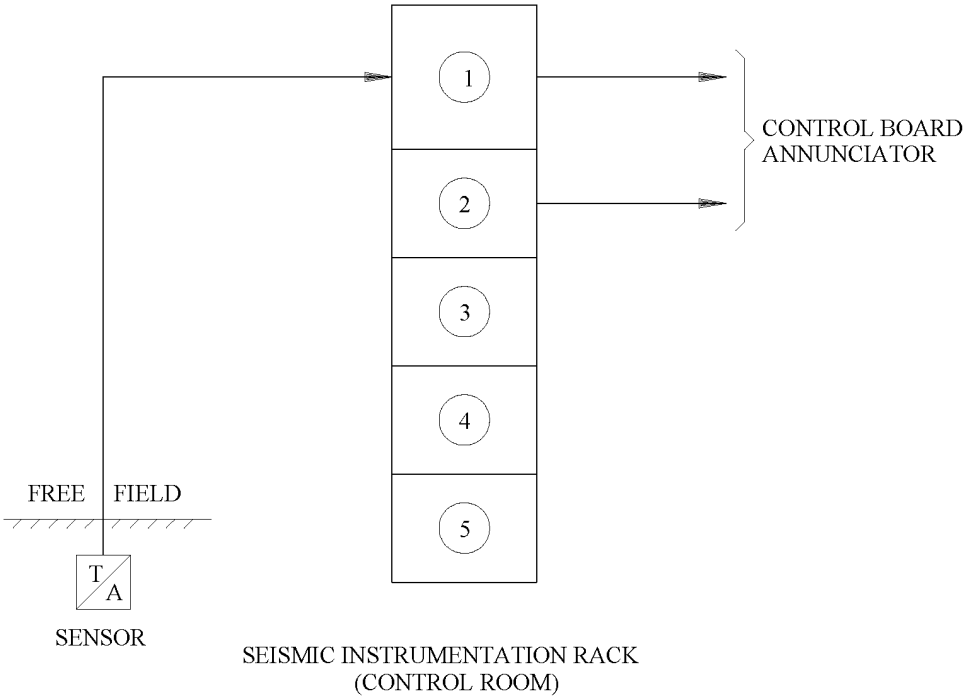
COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

INSTRUCTURE RESPONSE SPECTRA
STEAM GENERATOR SUPPORT
Z-EARTHQUAKE
SSE, 2 PERCENT DAMPING

FIGURE 3.7B-53

Amendment 68
February 15, 1988

CPE



LEGEND

T/A	TIME HISTORY ACCELEROGRAPH
1	RECORDER
2	CONTROLLER
3	SCREEN DISPLAY
4	PRINTER
5	UPS

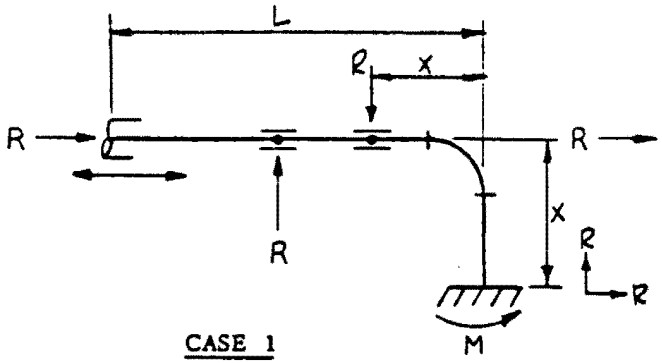
Amendment 102

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

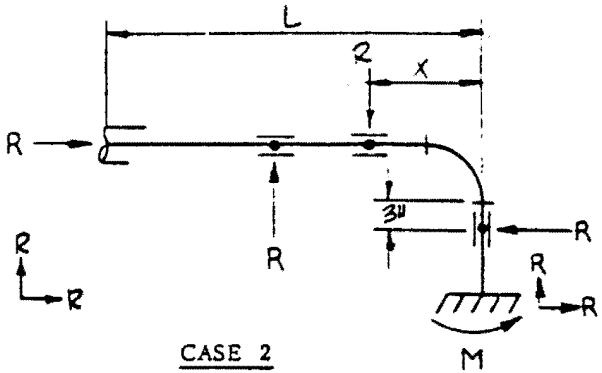
SEISMIC INSTRUMENTATION
SCHEMATIC DIAGRAM

FIGURE 3.7B-54

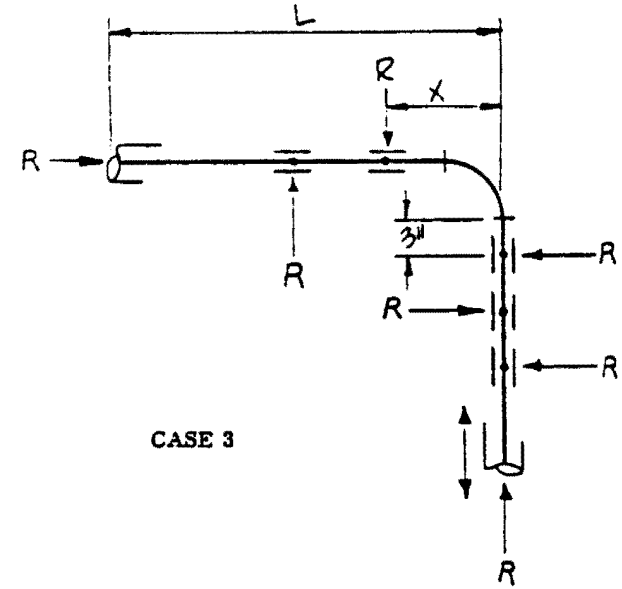
fs00000v.dgn



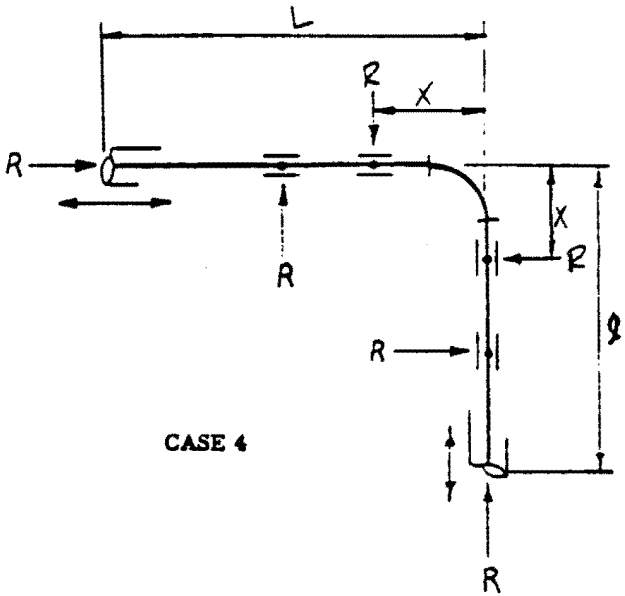
CASE 1



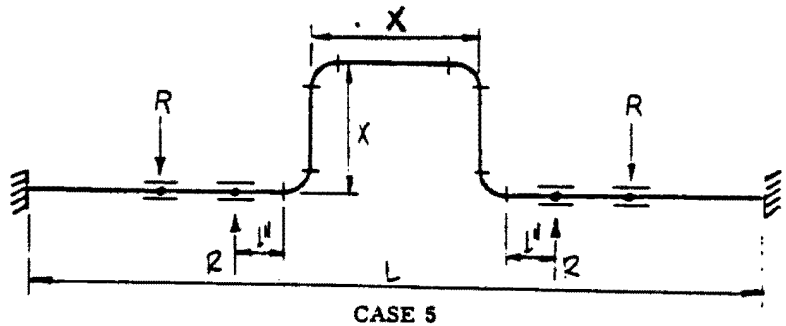
CASE 2



CASE 3



CASE 4



CASE 5

THERMAL EXPANSION LOOP

LEGEND

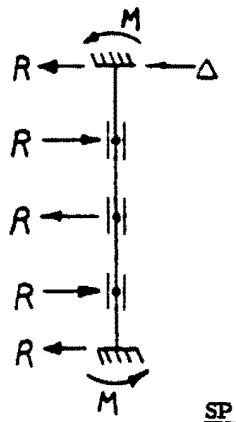
L - Allowable Spad

M - Moment

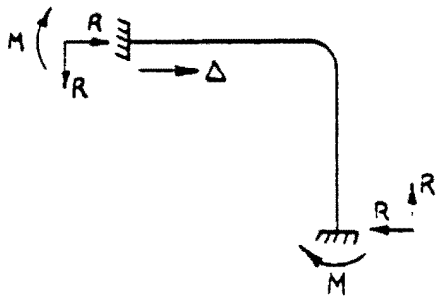
R - Reaction Force

X - Distance to Guide

Δ = Thermal Movement



CASE 6



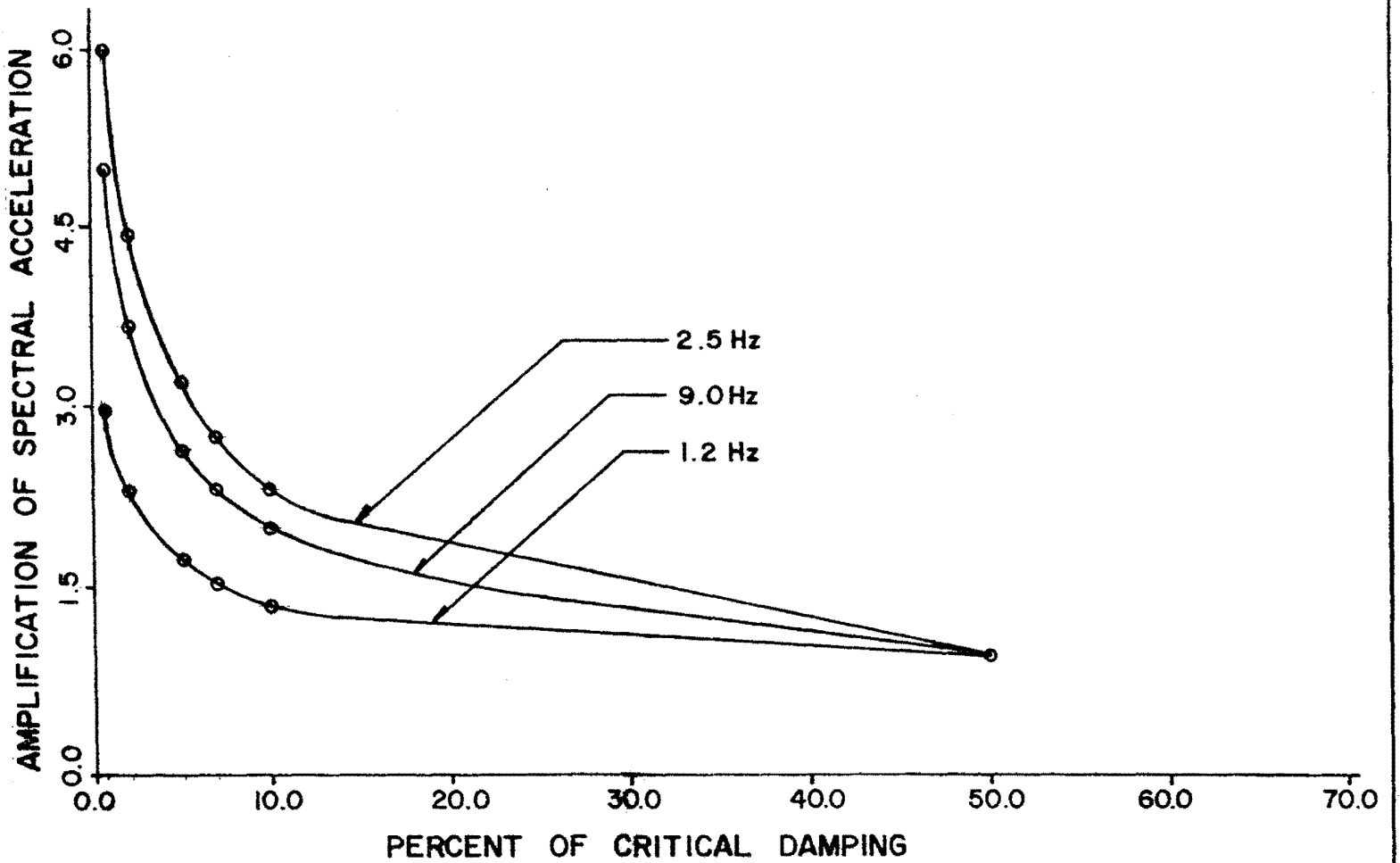
CASE 7

SPECIAL THERMAL CASES

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

SIMPLIFIED DYNAMIC ANALY.
FOR PIPING SYSTEMS

FIGURE 3.7B-55



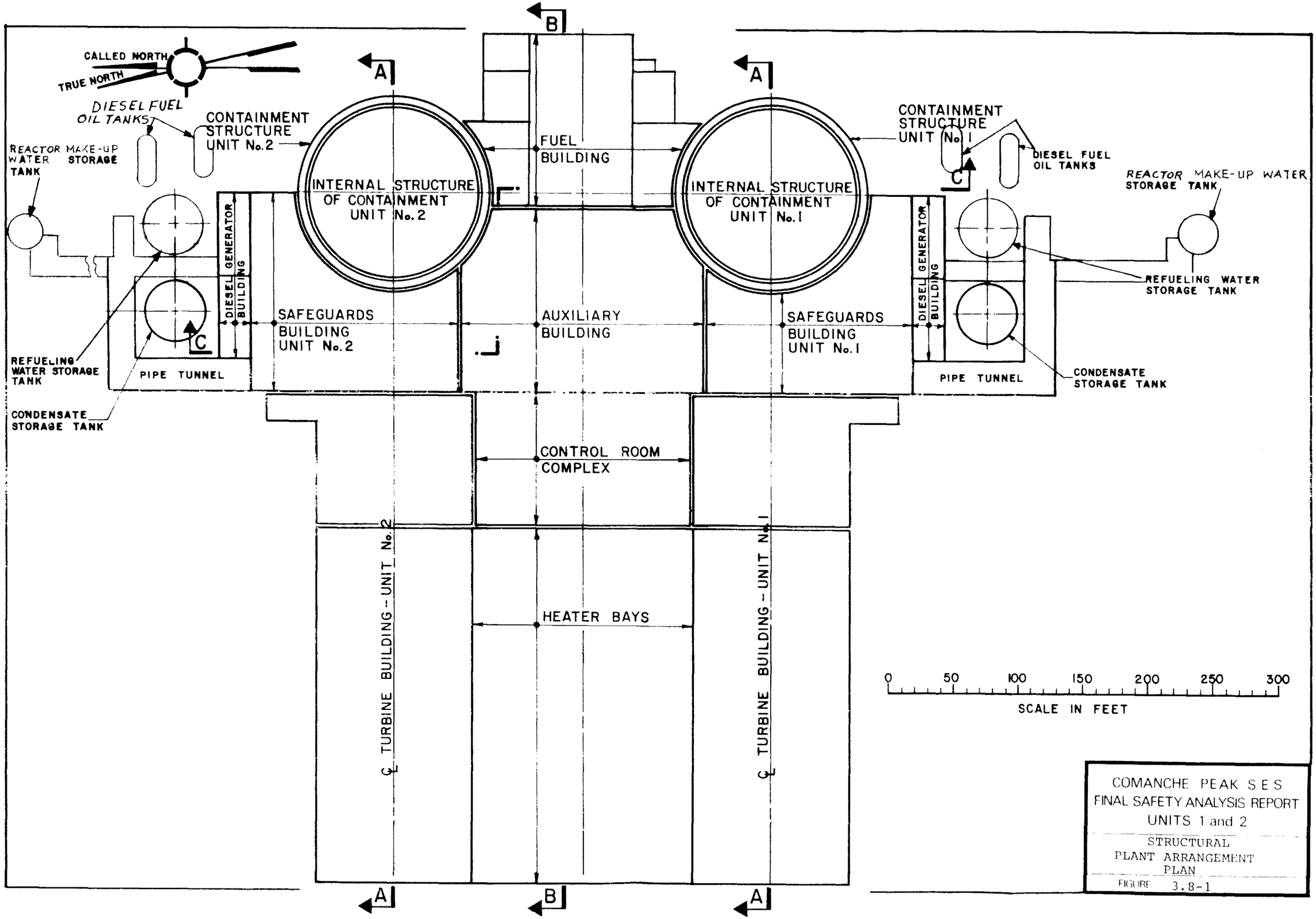
AMPLIFICATION CURVES USING LEAST SQUARE POLYNOMIAL FIT OF FREQUENCY CONTROL POINTS FOR HORIZONTAL GROUND RESPONSE SPECTRA

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

MAXIMUM

AMPLIFICATION CURVE

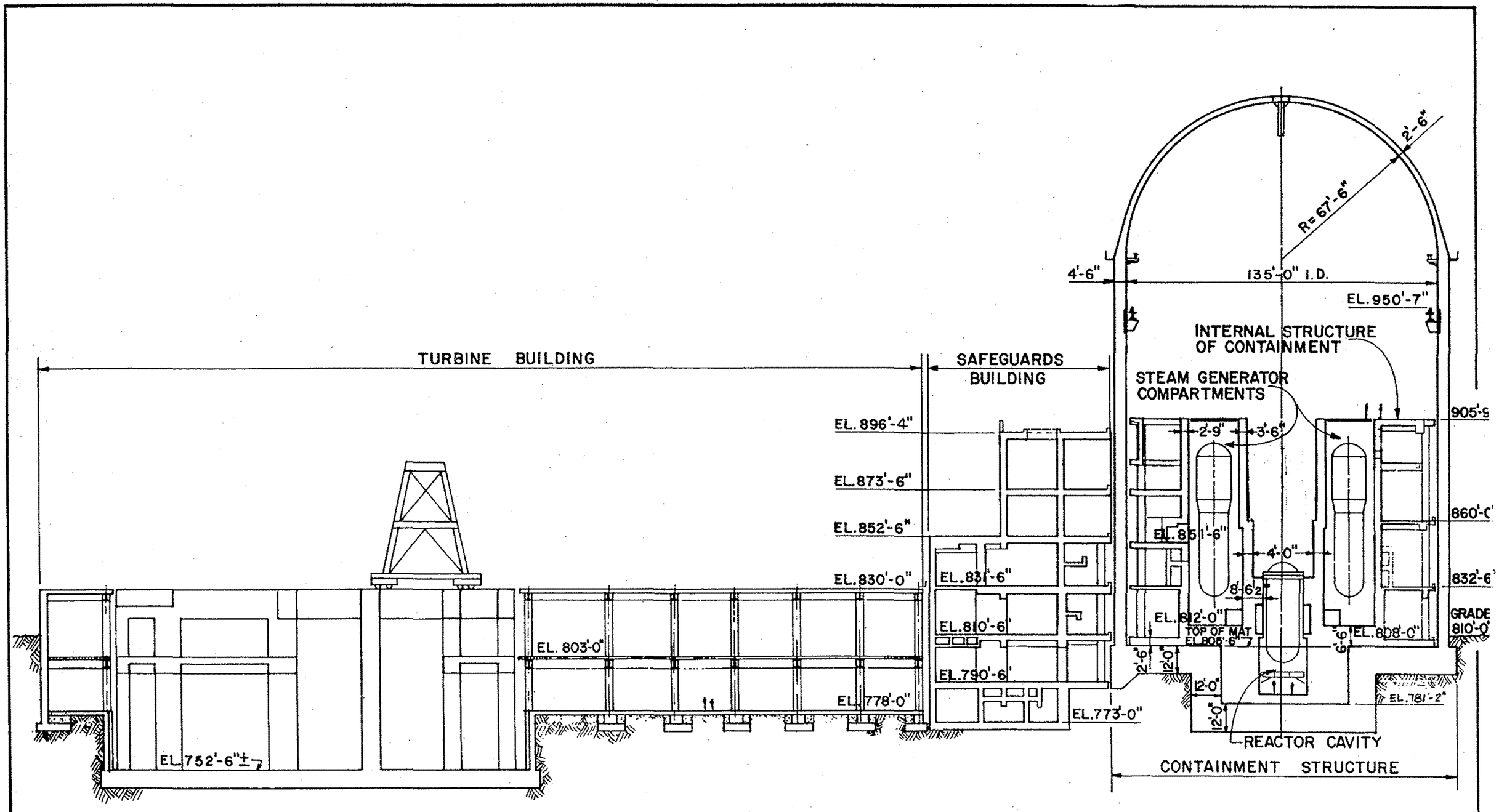
FIGURE 3.7B(A)-1



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

STRUCTURAL
PLANT ARRANGEMENT
PLAN

FIGURE 3.8-1

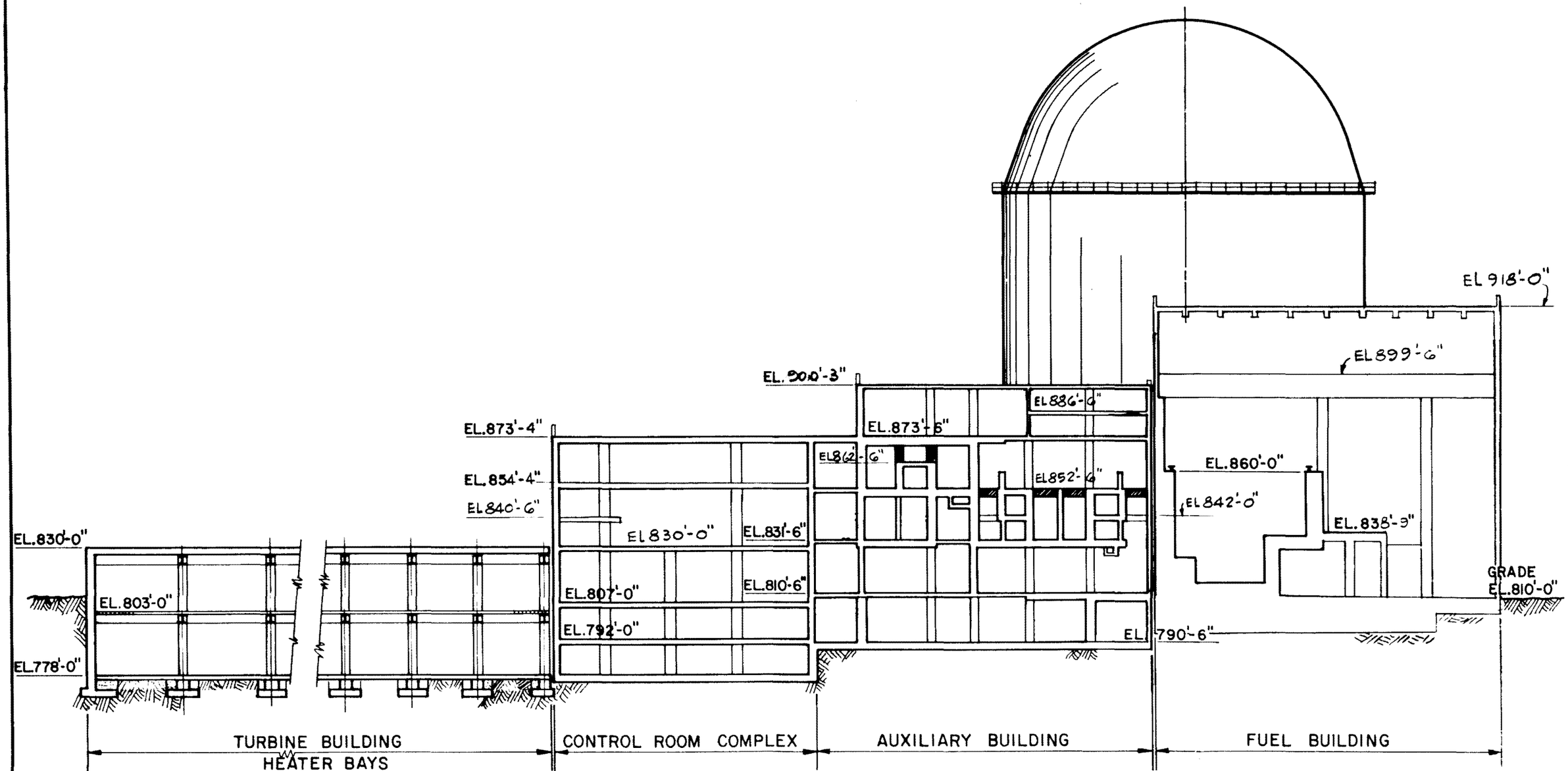


SECTION A-A

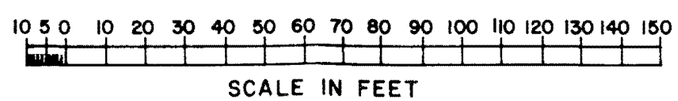
COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

STRUCTURAL
PLANT ARRANGEMENT
SECTION A-A

FIGURE 3.8-2



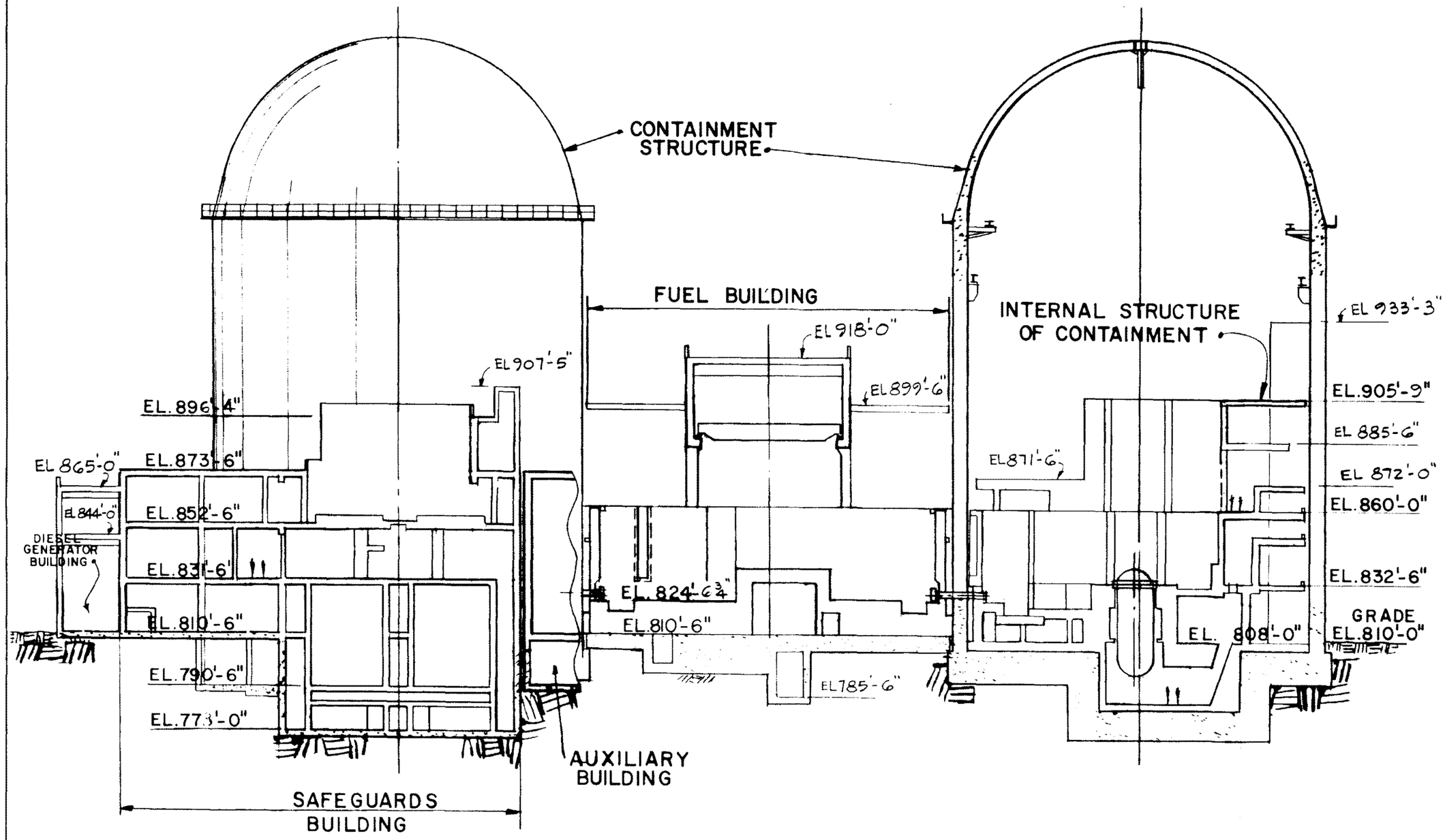
SECTION B-B



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

STRUCTURAL
PLANT ARRANGEMENT
SECTION B-B

FIGURE 3.8-3



SECTION C-C

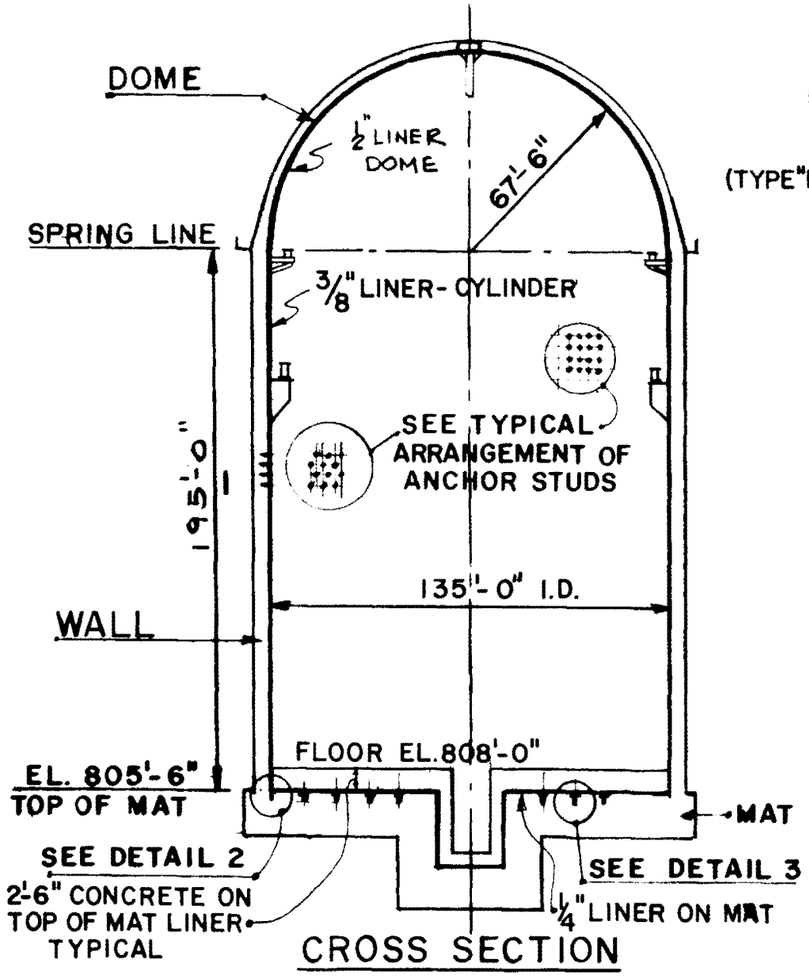
10 5 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

SCALE IN FEET

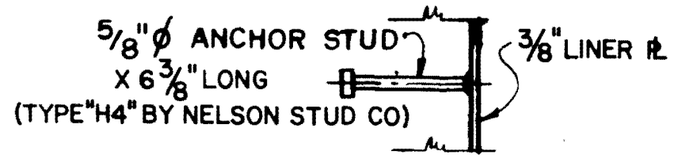
COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

STRUCTURAL
PLANT ARRANGEMENT
SECTION C-C

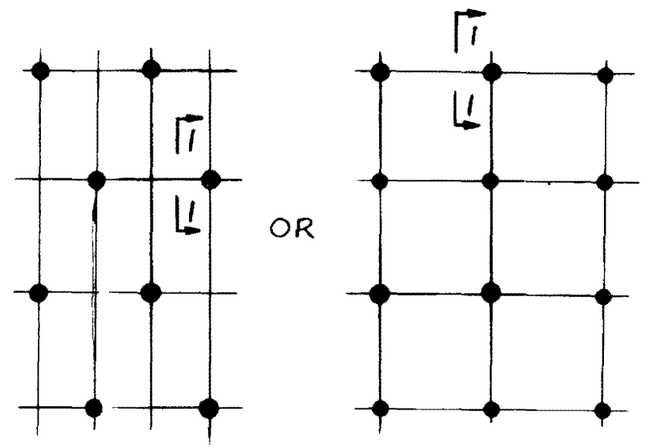
FIGURE 3.8-4



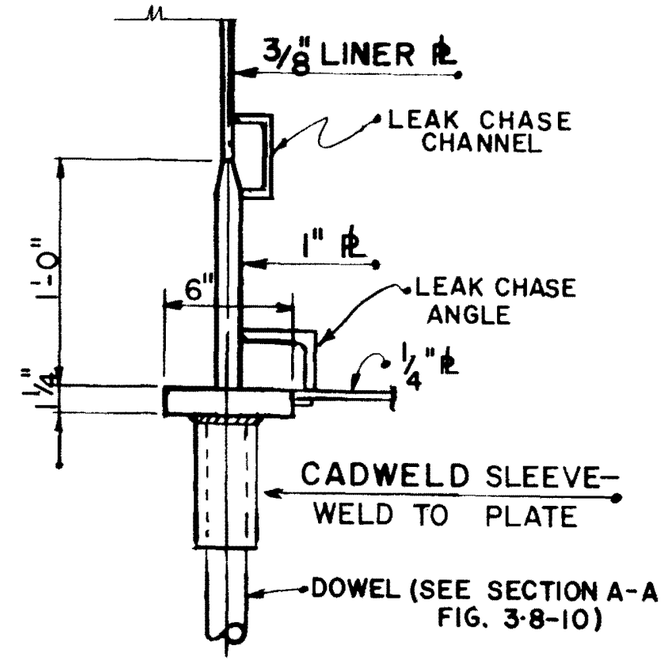
CROSS SECTION



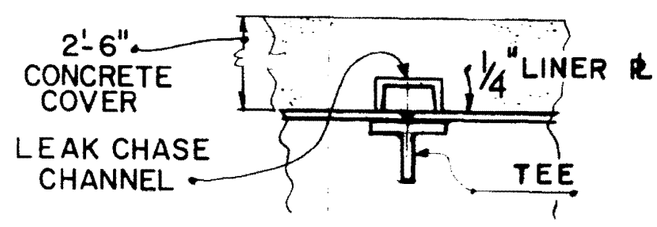
SECTION 1-1 (TYP)



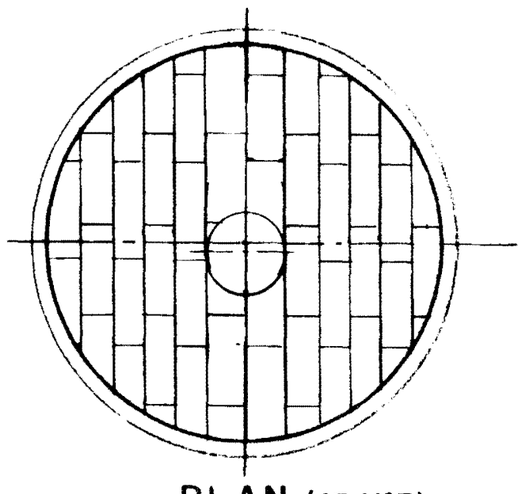
TYPICAL ARRANGEMENT OF ANCHOR STUDS IN WALL & DOME



DETAIL 2



DETAIL 3

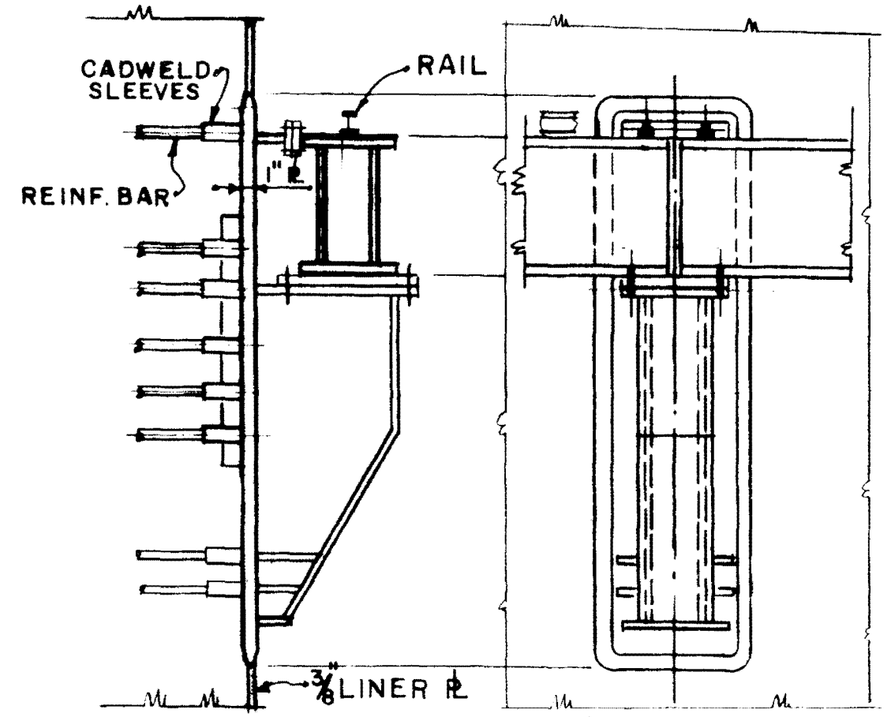


PLAN (AT MAT)

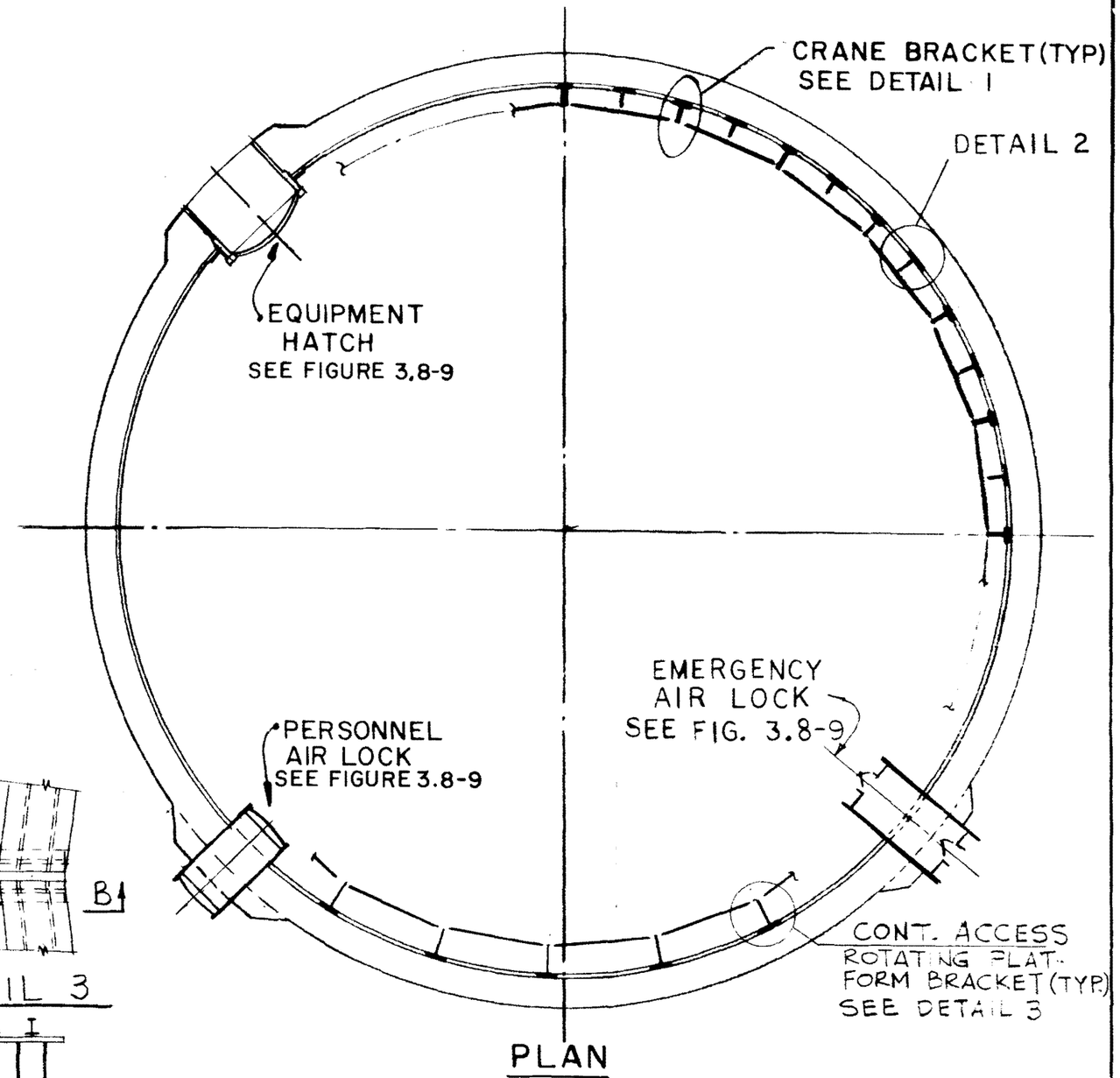
COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

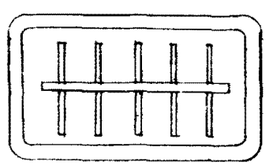
CONTAINMENT LINER DETAILS

FIGURE 3.8-5

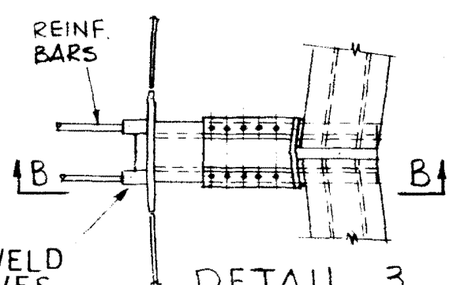


DETAIL 1
CRANE BRACKET (TYP)

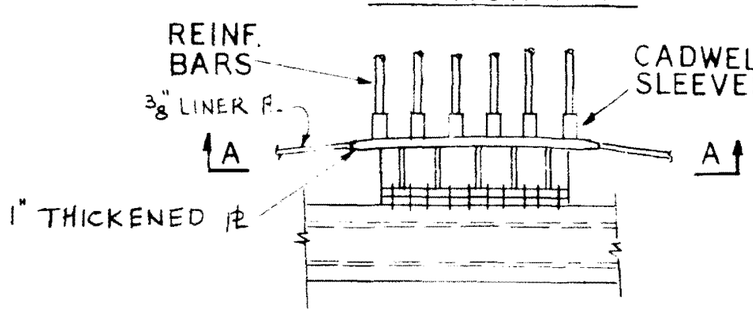




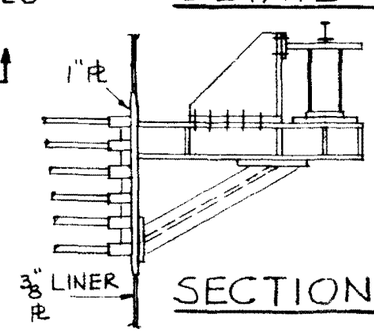
SECTION A A



DETAIL 3



DETAIL 2

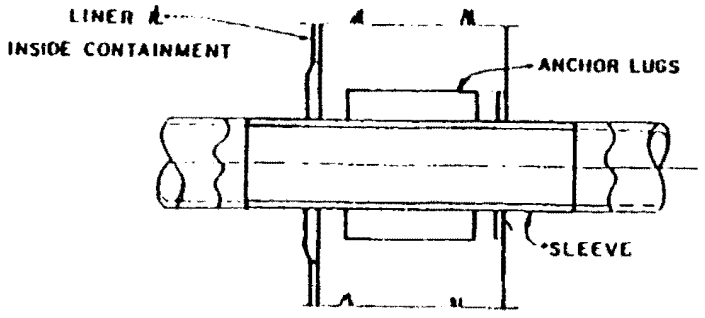


SECTION B-B

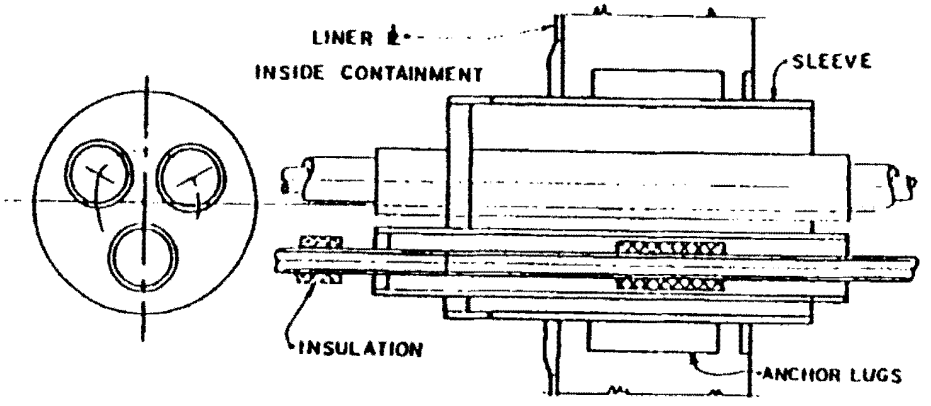
COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

CONTAINMENT LINER DETAILS

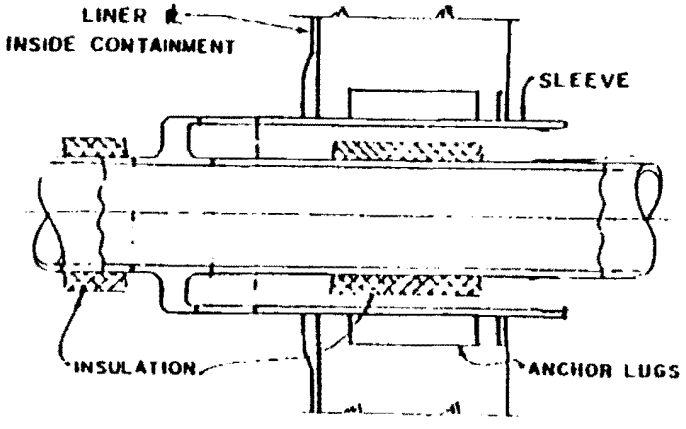
FIGURE 3.8-6



COLD PIPE PENETRATION



MULTIPLE PIPE PENETRATION



HOT PIPE PENETRATION

Amendment 68
February 15, 1988

COMANCHE PEAK S.E.S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

CONTAINMENT
TYPICAL PENETRATION DETAILS

FIGURE 3.8-7

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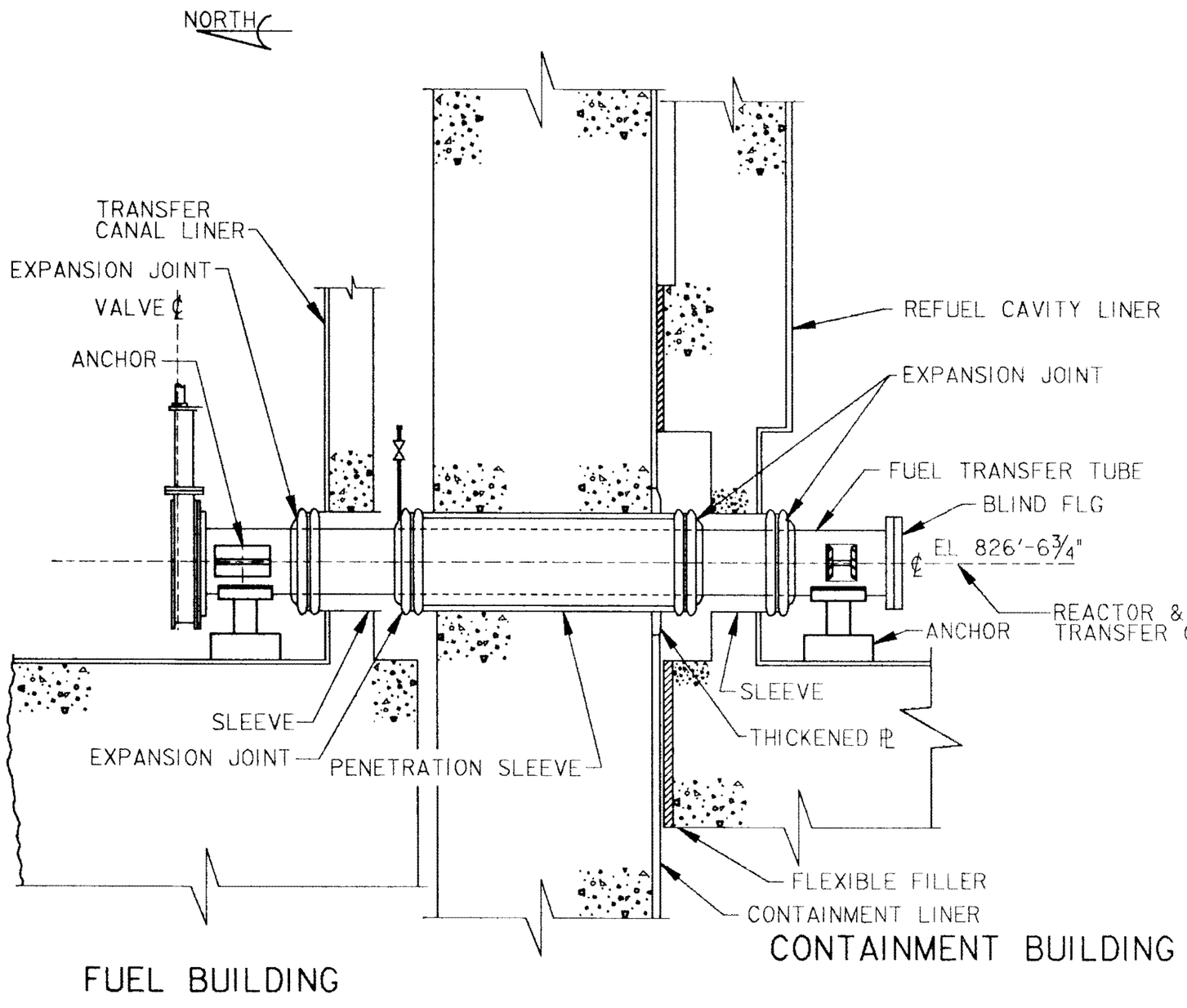
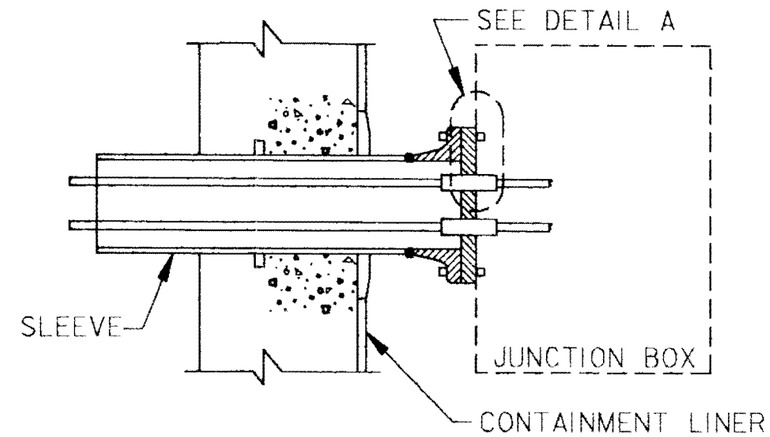
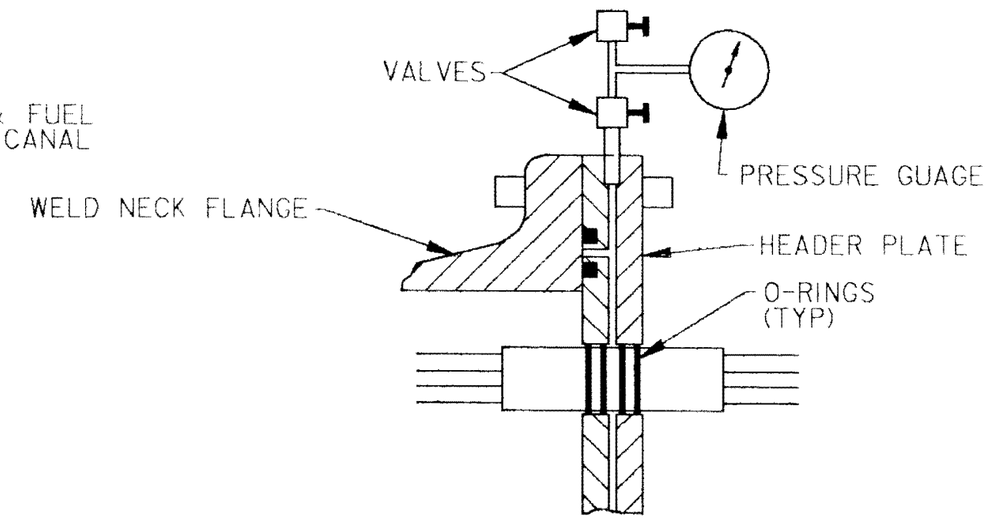


SECTION AT
FUEL TRANSFER TUBE PENETRATION



ELECTRICAL PENETRATION
(TYPICAL)



DETAIL A
LEAKAGE MONITORING

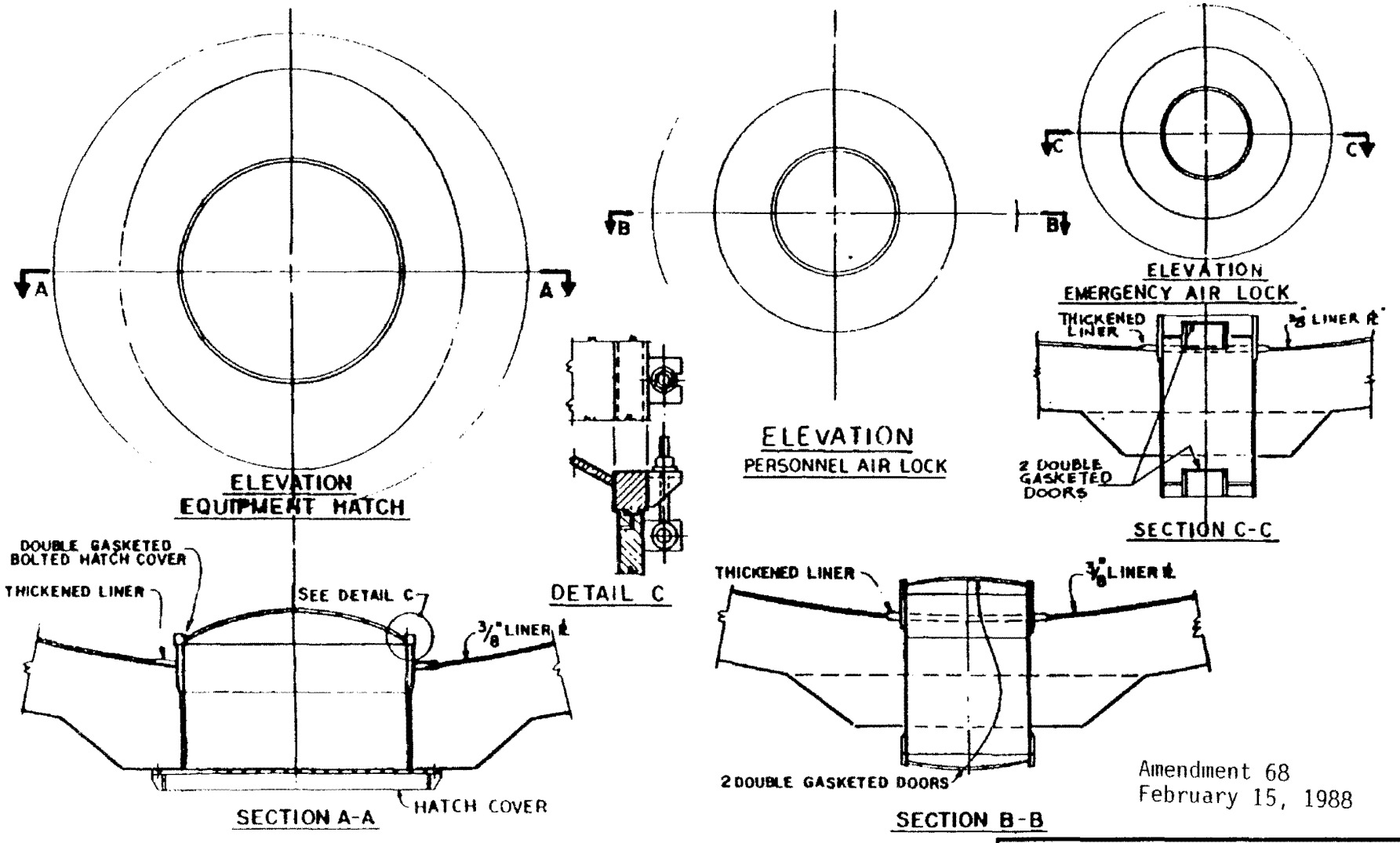
AMENDMENT 77
SEPTEMBER 8, 1989

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

CONTAINMENT
TYPICAL PENETRATION DETAILS

FIGURE 3.8-8

FSAR87012A



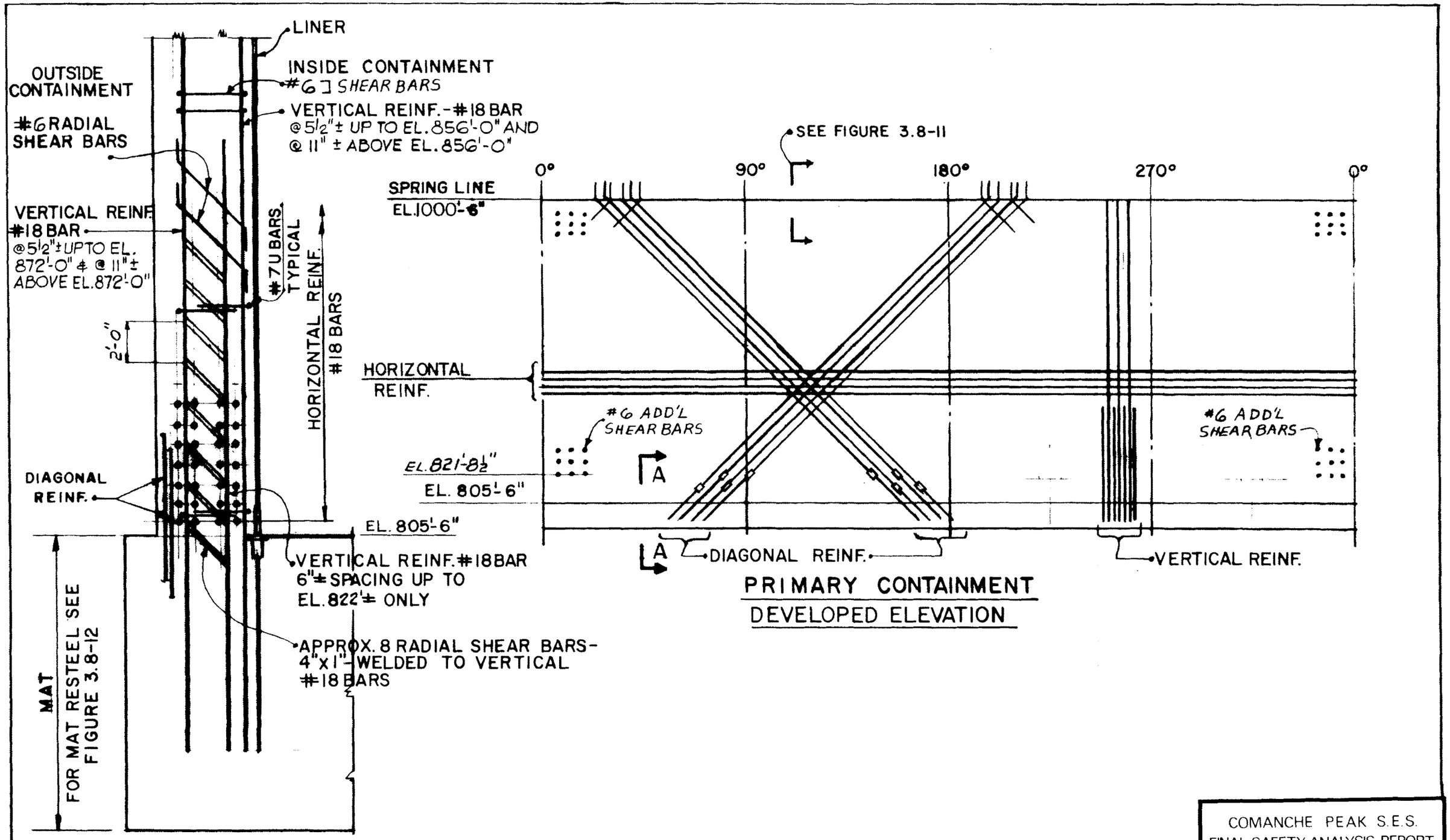
Amendment 68
February 15, 1988

2323-S2-0504
2323-S1-0504

COMANCHE PEAK S.E.S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

CONTAINMENT
ARRANGEMENT OF AIR LOCKS &
EQUIPMENT HATCH

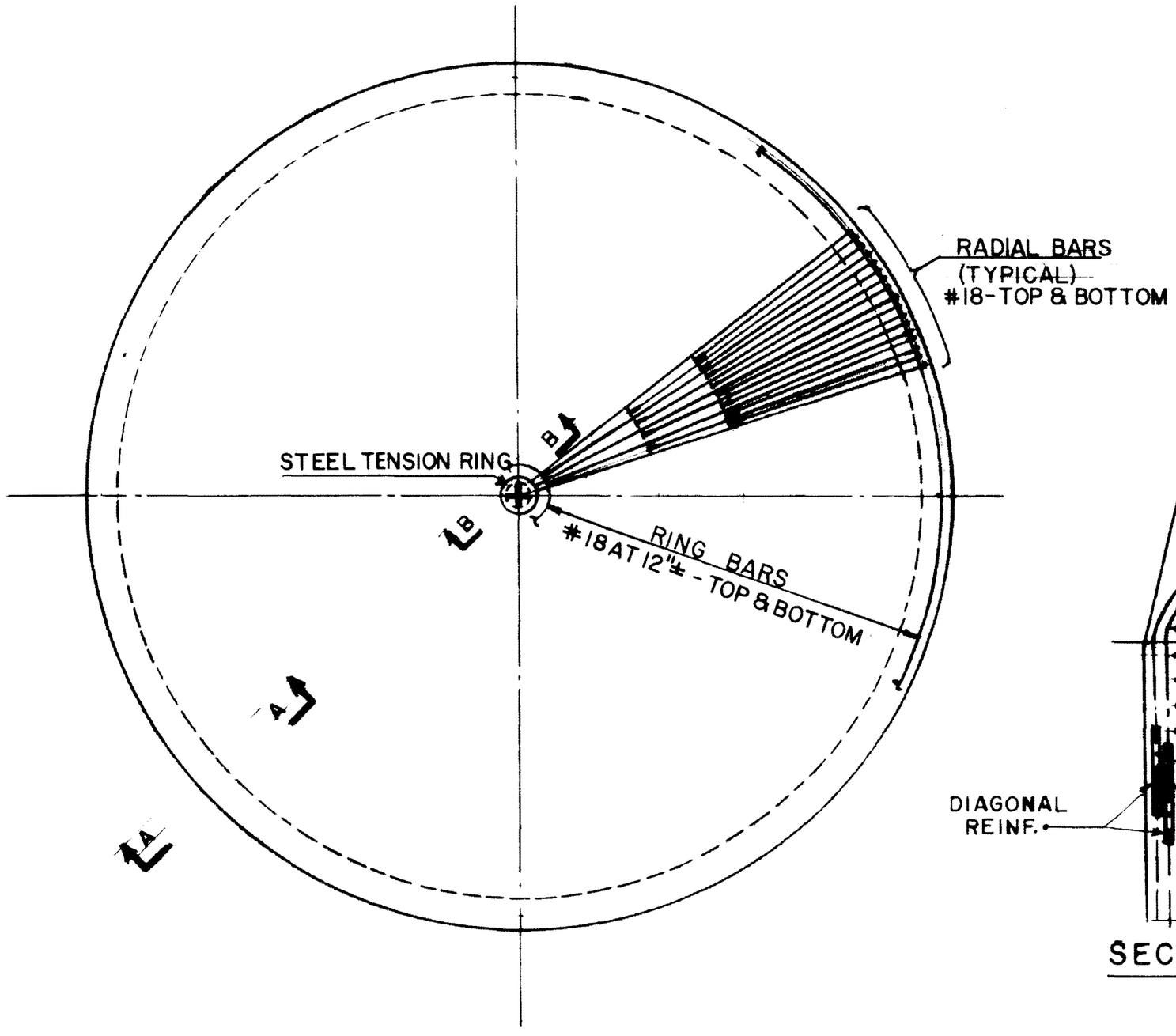
FIGURE 3.8-9



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

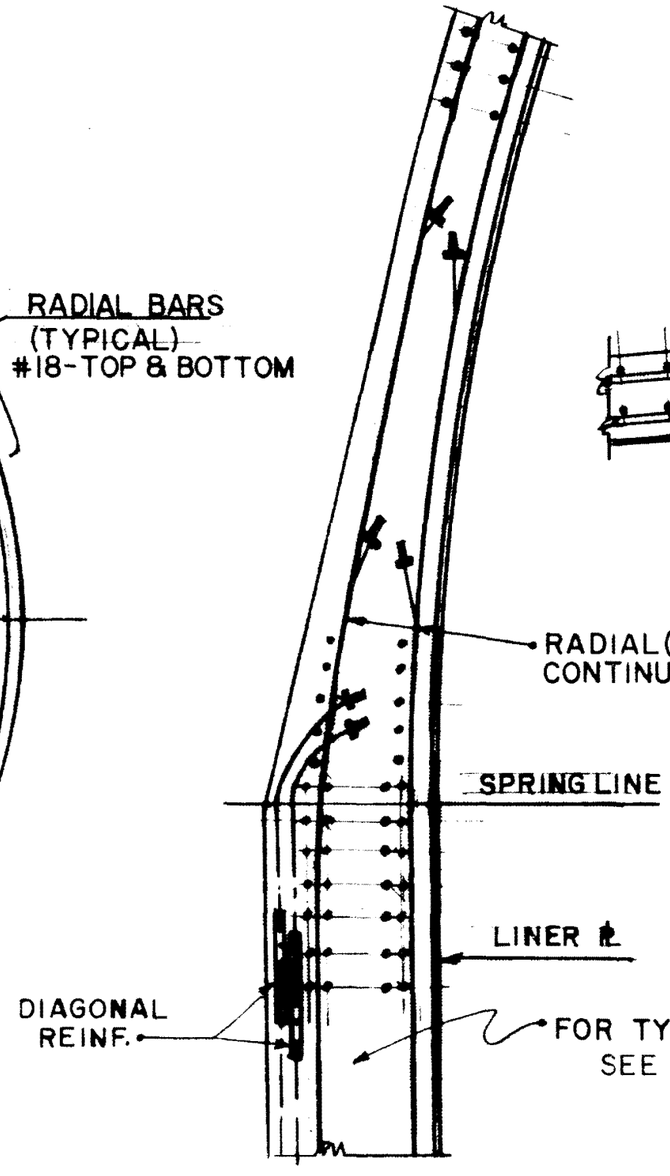
CONTAINMENT
TYPICAL WALL REINFORCEMENT

FIGURE 3.8-10

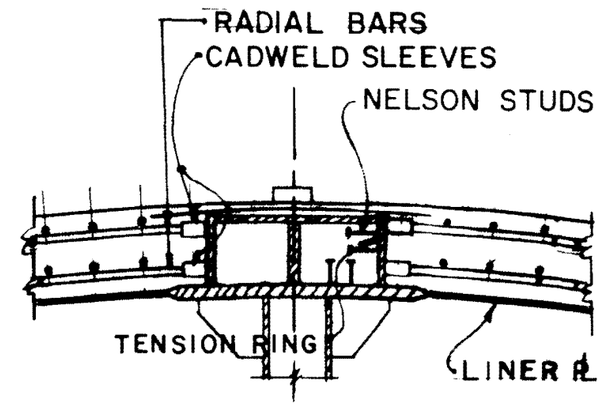


DOME REINFORCEMENT - PLAN

SHOWING MAIN REINFORCEMENT



SECTION A-A

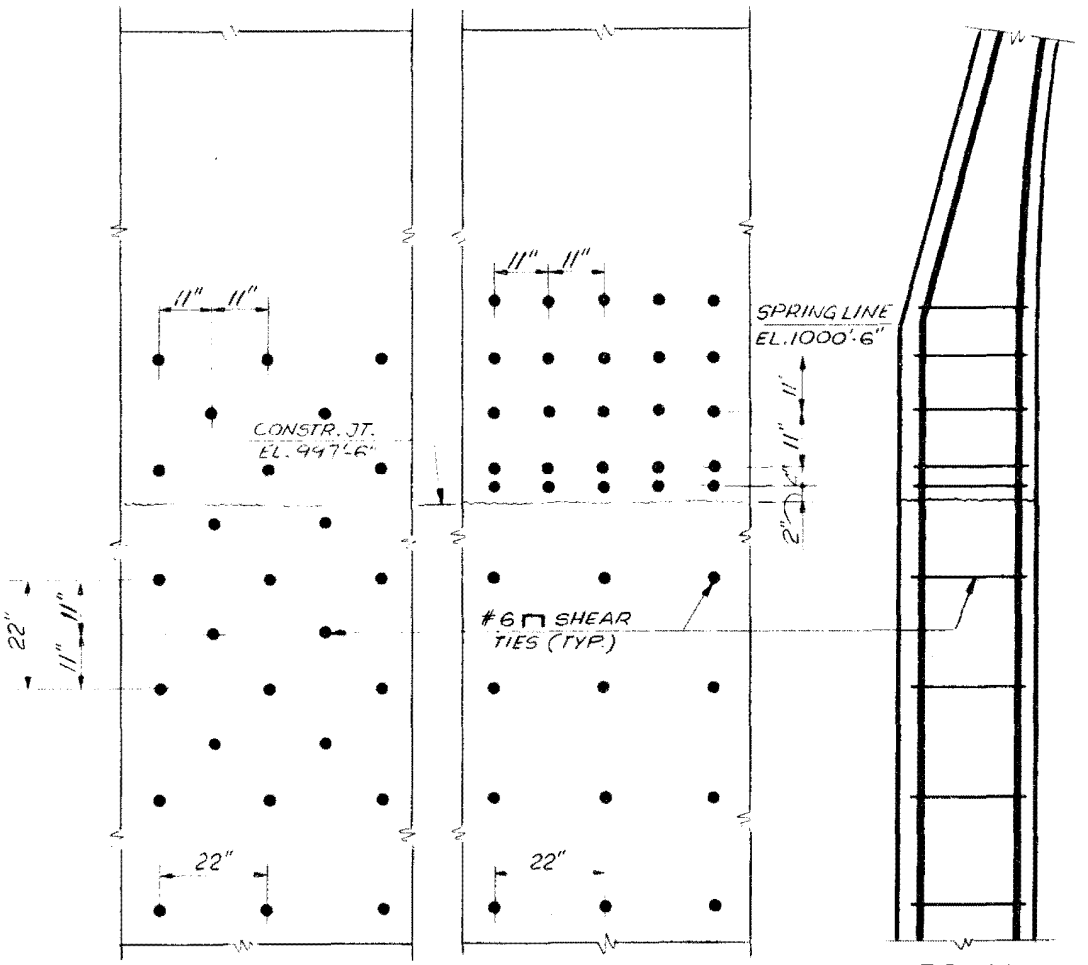


SECTION B-B

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

CONTAINMENT
TYPICAL DOME REINFORCEMENT

FIGURE 3.8-11



CONTAINMENT WALL PART ELEVATION

MARCH 31, 1980

COMANCHE PEAK S.E.S. FINAL SAFETY ANALYSIS REPORT UNITS 1 and 2
TYPICAL WALL SHEAR TIES NEAR SPRING LINE-EL 1000'-6"
FIGURE 3.8-11A

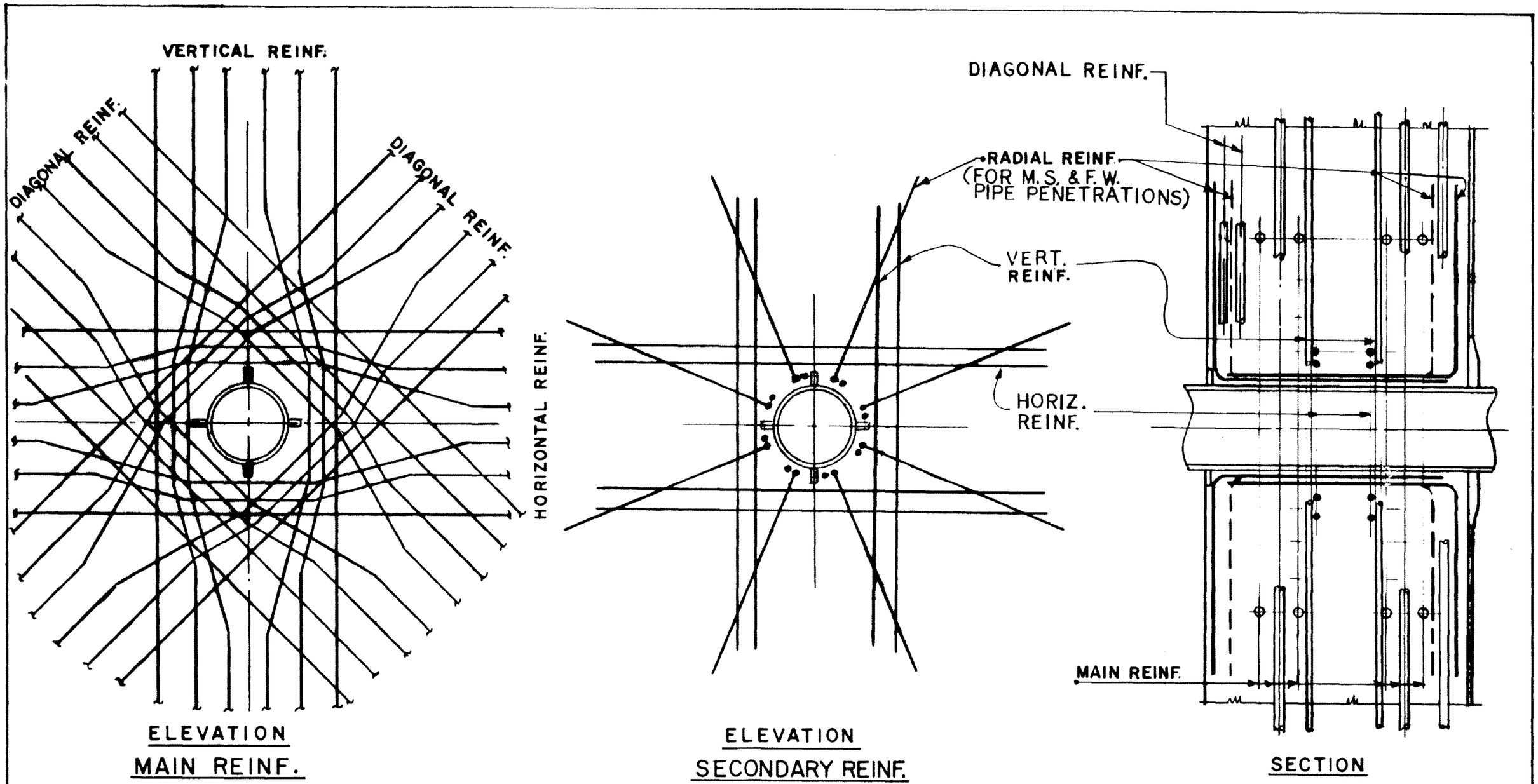
ARRANGEMENT OF
MAT REINFORCEMENT - PLAN

SECTION A-A

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

CONTAINMENT
TYPICAL MAT REINFORCEMENT

FIGURE 3.8-12

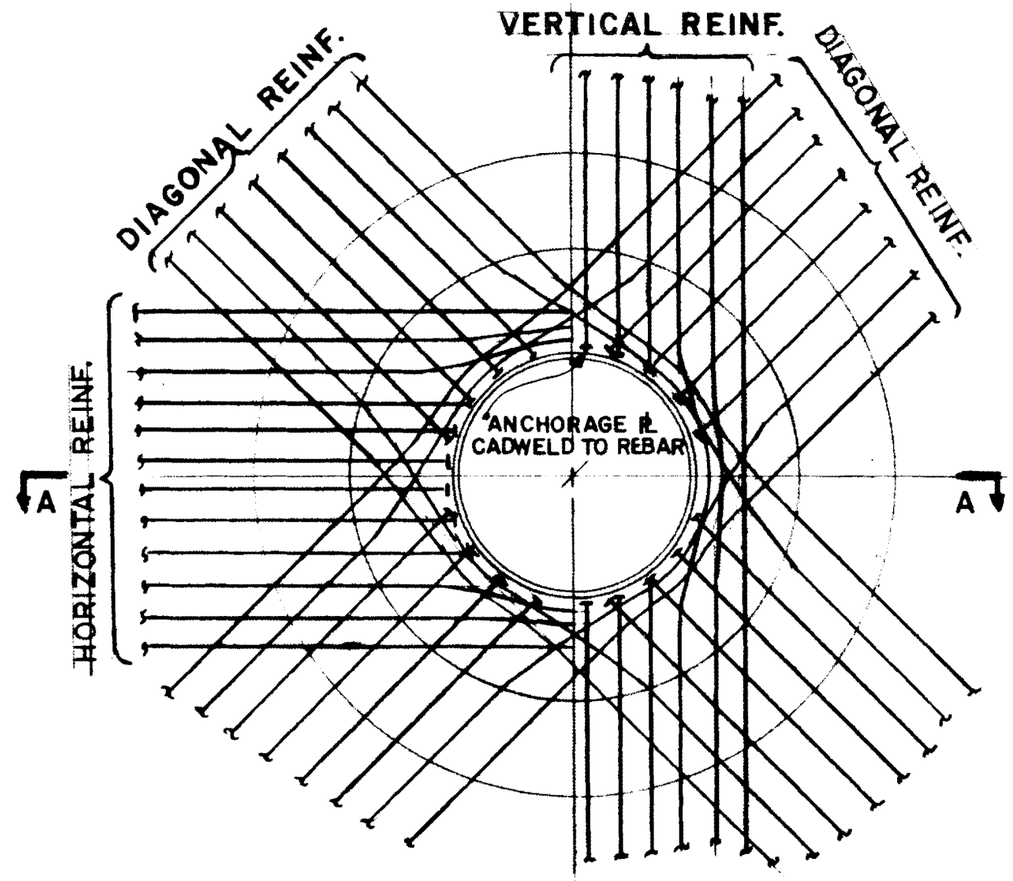


REINFORCEMENT FOR PIPE PENETRATIONS

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

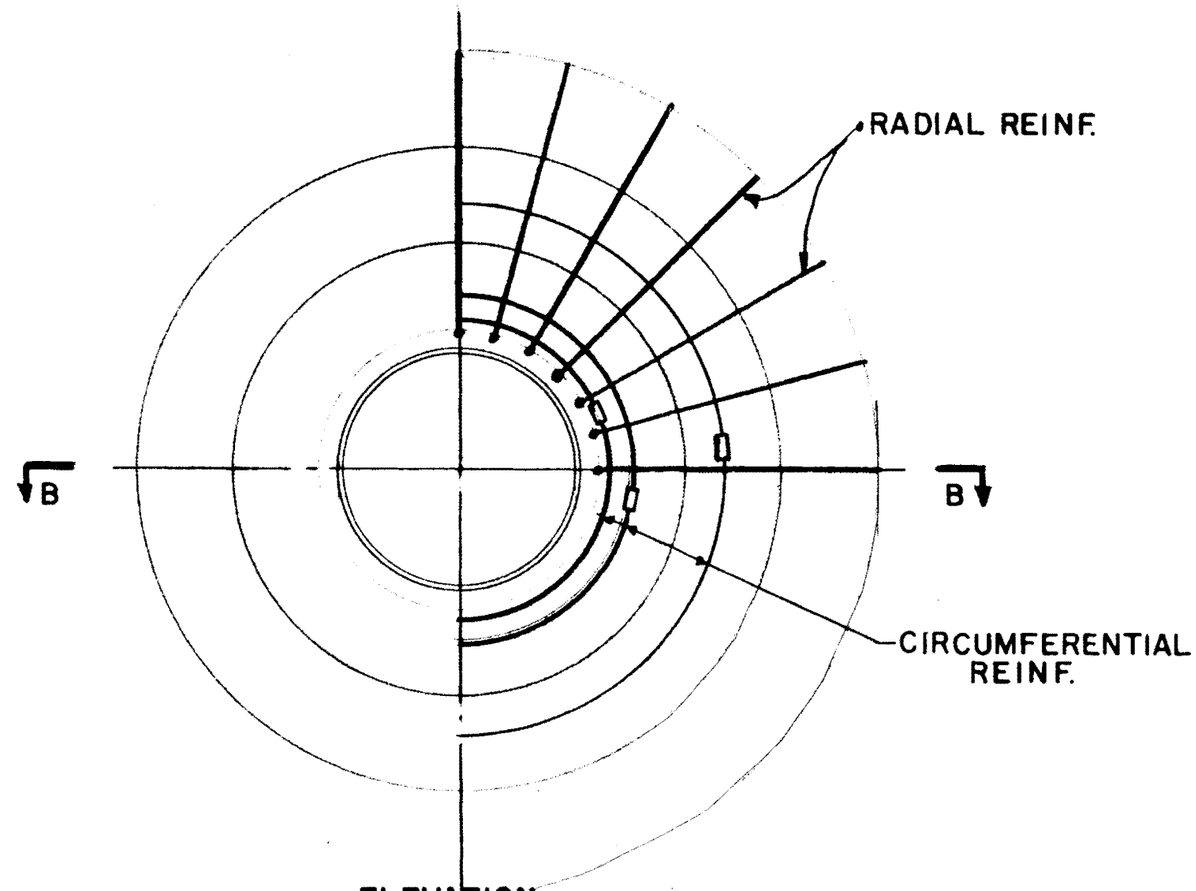
CONTAINMENT
TYPICAL REINFORCEMENT
AT PENETRATIONS

FIGURE 3.8-13



ELEVATION

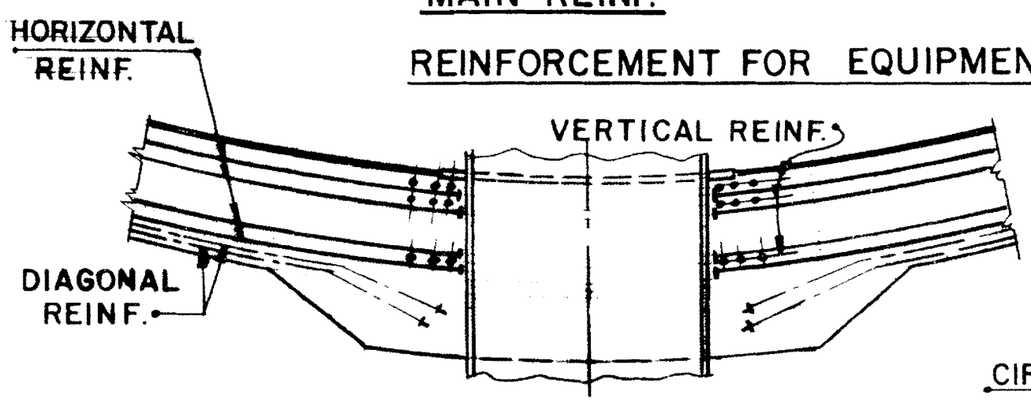
MAIN REINF.



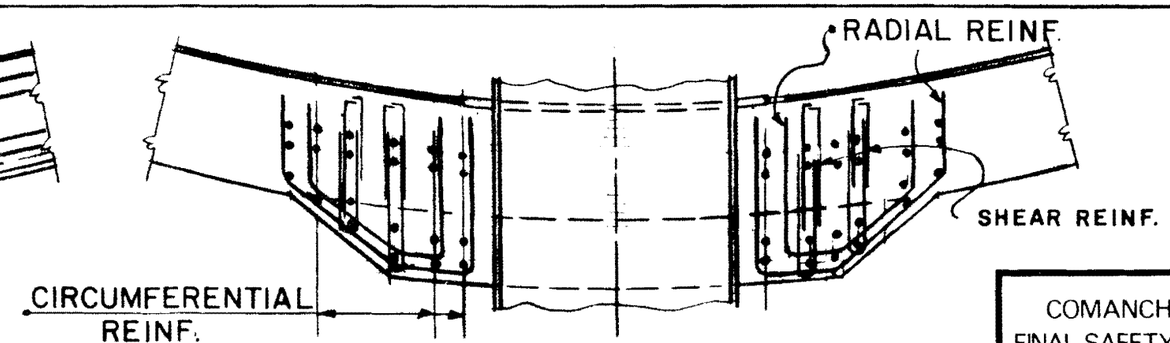
ELEVATION

SECONDARY REINF.

REINFORCEMENT FOR EQUIPMENT HATCH PERSONNEL AIR LOCK & EMERGENCY AIR LOCK



SECTION A-A

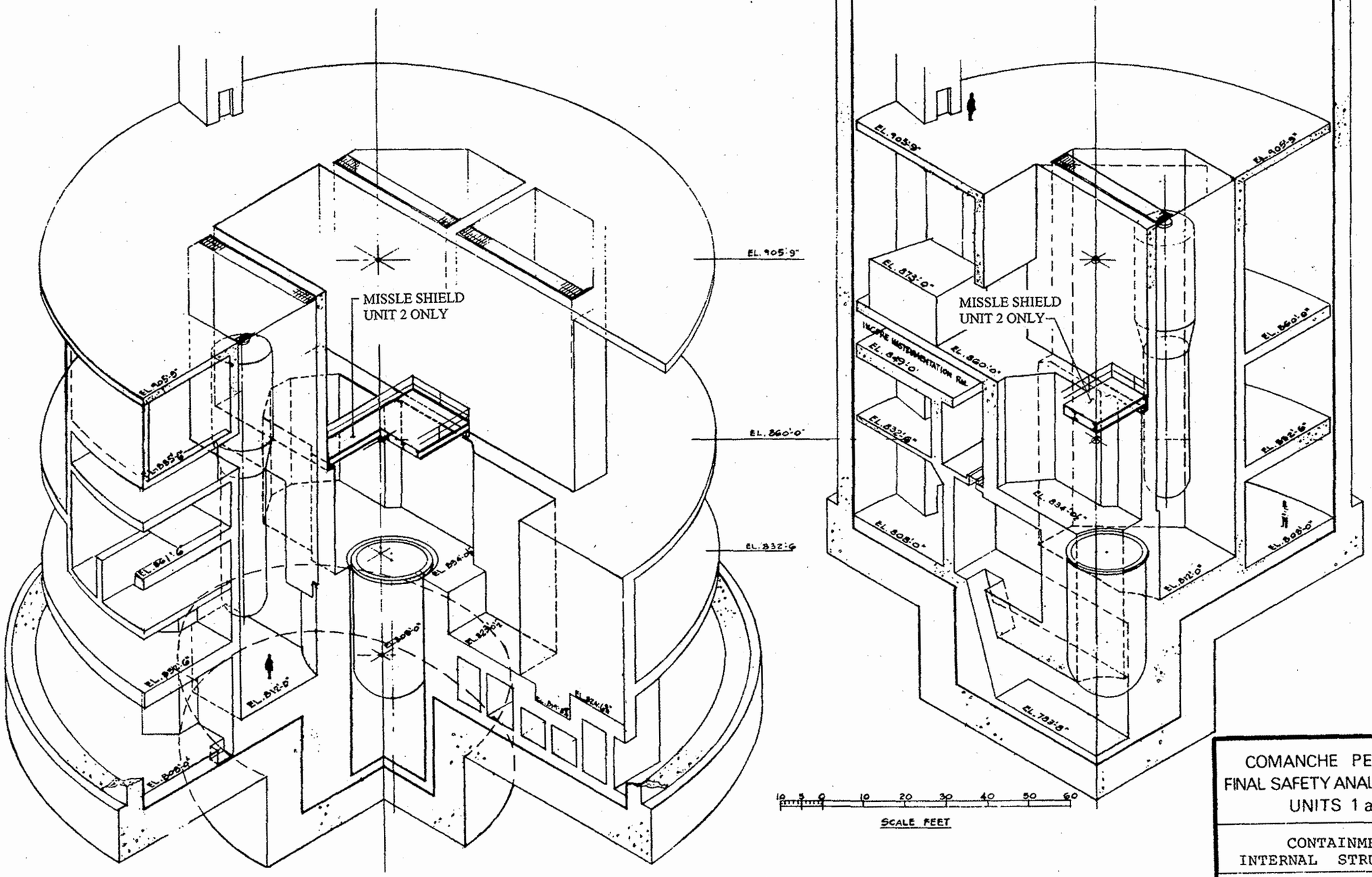


SECTION B-B

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

CONTAINMENT
TYPICAL REINFORCEMENT AT AIRLOCK & EQUIPMENT HATCH

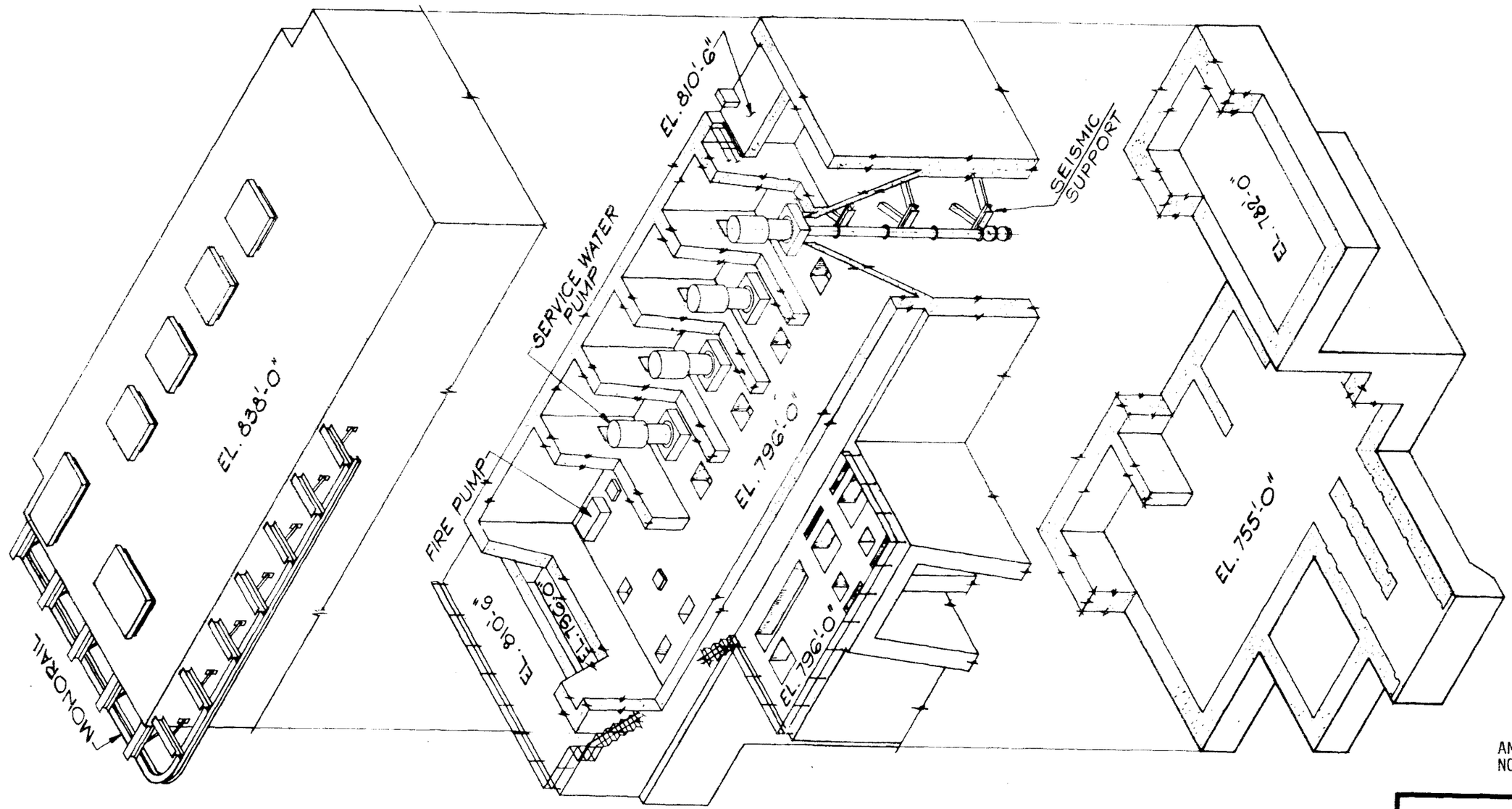
FIGURE 3.8-14



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

CONTAINMENT
INTERNAL STRUCTURE

FIGURE 3.8-15



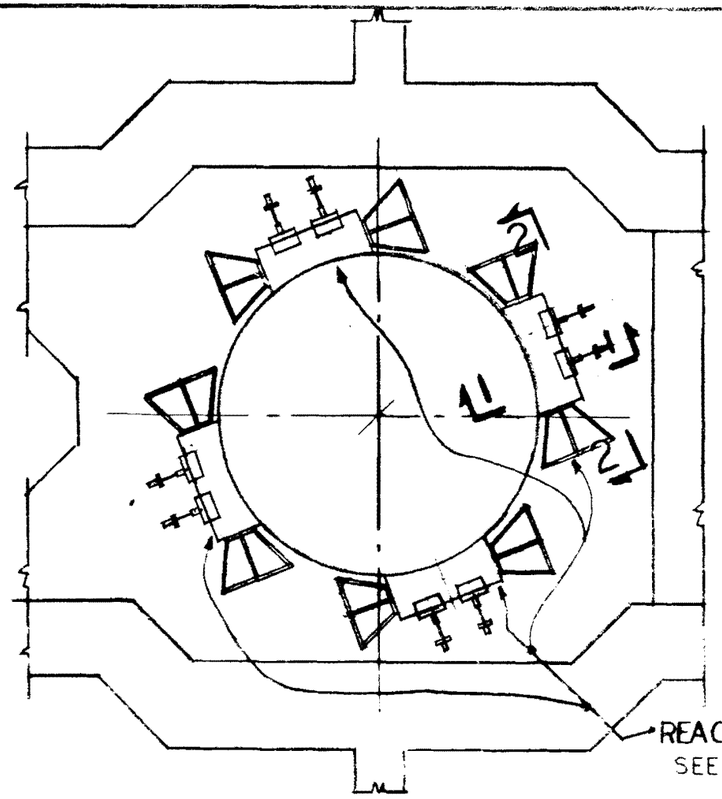
AMENDMENT 8
NOVEMBER 30, 1979

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

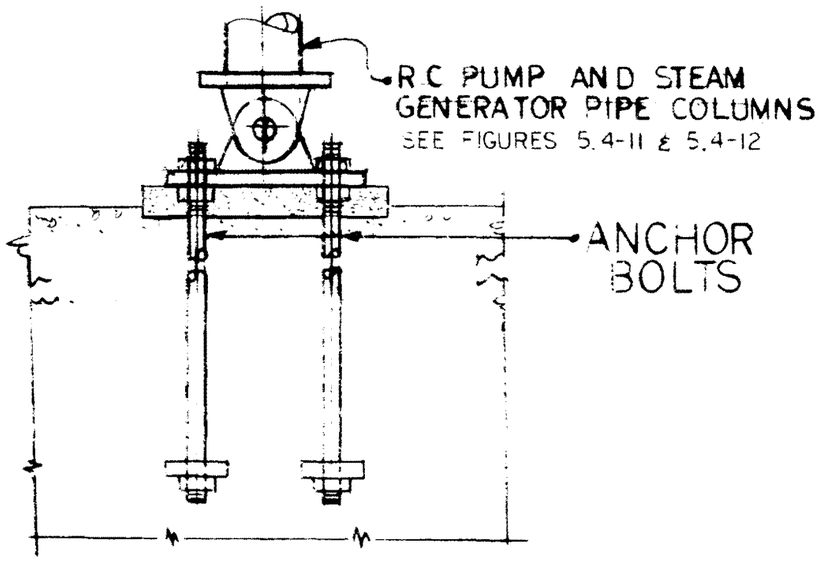
SERVICE WATER INTAKE STRUCTURE

FIGURE 3.8-16

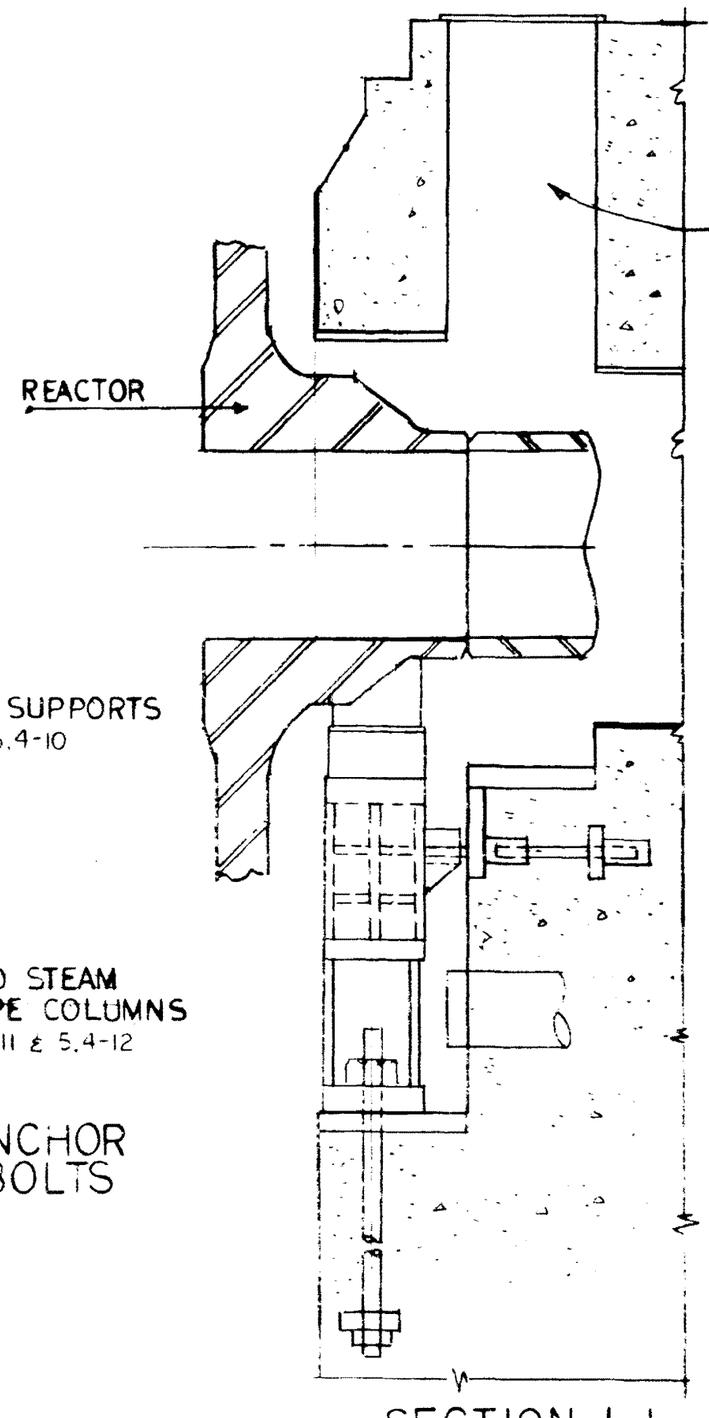
2323-S-1114 REV. 7



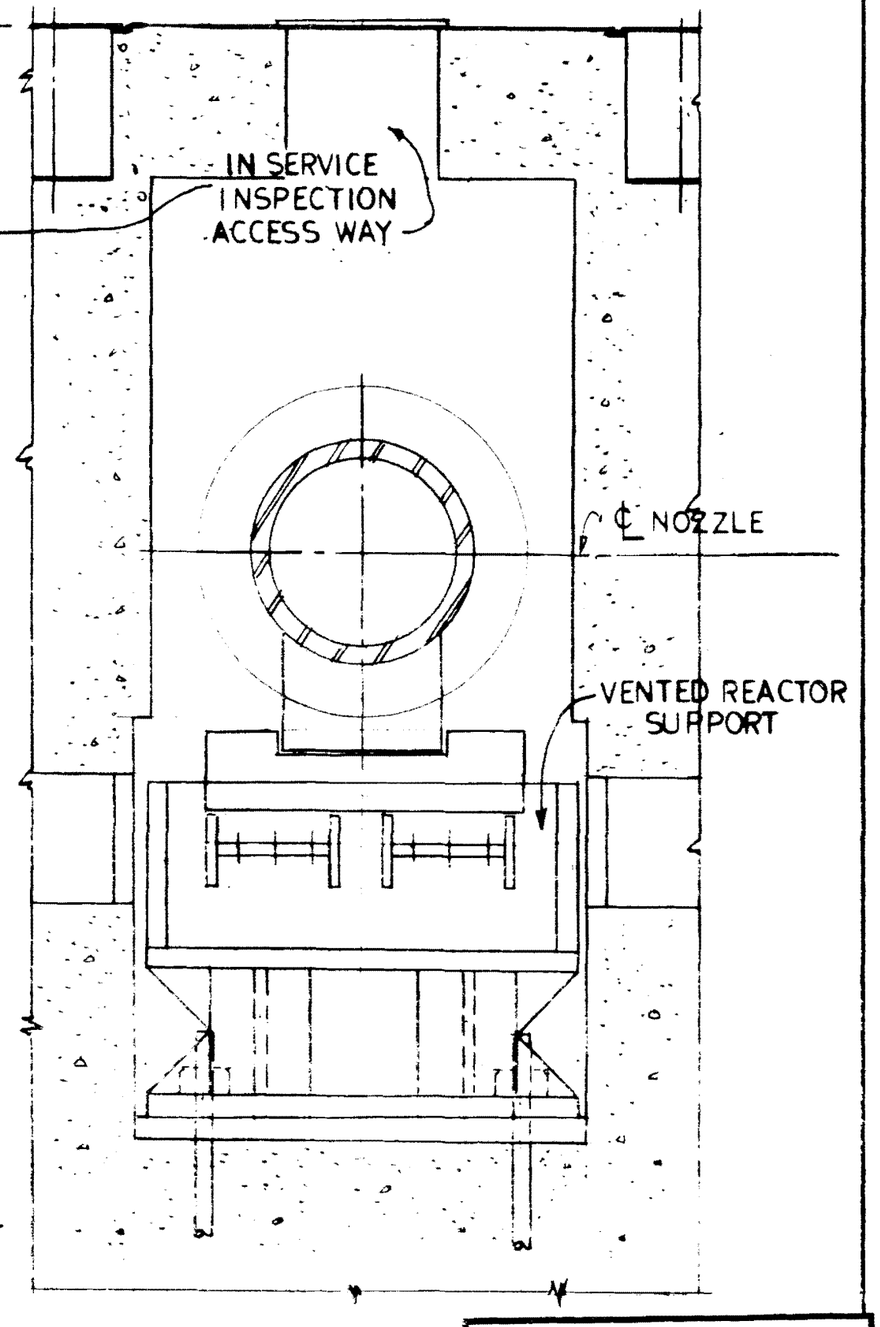
PLAN-REACTOR SUPPORTS



RC PUMP & STEAM GEN. VERTICAL SUPPORTS



SECTION 1-1

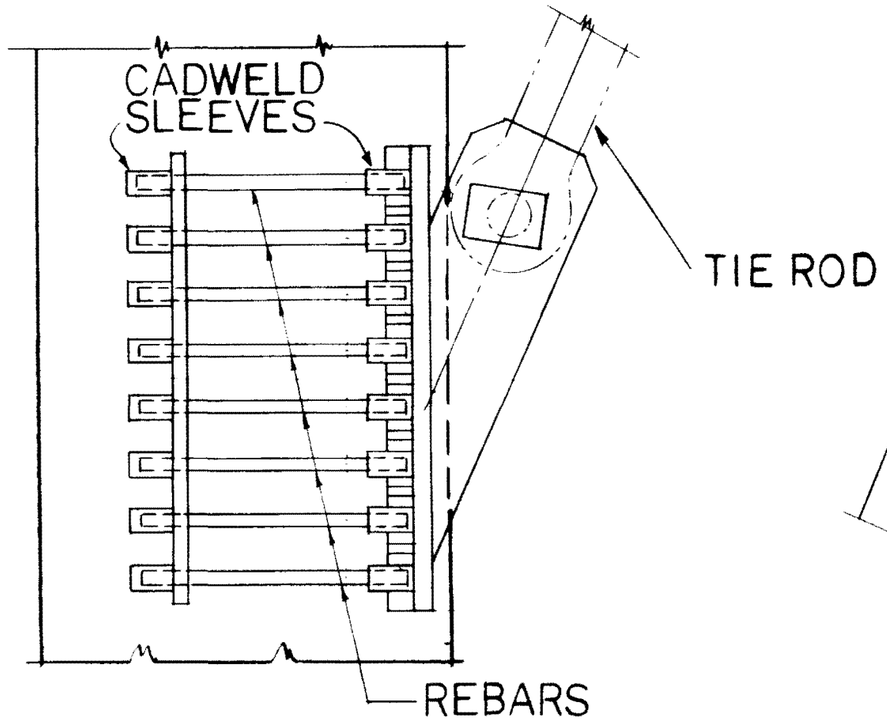


SECTION 2-2

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

REACTOR SUPPORTS
R.C.PUMP & S.G. VERT.SUP'TS

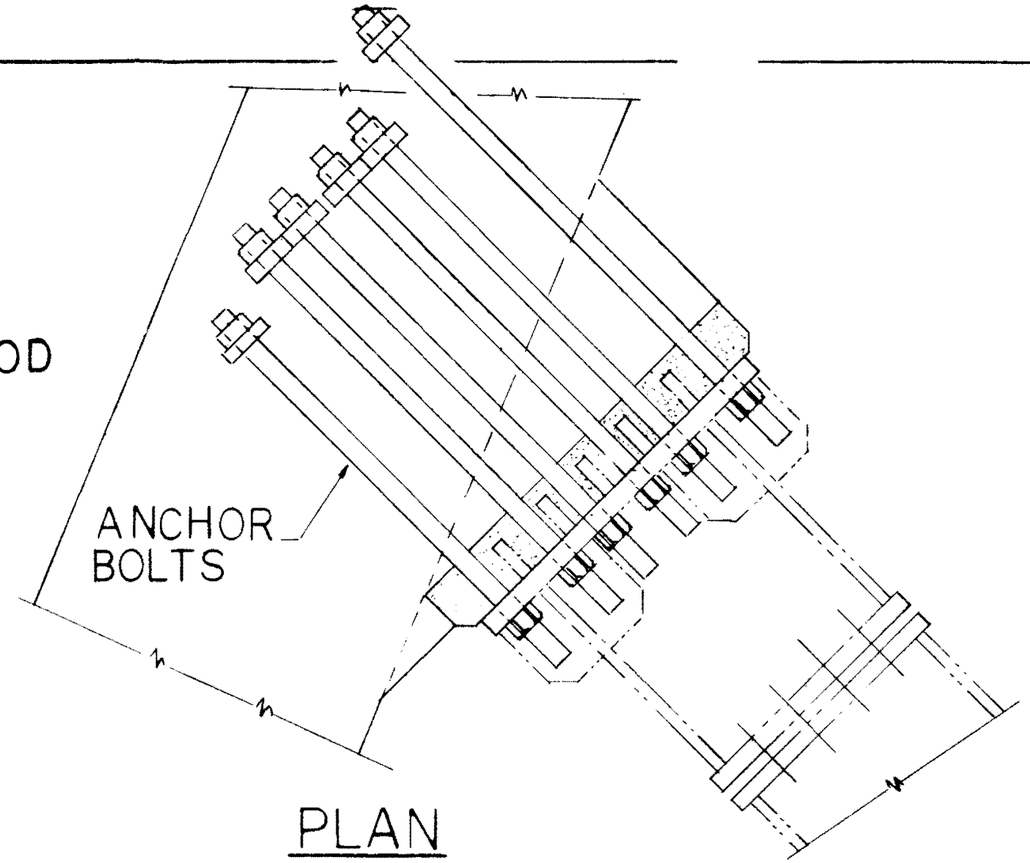
FIGURE 3.8-17



PLAN

TYPICAL R.C. PUMP TIE ROD SUPPORT

(SEE FIG. 5.4-12)



PLAN

STEAM GEN. LOWER LATERAL SUPPORT

(SEE FIG. 5.4-11)

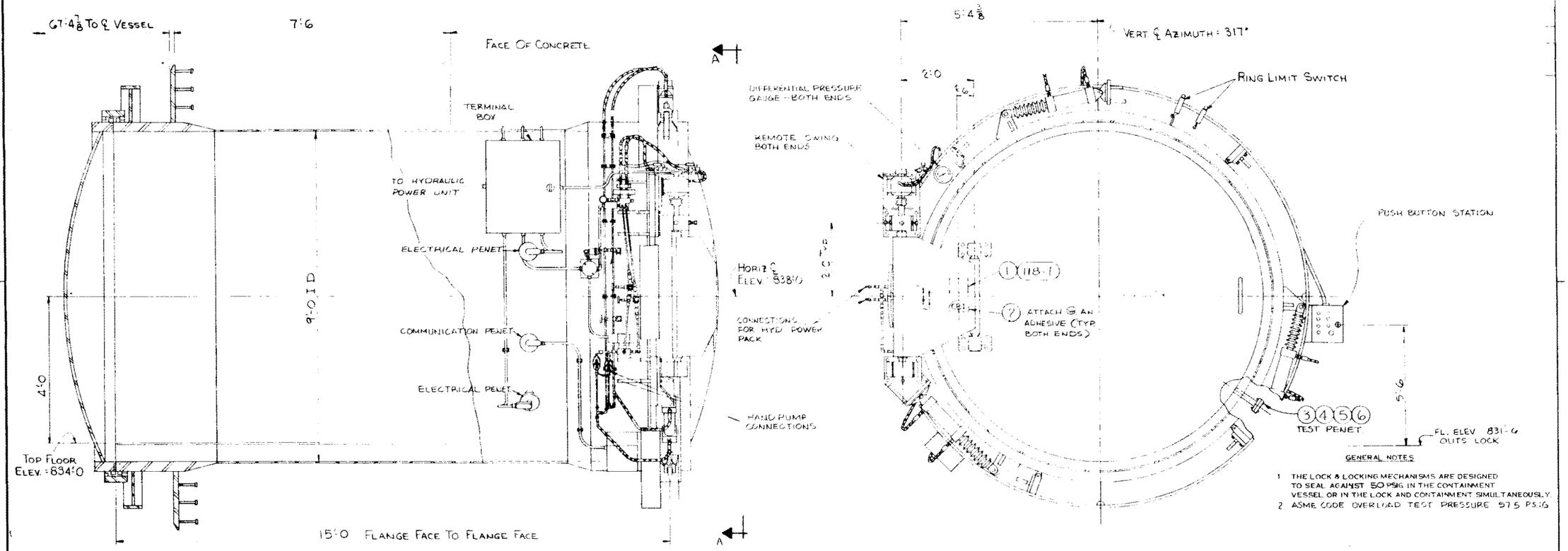
COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

R.C. PUMP TIE ROD SUP'T
S.G. LOWER LATERIAL SUP'T

FIGURE 3.8-18

93| FIGURE 3.8-19a

HAS BEEN DELETED



GENERAL NOTES

1. THE LOCK & LOCKING MECHANISMS ARE DESIGNED TO SEAL AGAINST 50 PSIG IN THE CONTAINMENT VESSEL OR IN THE LOCK AND CONTAINMENT SIMULTANEOUSLY.
2. ASME CODE OVERLOAD TEST PRESSURE 57.5 PSIG

NDE DESIGNATION
VT - VISUAL EXAMINATION
PT - DYE PENETRANT TEST
UT - ULTRASONIC TEST
RT - RADIOGRAPHIC TEST
MT - MAGNETIC PARTICLE TEST

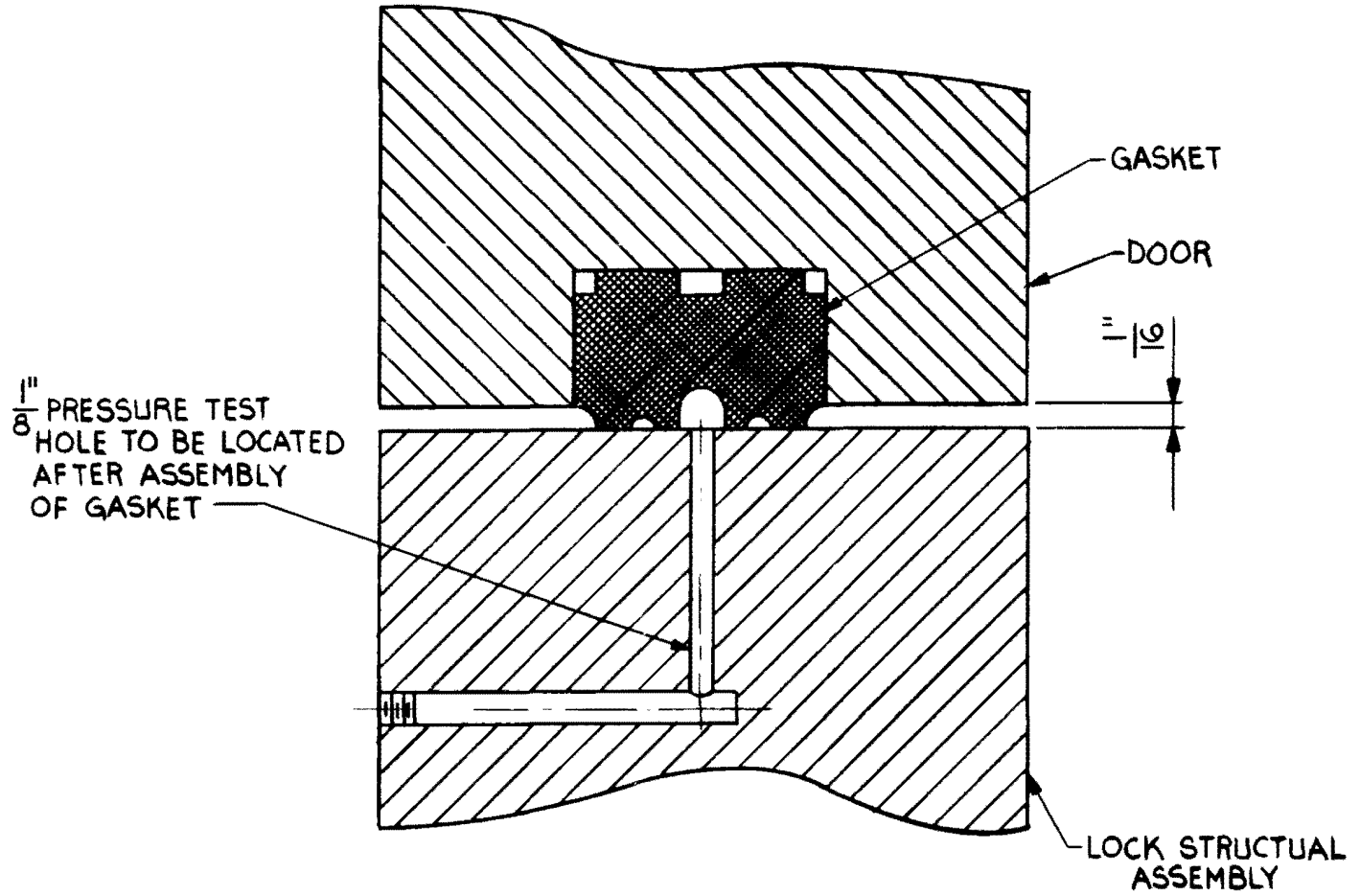
AMENDMENT 5

MARCH 30, 1979

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

GENERAL ARRANGEMENT
PERSONNEL AIR LOCK

FIGURE 3.8-20



NOTE:
GASKET CONFIGURATION
PAT #3,831,950

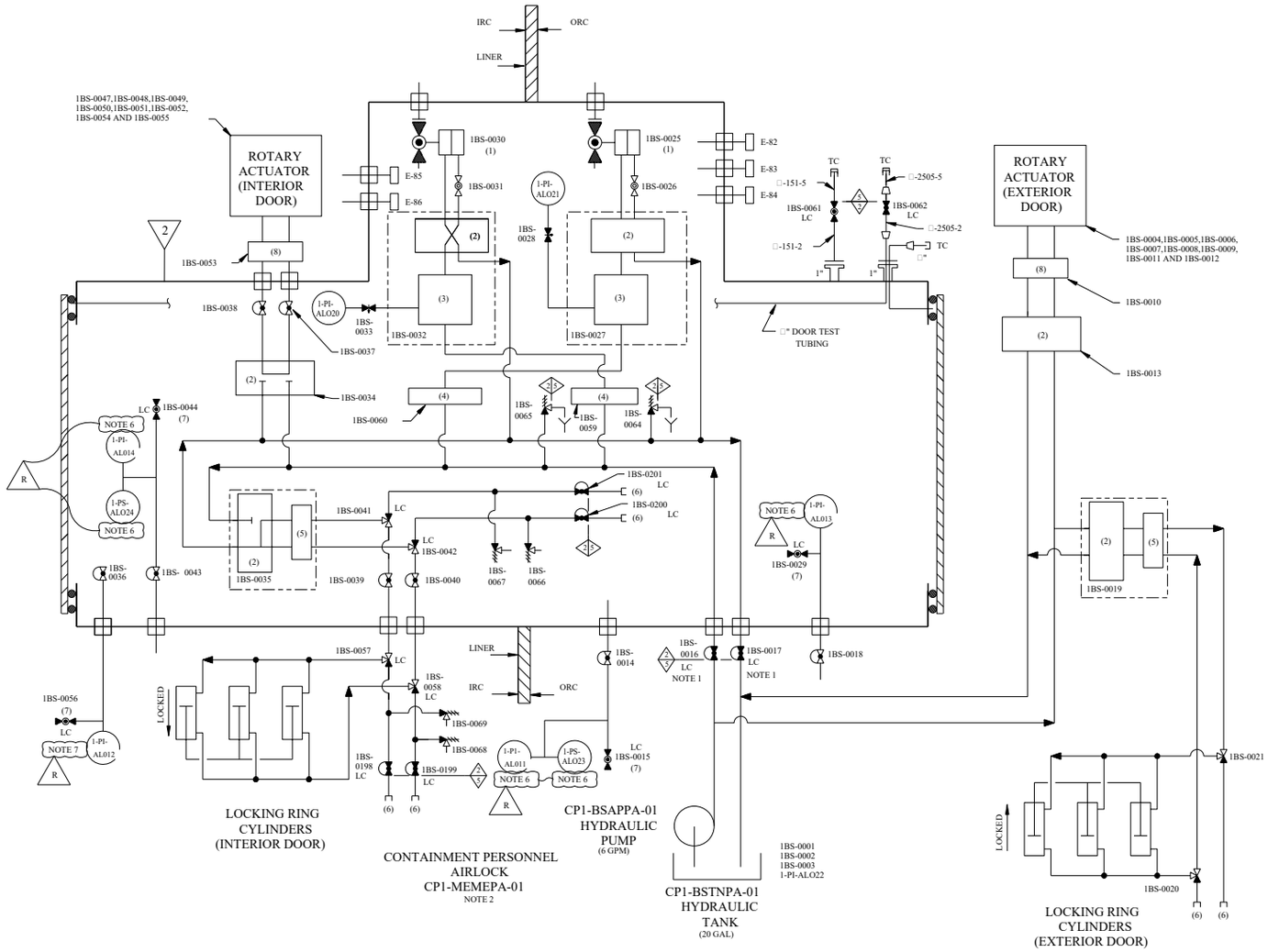
AMENDMENT 5

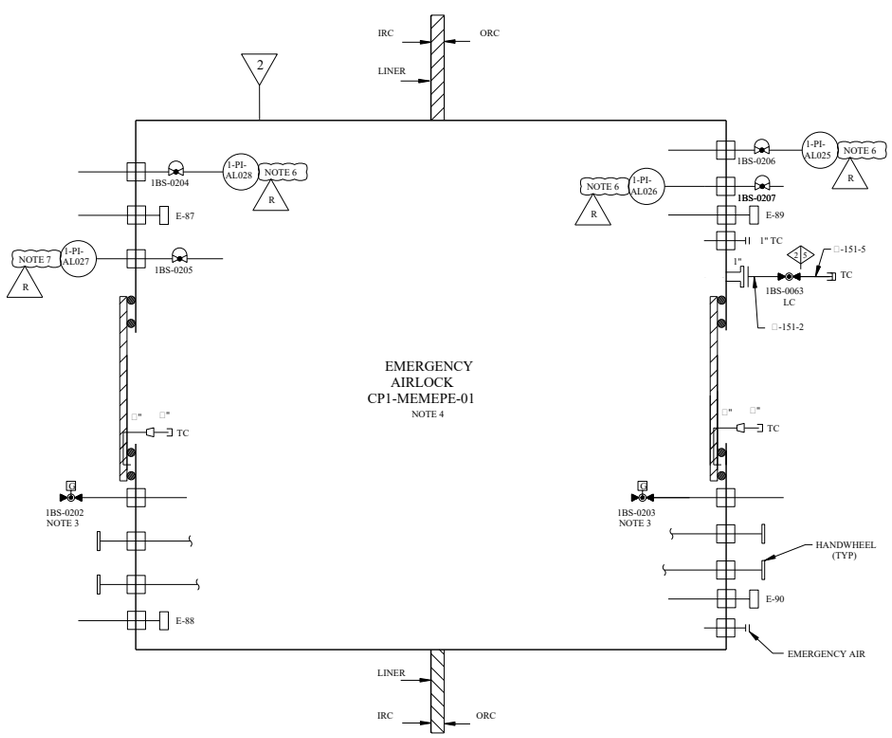
MARCH 30, 1979

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

PERSONNEL AIR LOCK
GASKET TESTING ARRG'T. SEC.

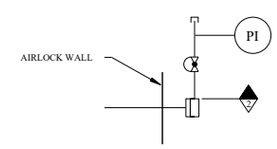
FIGURE 3.8-21





ELECTRIC PENETRATION ASSEMBLIES

EPA	FUNCTION	N2 PURGE VLV	N2 PRESS IND
E-82	POWER	1BS-0022	1-PI-AL017
E-83	COMN	1BS-0023	1-PI-AL018
E-84	POWER	1BS-0024	1-PI-AL019
E-85	COMN	1BS-0045	1-PI-AL015
E-86	POWER	1BS-0046	1-PI-AL016
E-87	POWER	1BS-0208	1-PI-AL029
E-88	COMN	1BS-0209	1-PI-AL030
E-89	POWER	1BS-0210	1-PI-AL031
E-90	COMN	1BS-0211	1-PI-AL032



TYPICAL EPA DETAIL

REV	DWN	CHKD	APVD	REMARKS
CP-12	JBMC 03-10 2014	DJL 03-10 2014		THIS DRAWING REVISED TO INCORPORATE DESIGN CHANGE FDA-2012-000230-02-00 PER SK-0001-12-000230-02-00.

NOTES:

1. VALVES 1BS-0016 AND 1BS-0017 ARE LOCKED CLOSED IN MODES 1-4 EXCEPT DURING INGRESS AND EGRESS AS ALLOWED BY TECH SPECS.
2. THE FOLLOWING VALVES ASSOCIATED WITH PERSONNEL AIRLOCK CP1-MEMEPA-01 ARE ASME VALVES: 1BS-0014,1BS-0016,1BS-0017,1BS-0018,1BS-0025, 1BS-0030,1BS-0036,1BS-0037,1BS-0038,1BS-0039 1BS-0040,1BS-0043,1BS-0198,1BS-0199,1BS-0200 1BS-0201 AND 1BS-0061. THE BALANCE ARE NON-ASME.
3. VALVES 1BS-0202 AND 1BS-0203, ON EMERGENCY AIRLOCK CP1-MEMEPE-01, ARE INTERLOCKED WITH THE DOOR OPERATING MECHANISM, AND SERVE TO EQUALIZE DIFFERENTIAL PRESSURE ACROSS LOCKED DOORS.
4. VALVES 1BS-0063, AND 1BS-0202 THRU 1BS-0207 ON EMERGENCY AIRLOCK CP1-MEMEPE-01, ARE ASME VALVES.
5. FOR GENERAL SYMBOLS AND NOTES SEE DRAWING M1-0200.
6. INSTRUMENTS PURCHASED COMMERCIAL GRADE AND HAVE BEEN DEDICATED TO MEET THE DESIGN CRITERIA TO BE SAFETY-RELATED.
7. NUCLEAR SAFETY-RELATED.

R

REFERENCES:

1. DM 90-343
2. C B & I DRAWING 74-2427-0119 REV 5 PERSONNEL LOCK HYDRAULIC SCHEMATIC
3. C B & I DRAWING 74-2427-0200 REV CP-1 GENERAL ARRANGEMENT 3, 2'-6" DIAMETER ESCAPE LOCK
4. C B & I DRAWING 74-2427-138
5. C B & I DRAWING 74-2427-261

FSAR FIGURE 3.8-22

PERSONNEL AIRLOCK VALVES

KEY	TYPE (FUNCTION)
1	AUTOMATIC EQUALIZING VALVE
2	DIRECTIONAL CONTROL VALVE (DCV)
3	PRESSURE REDUCING VALVE (PRV)
4	CAM OPERATED VALVE (CDV)
5	FLOW CONTROL VALVE (FCV)
6	QUICK DISCONNECT
7	MANUAL EQUALIZING VALVE
8	DUAL RELIEF VALVE

THIS DRAWING CREATED ELECTRONICALLY

CLASS I
(NUCLEAR SAFETY-RELATED)
SAFETY CLASS 1 SAFETY CLASS 2 SAFETY CLASS 3
SEISMIC CATEGORY I CLASS 1E ASSOCIATED CIRCUITS

LUMINANT
CPNPP
GLEN ROSE, TEXAS

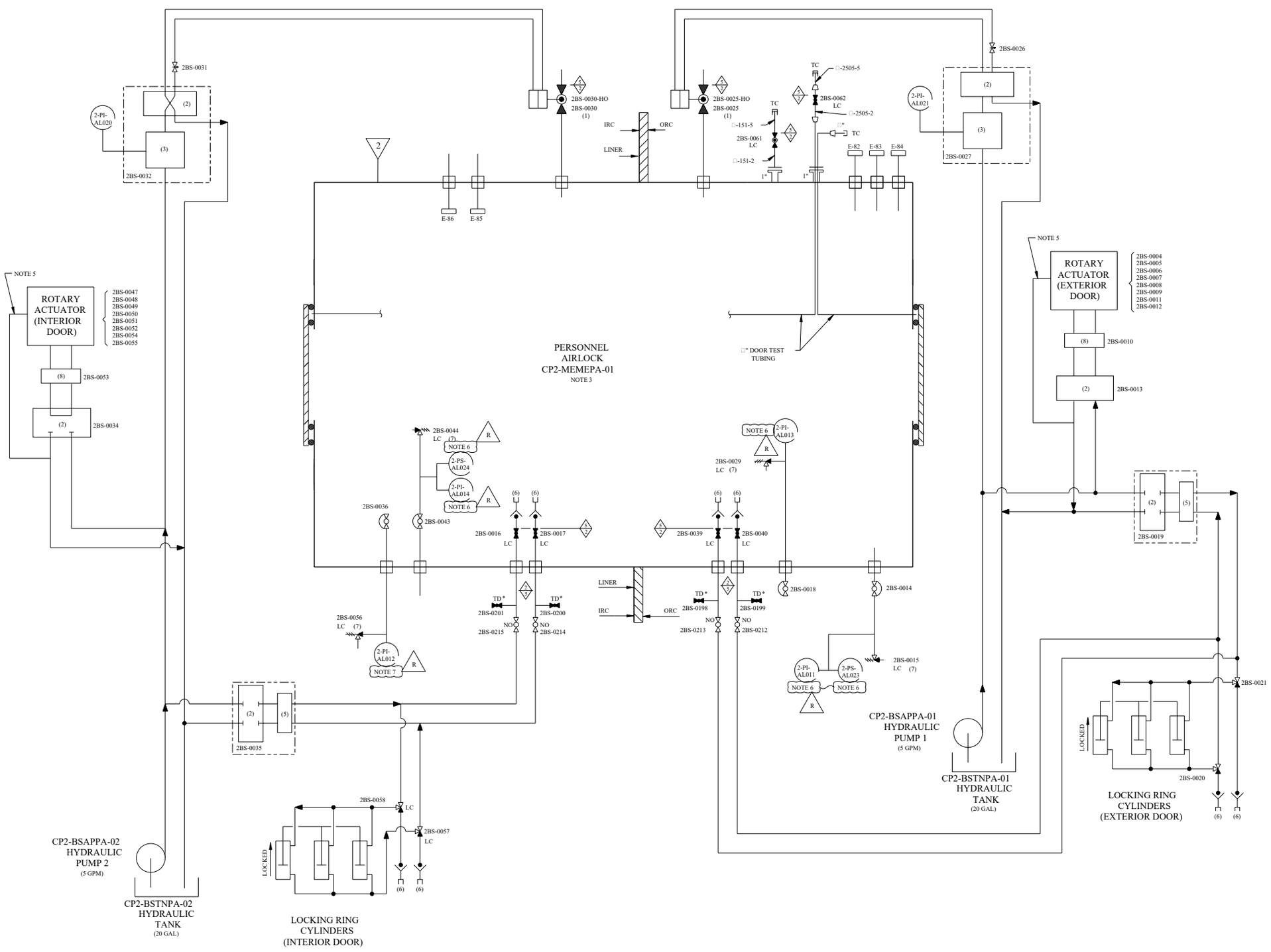
FLOW DIAGRAM
AIRLOCKS

DWG. NO. M1-0245 | SH. NO. - | REV. CP-12

FINAL PRINT

REF CKD 8/21/97 CP-6

mc104270.dgn A M1-0245



REV	DWN	CHKD	APVD	REMARKS
CP-12	HMC 03-10 2014	DJL 03-10 2014		THIS DRAWING REVISED TO INCORPORATE DESIGN CHANGE FDA-2012-00023 0-02-00 PER SK-0002-12-00023 0-02-00.

NOTES

1. VALVES 2BS-0016 , 2BS-0017 , 2BS-0029 , 2BS-0039 , 2BS-0040 , 2BS-0044 , 2BS-0015 , 2BS-0056 , 2BS-0057 AND 2BS-0058 ARE LOCKED CLOSED IN MODES 1-4 EXCEPT DURING INGRESS AND EGRESS AS ALLOWED BY TECH SPECS.
2. SHOWN WITH BOTH DOORS CLOSED AND LOCKED. BOTH LOCK PRESSURE EQUALIZING VALVES CLOSED AND WITHOUT ELECTRICAL POWER TO HYDRAULIC SYSTEM.
3. **VALVES** 2BS-0014/15/16/17/18 , 2BS-0025 , 2BS-0029/30 , 2BS-0036 , 2BS-0039/40 , 2BS-0043/44 , 2BS-0056 AND 2BS-0061 ARE ASME VALVES. THE BALANCE ARE NON-ASME.
4. * TD VALVES 2BS-0198/0199/0200/0201 SHALL BE POSITIONED HORIZONTALLY.
5. TUBING IS PROVIDED AS A DRAIN TO THE HYDRAULIC TANK.
6. INSTRUMENTS PURCHASED COMMERCIAL GRADE AND HAVE BEEN DEDICATED TO MEET THE DESIGN CRITERIA TO BE SAFETY-RELATED.
7. NUCLEAR SAFETY-RELATED. R

REFERENCE DRAWINGS

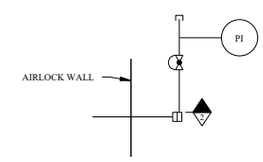
1. CB&I DRAWING 74-2428-0119 REV 3 PERSONNEL LOCK HYDRAULIC SCHEMATIC.
2. DCA 94072 REV 7.

AIRLOCK VALVES

KEY	TYPE (FUNCTION)
1	AUTOMATIC EQUALIZING VALVE
2	DIRECTIONAL CONTROL VALVE (DCV)
3	PRESSURE REDUCING VALVE (PRV)
5	FLOW CONTROL VALVE (FCV)
6	QUICK DISCONNECT
7	MANUAL EQUALIZING VALVE
8	DUAL RELIEF VALVE

ELECTRIC PENETRATION ASSEMBLIES

EPA	FUNCTION	N2 PURGE VLV	N2 PRESS IND
E-82	POWER	2-BS-0022	2-PI-AL017
E-83	COMN	2-BS-0023	2-PI-AL018
E-84	POWER	2-BS-0024	2-PI-AL019
E-85	COMN	2-BS-0045	2-PI-AL015
E-86	POWER	2-BS-0046	2-PI-AL016



TYPICAL EPA DETAIL

FSAR FIGURE 3.8-22

THIS DRAWING CREATED ELECTRONICALLY

DRAWING M2-0245 REV CP-1
HAS BEEN SPLIT INTO THE FOLLOWING SHEETS:
M2-0245
M2-0245-A

CLASS I
(NUCLEAR SAFETY-RELATED)
SAFETY CLASS 1 / SAFETY CLASS 2 / SAFETY CLASS 3 — SEISMIC CATEGORY I / CLASS 1E / ASSOCIATED CIRCUITS

LUMINANT
CPNPP
GLEN ROSE, TEXAS

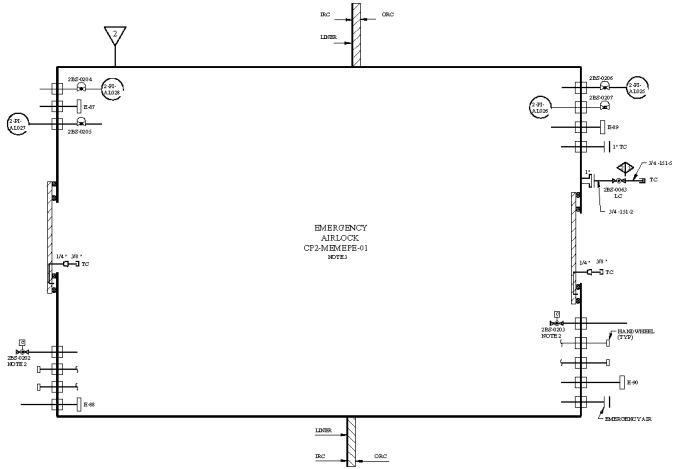
FLOW DIAGRAM
PERSONNEL AIR LOCK

DWG. NO. M2-0245 | SH. NO. - | REV. CP-12

FINAL PRINT

REF CKD 8/21/97 CP-7

me104280.dgn A M2-0245



REV	DWN	CHK	DATE	REMARKS
ISO	JK	JK	JK	THE DRAWING REVISED TO INCORPORATE SHEM CHANGE FDA-2005-00006-45-00 FDS-15-00-02-000-04-45-01

NOTES

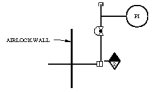
1. SHOWN WITH BOTH DOORS CLOSED AND LOCKED. BOTH LOCKS PRESSURE EQUALIZED VALVES CLOSED.
2. VALVES 2RS-0203 AND 2RS-0202 ARE INTERLOCKED WITH THE DOOR OPERATING MECHANISM AND SERVE TO EQUALIZE DIFFERENTIAL PRESSURE ACROSS LOCKED DOORS.
3. VALVES 2RS-0063, 2RS-0203/0202/0204/0206/0207 ARE ASME VALVES, THE BALANCE ARE NON-ASME.

REFERENCED DRAWINGS

1. CBAID DRAWING 74-2428-0200 REV CP-1 GENERAL ARRANGEMENT ESCAPE LOCK.

ELECTRIC PENETRATION ASSEMBLIES

EPA	FUNCTION	NO PURGE VLV	NO PRESS IND
E-87	POWER	2-RS-0208	2-95-ALU09
E-88	COMM	2-RS-0209	2-95-ALU10
E-89	POWER	2-RS-0210	2-95-ALU11
E-90	COMM	2-RS-0211	2-95-ALU12



TYPICAL EPA DETAIL

FSAR FIGURE 3.8-23

THIS DRAWING CREATED ELECTRONICALLY

DRAWING M2-0245 REV CP-1
HAS BEEN SPLIT INTO THE FOLLOWING SHEETS:
M2-0245
M2-0245-A

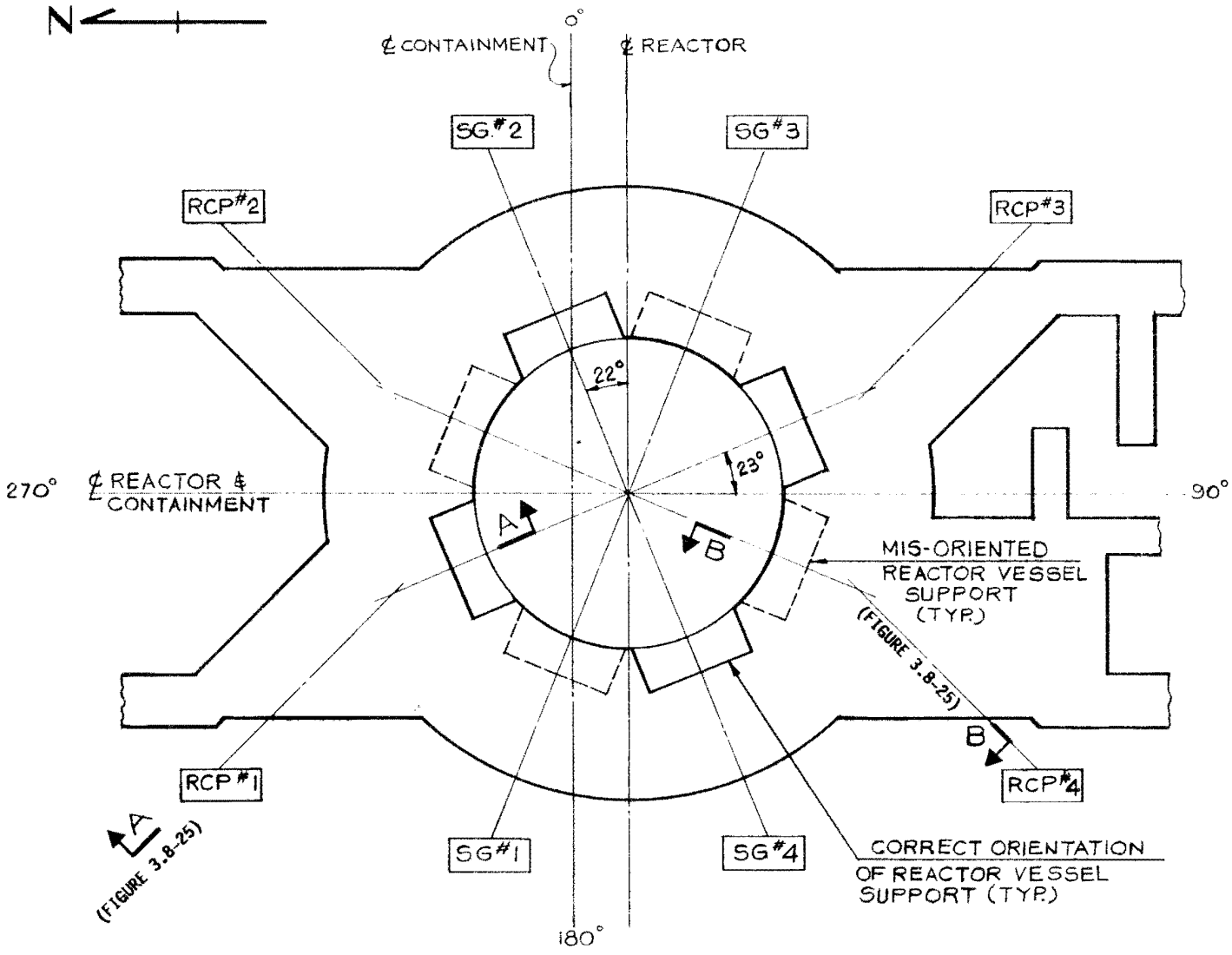
CLASS I
(SYSTEMS IN THIS RELATED)
IN THIS CLASS: SEISMIC CATEGORY I
IN THIS CLASS: QUALITY GROUP B
IN THIS CLASS: ASSOCIATED GROUPS

TXU ENERGY
CPSES
GLEN ROSE, TEXAS

FLOW DIAGRAM
EMERGENCY AIRLOCK

DWG NO. M2-0245 | SH. NO. A | REV CP-5

Form 400000 Rgh A M2-0245-A



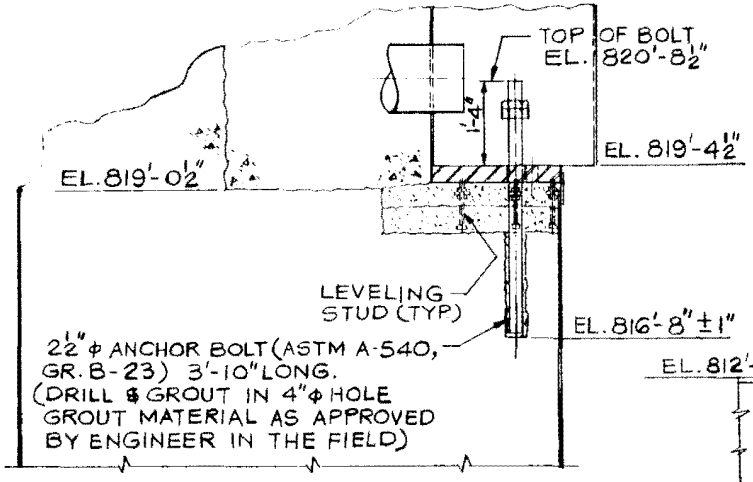
PLAN
REACTOR VESSEL SUPPORTS
TUSI - UNIT #2

Amendment 91
April 15, 1994

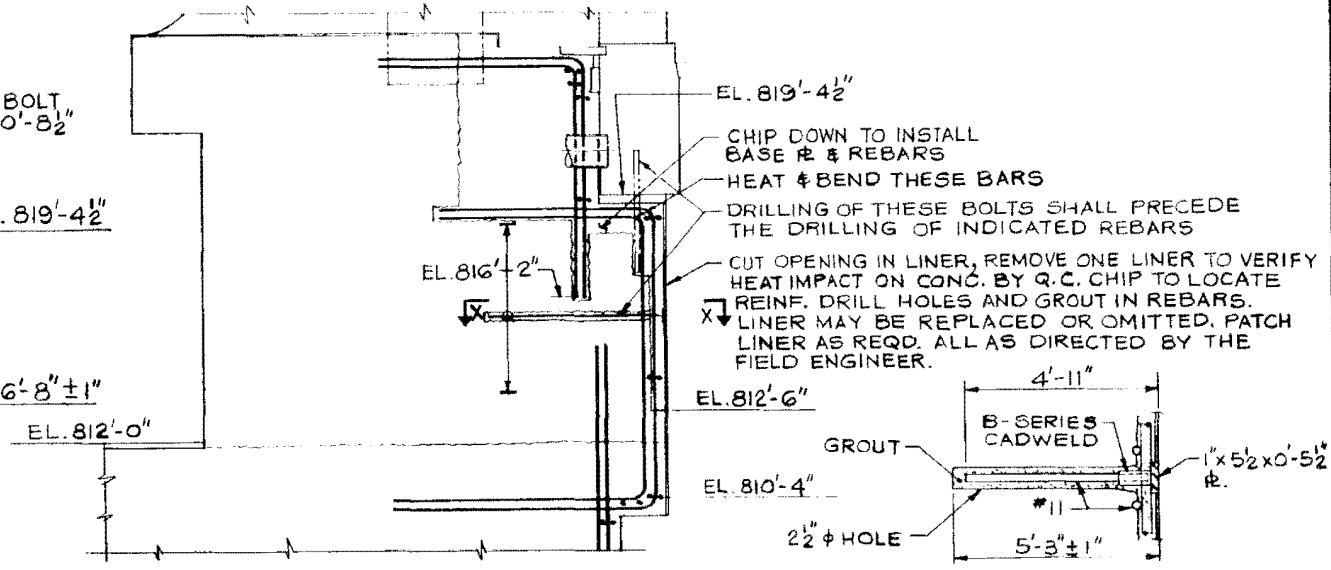
COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

LOCATION OF
MIS-ORIENTED SUPPORTS

FIGURE 3.8-24

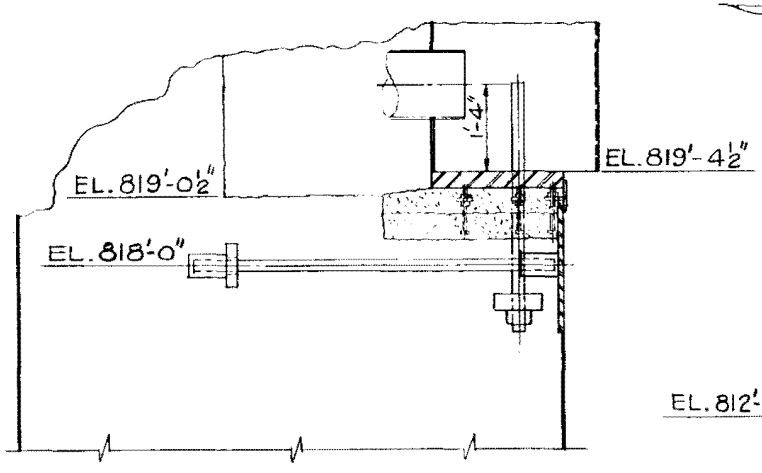


SECT. A-A (FIGURE 3.8-24)
(MASONRY)

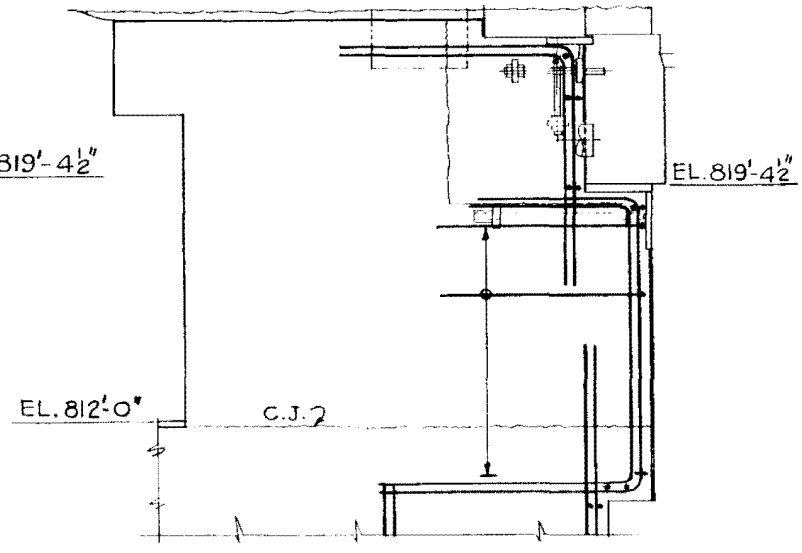


SECT. A-A (FIGURE 3.8-24)
(REINF.)

PLAN
SECT. X-X



SECT. B-B (FIGURE 3.8-24)
(MASONRY)



SECT. B-B (FIGURE 3.8-24)
(REINF.)

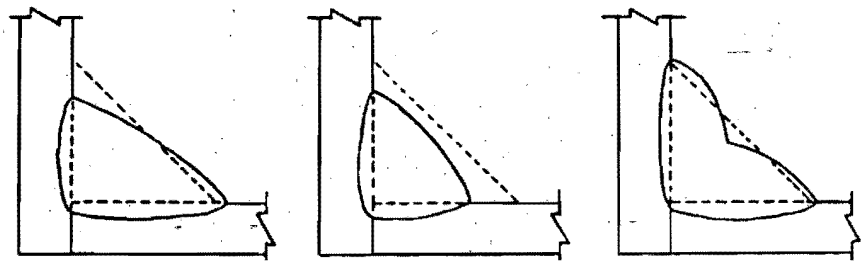
Amendment 91
April 15, 1994

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

UNIT 2 REINFORCED CONCRETE RPV SUPPORTS

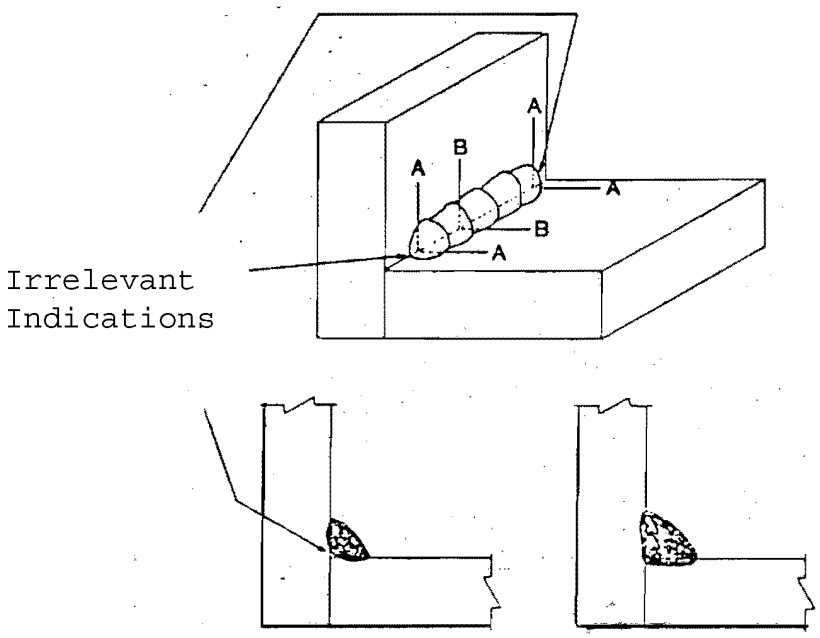
FIGURE 3.8-25

5/76



Leg Leg & Throat Throat

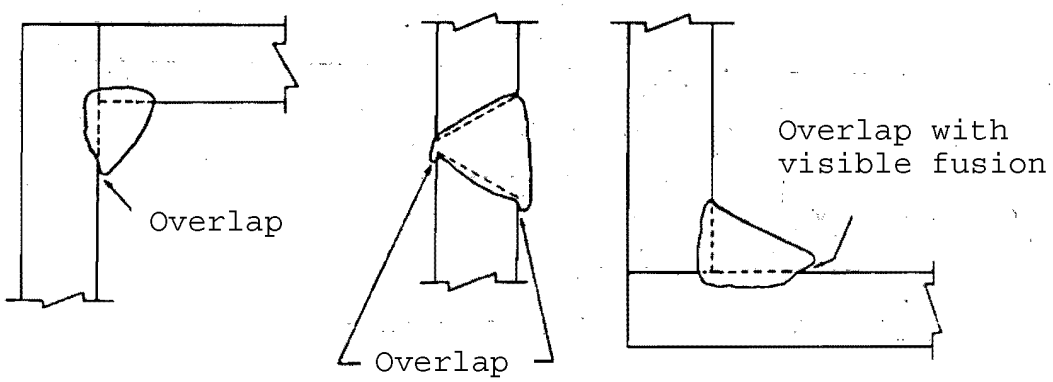
Appendix 3.8A - Figure 3-1



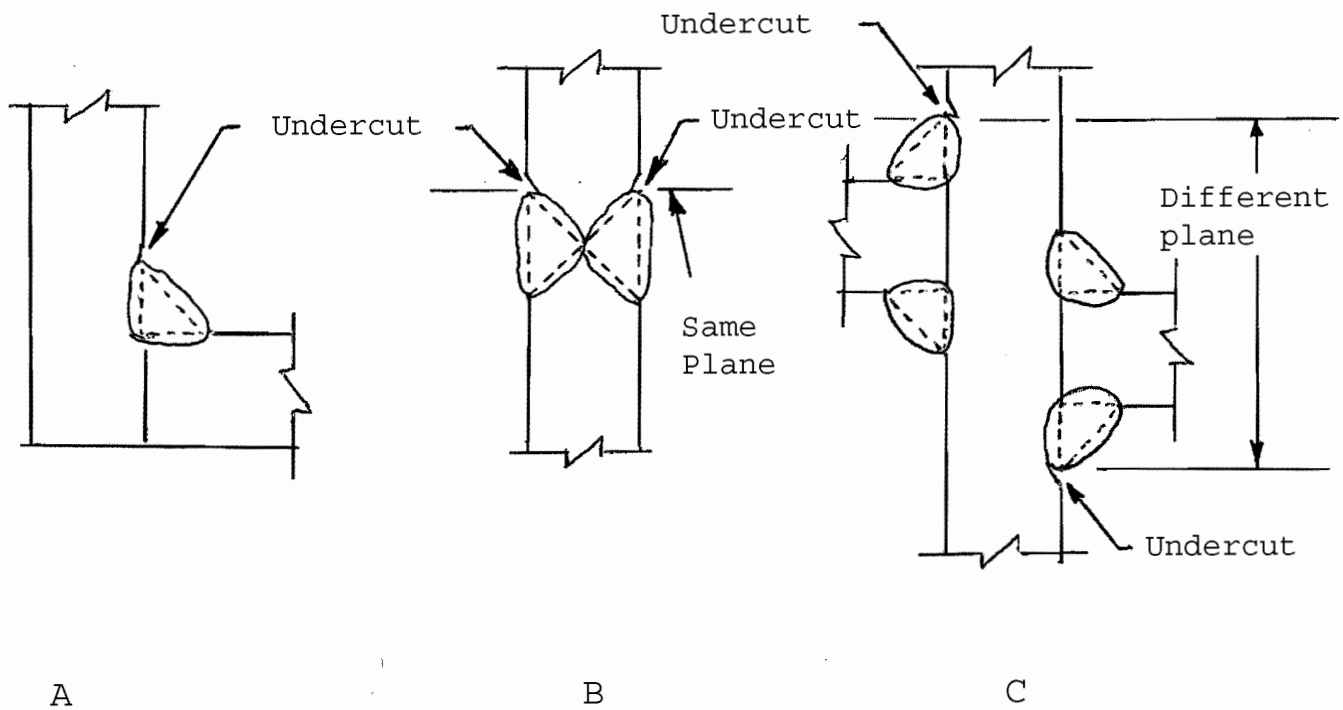
A - A
Transient
Condition
at end of weld.

B - B
Sound weld
showing complete
fusion

Appendix 3.8A - Figure 3-2



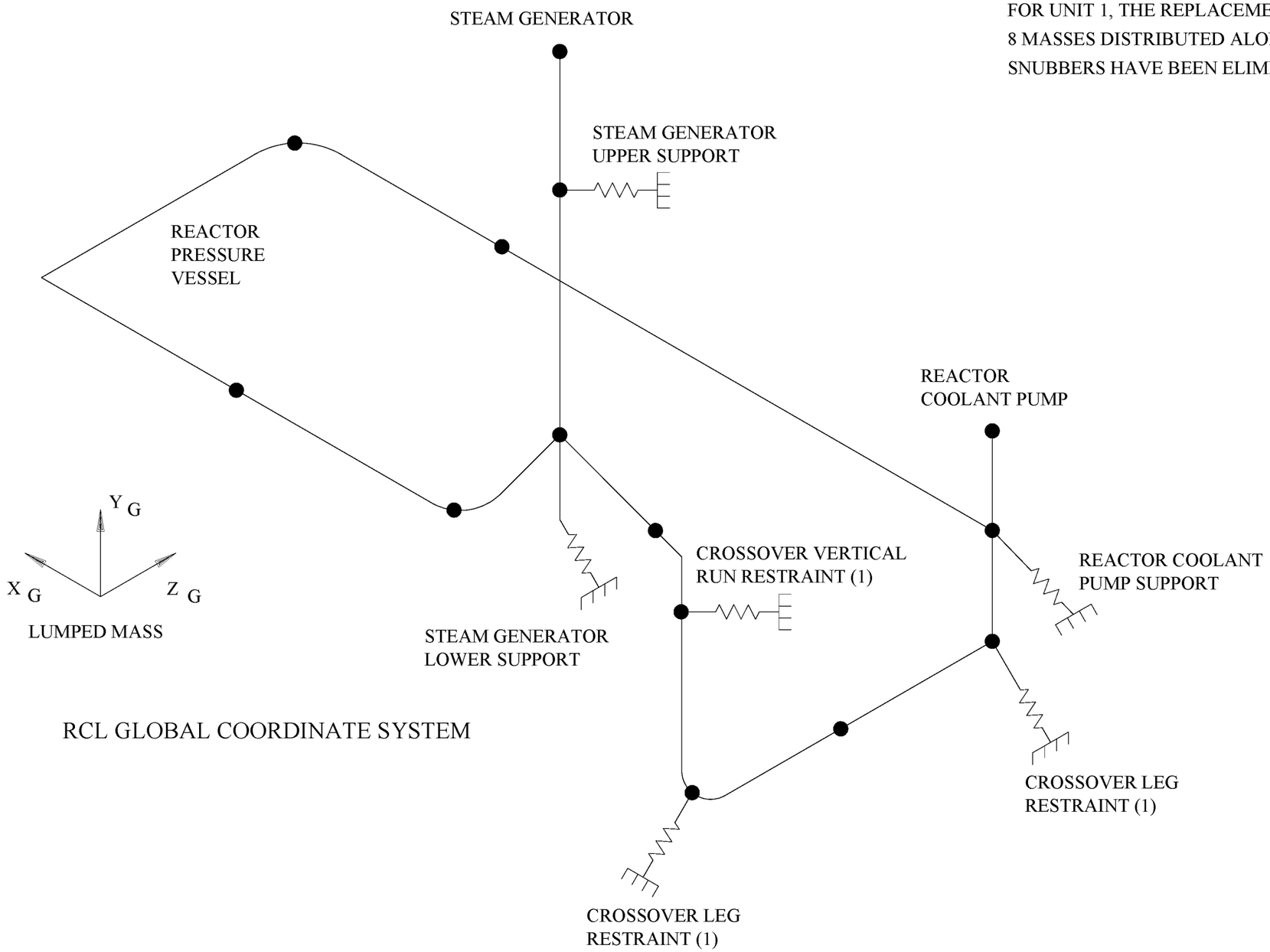
Appendix 3.8A - Figure 3-3



Appendix 3.8A - Figure 3-4

NOTE (1):
BASED ON GDC 4, LEAK-BEFORE-BREAK APPLICATION (SECTION 5.4.14) THE LOOP RESTRAINTS ARE NOT REQUIRED AND MAY BE ELIMINATED.

NOTE:
FOR UNIT 1, THE REPLACEMENT STEAM GENERATOR ACTUALLY HAS 8 MASSES DISTRIBUTED ALONG THE VERTICAL CENTERLINE, AND THE SNUBBERS HAVE BEEN ELIMINATED FROM THE UPPER SUPPORT.



Amendment 102

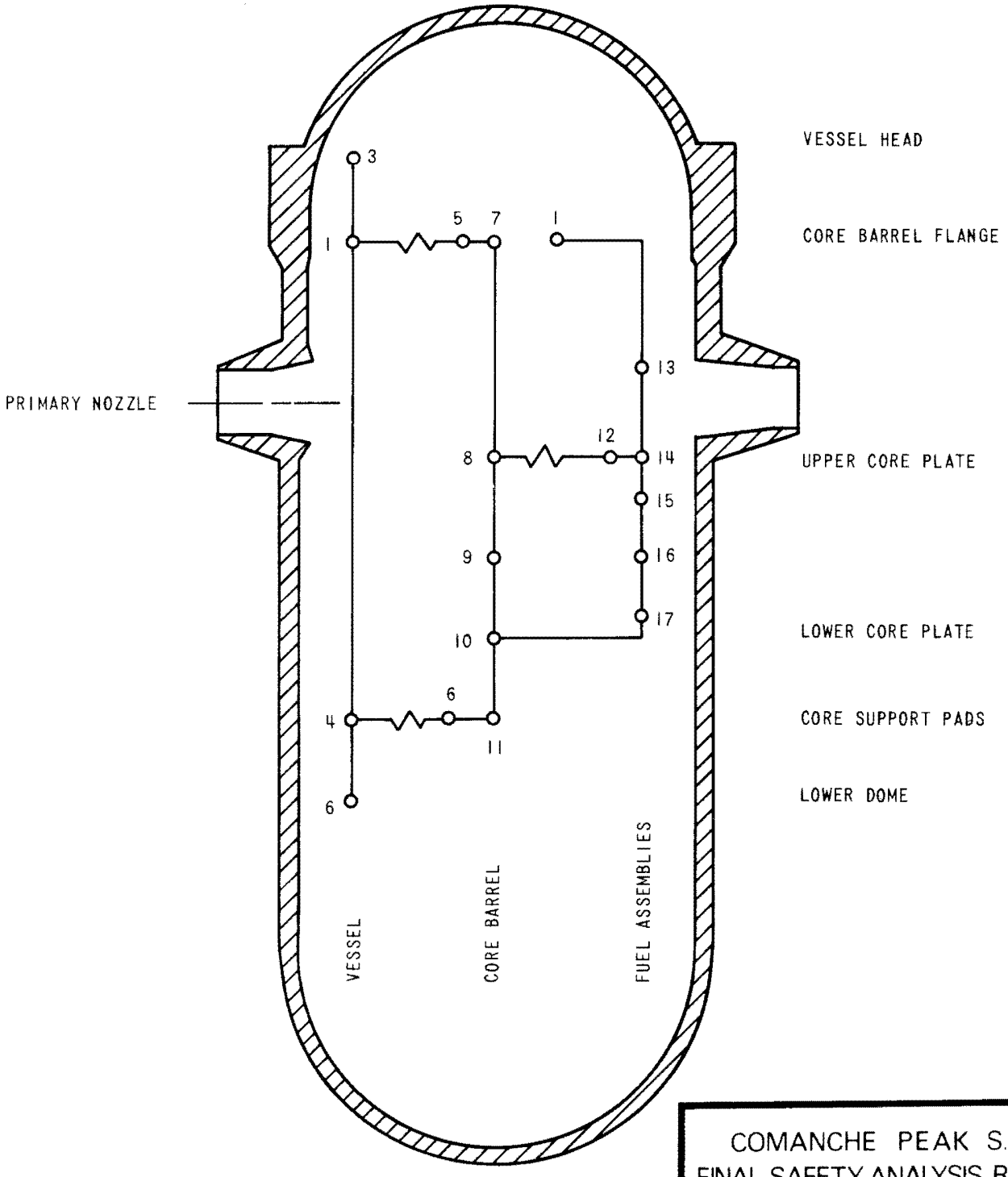
COMANCHE PEAK S E S

FINAL SAFETY ANALYSIS REPORT

UNITS 1 AND 2

REACTOR COOLANT LOOP SUPPORTS SYSTEM, DYNAMIC STRUCTURAL MODEL

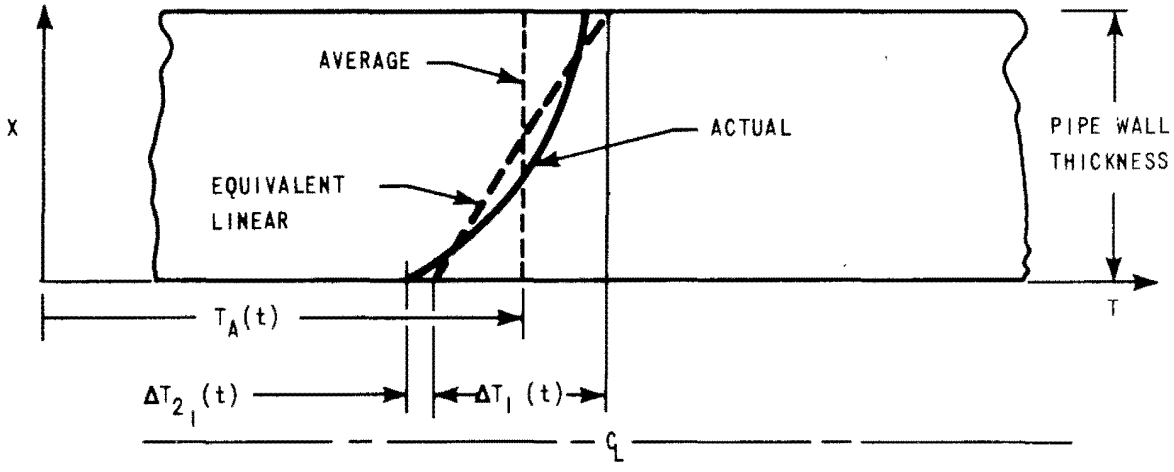
FIGURE 3.9N-1



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Reactor Pressure Vessel
Lumped Mass Model

FIGURE 3.9N-2



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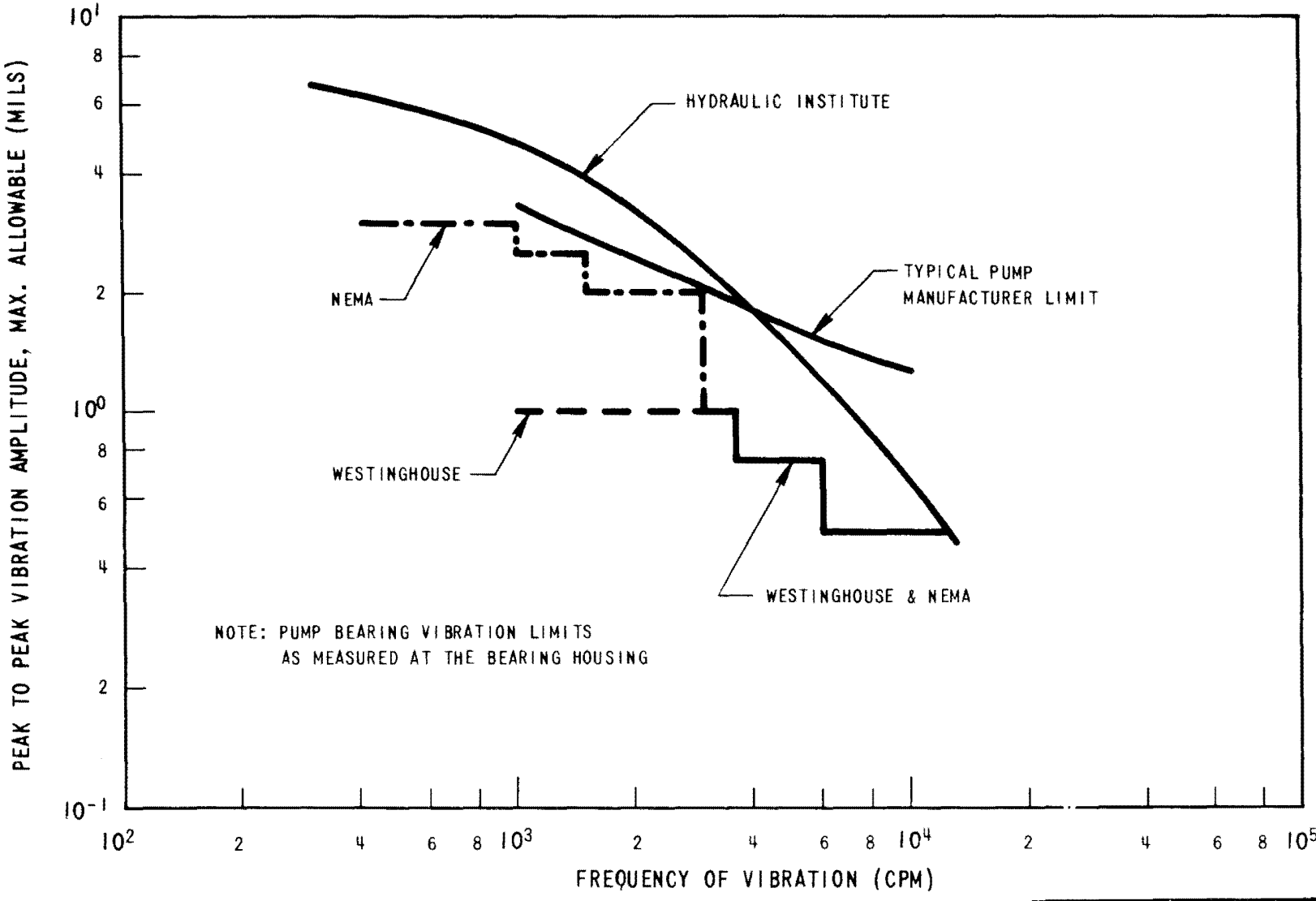
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Through-Wall Thermal Gradients

FIGURE 3.9N-3



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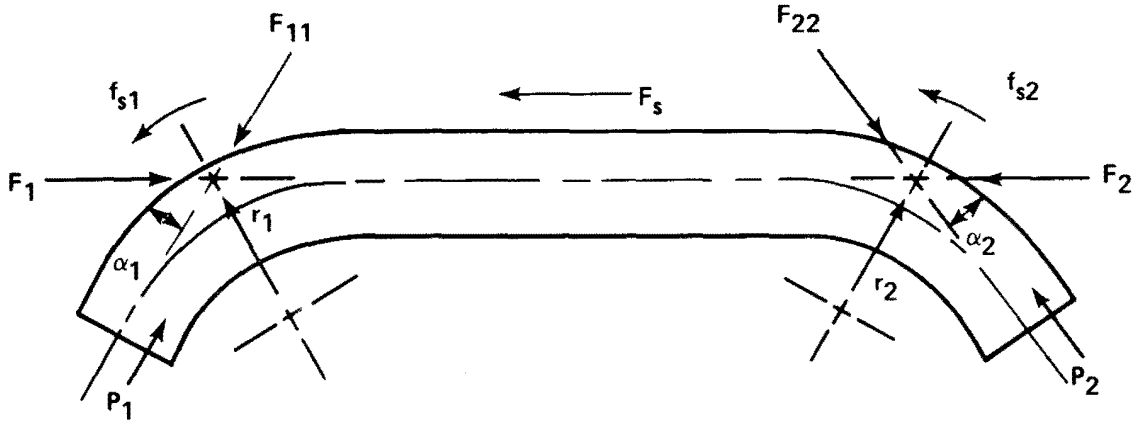
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Westinghouse Pump Bearing Vibration Limits Compared to Industry Standards

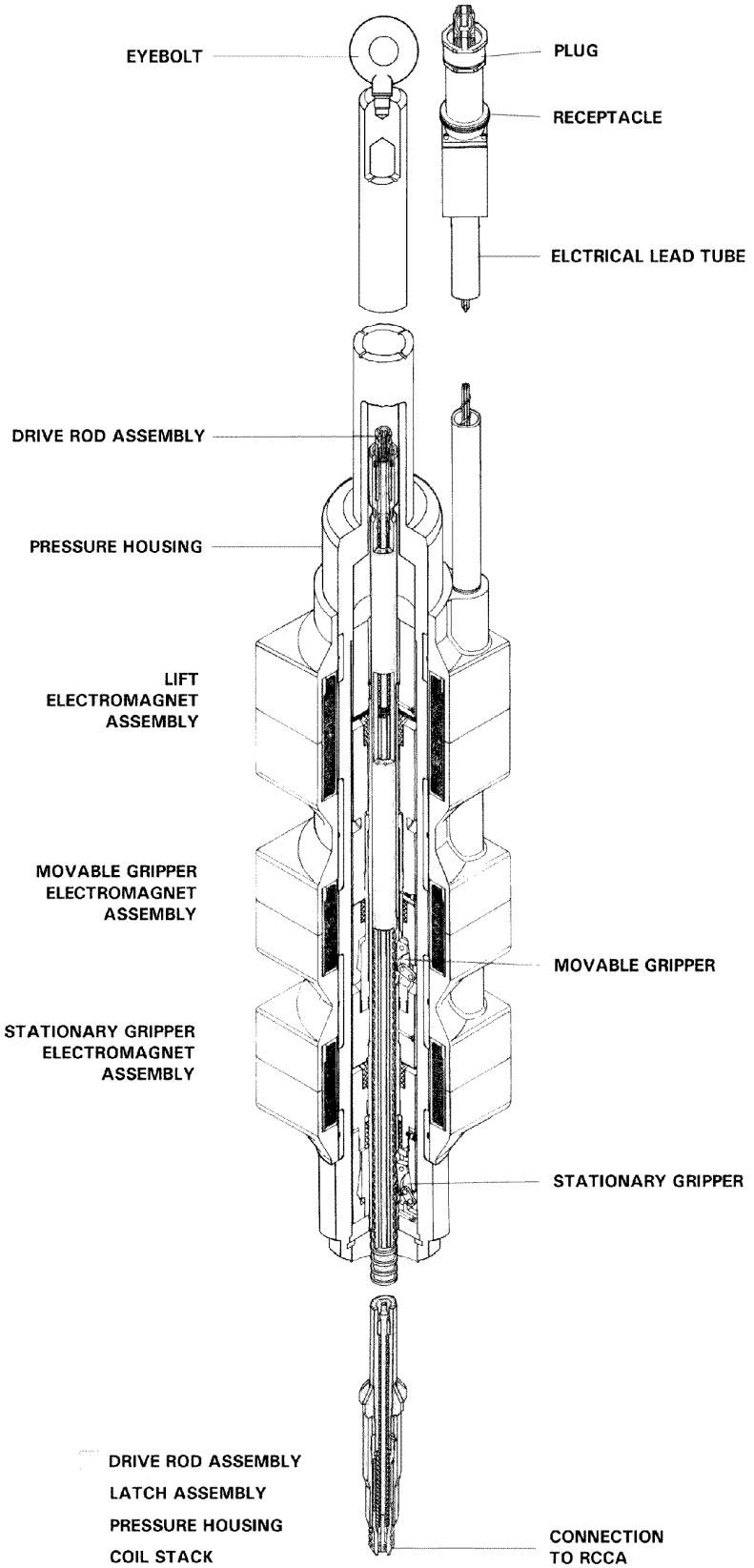
FIGURE 3.9N-4



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

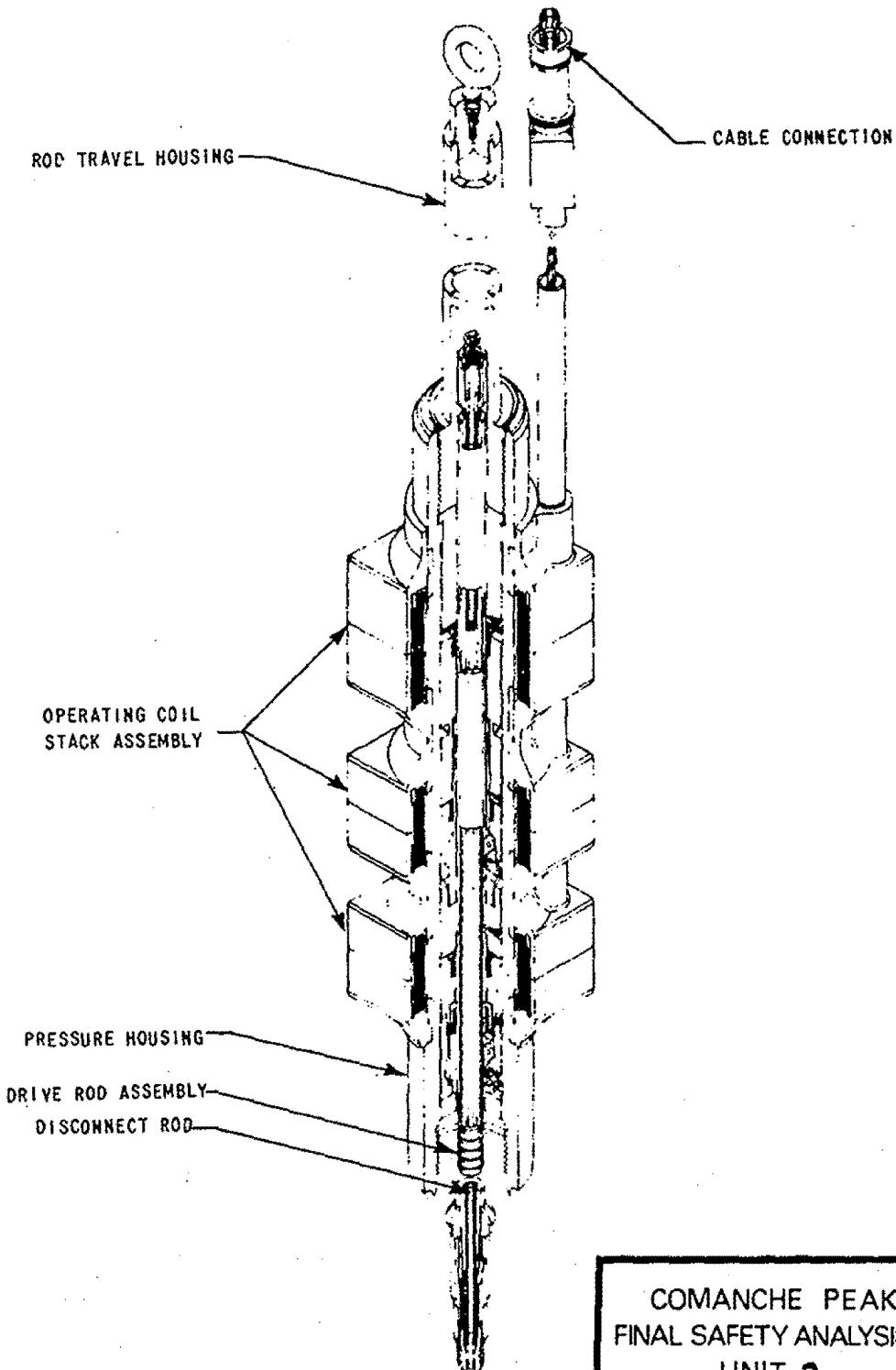
Control Volume for Momentum Equation

FIGURE 3.9N-4a.



COMANCHE PEAK S.E.S FINAL SAFETY ANALYSIS REPORT
UNIT 1
FULL LENGTH CONTROL ROD DRIVE MECHANISM
FIGURE 3.9N-5A

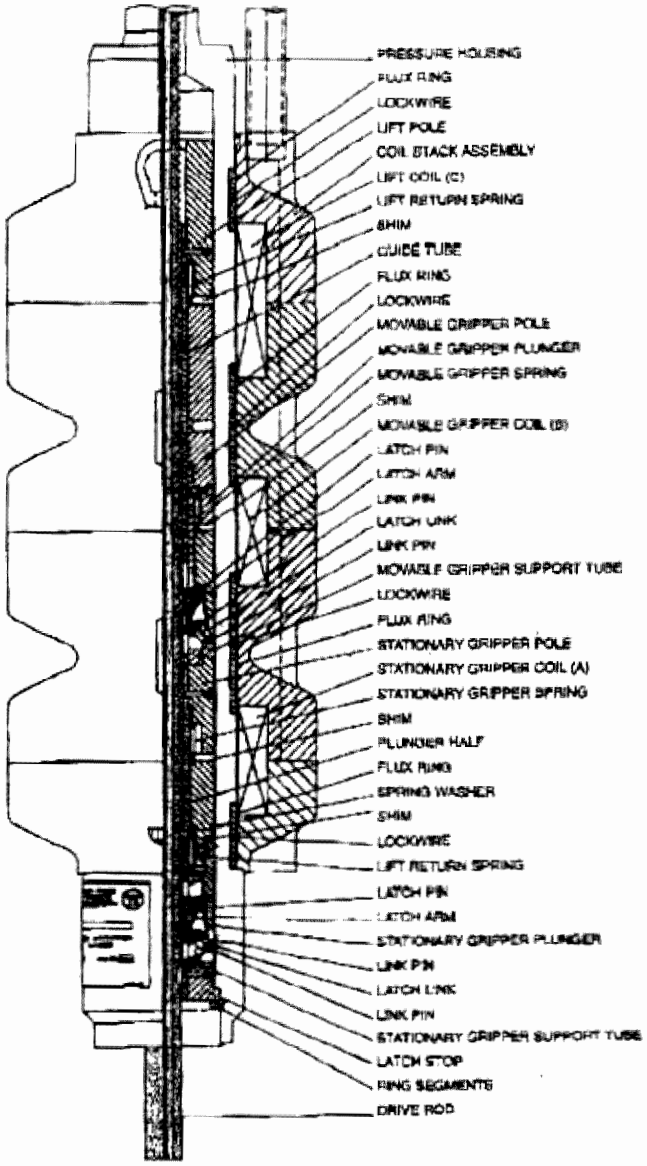
4026-302

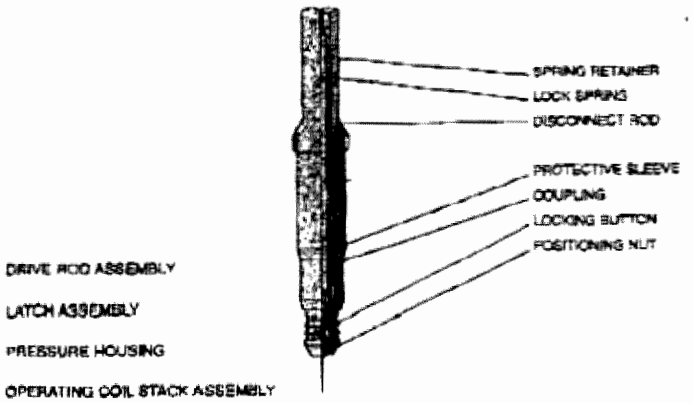


COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNIT 2

Full Length Conrtol Rod
Drive Mechanism

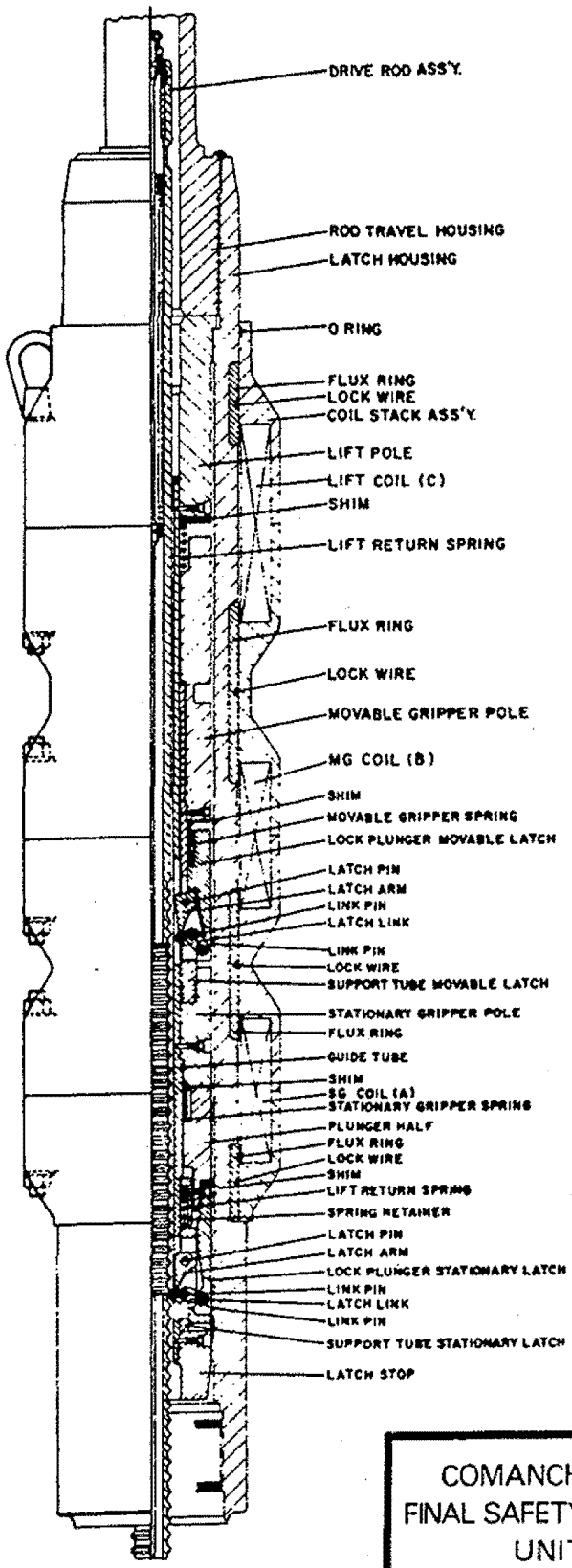
FIGURE 3.9N-5B





Amendment 102

COMANCHE PEAK S.E.S
FINAL SAFETY ANALYSIS REPORT
UNIT 1
Full Length Control Rod Drive
Mechanism Schematic
FIGURE 3.9N-6A



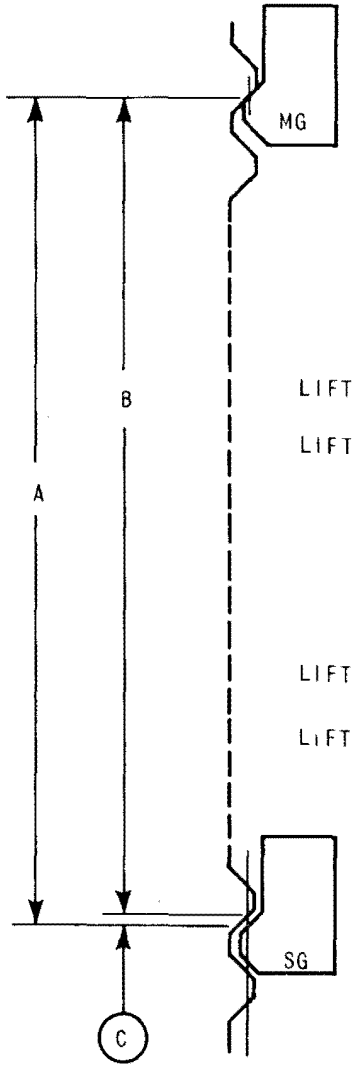
4026-303

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNIT 2

Full Length Control Rod
Drive Mechanism Schematic

FIGURE 3.9N-6 B

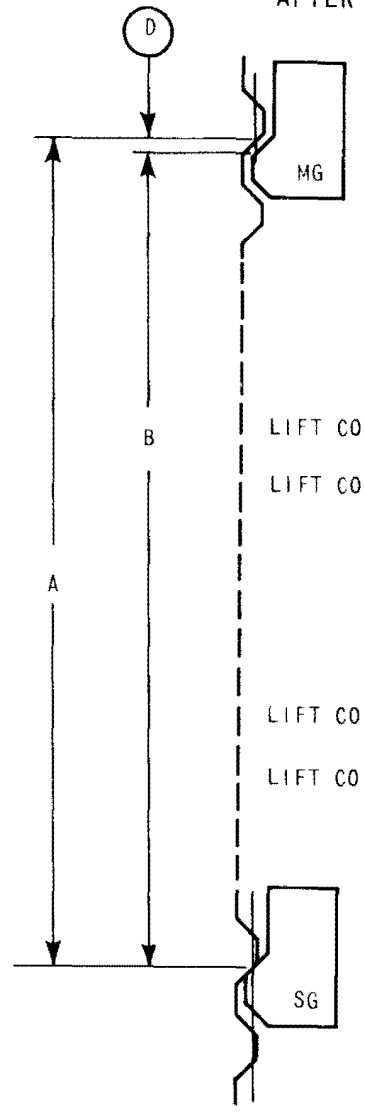
BEFORE LOAD TRANSFER



	AT 70°		
	A	B	C
LIFT COIL OFF	15.640	15.625	0.015
LIFT COIL ON	16.265	16.250	0.015

	AT 650°		
	A	B	C
LIFT COIL OFF	15.725	15.679	0.046
LIFT COIL ON	16.375	16.387	0.068

AFTER LOAD TRANSFER



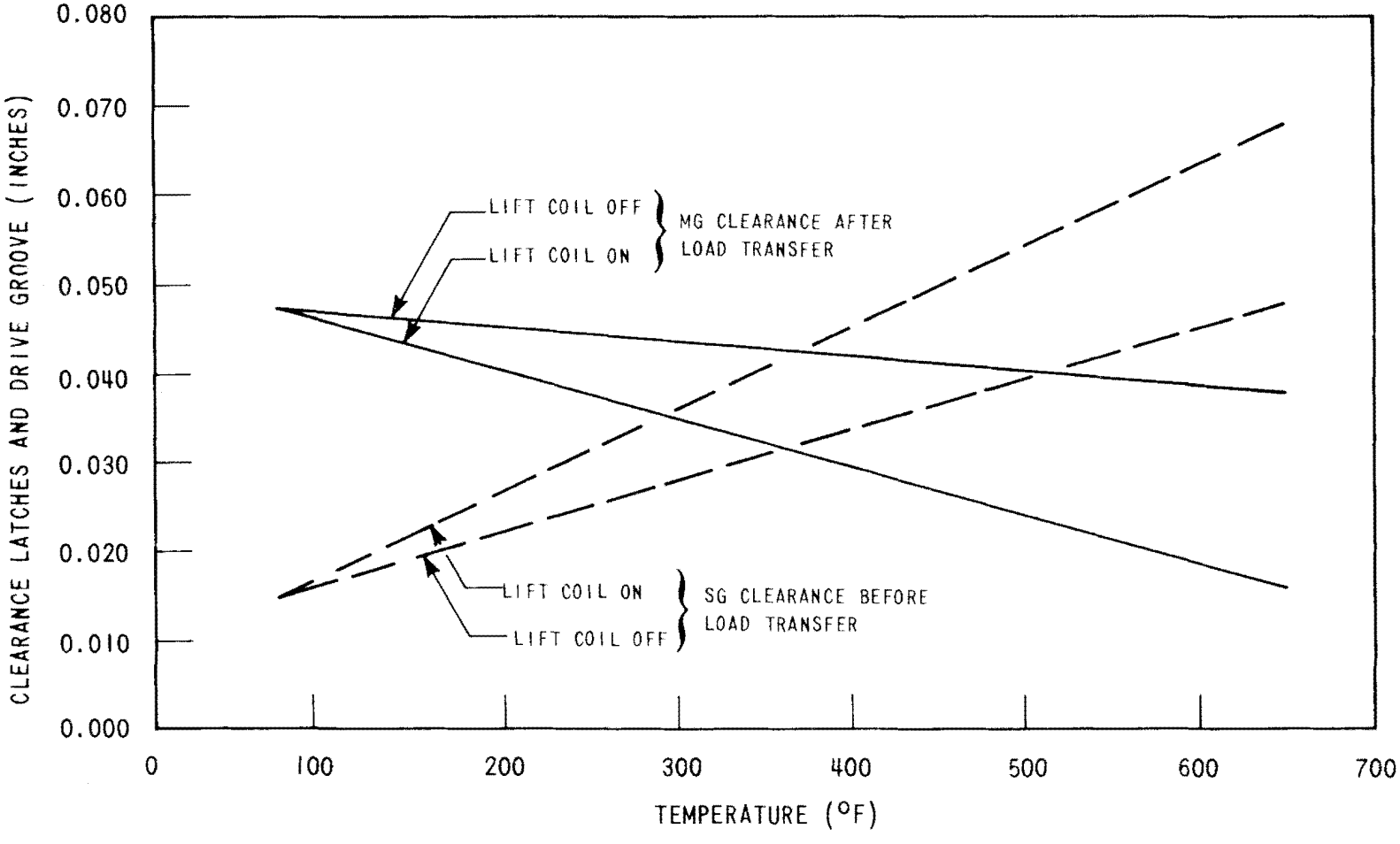
	AT 70°		
	A	B	D
LIFT COIL OFF	15.625	15.578	0.047
LIFT COIL ON	16.258	16.203	0.047

	AT 650°		
	A	B	D
LIFT COIL OFF	15.679	15.641	0.038
LIFT COIL ON	16.387	16.291	0.016

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Nominal Latch Clearance at Minimum and Maximum Temperature

FIGURE 3.9N-7



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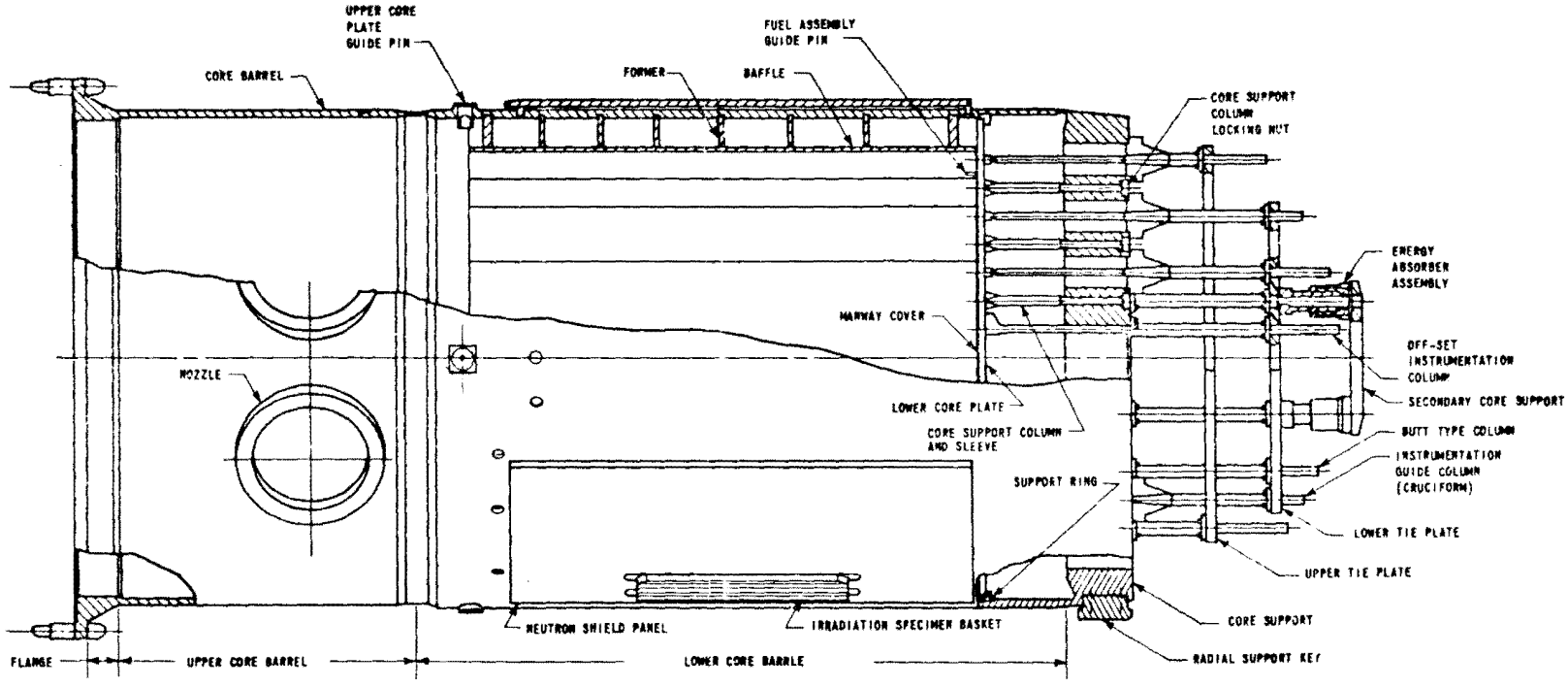
UNITS 1 and 2

Control Rod Drive Mechanism
Latch Clearance Thermal Effect

FIGURE 3.9N-8



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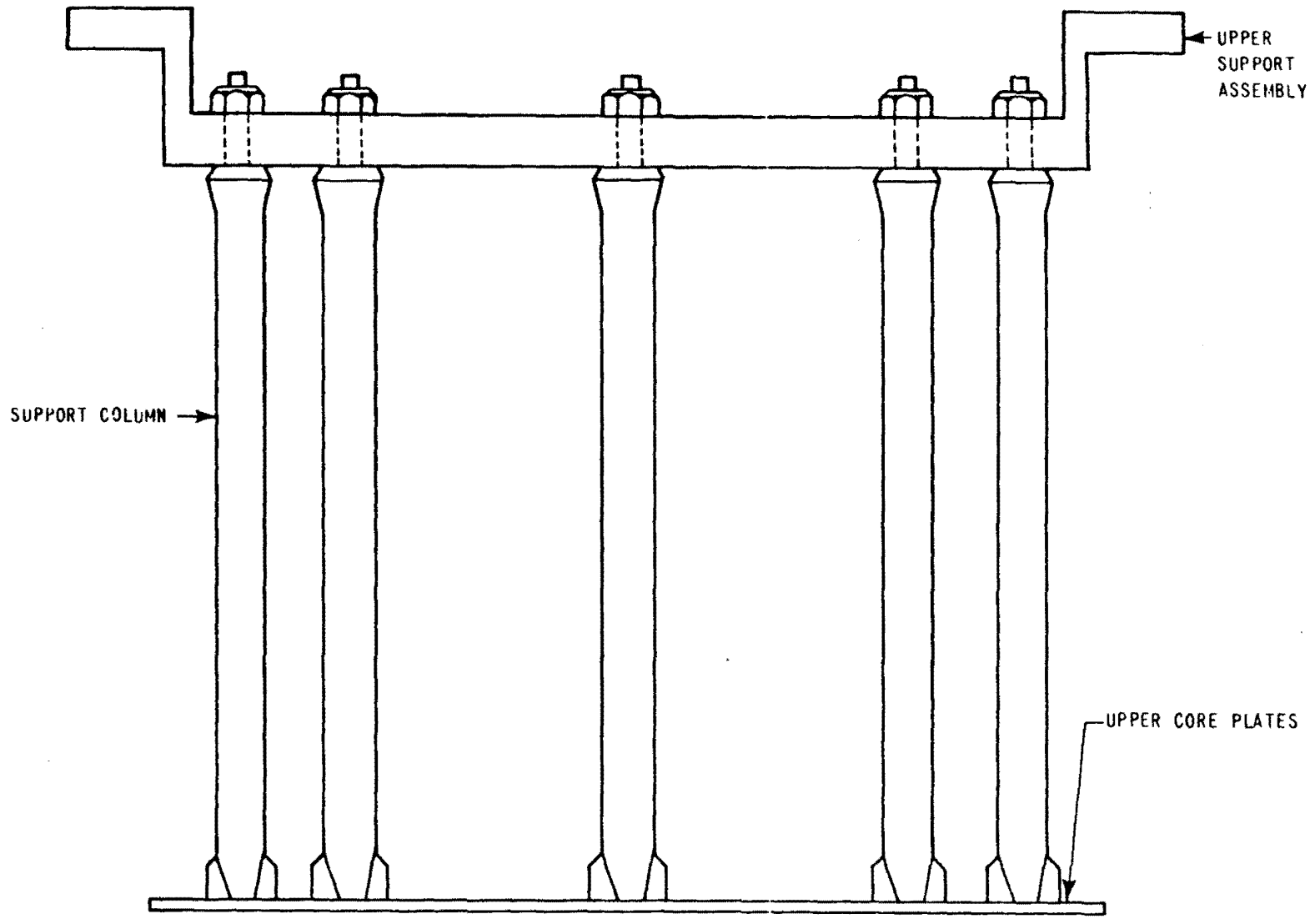
UNITS 1 and 2

Lower Core Support Assembly
(Core Barrel Assembly)

FIGURE 3.9N-9



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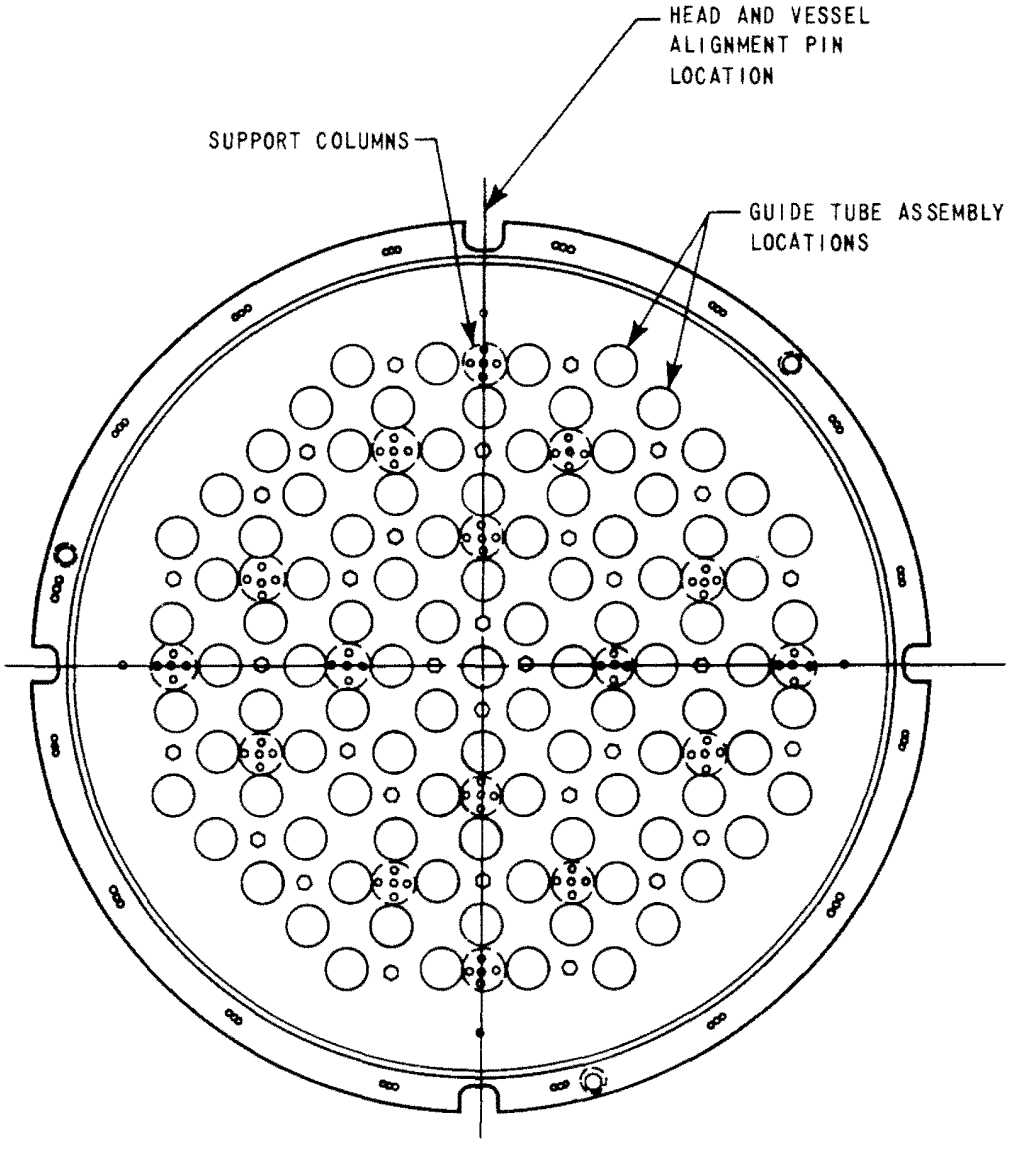
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Upper Core Support Structure

FIGURE 3.9N-10



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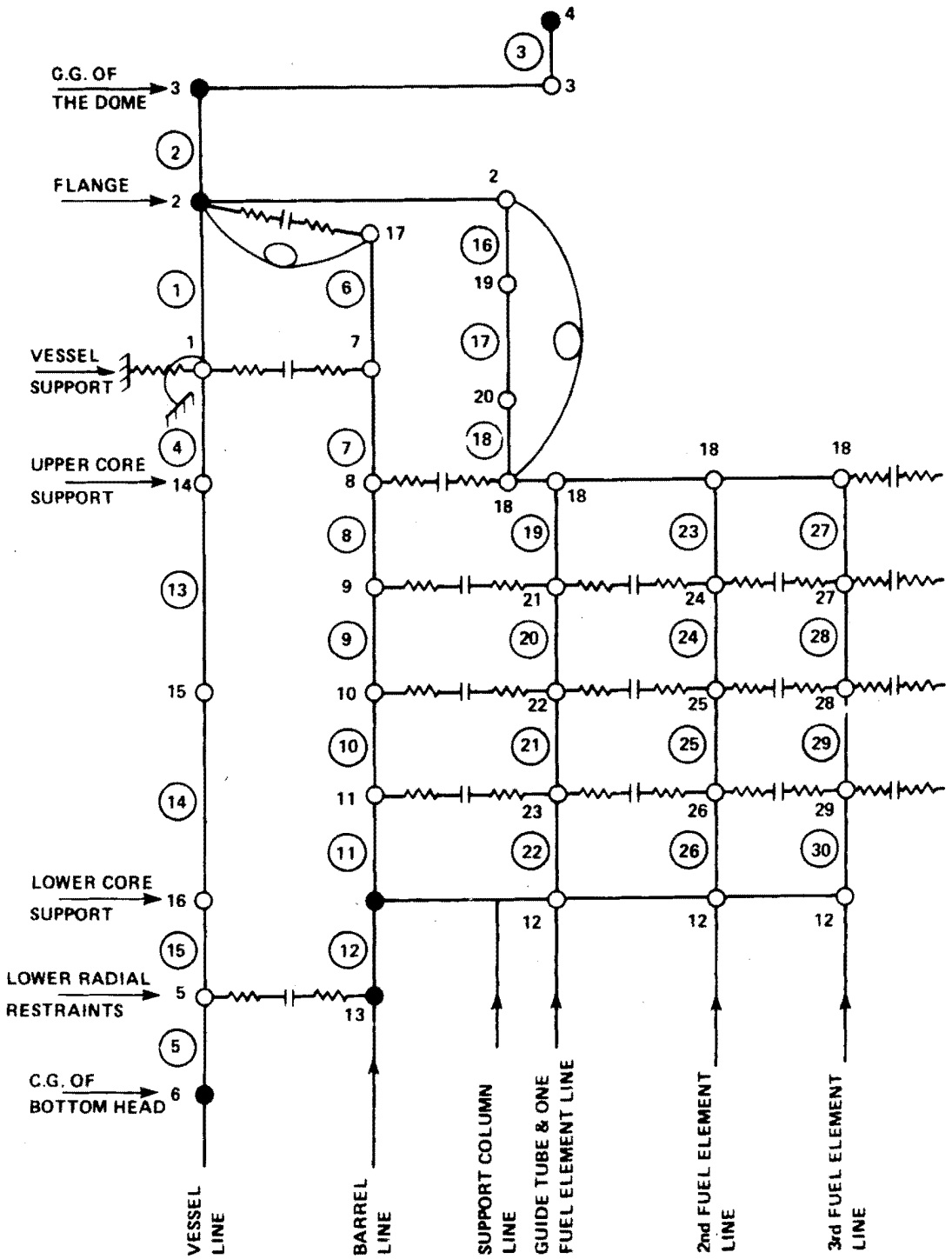
UNITS 1 and 2

Plan View of Upper Core Support Structure

FIGURE 3.9N-11



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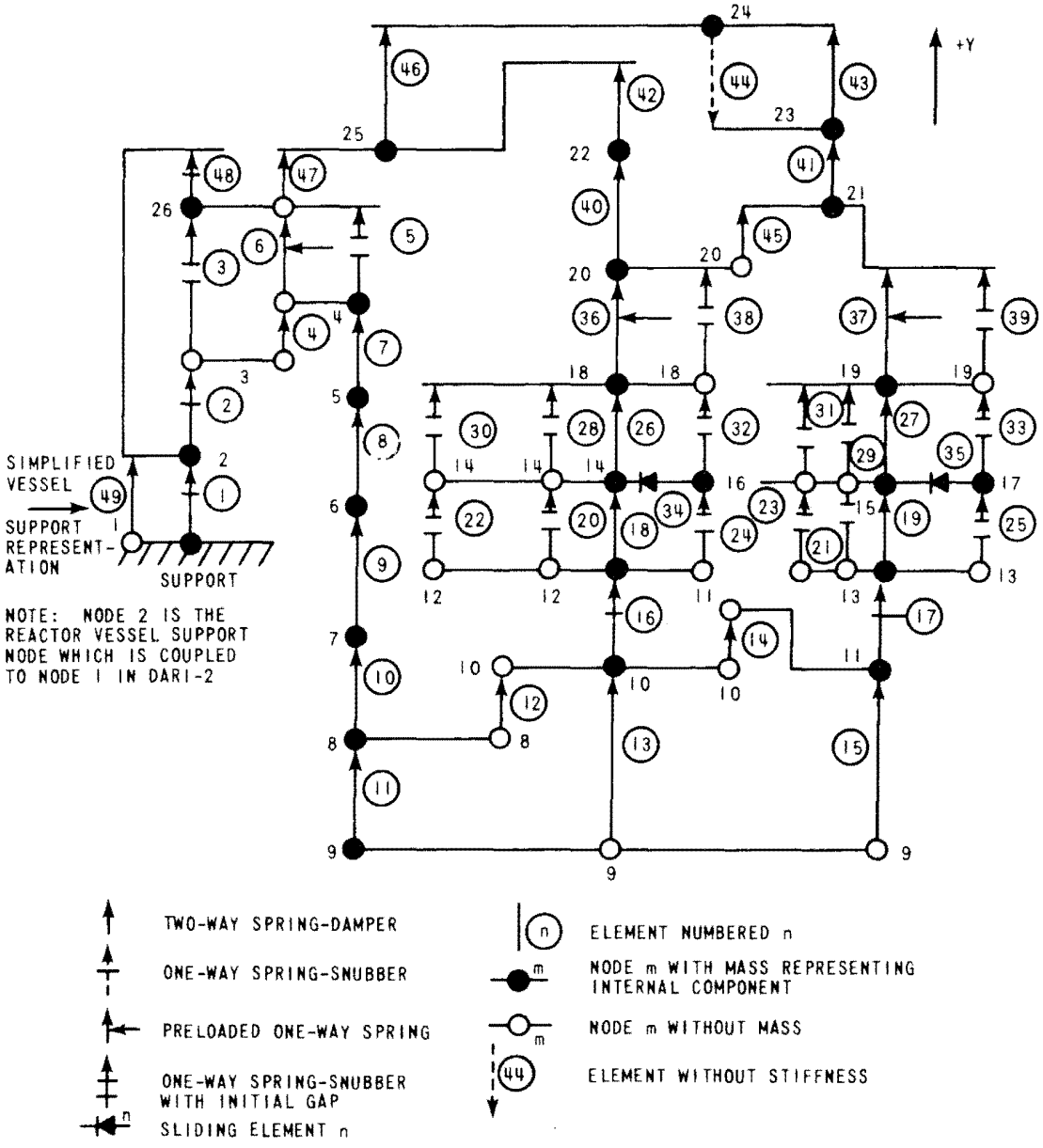
UNITS 1 and 2

Reactor Internals Model for DARI Variables

Figure 3.9N-12



MARCH 31, 1980

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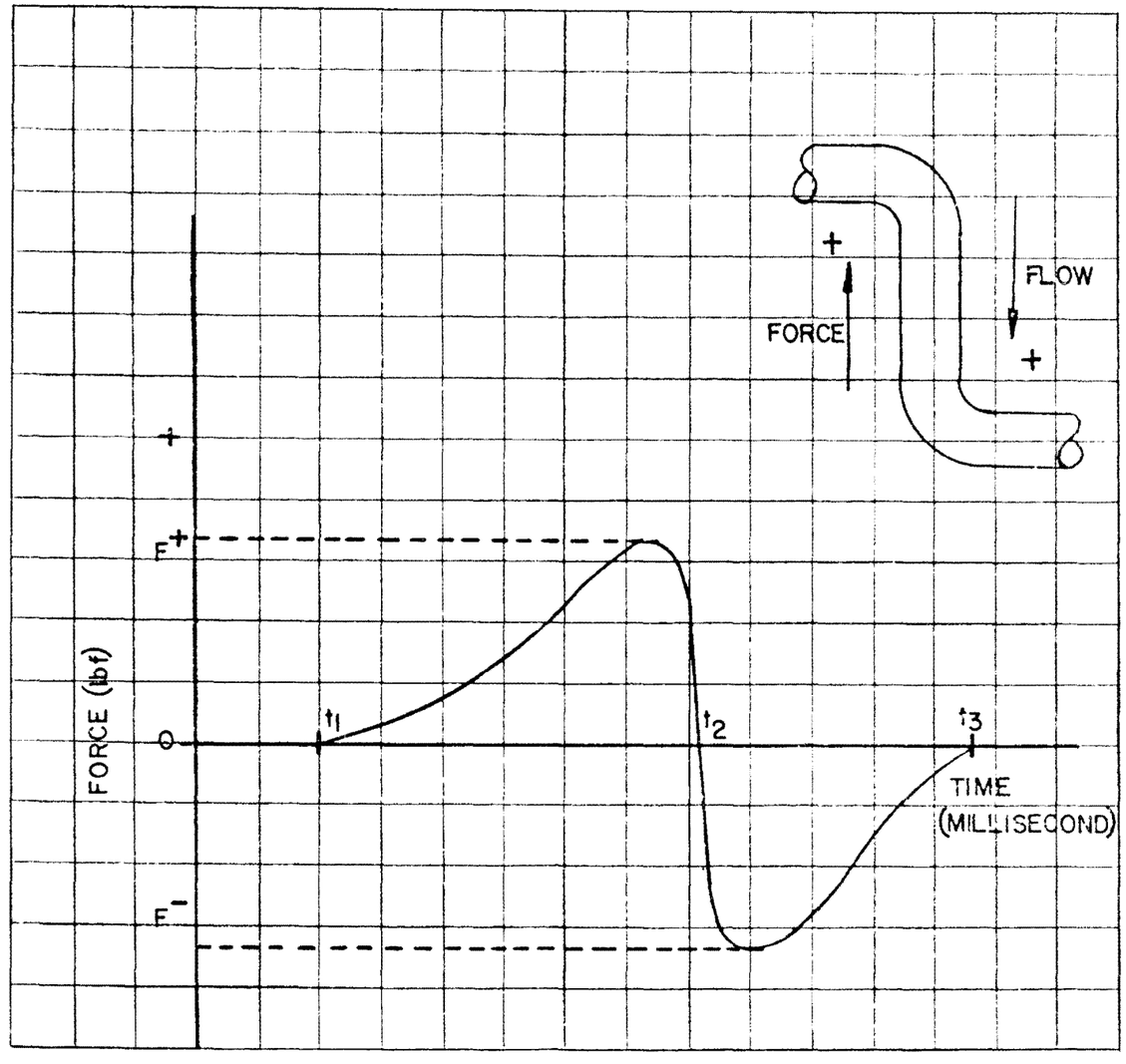
UNITS 1 and 2

Reactor Internals Mathematical Model for WOSTAS Variables

Figure 3.9N-13



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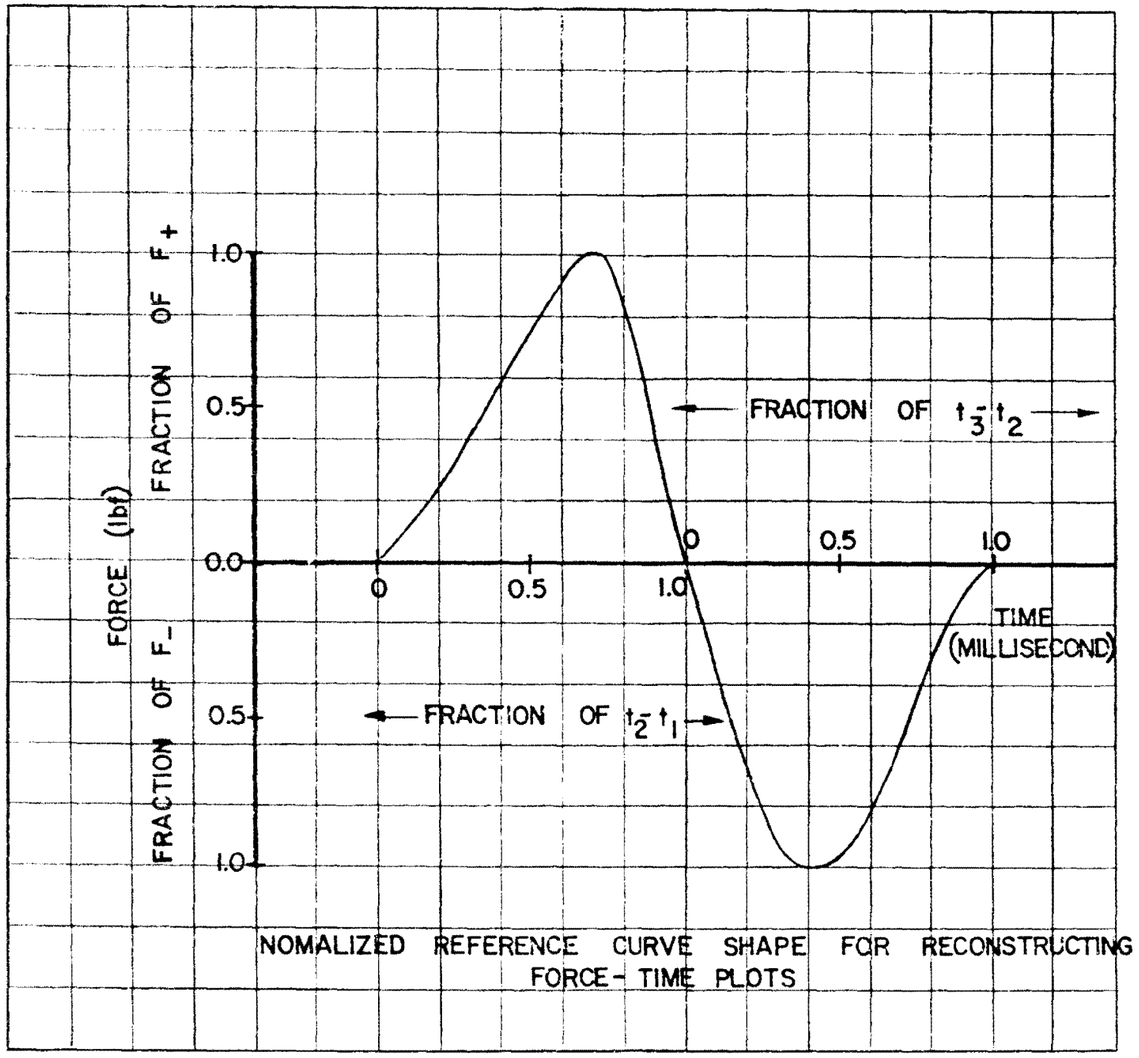
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

TYPICAL FORCE-TIME PLOT
FOR ONE LEG OF PIPING

FIGURE 3.9B-1



NOMALIZED REFERENCE CURVE SHAPE FOR RECONSTRUCTING FORCE-TIME PLOTS

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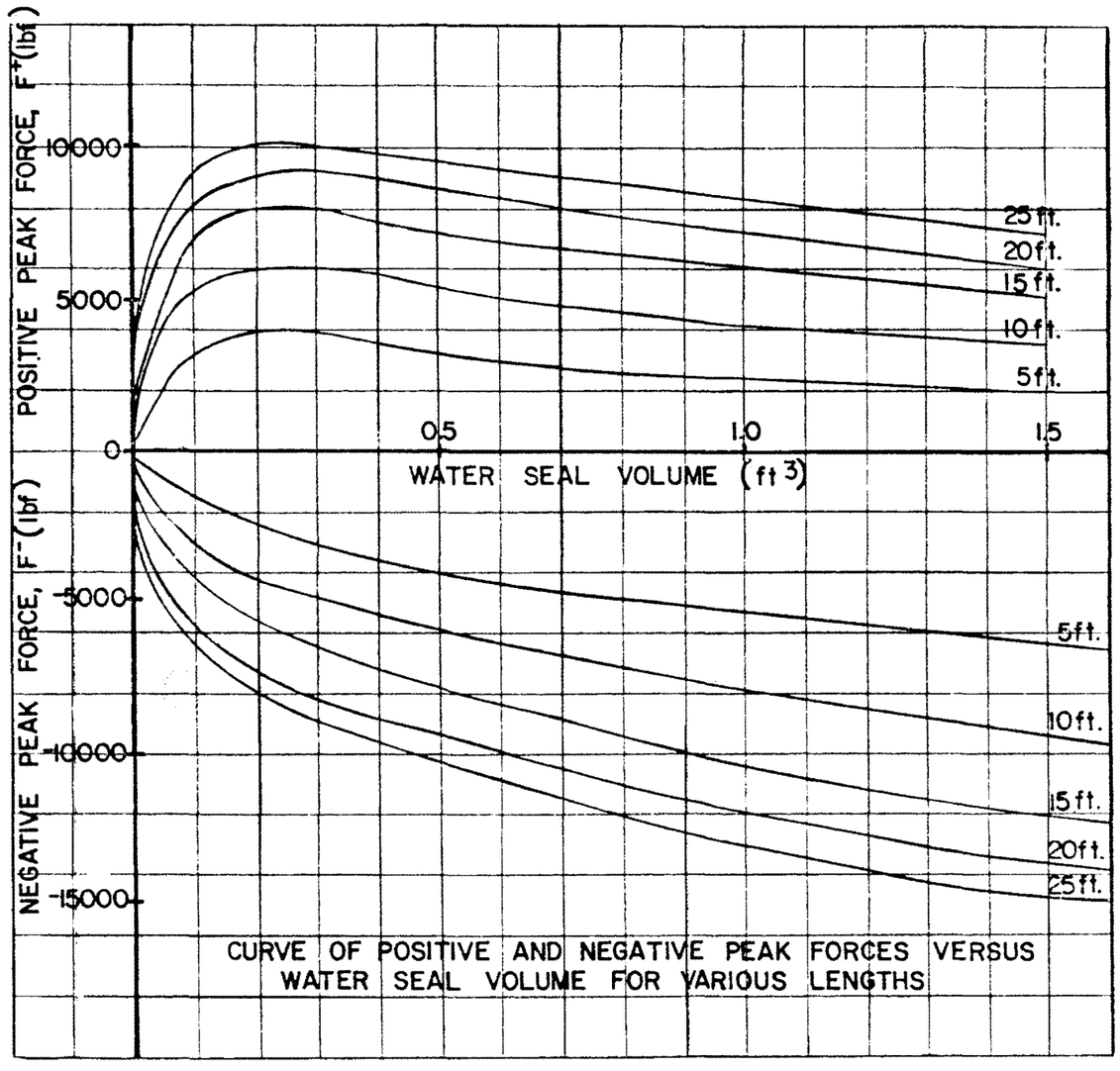
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

NORMALIZED REFERENCE CURVE

FIGURE 3.9B-2



CURVE OF POSITIVE AND NEGATIVE PEAK FORCES VERSUS WATER SEAL VOLUME FOR VARIOUS LENGTHS

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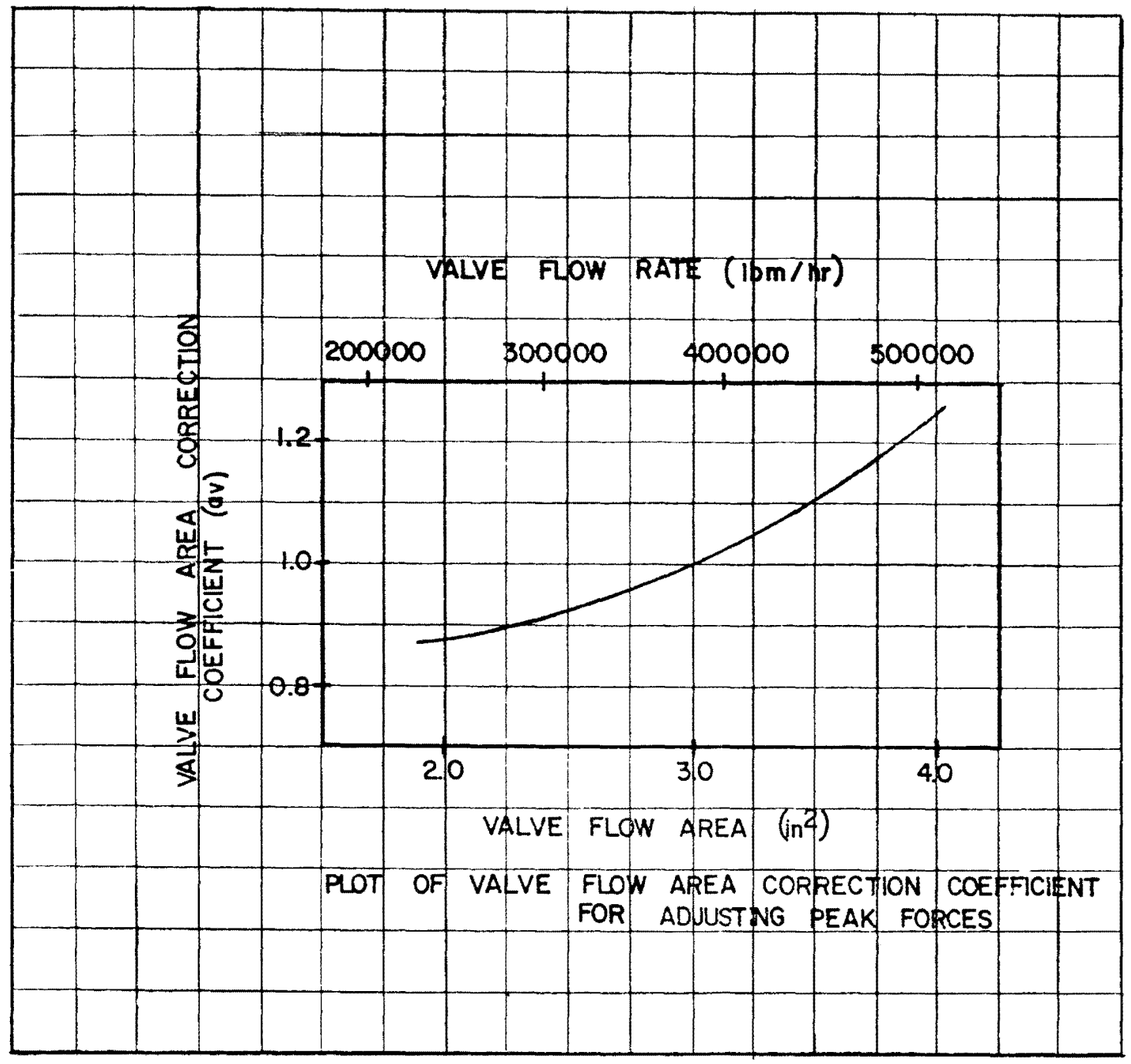
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

PEAK FORCES VERSUS VOLUME FOR VARIOUS LEG LENGTHS

FIGURE 3.9B-3



PLOT OF VALVE FLOW AREA CORRECTION COEFFICIENT FOR ADJUSTING PEAK FORCES

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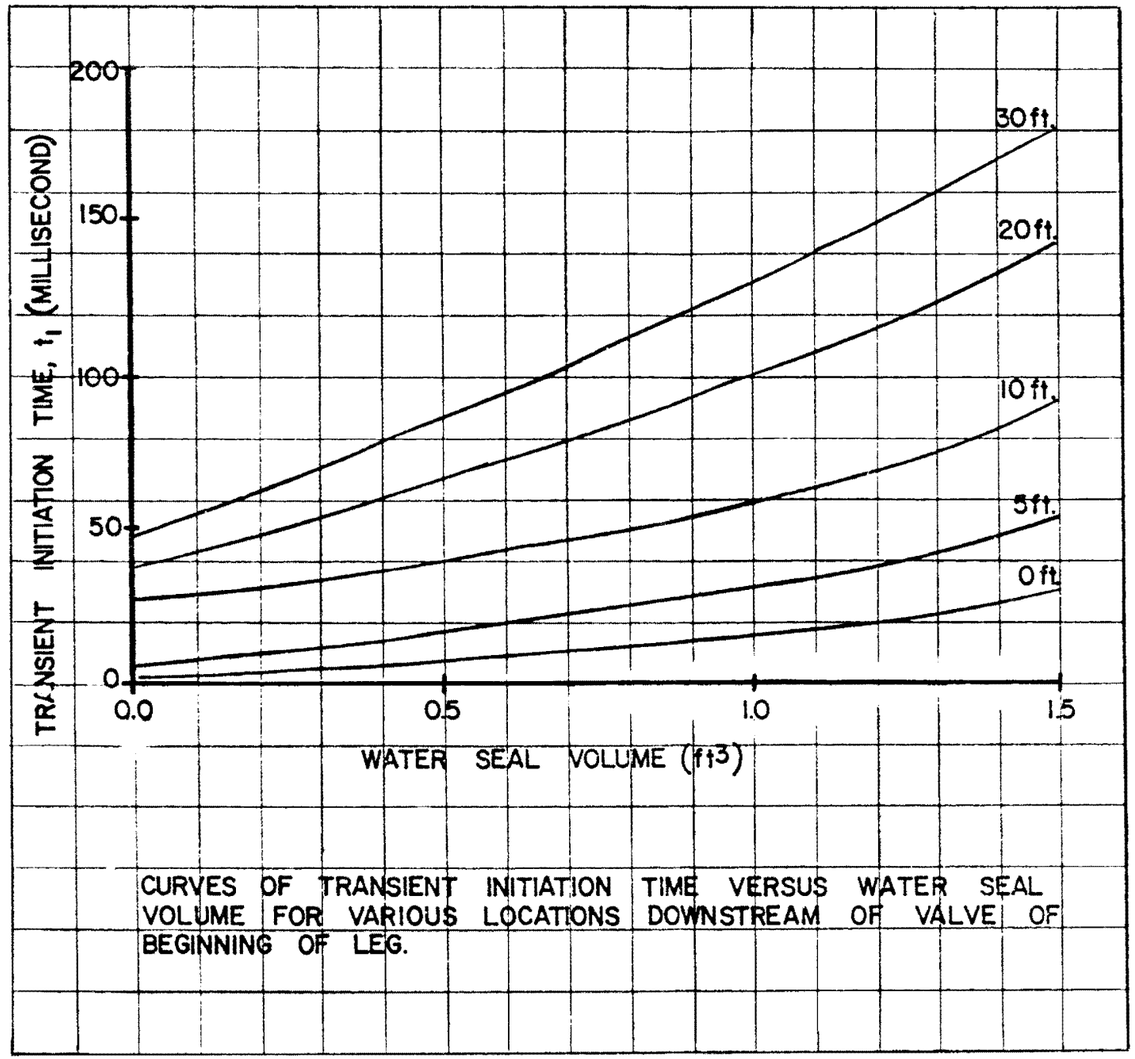
UNITS 1 and 2

VALVE FLOW AREA CORRECTION COEFFICIENT

FIGURE 3.9B-4



CURVES OF TRANSIENT INITIATION TIME VERSUS WATER SEAL VOLUME FOR VARIOUS LOCATIONS DOWNSTREAM OF VALVE OF BEGINNING OF LEG.

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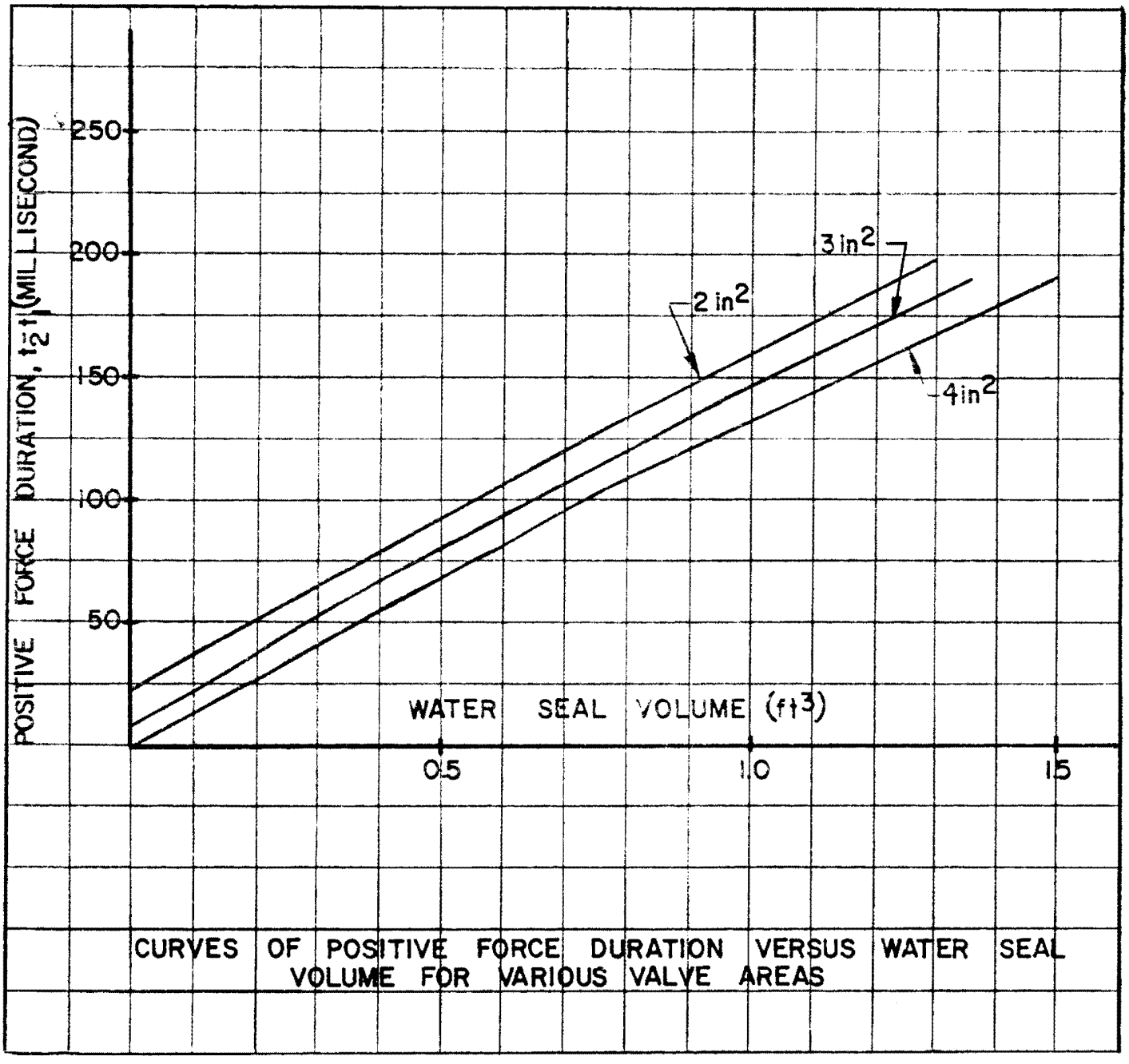
UNITS 1 and 2

TRANSIENT INITIATION TIME

FIGURE 3.9B-5



CURVES OF POSITIVE FORCE DURATION VERSUS WATER SEAL VOLUME FOR VARIOUS VALVE AREAS

Amendment 74
October 14, 1988

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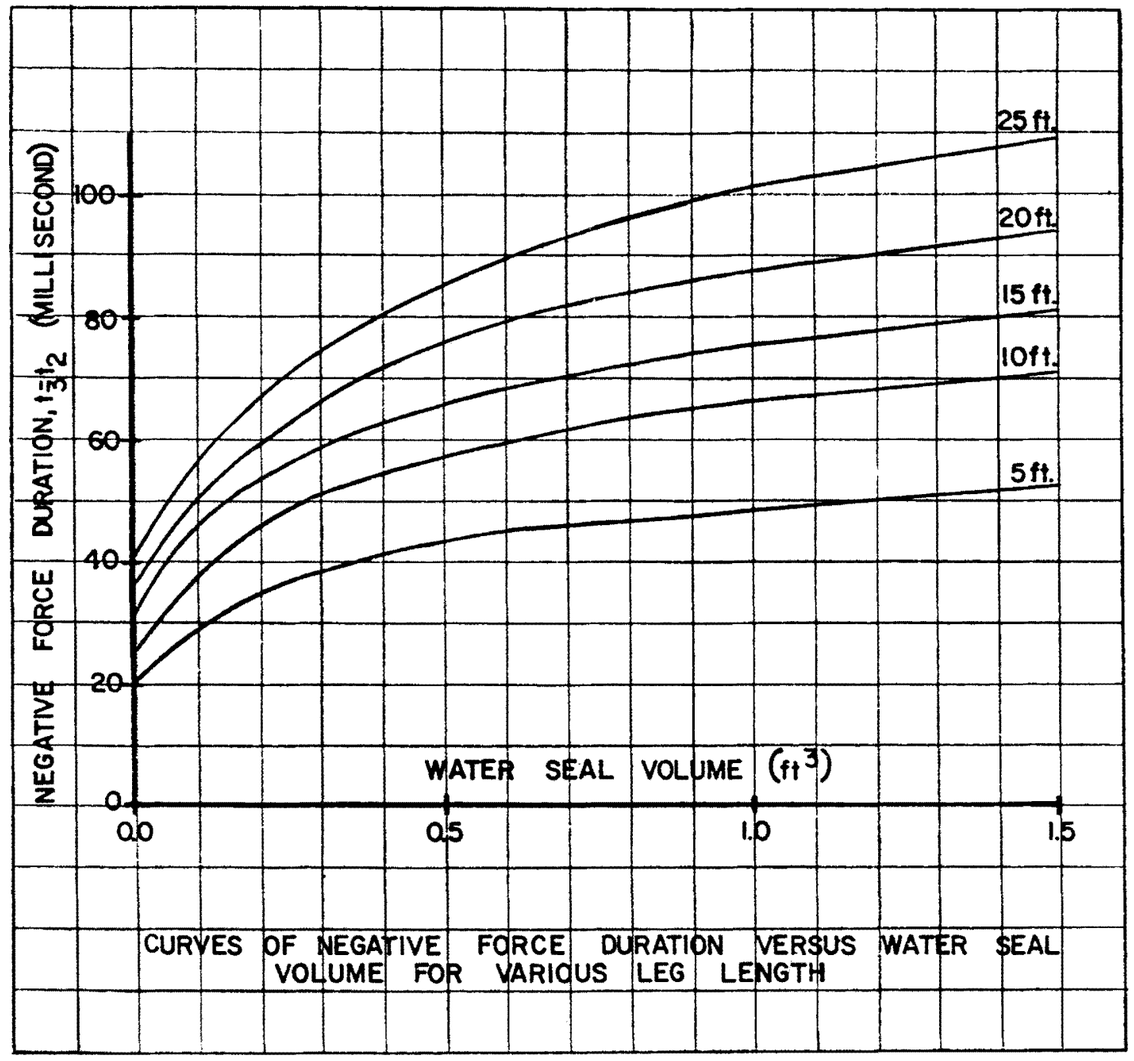
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

POSITIVE FORCE DURATION

FIGURE 3.9B-6



CURVES OF NEGATIVE FORCE DURATION VERSUS WATER SEAL VOLUME FOR VARIOUS LEG LENGTH

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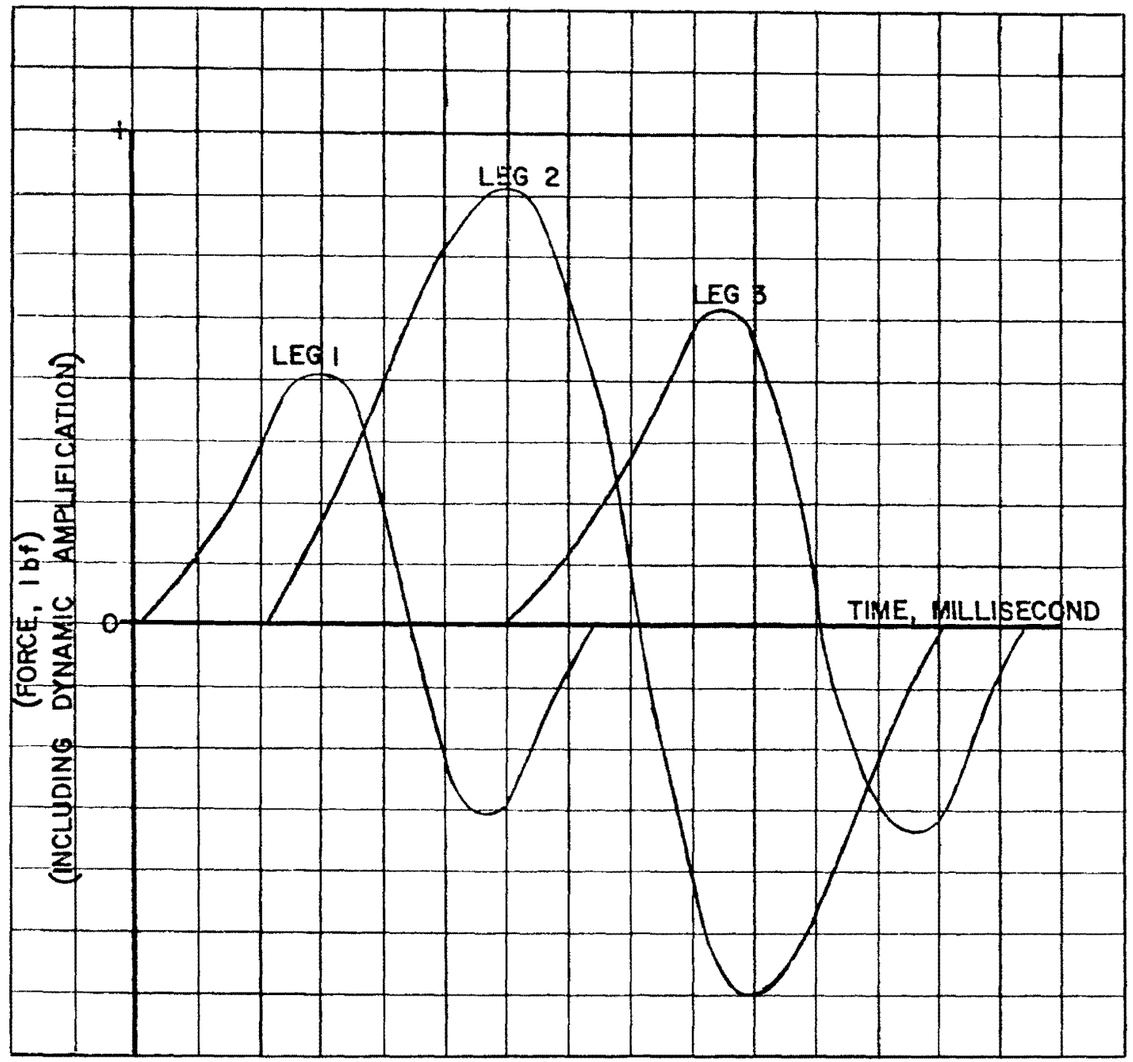
UNITS 1 and 2

NEGATIVE FORCE DURATION

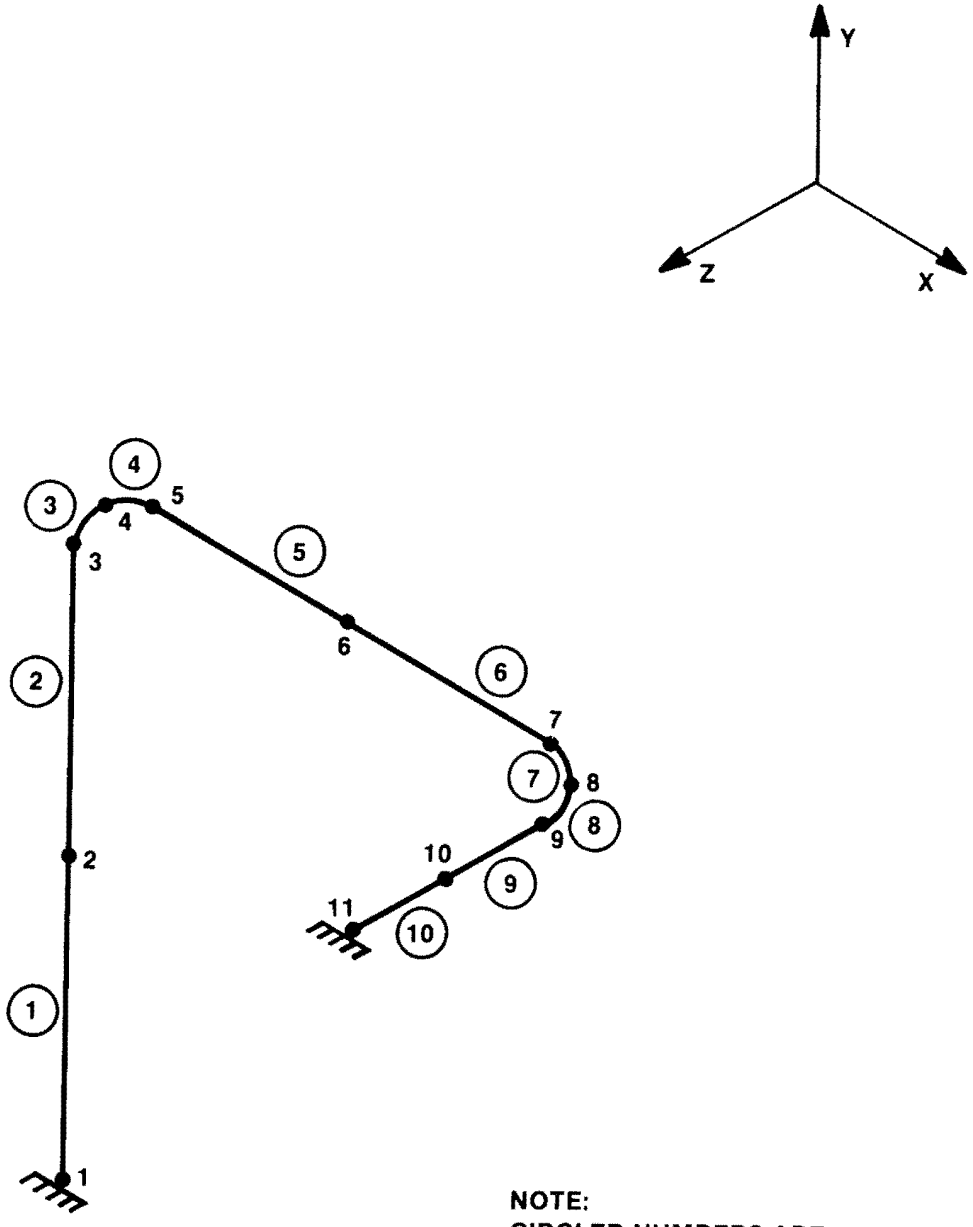
FIGURE 3.9B-7



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

TYPICAL FORCE - TIME TRACES FOR A THREE LEG PIPING SYSTEM

FIGURE 3.9B-8



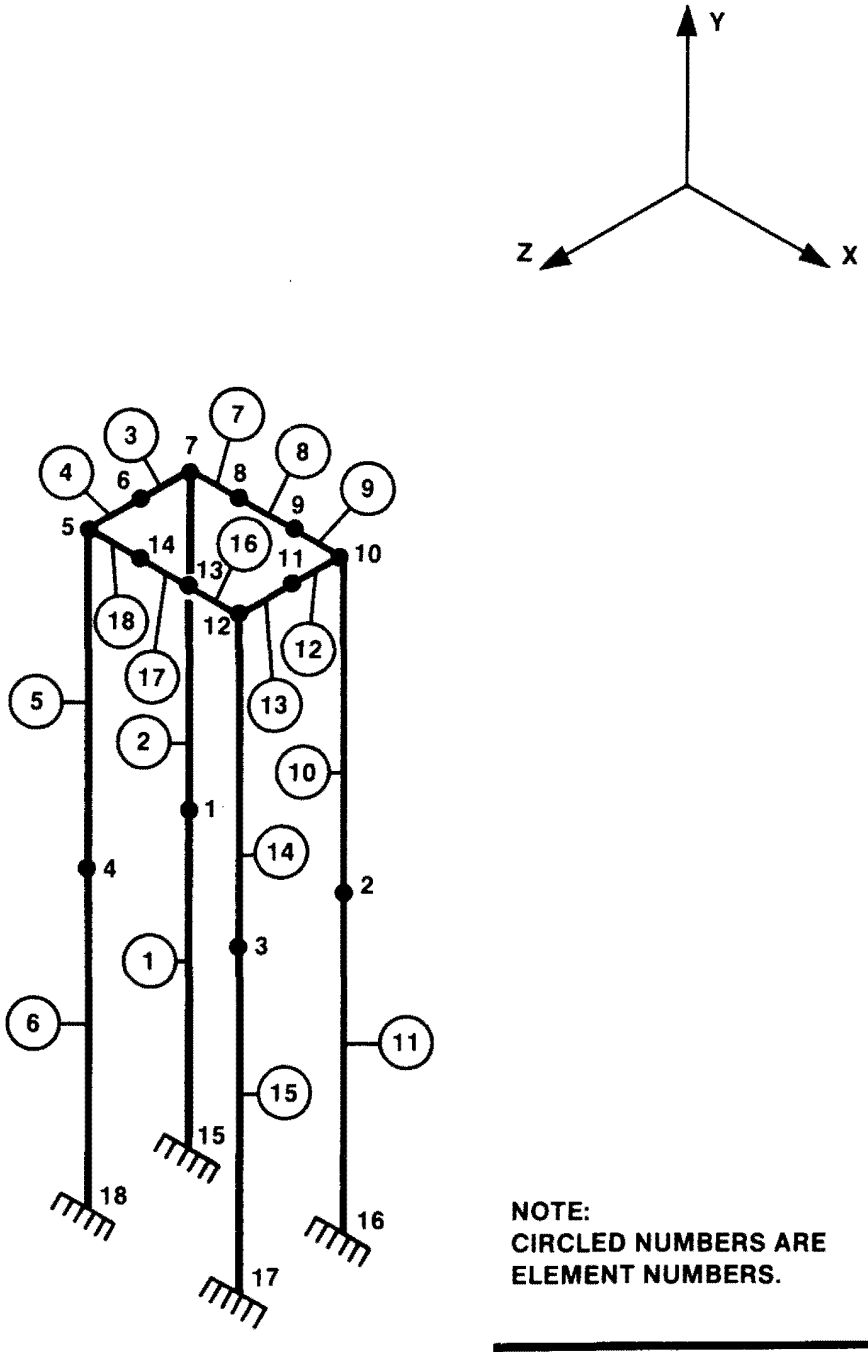
NOTE:
CIRCLED NUMBERS ARE ELEMENT NUMBERS.

AMENDMENT 61
DECEMBER 19, 1986

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

MATHEMATICAL MODEL FOR RESPONSE SPECTRA SEISMIC VERIFICATION

FIGURE 3B.1-1



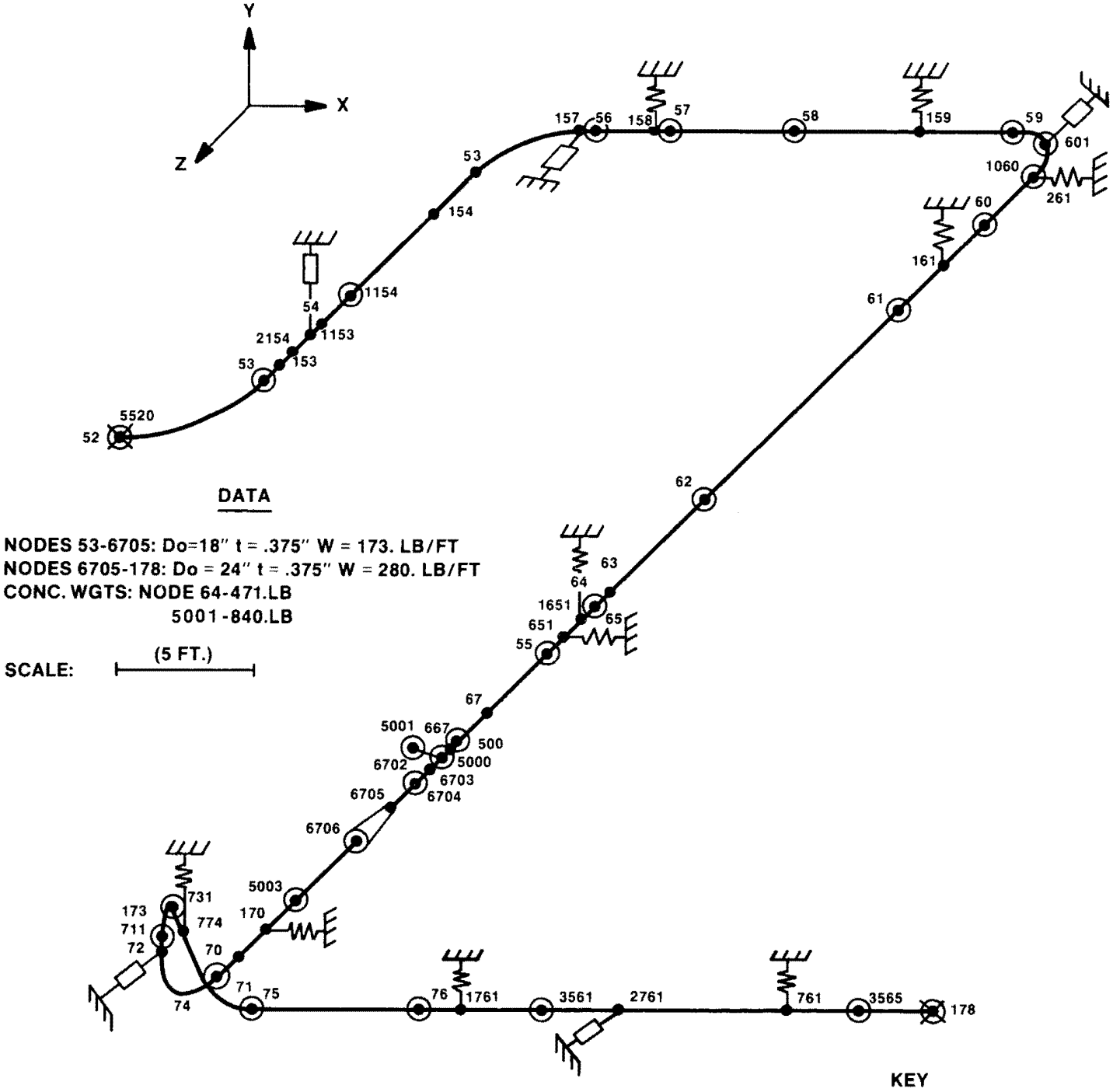
NOTE:
CIRCLED NUMBERS ARE ELEMENT NUMBERS.

AMENDMENT 61
DECEMBER 19, 1986

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

MATHEMATICAL MODEL FOR RESPONSE SPECTRA SEISMIC VERIFICATION

FIGURE 3B.1-2



KEY

— ANCHOR

— RESTRAINT

— SNUBBER

— MASS POINT

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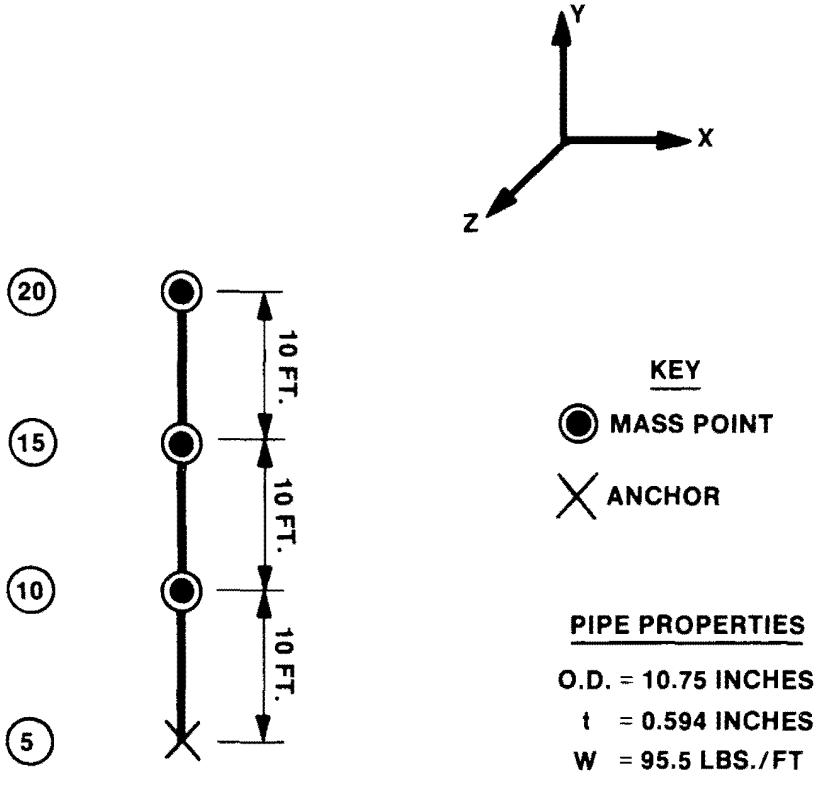
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

MATHEMATICAL MODEL FOR MISSING MASS VERIFICATION

FIGURE 3B.1-3

AMENDMENT 61
DECEMBER 19, 1986

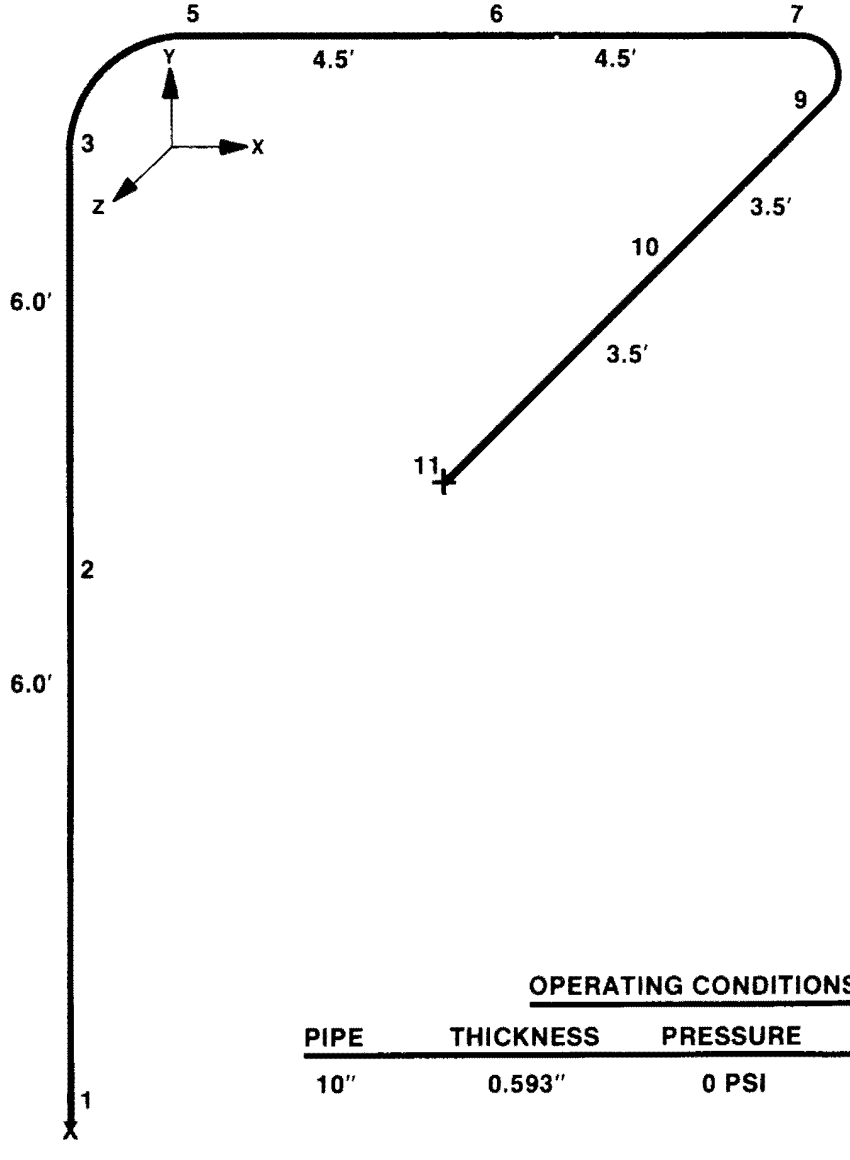


AMENDMENT 61
DECEMBER 19, 1986

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

MATHEMATICAL MODEL FOR MISSING MASS VERIFICATION

FIGURE 3B.1-4



OPERATING CONDITIONS

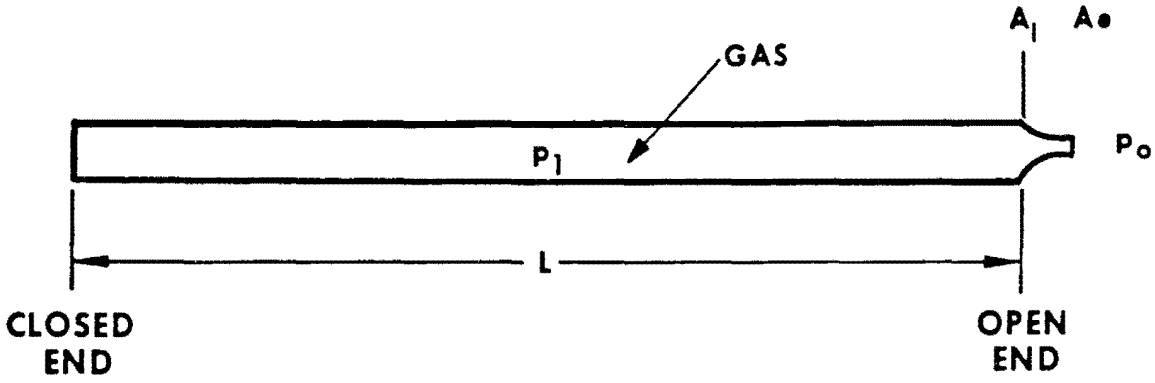
PIPE	THICKNESS	PRESSURE	TEMPERATURE
10″	0.593″	0 PSI	350°F

AMENDMENT 61
DECEMBER 19, 1986

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

MATHEMATICAL MODEL FOR THERMAL ANALYSIS

FIGURE 3B.1-5



CASE (A) FOR COMPARISON WITH ANALYTICAL RESULTS

INITIAL CONDITIONS =

$p_1/p_o = 4.72$, $a_o/a_1 = 0.80$

DIMENSIONS =

$A_e/A_1 = 0.6$, L = PIPE LENGTH

SPECIFIC HEAT RATIO =

$\gamma = C_p/C_v = 1.4$

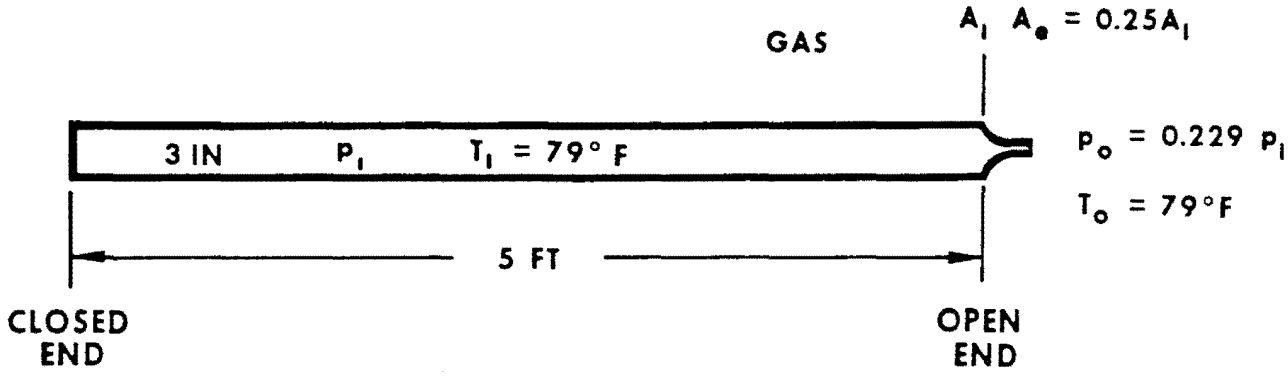
p = PRESSURE, a = SOUND VELOCITY, A = FLOW AREA

AMENDMENT 61
DECEMBER 19, 1986

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

SUDDEN DISCHARGE OF A GAS FROM A PIPELINE THROUGH A NOZZLE (CASE A)

FIGURE 3B.8-1



CASE (B) FOR COMPARISON WITH EXPERIMENTAL DATA AND HAND CALCULATION

PRESSURE = p_o = 14.7 psia, p_1 = 14.7/0.229 = 64.2 psia

AREA = $A_1 = \frac{\pi}{4}(0.25)^2 = 0.0491\ ft^2$, $A_e = 0.25A_1 = 0.0123\ ft^2$

GAS CONSTANT = R = 53.35 ft - lb_f/lb°R

TEMPERATURE = T_o = 79°F = 539°R, $T_1 = T_o$

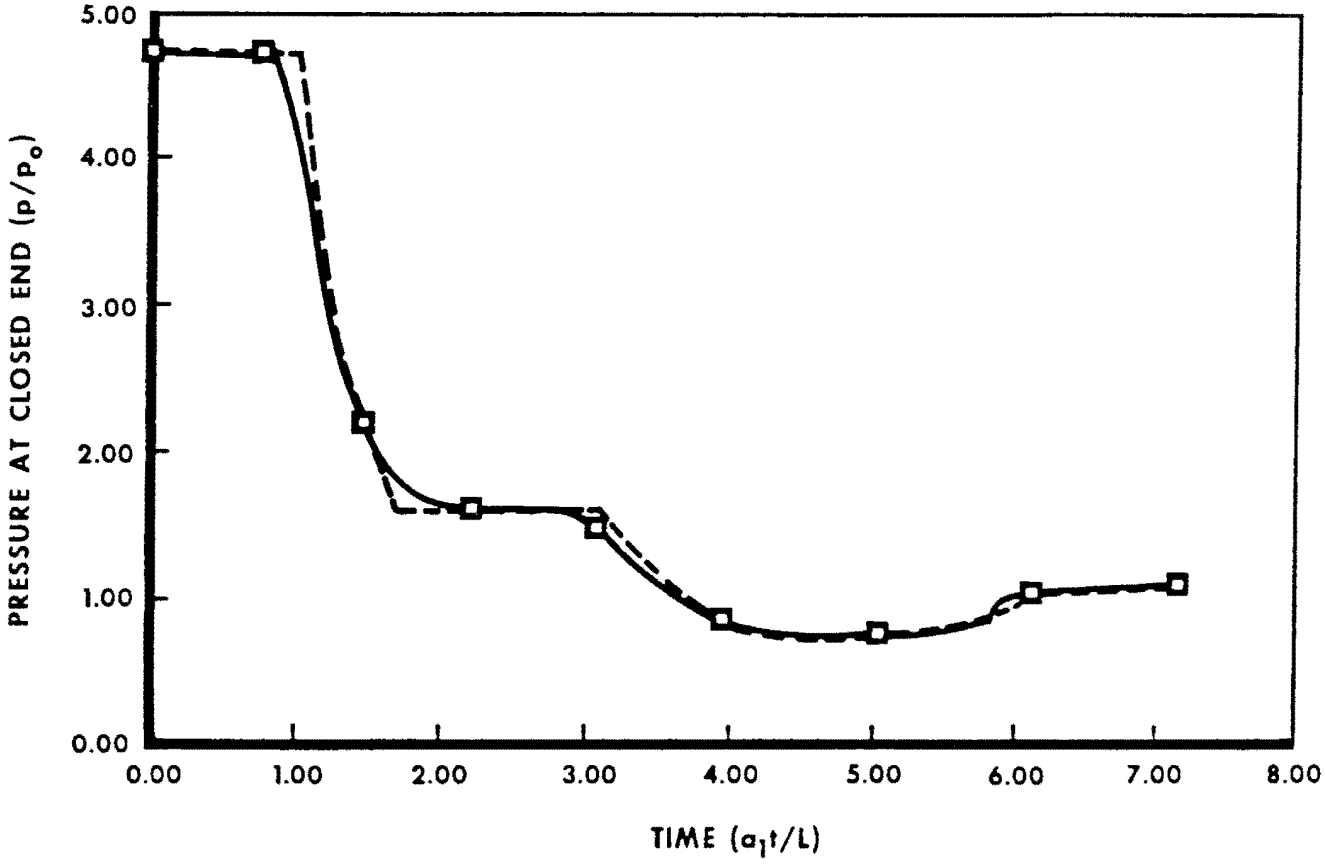
DENSITY = $\rho_o = \frac{p_o}{RT_o} = 0.0736\ lb/ft^3$, $\rho_1 = \frac{p_1}{RT_1} = 0.3215\ lb/ft^3$

AMENDMENT 61
DECEMBER 19, 1986

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

SUDDEN DISCHARGE OF A GAS FROM A PIPELINE THROUGH A NOZZLE (CASE B)

FIGURE 3B.8-2



LEGEND

(CASE A)

——— STEHAM

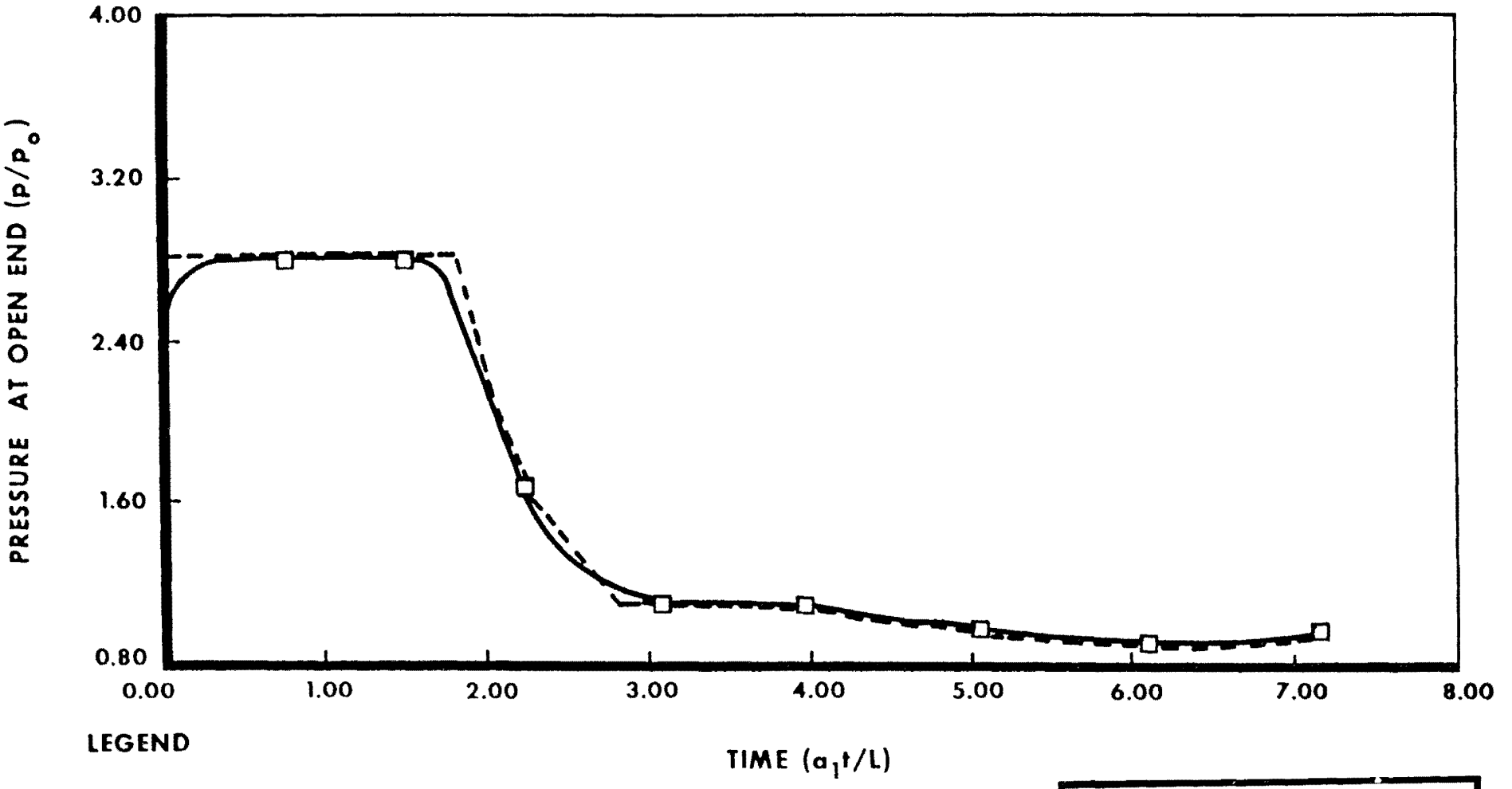
– – – – ANALYTICAL SOLUTION (REF 4 & 5)

AMENDMENT 61
DECEMBER 19, 1986

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

COMPARISON OF PRESSURE RESPONSE AT THE CLOSED END

FIGURE 3B.8-3



LEGEND

(CASE A)

STEHAM

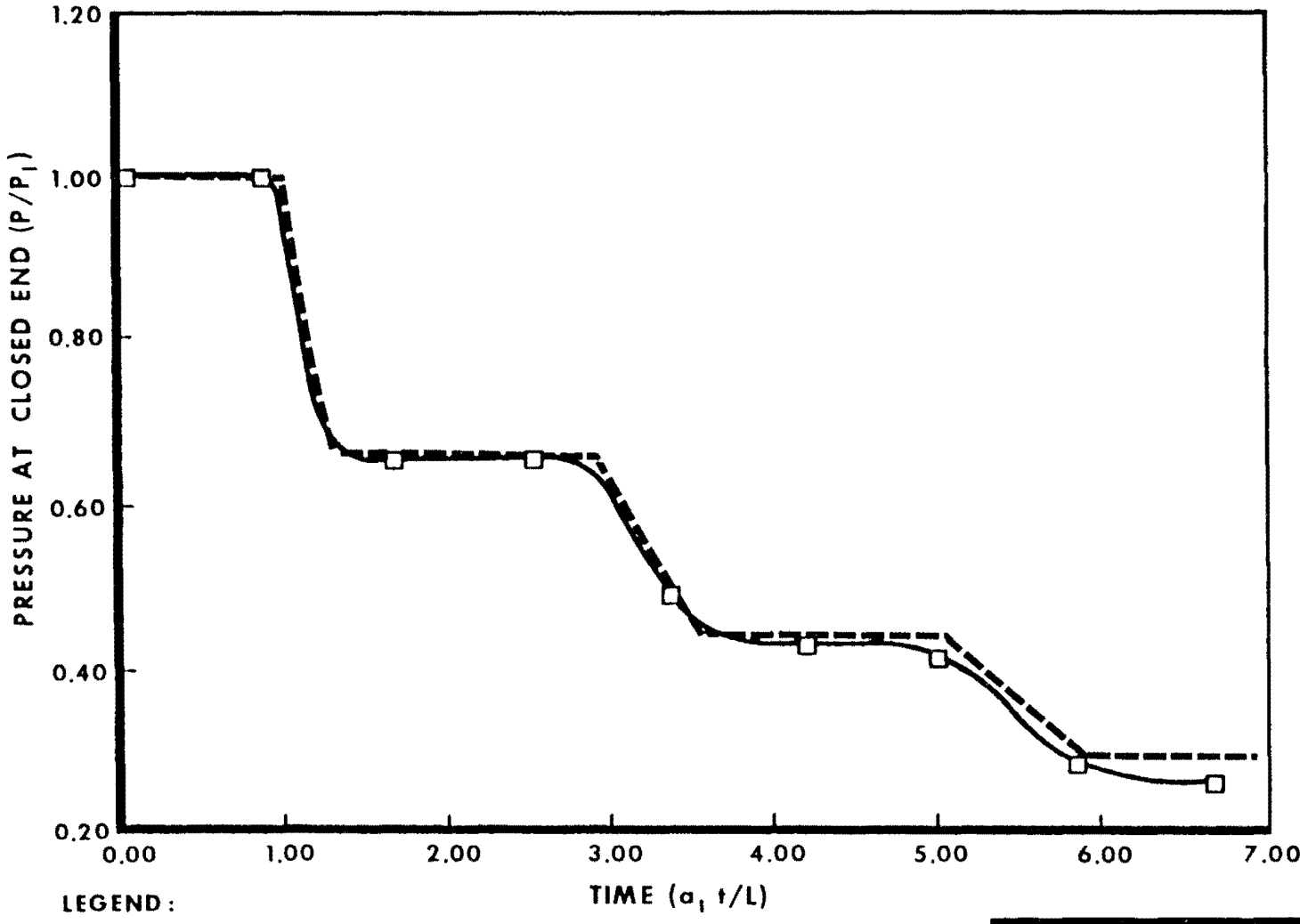
ANALYTICAL SOLUTION (REF 4&5)

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

COMPARISON OF PRESSURE RESPONSE AT THE OPEN END

FIGURE 3B.8-4

AMENDMENT 61
DECEMBER 19, 1986



LEGEND:

(CASE B)

STEHAM

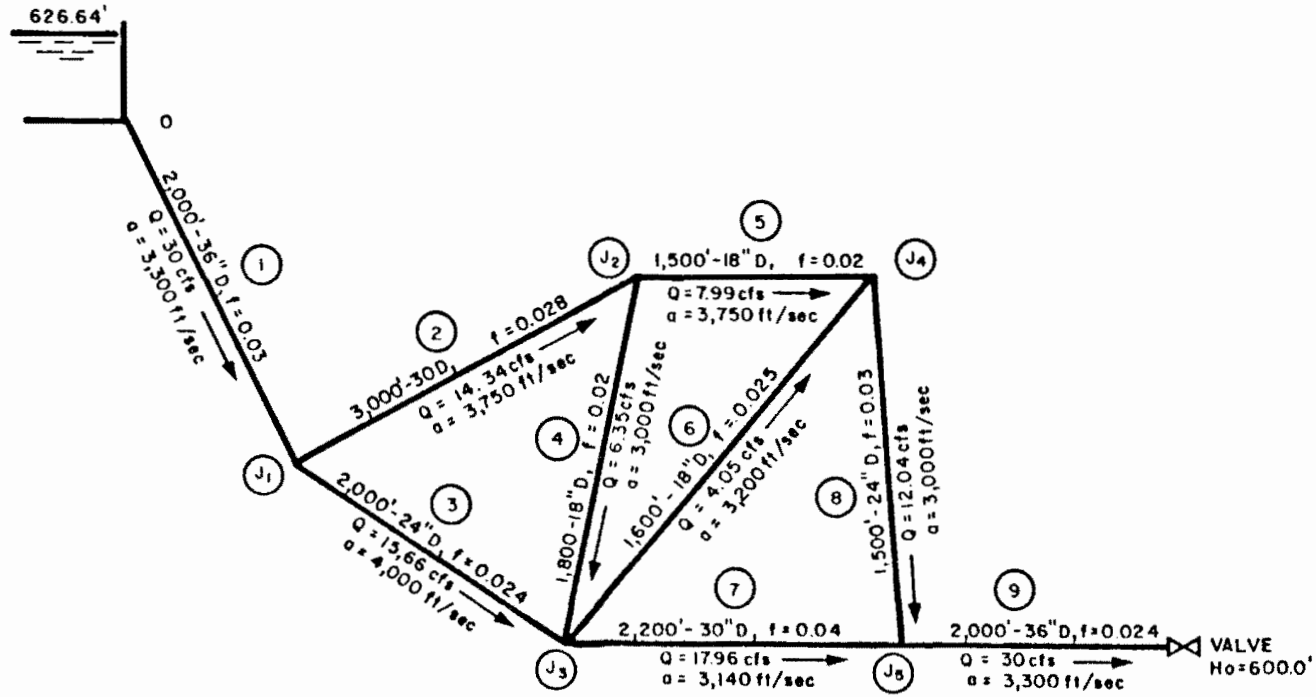
ANALYTICAL SOLUTION (REF 4&5)

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

COMPARISON OF PRESSURE RESPONSES BY STEHAM & EXPERIMENT

FIGURE 3B.8-5

AMENDMENT 61
DECEMBER 19, 1986

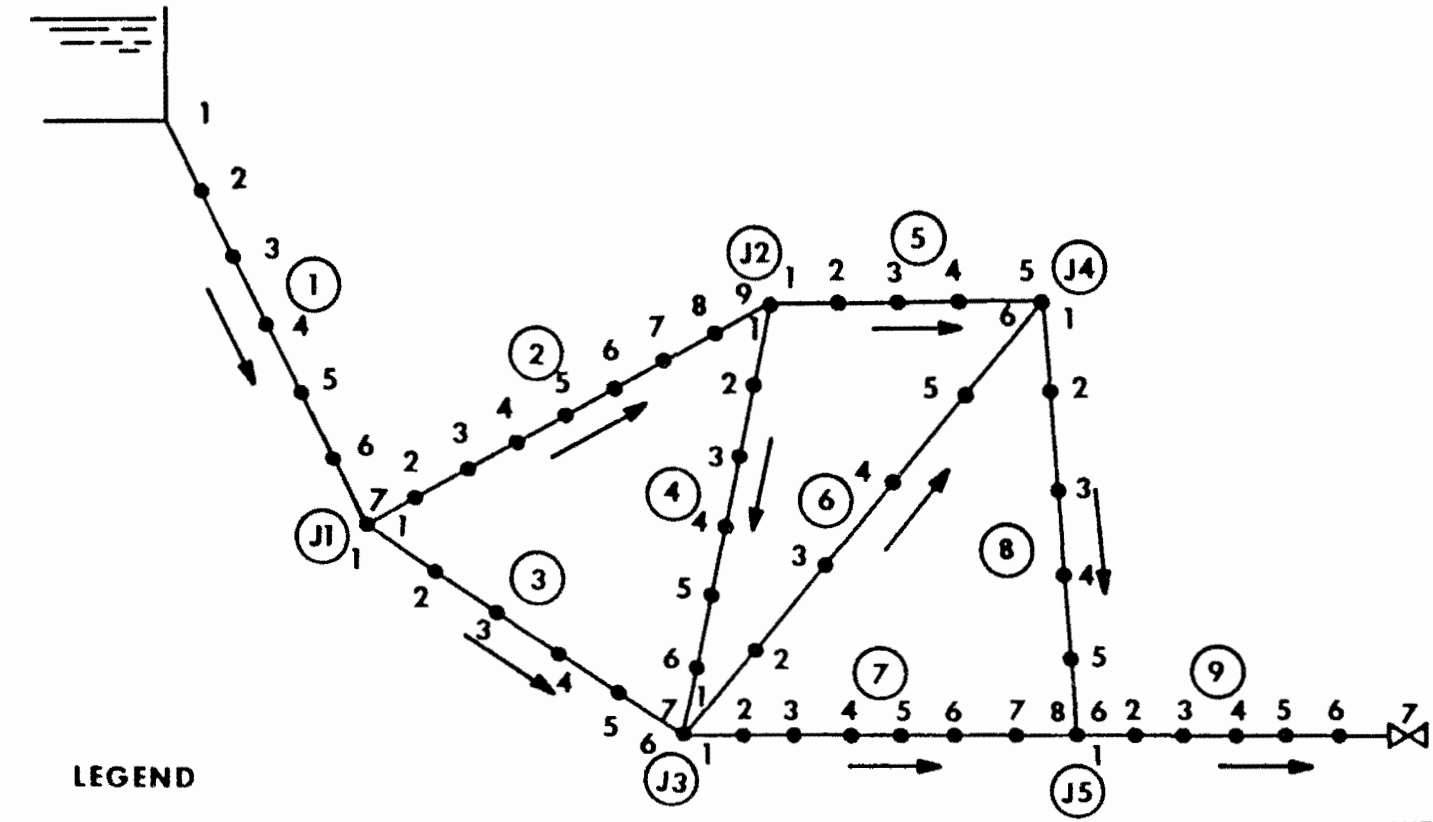


AMENDMENT 61
DECEMBER 19, 1986

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

HYDRAULIC NETWORK FOR
VERIFICATION PROGRAM

FIGURE 3B.9-1



LEGEND

(5) PIPE NUMBER

(J1) PIPE JUNCTION

5 NODE NUMBER

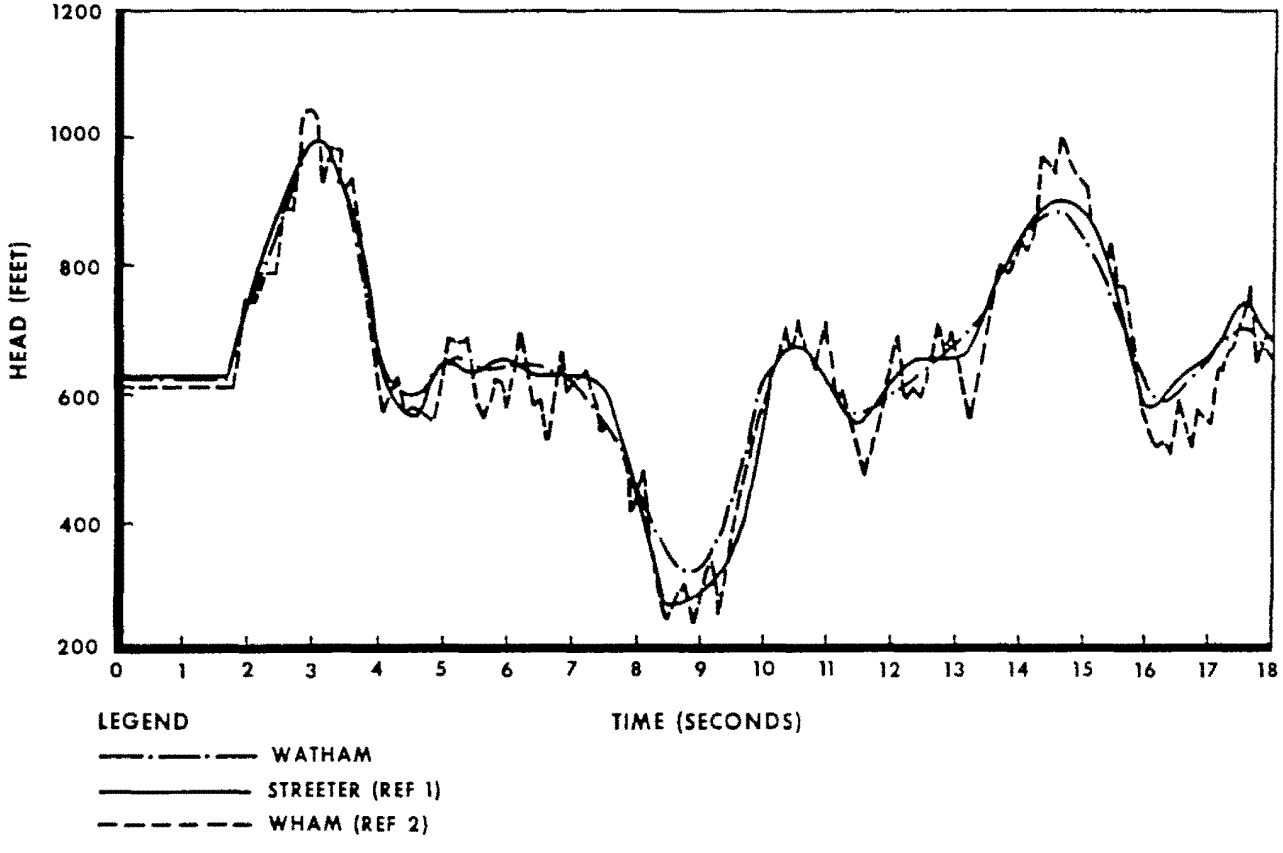
VALVE

AMENDMENT 61
DECEMBER 19, 1986

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

HYDRAULIC NETWORK FOR
WATHAM VERIFICATION

FIGURE 3B.9-2

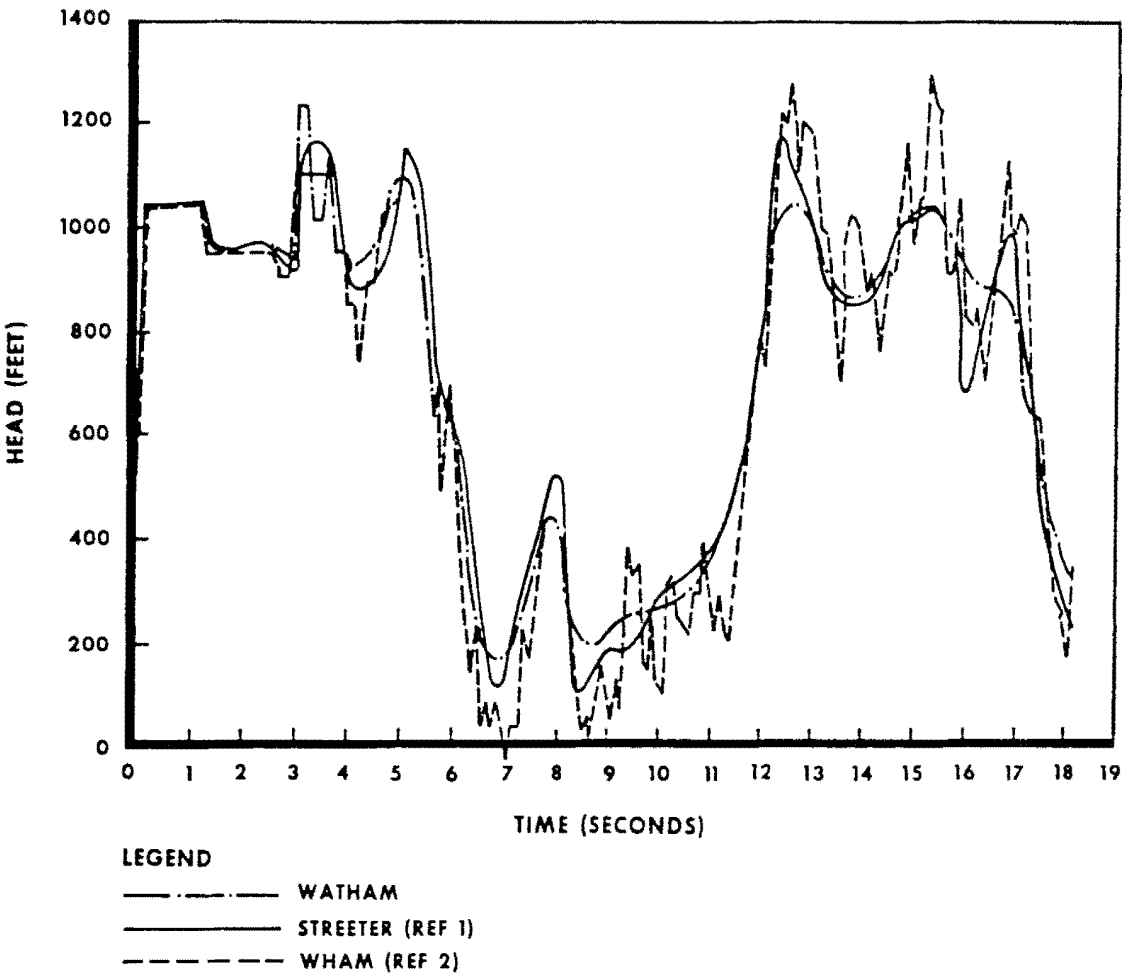


AMENDMENT 61
DECEMBER 19, 1986

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

HEAD-VERSUS-TIME PLOT
FOR JUNCTION J

FIGURE 3B.9-3

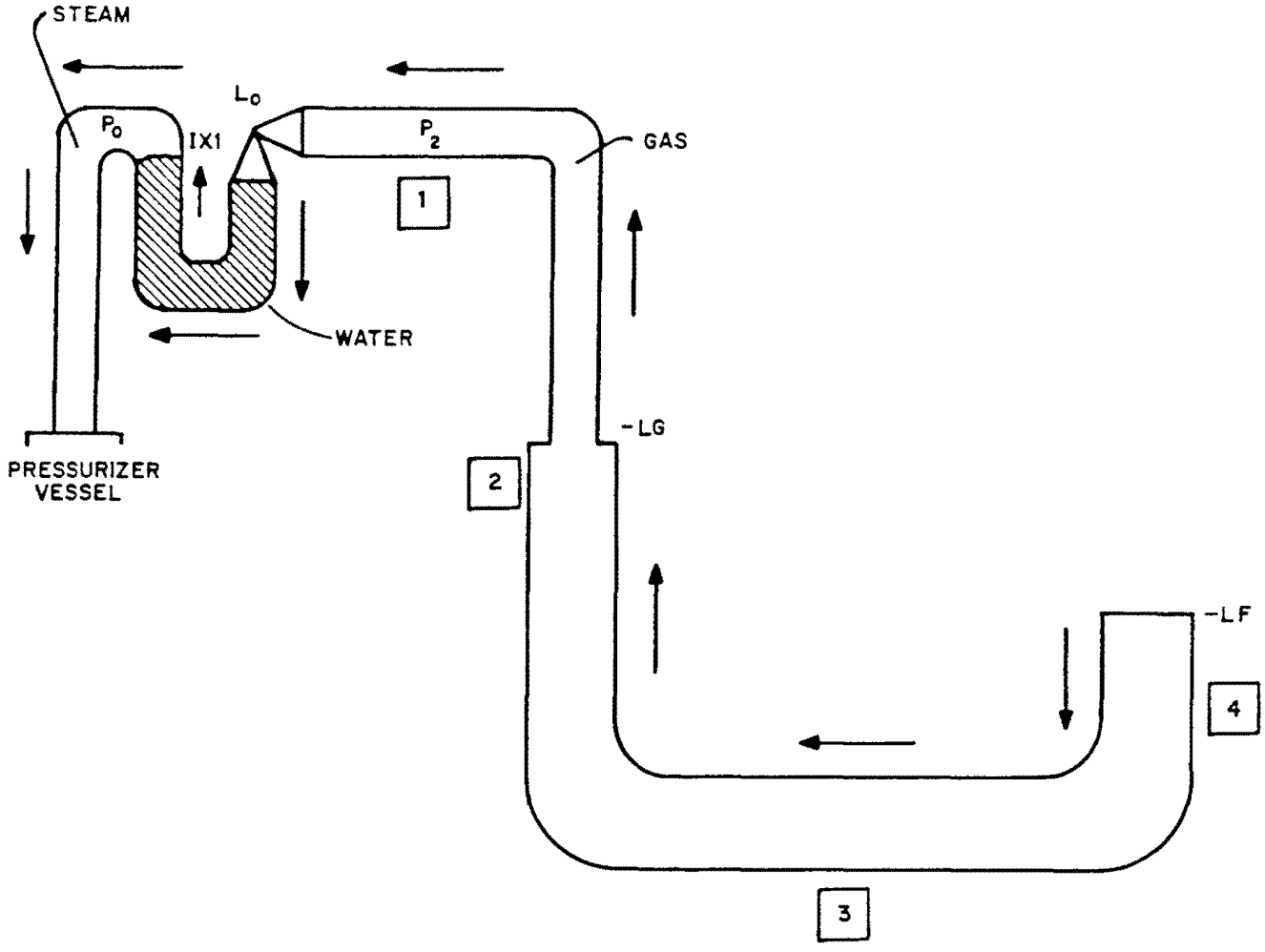


AMENDMENT 61
DECEMBER 19, 1986

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

HEAD-VERSUS-TIME PLOT AT VALVE

FIGURE 3B.9-4



DISTANCES FROM PRESSURIZER VESSEL:

L_o = SAFETY/RELIEF VALVE

LG = DOWNSTREAM AREA CHANGE

LF = PIPE EXIT

IX1 = TRAILING EDGE OF SLUG 1

← FORCING FUNCTION DIRECTION, +

□ EPRI TEST 908 SEGMENT NO.

WATSLUG MODEL PIPE NUMBER

1 - PRESSURIZER TO L_o

2 - L_o TO LG

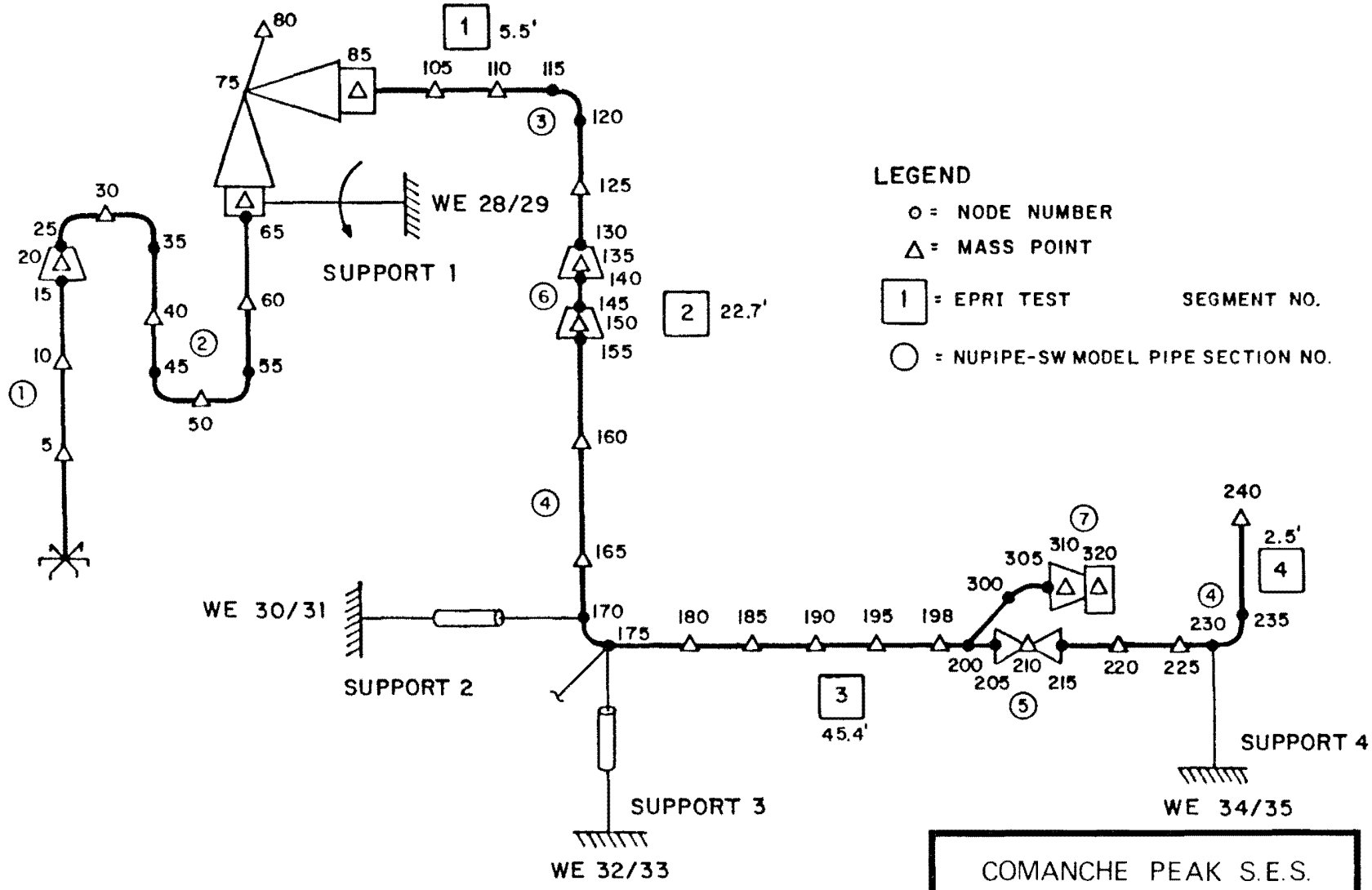
3 - LG TO LF

AMENDMENT 61
DECEMBER 19, 1986

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

WATSLUG MODEL OF EPRI SAMPLE PROBLEM

FIGURE 3B.10-1



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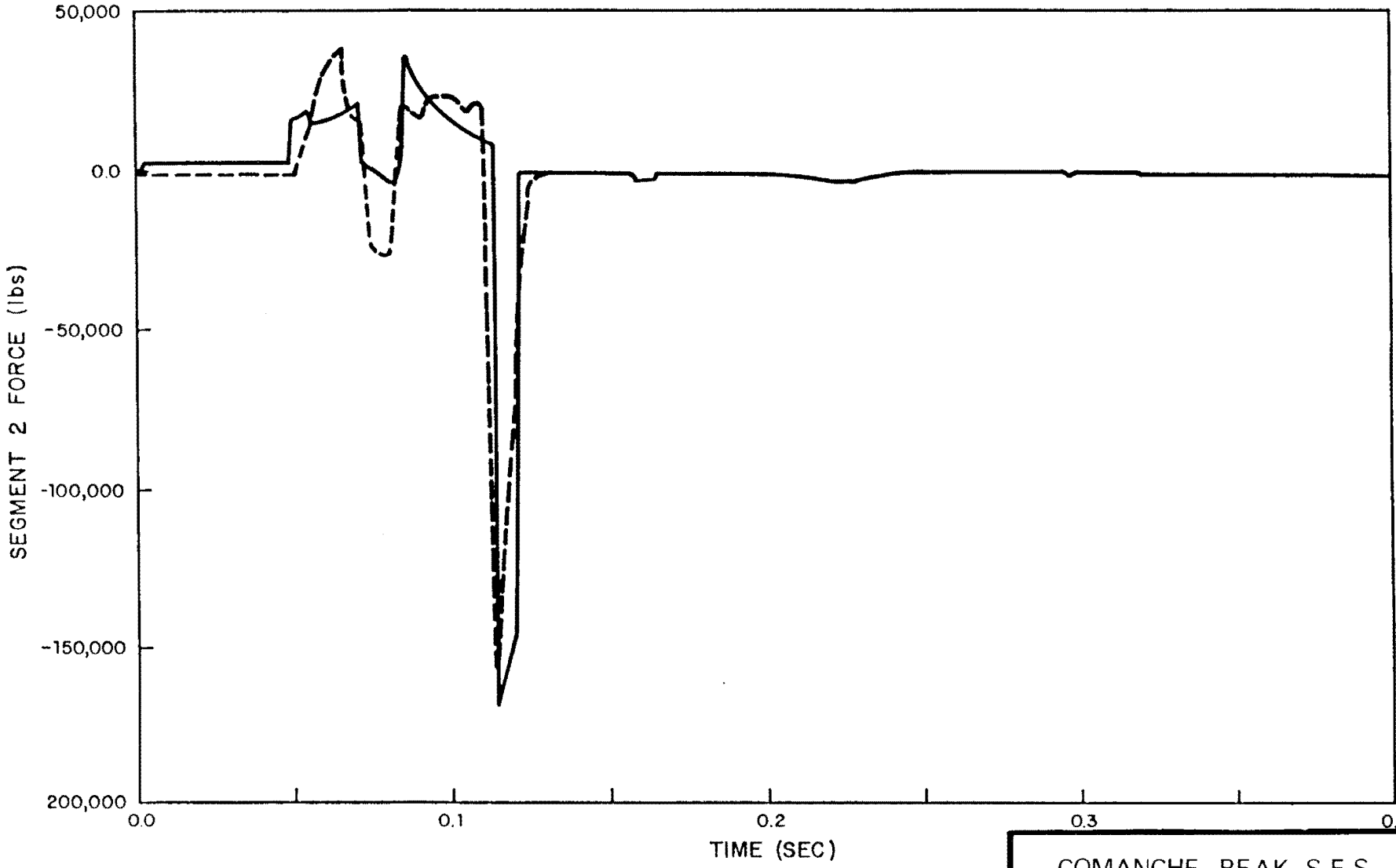
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

NUPIPE-SW MODEL OF EPRI SAMPLE PROBLEM

FIGURE 3B.10-2

AMENDMENT 61
DECEMBER 19, 1986



LEGEND

WATSLUG

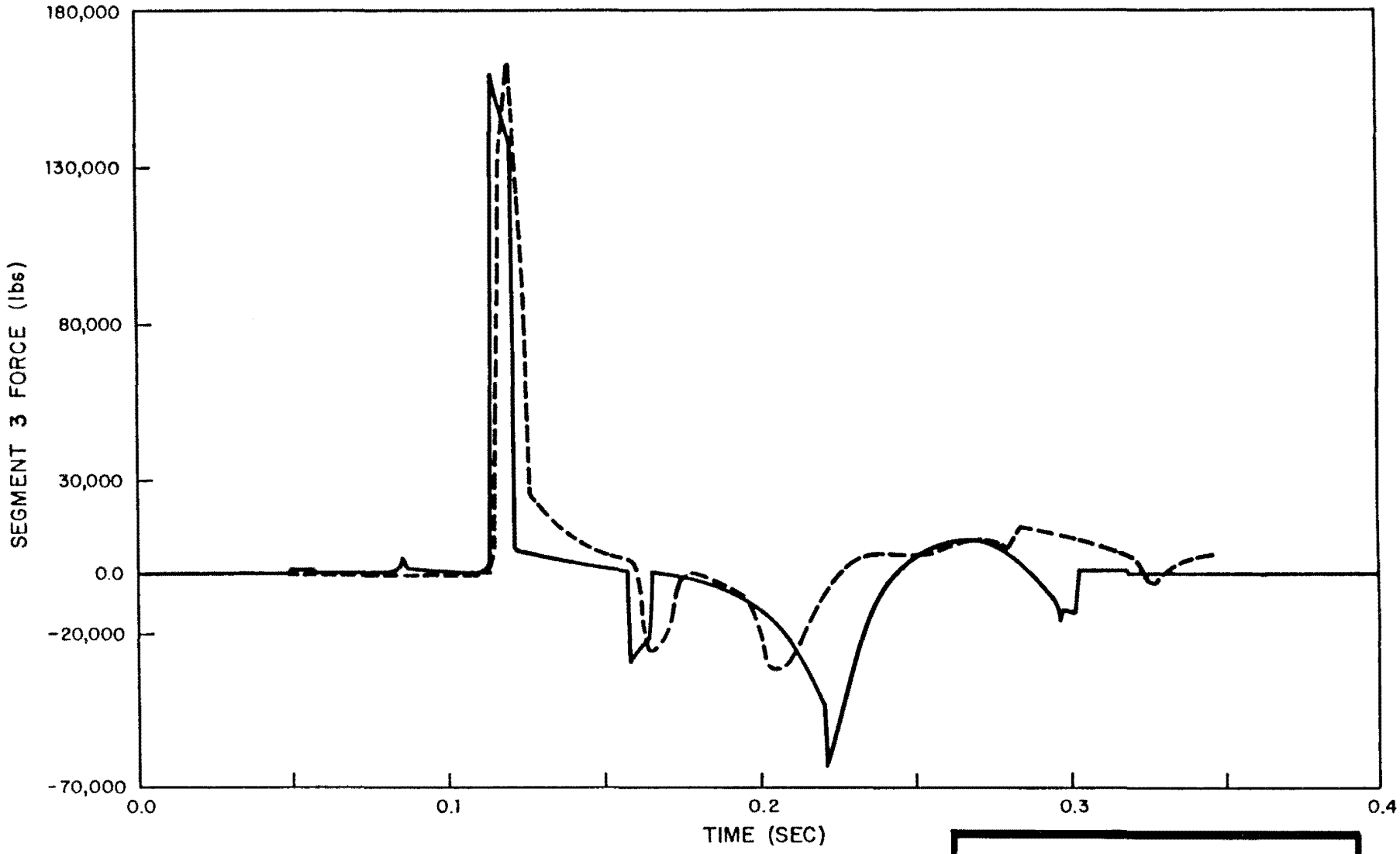
RELAP 5/MOD 1

AMENDMENT 61
DECEMBER 19, 1986

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

COMPARISON OF SEGMENT 2
FORCING FUNCTION

FIGURE 3B.10-3



LEGEND

WATSLUG

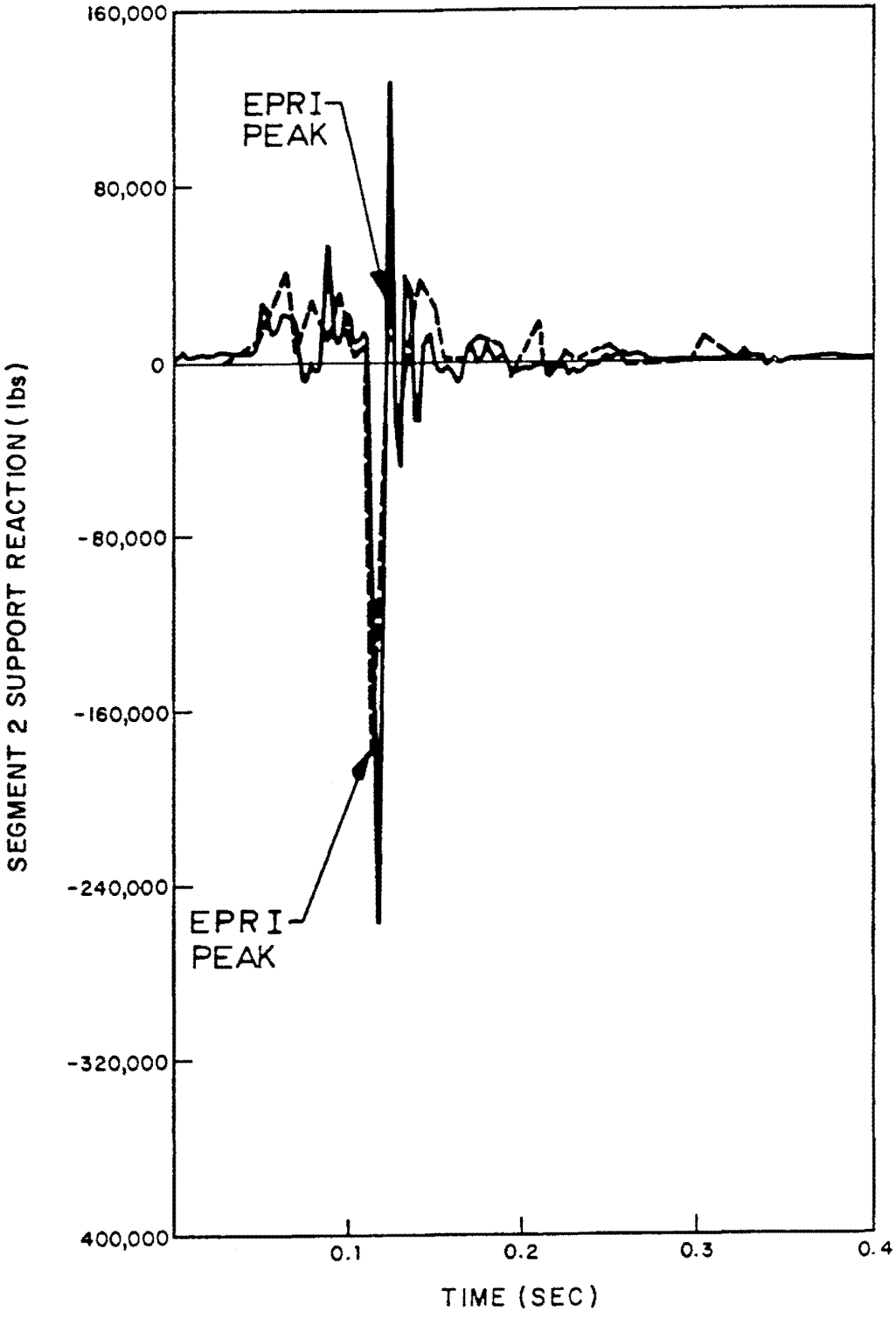
RELAP 5/MOD 1

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

COMPARISON OF SEGMENT 3
FORCING FUNCTION

FIGURE 3B.10-4

AMENDMENT 61
DECEMBER 19, 1986



LEGEND

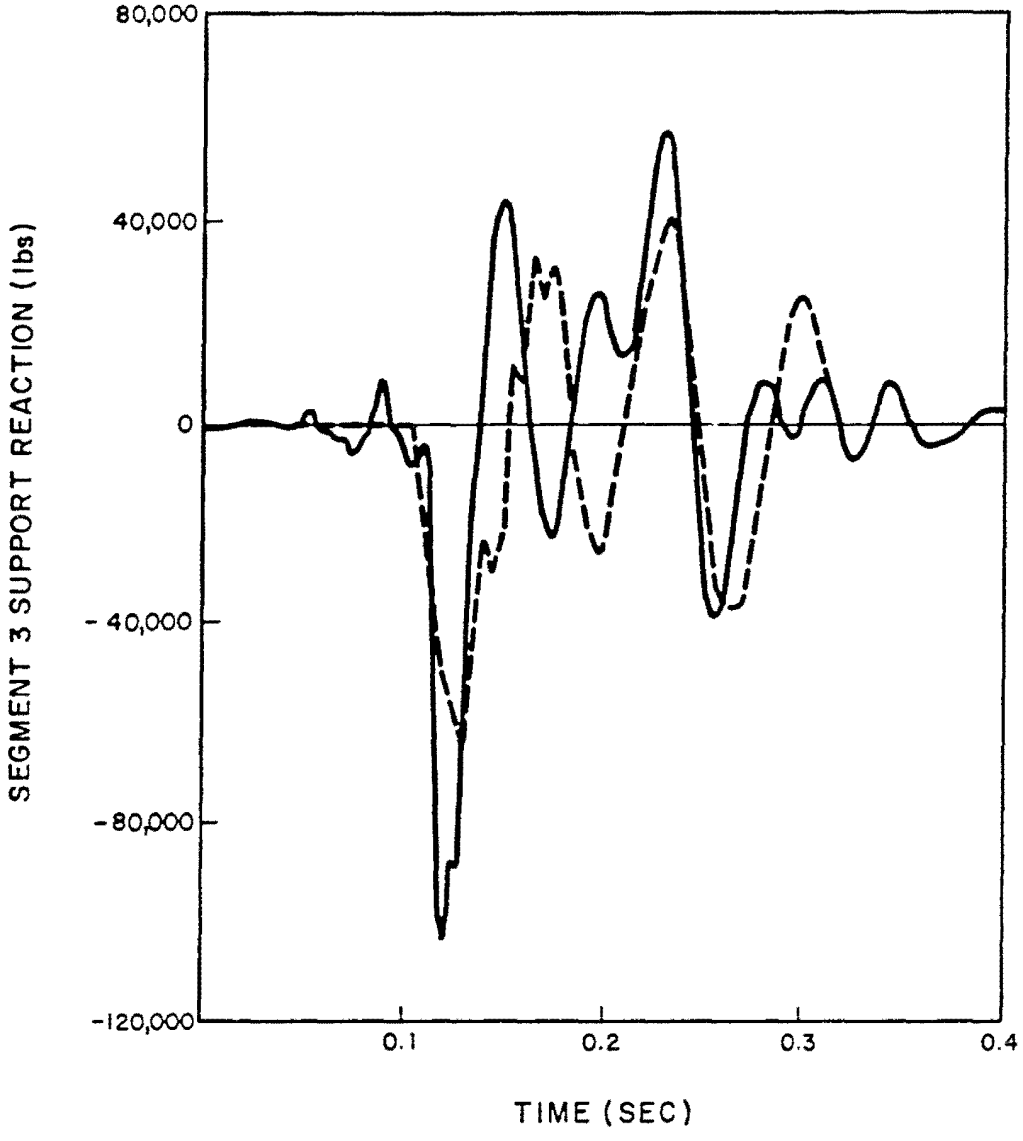
——— NUPIPE-SW

— — — EPRI TEST RESULTS

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

COMPARISON OF SEGMENT 2 SUPPORT REACTION

FIGURE 3B.10-5



LEGEND

NUPIPE-SW

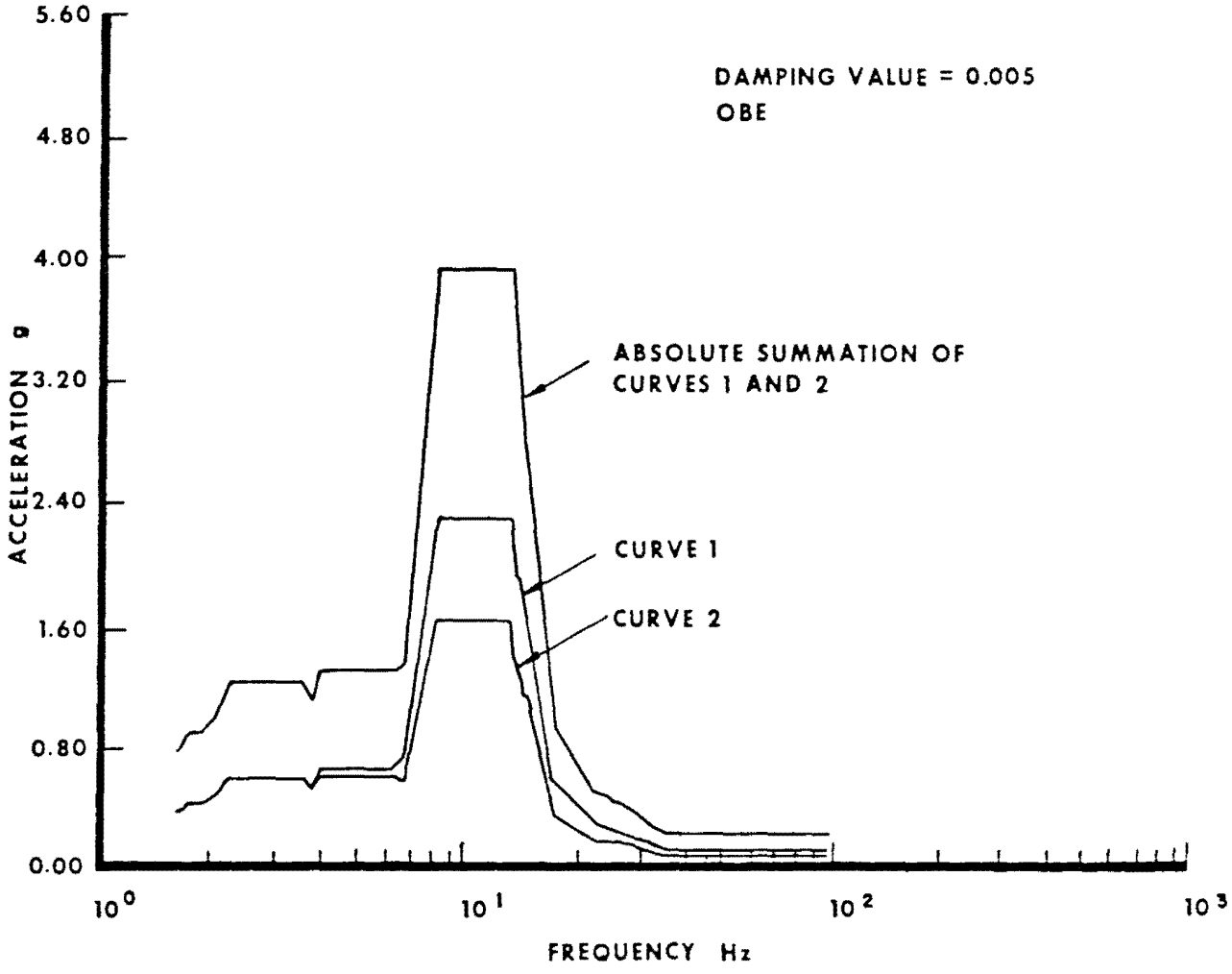
EPRI TEST RESULTS

AMENDMENT 61
DECEMBER 19, 1986

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

COMPARISON OF SEGMENT 3
SUPPORT REACTION

FIGURE 3B.10-6

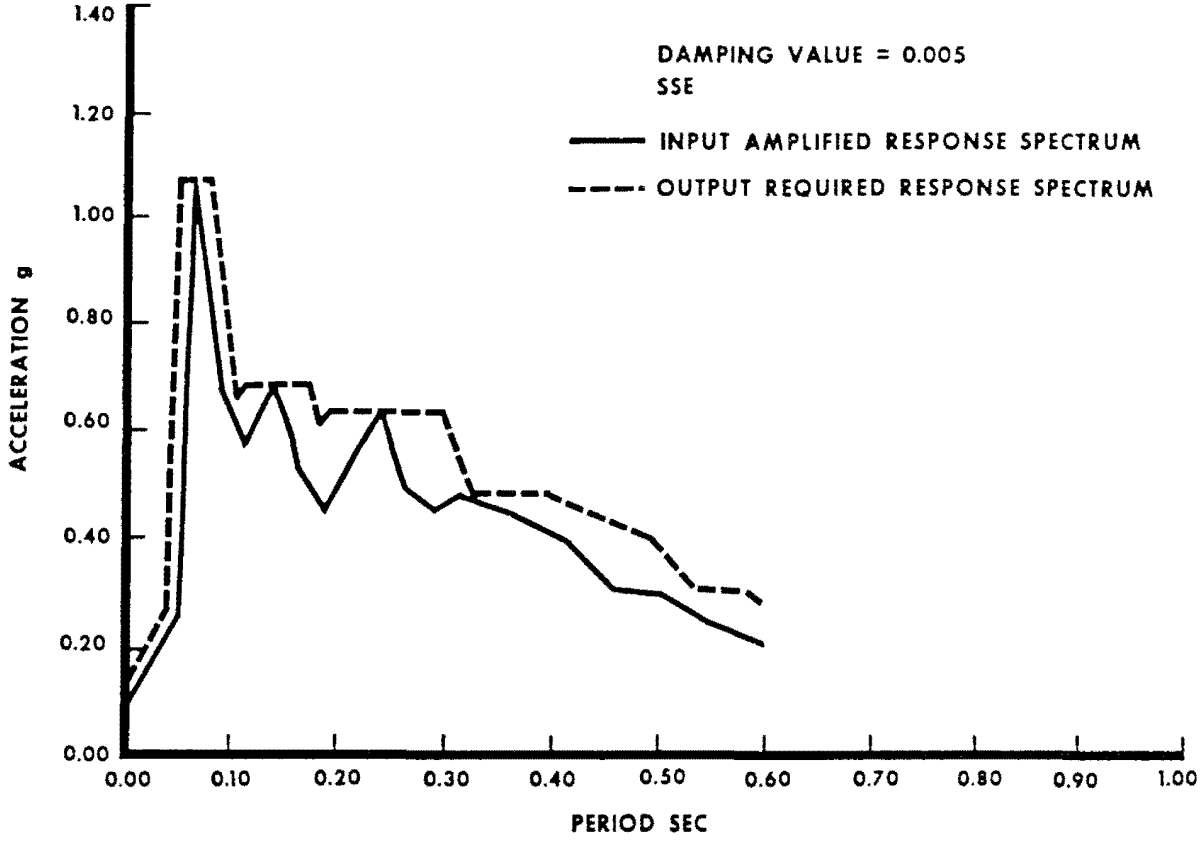


AMENDMENT 61
DECEMBER 19, 1986

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

PSPECTRA-ABSOLUTE
SUMMATION OF ARS CURVES

FIGURE 3B.12-1

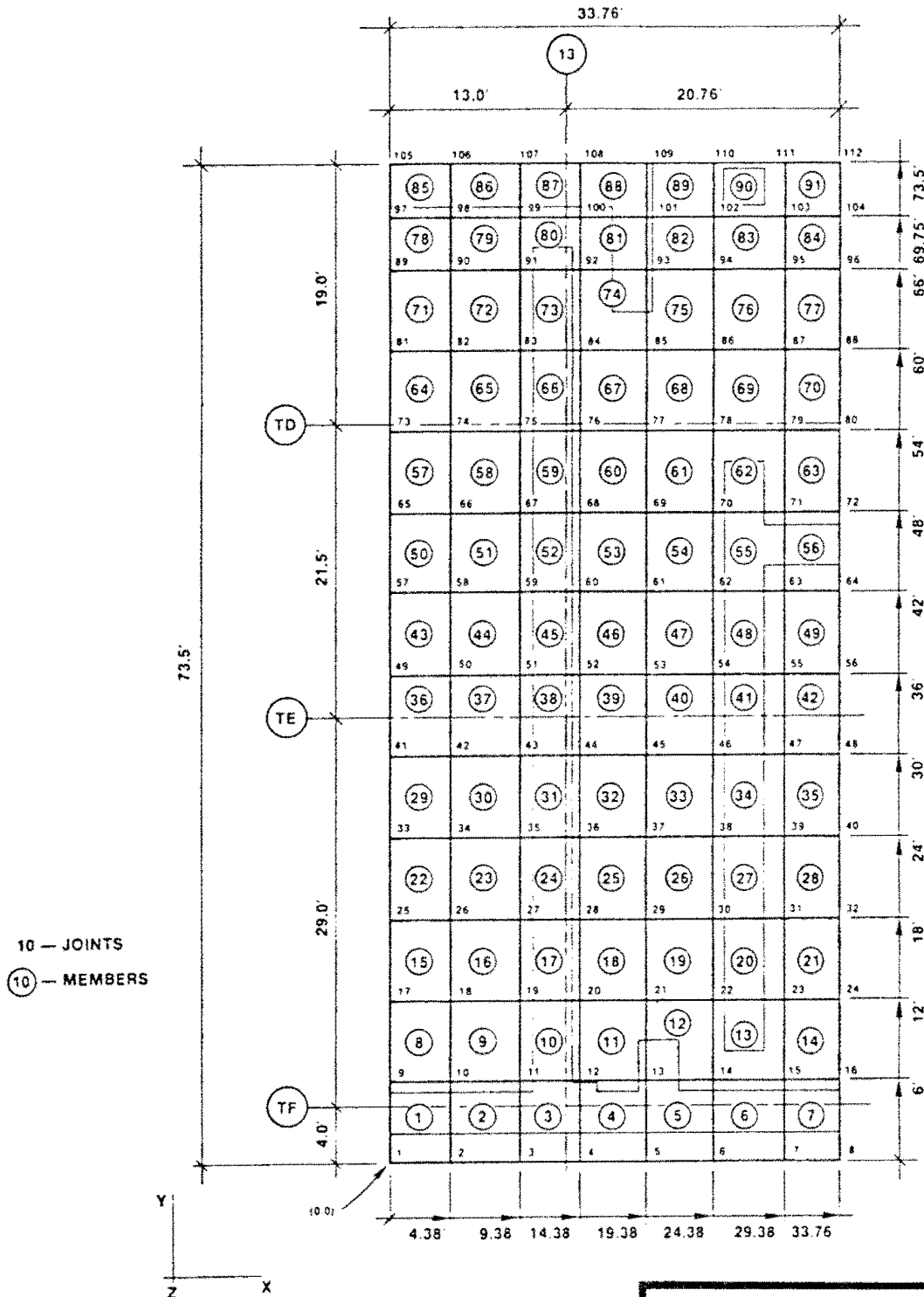


AMENDMENT 61
DECEMBER 19, 1986

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

PSPECTRA-REQUIRED RESPONSE SPECTRUM GENERATION

FIGURE 3B.12-2

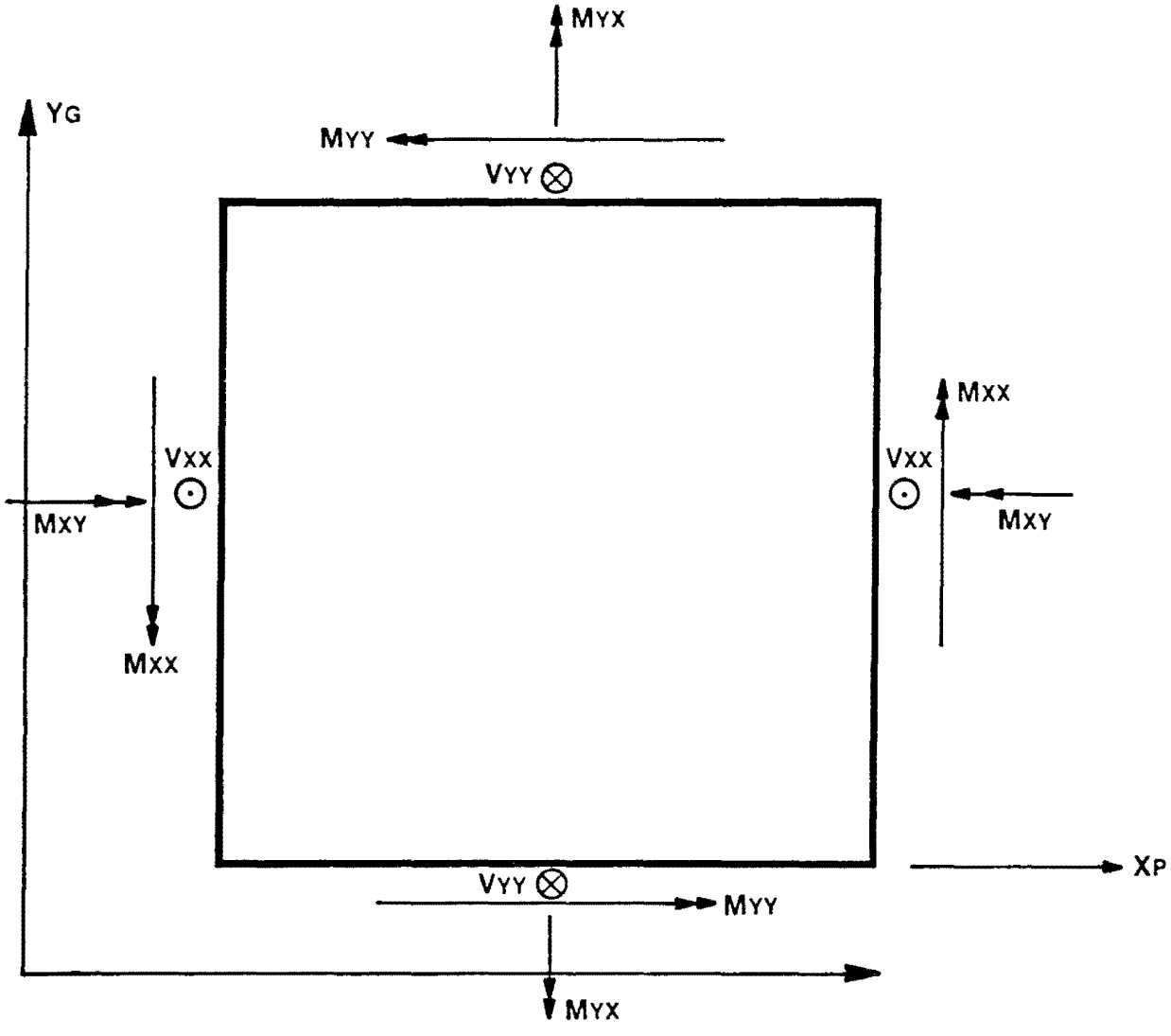


AMENDMENT 61
DECEMBER 19, 1986

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

FINITE ELEMENT MODEL OF THE FOUNDATION MAT FOR A PORTION OF THE OFF-GAS BUILDING

FIGURE 3B.13-1



NOTES:

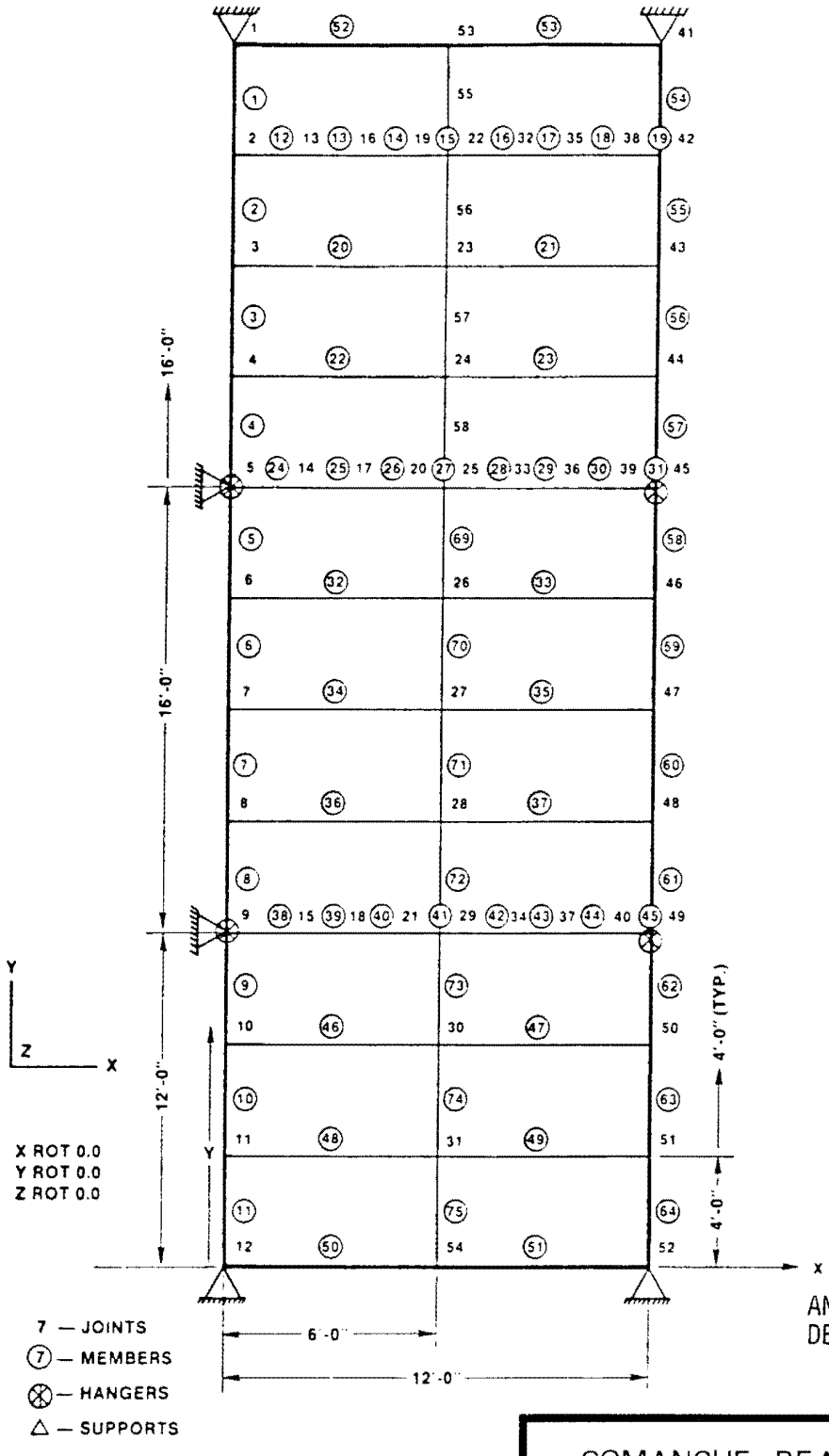
MXX, MYY, MXY, THE MOMENT RESULTANTS,ARE OUTPUT AT THE AVAILABLE LOCATIONS ON THE ELEMENTS.
VXX, VYY ARE ALSO OUTPUT FOR THE TRANSVERSE SHEAR RESULTANTS
⊙ POSITIVE DIRECTION COMING OUT OF PAPER
⊗ POSITIVE DIRECTION GOING INTO THE PAPER
XP, YP — PLANER COORDINATE SYSTEM
XG,YG — GLOBAL COORDINATE SYSTEM
XP IS PARALLEL TO XG
YP IS PARALLEL TO YG

AMENDMENT 61
DECEMBER 19, 1986

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

POSITIVE SIGN CONVENTION FOR RESULTS OF PLATE BENDING ELEMENT

FIGURE 3B.13-2

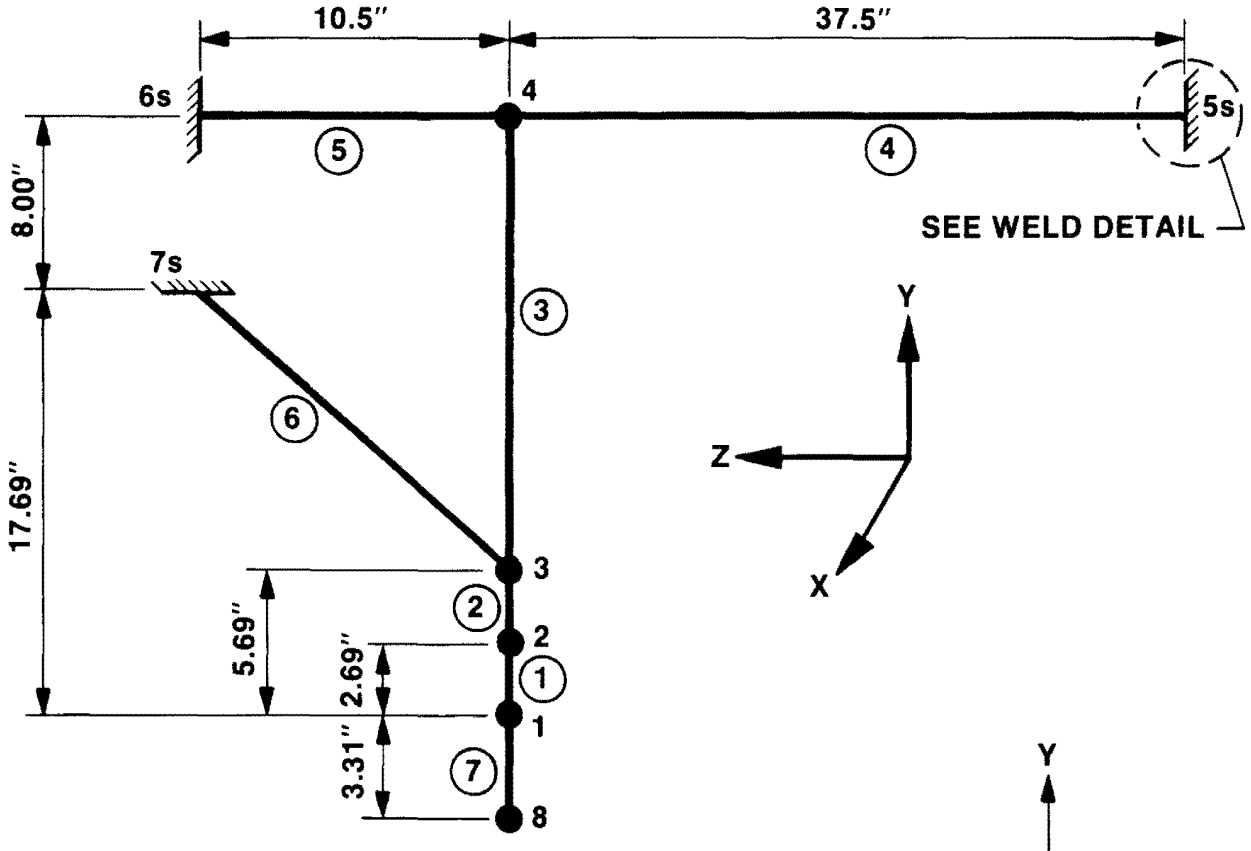


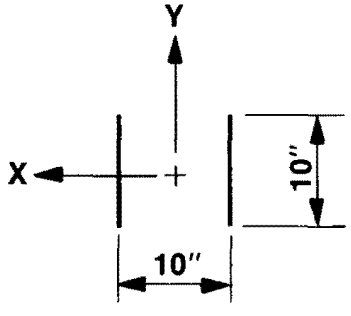
AMENDMENT 61
DECEMBER 19, 1986

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

MODEL - SUSPENDED CEILING

FIGURE 3B.13-3





WELD AT JOINT 5s

NOTES:

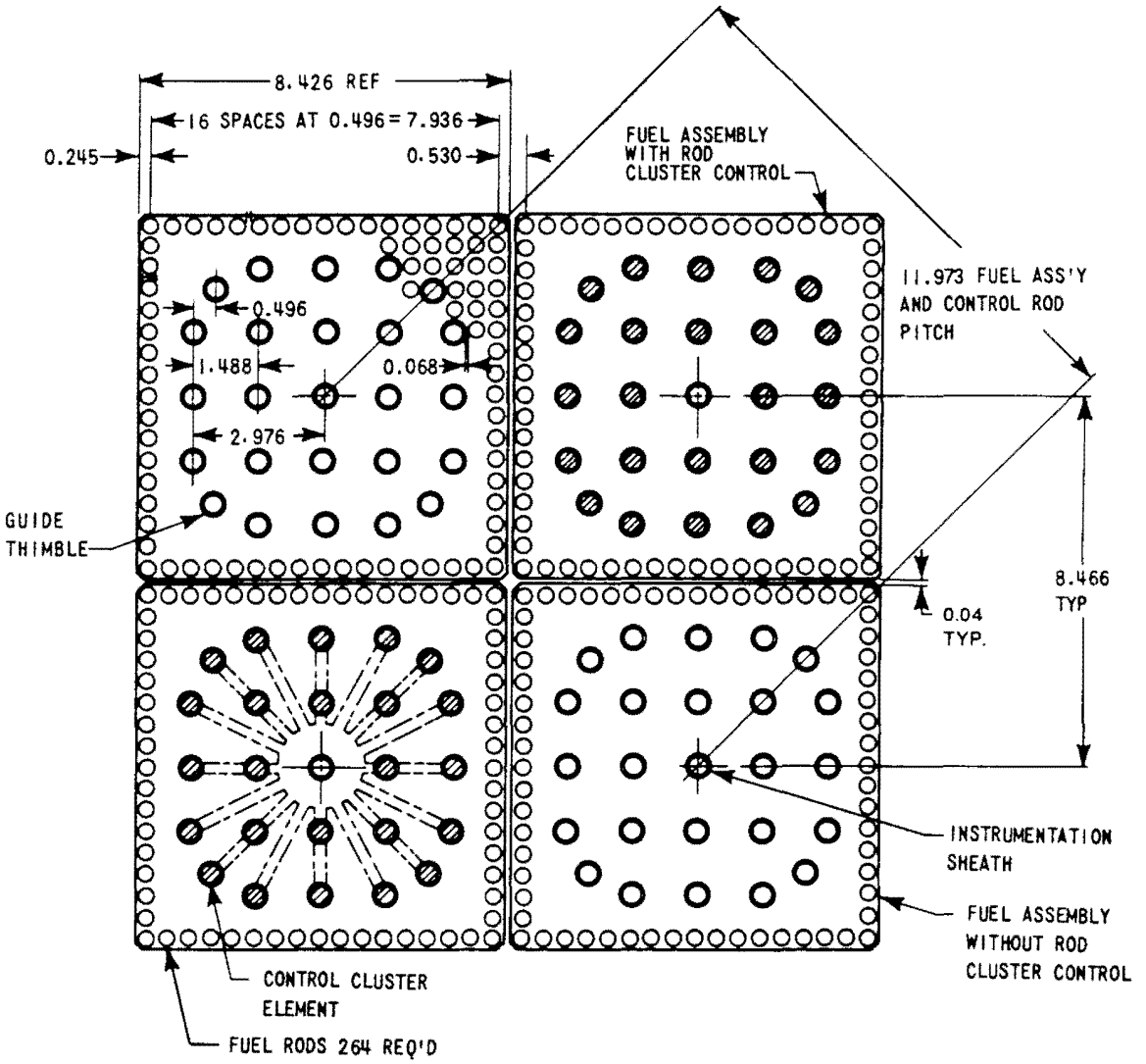
1. MEMBERS 1 & 6-6" SCH 160 PIPE
2. MEMBERS 2 & 3-8" SCH 160 PIPE
3. MEMBERS 4 & 5-TS 10" X 10" X 1/2"
4. MEMBER 7 IS A FICTITIOUS MEMBER FROM THE CENTERLINE TO THE OUTER SURFACE OF THE SUPPORTED PIPE
5. LEGEND:
   - 2 INDICATES JOINT
   - (2) INDICATES MEMBER
   - s INDICATES STRUCTURAL ATTACHMENT POINT

AMENDMENT 61
DECEMBER 19, 1986

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

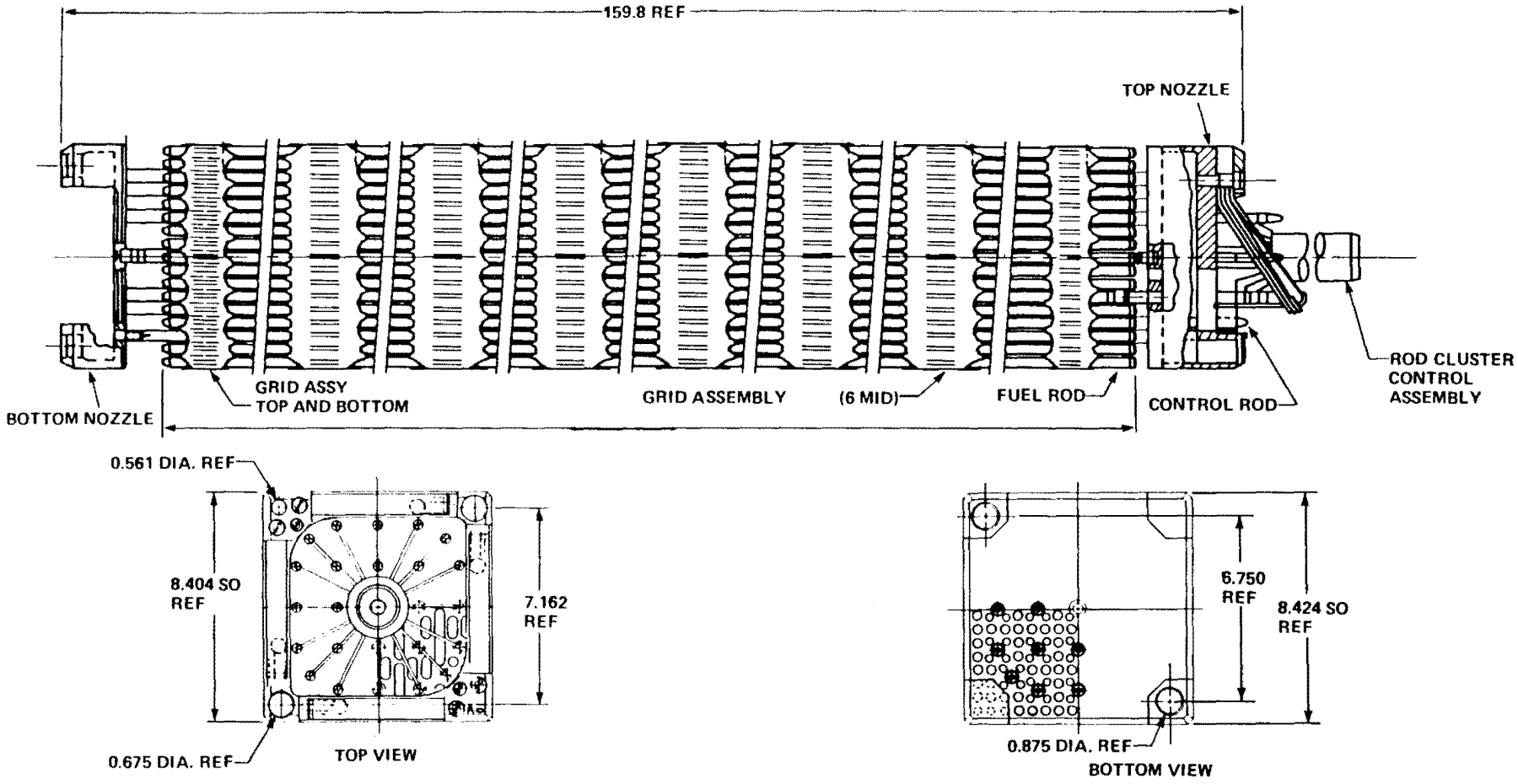
STRUDL INPUT ASME ANCHOR

FIGURE 3B.14-1



AMENDMENT 92
AUGUST 31, 1994

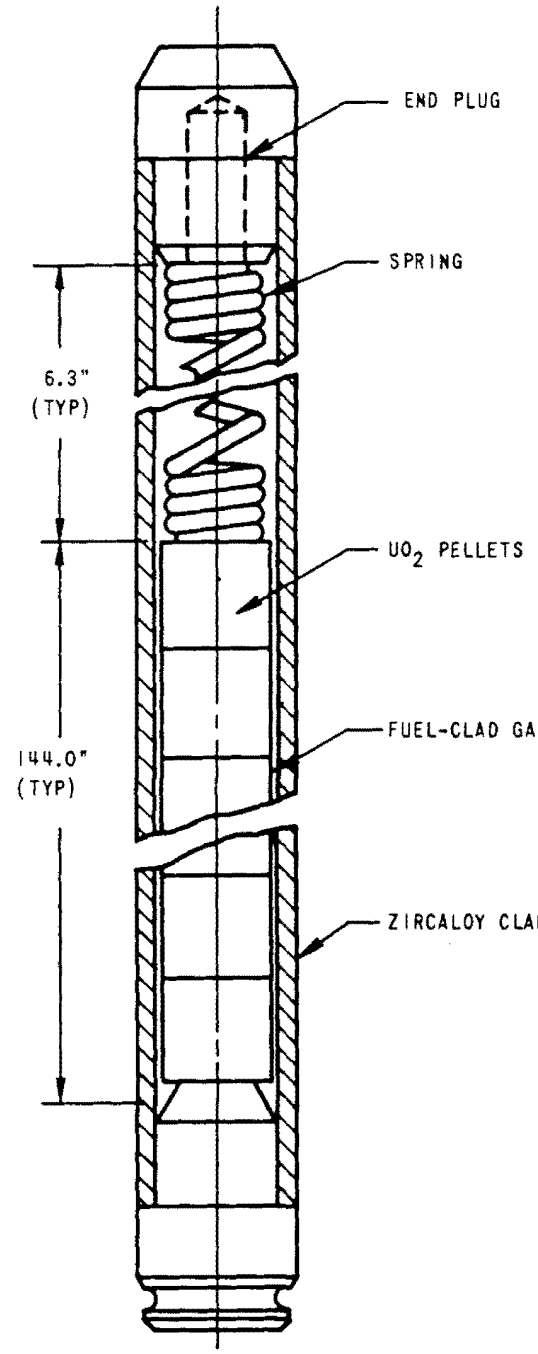
COMANCHE PEAK S.E.S. FINAL SAFETY ANALYSIS REPORT Typical
Fuel Assembly Cross Section 17X17
FIGURE 4.2-1



COMANCHE PEAK S.E.S. FINAL SAFETY ANALYSIS REPORT
Typical 17X17 Fuel Assembly Outline
FIGURE 4.2-2

AMENDMENT 92
AUGUST 31, 1994

7579-59



SPECIFIC DIMENSIONS DEPEND ON DESIGN VARIABLES SUCH AS PRE-PRESSURIZATION. POWER HISTORY. AND DISCHARGE BURNUP

COMANCHE PEAK S.E.S. FINAL SAFETY ANALYSIS REPORT Typical
Fuel Rod Schematic
FIGURE 4.2-3

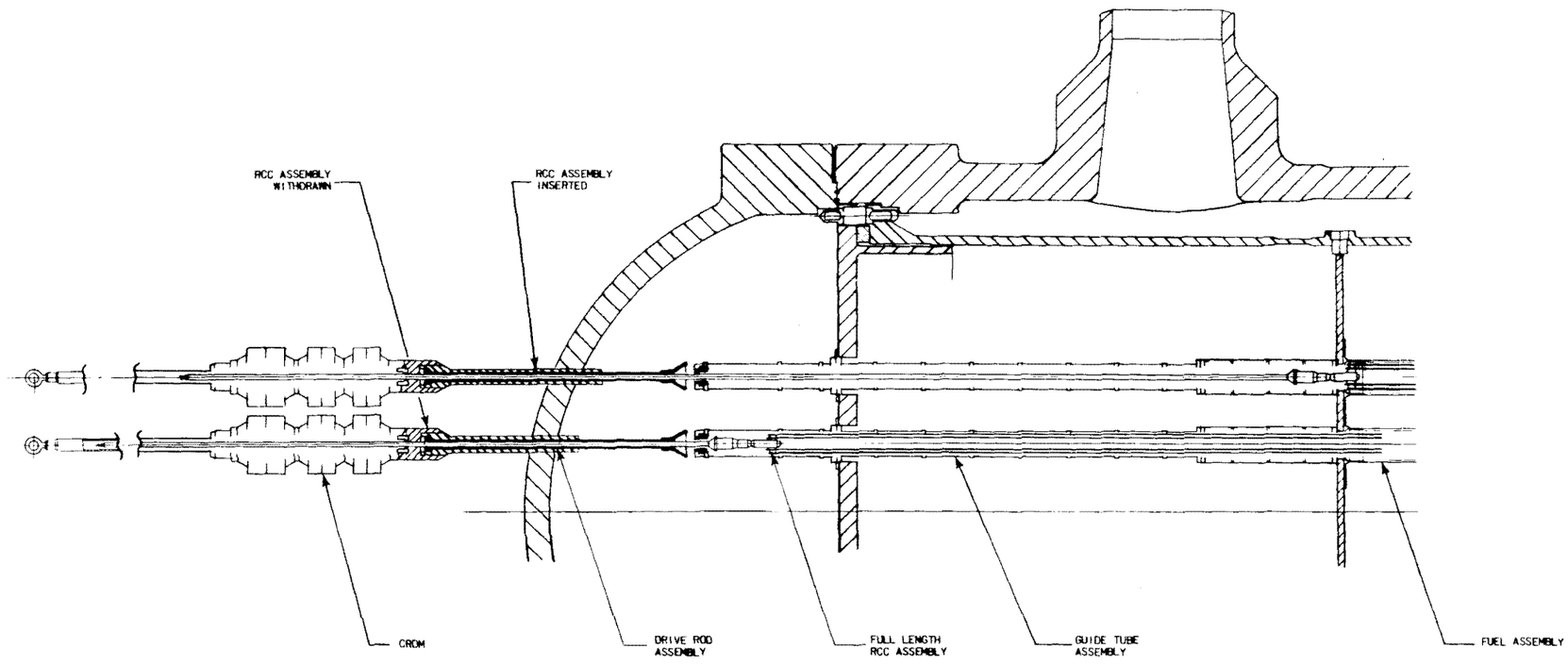
AMENDMENT 92
AUGUST 31, 1994

Figures 4.2-4A,B thru 4.2-7A,B have been deleted | 92

Figures 4.2-4A,B thru 4.2-7A,B have been deleted | 92

Figures 4.2-4A,B thru 4.2-7A,B have been deleted | 92

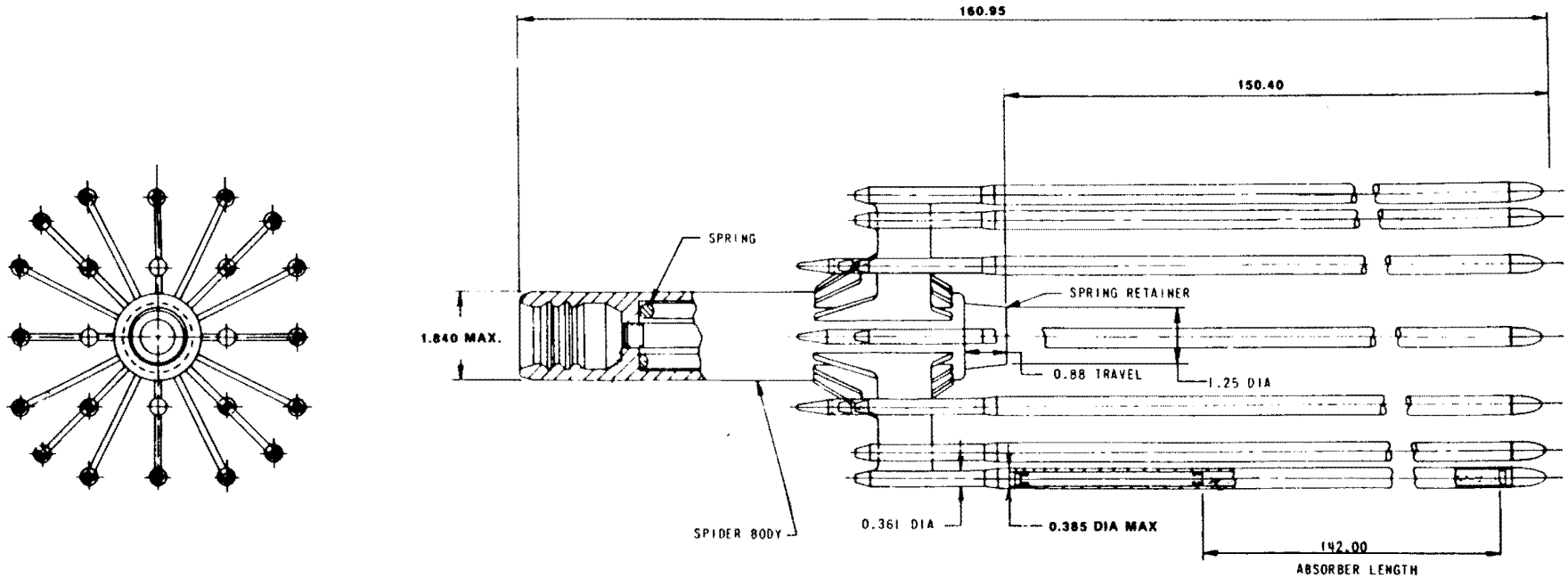
Figures 4.2-4A,B thru 4.2-7A,B have been deleted | 92



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Full Length RCC and
Drive Rod Assembly
With Interfacing Components

FIGURE 4.2-8

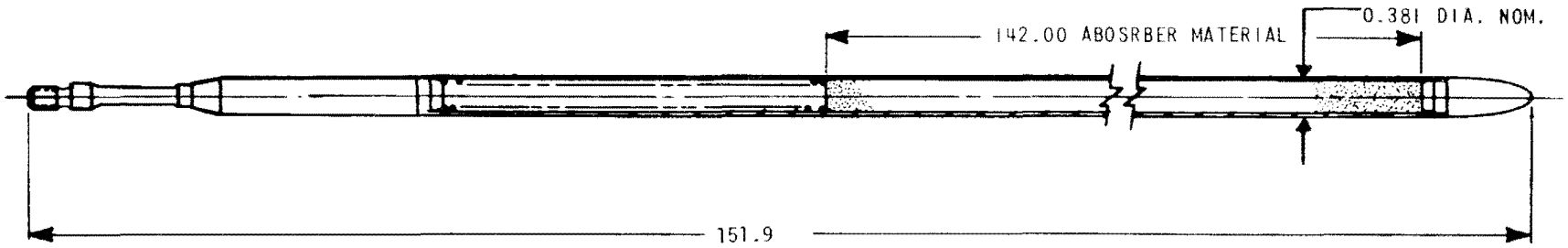


AMENDMENT 92
AUGUST 31, 1994

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
Typical

Rod Cluster Control
Assembly Outline

FIGURE 4.2-9



AMENDMENT 84
FEBRUARY 28, 1992

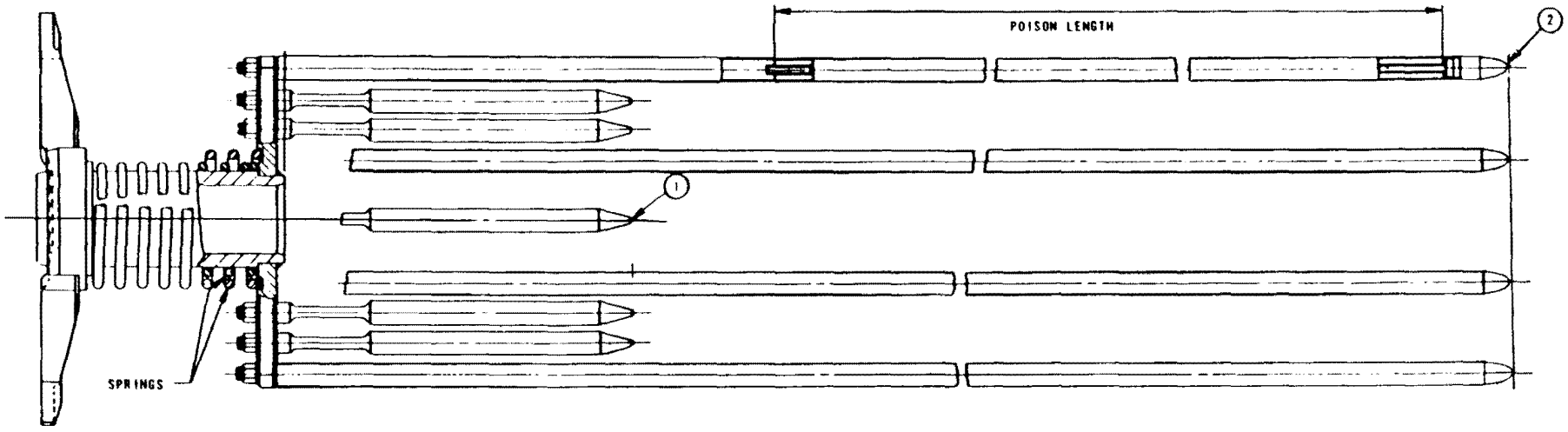
COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Full Length Absorber Rod
All Ag-In-Cd Design

FIGURE 4.2-10

Figure 4.2-11
Has Been Deleted

84

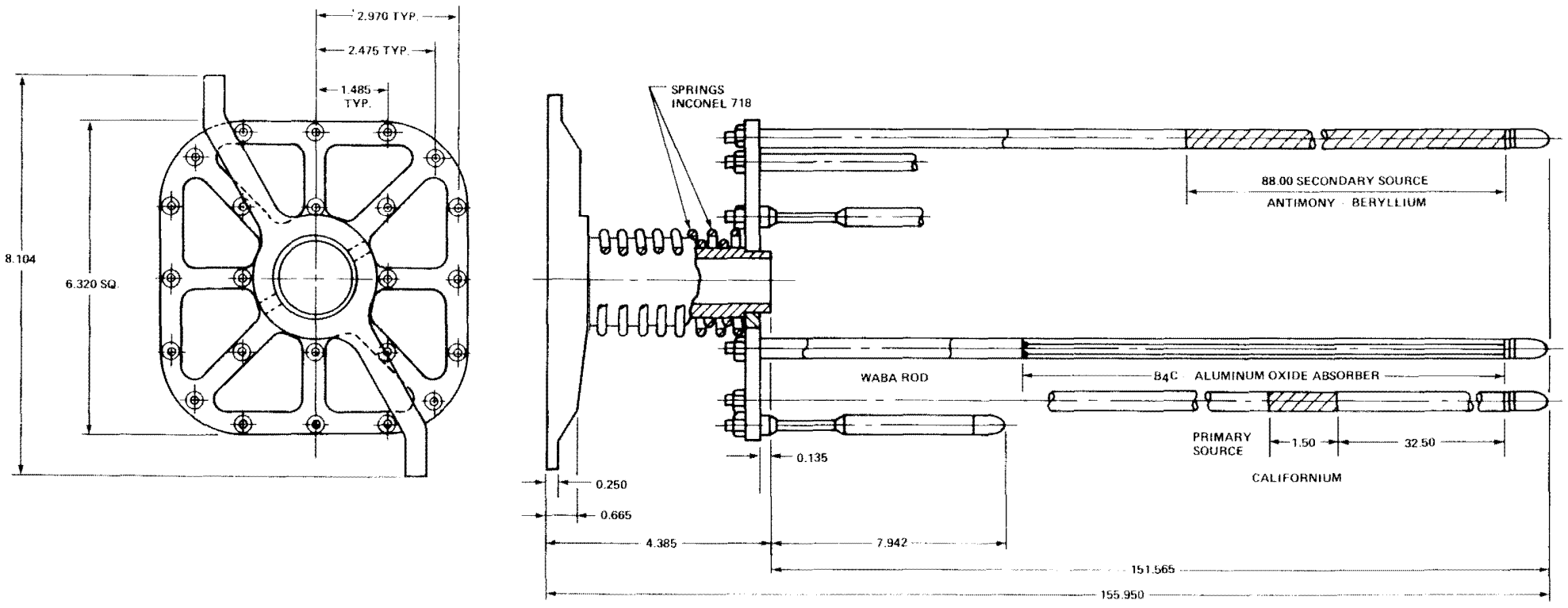


AMENDMENT 92
AUGUST 31, 1994

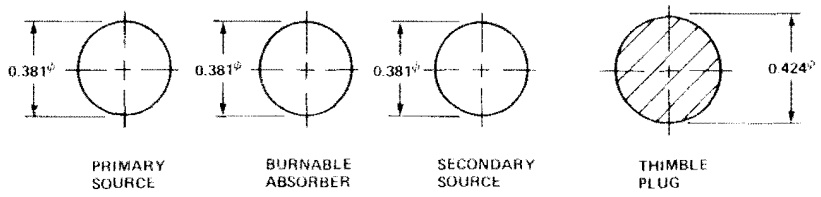
COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
Typical

Burnable Poison Assembly

FIGURE 4.2-12



X = 151.565 - 143.107
= 8.458
Y = X + END PLUG LENGTH
= 9.583



AMENDMENT 84
FEBRUARY 28, 1992

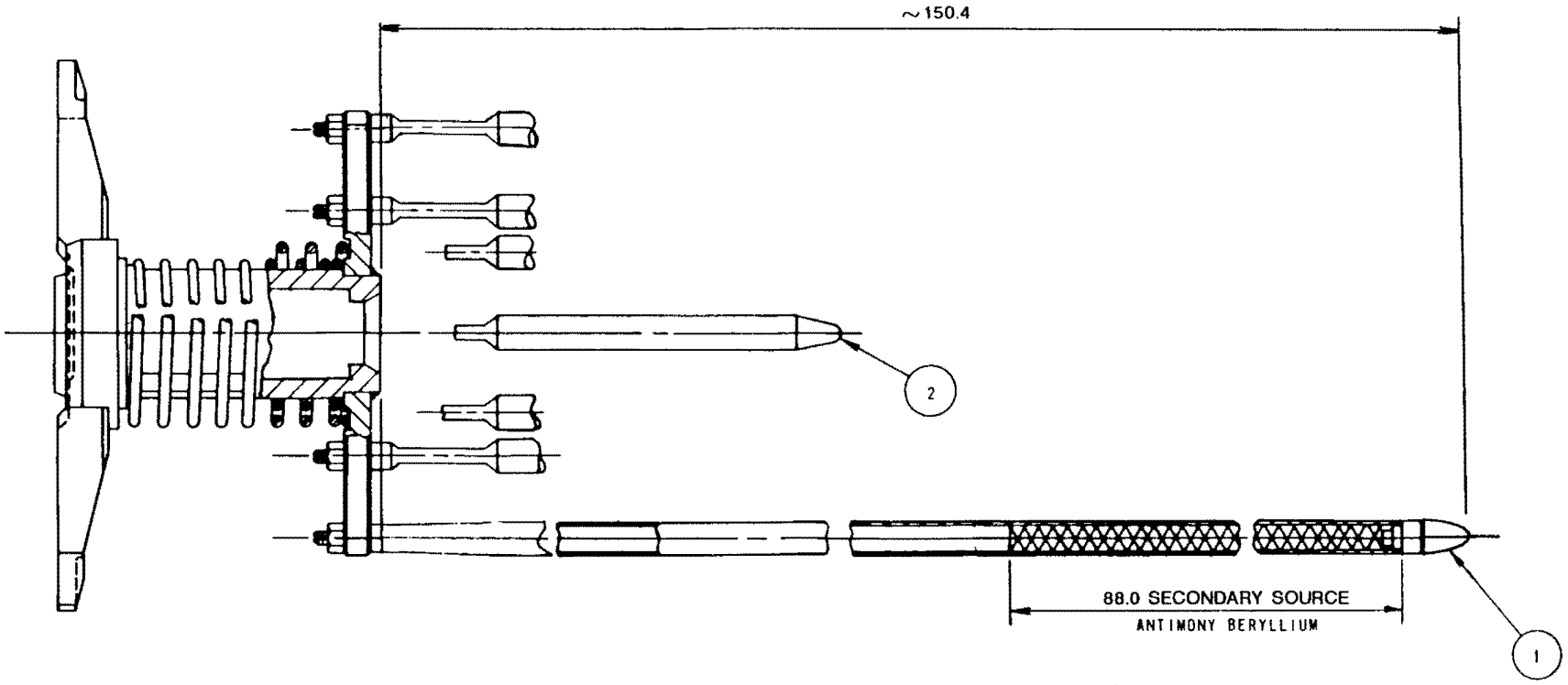
COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNIT 2

Composite Core Component
Rods and Assembly Outline

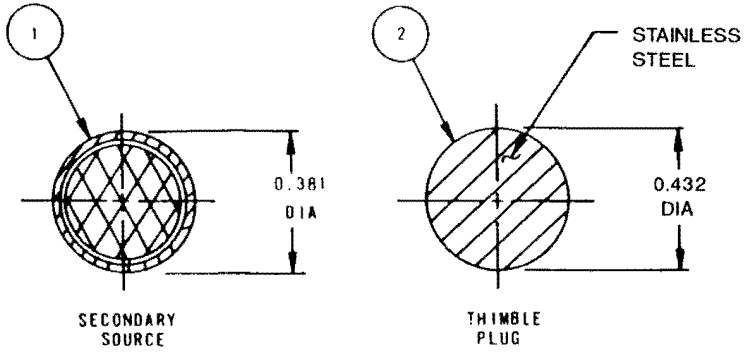
FIGURE 4.2-12B

Figures 4.2-13A,B and 4.2-14 have been deleted | 92

Figures 4.2-13A,B and 4.2-14 have been deleted | 92



NOTE: ALL DIMENSIONS ARE IN INCHES

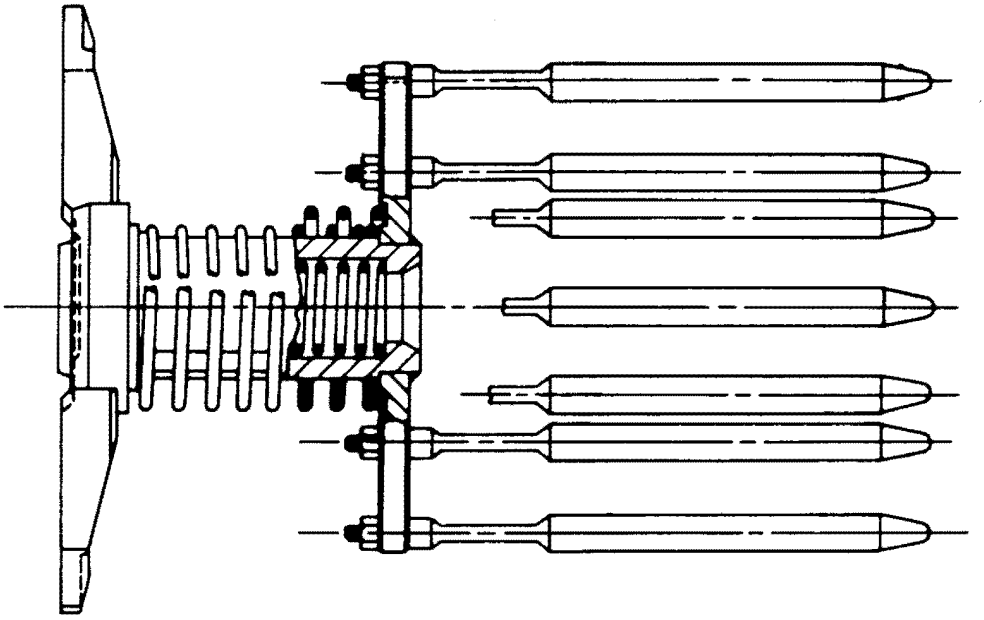


AMENDMENT 92
AUGUST 31, 1994

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
Typical

Secondary Source Assembly

FIGURE **4.2-15**



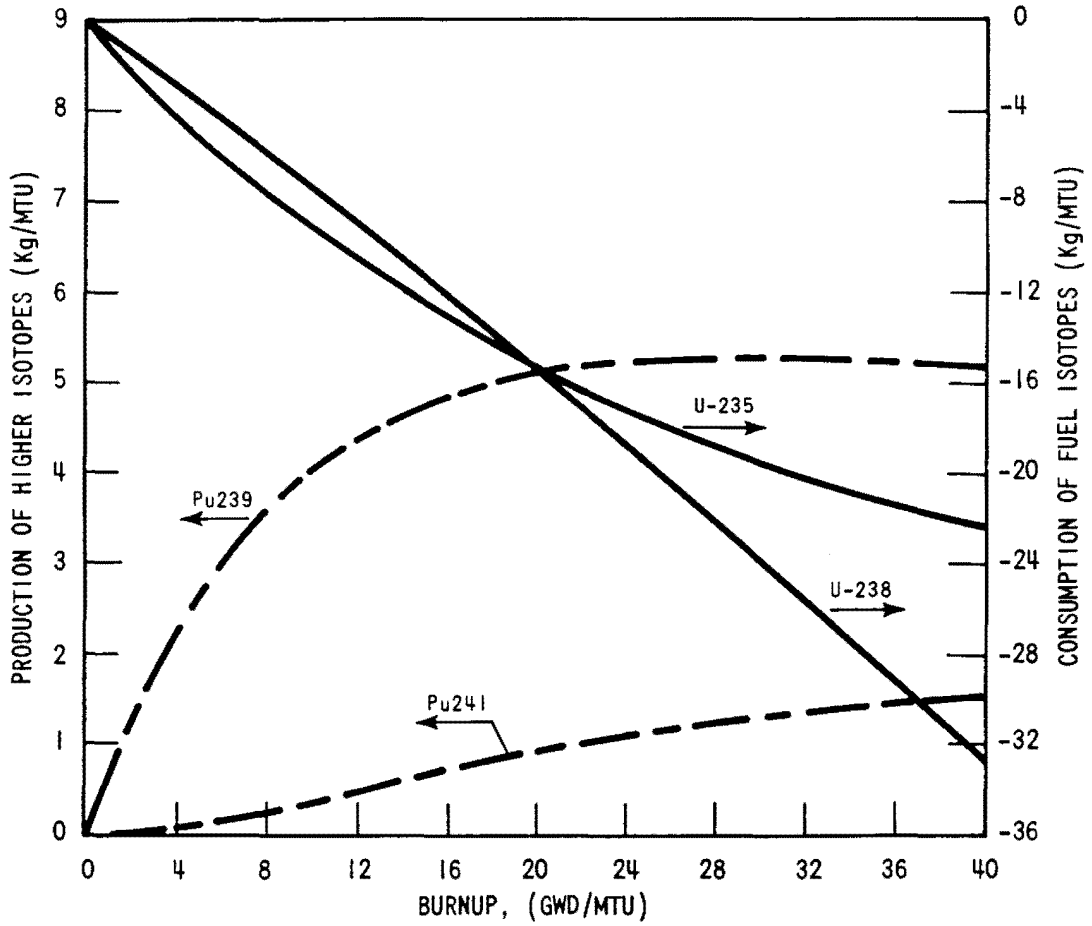
COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
Typical

Thimble Plug Assembly

FIGURE **4.2-16**

AMENDMENT 92
AUGUST 31, 1994

Figure 4.3-1 has been deleted.

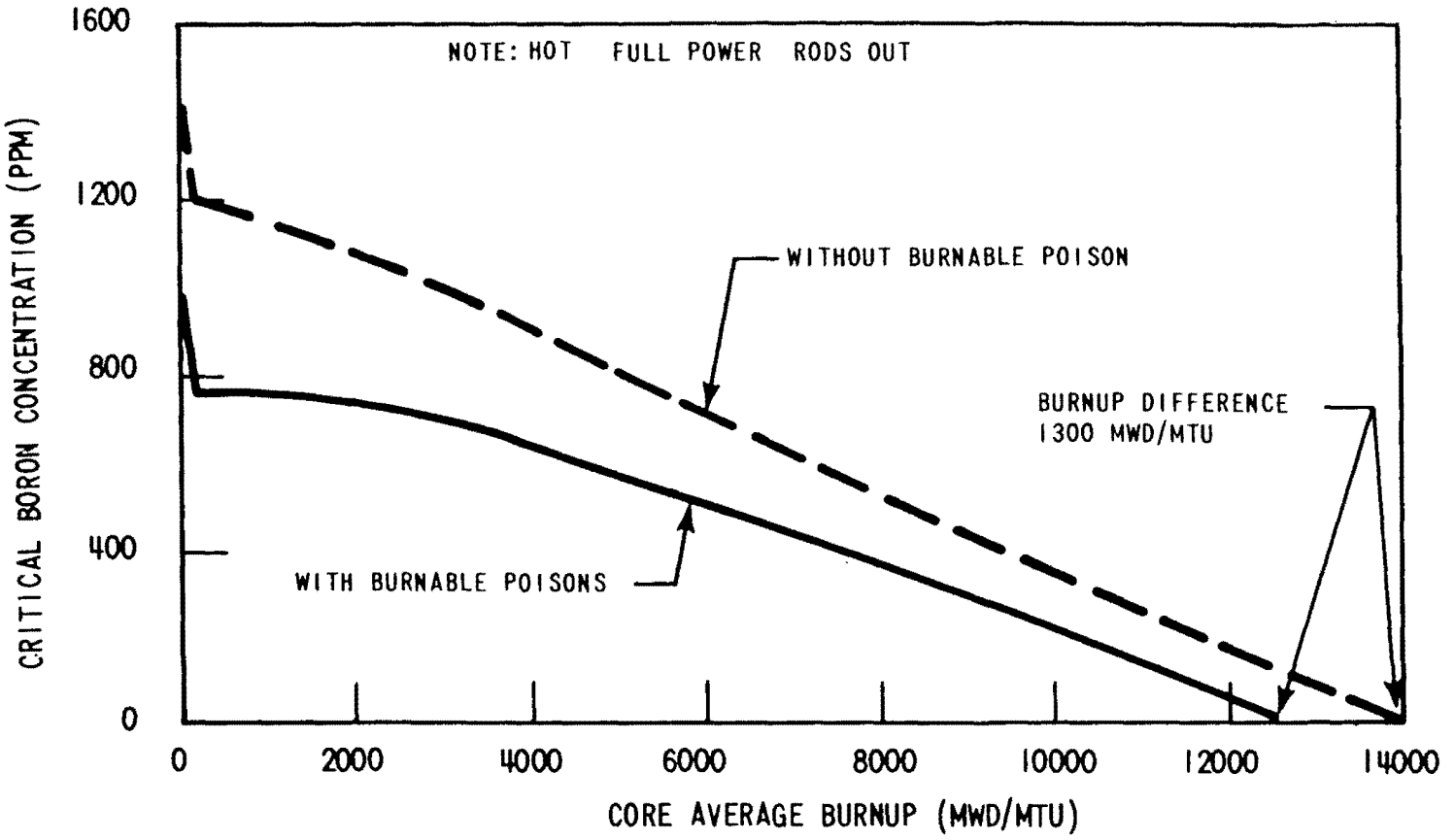


AMENDMENT 92
AUGUST 31, 1994

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Production and Consumption of Higher Isotopes (Typical)

FIGURE 4.3-2

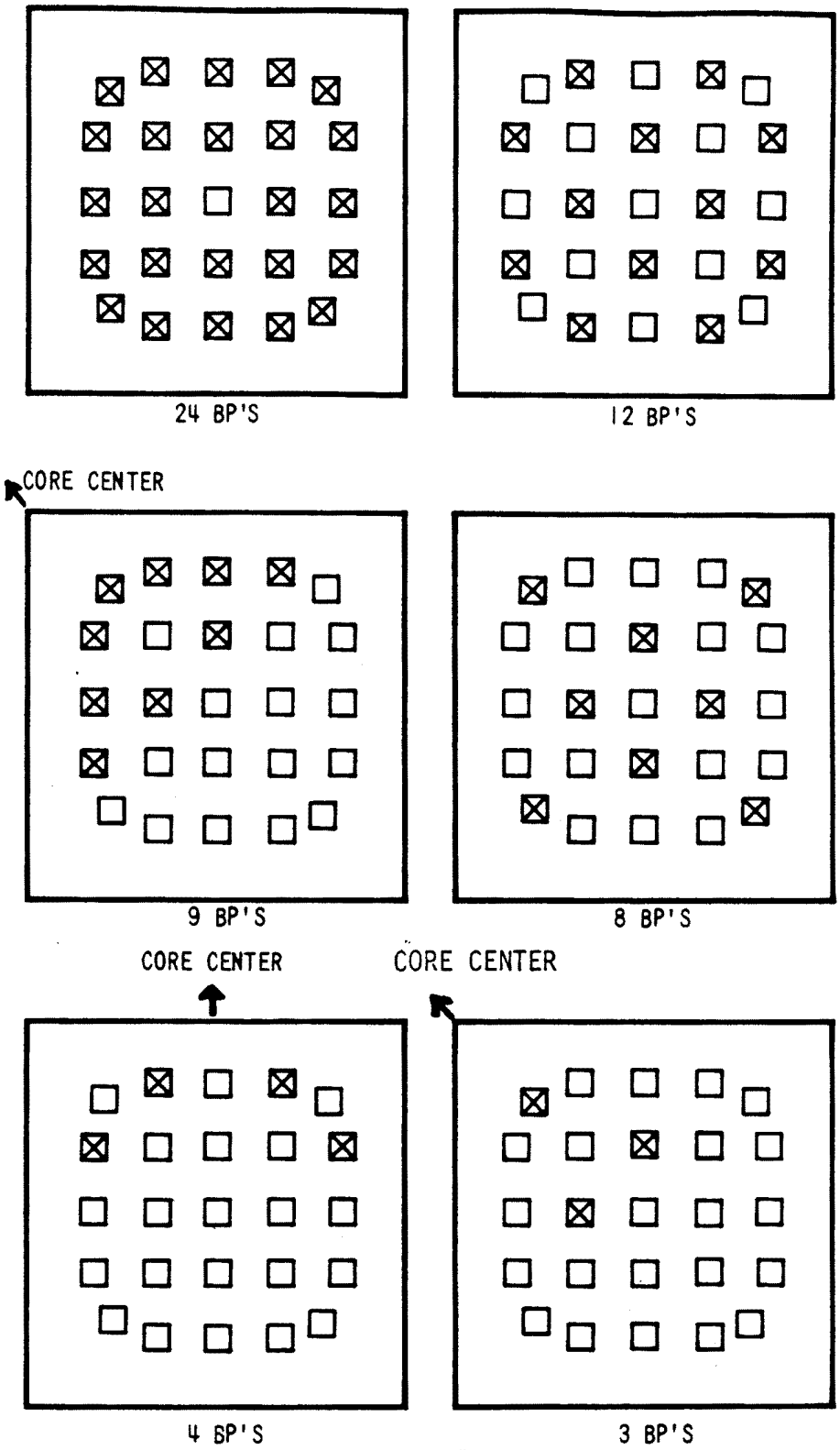


COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Boron Concentration vs First Cycle Burnup With and Without Burnable Absorber Rods (Typical)

FIGURE 4.3-3

AMENDMENT 92
AUGUST 31, 1994



AMENDMENT 92
AUGUST 31, 1994

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Burnable Absorber Arrangement Within an Assembly (Typical)

FIGURE 4.3-4

180°

	R	P	N	M	L	K	J	H	G	F	E	D	C	B	A
1						4		4		4					
2					9		1P 23		1P* 23		9				
3			3	24		4		8		4		24	3		
4			24		12	4S	8		8		12		24		
5		9		12		8		8		8		12		9	
6	4		4		8		8		8		8		4		4
7		24		8		8		12		8		8		24	
8	4		8		8		12		12		8		8		4
9		24		8		8		12		8		8		24	
10	4		4		8		8		8		8		4		4
11		9		12		8		8		8		12		9	
12			24		12		8		8	4S	12		24		
13			3	24		4		8		4		24	3		
14					9		1P 23		1P* 23		9				
15						4		4		4					

90° 270°

944 BP Rods
12.5 w/o B_2O_3

0°

NUMBER INDICATES NUMBER OF BURNABLE POISON RODS

'S' INDICATES SECONDARY SOURCE ROD

'P' INDICATES PRIMARY SOURCE ROD

'*' INDICATES DEPLETED PRIMARY SOURCE ROD

AMENDMENT 92
AUGUST 31, 1994

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
Typical

Burnable Absorber
Loading Pattern

FIGURE 4.3-5

	H	G	F	E	D	C	B	A
8	0.93							
9	1.06	0.98						
10	1.02	1.19	1.05					
11	1.20	1.05	1.20	1.02				
12	1.03	1.19	1.02	1.10	1.21			
13	1.12	0.98	1.23	0.96	0.87	1.10		
14	0.86	0.97	0.90	1.13	0.98	0.68		
15	0.82	0.84	0.81	0.68				

CALCULATED $F^N_{\Delta H}$ = 1.40

KEY:
VALUE REPRESENTS ASSEMBLY RELATIVE POWER

AMENDMENT 92
AUGUST 31, 1994

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Normalized Power Density Distribution
Near BOL, Unrodded Core, HFP,
No Xenon (Typical)

FIGURE 4.3-6

	H	G	F	E	D	C	B	A
8	1.00							
9	1.12	1.05						
10	1.08	1.24	1.10					
11	1.25	1.10	1.24	1.05				
12	1.07	1.22	1.05	1.10	1.18			
13	1.13	1.00	1.22	0.95	0.84	1.02		
14	0.86	0.96	0.89	1.08	0.92	0.63		
15	0.80	0.81	0.78	0.65				

CALCULATED $F_{\Delta}^{N}H = 1.36$

KEY:
VALUE REPRESENTS ASSEMBLY RELATIVE POWER

AMENDMENT 92
AUGUST 31, 1994

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Normalized Power Density Dist.
Near BOL, Unrodded Core, HFP,
Equilibrium Xenon (Typical)

FIGURE 4.3-7

	H	G	F	E	D	C	B	A
8	0.88							
9	1.09	1.04						
10	1.08	1.25	1.11					
11	1.27	1.12	1.24	1.03				
12	1.10	1.24	1.05	1.06	1.03			
13	1.17	1.02	1.24	0.93	0.79	0.98		
14	0.89	0.98	0.90	1.08	0.90	0.61		
15	0.82	0.84	0.80	0.65				

CALCULATED $F^N_\Delta H = 1.38$

KEY:
VALUE REPRESENTS ASSEMBLY RELATIVE POWER

AMENDMENT 92
AUGUST 31, 1994

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Normalized Power Density Distribution Near BOL, Group D 35%, HFP, Equilibrium Xenon (Typical)

FIGURE 4.3-8

	H	G	F	E	D	C	B	A
8	1.03							
9	1.17	1.04						
10	1.05	1.21	1.06					
11	1.21	1.05	1.21	1.05				
12	1.04	1.20	1.04	1.16	1.20			
13	1.15	1.00	1.18	0.98	0.95	1.04		
14	0.90	1.02	0.89	1.057	0.90	0.62		
15	0.80	0.80	0.77	0.62				

CALCULATED $F_{\Delta}^{N}H = 1.30$

KEY:
VALUE REPRESENTS ASSEMBLY RELATIVE POWER

AMENDMENT 92
AUGUST 31, 1994

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Normalized Power Density Distribution Near MOL Unrodded Core, HFP, Equilibrium Xenon (Typical)

FIGURE 4.3-9

	H	G	F	E	D	C	B	A
8	0.97							
9	1.10	0.97						
10	0.97	1.12	0.98					
11	1.12	0.98	1.14	1.01				
12	0.99	1.14	1.00	1.16	1.20			
13	1.14	1.00	1.16	1.00	1.07	1.10		
14	0.95	1.12	0.93	1.09	0.93	0.66		
15	0.86	0.85	0.81	0.65				

CALCULATED $F_{\Delta}^{N}H = 1.29$

KEY:
VALUE REPRESENTS ASSEMBLY RELATIVE POWER

AMENDMENT 92
AUGUST 31, 1994

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Normalized Power Density Distribution Near EOL, Unrodded Core, HFP, Equilibrium Xenon (Typical)

FIGURE 4.3-10

	H	G	F	E	D	C	B	A
8	0.83							
9	1.06	0.96						
10	0.98	1.13	0.99					
11	1.15	1.00	1.14	0.99				
12	1.02	1.17	1.08	1.10	1.01			
13	1.19	1.03	1.17	0.98	1.00	1.04		
14	0.99	1.16	0.95	1.09	0.91	0.64		
15	0.90	0.89	0.84	0.66				

CALCULATED $F^N_{\Delta H} = 1.34$

KEY:
VALUE REPRESENTS ASSEMBLY RELATIVE POWER

Amendment 95
February 2, 1998

COMANCHE PEAK S.E.S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Normalized Power Density Distribution
Near EOL, Group D @ 35%, HFP,
Equilibrium Xenon (Typical)

FIGURE 4.3-11

1.02																
1.02	1.03															
1.02	1.05	1.08														
1.02	1.06	1.12	X													
1.03	1.08	1.14	1.17	1.16												
1.03	1.10	X	1.17	1.18	X											
1.03	1.08	1.14	1.14	1.16	1.18	1.17										
1.03	1.08	1.14	1.14	1.16	1.19	1.17	1.17									
1.03	1.10	X	1.16	1.18	X	1.19	1.20	X								
1.03	1.09	1.14	1.14	1.16	1.19	1.17	1.17	1.20	1.18							
1.03	1.09	1.15	1.15	1.16	1.19	1.17	1.17	1.20	1.18	1.18						
1.04	1.11	X	1.18	1.18	X	1.19	1.19	X	1.20	1.20	X					
1.04	1.09	1.15	1.18	1.17	1.19	1.17	1.17	1.19	1.17	1.17	1.20	1.18				
1.04	1.08	1.14	X	1.18	1.18	1.16	1.16	1.18	1.16	1.16	1.19	1.19	X			
1.04	1.06	1.10	1.14	1.16	X	1.16	1.16	X	1.16	1.16	X	1.17	1.15	1.11		
1.04	1.05	1.07	1.08	1.10	1.12	1.10	1.10	1.12	1.10	1.11	1.12	1.11	1.09	1.08	1.07	
1.04	1.04	1.04	1.04	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.06	1.06	1.06	1.06	1.06	1.06

AMENDMENT 92
AUGUST 31, 1994

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Typical Rodwise Power Distribution in a Typical Assembly Near BoI, HFP, EQ, Xenon, Unrodded Core

FIGURE 4.3-12

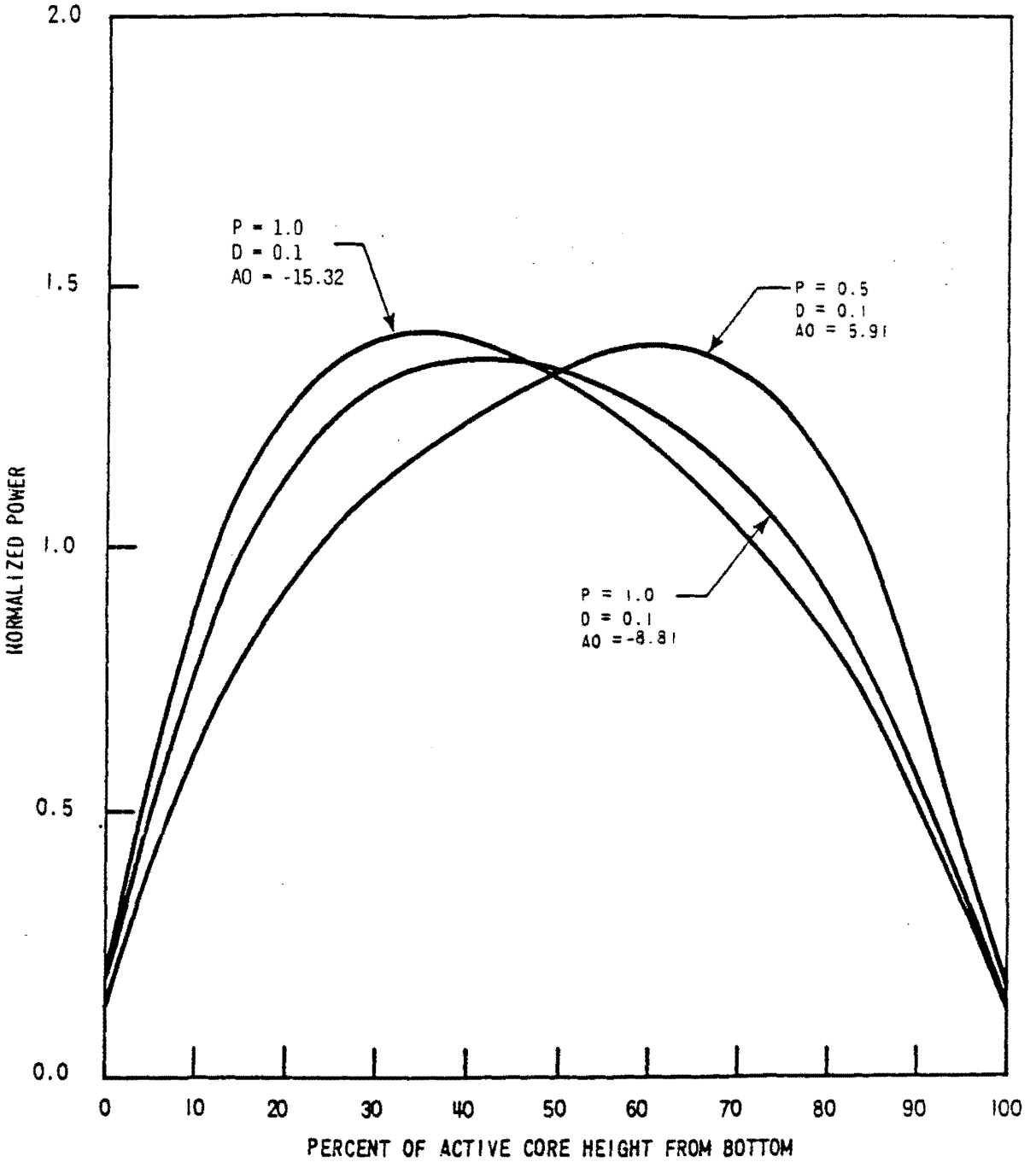
0.98																
0.98	0.99															
0.98	1.00	1.03														
0.99	1.02	1.07	X													
1.00	1.03	1.09	1.11	1.09												
1.01	1.06	X	1.11	1.11	X											
1.00	1.04	1.08	1.07	1.08	1.10	1.08										
1.00	1.04	1.08	1.07	1.08	1.10	1.08	1.08									
1.01	1.06	X	1.09	1.10	X	1.10	1.10	X								
1.00	1.04	1.08	1.07	1.08	1.10	1.08	1.08	1.10	1.08							
1.00	1.04	1.08	1.07	1.08	1.10	1.08	1.08	1.10	1.08	1.08						
1.01	1.06	X	1.11	1.11	X	1.10	1.10	X	1.10	1.10	X					
1.00	1.03	1.09	1.11	1.09	1.11	1.08	1.08	1.10	1.08	1.08	1.11	1.09				
0.99	1.02	1.07	X	1.11	1.11	1.07	1.07	1.09	1.07	1.07	1.11	1.11	X			
0.98	1.00	1.03	1.07	1.09	X	1.08	1.08	X	1.08	1.08	X	1.09	1.07	1.03		
0.98	0.99	1.00	1.02	1.03	1.06	1.04	1.04	1.06	1.04	1.04	1.06	1.03	1.02	1.00	0.98	
0.98	0.98	0.98	0.99	1.00	1.01	1.00	1.00	1.01	1.00	1.00	1.01	1.00	0.99	0.98	0.98	0.98

AMENDMENT 92
AUGUST 31, 1994

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Rodwise Power Distribution in a Typical Assembly Near EOL, HFP, Equilibrium Xenon, Unrodded Core

FIGURE 4.3-13



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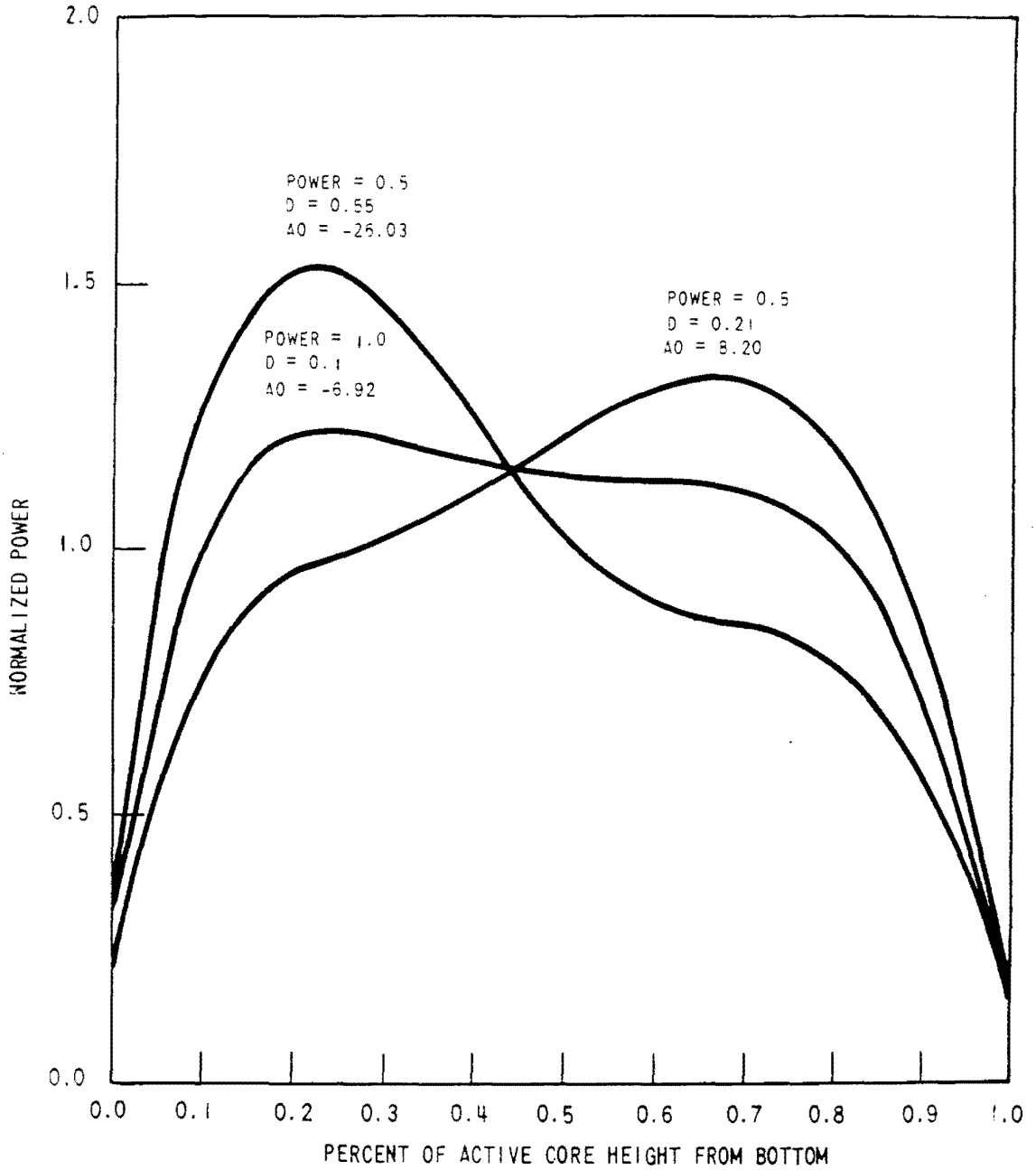
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Typical Axial Power Shapes Occurring at BOL

FIGURE 4.3-14

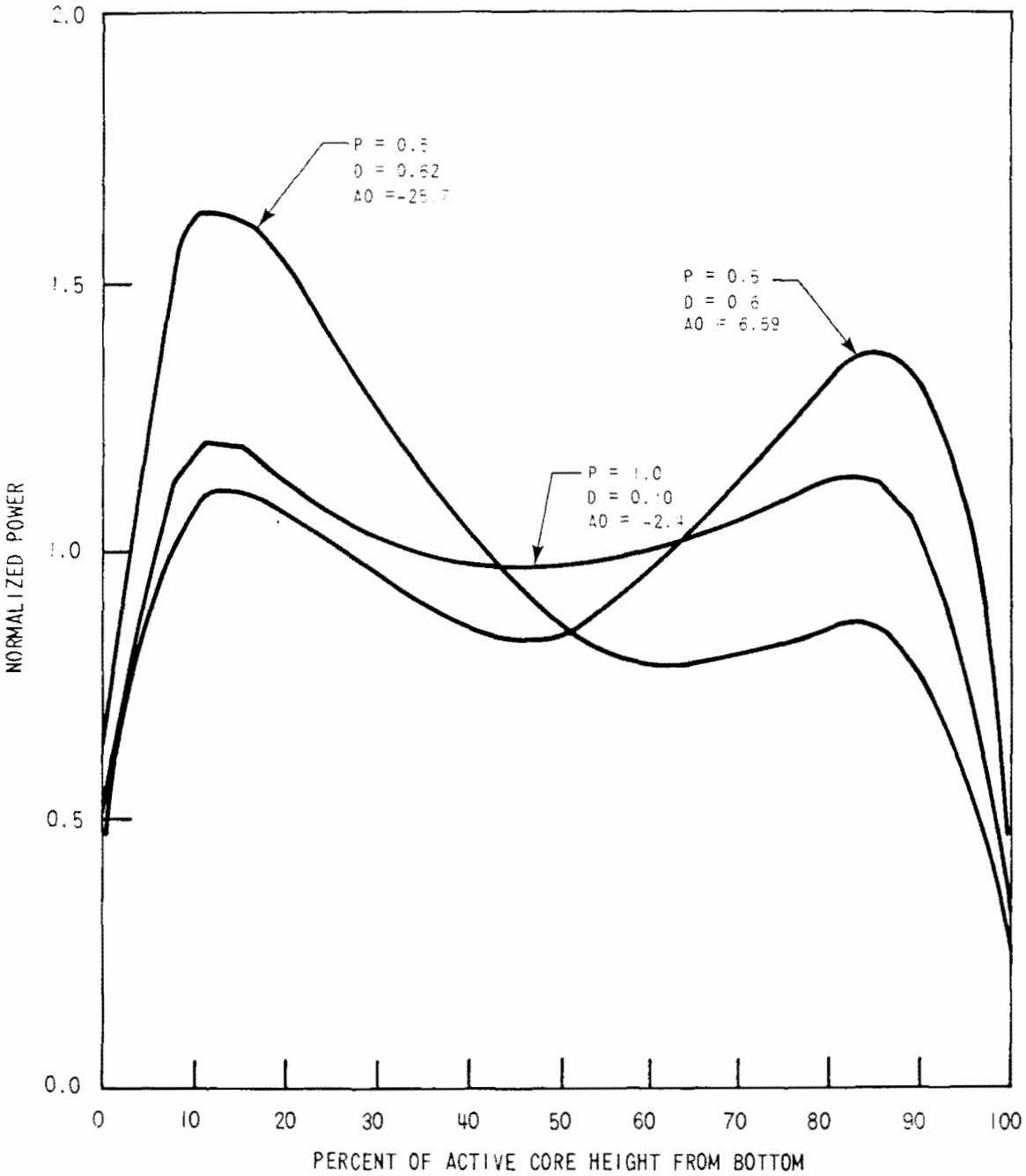


COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT

Typical Axial Power Shapes Occurring at MOL

FIGURE 4.3-15

AMENDMENT 92
AUGUST 31, 1994

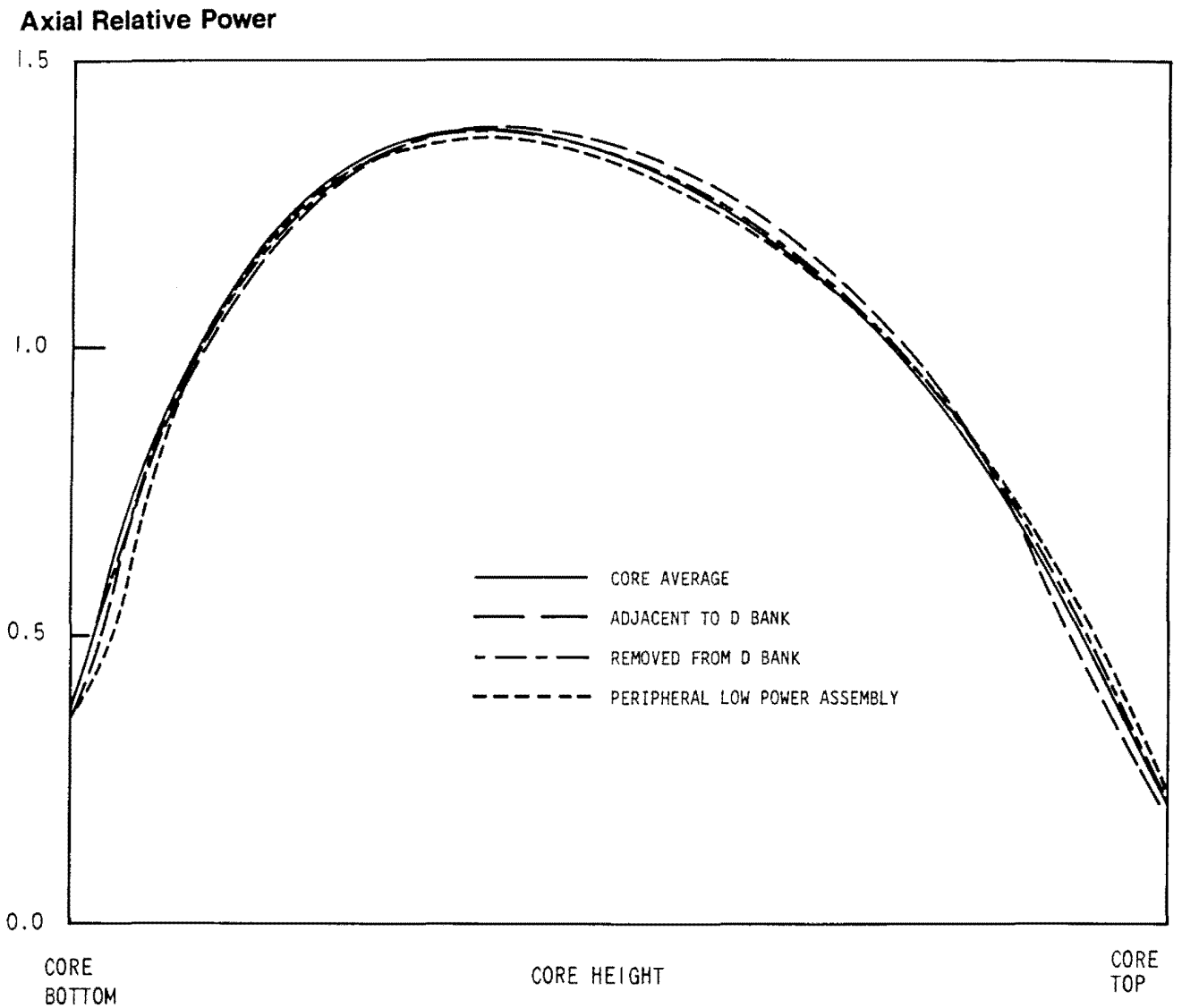


AMENDMENT 92
AUGUST 31, 1994

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT

Typical Axial Power
Shapes Occurring at EOL

FIGURE 4.3-16



AMENDMENT 92
AUGUST 31, 1994

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Comp of Assembly Axial Power
Dist. with Core Average Axial
Dist. D. Bank SLightly Inserted

FIGURE 4.3-17

Figures 4.3-18 thru 4.3-23A,B have been deleted | 92

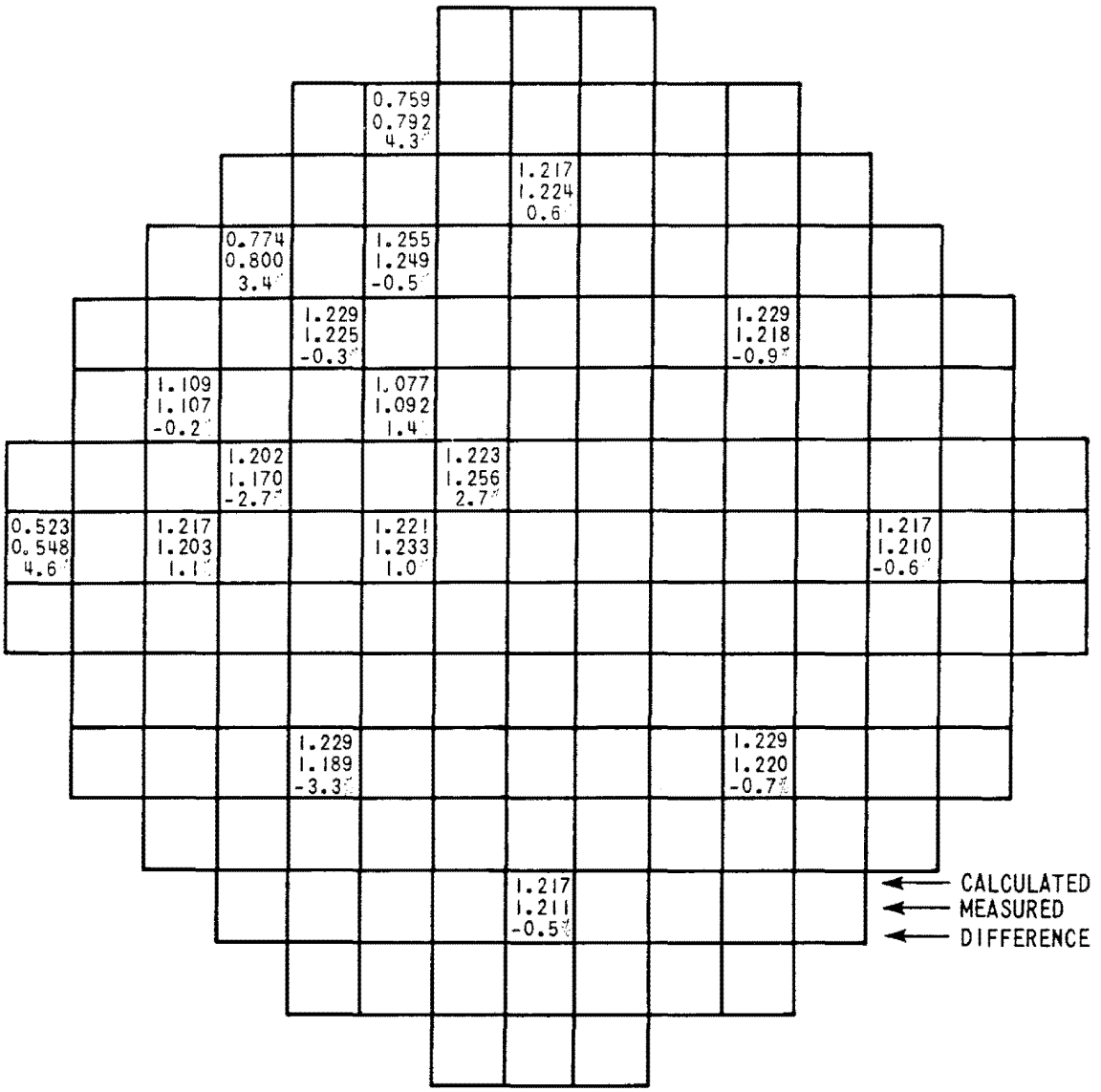
Figures 4.3-18 thru 4.3-23A,B have been deleted | 92

Figures 4.3-18 thru 4.3-23A,B have been deleted | 92

Figures 4.3-18 thru 4.3-23A,B have been deleted | 92

Figures 4.3-18 thru 4.3-23A,B have been deleted | 92

Figures 4.3-18 thru 4.3-23A,B have been deleted | 92



PEAKING FACTORS

$\bar{F}_z$ = 1.5

$F^N_{\Delta H}$ = 1.357

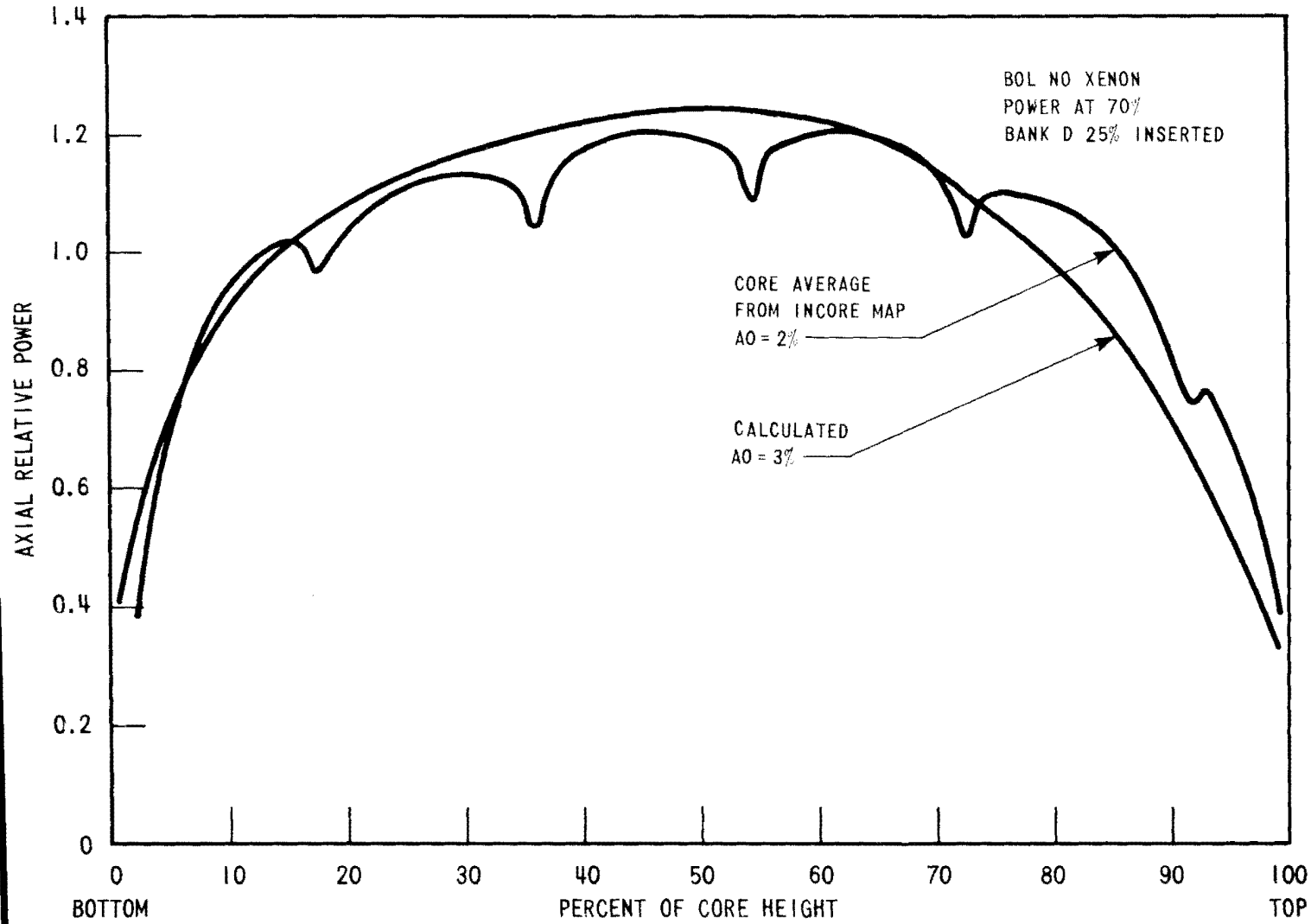
F^N_Q = 2.07 LOCATED AT M-8 SOUTH

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT

Comparison Between Calculated and Measured Relative Fuel Assembly Power Distribution

FIGURE 4.3-24

AMENDMENT 92
AUGUST 31, 1994

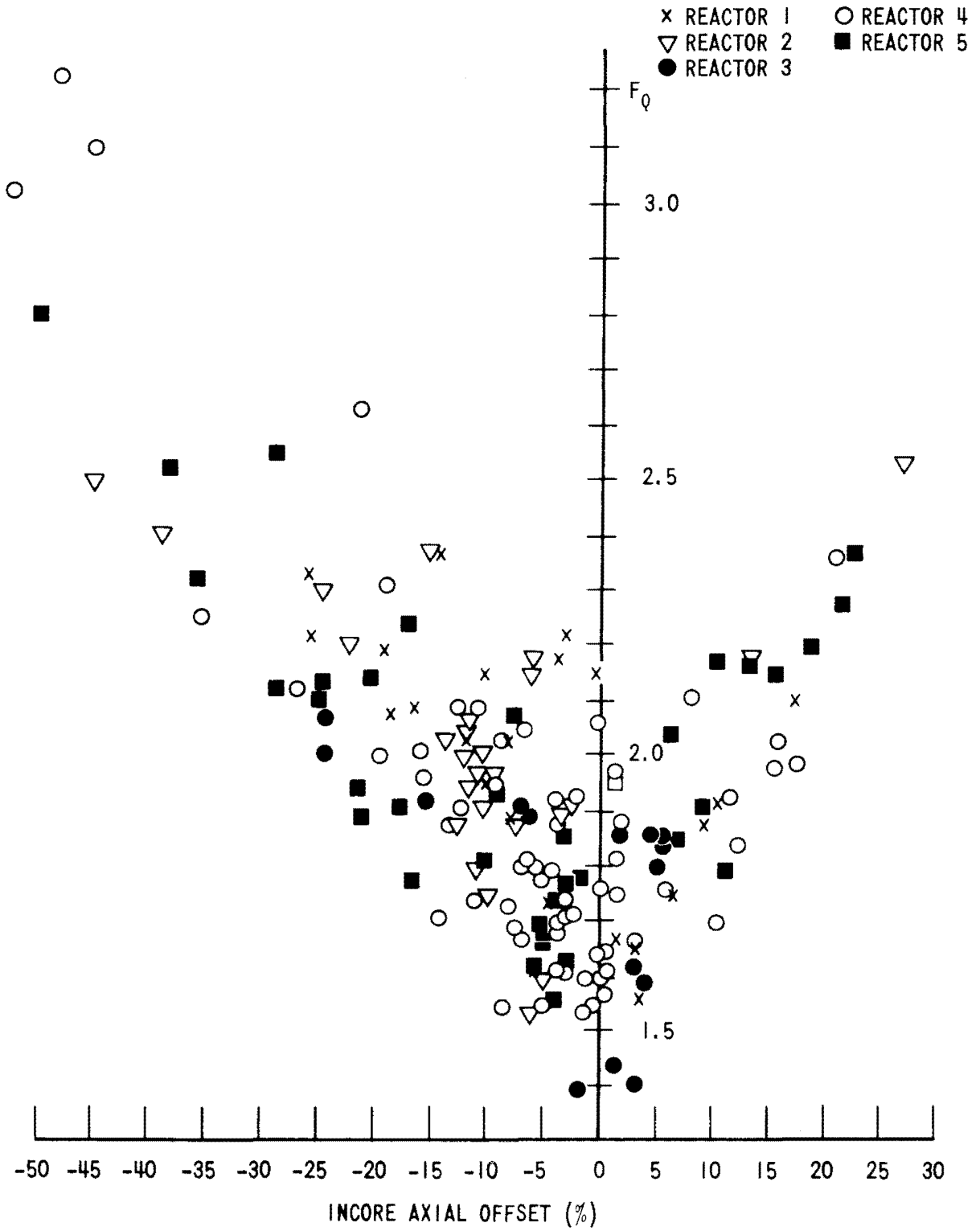


COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Comparison of Calculated and Measured Axial Shape

FIGURE 4.3-25

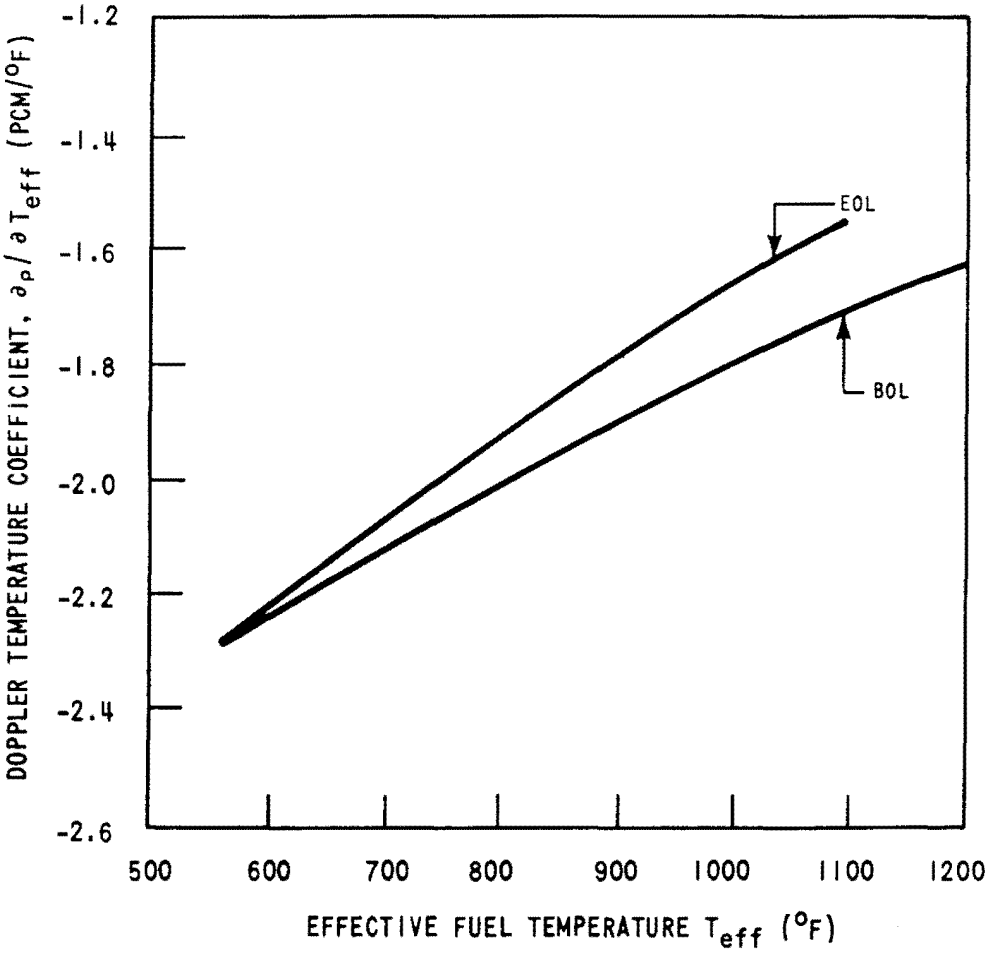
6274-77



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Measured Values of F_Q for Full Power Rod Configurations

FIGURE 4.3-26

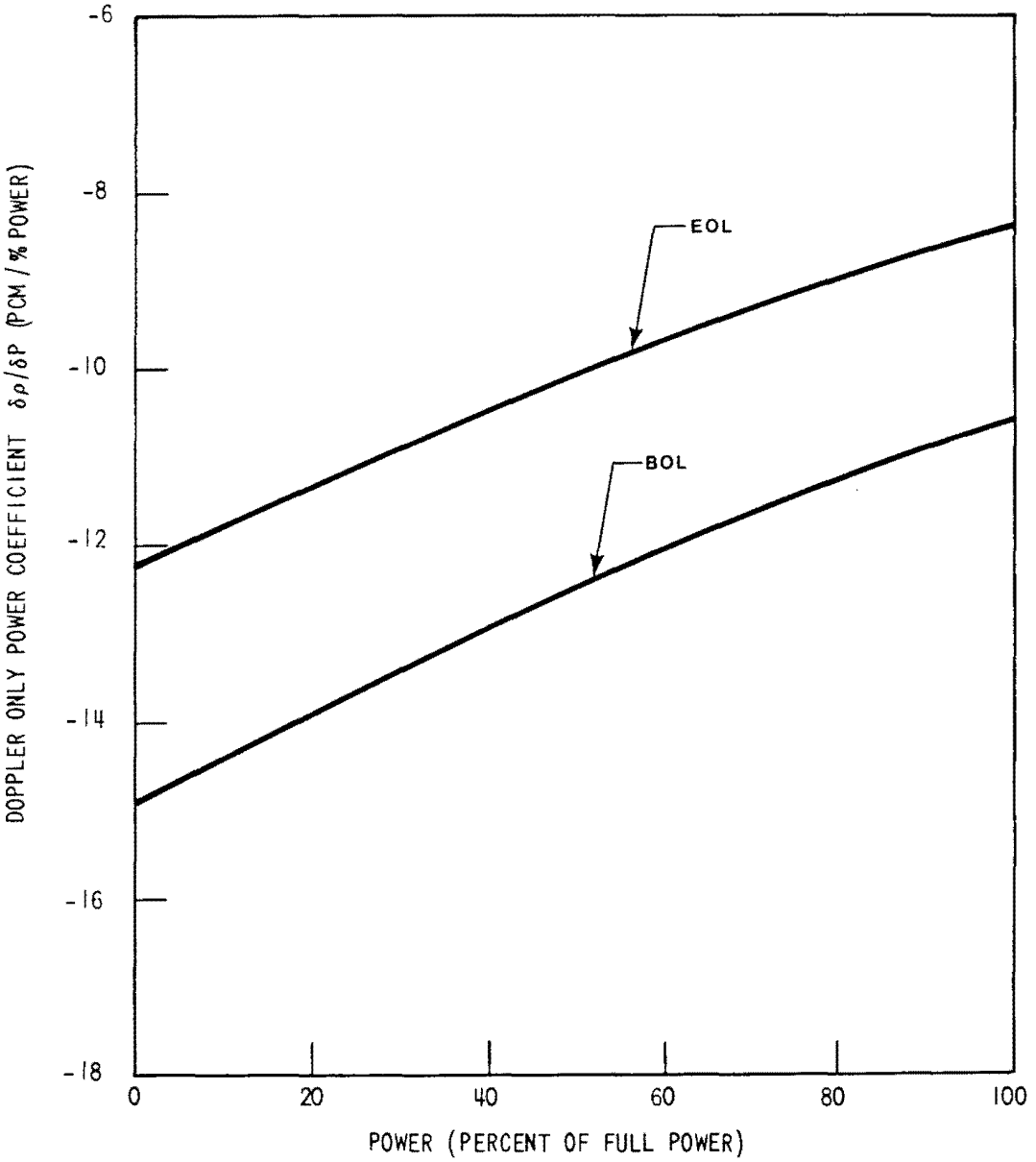


AMENDMENT 92
AUGUST 31, 1994

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
Typical

Doppler Temperature Coefficient at BOL and EOL Cycle 1

FIGURE 4.3-27

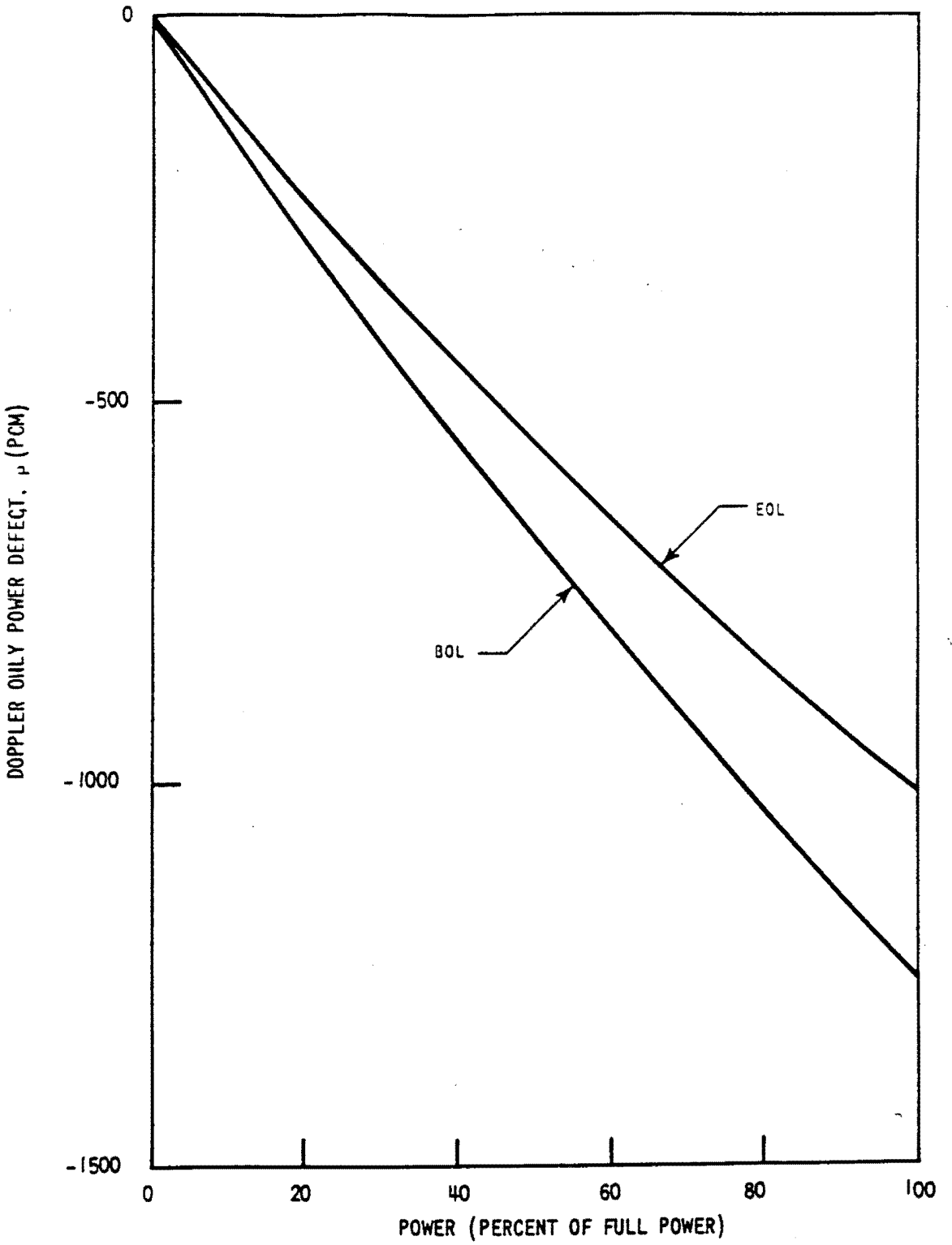


AMENDMENT 92
AUGUST 31, 1994

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Typical Doppler-Only Power Coefficient - BOL, EOL

FIGURE 4.3-28

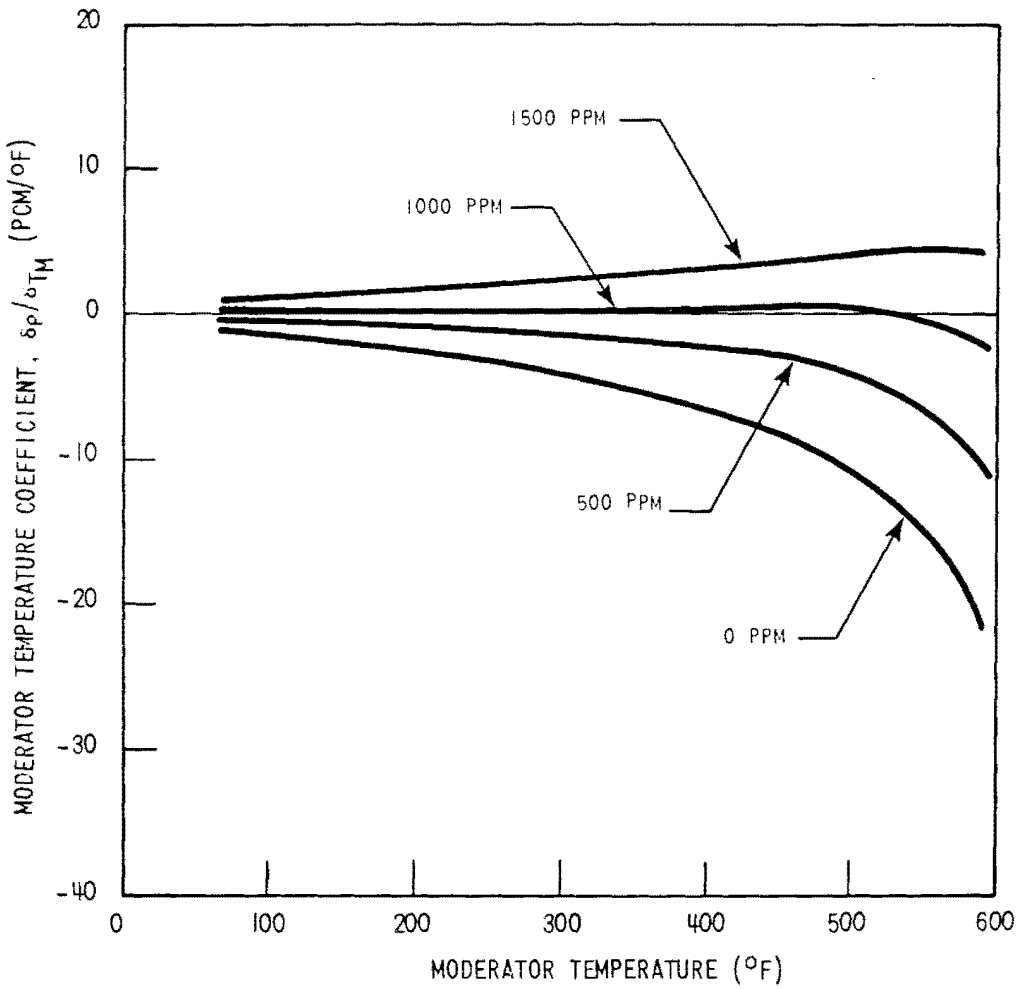


Amendment 95
February 2, 1998

COMANCHE PEAK S.E.S
FINAL SAFETY ANALYSIS REPORT

Typical Doppler-Only
Power Defect - BOL, EOL

FIGURE 4.3-29

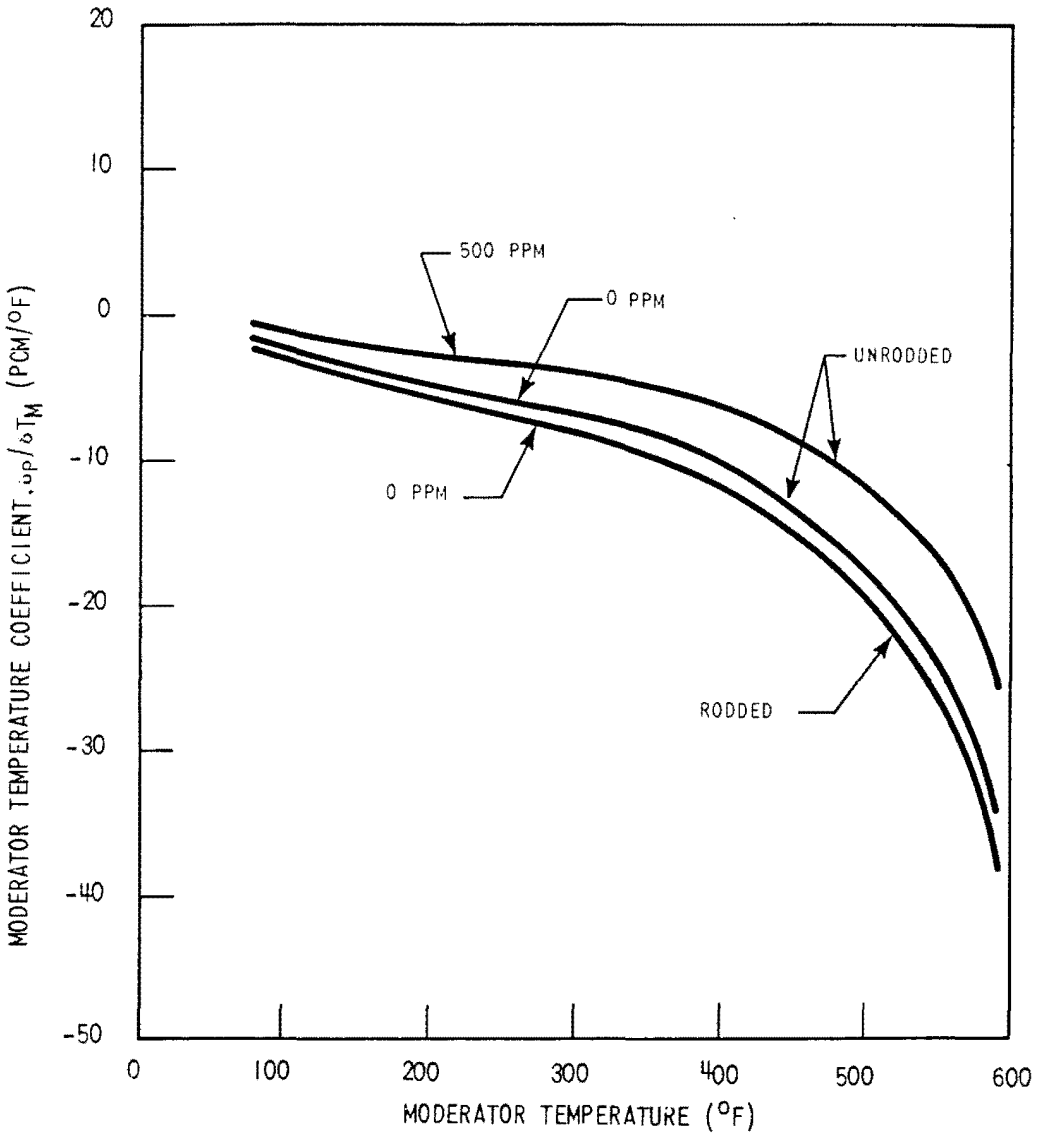


AMENDMENT 92
AUGUST 31, 1994

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Moderator Temperature Coefficient
- BOL, No Rods (Typical)

FIGURE 4.3-30

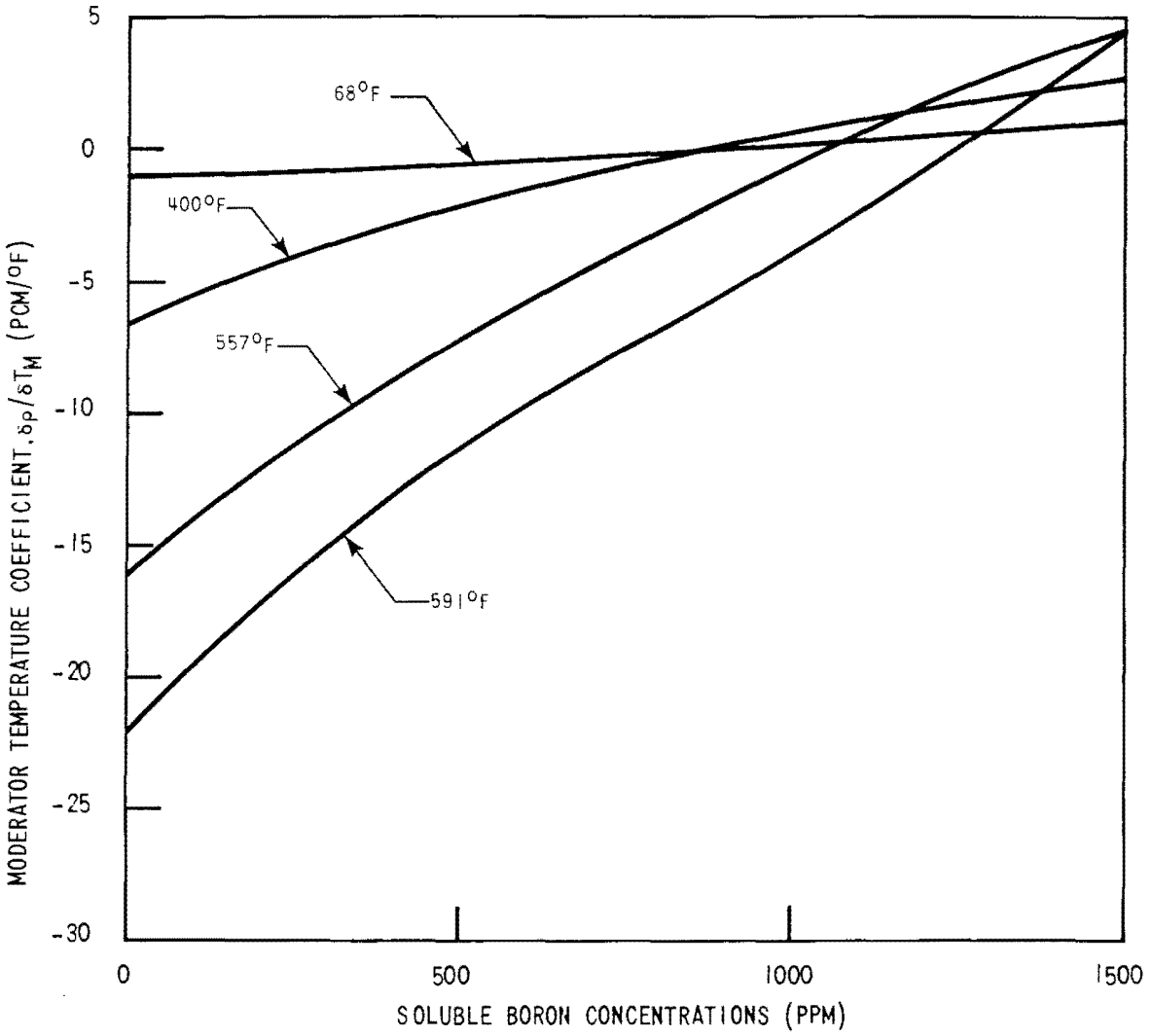


AMENDMENT 92
AUGUST 31, 1994

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Typical Moderator Temperature Coefficient, EOL

FIGURE 4.3-31

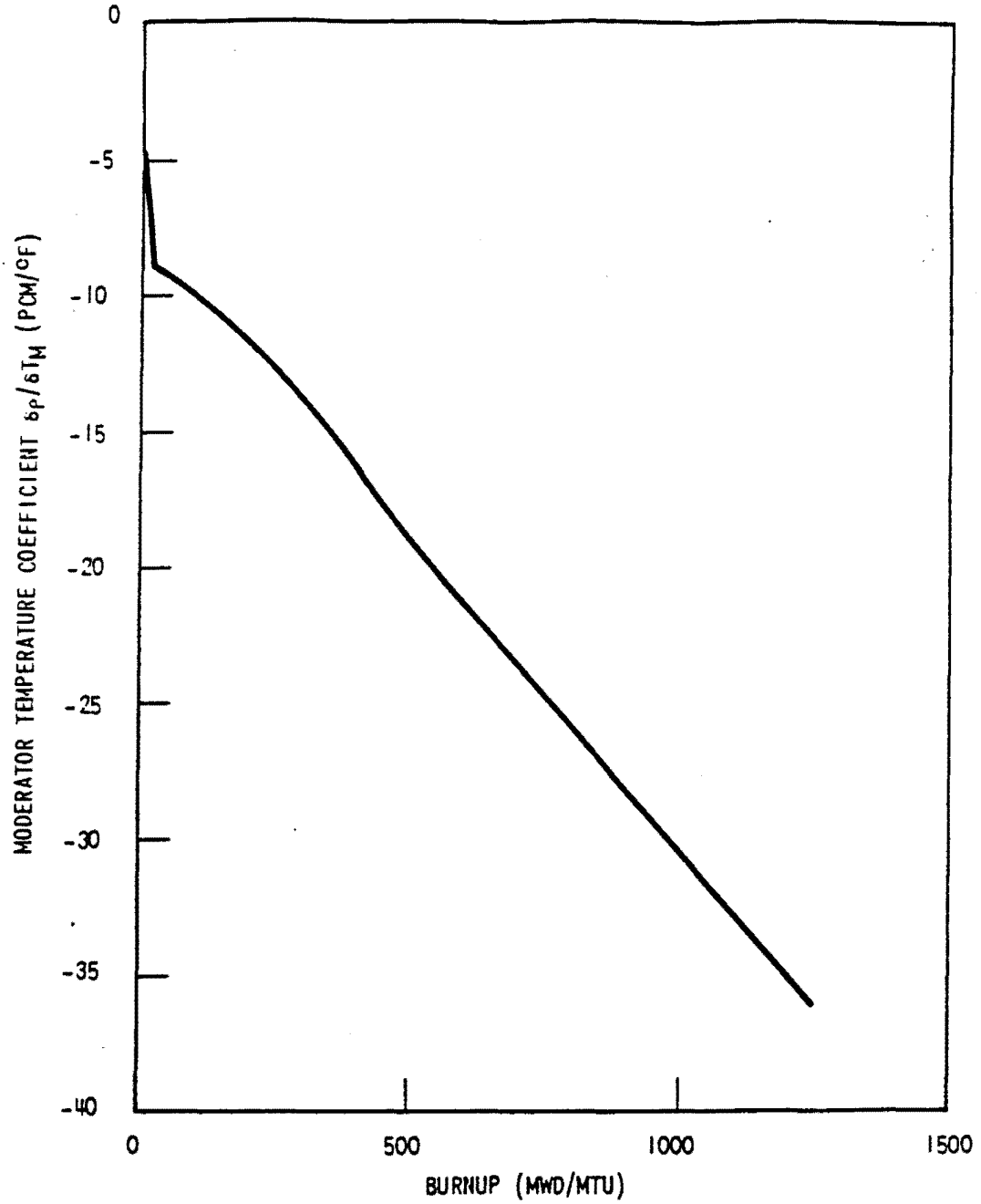


AMENDMENT 92
AUGUST 31, 1994

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

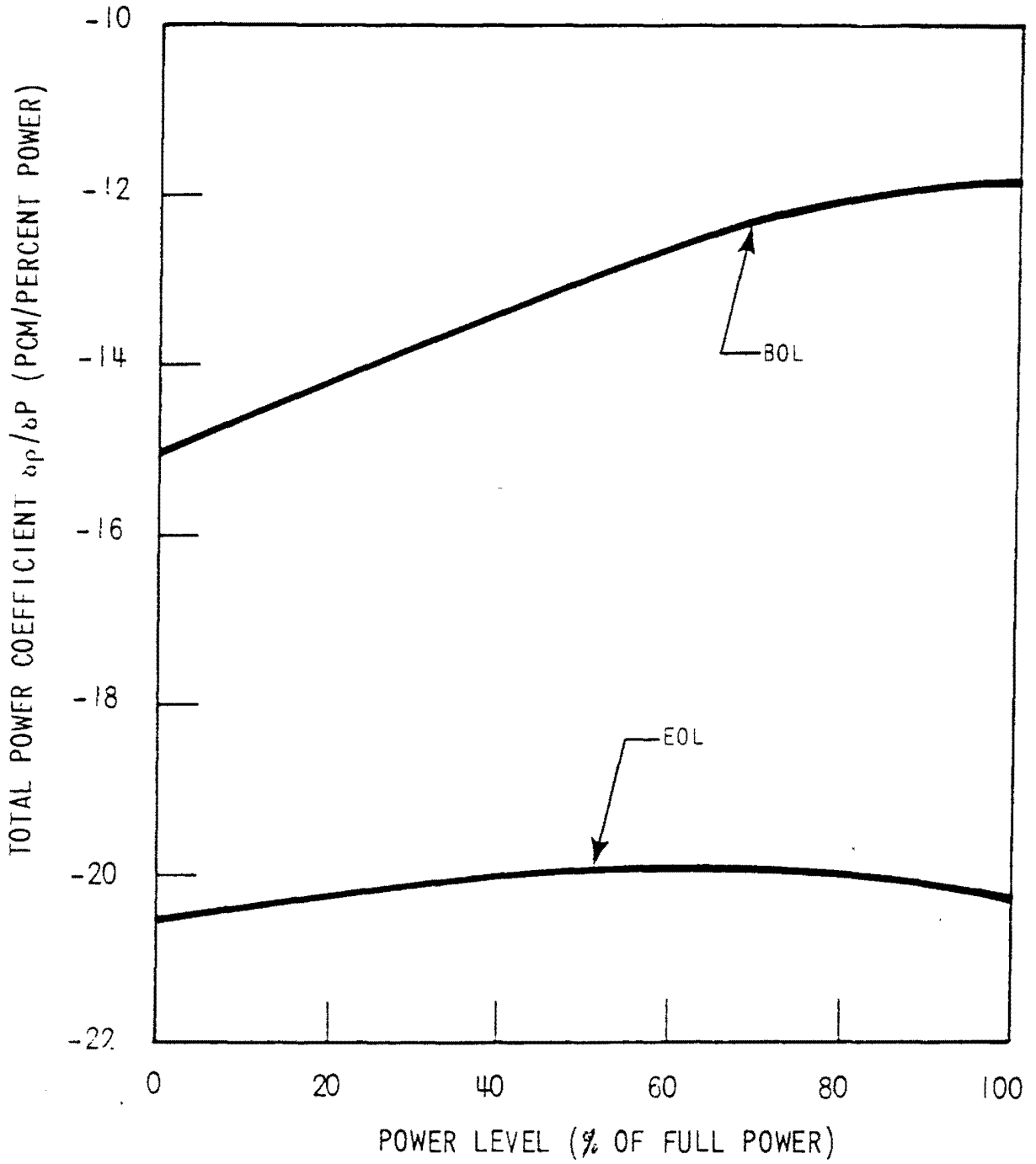
Moderator Temperature Coefficient as a Function of Boron Concentration - BOL, No Rods (Typical)

FIGURE 4.3-32



Amendment 95
February 2, 1998

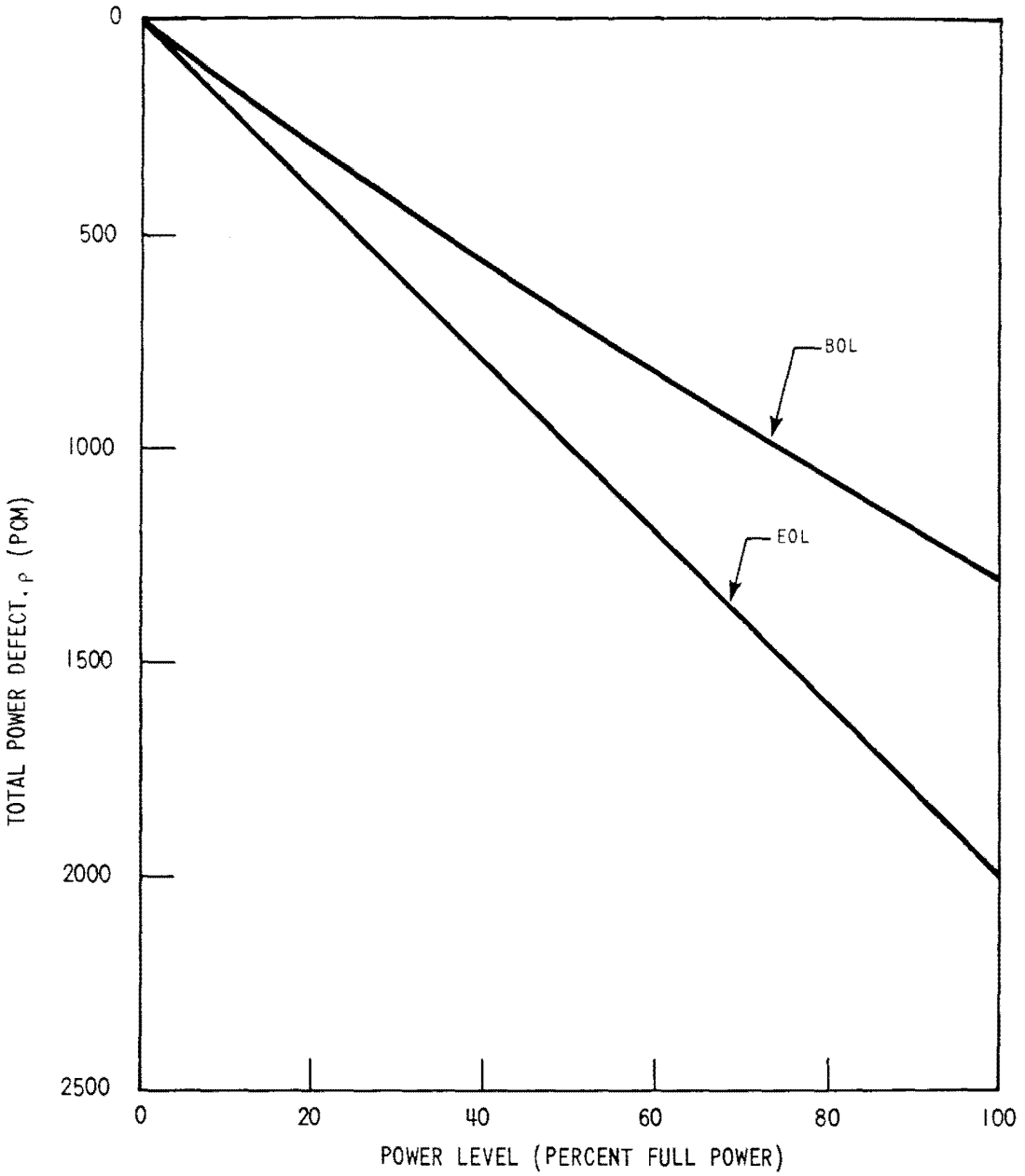
COMANCHE PEAK S.E.S FINAL SAFETY ANALYSIS REPORT UNITS 1 and 2
HFP Temperature Coefficient for the Critical Boron Concentration (Typical)
FIGURE 4.3-33



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Typical Total Power Coefficient - BOL, EOL

FIGURE 4.3-34

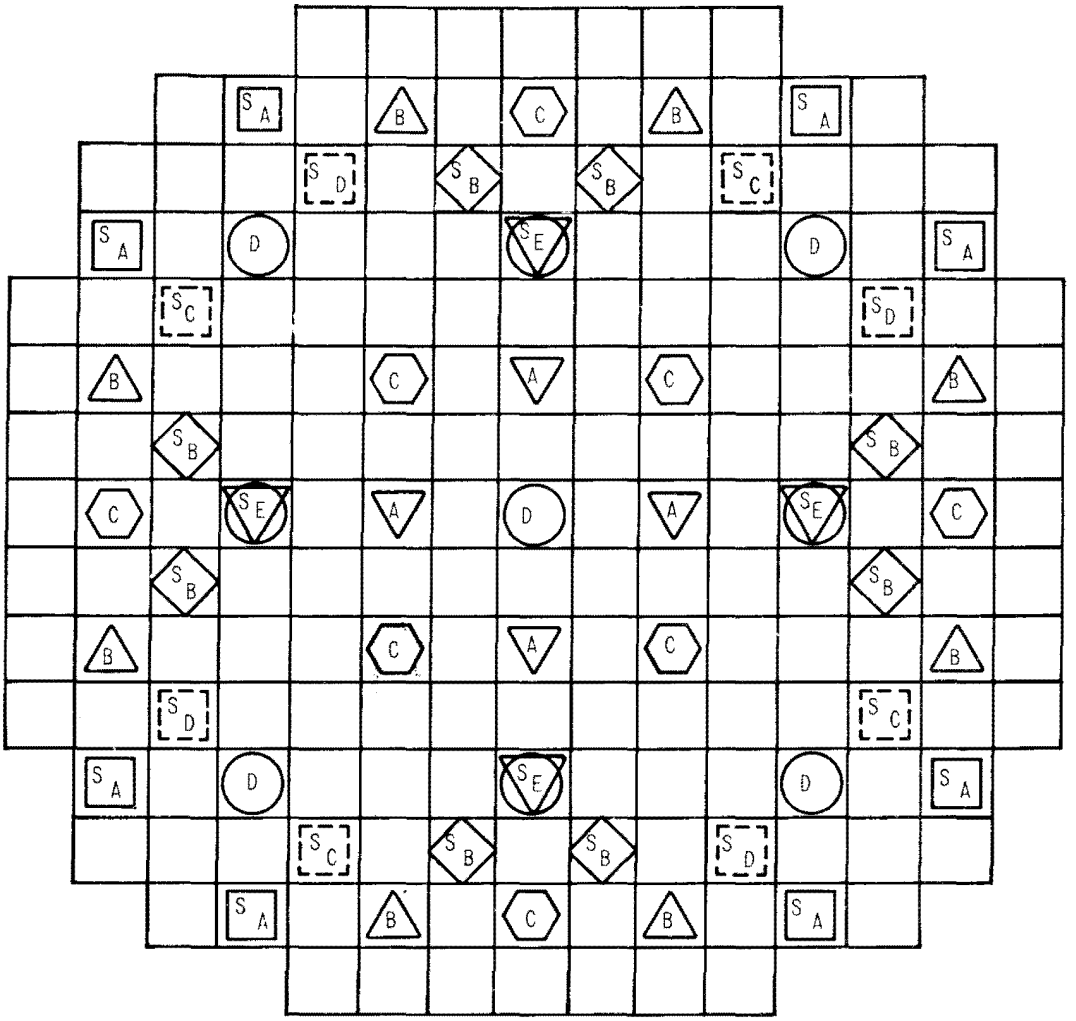


AMENDMENT 92
AUGUST 31, 1994

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Typical Total Power Defect - BOL, EOL

FIGURE 4.3-35

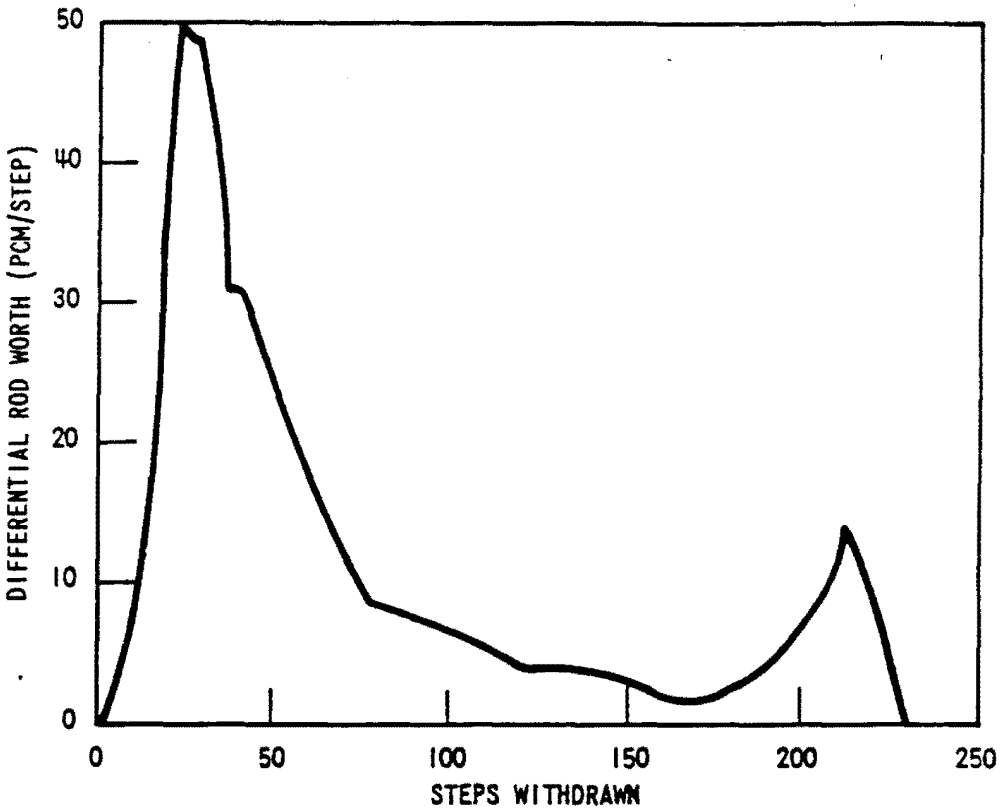


SHUTDOWN BANK	S_A	8
SHUTDOWN BANK	S_B	8
SHUTDOWN BANK	S_C & S_D	4 & 4
SHUTDOWN BANK	S_E	4
CONTROL BANK	A	4
CONTROL BANK	B	8
CONTROL BANK	C	8
CONTROL BANK	D	5

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Rod Cluster Control
Assembly Pattern

FIGURE 4.3-36

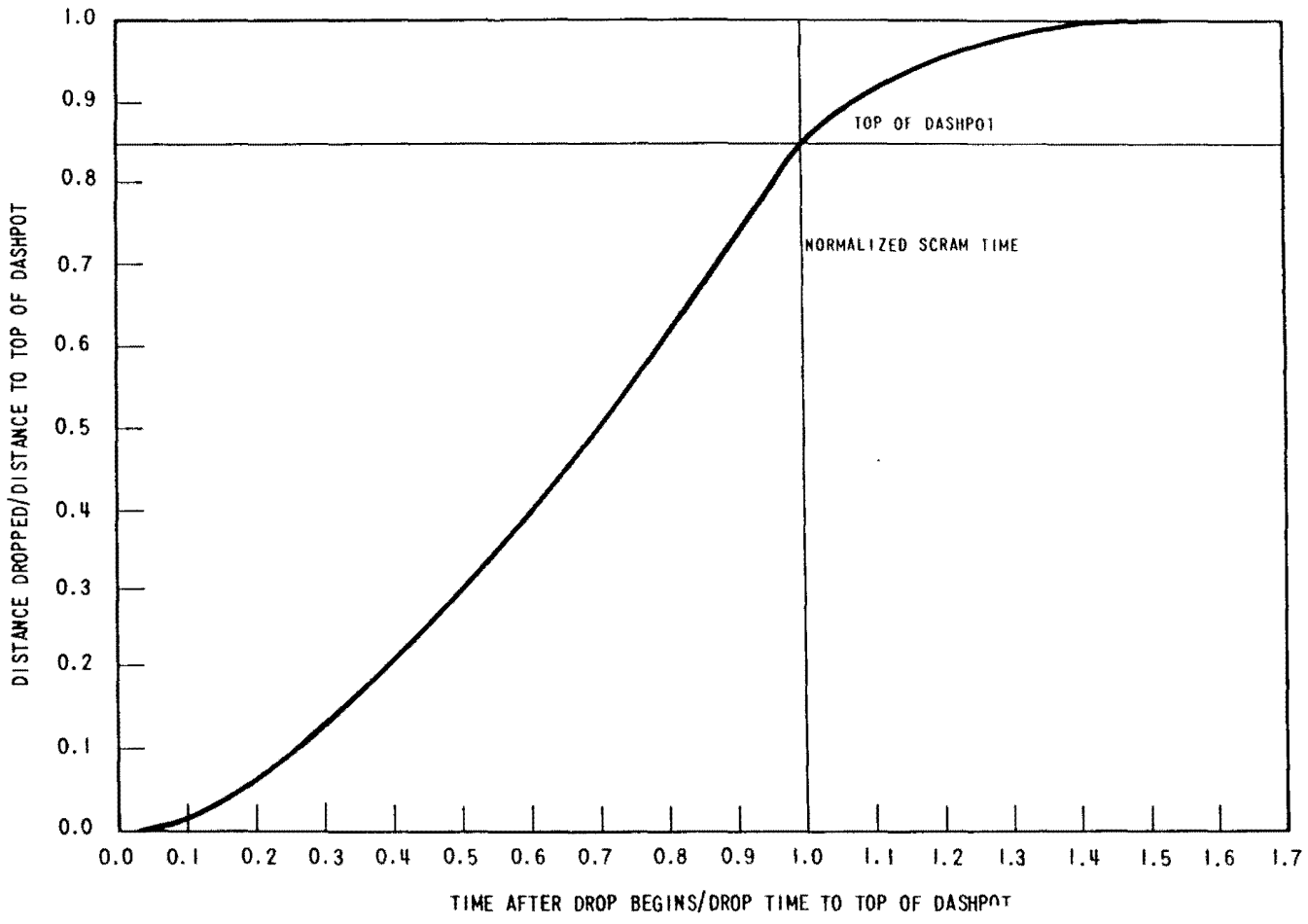


Amendment 95
February 2, 1998

COMANCHE PEAK S.E.S
FINAL SAFETY ANALYSIS REPORT

Accidental Simultaneous Withdrawel of 2 Control Banks EOL, HZP Banks C and B Moving in Same Plane (Typical)

FIGURE 4.3-37

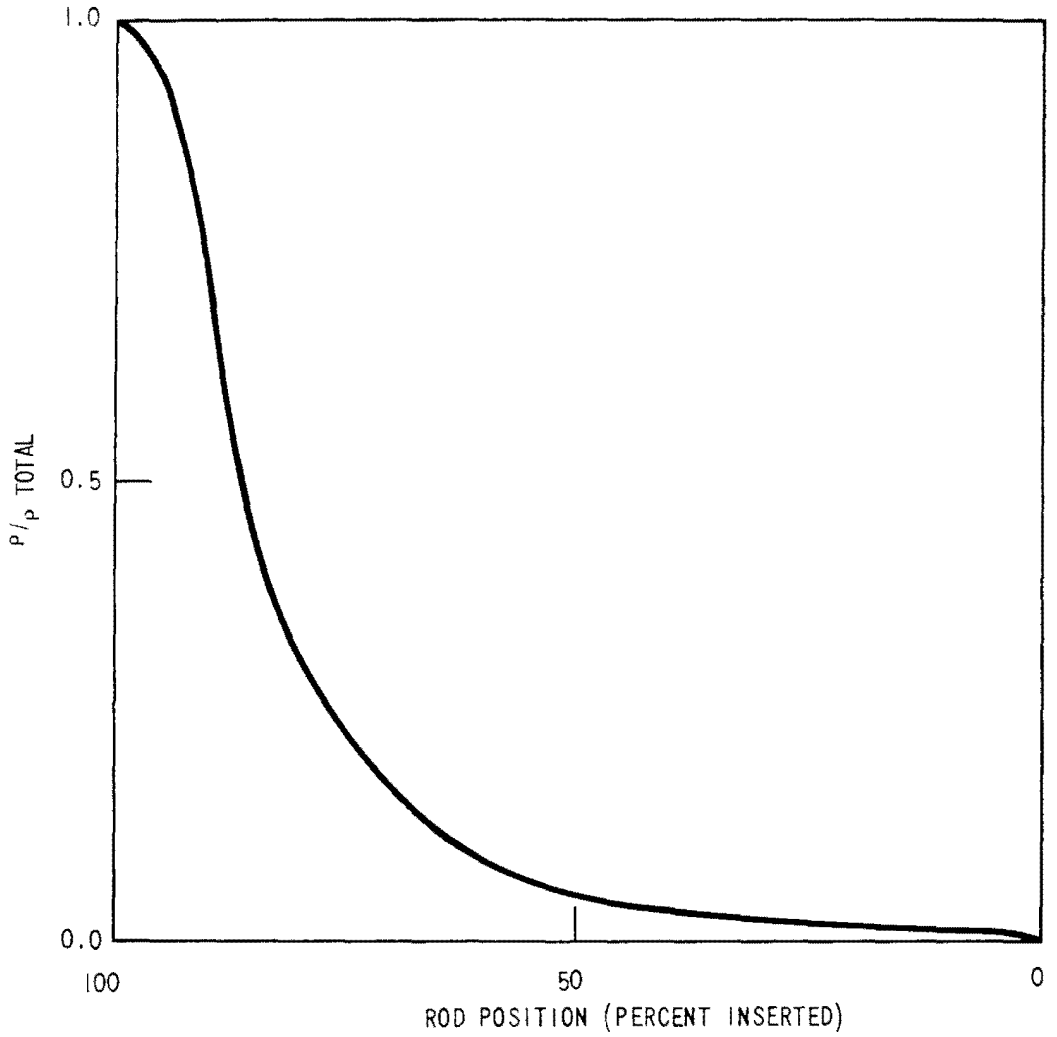


COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Typical Trip Curve

FIGURE 4.3-38

AMENDMENT 92
AUGUST 31, 1994

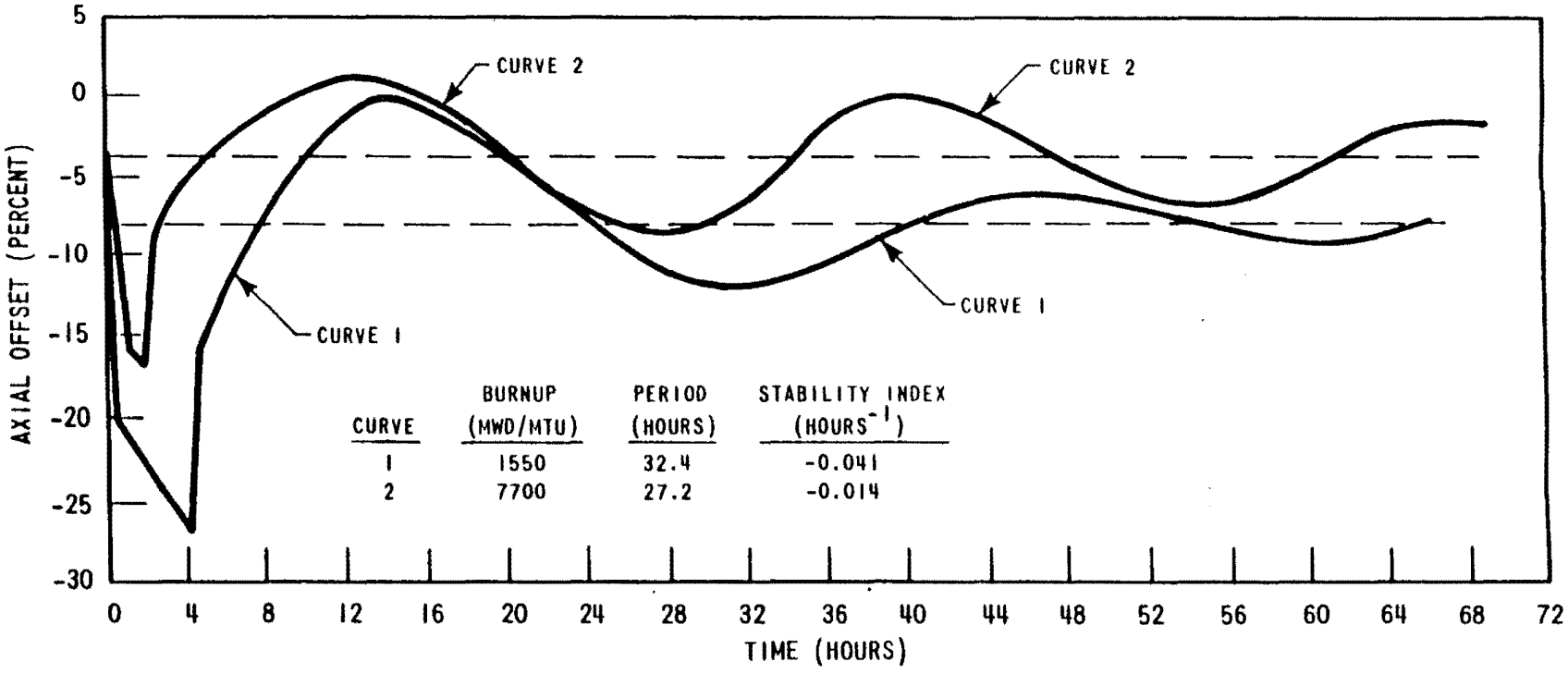


AMENDMENT 92
AUGUST 31, 1994

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Normalized Rod Worth Vs
Percent Insertion -
All Rods But One (Typical)

FIGURE 4.3-39

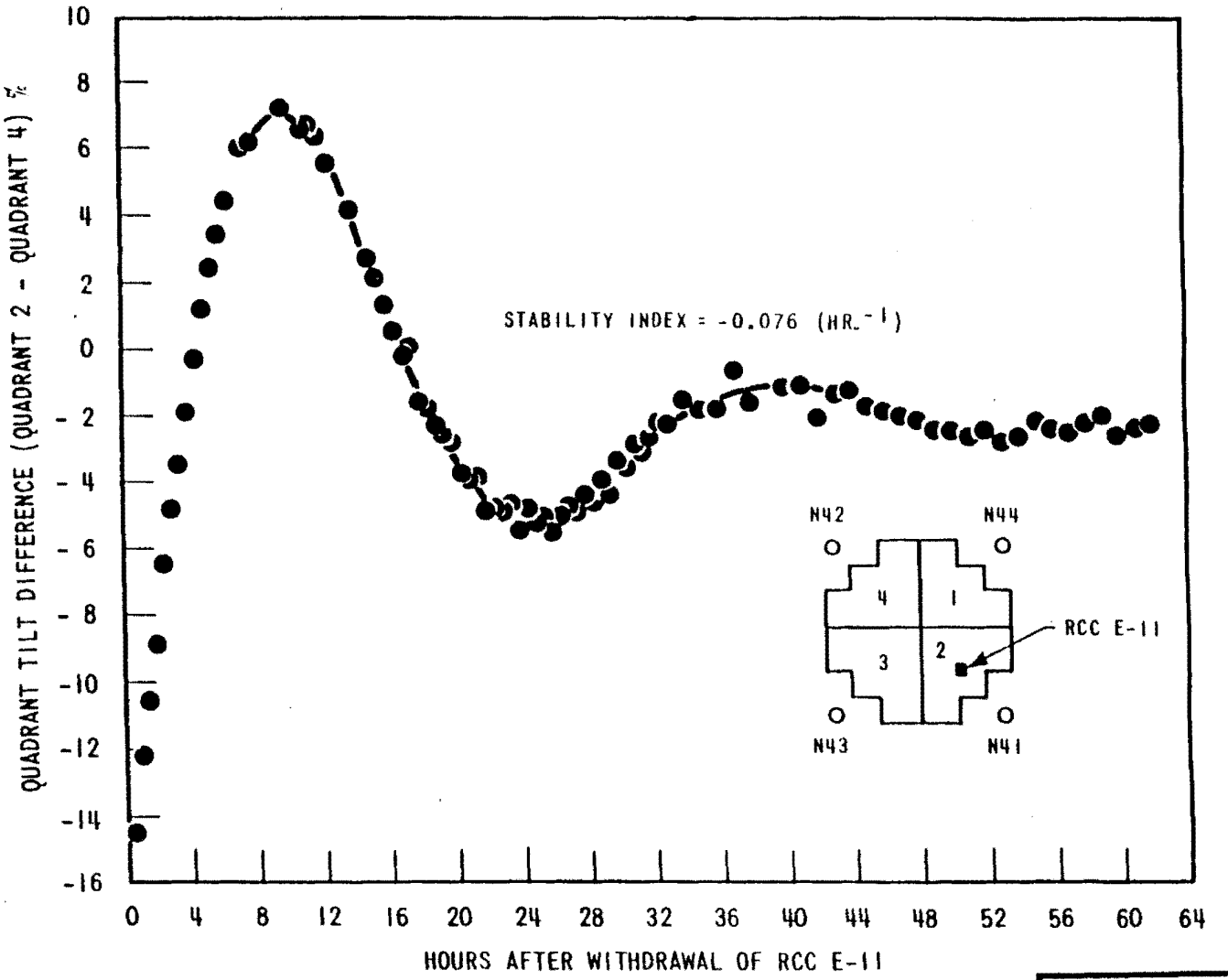


Amendment 95
February 2, 1998

COMANCHE PEAK S.E.S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Axial Offset Vs. Time
PWR Core with a 12-Ft Height
and 121 Assemblies

FIGURE 4.3-40



Amendment 95
February 2, 1998

COMANCHE PEAK S.E.S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

XY Xenon Test Thermocouple Response Quadrant Tilt Difference Vs. Time

FIGURE 4.3-41

Figures 4.3-42 thru 4.3-45 have been deleted |92

Figures 4.3-42 thru 4.3-45 have been deleted |92

Figures 4.3-42 thru 4.3-45 have been deleted |92

Figures 4.3-42 thru 4.3-45 have been deleted |92

Figures 4.4-1 thru 4.4-19 have been deleted | 92

1.096 1.001							Key: $\Delta h/\overline{\Delta h}$ $G/\overline{G}$
1.029 1.001	1.120 1.001						
1.153 1.000	1.074 1.001	1.185 1.000					
1.166 1.000	1.209 1.000	1.162 1.001	1.185 1.000				
1.223 1.000	1.170 1.001	1.188 1.000	1.065 1.002	1.238 1.000			
1.126 1.001	1.161 1.001	1.093 1.002	1.086 1.002	0.916 1.001	0.967 1.001		
1.025 1.002	1.025 1.002	0.990 1.002	0.975 1.002	0.823 1.000	0.466 0.997		
0.717 0.999	0.780 0.999	0.664 0.998	0.563 0.997				

For Radial Power Distribution Near Beginning of Life, Hot Full Power, Equilibrium Xenon

Calculated $F^N_{\Delta H} = 1.34$

COMANCHE PEAK S.E.S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Normalized Radial Flow and Enthalpy Distribution at 4-Ft Elevation Typical of Cycle 1

Figure 4.4-2

℄

1.096 0.996						
1.026 1.002	1.120 0.994					
1.155 0.991	1.072 0.998	1.188 0.988				
1.169 0.990	1.212 0.986	1.165 0.990	1.189 0.998			
1.228 0.985	1.173 0.989	1.191 0.988	1.065 0.998	1.242 0.981		
1.129 0.992	1.165 0.990	1.095 0.995	1.086 0.996	0.916 1.009	0.963 1.006	
1.024 1.000	1.025 1.000	0.989 1.003	0.973 1.004	0.819 1.018	0.468 1.018	
0.715 1.022	0.777 1.019	0.663 1.021	0.562 1.019			

℄

Key:
$\Delta h/\overline{\Delta h}$
$G/\overline{G}$

For Radial Power Distribution Near Beginning of Life, Hot Full Power, Equilibrium Xenon

Calculated $F_{\Delta H}^{N} = 1.34$

COMANCHE PEAK S.E.S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Normalized Radial Flow and Enthalpy Distribution at 8-Ft Elevation Typical of Cycle 1

Figure 4.4-3

1.097 0.995							Key: $\Delta h/\overline{\Delta h}$ $G/\overline{G}$
1.026 0.999	1.121 0.993						
1.157 0.991	1.073 0.996	1.189 0.989					
1.170 0.990	1.215 0.980	1.166 0.991	1.190 0.990				
1.231 0.987	1.175 0.990	1.193 0.989	1.066 0.997	1.243 0.987			
1.130 0.993	1.165 0.991	1.095 0.995	1.087 0.996	0.914 1.005	0.961 1.003		
1.023 1.000	1.024 1.000	0.987 1.002	0.971 1.003	0.817 1.011	0.469 1.030		
0.711 1.016	0.774 1.013	0.660 1.019	0.560 1.025				

For Radial Power Distribution Near Beginning of Life, Hot Full Power, Equilibrium Xenon

Calculated $F_{\Delta H}^{N} = 1.34$

COMANCHE PEAK S.E.S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Normalized Radial Flow and Enthalpy Distribution at 12-Ft Elevation Typical of Cycle 1

Figure 4.4-4

Figures 4.4-1 thru 4.4-19 have been deleted | 92

Figures 4.4-1 thru 4.4-19 have been deleted | 92

Figures 4.4-1 thru 4.4-19 have been deleted | 92

Figures 4.4-1 thru 4.4-19 have been deleted | 92

Figures 4.4-1 thru 4.4-19 have been deleted | 92

Figures 4.4-1 thru 4.4-19 have been deleted | 92

Figures 4.4-1 thru 4.4-19 have been deleted | 92

Figures 4.4-1 thru 4.4-19 have been deleted | 92

Figures 4.4-1 thru 4.4-19 have been deleted | 92

Figures 4.4-1 thru 4.4-19 have been deleted | 92

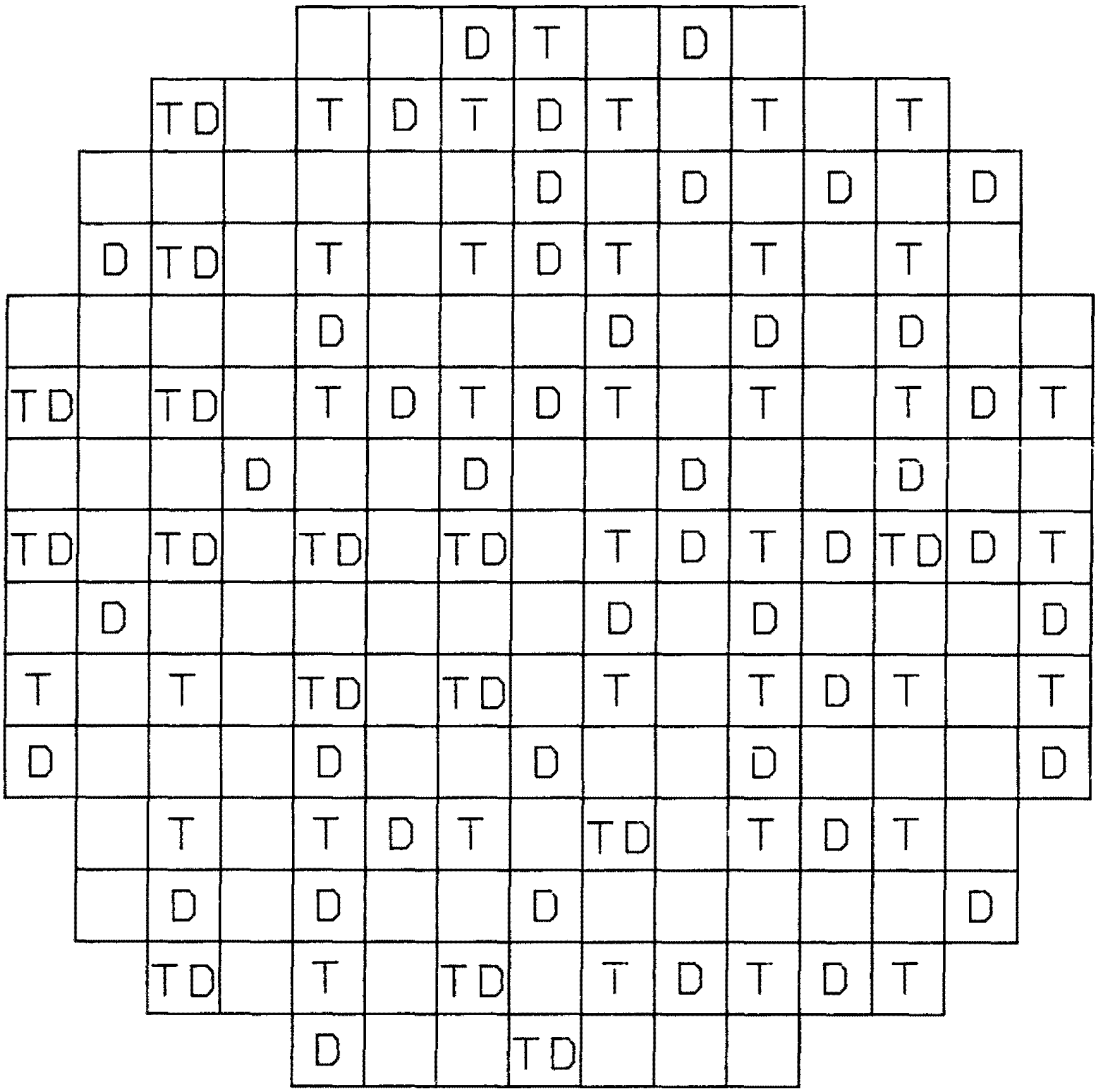
Figures 4.4-1 thru 4.4-19 have been deleted | 92

Figures 4.4-1 thru 4.4-19 have been deleted | 92

Figures 4.4-1 thru 4.4-19 have been deleted | 92

Figures 4.4-1 thru 4.4-19 have been deleted | 92

Figures 4.4-1 thru 4.4-19 have been deleted | 92



T = THERMOCOUPLE (50)

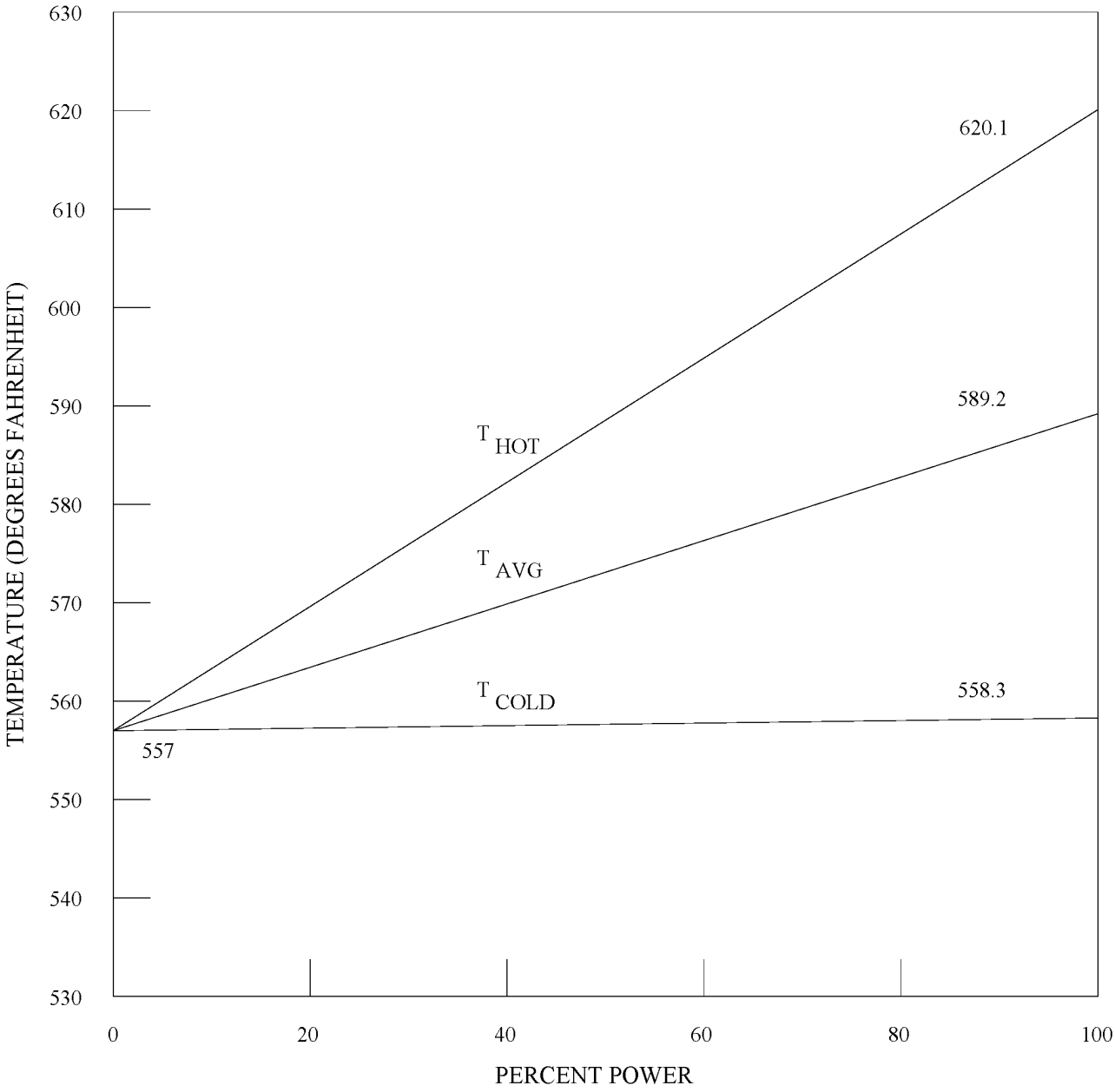
D = MOVABLE INCORE DETECTOR (58 LOCATIONS)

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Distribution of Incore Instrumentation

FIGURE 4.4-20

CPE



Amendment 102

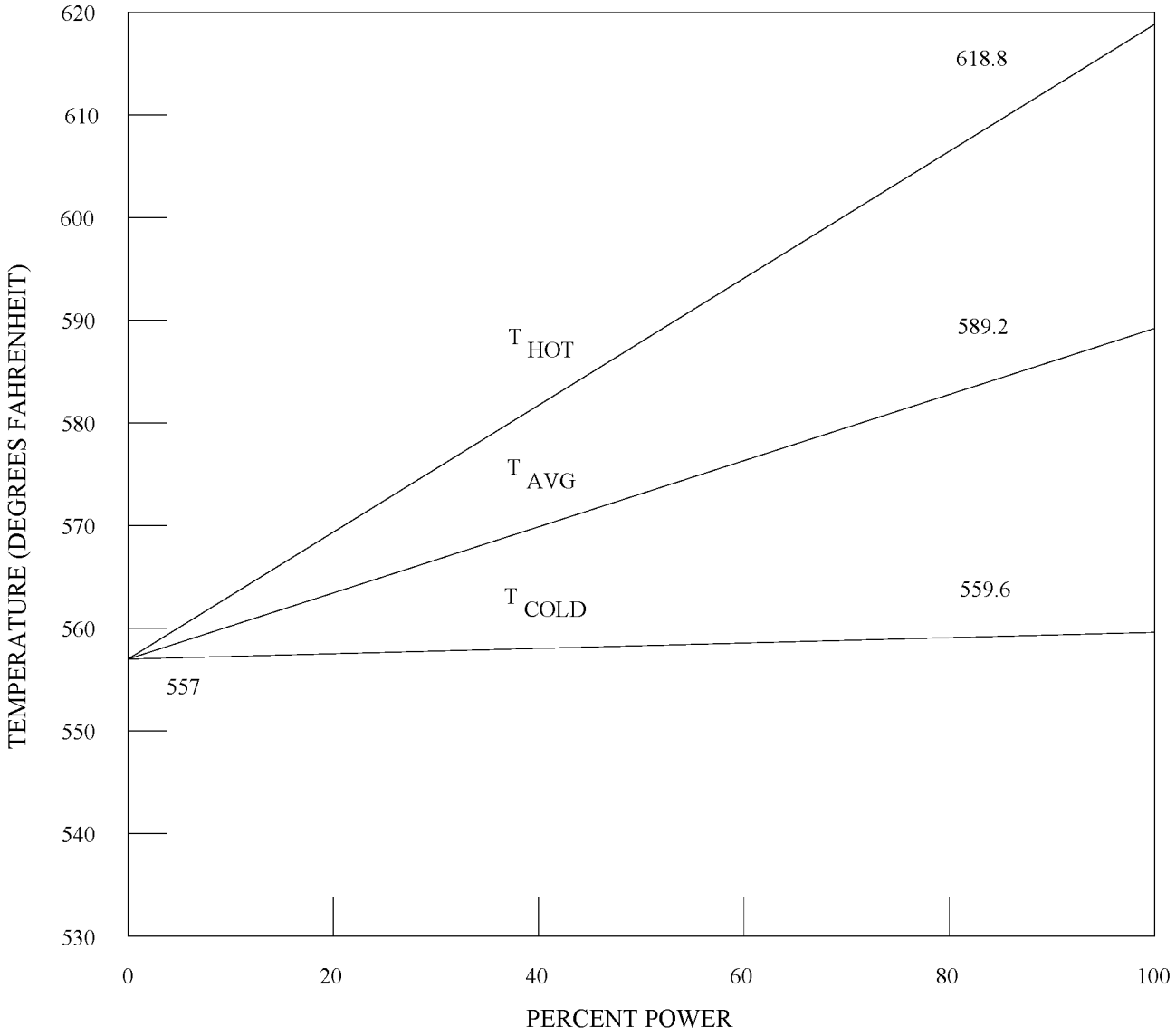
COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 1

REACTOR COOLANT SYSTEM
TEMPERATURE PERCENT POWER MAP

FIGURE 4.4-21A

fs000010.dgn

CPE



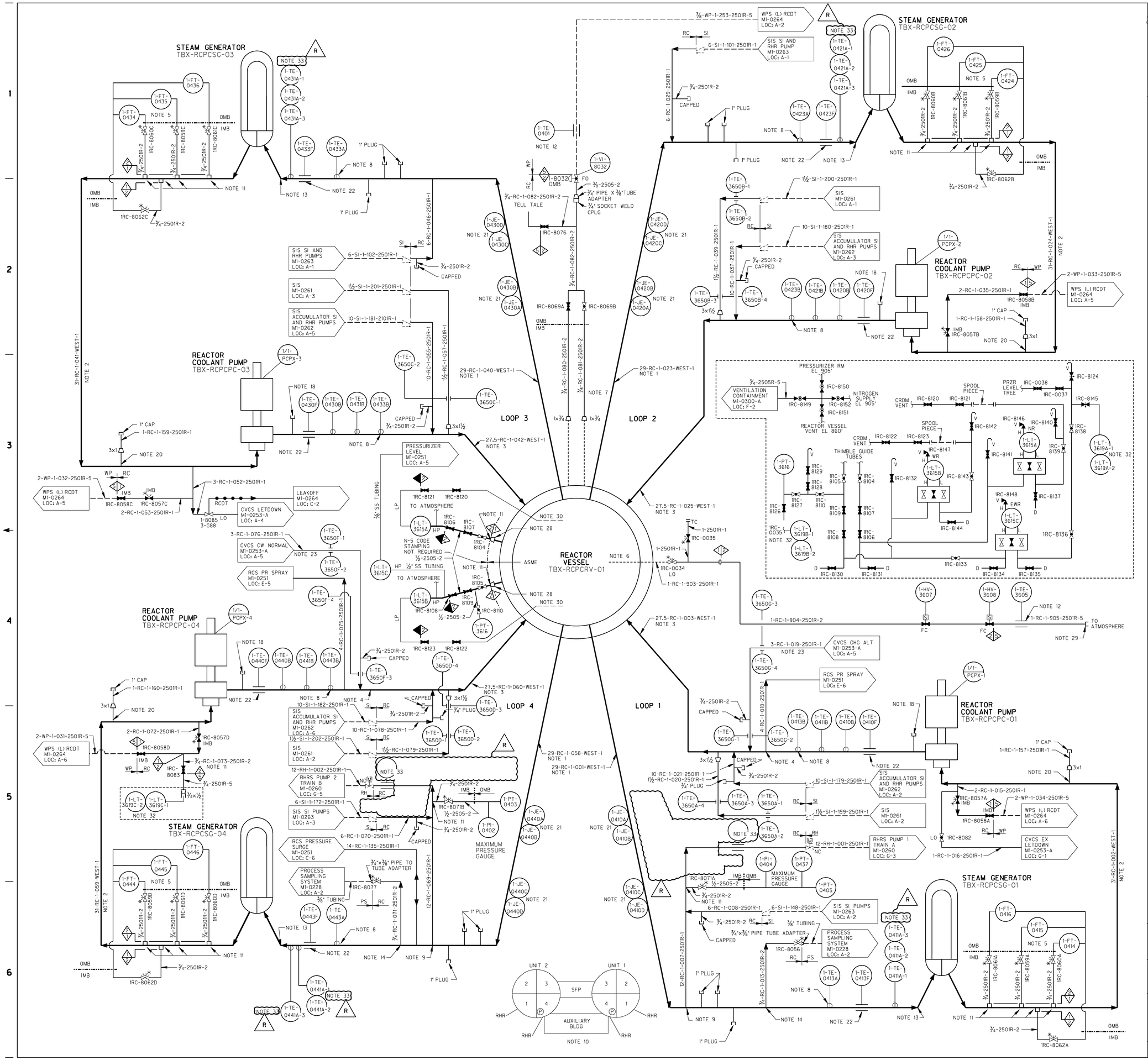
Amendment 102

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

REACTOR COOLANT SYSTEM
TEMPERATURE PERCENT POWER MAP

FIGURE 4.4-21B

fs00000z.dgn



REV	DWN	CHKD	APVD	REMARKS
CP-34	MHF 04-08-2013	GAW 04-08-2013		THIS DRAWING REVISED TO INCORPORATE DESIGN CHANGE FDA-2008-001958-02-03 PER SK-0020-08-001958-02-02.

NOTES:

1. 29" INSIDE DIAMETER. (BY WESTINGHOUSE)
2. 31" INSIDE DIAMETER. (BY WESTINGHOUSE)
3. 27.5" INSIDE DIAMETER. (BY WESTINGHOUSE)
4. SPRAY LINE SCOOP.
5. ELBOW FLOW METERS INSTALLATION - SEE REF G ON DRAWING M1-0200.
6. VENT PIPE FURNISHED WITH REACTOR VESSEL HEAD.
7. HEAD GASKET MONITORING CONNECTIONS FURNISHED WITH REACTOR VESSEL.
8. RTD INSTALLED IN WELL.
9. CONNECTION LOCATED IN BOTTOM HALF OF REACTOR COOLANT PIPING ON 45° ANGLE TO VERTICAL.
10. LOOP IDENTIFICATION AS SHOWN.
11. 3/8" ID FLOW RESTRICTOR PROVIDED. (SEE MECHANICAL SYMBOLS AND NOTES DRAWING M1-0200, NOTE 15).
12. STRAP-ON (SURFACE MOUNTED) RTD LOCATED AT BOTTOM OF PIPE.
13. 31" ID X 29" REDUCING ELBOW. (BY WESTINGHOUSE)
14. A FLOW RESTRICTING SCOOP WITH A BORE OF 0.234" WILL BE SUPPLIED BY VENDOR WITH THE LOOP 1 AND 4 HOT LEGS.
15. * INDICATES HERMETICALLY SEALED VALVE.
16. DELETED
17. DELETED
18. 2" NOZZLE TO BE PLUGGED IN FIELD.
19. DELETED
20. LOCATE CONNECTION ON UPPER 90° OF PIPE CIRCUMFERENCE.
21. LOCATE N-16 MONITOR AS CLOSE AS POSSIBLE TO BIOLOGICAL SHIELD.
22. STRAP ON RTD'S LOCATED IN PROXIMITY TO INLINE RTD'S FOR CROSS CALIBRATION.
23. USE OF THE NORMAL CHARGING LINE AND ALTERNATE CHARGING LINE SHOULD BE ALTERNATED OVER THE PLANT LIFE SUCH THAT NEITHER PATH WILL BE EXPOSED TO MORE THAN 60% OF THE DESIGN TRANSIENTS INVOLVING COMPLETE STOPPAGE OF LETDOWN AND/OR CHARGING FLOW. TRANSFER FROM ONE PATH TO THE OTHER SHOULD BE PERFORMED ONLY AT COLD SHUTDOWN CONDITIONS TO AVOID SUBJECTING THE CHARGING LINES TO UNNECESSARY THERMAL TRANSIENTS.
24. DELETED
25. DELETED
27. THE STRAP ON RTD'S IDENTIFIED ON THE FOLLOWING TABLE ARE USED TO MONITOR THERMAL CYCLING AND STRATIFICATION IN THEIR RESPECTIVE PIPING LEGS. AS NOTED ON THE TABLE, THE RTD'S ARE MOUNTED ON EITHER THE TOP OR THE BOTTOM OF THE PIPE.

TOP	BOTTOM
1-TE-3650A-1	1-TE-3650A-2
1-TE-3650A-3	1-TE-3650A-4
1-TE-3650B-1	1-TE-3650B-2
1-TE-3650B-3	1-TE-3650B-4
1-TE-3650C-1	1-TE-3650C-2
1-TE-3650D-1	1-TE-3650D-2
1-TE-3650D-3	1-TE-3650D-4
1-TE-3650F-1	1-TE-3650F-2
1-TE-3650F-3	1-TE-3650F-4
1-TE-3650G-1	1-TE-3650G-2
1-TE-3650G-3	1-TE-3650G-4

28. THESE CONNECTIONS MADE AT BMI (BOTTOM MOUNTED INSTRUMENTATION) THIMBLE GUIDE TUBES NUMBERS 46 AND 55 WHICH CORRESPOND TO CORE LOCATIONS J-1 AND N-14 RESPECTIVELY. THIMBLE GUIDE TUBE 46 (LOCATION J1) TO BE USED FOR WIDE RANGE LEVEL TRANSMITTER, 1-LT-3615B. THIMBLE GUIDE TUBE 55 (LOCATION N-14) TO BE USED FOR NARROW RANGE LEVEL TRANSMITTER, 1-LT-3615A.
29. END OF VENT LINE HAS CAMLOCK QUICK COUPLING TO FACILITATE A 1" QUICK DISCONNECT HOSE CONNECTION. THIS PIPE MUST NOT BE CAPPED FOR ANY REASON.
30. USE 1/4" SS TUBING FOR CONNECTION TO CONTROL ROD DRIVE MECHANISM. CONTROL ROD DRIVE MECHANISM INCLUDES FLOW RESTRICTOR TO SERVE AS TRANSITION FROM SAFETY CLASS 1 TO 2.
31. DELETED
32. 1-LT-3619A-1,A-2,B-1,B-2,C-1 AND C-2 ARE INSTALLED FOR PERIODIC RCS LEVEL MONITORING. ROOT VALVES ARE NORMALLY CLOSED. FOR ONE INSERVICE LINE-UP SEE APPLICABLE IPO. VALVE 1RC-8083 IS TO BE CAPPED OFF WHEN RCS LEVEL MONITORING SYSTEM IS NOT IN SERVICE.
33. THE FOLLOWING TEMPERATURE ELEMENTS ARE ABANDONED IN PLACE:

1-TE-0411A-1	1-TE-0431A-1	1-TE-3617A-10
1-TE-0411A-2	1-TE-0431A-2	1-TE-3617A-11 / 1-TE-3617B-11
1-TE-0411A-3	1-TE-0431A-3	1-TE-3617A-12 / 1-TE-3617B-12
		1-TE-3617A-13 / 1-TE-3617B-13
1-TE-0421A-1	1-TE-0441A-1	1-TE-3617B-14
1-TE-0421A-2	1-TE-0441A-2	
1-TE-0421A-3	1-TE-0441A-3	1-TE-3617A-16 / 1-TE-3617B-16

REFERENCE NOTES: R 01 R 02

THIS FLOW DIAGRAM HAS BEEN REDRAWN FROM WESTINGHOUSE DRAWING NUMBER 1138E92 SH 1 OF 2, REV 6 WITH EXCEPTIONS AS FOLLOWS:

a. VALVES AND LINE NUMBERS HAVE BEEN ADDED.
b. CONTROL LOOPS HAVE BEEN DELETED EXCEPT FOR THE PRIMARY AND FINAL ELEMENTS. THE DETAILS OF THE CONTROL LOOPS WILL BE SHOWN ON INSTRUMENTATION AND CONTROL DIAGRAM.

FSAR FIGURE 5.1-1

THIS DRAWING CREATED ELECTRONICALLY

CLASS I
(NUCLEAR SAFETY-RELATED)
SAFETY CLASS 1 — SEISMIC CATEGORY I
SAFETY CLASS 2 — CLASS IE
SAFETY CLASS 3 — ASSOCIATED CIRCUITS

LUMINANT
CPNPP
GLEN ROSE, TEXAS

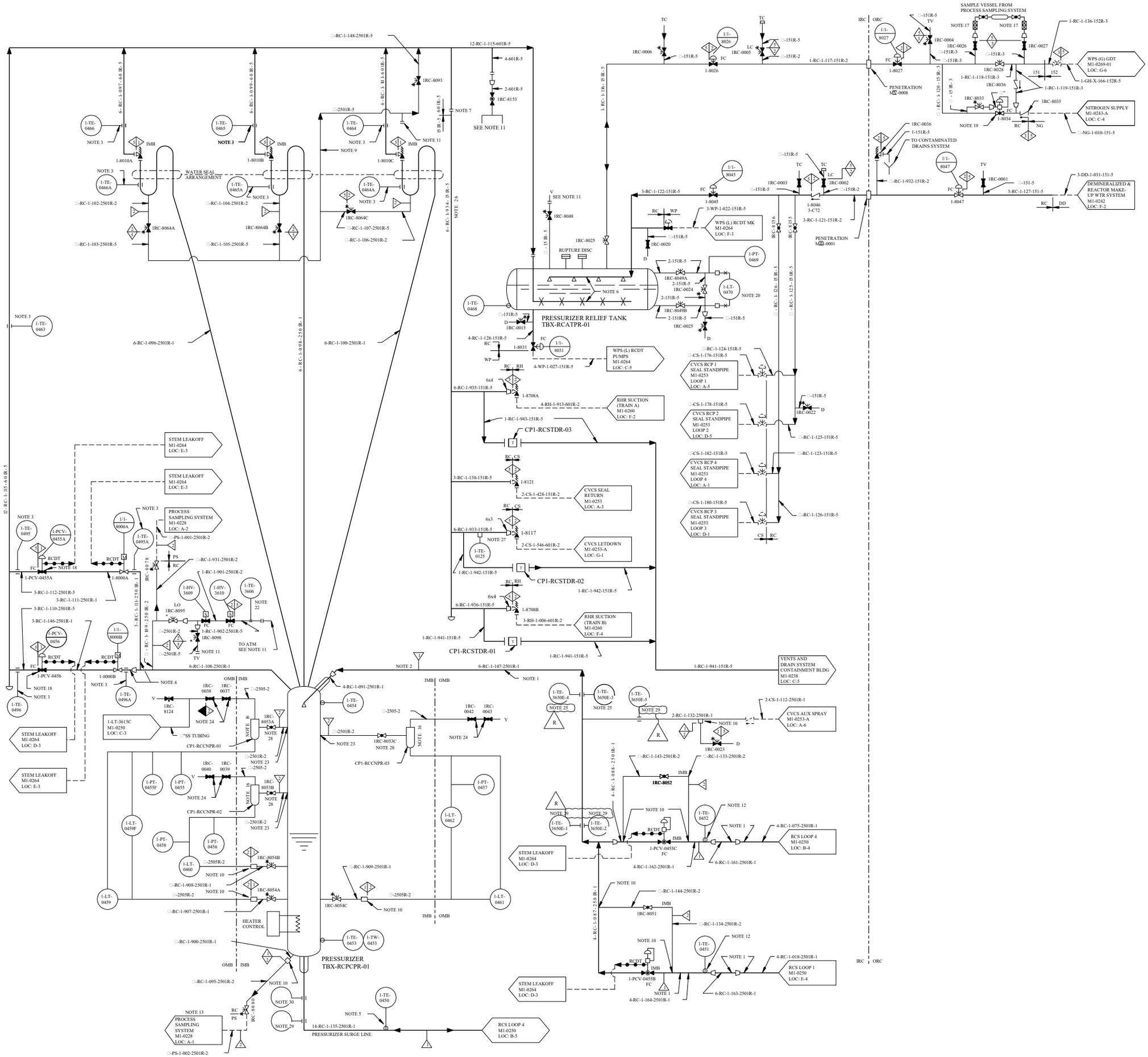
FLOW DIAGRAM
REACTOR COOLANT SYSTEM

DWG. NO. M1-0250 | SH. NO. - | REV. CP-34

FINAL PRINT

REF CKD CP-22 11-13-96

me104170.dgn



REV	DWN	CHKD	APVD	REMARKS
CP-34	JRMC 11-10 2014	DJL 11-10 2014		THIS DRAWING REVISED TO INCORPORATE DESIGN CHANGE FDA-2008-001958-02-04 PER SK-0039-08-001958-02-00.

NOTES:

1. PRESSURIZER SPRAY LINES FROM REACTOR COOLANT LOOPS TO PRESSURIZER ARE RUN USING LONG RADIUS BENDS TO COMPLY WITH MAXIMUM ALLOWABLE PRESSURE DROP PER WESTINGHOUSE DOCUMENT PFD-PD-285-4.
2. SPRAY PIPE SLOPED TO PROVIDE WATER SEAL BETWEEN PRESSURIZER AND SPRAY VALVES.
3. STRAP ON (SURFACE MOUNTED) RTD'S LOCATED AT BOTTOM OF PIPE.
4. PIPE SLOPED DOWNWARD TO PROVIDE WATER SEAL BETWEEN PRESSURIZER AND MOTOR OPERATED VALVES.
5. LOCATED APPROXIMATELY MIDWAY BETWEEN LOOP AND PRESSURIZER.
6. SPARGER AND SPRAY HEADER SUPPLIED WITH PRESSURIZER RELIEF TANK. VENT HOLE PROVIDED IN SPARGER LINE.
7. 600 LB ANSI FLANGES.
8. DELETED
9. DRAIN LINES SLOPED DOWN FROM LOOP SEALS TO CONNECT WITH PRT HEADER LINE.
10. ☐ INCH I.D. FLOW RESTRICTOR WITH PIPING FOR CLASS-1 AND CLASS-2 TRANSITION AT PRESSURIZER LIQUID SPACE LEVEL INSTRUMENT AND SAMPLE NOZZLES AND OTHER LOCATIONS AS SHOWN SIMILAR TO ARRANGEMENT SHOWN ON MECHANICAL SYMBOLS AND NOTES DRAWING NO. M1-0200, NOTE 15.
11. TYGON HOSE TO BE INSTALLED AT THESE CONNECTIONS TO VENT PRESSURIZER DURING DRAINING AND FILLING.
12. LOCATED CLOSE TO PRESSURIZER SPRAY VALVES IN ITS WATER SEAL.
13. DIGITAL PRESSURIZER INDICATOR LOCATED ON THIS LINE DOWNSTREAM OF SAMPLE HEAT EXCHANGER.
14. DELETED
15. ✱ INDICATES HERMETICALLY SEALED VALVE.
16. SEE REFERENCE "G" ON MECHANICAL SYMBOLS AND NOTES DRAWING NO. M1-0200.
17. ALL QUICK CONNECT COUPLINGS SHALL BE SWAGELOK SS-QC4-S-400 AND SS-QC4-3-400 FURNISHED WITH SAMPLE VESSEL.
18. NITROGEN SUPPLY REQUIRED FOR COLD OVERPRESSURE PROTECTION.
19. LOCATE ABOVE THE PRESSURIZER RELIEF TANK. PIPING MUST BE SLOPED CONTINUOUSLY DOWNWARD FROM THE REGULATOR TO THE PRT TO AVOID WATER SEALS.
20. FLANGES USED IN THE INSTRUMENT CONNECTIONS FOR 1-LT-0470 ARE RATED AT 150 LBS.
21. DELETED
22. TEMPERATURE ELEMENT IS STRAP-ON RTD.
23. 0.83 INCH I.D. FLOW RESTRICTORS IN PRESSURIZER STEAM SPACE LEVEL INSTRUMENT NOZZLES PROVIDE THE CLASS-1 TO CLASS-2 TRANSITION.
24. BY INSTRUMENTATION.
25. THE STRAP ON RTD'S IDENTIFIED ON THE FOLLOWING TABLE ARE USED TO MONITOR THERMAL CYCLING AND STRATIFICATION IN THEIR RESPECTIVE PIPING LEGS. AS NOTED ON THE TABLE, THE RTD'S ARE MOUNTED ON EITHER THE TOP OR BOTTOM OF THE PIPE.

TOP	BOTTOM
1-TE-3650E-3	1-TE-3650E-4

STRAP ON RTD 1-TE-3650E-5 IS ALSO USED TO MONITOR THERMAL CYCLING AND STRATIFICATION BUT IS LOCATED IN A VERTICAL RISER, SO BEING LOCATED ON TOP OR BOTTOM OF PIPE IS NOT PERTINENT.

26. TO FACILITATE PIPE SUPPORT DESIGN, PIPE IS UPGRADED TO SCHEDULE 160S.
27. TO FACILITATE PIPE SUPPORT DESIGN, PIPE IS UPGRADED TO SCHEDULE 80S.
28. HANDWHEELS FOR VALVES 1RC-8053A , 1RC-8053B AND 1RC-8053C HAVE BEEN REMOVED DUE TO INTERFERENCES. A TEMPORARY VALVE WRENCH WILL BE USED WHEN NECESSARY.
29. THE STRAP-ON RTD'S IDENTIFIED IN THE FOLLOWING TABLE HAVE BEEN ABANDONED IN PLACE.

1-TE-3618A-1	1-TE-3618A-6	1-TE-3618A-11	1-TE-3650E-1
1-TE-3618A-2	1-TE-3618A-7	1-TE-3618A-12	1-TE-3650E-2
1-TE-3618A-3	1-TE-3618A-8	1-TE-3618A-13	1-TE-3650E-5
1-TE-3618A-4	1-TE-3618A-9	1-TE-3618A-14	
1-TE-3618A-5	1-TE-3618A-10		

30. THE FOLLOWING LANYARD POTENTIOMETERS (REF DCN 00238) ARE ABANDONED IN PLACE:

1-ZT-3618B-1	1-ZT-3618B-2	1-ZT-3618B-3

REFERENCES NOTE:

THIS FLOW DIAGRAM HAS BEEN REDRAWN FROM WESTINGHOUSE DRAWING NO. 1138E92 SH 2 OF 2 REV 6 WITH EXCEPTIONS AS FOLLOWS:

a. VALVE AND LINE NUMBERS HAVE BEEN ADDED.
b. CONTROL LOOPS HAVE BEEN DELETED EXCEPT FOR THE PRIMARY AND THE FINAL ELEMENTS. THE DETAILS OF THE CONTROL LOOPS WILL BE SHOWN ON INSTRUMENTATION AND CONTROL DIAGRAM.

FSAR FIGURE 5.1-1

THIS DRAWING CREATED ELECTRONICALLY

CLASS I
(NUCLEAR SAFETY-RELATED)
SAFETY CLASS 1 / SAFETY CLASS 2 / SAFETY CLASS 3 — SEISMIC CATEGORY I / CLASS 1E / ASSOCIATED CIRCUITS

LUMINANT
CPNPP
GLEN ROSE, TEXAS

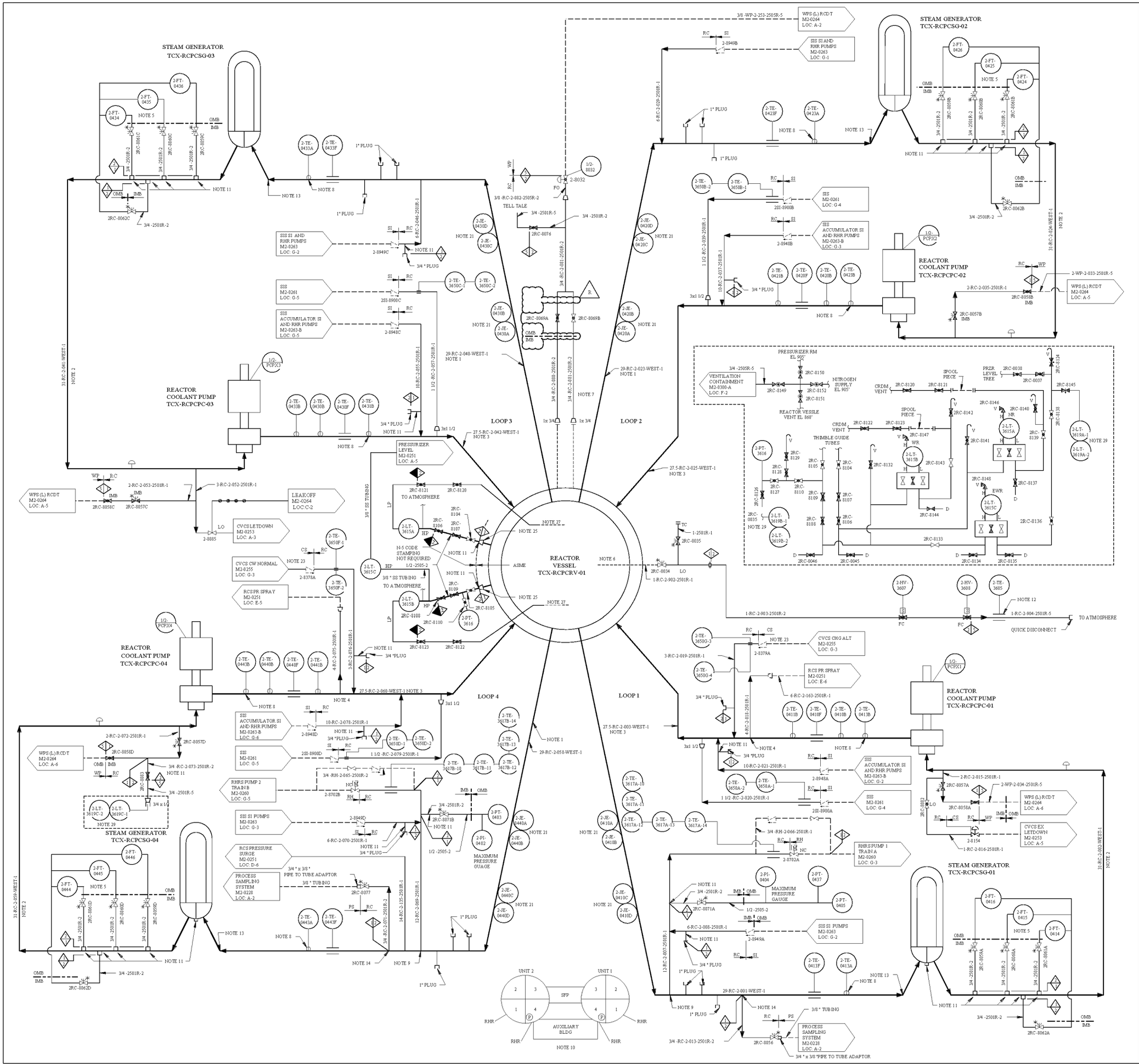
FLOW DIAGRAM
REACTOR COOLANT SYSTEM

DWG. NO. M1-0251 | SH. NO. - | REV. CP-34

FINAL PRINT

REF CKD CP-2112/19/96

me776200.dgn M1-0251



REV	DWN	CHKD	APV'D	REMARKS
CP-18	DLK 04-20-2011	MSF 04-20-2011		THIS DRAWING REVISED TO INCORPORATE DESIGN CHANGE FDA 2011-000077-01-00 PER SX-0001-11-000077-01-00.

NOTES:

1. 29" INSIDE DIAMETER. (BY WESTINGHOUSE)
2. 31" INSIDE DIAMETER.(BY WESTINGHOUSE)
3. 27.5" INSIDE DIAMETER. (BY WESTINGHOUSE)
4. SPRAY LINE SCOOP.
5. ELBOW FLOW METERS INSTALLATION-SEE REF. G ON DRAWING M1-0200.
6. VENT PIPE FURNISHED WITH REACTOR VESSEL HEAD.
7. HEAD GASKET MONITORING CONNECTIONS FURNISHED WITH REACTOR VESSEL.
8. RTD INSTALLED IN WELL.
9. CONNECTION LOCATED IN BOTTOM HALF OF REACTOR COOLANT PIPING ON 45° ANGLE TO VERTICAL.
10. LOOP INDENTIFICATION AS SHOWN.
11. 3/8 " I.D. FLOW RESTRICTOR PROVIDED. (SEE MECHANICAL SYMBOLS AND NOTES DRAWING M1-0200, NOTE 15).
12. STRAP-ON (SURFACE MOUNTED) RTD LOCATED AT BOTTOM OF PIPE.
13. 31" ID X29" REDUCING ELBOW. (BY WESTINGHOUSE)
14. A FLOW RESTRICTING SCOOP WITH A BORE OF 0.234" WILL BE SUPPLIED BY VENDOR WITH THE LOOP 1 AND LOOP 4 HOT LEGS.
15. FOR MECHANICAL SYMBOLS AND NOTES SEE DRAWING M1-0200.
16. DELETED
17. TYGON HOSE TO BE INSTALLED AT THIS CONNECTION FOR DRAINING BOTTOM OF CHANNEL HEAD TO CONTAINMENT SUMP AFTER REACTOR COOLANT SYSTEM HAS BEEN DRAINED BELOW STEAM GENERATOR NOZZLES.
18. DELETED
19. DELETED
20. LOCATE CONNECTION OF UPPER 90 OF PIPE CIRCUMFERENCE.
21. LOCATE N-16 MONITOR AS CLOSE AS POSSIBLE TO BIOLOGICAL SHIELD.
22. DELETED
23. USE OF THE NORMAL CHARGING LINE AND ALTERNATE CHARGING LINE SHOULD BE ALTERNATED OVER THE PLANT LIFE SUCH THAT NEITHER PATH WILL BE EXPOSED TO MORE THAN 60% OF THE DESIGN TRANSIENTS INVOLVING COMPLETE STOPPAGE OF LETDOWN AND/OR CHARGING FLOW. TRANSFER FROM ONE PATH TO THE OTHER SHOULD BE PERFORMED ONLY AT COLD SHUTDOWN CONDITIONS TO AVOID SUB-JECTING THE CHARGING LINES TO UNNECESSARY THERMAL TRANSIENTS.
24. DELETED
25. THESE CONNECTIONS MADE AT BMI (BOTTOM MOUNTED INSTRUMENTATION) THIMBLE TUBES NUMBERS 46 AND 55 WHICH CORRESPONDS TO CORE LOCATIONS J-1 AND N-14 RESPECTIVELY.
26. THE STRAP-ON RTD'S IDENTIFIED ON THE FOLLOWING TABLE ARE USED TO MONITOR THERMAL CYCLING AND STRATIFICATION IN THEIR RESPECTIVE PIPING LEGS. AS NOTED ON THE TABLE THE RTD'S ARE MOUNTED ON EITHER THE TOP OR BOTTOM OF THE PIPE.

TOP	BOTTOM
2-TE-3650A-1	2-TE-3650A-2
2-TE-3650B-1	2-TE-3650B-2
2-TE-3650C-1	2-TE-3650C-2
2-TE-3650D-1	2-TE-3650D-2
2-TE-3650F-1	2-TE-3650F-2

27. USE 1/2 " SS TUBING FOR CONNECTION TO CONTROL ROD DRIVE MECHANISM. CONTROL ROD DRIVE MECHANISM INSERT INCLUDES FLOW RESTRICTOR TO SERVE AS TRANSITION FROM SAFETY CLASS 1 TO 2.
28. DELETED
29. 2-LT-3619A-1,A-2,B-1,B-2,C-1 AND C-2 ARE INSTALLED FOR PERIODIC RCS LEVEL MONITORING. ROOT VALVES ARE NORMALLY CLOSED. FOR ONE INSERVICE LINE-UP SEE APPLICABLE IPO. VALVE 2RC-8083 IS TO BE CAPPED OFF WHEN THE RCS LEVEL MONITORING SYSTEM IS NOT IN SERVICE.

REFERENCE NOTES:

THIS FLOW DIAGRAM HAS BEEN REDRAWN FROM WESTINGHOUSE DRAWING NUMBER 1138E92 SH 1 OF 2 REV 6 WITH EXCEPTIONS AS FOLLOWS:

a. VALVE AND LINE NUMBERS HAVE BEEN ADDED.
b. CONTROL LOOPS HAVE BEEN DELETED EXCEPT FOR THE PRIMARY AND THE FINAL ELEMENTS.
THE DETAILS OF THE CONTROL LOOPS WILL BE SHOWN ON INSTRUMENTATION AND CONTROL DIAGRAM.

FSAR FIGURE 5.1-1

THIS DRAWING CREATED ELECTRONICALLY

CLASS I
(NUCLEAR SAFETY-RELATED)
SAFETY CLASS 1 — SEISMIC CATEGORY I
SAFETY CLASS 2 — CLASS 1E
SAFETY CLASS 3 — ASSOCIATED CIRCUITS

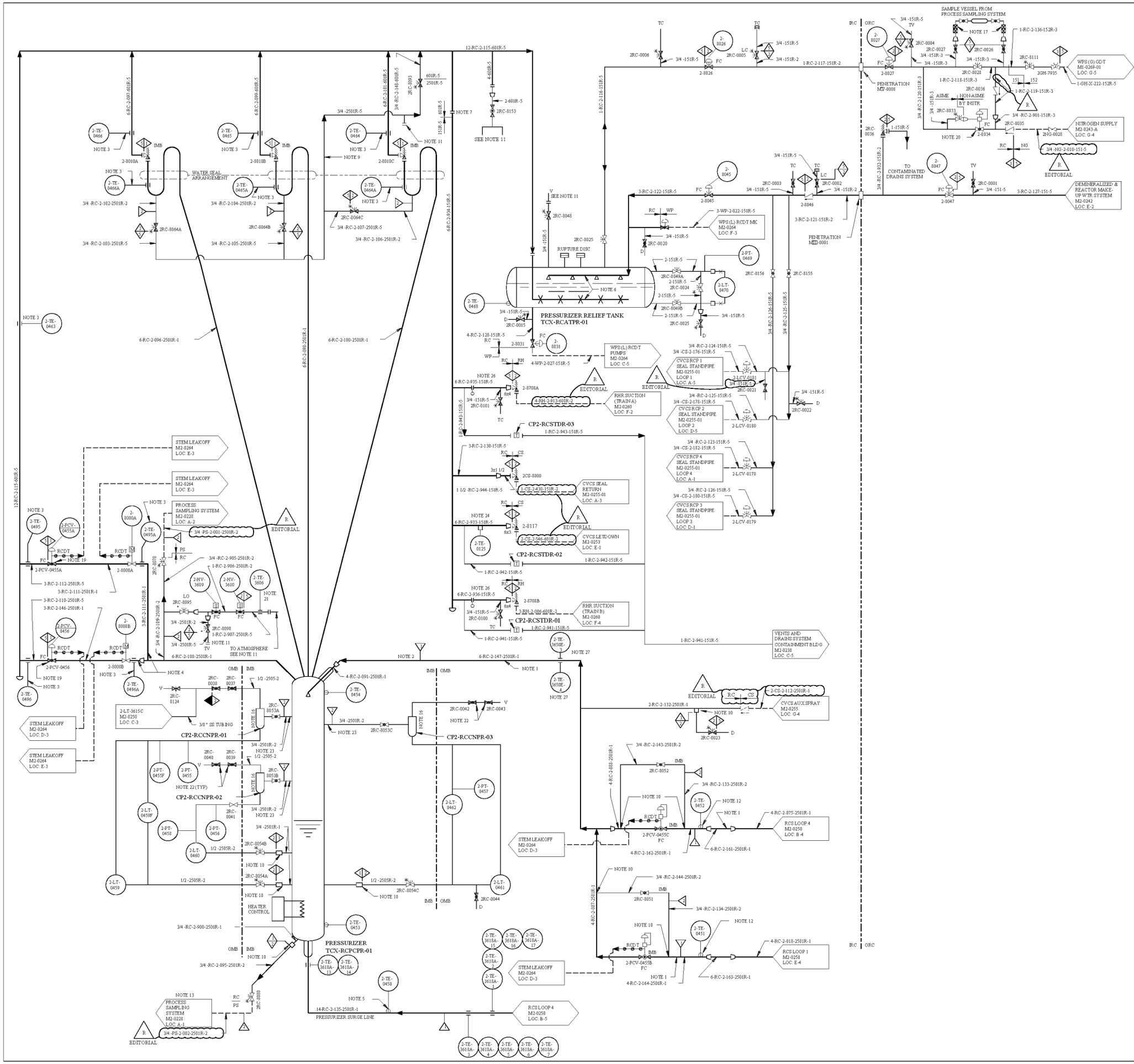
LUMINANT
CPNPP
GLEN ROSE, TEXAS

FLOW DIAGRAM
REACTOR COOLANT SYSTEM

DWG. NO. M2-0250 | SH. NO. - | REV. CP-18

FINAL PRINT

REF CKD CP-12/05/11/98



REV	DWN	CHKD	APVD	REMARKS
CP-21	DLK 12-10-2009	MM 12-15-2009		THIS DRAWING REVISED TO INCORPORATE DESIGN CHANGE FDA-2009-00704-01-00 PER SE-0008-09-00704-01-00. EDITORIAL CHANGES AS NOTED.

NOTES:

1. PRESSURIZER SPRAY LINES FROM REACTOR COOLANT LOOPS TO PRESSURIZER ARE RUN USING LONG RADIUS BENDS TO COMPLY WITH MAXIMUM ALLOWABLE PRESSURE DROP PER WESTINGHOUSE DOCUMENT PFD-RD-285-4.
2. SPRAY PIPE SLOPED TO PROVIDE WATER SEAL BETWEEN PRESSURIZER AND SPRAY VALVES.
3. STRAP ON (SURFACE MOUNTED) RTD'S LOCATED AT BOTTOM OF PIPE.
4. PIPE SLOPED DOWNWARD TO PROVIDE WATER SEAL BETWEEN PRESSURIZER AND MOTOR OPERATED VALVES.
5. LOCATED APPROXIMATELY MIDWAY BETWEEN LOOP AND PRESSURIZER.
6. SPARGER AND SPRAY HEADER SUPPLIED WITH PRESSURIZER RELIEF TANK. VENT HOLE PROVIDED IN SPARGER LINE.
7. 600 LB ANSI FLANGES.
8. DELETED
9. DRAIN LINES SLOPED DOWN FROM LOOP SEALS TO CONNECT WITH PRT HEADER LINE.
10. 3/8 INCH I.D. FLOW RESTRICTOR WITH PIPING FOR CLASS 1 AND CLASS 2 TRANSITION AT PRESSURIZER LIQUID SPACE LEVEL INSTRUMENT AND SAMPLE NOZZLES AND OTHER LOCATIONS AS SHOWN SIMILAR TO ARRANGEMENT SHOWN ON MECHANICAL SYMBOLS AND NOTES DRAWING NUMBER M1-0200, NOTE 15.
11. TYGON HOSE TO BE INSTALLED AT THESE CONNECTIONS TO VENT PRESSURIZER DURING DRAINING AND FILLING.
12. LOCATED CLOSE TO PRESSURIZER SPRAY VALVES IN ITS WATER SEAL.
13. DIGITAL PRESSURE INDICATOR LOCATED ON THIS LINE DOWNSTREAM OF SAMPLE HEAT EXCHANGER.
14. DELETED
15. DELETED
16. SEE REFERENCE G ON MECHANICAL SYMBOLS AND NOTES DRAWING NUMBER M1-0200.
17. ALL QUICK CONNECT COUPLINGS SHALL BE SWAGELOCK SS-QC4-S-400 AND SS-QC4-3-400 FURNISHED WITH SAMPLE VESSEL.
18. DELETED
19. NITROGEN SUPPLY REQUIRED FOR COLD OVERPRESSURE PROTECTION.
20. LOCATE ABOVE THE PRESSURIZER RELIEF TANK. PIPING MUST BE SLOPED CONTINUOUSLY DOWNWARD FROM THE REGULATOR TO THE PRT TO AVOID WATER SEALS.
21. TEMPERATURE ELEMENT IS STRAP-ON RTD.
22. BY INSTRUMENTATION.
23. 0.83 INCH ID FLOW RESTRICTORS IN PRESSURIZER STEAM SPACE LEVEL INSTRUMENT NOZZLES PROVIDE THE CLASS 1 TO CLASS 2 TRANSITION.
24. TO FACILITATE PIPE SUPPORT DESIGN, PIPE IS UPGRADED TO SCHEDULE 160S.
25. DELETED
26. TO FACILITATE PIPE SUPPORT DESIGN, PIPE IS UPGRADED TO SCHEDULE 80S.
27. THE STRAP-ON RTD'S IDENTIFIED ON THE FOLLOWING TABLE ARE USED TO MONITOR THERMAL CYCLING AND STRATIFICATION IN THEIR RESPECTIVE PIPING LEGS. AS NOTED ON THE TABLE, THE RTD'S ARE MOUNTED ON EITHER THE TOP OR BOTTOM OF THE PIPE.

TOP	BOTTOM
2-TE-3650E-3	2-TE-3650E-4

REFERENCE NOTES:

THIS FLOW DIAGRAM HAS BEEN REDRAWN FROM WESTINGHOUSE DRAWING NUMBER 1138E92 SH 2 OF 2 REV 9 WITH EXCEPTIONS AS FOLLOWS:

a. VALVE AND LINE NUMBERS HAVE BEEN ADDED.
b. CONTROL LOOPS HAVE BEEN DELETED EXCEPT FOR THE PRIMARY AND FINAL ELEMENTS. THE DETAILS OF THE CONTROL LOOPS WILL BE SHOWN ON INSTRUMENTATION AND CONTROL DIAGRAMS.

FSAR FIGURE 5.1-1

THIS DRAWING CREATED ELECTRONICALLY

CLASS I
(NUCLEAR SAFETY-RELATED)
SAFETY CLASS 1 — SEISMIC CATEGORY I
SAFETY CLASS 2 — CLASS 1E
SAFETY CLASS 3 — ASSOCIATED CIRCUITS

LUMINANT
CPNPP
GLEN ROSE, TEXAS

FLOW DIAGRAM
REACTOR COOLANT SYSTEM

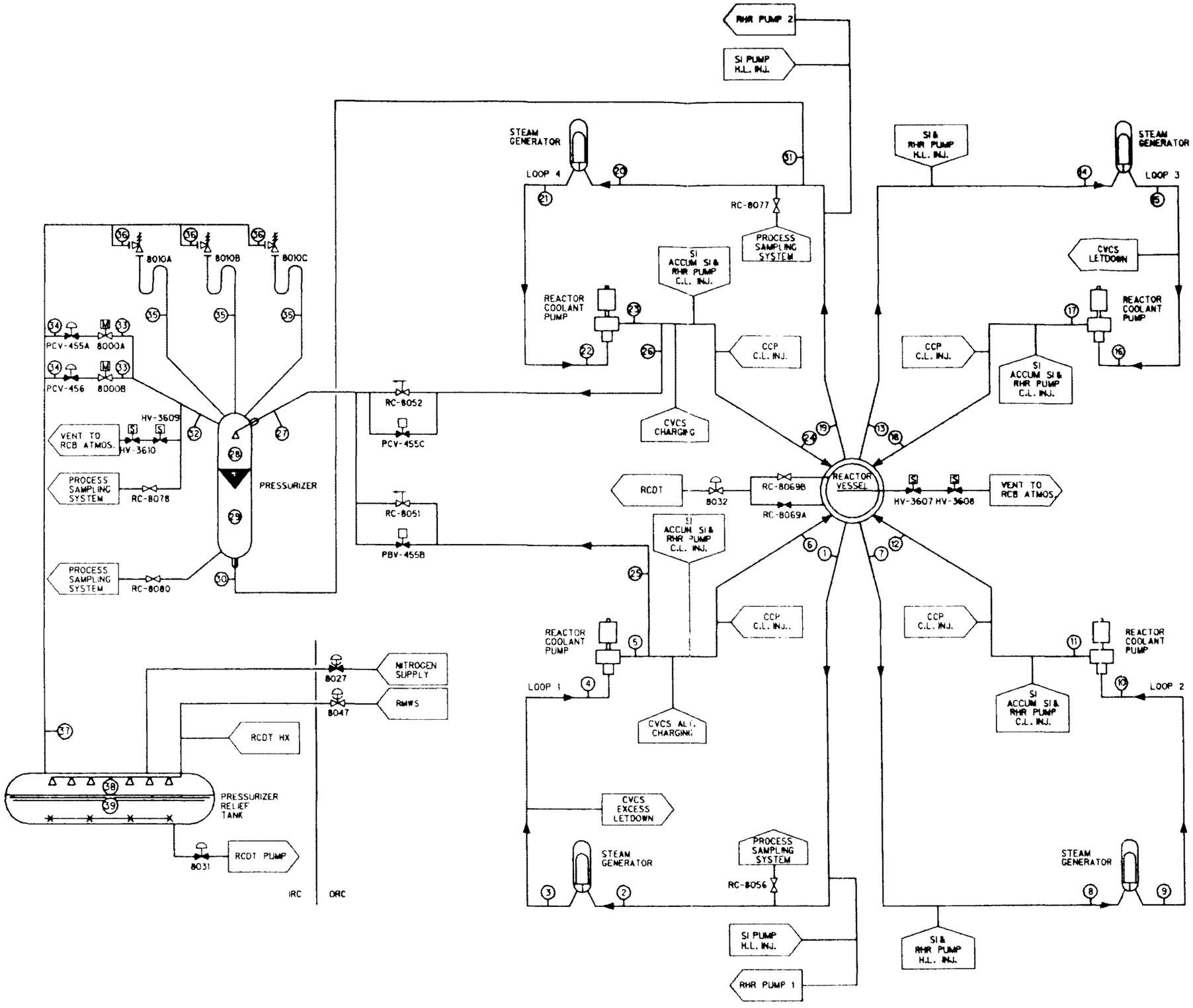
DWG. NO. M2-0251 | SH. NO. - | REV. CP-21

< FINAL PRINT >

REF CKD 2/5/97 CP-13

$$$$$$$DATE$$$$$$$

m e966400.dgn M2-0251



Amendment 67
February 5, 1988

COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

PROCESS FLOW DIAGRAM
REACTOR COOLANT SYSTEM

FIGURE 5.1-2

NOTES TO FIGURE 5.1-2

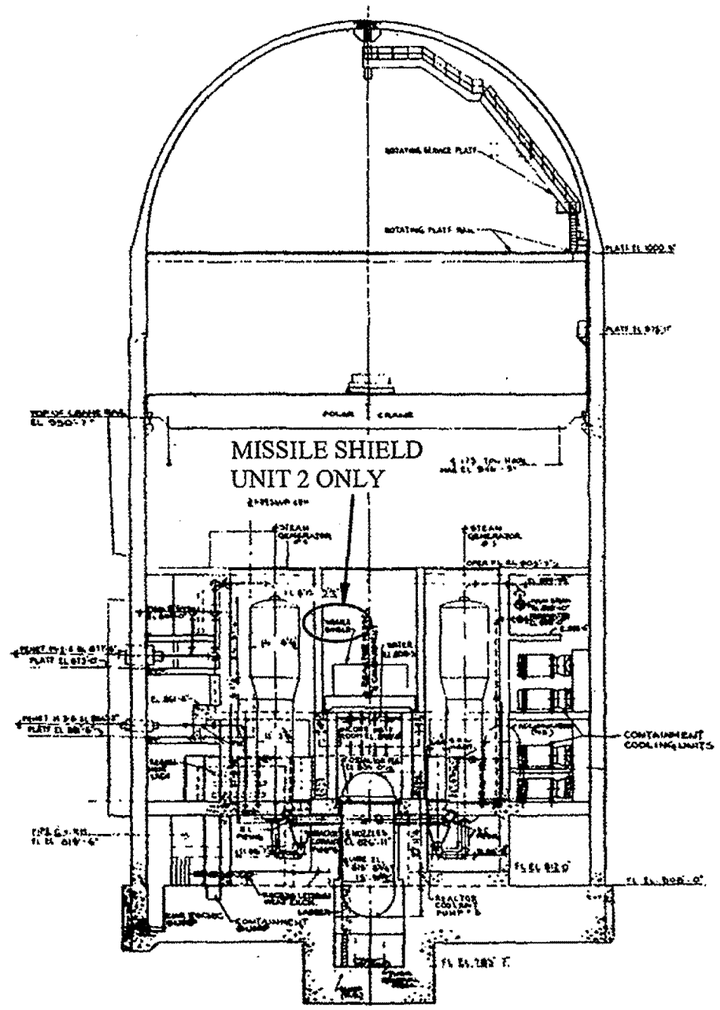
RCS AT STEADY STATE FULL POWER OPERATION

ITEM	FLUID	PRESSURE (psig)	TEMP (°F)	FLOW[a] (gpm)[b]	(lb/hr)[c]	VOLUME (cu.ft.)	
1	RC	2235.0	618.8	110,250	36.7125	---	68
2	RC	2233.1	618.8	110,250	36.7125	---	68
3	RC	2195.9	559.3	99,839	36.7125	---	68
4	RC	2192.4	559.3	99,839	36.7125	---	68
5	RC	2285.1	559.6	98,900	36.7125	---	68
6	RC	2283.2	559.6	98,900	36.7125	---	68
7-12	See Loop 1 Specifications (1-6)						68
13-18	See Loop 1 Specifications (1-6)						68
19-24	See Loop 1 Specifications (1-6)						68
25	RC	2285.1	559.6	1.0	0.0004	---	68
26	RC	2285.1	559.6	1.0	0.0004	---	68
27	RC	2235.0	559.6	2.0	0.0008	---	68
28	Steam	2235.0	652.7	---	---	720	68
29	RC	2235.0	652.7	---	---	1080	68
30	RC	2235.0	652.7	2.5	0.0008	---	68
31	RC	2235.0	652.7	0	0	---	68
32	Steam	2235.0	652.7	0	0	---	68
33	RC	2235.0	<652.7	0	0	Minimize	68
34	Nitrogen	3.0	120	0	0	---	68
35	RC	2235.0	<652.7	0	0	Minimize	68
36	Nitrogen	3.0	120	0	0	---	68
37	Nitrogen	3.0	120	0	0	---	68
38	Nitrogen	3.0	120	---	---	456	68
39	PRT Water	3.0	120	---	---	1350	68

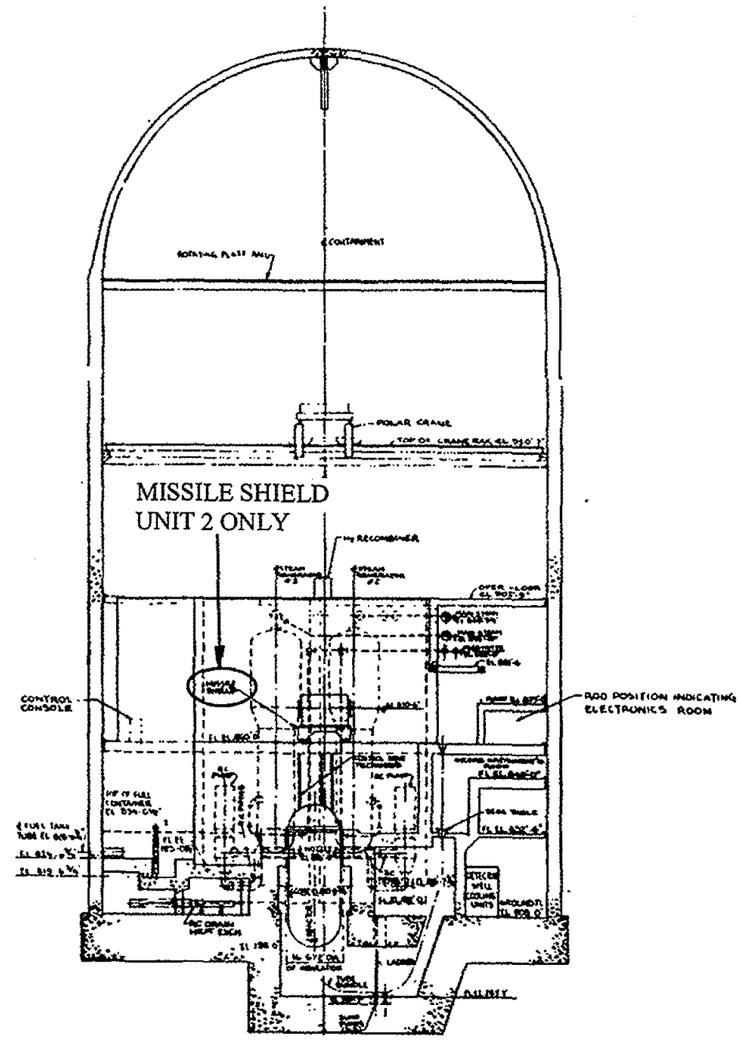
a) Flow measured at 130°F and 2300 psig; charging and letdown not included | 68

b) At the conditions specified | 68

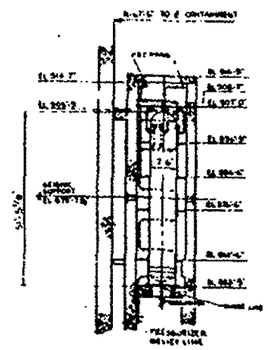
c) $\times 10^6$ | 68



SECTION LOOKING NORTH



SECTION LOOKING EAST



SECTION OF PRESSURIZER

COMANCHE PEAK S.E.S.
NUCLEAR PLANT
UNITS 1 and 2

REACTOR COOLANT
SYSTEM ELEVATIONS

Figure 5.1-3

THIS FIGURE HAS BEEN DELETED.

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Vessel Inservice Inspection Tool

Figure 5.2-1

Amendment 102

Amendment 102

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

RCS Heatup Limitations

Figure 5.2-2 Sht. 1

Amendment 102

Amendment 102

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNIT 2

RCS Heatup Limitations

Figure 5.2-2. Sht. 2

Amendment 102

THIS FIGURE HAS BEEN DELETED.

Amendment 102

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNIT 1

RCS Cooldown Limitations

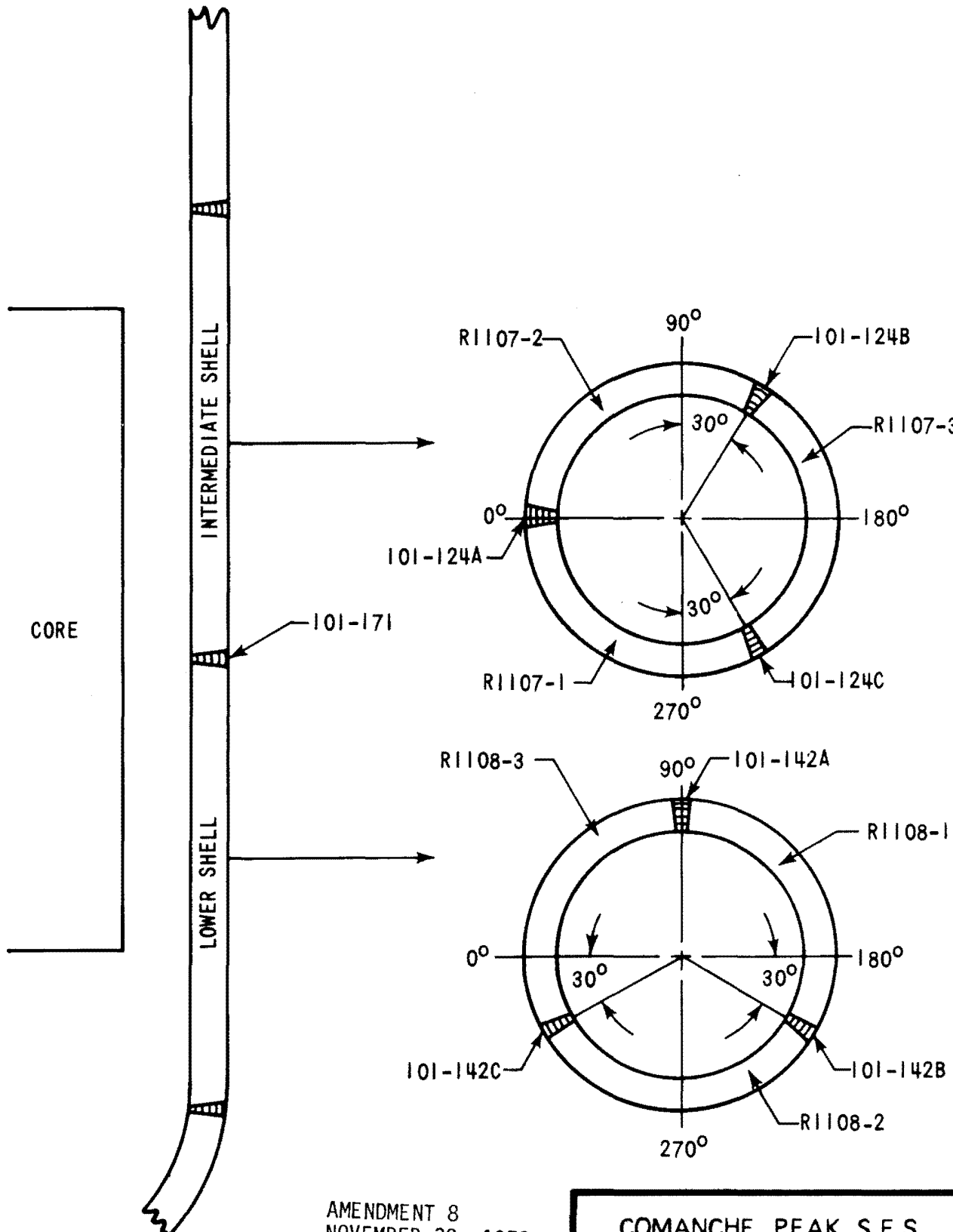
Figure 5.2-3. Sht. 1

Amendment 102

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNIT 2

RCS Cooldown Limitations

Figure 5.2-3. Sht. 2

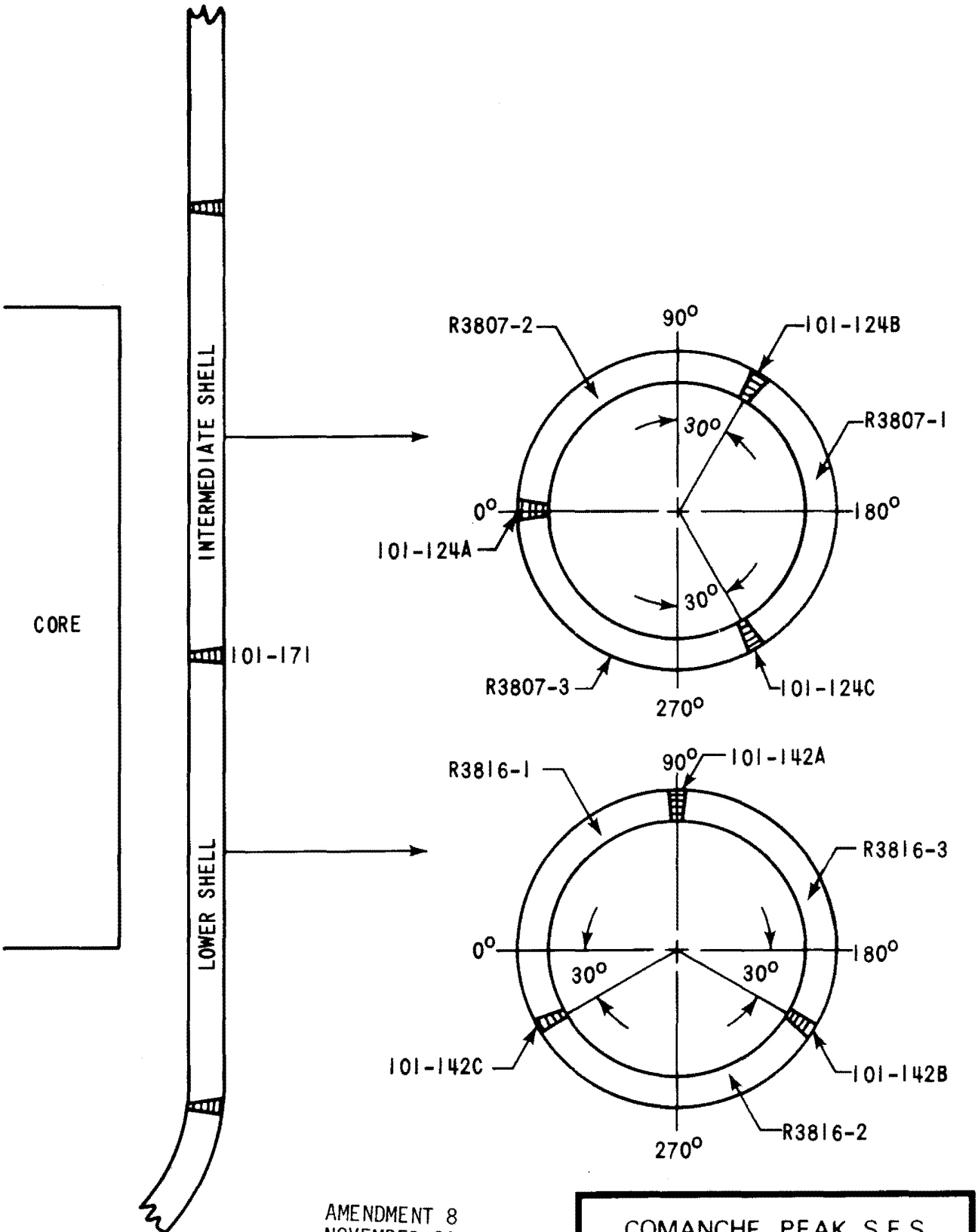


AMENDMENT 8
NOVEMBER 30, 1979

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Unit No. 1 Reactor Vessel Beltline Region Material Identification

FIGURE 5.3-1A

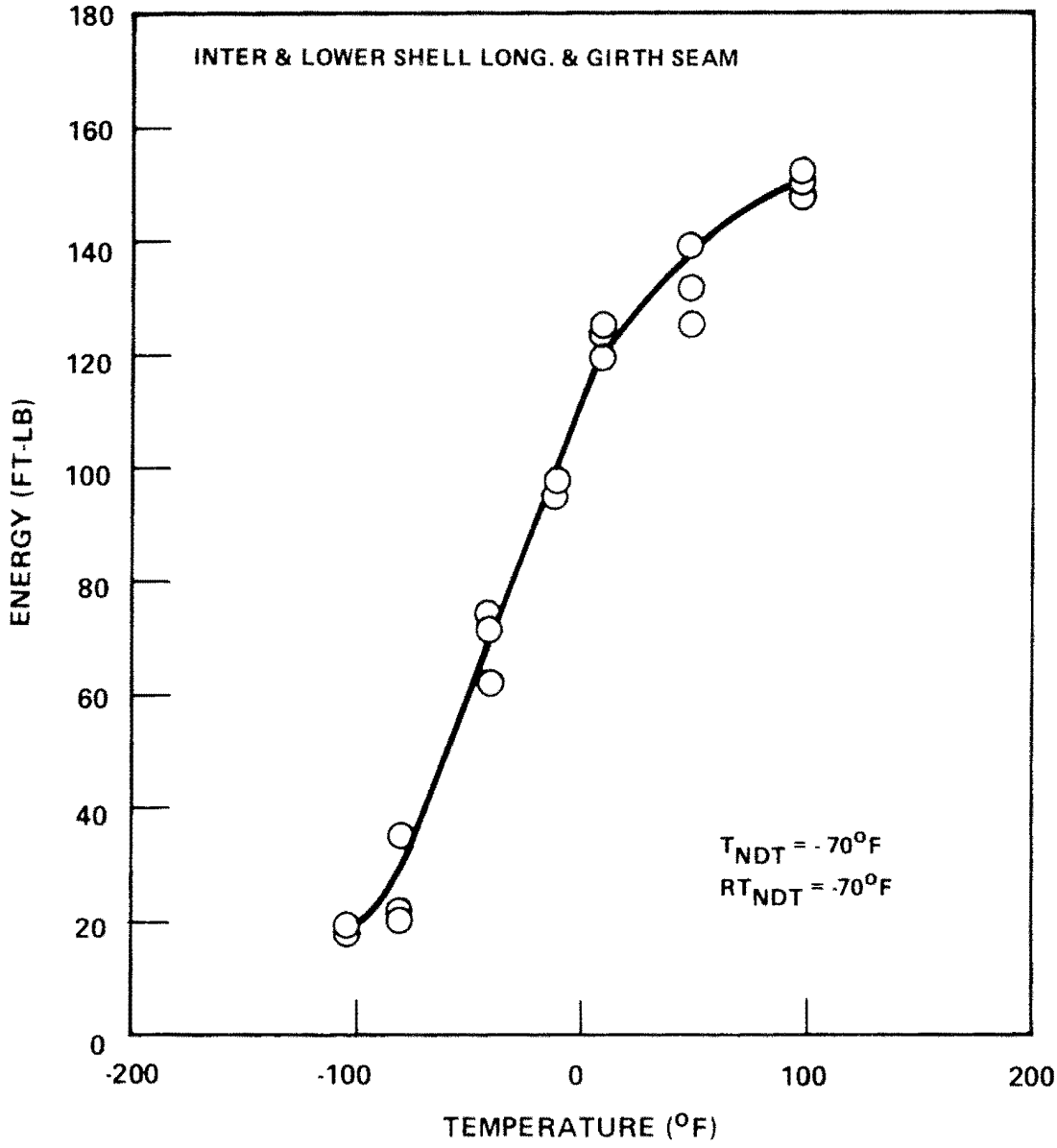


AMENDMENT 8
NOVEMBER 30, 1979

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Unit No. 2 Reactor Vessel Beltline Region Material Identification

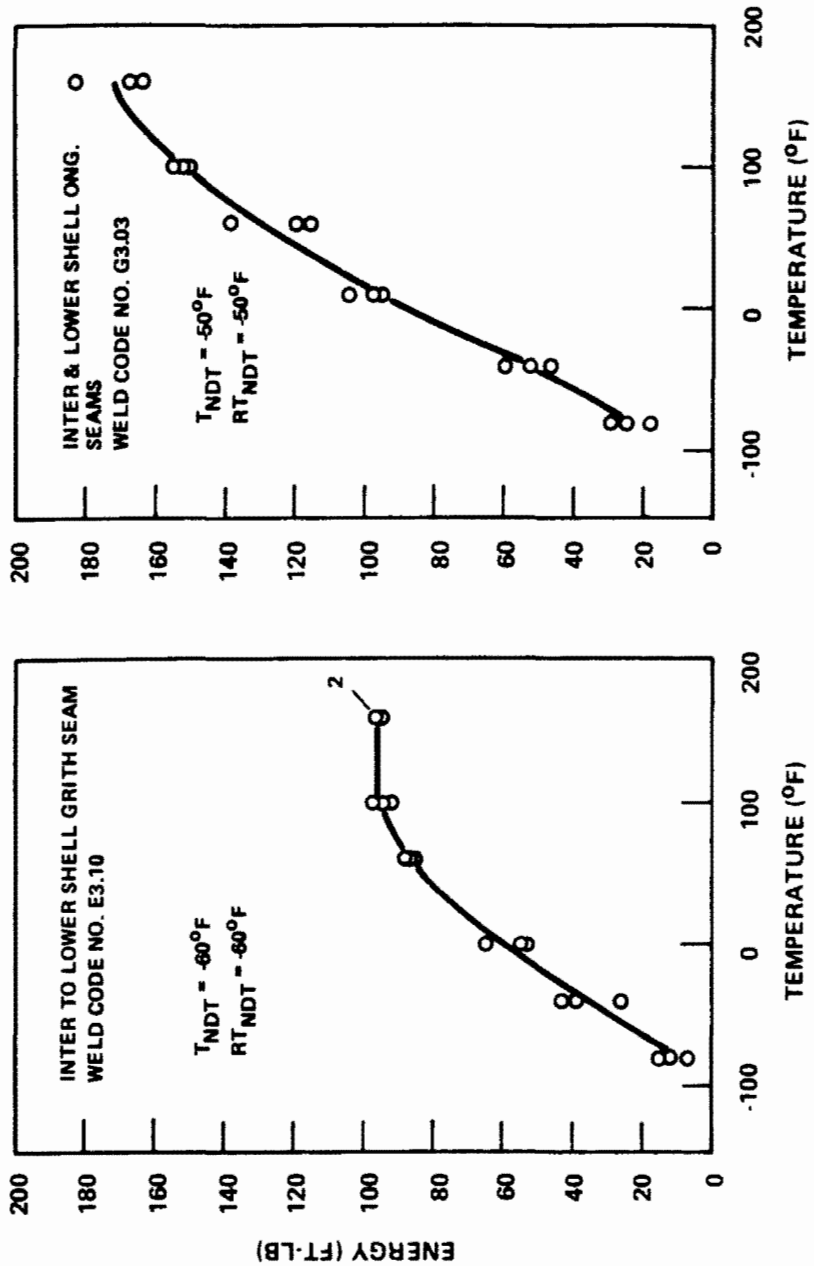
FIGURE 5.3-1B



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Comanche Peak Unit 1 Beltline Region
Weld Metal Charpy V-Notch Impact Data
Weld Code No. G1.67

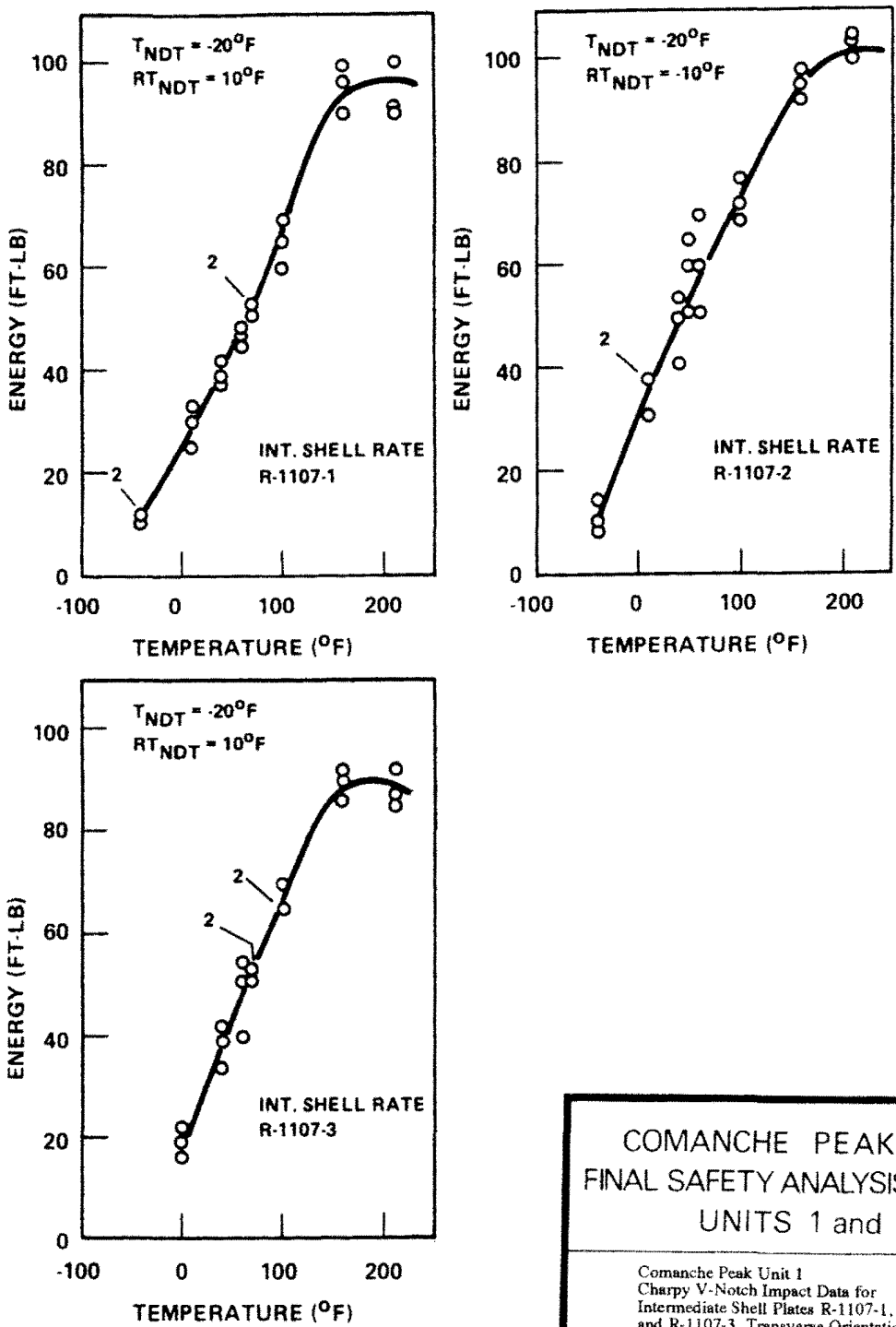
FIGURE 5.3-2A



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Comanche Peak Unit 2
Beltline Region Weld Metal Charpy
V-Notch Impact Data

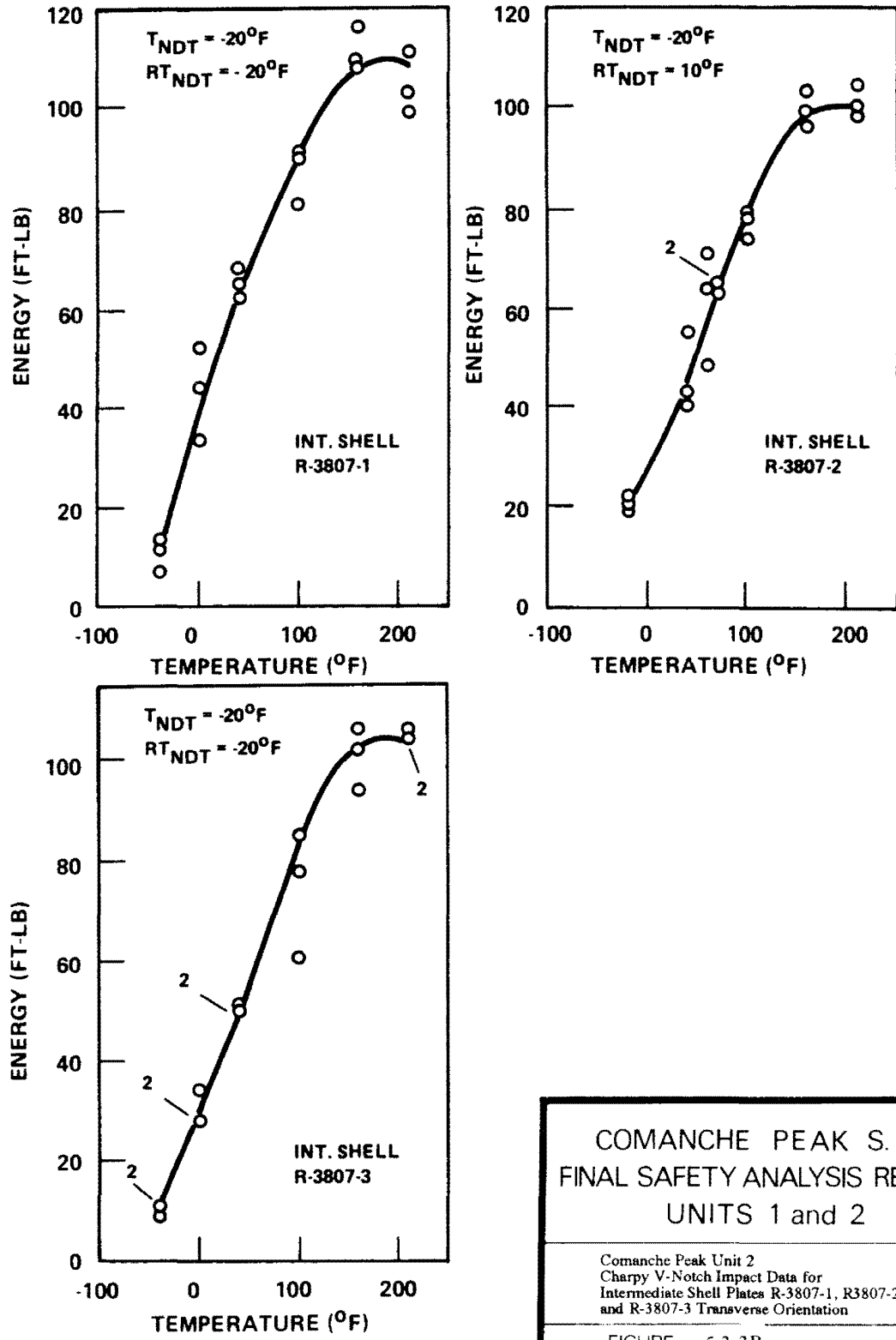
FIGURE 5.3-2B



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Comanche Peak Unit 1
Charpy V-Notch Impact Data for
Intermediate Shell Plates R-1107-1, R1107-2
and R-1107-3, Transverse Orientation

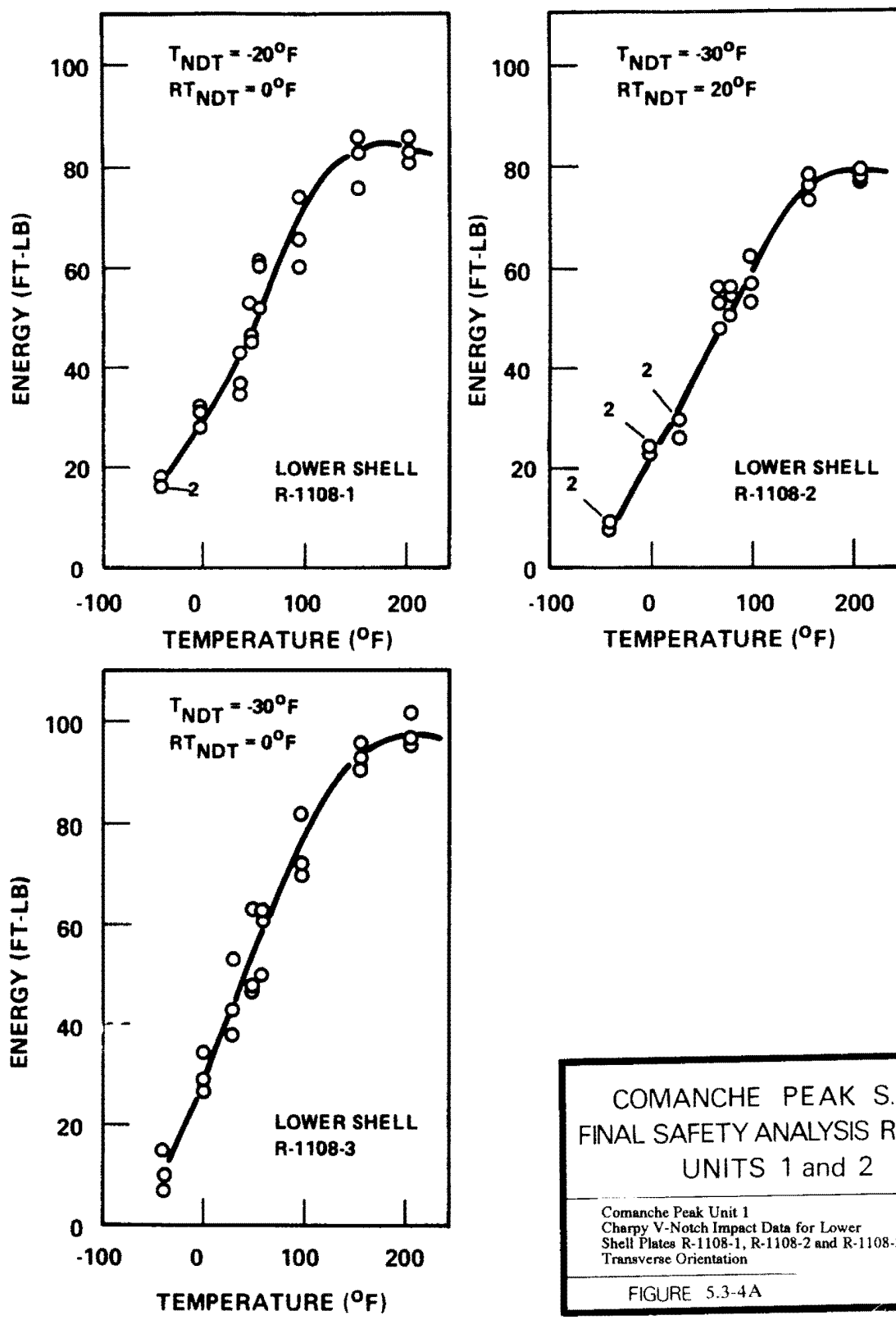
FIGURE 5.3-3A



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Comanche Peak Unit 2
Charpy V-Notch Impact Data for
Intermediate Shell Plates R-3807-1, R3807-2
and R-3807-3 Transverse Orientation

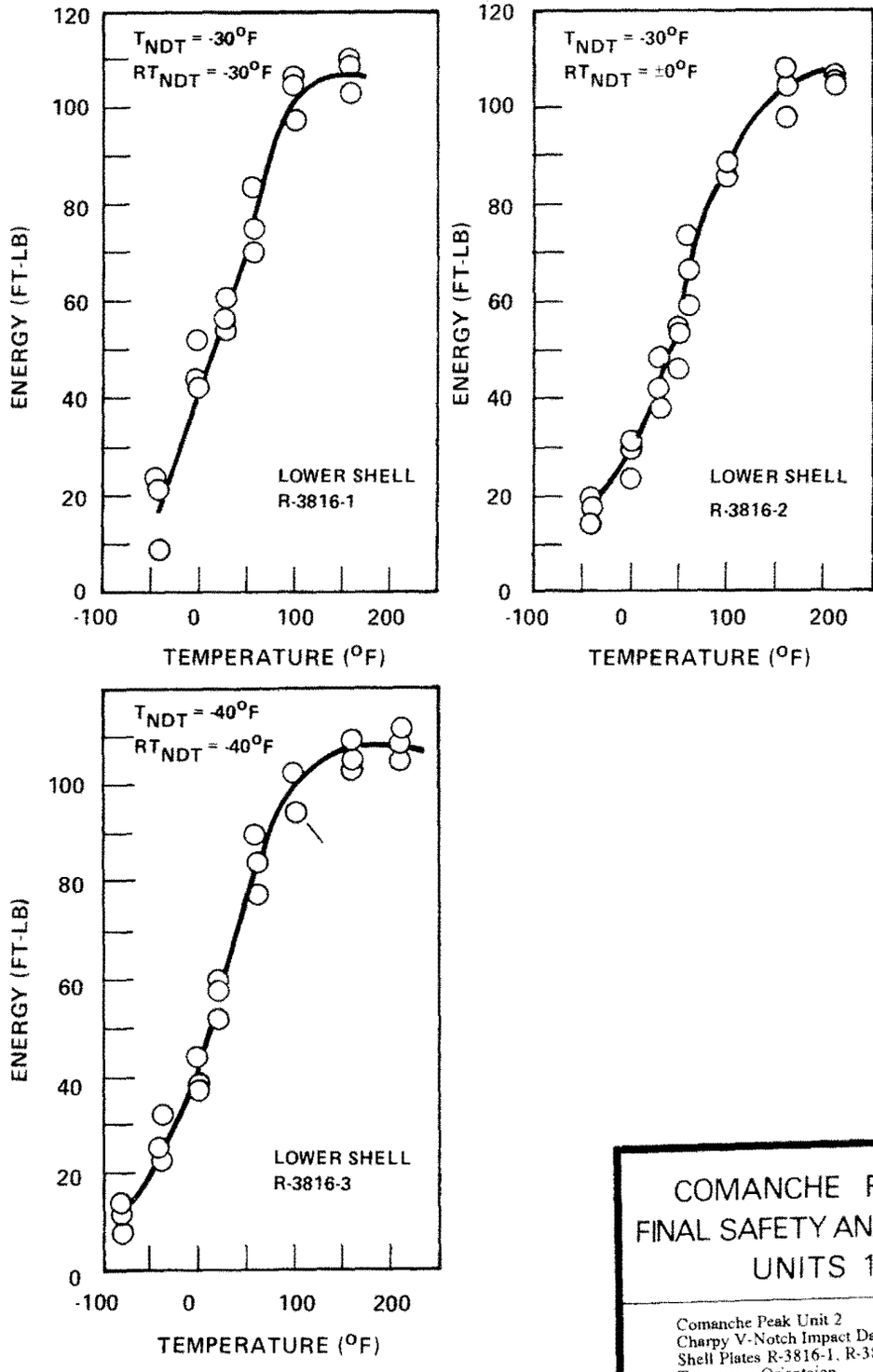
FIGURE 5.3-3B



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Comanche Peak Unit 1
Charpy V-Notch Impact Data for Lower Shell Plates R-1108-1, R-1108-2 and R-1108-3, Transverse Orientation

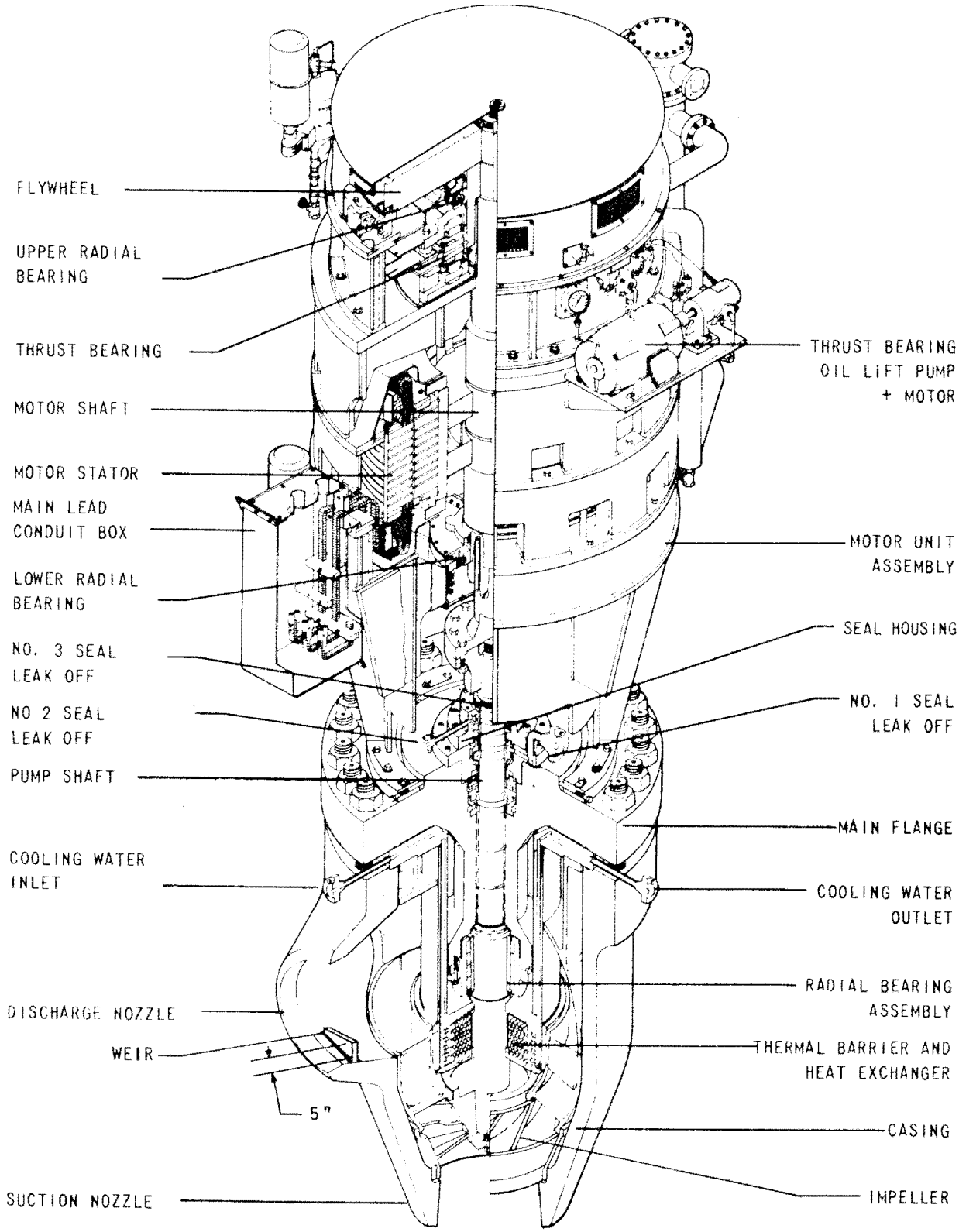
FIGURE 5.3-4A



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Comanche Peak Unit 2
Charpy V-Notch Impact Data for Lower
Shell Plates R-3816-1, R-3816-2 and R-3816-3
Transverse Orientaion

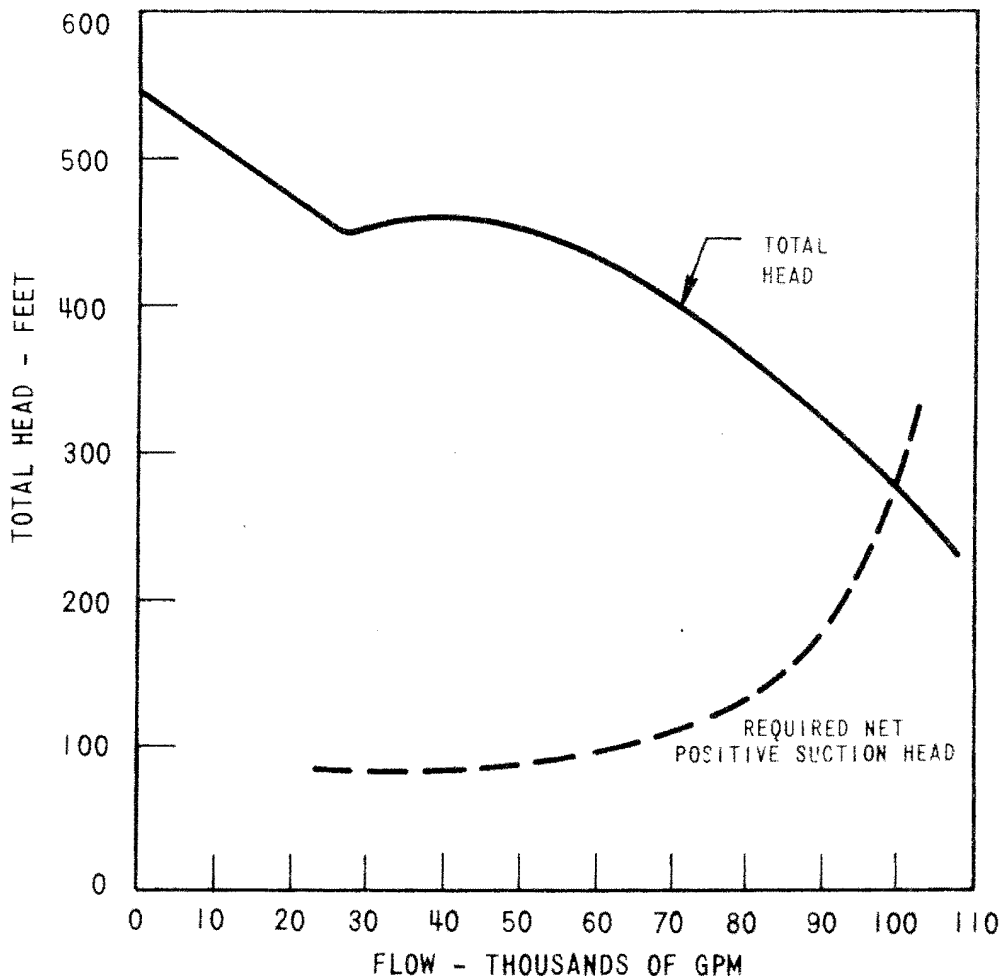
FIGURE 5.3-4B



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Reactor Coolant
Controlled Leakage Pump

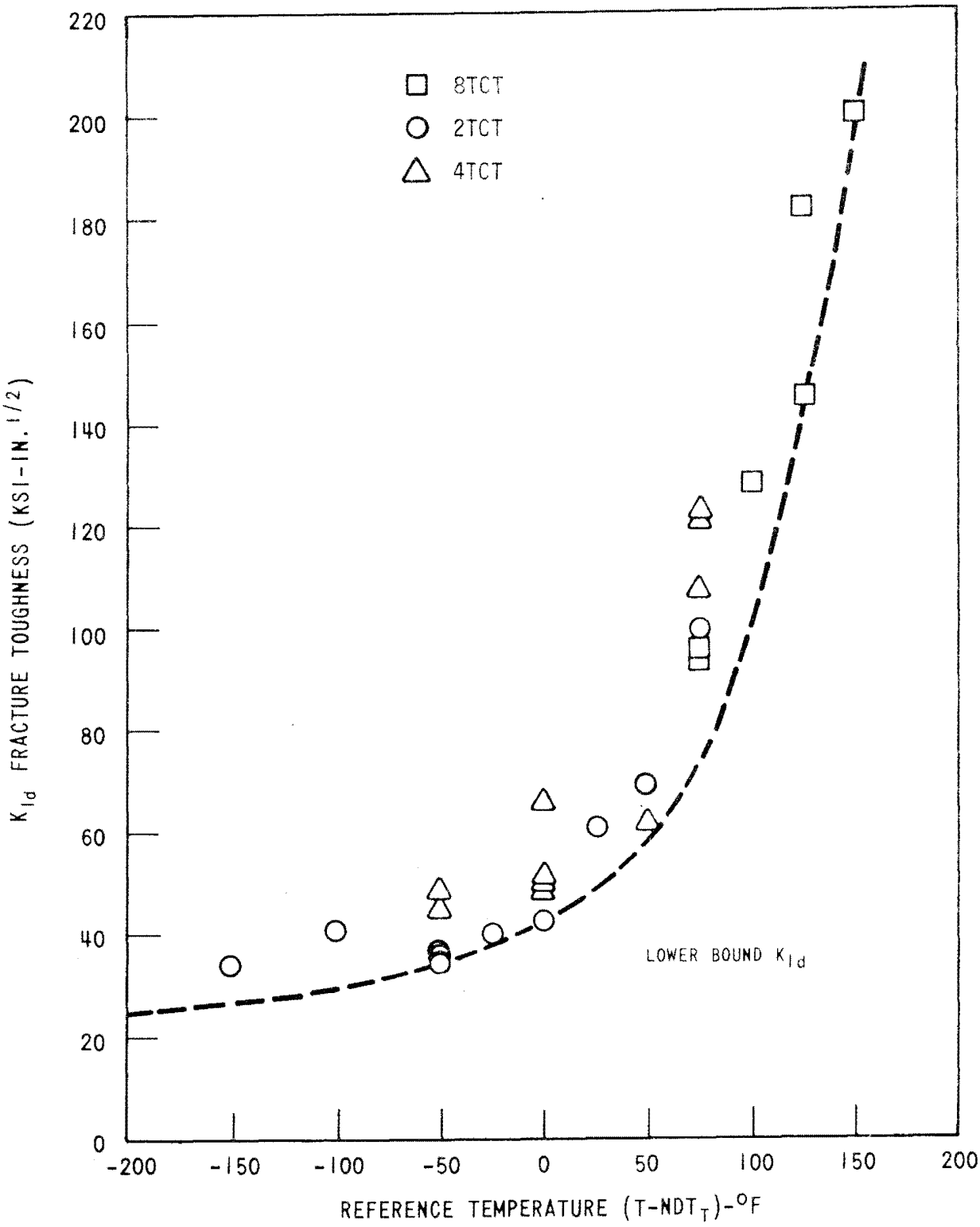
FIGURE 5.4-1



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Reactor Coolant Pump
Estimated
Performance Characteristic

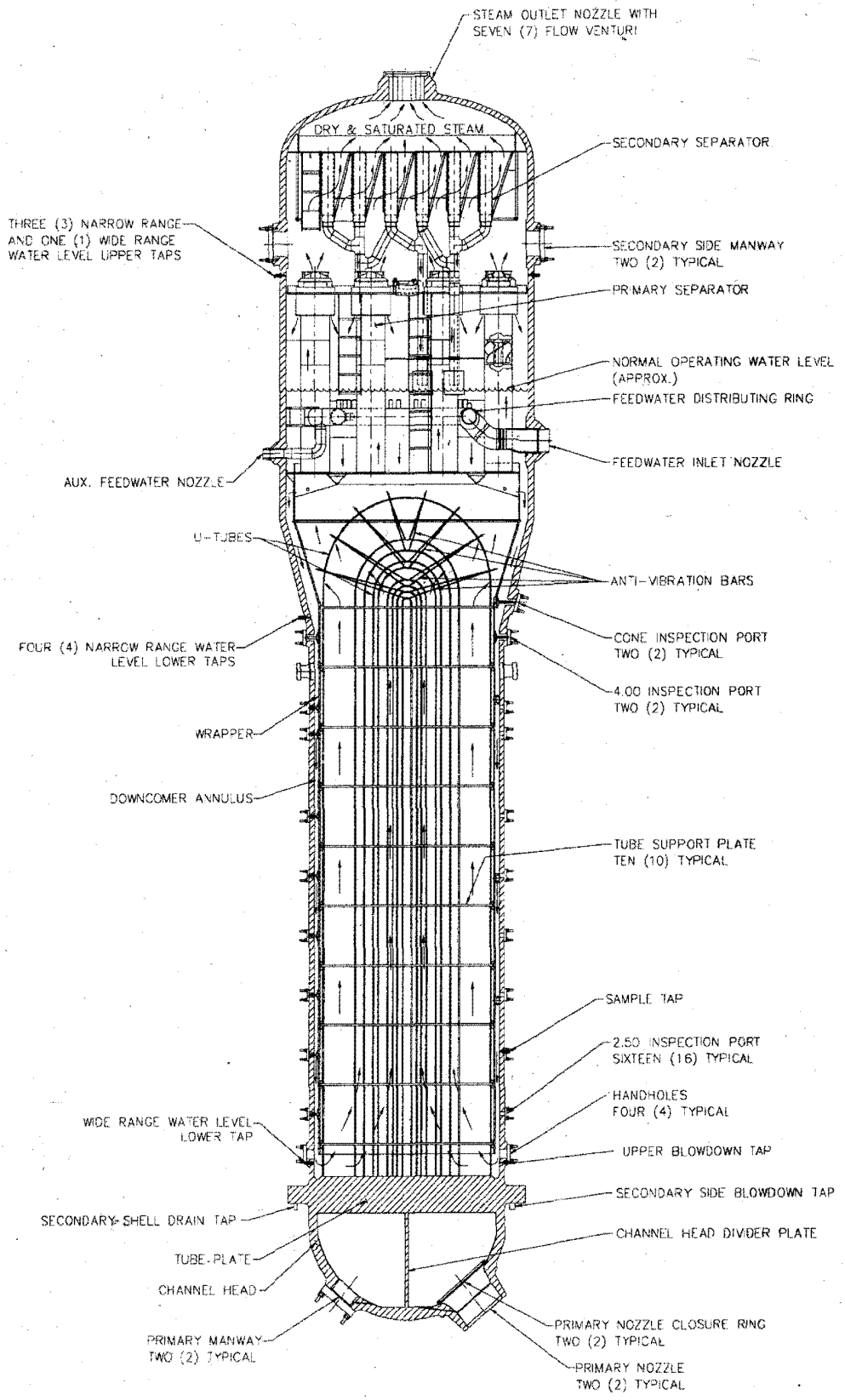
FIGURE 5.4-2



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

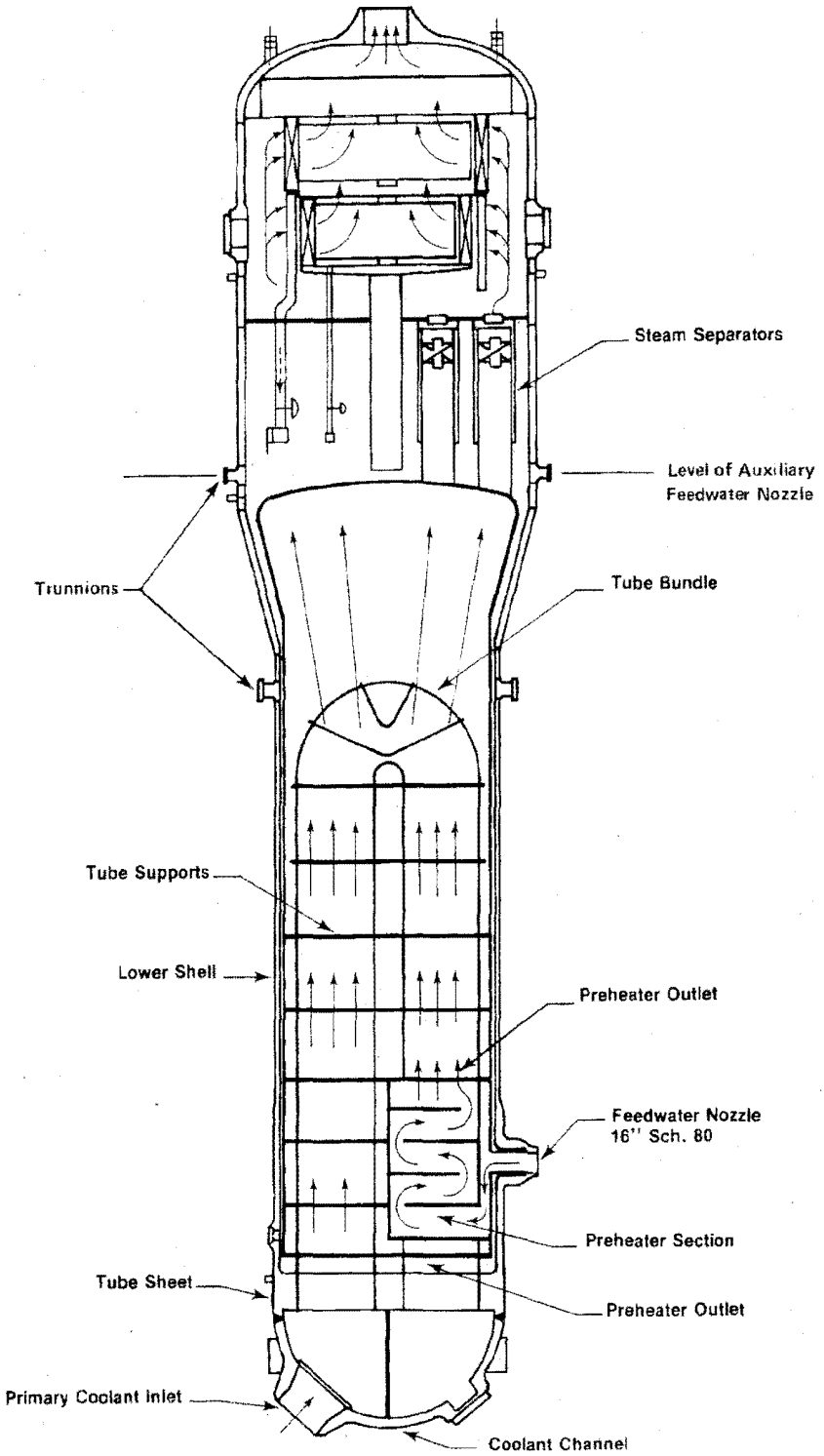
K_{Id} Lower Bound Fracture Toughness SA-533, Grade B, Class 1 (Reference [2])

FIGURE 5.4-3



COMANCHE PEAK S E S FINAL SAFETY ANALYSIS REPORT UNIT 1
LONGITUDINAL SECTION OF FEEDRING STEAM GENERATOR
FIGURE 5.4-4A

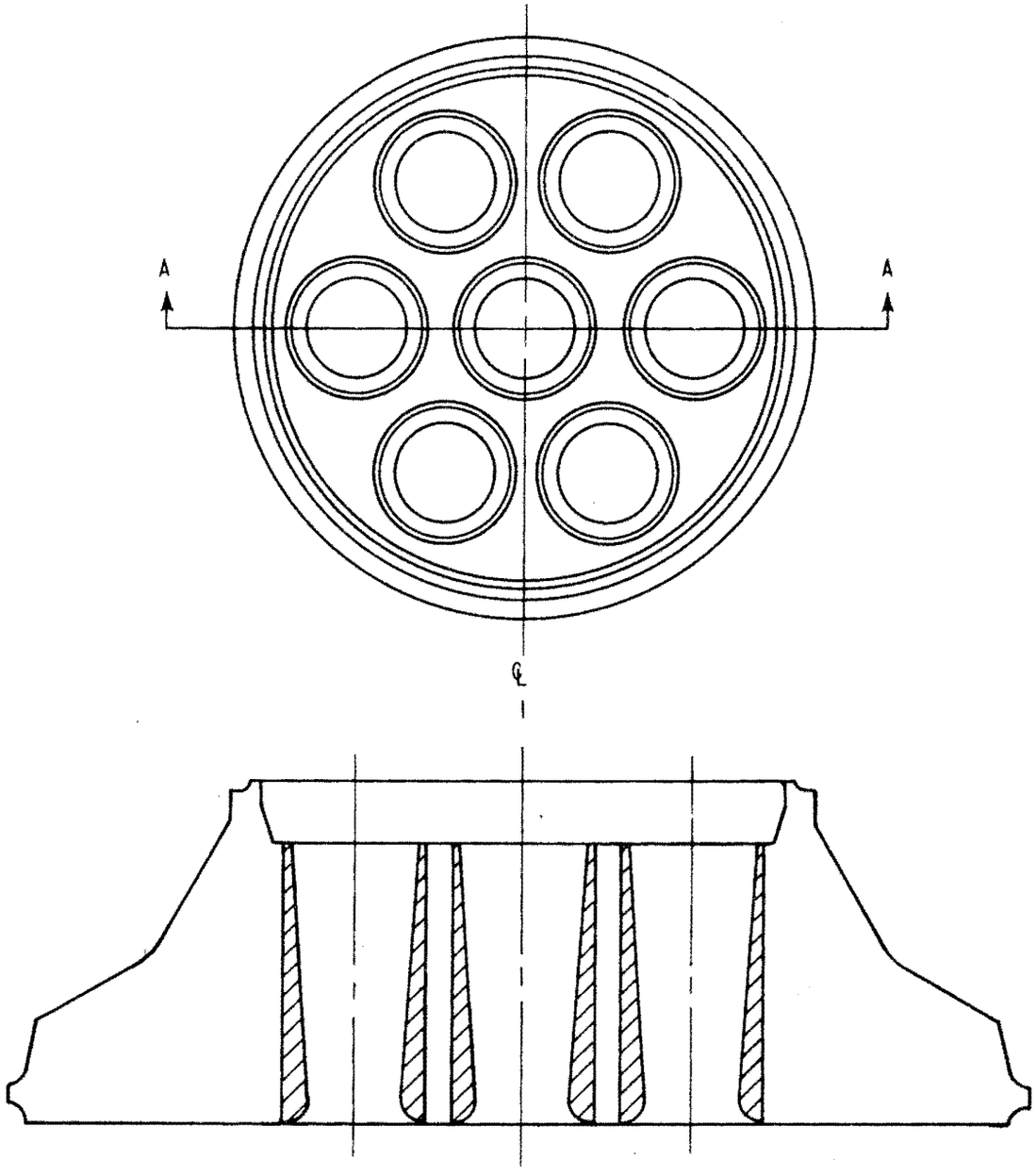
Amendment 102



COMANCHE PEAK S E S
FINAL SAFETY ANALYSIS REPORT
UNIT 2

LONGITUDINAL SECTION OF
PREHEAT STEAM GENERATOR

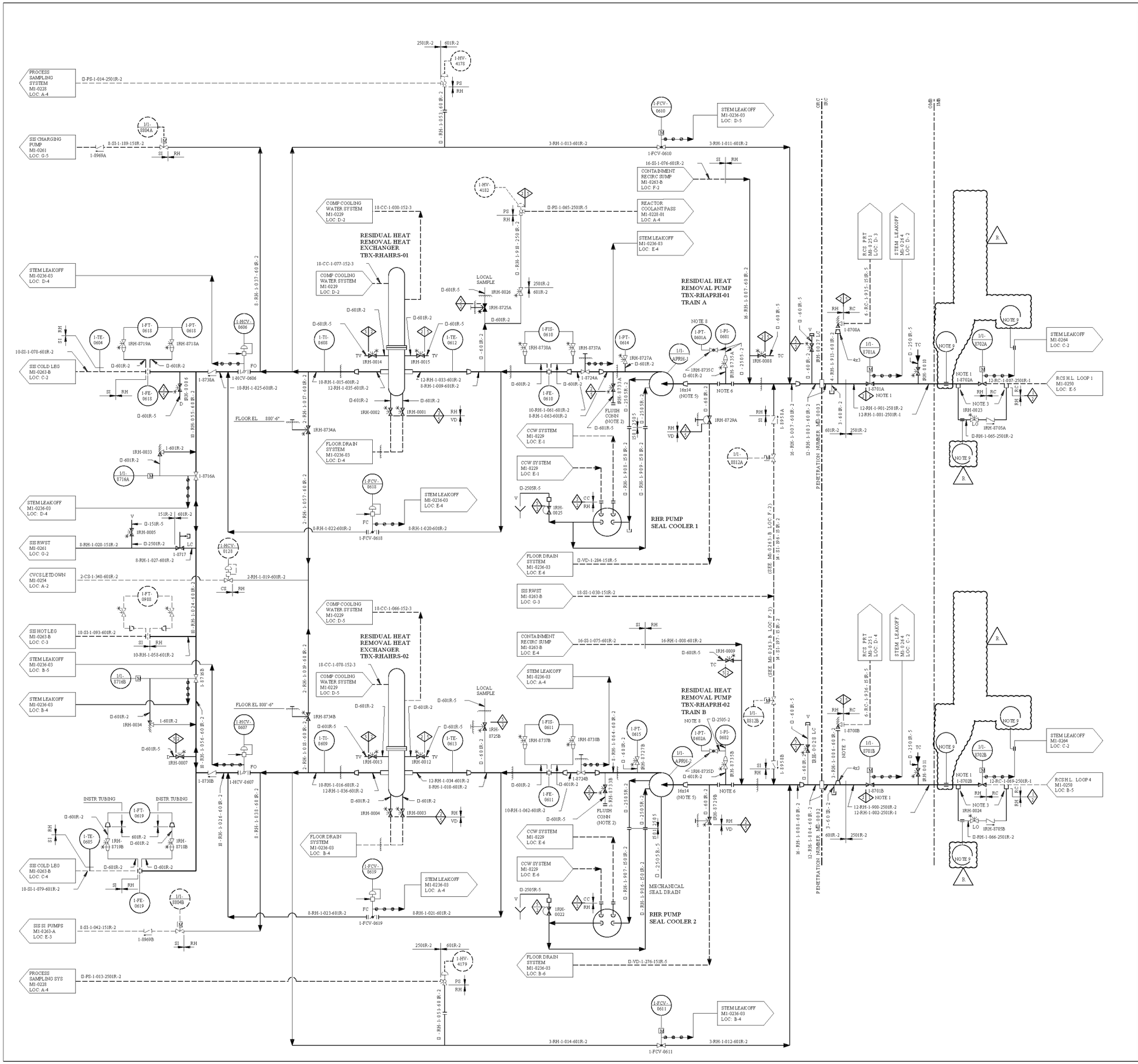
FIGURE 5.4-4B



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Steam Line Flow Restrictor

FIGURE 5.4-5



REV	DWN	CHK	APVD	REMARKS
CP-37	FJL 10-18-2012	RMC 10-19-2012		THIS DRAWING REVISED TO INCORPORATE DESIGN CHANGE FDA-2008-00195R-02-01 PER SK-0022-08-00195R-02-00.

NOTES:

1. VALVE INTERLOCKED WITH REACTOR COOLANT SYSTEM PRESSURE SIGNAL.
2. VALVE LOCATED OUTSIDE RESIDUAL HEAT REMOVAL PUMP SHIELDING.
3. D* ID FLOW RESTRICTOR PROVIDED. RESTRICTOR ALSO UTILIZED FOR ANS 1/2 BOUNDARY.
4. FOR MECHANICAL SYMBOLS AND NOTES SEE DRAWING M1-0200.
5. 16x14 REDUCING ELBOW.
6. TEMPORARY STRAINERS CP1-RHSRTS-01 AND CP1-RHSRTS-02 ARE PLACED IN THE SPOOL PIECES DURING INITIAL FLUSHING OPERATIONS. STRAINER MUST BE REMOVED AT PLANT START UP.
7. INLET PIPING AND FITTINGS TO 1-8708B IS SCHEDULE 80S TO FACILITATE PIPE STRESS ANALYSIS.
8. VALVES 1RH-8735C AND 1RH-8735D ARE REQUIRED TO BE OPEN IN MODES 1, 2 AND 3.
9. THE FOLLOWING TEMPERATURE ELEMENTS ARE ABANDONED IN PLACE:

1-TE-3617A-1	1-TE-3617B-1
1-TE-3617A-2	1-TE-3617B-2
1-TE-3617A-3	1-TE-3617B-3
1-TE-3617A-4	1-TE-3617B-4
1-TE-3617A-5	1-TE-3617B-5
1-TE-3617A-6	1-TE-3617B-6
1-TE-3617A-7	1-TE-3617B-7
1-TE-3617A-8	1-TE-3617B-8
1-TE-3617A-9	1-TE-3617B-9

FSAR FIGURE 5.4-6

THIS DRAWING CREATED ELECTRONICALLY

CLASS I
(NUCLEAR SAFETY-RELATED)
SAFETY CLASS 1 — SEISMIC CATEGORY I
SAFETY CLASS 2 — CLASS 1E
SAFETY CLASS 3 — ASSOCIATED CIRCUITS

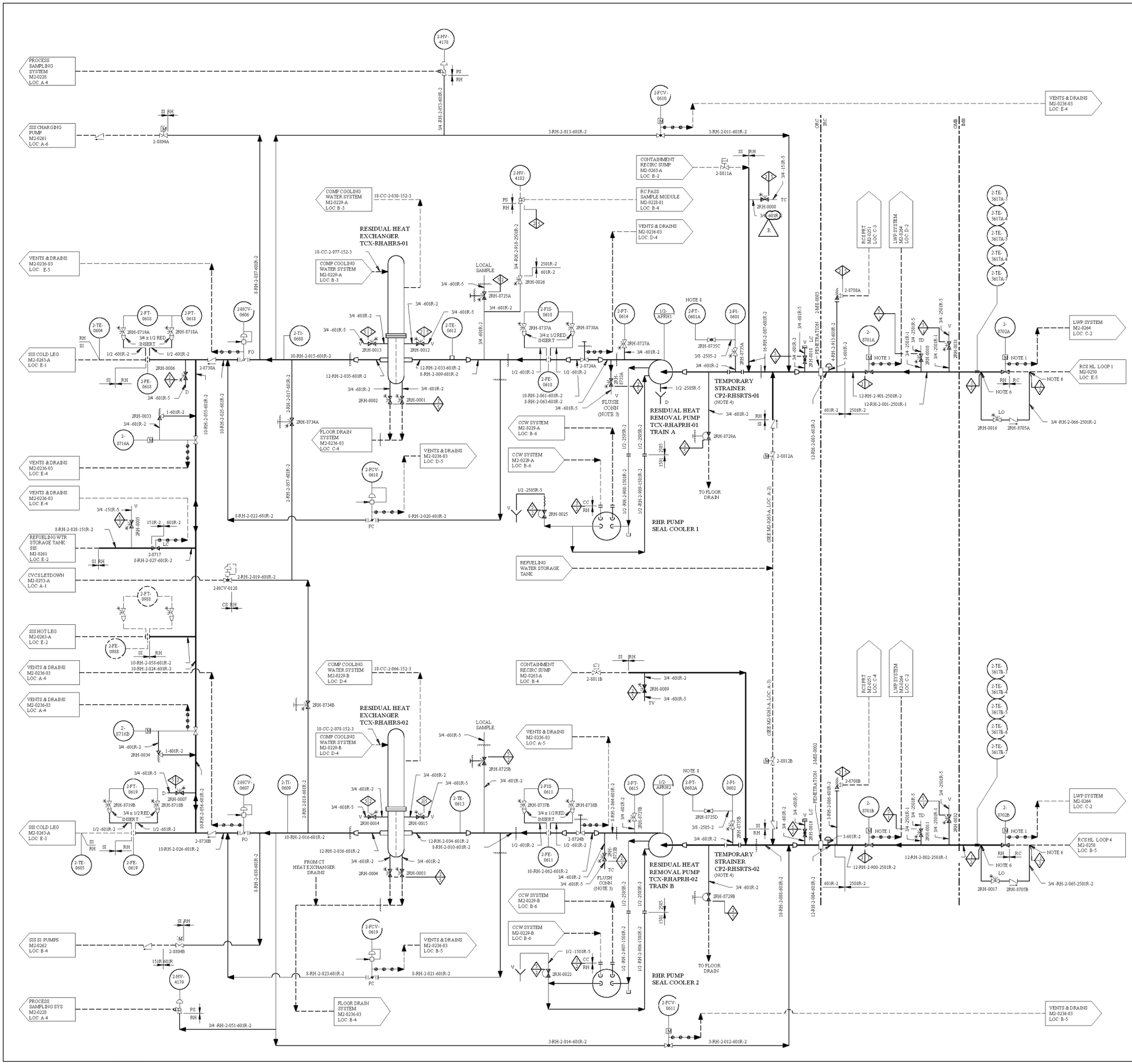
LUMINANT
CPNPP
GLEN ROSE, TEXAS

FLOW DIAGRAM
RESIDUAL HEAT
REMOVAL SYSTEM

DWG. NO. M1-0260 | SH. NO. - | REV. CP-37

< FINAL PRINT >

$$$$$$$DATE$$$$$$ REF CKD 4/16/98 CP-26



REV	DWN	CHK	APVD	REMARKS
CP-21	DLE 10-26-2009	MM 10-26-2009		THIS DRAWING REVISED TO INCORPORATE DESIGN CHANGE FDA 2009-00647/2-01-00 PER SE-0001-09-00647/2-01-00.

NOTES:

1. VALVE INTERLOCKED WITH REACTOR COOLANT SYSTEM PRESSURE SIGNAL.
2. DELETED
3. VALVE LOCATED OUTSIDE RESIDUAL HEAT REMOVAL PUMP SHIELDING.
4. TEMPORARY STRAINERS (CP2-RHSRTS-01/02) ARE PLACED IN SPOOL PIECE DURING INITIAL FLUSHING OPERATIONS. STRAINER MUST BE REMOVED BEFORE PLANT START-UP.
5. FOR MECHANICAL SYMBOLS AND NOTES SEE DRAWING M1-0200.
6. 9/32 " FLOW RESTRICTOR WITH PIPING FOR CLASS 1 AND CLASS 2 TRANSITION.
7. DELETED
8. INSTRUMENT VALVES 2RH-8735C AND 2RH-8735D ARE REQUIRED TO BE OPEN IN MODES 1, 2 AND 3.

REFERENCE NOTE:

THIS FLOW DIAGRAM HAS BEEN REDRAWN FROM WESTINGHOUSE DRAWING 1138E97 REV 6 WITH EXCEPTIONS AS FOLLOWS:

a. VALVES AND LINE NUMBERS HAVE BEEN ADDED.
b. CONTROL LOOPS HAVE BEEN DELETED EXCEPT FOR THE PRIMARY AND THE FINAL ELEMENTS. THE DETAILS OF THE CONTROL LOOPS WILL BE SHOWN ON INSTRUMENTATION AND CONTROL DIAGRAM.

FSAR FIGURE 5.4-6

THIS DRAWING CREATED ELECTRONICALLY

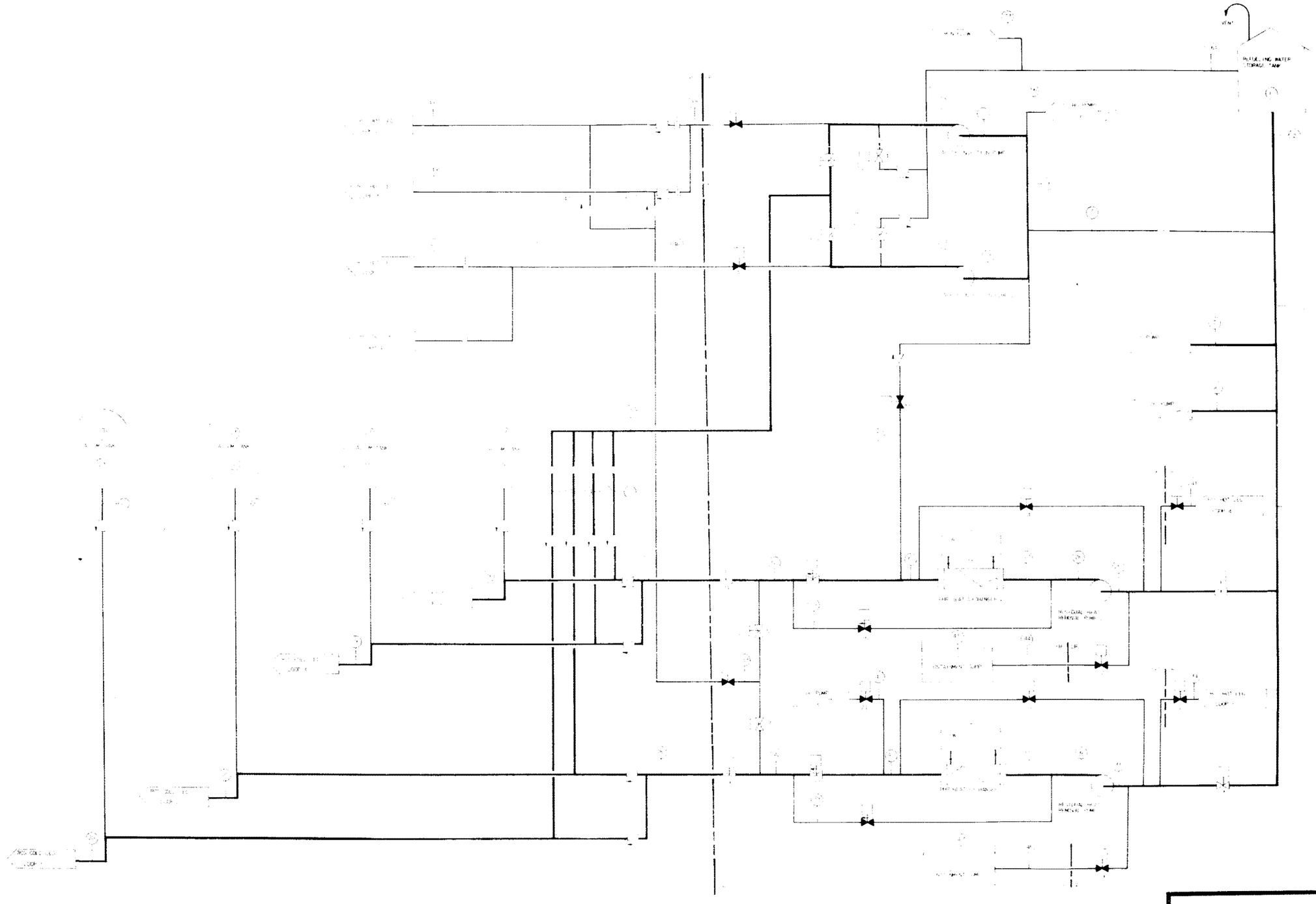
CLASS I
(NUCLEAR SAFETY-RELATED)
SAFETY CLASS 1 — SEISMIC CATEGORY I
SAFETY CLASS 2 — CLASS 1E
SAFETY CLASS 3 — ASSOCIATED CIRCUITS

LUMINANT
CPNPP
GLEN ROSE, TEXAS

FLOW DIAGRAM
RESIDUAL HEAT
REMOVAL SYSTEM

DWG. NO. M2-0260 | SH. NO. - | REV. CP-21

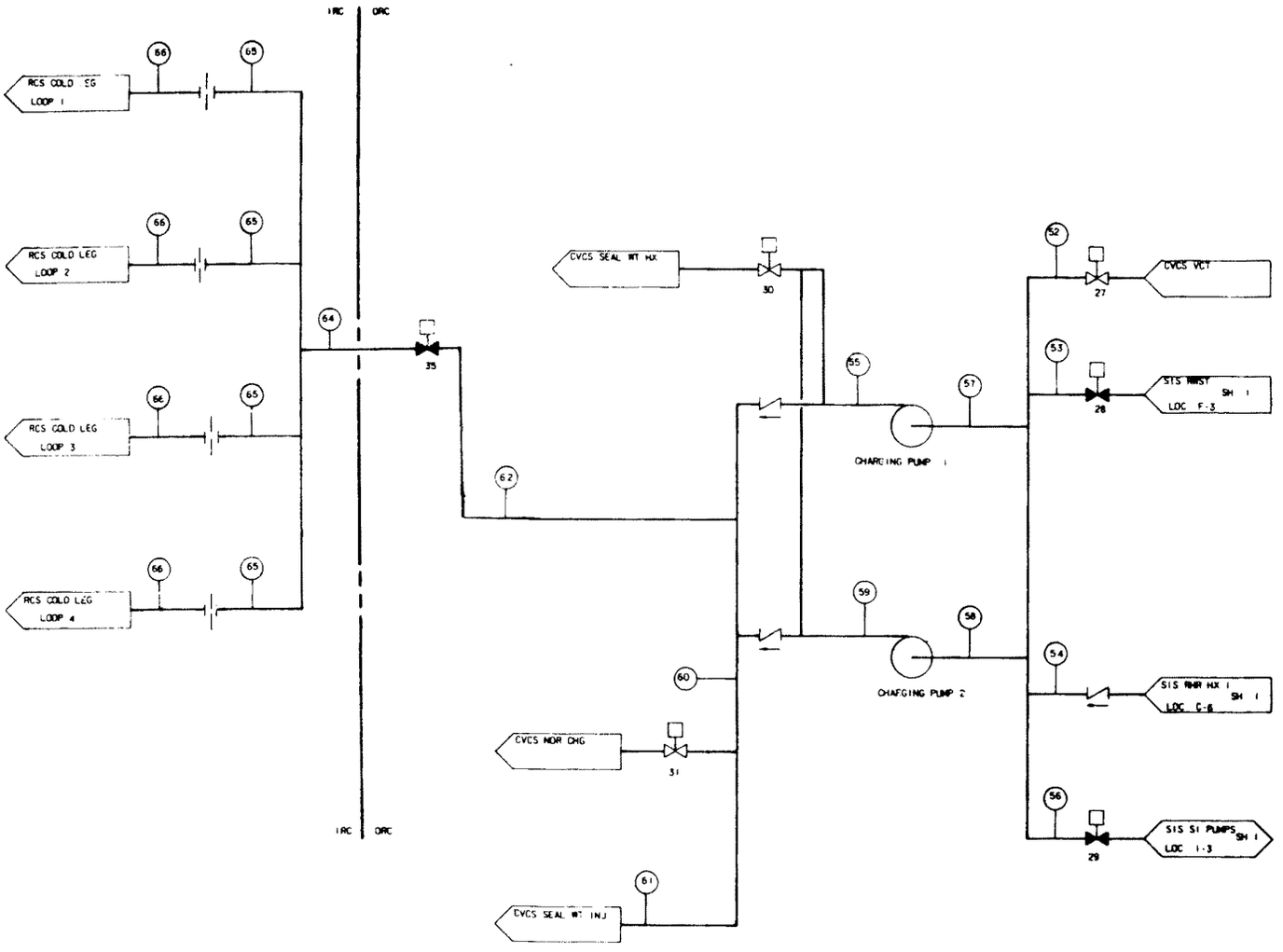
me961800.dgn M2-0260 < FINAL PRINT >



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Residual Heat Removal System
Process Flow Diagram

FIGURE 5.4-7, Sheet 1



AMENDMENT 17
APRIL 7, 1981

NOTE:

1. THIS DIAGRAM IS A SIMPLIFICATION OF THE SYSTEM INTENDED TO FACILITATE THE UNDERSTANDING OF THE PROCESS. FOR DETAILS OF THE PIPING, VALVES, INSTRUMENTATION, ETC. REFER TO THE ENGINEERING FLOW DIAGRAM. REFER TO PROCESS FLOW DIAGRAM TABLES FOR THE CONDITIONS AT EACH POINT.

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Residual Heat Removal System
Process Flow Diagram

FIGURE 5.4-7, Sheet 2

NOTES TO FIGURE 5.4-7

(Sheet 1 of 4)

MODES OF OPERATION

Q212.63

Mode A - Initiation of RHR Operation

When the reactor coolant temperature and pressure are reduced to RHRS operational conditions, approximately 4 hours after reactor shutdown, the second phase of plant cooldown starts with the RHRS being placed in operation. Before starting the pumps, Component Cooling Water is established through the heat exchanger. Upon initial startup of the RHR pump, the miniflow valves automatically position open to protect the pump and RHR boration requirements are established. Once boration is completed, power is restored and the RHR to Hot Leg Recirculation Isolation Valves are opened. 96

Startup of the RHRS includes a warm-up period during which time reactor coolant flow through the heat exchangers is limited to minimize thermal shock on the RCS. The rate of heat removal from the reactor coolant is controlled manually, not to exceed 100°F per hour. Cooldown rate is based on equipment stress and a maximum Component Cooling water temperature of 122°F through the RHR heat exchanger. A constant flow is regulated automatically by control valves in the heat exchanger bypass line. 96

Mode B - End Conditions of a Normal Cooldown

This situation characterizes most of the RHRS operation. As the reactor coolant temperature decreases, the flow through the residual heat exchanger is increased until all of the flow is directed through the heat exchanger to obtain maximum cooling.

Note: For the safeguards functions performed by the RHRS refer to Section 6.3.

NOTES TO FIGURE 5.4-7
(Sheet 2 of 4)

VALVE ALIGNMENT CHART

Valve No.	Operational Mode	
	A	B
2	C	C
3	C	C
10	O	O
11	O	O
12	C	C
13	C	C
14	C	C
15	C	C
16	P	C
17	P	C
18	P	P
19	P	P
20	C	C
21	C	C
22	O	O
23	O	O
24	O	O
26	O	O

O = Open.

C = Closed.

P = Partially Open.

NOTES TO FIGURE 5.4-7
(Sheet 3 of 4)

MODE A - INITIATION OF RHR OPERATION

	Location	Fluid	Pressure (psig)	Temperature (°F)	Flow (gpm)[a]	Flow (lb/hr)
	24	Reactor Coolant	400	350	3800	1.69×10^6
	25	"	407	350	3800	1.69×10^6
	26	"	542	350	3800	1.69×10^6
93	27	"	541	350	992	0.44×10^6
	31	"	539	142	992	0.44×10^6
	29	"	496	350	2808	1.25×10^6
	32	"	496	296	3800	1.69×10^6
	28	"	480	296	3690	1.64×10^6
	19 Loop 4	"	404	296	1992	0.885×10^6
	19 Loop 3	"	419	296	1698	0.755×10^6
18	34	"	400	350	3800	1.69×10^6
	35	"	407	350	3800	1.69×10^6
	36	"	542	350	3800	1.69×10^6
93	37	"	541	350	992	0.44×10^6
	41	"	539	142	992	0.44×10^6
	39	"	496	350	2808	1.25×10^6
	42	"	496	296	3800	1.69×10^6
	38	"	479	296	3910	1.74×10^6
	20 Loop 1	"	404	296	1955	0.87×10^6
	20 Loop 2	"	404	296	1955	0.87×10^6

---

[a] At reference conditions 350°F and 400 psig.

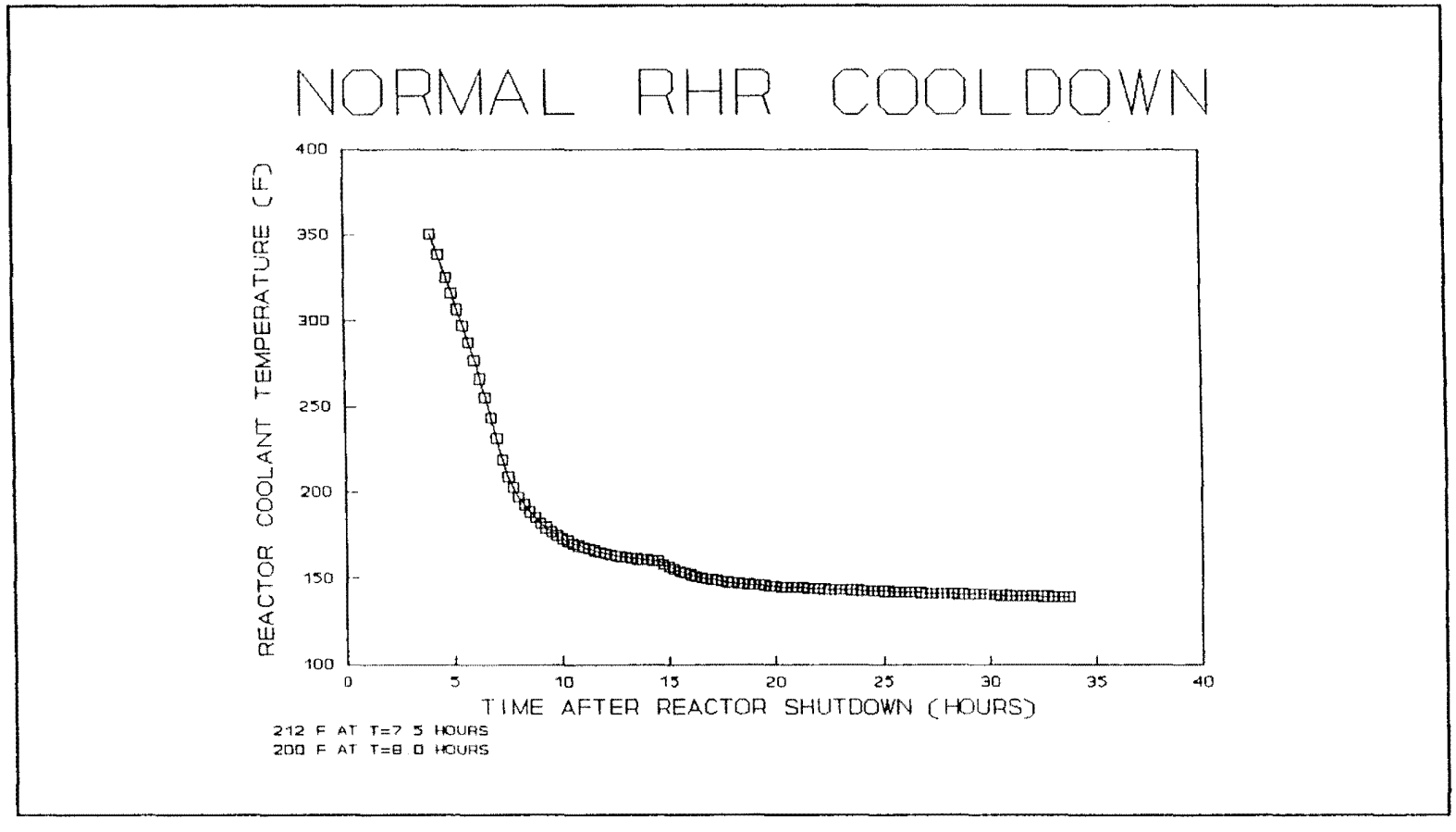
NOTES TO FIGURE 5.4-7
(Sheet 4 of 4)

MODE B - END CONDITIONS OF A NORMAL COOLDOWN

	Location	Fluid	Pressure (psig)	Temperature (^{o}F)	Flow (gpm)[a]	Flow (lb/hr)
	24	Reactor Coolant	0	140	3800	1.87×10^6
	25	"	7	140	3800	1.87×10^6
	26	"	156	140	3800	1.87×10^6
	27	"	149	140	3800	1.87×10^6
	31	"	129	120	3800	1.87×10^6
	29	"	93	120	0	0
18	32	"	93	120	3800	1.87×10^6
	28	"	75	120	3800	1.87×10^6
	19	"	2	120	1900	0.935×10^6
18	34	"	0	140	3800	1.87×10^6
	35	"	7	140	3800	1.87×10^6
	36	"	156	140	3800	1.87×10^6
	37	"	149	140	3800	1.87×10^6
93	41	"	129	122	3800	1.87×10^6
	39	"	93	122	0	0
	42	"	93	122	3800	1.87×10^6
	38	"	75	122	3800	1.87×10^6
	20	"	2	122	1900	0.935×10^6

---

[a] At reference conditions $140^{o}F$ and 0 psig.

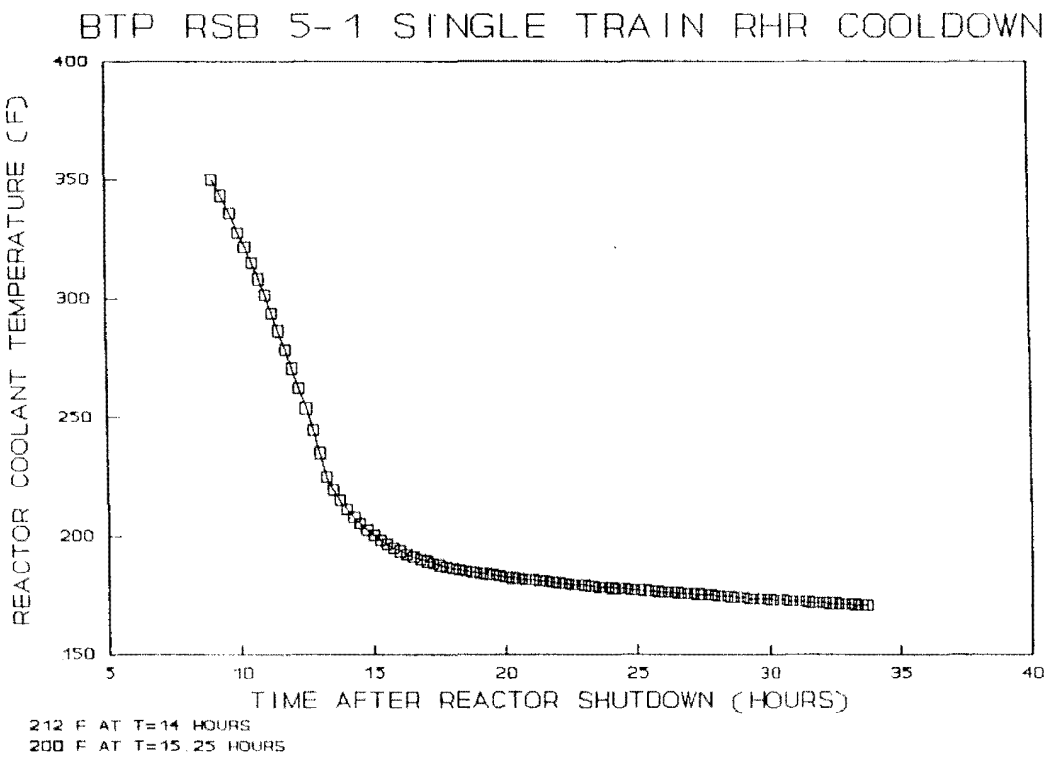


Amendment 93
February 1, 1995

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Normal RHR Cooldown

FIGURE 5.4-8

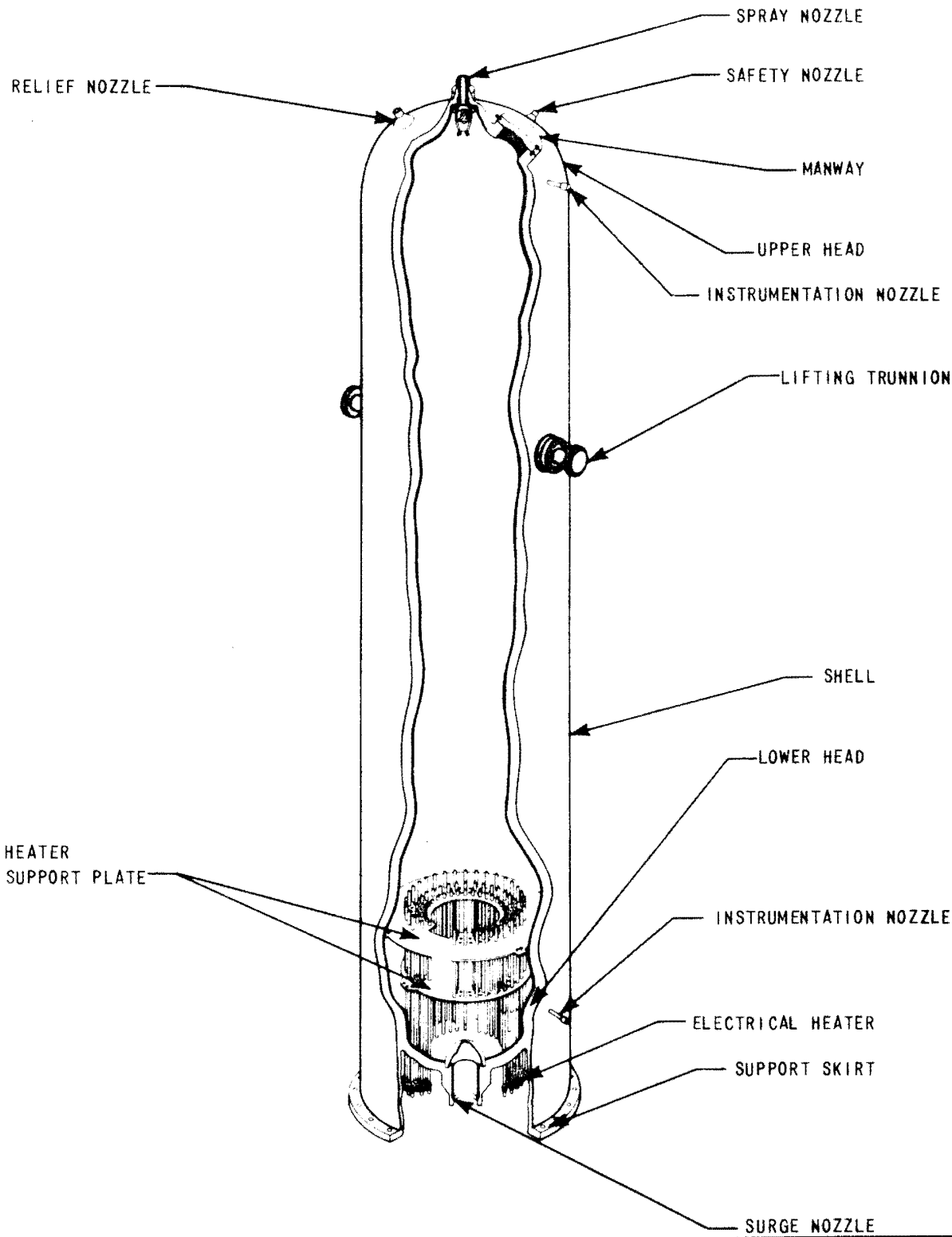


Amendment 93
February 1, 1995

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

SINGLE TRAIN RHR COOLDOWN

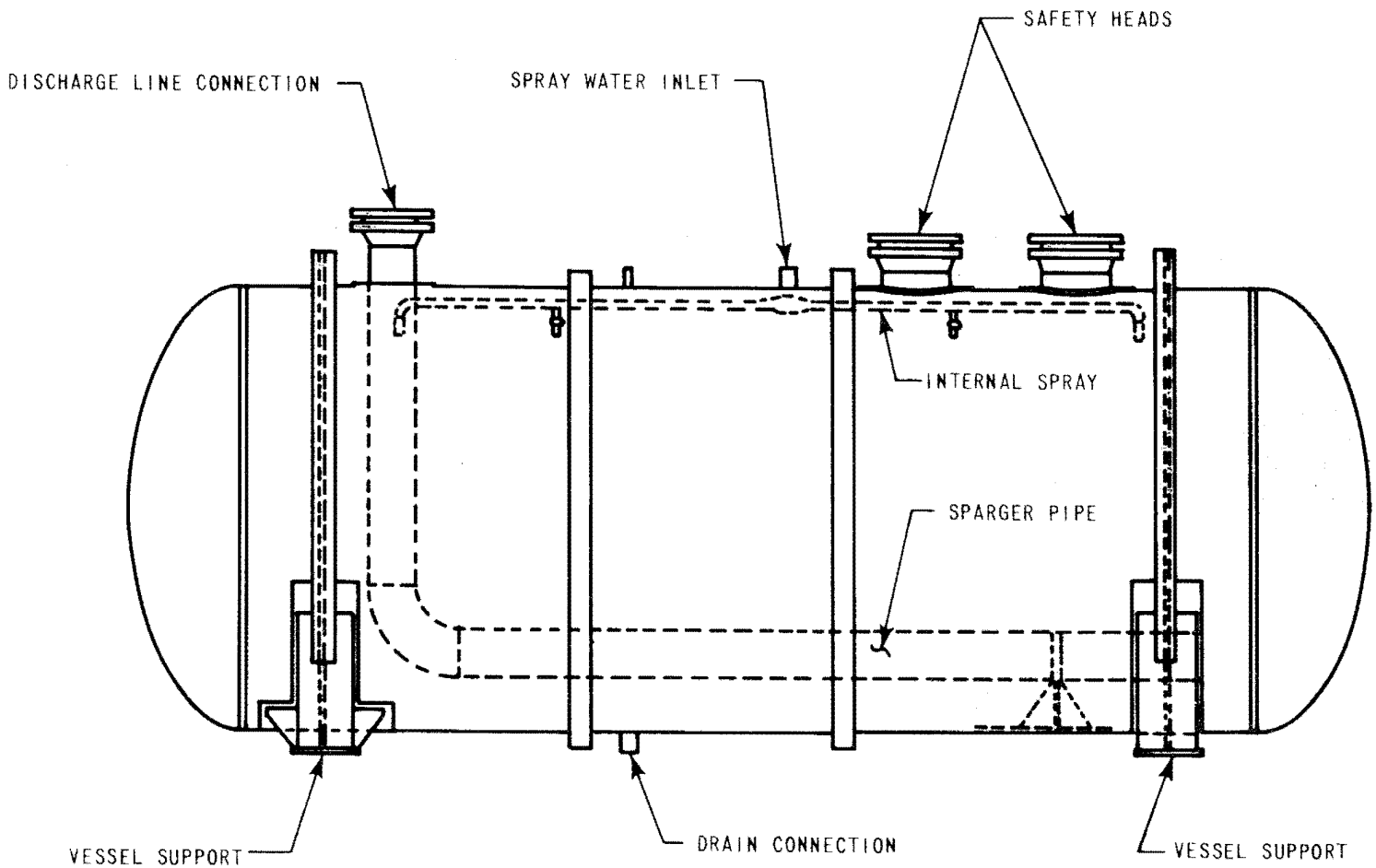
FIGURE 5.4-9



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Pressurizer

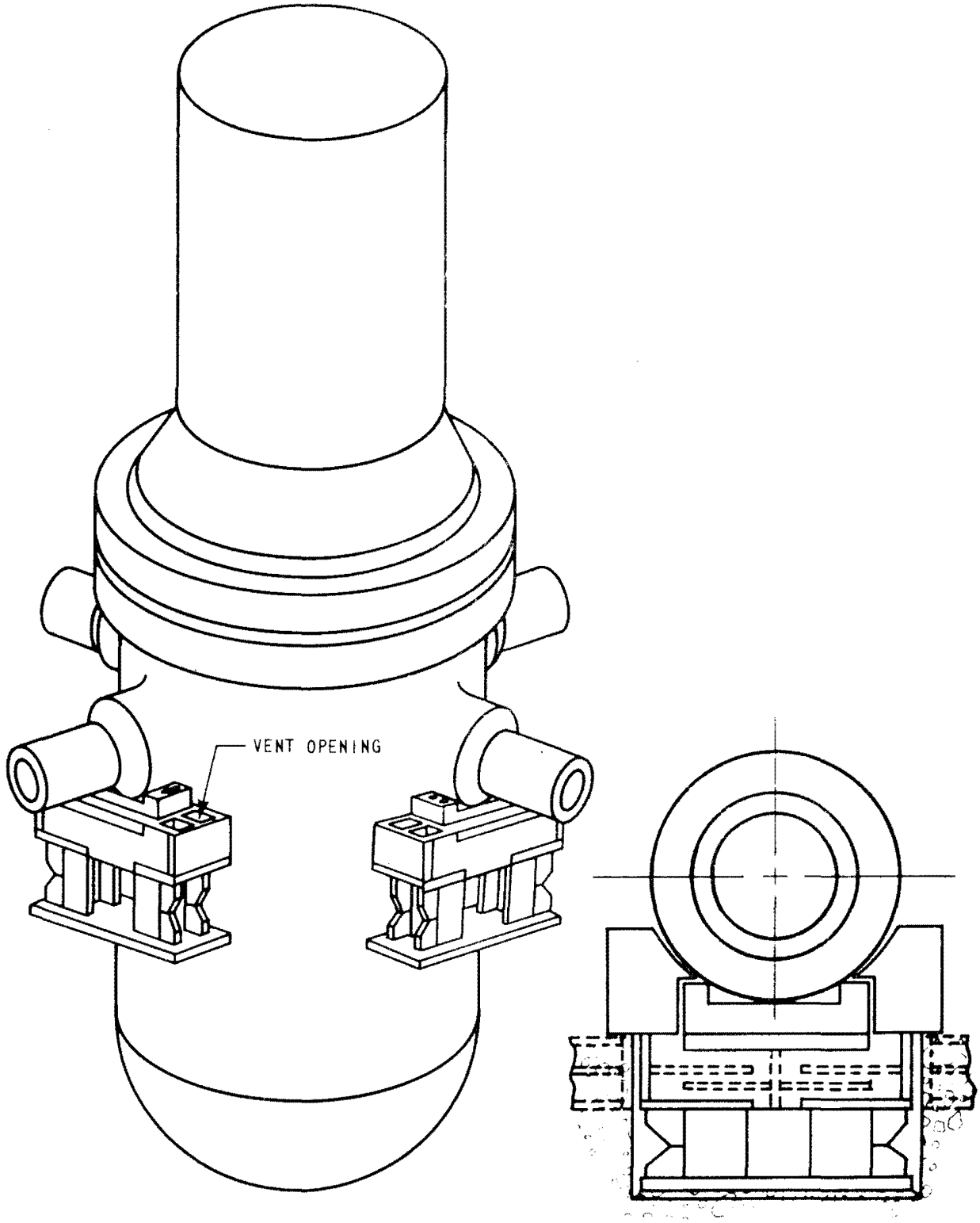
FIGURE 5.4-10



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Pressurizer Relief Tank

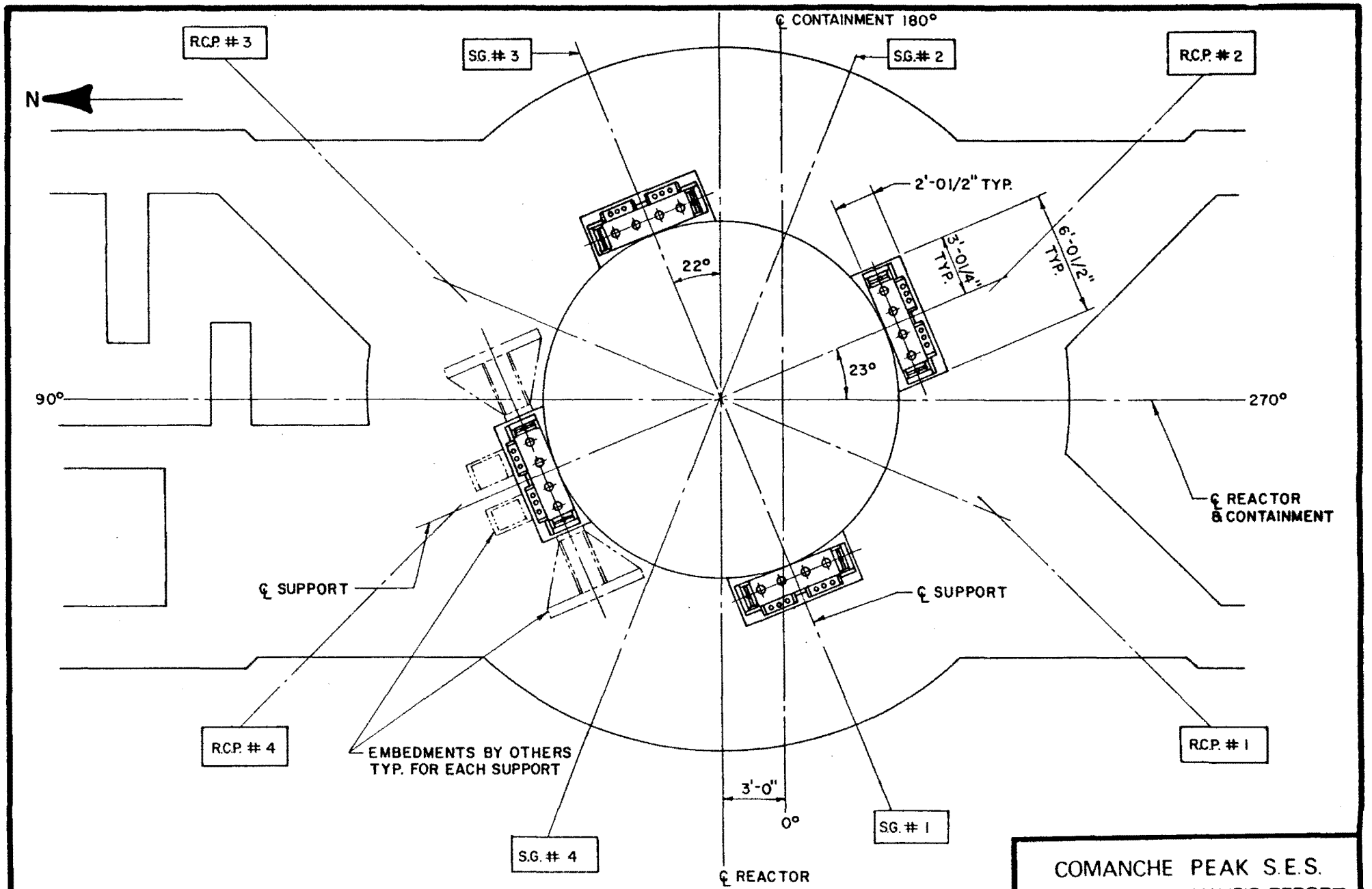
FIGURE 5.4-11



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Typical Reactor Vessel Supports

FIGURE 5.4-12

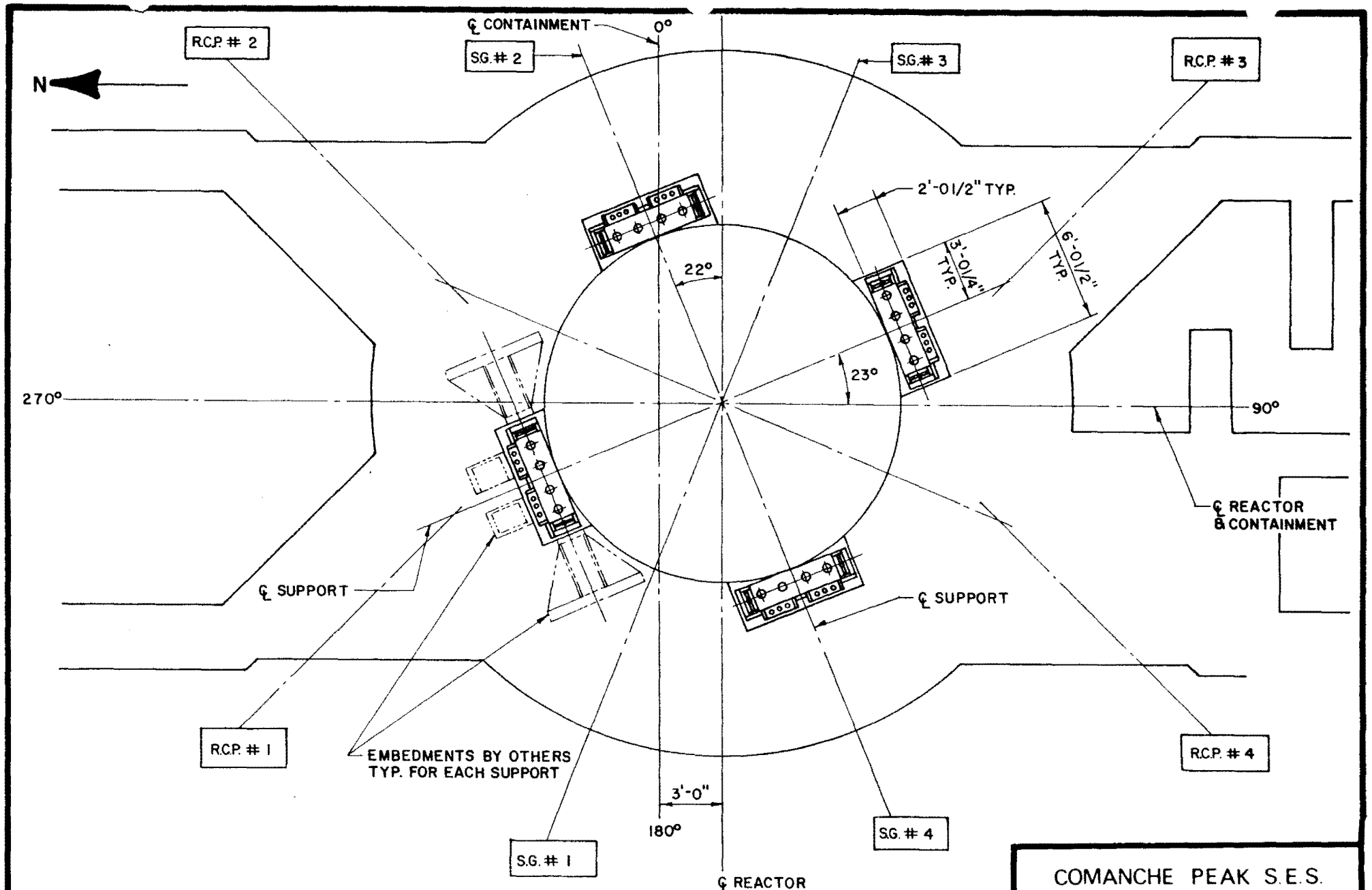


AMENDMENT 8
NOVEMBER 30, 1979

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

PLAN-REACTOR SUPPORTS
TUSI UNIT # 1

FIGURE 5.4-12A

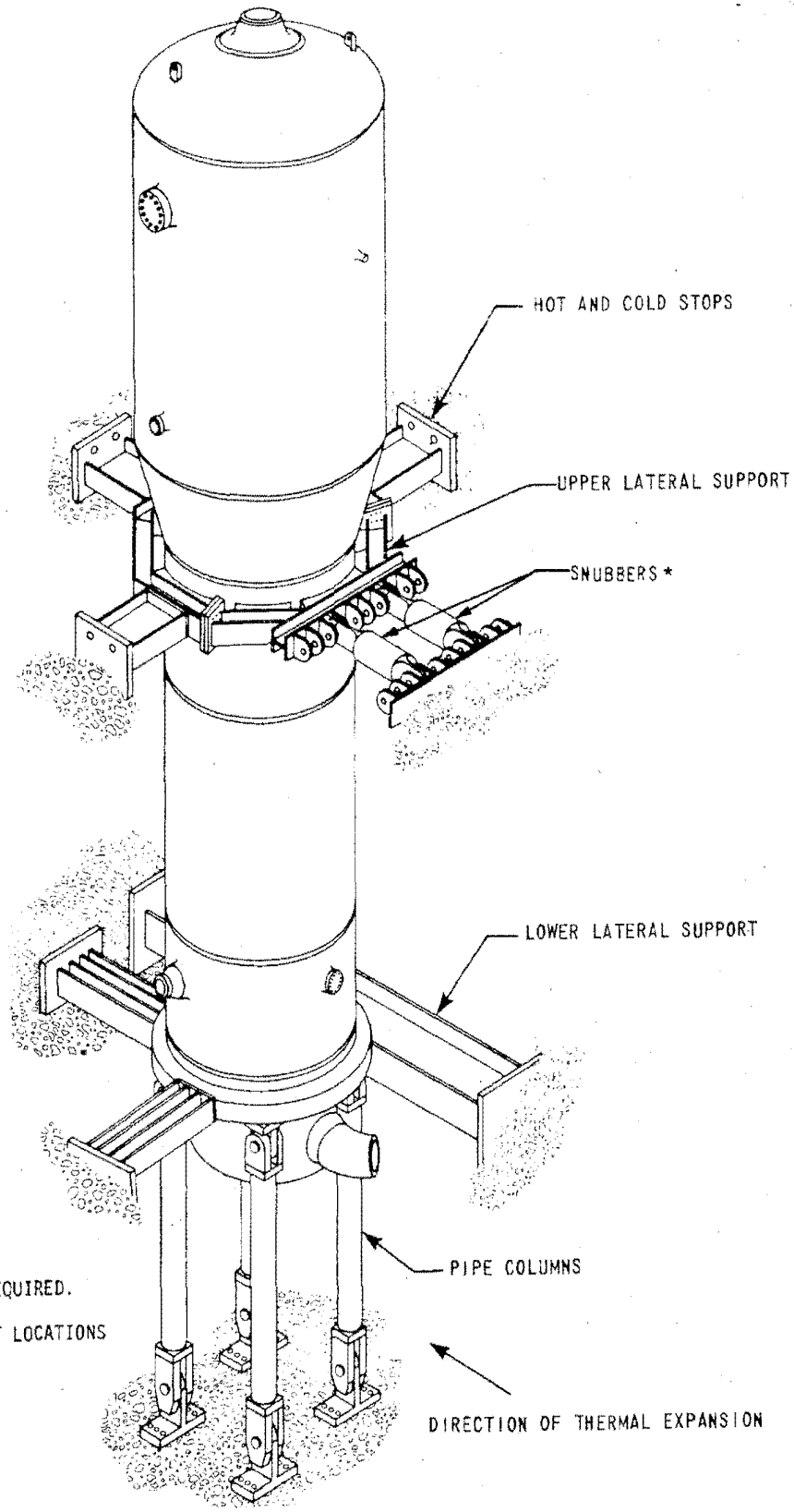


AMENDMENT 8
NOVEMBER 30, 1979

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

PLAN-REACTOR SUPPORTS
TUSI UNIT # 2

FIGURE 5.4-12B

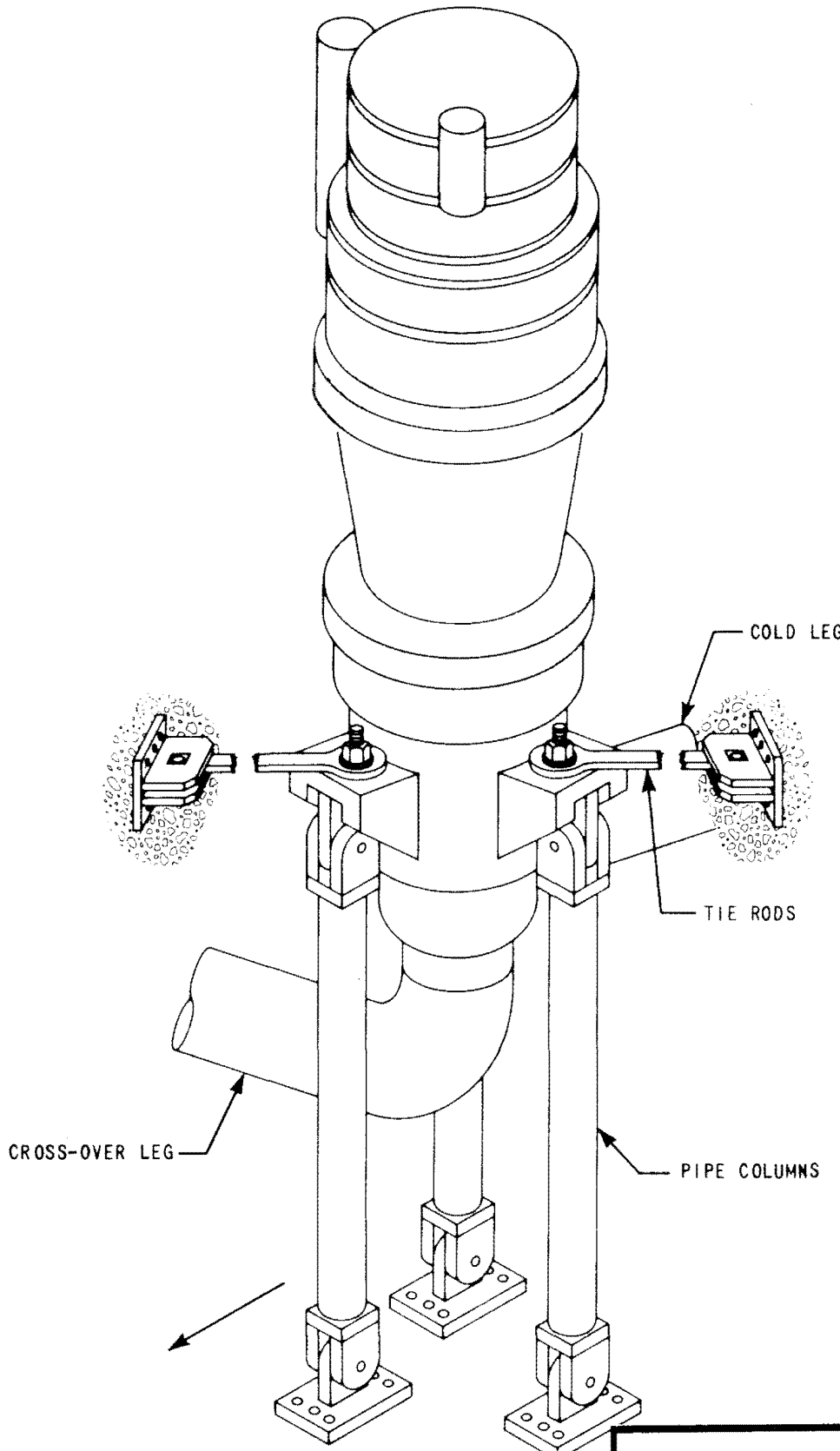


* ONLY 2 SNUBBERS REQUIRED.

TO BE INSTALLED AT LOCATIONS 2 AND 4 AS SHOWN.

NOTE:
THE SNUBBERS EXIST ONLY ON UNIT 2.
THEY HAVE BEEN REMOVED FROM UNIT 1.

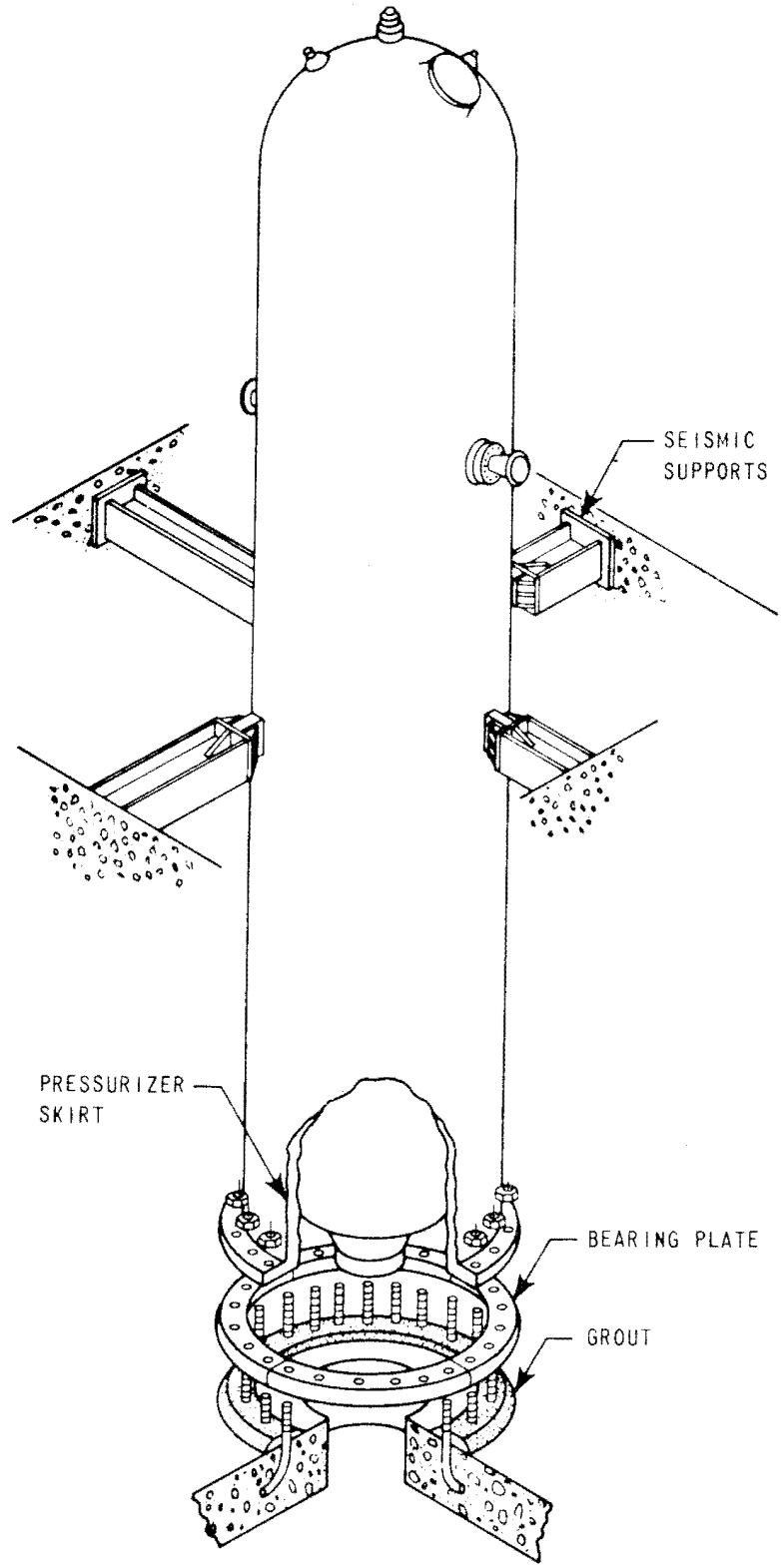
COMANCHE PEAK S E S FINAL SAFETY ANALYSIS REPORT UNITS 1 AND 2
TYPICAL STEAM GENERATOR SUPPORTS
FIGURE 5.4-13



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Typical Reactor Coolant Pump Supports

FIGURE 5.4-14



COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Typical Pressurizer Supports

FIGURE 5.4-15

THIS FIGURE HAS BEEN DELETED.

Amendment 66
January 15, 1988

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Typical Crossover Leg Restraint

FIGURE 5.4-16

THIS FIGURE HAS BEEN DELETED.

Amendment 66
January 15, 1988

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Typical Crossover Leg
Vertical Run Restraint

FIGURE 5.4-17

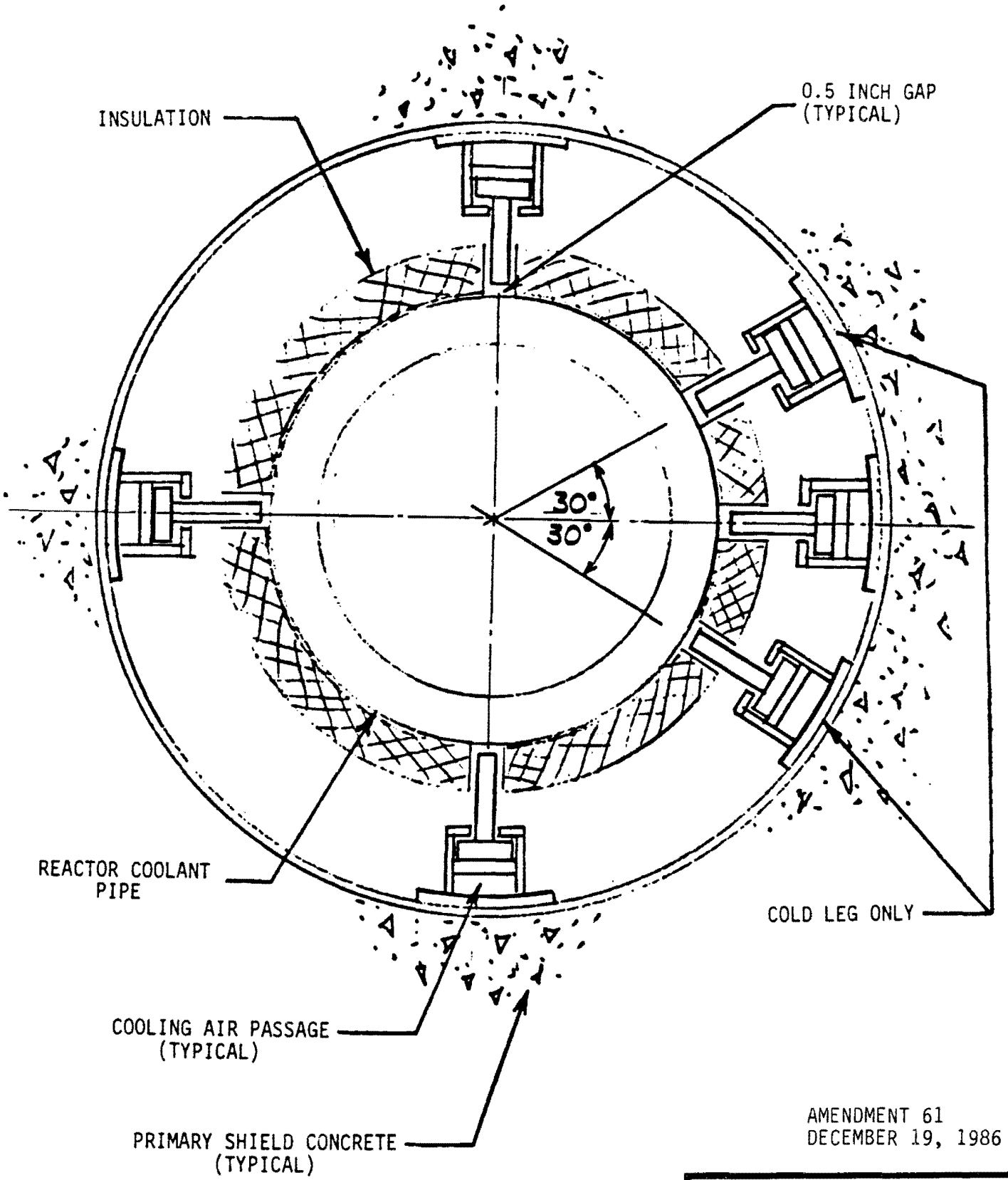
THIS FIGURE HAS BEEN DELETED.

Amendment 66
January 15, 1988

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

Typical Hot Leg Pipe
Whip Restraint

FIGURE 5.4-18



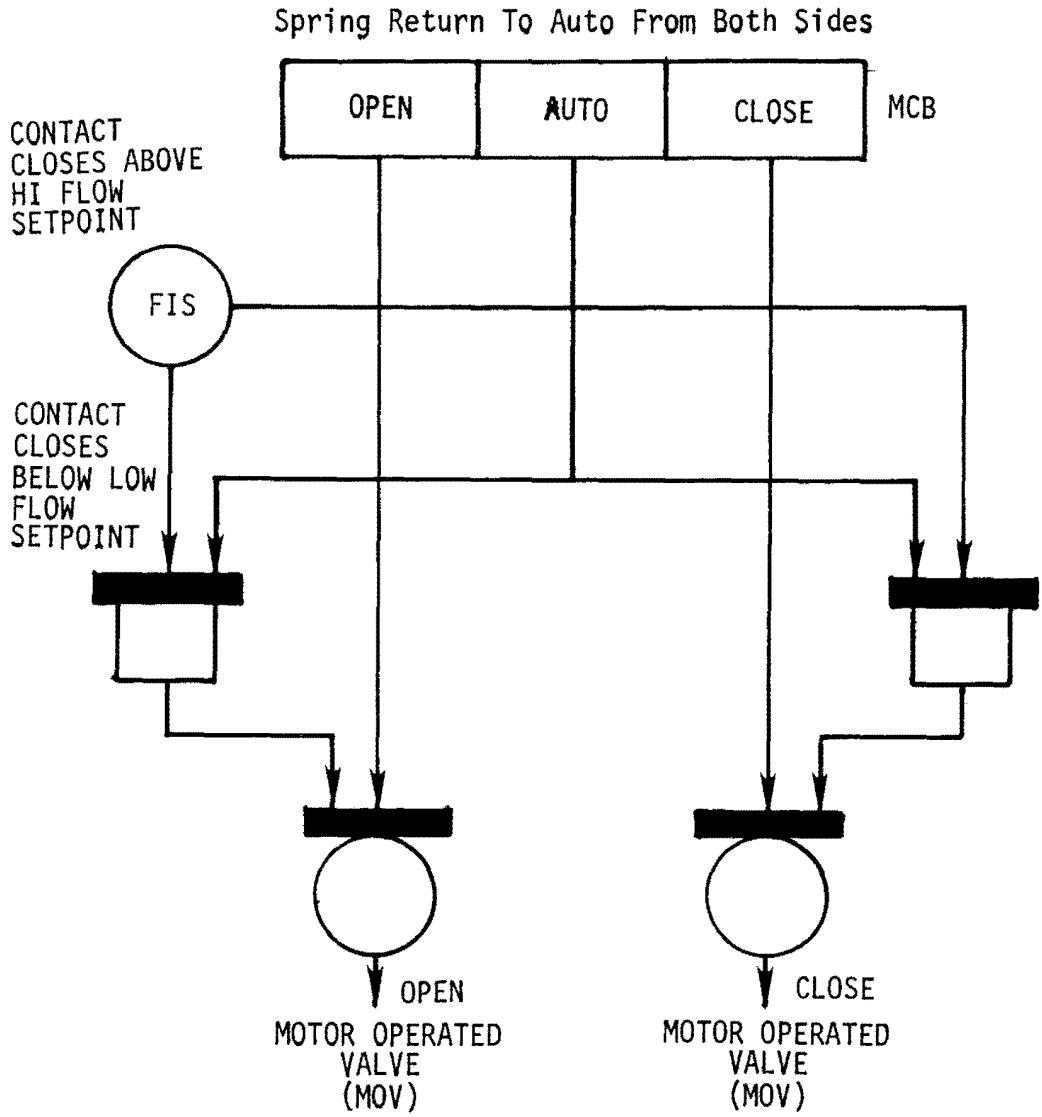
AMENDMENT 61
DECEMBER 19, 1986

NOTE: Hot and Cold Leg Restraint may be eliminated (See Section 5.4.14.2.5)

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

TYPICAL
LATERAL RESTRAINTS

FIGURE 5.4-19



TRAIN	FLOW SW INSTRUMENT NO	MOV NO
A	FIS-610	FCV -610
B	FIS-611	FCV-611

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

RHR PUMP MINI-FLOW VALVE INTERLOCK

FIGURE 5.4-20

Amendment 91
April 15, 1994