

SEP 20 1988

Docket No. 50-112

PLANT: Beaver Valley Unit 2

LICENSEE: Duquesne Light Company

SUBJECT: MEETING SUMMARY - THERMAL STRATIFICATION IN THE PRESSURIZER
SURGE LINE (TAC 69219)

A meeting was originally called to address the subject issue at Comanche Peak. However, the scope of that meeting was expanded to include Beaver Valley Unit 2 (see meeting notice, P. Tam to J. Stolz dated September 1, 1988). This summary therefore only covers the part of the meeting when Duquesne Light Company (DLC) personnel made the presentation and held discussion with the staff.

Enclosure 1 is the meeting attendee list showing only DLC and NRC personnel. Enclosure 2 is the collection of slides used by DLC in the presentation; this enclosure is self-explanatory and serves as a record of what was said by licensee personnel. The staff asked questions to clarify various points, and indicated that the licensee appears to be on the right track to address the subject issue. No additional licensee actions were requested by the staff in the meeting but there may be future requests.

original signed by
Peter S. Tam, Senior Project Manager
Project Directorate I-4
Division of Reactor Projects I/II

Enclosures:
As stated

cc w/enclosures
See next page

LA: PDI-4
SI S
03 n

PM: PDI-4
PTam: cb } S
09/20/88

D: PDI-4
JStolz } PS Tam for
09/20/88

8809300176 880920
PDR ADOCK 05000412
P PDC

DFold



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SEP 20 1988

Docket No. 50-412

PLANT: Beaver Valley Unit 2

LICENSEE: Duquesne Light Company

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SURGE LINE (TAC 69219)

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A handwritten signature in cursive script that reads "Peter S. Tam".

Peter S. Tam, Senior Project Manager
Project Directorate I-4
Division of Reactor Projects I/II

Enclosures:
As stated

cc w/enclosures
See next page

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cc:

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John D. Borrows
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Beaver Valley Power Station
Units 1 & 2

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Post Office Box 3321
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MEETING WITH DUQUESNE LIGHT COMPANYSEPTEMBER 7, 1988ATTENDEES

<u>Name</u>	<u>Affiliation</u>
J.H. Wilson	CPPD/OSP/NRC
P.F. McKee	CPPD/OSP/NRC
J.S. Wiebe	CPPD/OSP/NRC
P.T. Kuo	NRC/NRR/EMEB
George Dick	NRC/NRR/PD-4
Peter Tam	NRC/NRR/PDI-4
S.K. Mukherjee	Duquesne Light Co.
Steve Greer	Stone and Webster
Michael Testa	Duquesne Light
Greg Kammerdeiner	Duquesne Light
Nelson Tonet	Duquesne Light
James E. Lyons	NRC/OSP/PPD
C.Y. Cheng	NRC/DEST/EMTB
L.B. Marsh	NRC/DEST/EMEB
S. Hou	NRC/DEST/EMEB
S. Lee	NRC/DEST/EMTB
G. DeGrassf	NRC/BNL
T. Chan	NRC/PD5

Enclosure 2

DUQUESNE LIGHT COMPANY

BEAVER VALLEY UNIT 2

***PRESSURIZER SURGE LINE
STRATIFICATION***

***S. K. MUKHERJEE
NUCLEAR ENGINEERING
DEPARTMENT***

BACKGROUND

- ORIGINAL CONFIGURATION OF SURGE LINE (PRE HFT)
 - TANDEM 6 KIP MECH. SNUBBERS INSTALLED
 - WHIP RESTRAINTS REMOVED PER WHIPJET PROGRAM
 - 2 VARIABLE SPRING HANGERS INSTALLED } See Beaver Valley Unit 2 SER Supplement 4, Section 3
 - 1 PERMANENT RTD INSTALLED
 - OPERATING LIMITS - MAX TEMP. DIFF. 300°F

- STRATIFICATION FIRST ^{BECAME} ~~BECAUSE~~ APPARENT DURING HFT (Hot Functional Test)
 - UNUSUAL MOVEMENT OF SNUBBERS NOTED
 - ADDITIONAL INSTRUMENTATION INSTALLED TO REMOTELY MONITOR DISPLACEMENT DURING FUTURE TESTING

- DURING PREOP AND POWER ASCENSION TESTING FURTHER DISPLACEMENT OF A CYCLIC NATURE WERE OBSERVED
 - MAX. RECORDED DISPLACEMENT WAS ~ 3.0 INCHES VERSUS .4 IN. CALCULATED DISPLACEMENT
 - MAX. DISPLACEMENT OCCURRED DURING HEAT UP AND COOL DOWN

- FROM EVALUATION OF DATA CONCLUDED THAT HIGH DISPLACEMENTS WERE A RESULT OF FLUID THERMAL STRATIFICATION

DATA COLLECTION

- - PIPING DISPLACEMENTS APPEARED TO VARY AS A FUNCTION OF TEMPERATURE DIFFERENTIAL BETWEEN THE PRESSURIZER AND THE RCS HOT LEG
- - ADDITIONAL INSTRUMENTATION INSTALLED TO REMOTELY MONITOR TEMPERATURE
- - CONTINUED PLANT TESTING WITH CONTINUOUS MONITORING OF DISPLACEMENTS AND TEMPERATURE

ACTIONS

- - IMPOSED HEAT UP/COOL DOWN LIMITATION OF $\Delta T \leq 200^{\circ}\text{F}$ BETWEEN PRESSURIZER AND RCS HOT LEG
- - REMOVED SNUBBER TRAPEZE ON SURGE LINE UTILIZING ASME CODE CASE N-411 *Approved for use by Unit 1, NRC letter to DC, 4/8/87*
- - ANALYSIS CONDUCTED TO QUANTIFY EFFECTS OF STRATIFICATION

SPECIFIC ANALYSIS

- - SIMPLIFIED 'ANSYS' MODEL OF SURGE LINE GENERATED
 - MODEL COMPRISED OF ELASTIC BEAM ELEMENTS
 - FIRST BENCH MARKED 'ANSYS' MODEL TO ORIGINAL 'NUPIPE' MODEL
 - ALL THERMAL CONDITIONS APPLICABLE TO SURGE LINE WERE REVIEWED TO DETERMINE THE PRESENCE OF THERMAL STRATIFICATION AND POTENTIAL EFFECTS ON THE EXISTING PIPING ANALYSIS
 - THESE THERMAL CONDITIONS INCLUDED
 - NORMAL POWER OPERATION
 - HEAT UP AND COOL DOWN
 - MAXIMUM STRATIFICATION FOLLOWING PLANT EXCURSION/TRIP

- - 'ANSYS' MODEL INCORPORATED ACTUAL RECORDED IN-PLANT TEMPERATURE DATA DURING THE ABOVE THERMAL CONDITIONS TO QUANTIFY THERMAL STRATIFICATION EFFECTS

- - RESULTS OF 'ANSYS' MODEL (FORCES, MOMENTS) FOR EACH APPLICABLE THERMAL CONDITION WAS RE-EVALUATED BY THE ORIGINAL 'NUPIPE' MODEL

- - NUPIPE MODEL THEREFORE COMBINED THE EFFECTS OF THERMAL STRATIFICATION WITH ALL OTHER LOADING CONDITIONS

WHIPJET REVIEW

- EFFECT OF REVISED ANALYSIS ON SURGE LINE EVALUATED
 - LEAKAGE SIZE FLAW RECALCULATED
 - STABILITY EVALUATION CONDUCTED
 - FATIGUE CRACK GROWTH RATE ANALYSIS REVIEWED

- MAINTAINED MARGINS PER NUREG 1061 VOL. 3

BV-1 SURGE LINE REVIEW

- GEOMETRY CLOSELY APPROXIMATES BV-2
 - THIS INCLUDES PIPE ROUTING, SIZE, ENTRANCE

INTO HOT LEG AND SLOPE

- SUPPORTING ARRANGEMENT SIMILAR TO BV-2
 - NO RUPTURE RESTRAINTS ON SURGE LINE

 - PIPING SUPPORTED BY TWO VARIABLE SPRING HANGERS

- OPERATIONAL RESTRICTIONS IMPOSED DURING HEATUP/
COOLDOWN SIMILAR TO BV-2

- PIPING LOADS DUE TO STRATIFICATION FROM BV-2
ANALYSIS BEING EVALUATED

CONCLUSIONS

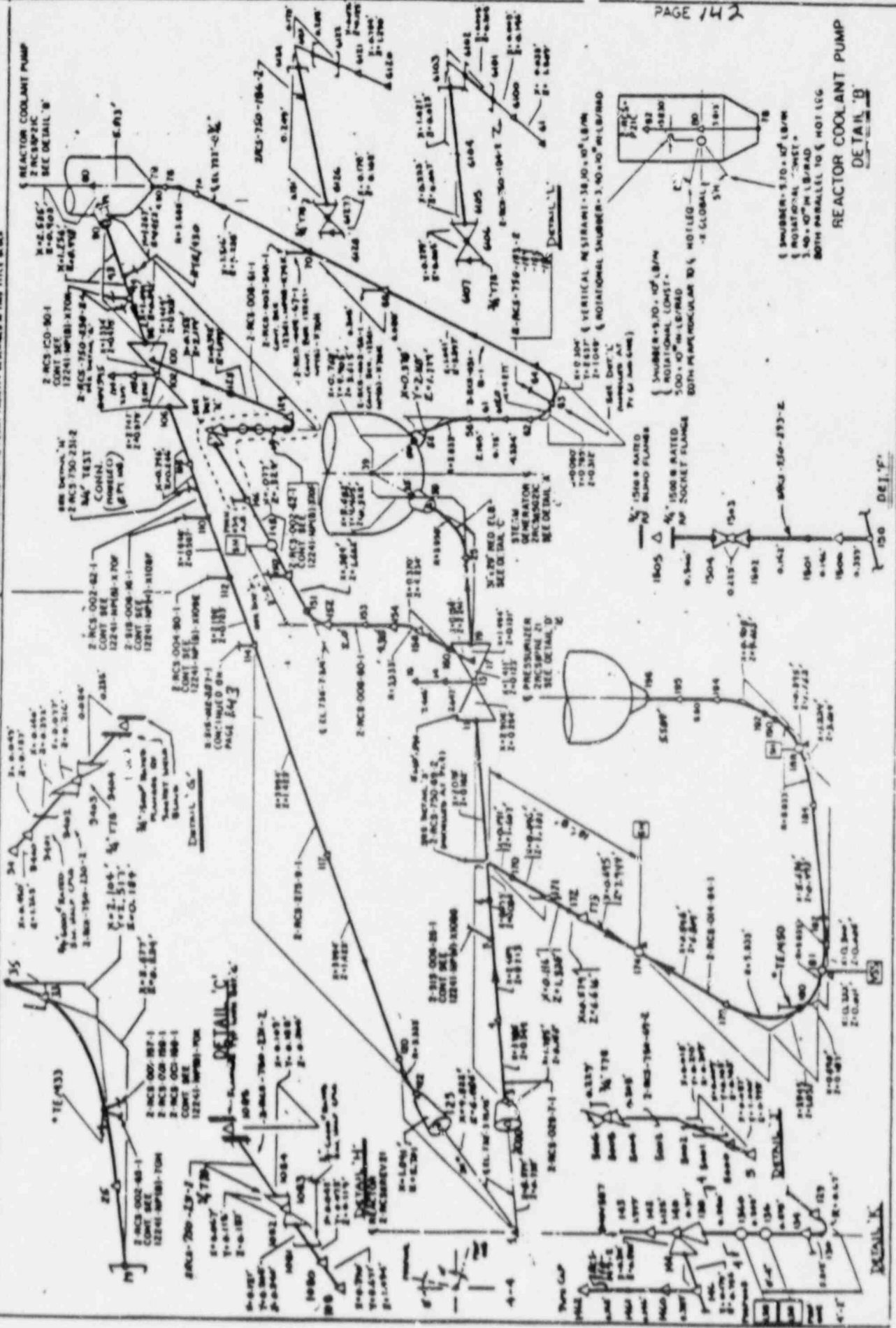
- STRATIFICATION EFFECTS WERE QUALIFIED AND INCORPORATED INTO THE ANALYSIS
- ANALYSIS SHOWS THAT CODE ACCEPTABILITY MAINTAINED UNDER ALL CASES
- WHIPJET REANALYSIS OF SURGE LINE DEMONSTRATES PIPE LBB CAPABILITY UNDER REVISED LOADING
 ↑ Leak-before-break
- OPERATIONAL RESTRICTIONS OF $\Delta T \leq 200^{\circ}\text{F}$ IMPOSED DURING HEATUP AND COOLDOWN ON BOTH BV-1 AND BV-2
- SIMILARITY OF BOTH UNITS SHOWS BV-2 STRATIFICATION EFFECTS/LOADS CAN BE APPLIED TO BV-1

STONE G. WEBSTER ENGINEERING CORPORATION
PIPE STRESS SHEET 1

CLIENT: BROWNSHAW LIGHT SO. LOCATION: B.T.E.
SYSTEM: REACTOR COOLANT PIPING LOOP 23 REACTOR SUPPLEMENT
CALCULATION NO.: SECT. 1012-2100-X

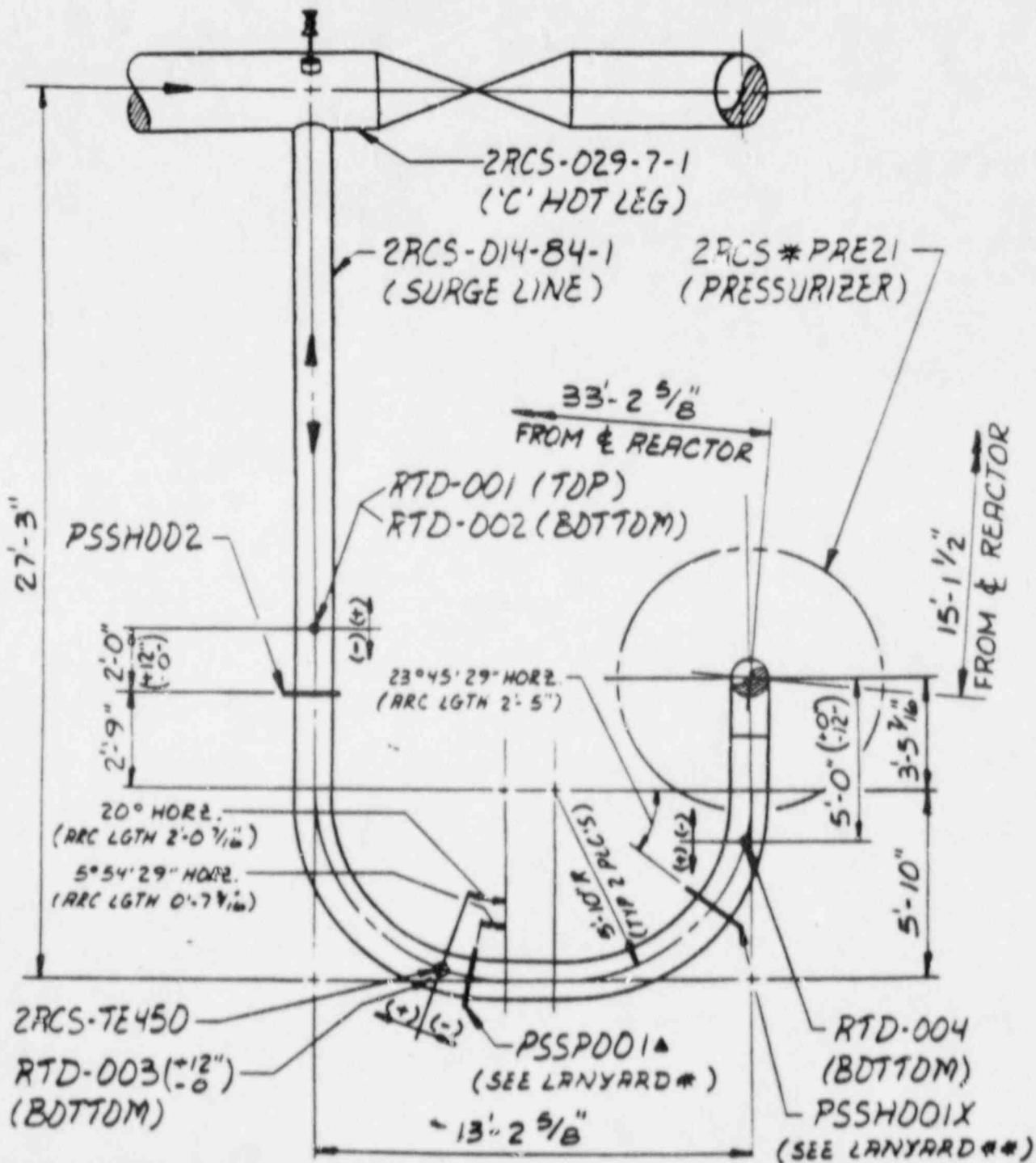
THE INFORMATION ON THIS DRAWING HAS NOT BE CHECKED FOR CONFORMANCE WITH THE LICENSING, CONSTRUCTION, OPERATING, AND MAINTENANCE OF THE PLANT FACILITY REGULATED BY THE NUCLEAR REGULATORY COMMISSION.

- △ INDICATES NET
- INDICATES NET POINT
- INDICATES ANCHOR
- ◇ INDICATES ANCHOR TYPE
- INDICATES INFORMATION POINT
- INDICATES DIRECTION OF FLOW
- CS - CONSTANT SUPPORT
- VS - VERTICAL SUPPORT
- VE - VERTICAL CONSTRAINT
- LS - LATERAL CONSTRAINT
- AS - ANCHOR CONSTRAINT
- NS - NORTH SOUTH CONSTRAINT
- ES - EAST WEST CONSTRAINT
- SH - SPRING HANGER (VARIABLE)
- NH - NON-HANGER
- VSS - VERTICAL SHOCK SUPPRESSOR
- LSS - LATERAL SHOCK SUPPRESSOR
- ASS - AXIAL SHOCK SUPPRESSOR
- SSS - SOUTH SOUTH SHOCK SUPPRESSOR
- ESS - EAST WEST SHOCK SUPPRESSOR



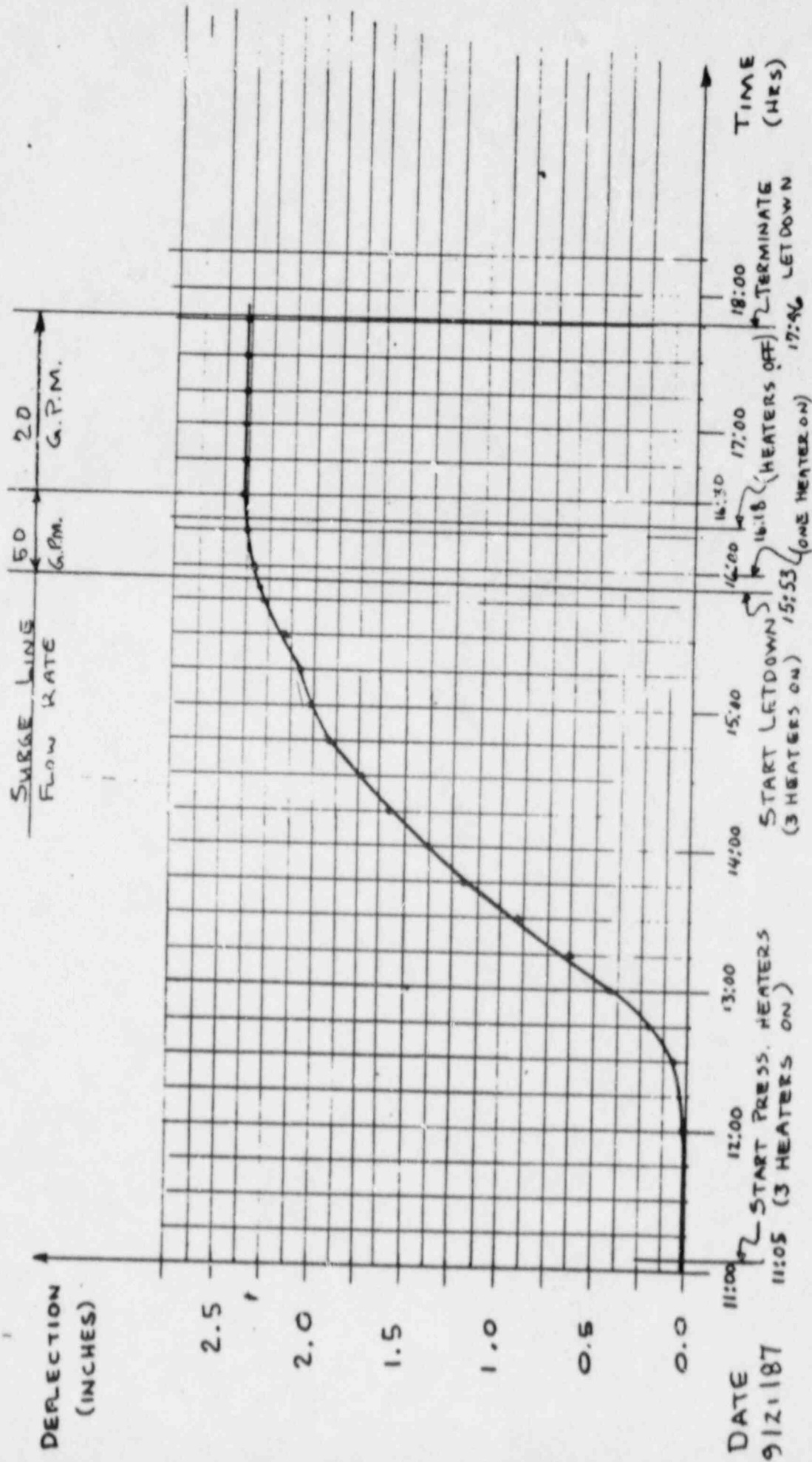
REACTOR COOLANT PUMP
DETAIL B

- * { LANYARD RCS-TE01-076P Y - VERTICAL DEFLECTION MONITOR ▲▲
- * { LANYARD RCS-TE02-077P L - LATERAL DEFLECTION MONITOR
- * { LANYARD RCS-TE03-078P A - AXIAL DEFLECTION MONITOR
- * * LANYARD RCS-TE04-079P Y - VERTICAL DEFLECTION MONITOR



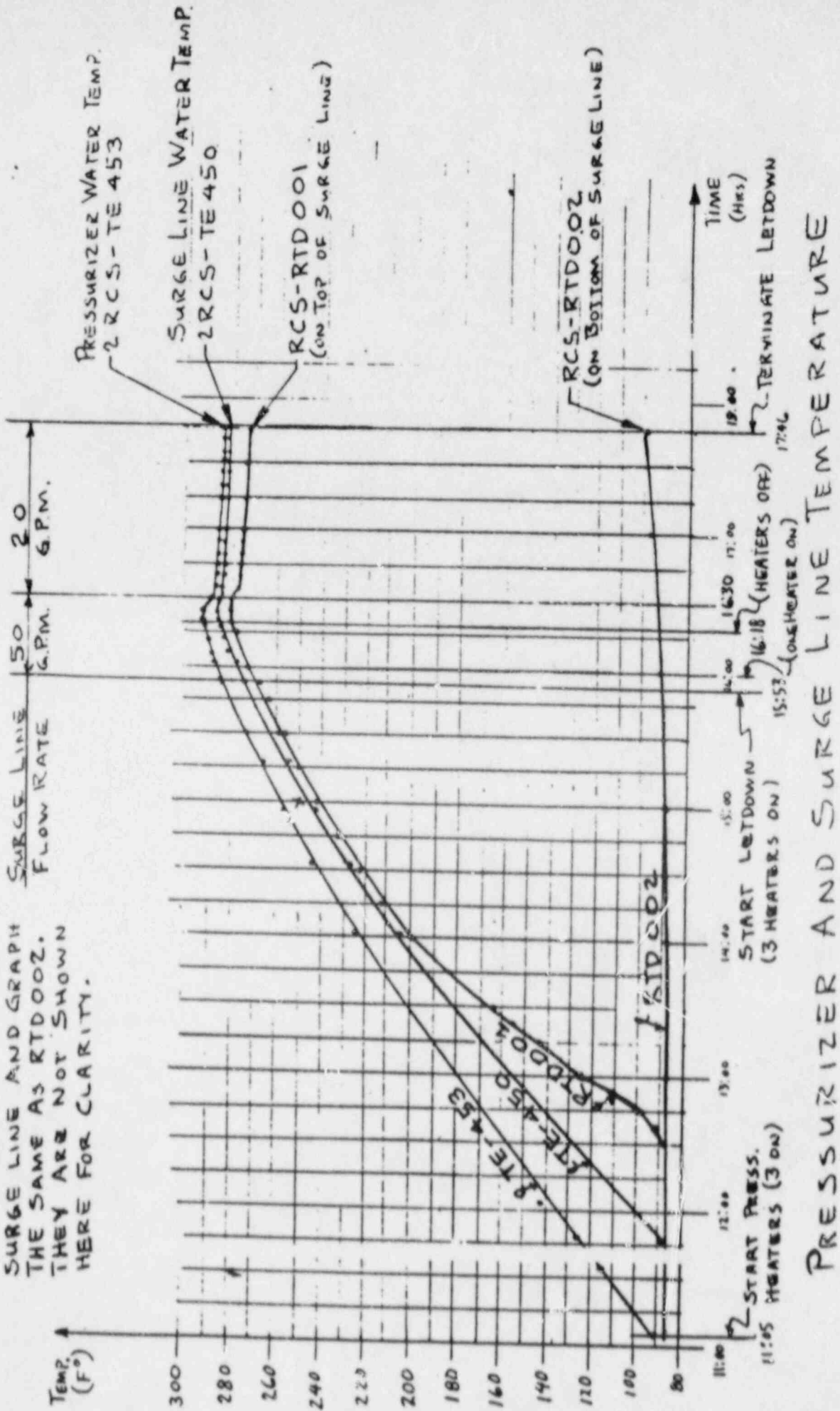
▲ SNUBBER PSSP001 DELETED PER EIDCR № DCP-1015-02
 SHOWN FOR REFERENCE ONLY

▲▲ LANYARD RCS-TE01-076P IS ALSO IDENTIFIED AS LAN. 43

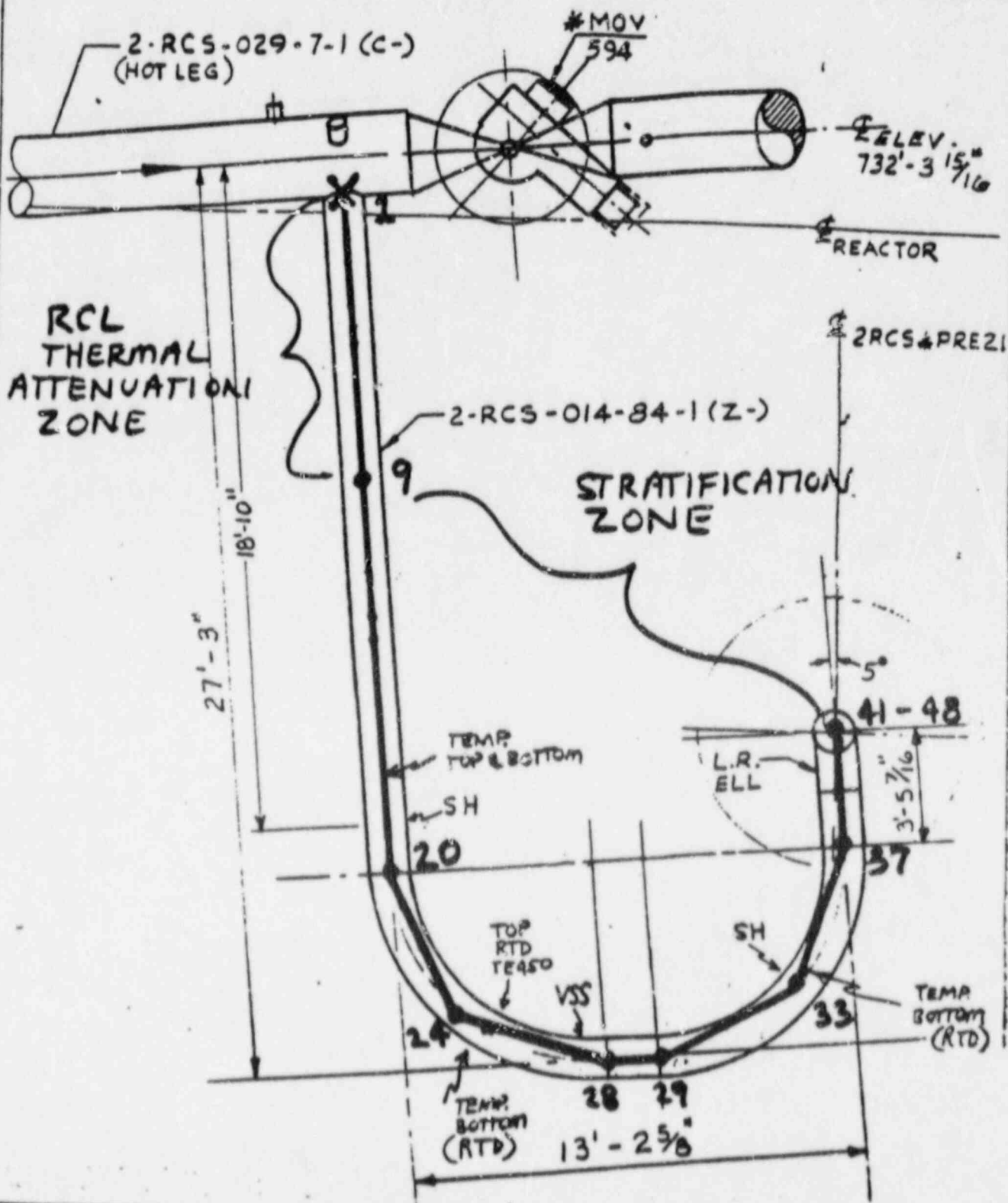


PIPE DEFLECTION AT LANYARD N^o 76

NOTE: RCS-RTD003 & 004 ARE ON THE BOTTOM OF THE SURGE LINE AND GRAPH THE SAME AS RTD002. THEY ARE NOT SHOWN HERE FOR CLARITY.

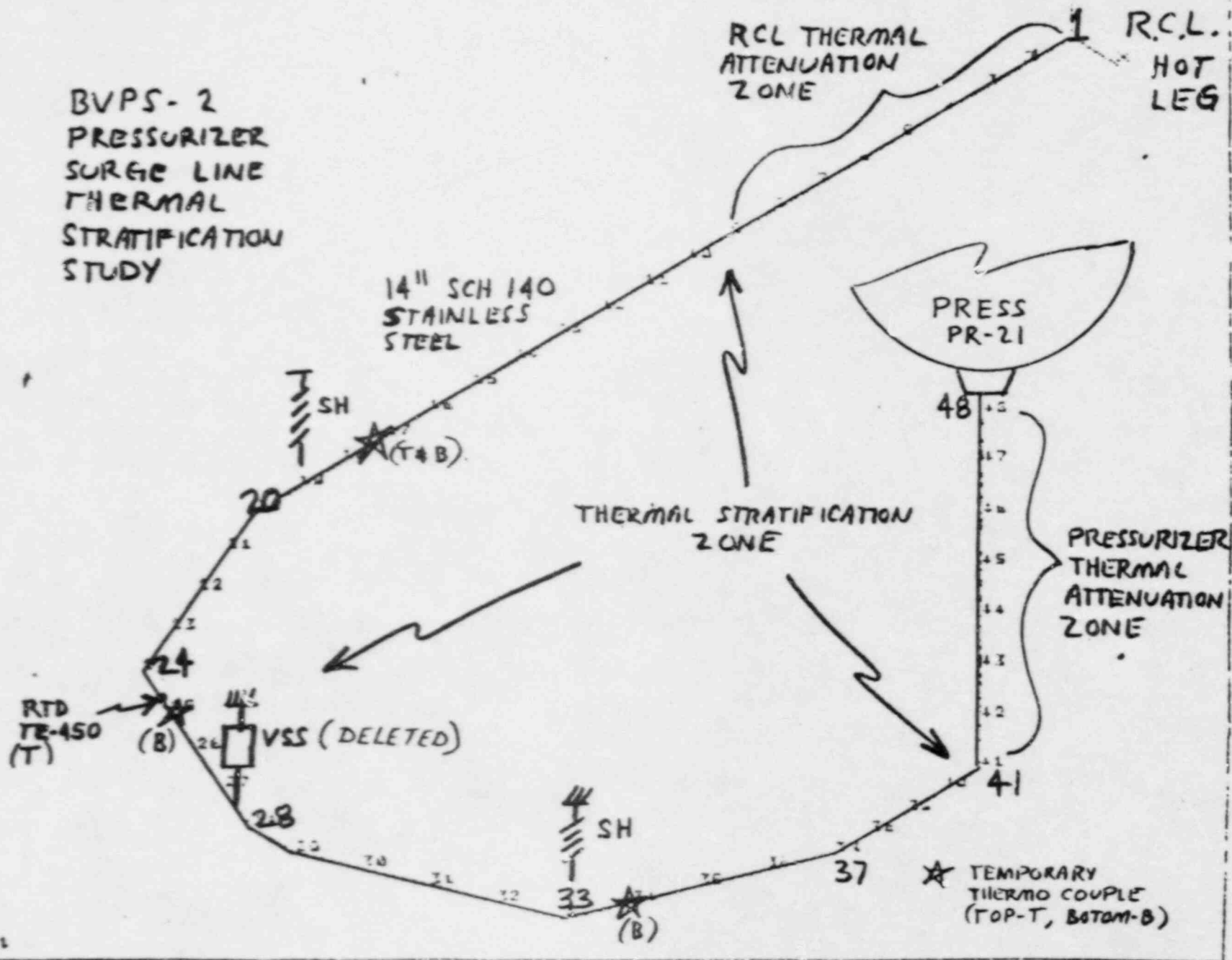


PRESSURIZER AND SURGE LINE TEMPERATURE



CHECKED		TITLE PRESSURIZER SURGE LINE BEAVER VALLEY UNIT 2	SCALE: $\frac{1}{4}'' = 1'-0''$	
CORRECT			DATE:	
APPROVED			SKETCH NUMBER	
REVISIONS	②		③	④

BVPS-2
PRESSURIZER
SURGE LINE
THERMAL
STRATIFICATION
STUDY



DISTRIBUTION

~~Docket File~~

NRC & Local PDRs

PDI-4

JStolz

PTam

OGC-Rockville

EJordan

B.Grimes

NRC Participants

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J.S.Wiebe

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ACRS(10)

DF01
1/2