

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 8711090319 DDC. DATE: 87/11/05 NOTARIZED: NO DOCKET #
 FACIL: 50-387 Susquehanna Steam Electric Station, Unit 1, Pennsylvania 05000387
 50-388 Susquehanna Steam Electric Station, Unit 2, Pennsylvania 05000388
 AUTH. NAME AUTHOR AFFILIATION
 KEISER, H. W. Pennsylvania Power & Light Co.
 RECIP. NAME RECIPIENT AFFILIATION
 BUTLER, W. R. Pennsylvania Power & Light Co.

SUBJECT: Transmits Test Procedure TP-157-003 & Calculation M-SLC-004
 re test data for standby liquid control sys two-pump test.
 Data, in conjunction w/mods installed during third refueling &
 insp outage, satisfies util commitments concerning ATWS rule.

DISTRIBUTION CODE: A001D COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 8+35
 TITLE: OR Submittal: General Distribution

NOTES: 1cy NMSS/FCAF/PM. LPDR 2cys Transcripts. 05000387
 1cy NMSS/FCAF/PM. LPDR 2cys Transcripts. 05000388

	RECIPIENT ID CODE/NAME	COPIES LTTR ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR ENCL
	PD1-2 LA THADANI, M	1 0 1 1	PD1-2 PD	5 5
INTERNAL:	ACRS	6 6	ARM/DAF/LFMB	1 0
	NRR/DEST/ADS	1 1	NRR/DEST/CEB	1 1
	NRR/DEST/MTB	1 1	NRR/DEST/RSB	1 1
	NRR/DOEA/TSB	1 1	NRR/PMS/ILRB	1 1
	OGC/HDS2	1 0	<u>REG FILE</u> 01	1 1
	RES/DE/EIB	1 1		
EXTERNAL:	EG&G BRUSKE, S	1 1	LPDR	2 2
	NRC PDR	1 1	NSIC	1 1
NOTES:		3 3		

1. The first part of the document discusses the general situation of the country and the role of the government. It mentions the need for a strong and stable government to ensure the well-being of the people.

2. The second part of the document discusses the economic situation and the need for reforms. It mentions the need for a strong and stable government to ensure the well-being of the people.

3. The third part of the document discusses the social situation and the need for reforms. It mentions the need for a strong and stable government to ensure the well-being of the people.

4. The fourth part of the document discusses the political situation and the need for reforms. It mentions the need for a strong and stable government to ensure the well-being of the people.

5. The fifth part of the document discusses the international situation and the need for reforms. It mentions the need for a strong and stable government to ensure the well-being of the people.

Item	Quantity	Unit	Value
1. Rice	1000	kg	10000
2. Wheat	500	kg	5000
3. Sugar	200	kg	2000
4. Oil	100	kg	1000
5. Cloth	500	m	5000
6. Paper	100	kg	1000
7. Tea	50	kg	500
8. Coffee	20	kg	200
9. Spices	10	kg	100
10. Miscellaneous	50	kg	500



Pennsylvania Power & Light Company

Two North Ninth Street • Allentown, PA 18101 • 215 / 770-5151

Harold W. Keiser
Vice President-Nuclear Operations
215/770-7502

NOV 05 1987

50-387
50-388

Director of Nuclear Reactor Regulation
Attn.: Dr. W. R. Butler, Project Director
Project Directorate I-2
Division of Reactor Projects
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUSQUEHANNA STEAM ELECTRIC STATION
ATWS
PLA-2936 FILES R41-2, S053A

Dear Dr. Butler:

The purpose of this letter is two-fold: first to transmit results of the Standby Liquid Control system two pump test; and second, to inform the NRC that submittal of this data in conjunction with the Unit 1 ATWS modifications which were installed during that Unit's 3rd Refueling and Inspection Outage, satisfies PP&L's commitments related to the ATWS rule for Susquehanna Unit 1.

Regarding the aforementioned test data, two documents, TP-151-003 and PP&L Calculation M-SLC-004, are enclosed.

TP-157-003 is the actual test procedure and Calculation M-SLC-004 determines the maximum standby liquid control system pressure for injection during an ATWS event.

If you have any questions, please contact D.J. Walters at (215) 770-6536.

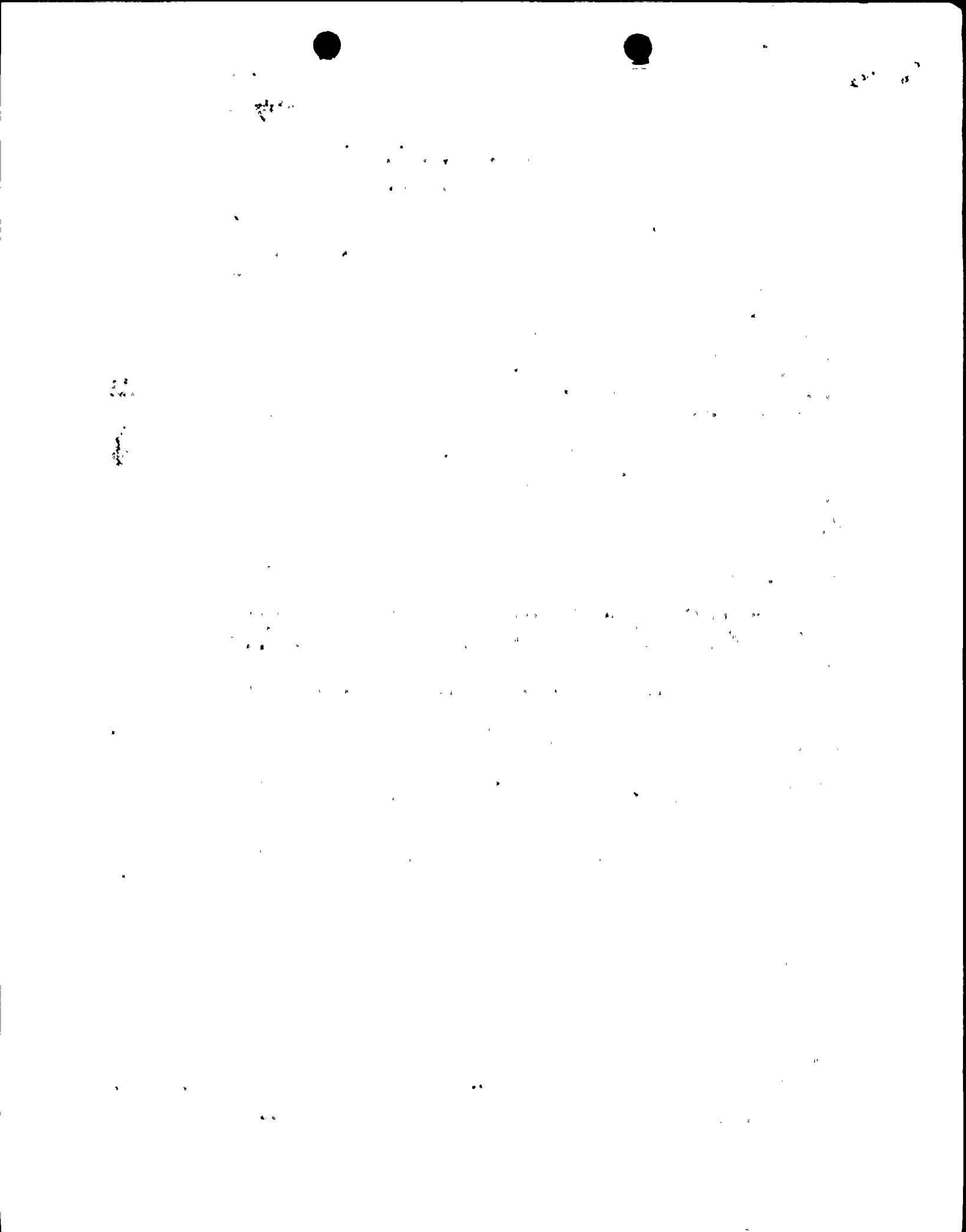
Very truly yours,

H. W. Keiser
Vice President-Nuclear Operations

cc: NRC Document Control Desk (original)
NRC Region I
Mr. J. Stair, NRC Resident Inspector
Mr. M. C. Thadani, NRC Project Manager

Aool
11

8711090319 871105
PDR ADDCK 05000387
P PDR





CALCULATION COVER SHEET

CALC. NO. M-SLC-004
 FILE NO: S053A
 SUPERSEDED BY R2-1

SAFETY-RELATED
 ASME III OR XI
 OTHER QUALITY
 NON QUALITY

PROJECT SUSQUEHANNA SES
 DESIGN ACTIVITY/PMR NUMBER 85-3097A
 TITLE/DESCRIPTION CALCULATION OF MAX. ATWS INJECTION PRESSURE

ER/CTN NO. 400944 / 050
 PAGE 1 OF 5

STATEMENT OF PROBLEM *THE PURPOSE OF THIS CALCULATION IS TO CALCULATE THE MAXIMUM SLC SYSTEM PRESSURE FOR INJECTION OF BORON DURING AN ATWS EVENT. THE CALCULATION IS BASED ON DATA TAKEN DURING A TWO PUMP INJECTION TEST COMPLETED ON 9-13-87.*

DESIGN BASIS (DC020.0 OR DC020.1)

REACTOR COOLANT TEMPERATURE: 120.5 °F
 REACTOR STEAM PRESSURE: ATMOSPHERIC 0 psig } TEST CONDITIONS (ATTACHMENT 2)
 REACTOR LEVEL: + 248 INCHES }
 MAXIMUM MEASURED PUMP PRESSURE: 205 psig - TEST RESULTS (REF. 1) 889-16-87
 MAXIMUM WATER LEVEL: + 54 INCHES }
 MAXIMUM REACTOR STEAM PRESSURE: 1076 psig } ATWS CONDITIONS
 REACTOR COOLANT TEMPERATURE: ~~540~~ 553.504 °F
 CORE ΔP: ~~4.88~~ 5.88 psig P.W.H.
 SYSTEM CONFIGURATION: 2 PUMPS RUNNING, 2 SQUEB VALVES FERED

REFERENCES/FORMULAE

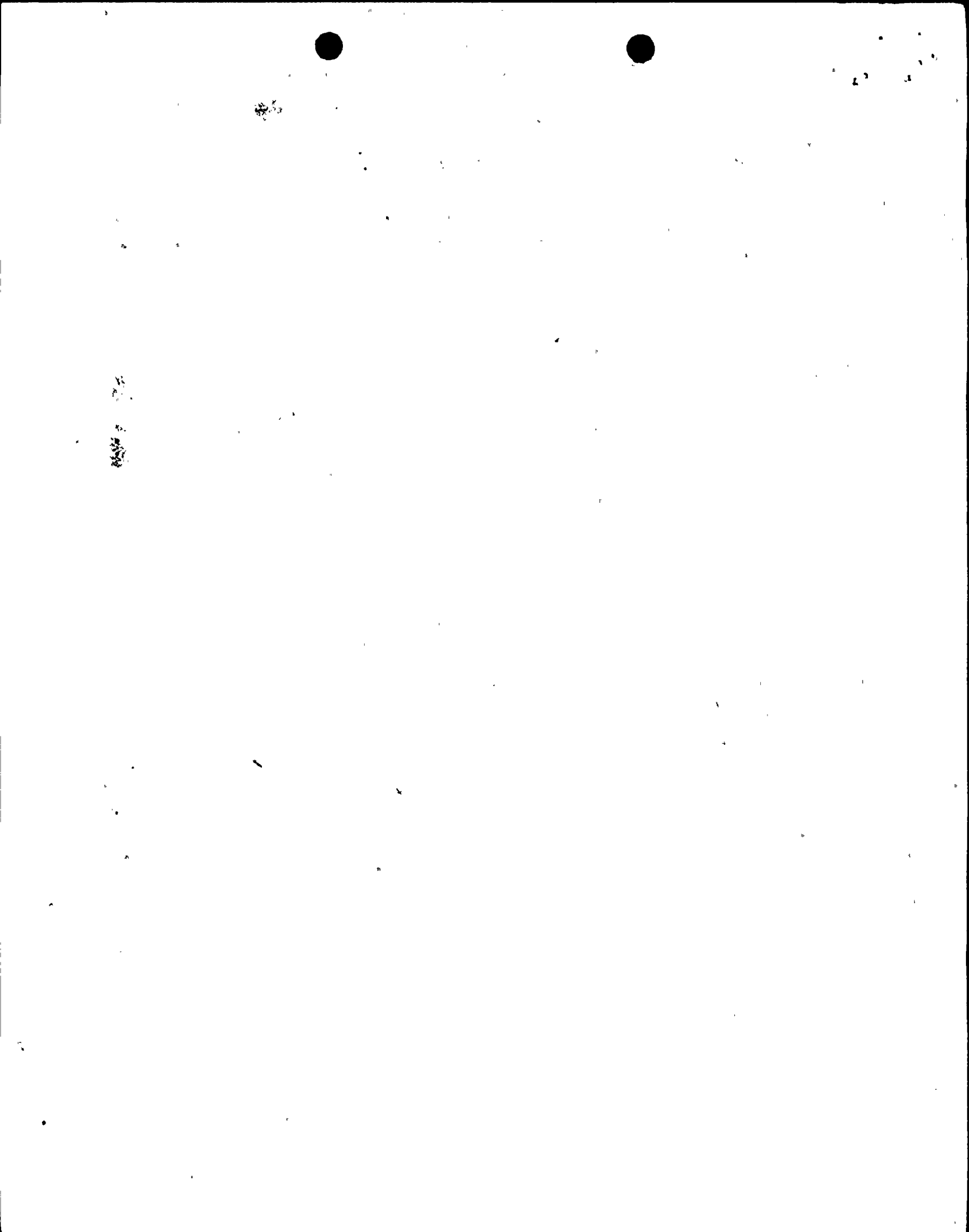
- (1) TEST RESULTS FROM TP-153-007 CONDUCTED 9-13-87
- (2) EO-100-102 PRIMARY CONTAINMENT CONTROL BASED
- (3) CRANE TECHNICAL PAPER NO. 410
- (4) PP&L MECHANICAL CALC. M-SLC-001 REV. 0
- (5) ILO. SP-DLB-101-4 REV. 8
- (6) DRAWING 8856-MI-R11-334-16

SUMMARY/CONCLUSIONS

THE MAXIMUM ATWS INJECTION PRESSURE WITH 2 SLC PUMPS RUNNING THROUGH 2 SQUEB VALVES IS 1276 psig.

DC110.0-A REV. 0

REV. NO.	DATE	PREPARED BY	REVIEWED/CHECKED BY	DATE	APPROVED BY	DATE
0	9-15-87	<i>Ed. W. Hunt</i>	<i>Ph. Nixon</i>	9/15/87	<i>John P. [Signature]</i>	9/16/87



Dept. UPE - MECH.

PENNSYLVANIA POWER & LIGHT COMPANY
CALCULATION SHEET

ER No. _____

Date 9-14-1987

Designed by P.W.H.

PROJECT _____

Sht. No. 2 of 5

Approved by _____

CALCULATION OF MAX. ATWS
INJECTION PRESSURE

I. METHODOLOGY

THE METHOD USED TO PERFORM THIS CALCULATION WAS TO PERFORM A TWO PUMP INJECTION TEST TO THE REACTOR VESSEL TO OBTAIN ACTUAL DATA FROM WHICH TO OBTAIN THE ACTUAL FRICTIONAL LOSSES IN THE SLC SYSTEM.

THIS DATA WAS THEN COMBINED WITH ATWS CONDENSER DATA TO DETERMINE THE MAXIMUM PUMP DISCHARGE PRESSURE REQ'D.

II. ASSUMPTIONS

1. THE MAX. PRESSURE AT THE PRESSURE GAUGE PI-12003 IS ESSENTIALLY THE SAME AS AT THE PUMP DISCHARGES AND RELIEF VALVES.
2. THE TEMPERATURE FLOWING FROM THE SLC PUMP THROUGH THE SPARGERS IS 90°F

III. PROCEDURE

CALCULATING FRICTION LOSSES

100-100

Dept. <u>NPE-MECH.</u>	PENNSYLVANIA POWER & LIGHT COMPANY	ER No. _____
Date <u>9-14-1987</u>	CALCULATION SHEET	_____
Designed by <u>S.W.H.</u>	PROJECT _____	Sht. No. <u>3</u> of <u>5</u>
Approved by _____	<u>CALCULATION OF MAX. ATWS</u>	
	<u>INTEGRON PRESSURE</u>	

THE MEASURED DISCHARGE PRESSURE IS THE
SUM OF FRICTION LOSSES, STATIC HEAD AND
REACTION STEAM PRESSURE

$$P_{\text{GUAGE}} = H_L + P_{\text{STAT.}} + P_{\text{REACTION}}$$

FROM TEST DATA $P_{\text{REACTION}} = 0 \text{ PSIG}$

$$\therefore P_{\text{GUAGE}} = H_L + P_{\text{STAT}}$$

$$H_L = \frac{P_{\text{GUAGE}}}{\rho} - P_{\text{STAT}}$$

FROM TEST DATA

REACTION WATER LEVEL = + 248 INCHES

WHICH CORRESPONDS TO 775.5 INCHES ABOVE

VESSEL ZERO (SEE ATTACHMENT 1)

FROM REF. 2

THE SLL SPARGER MID-POINT IS AT 121.5 INCHES

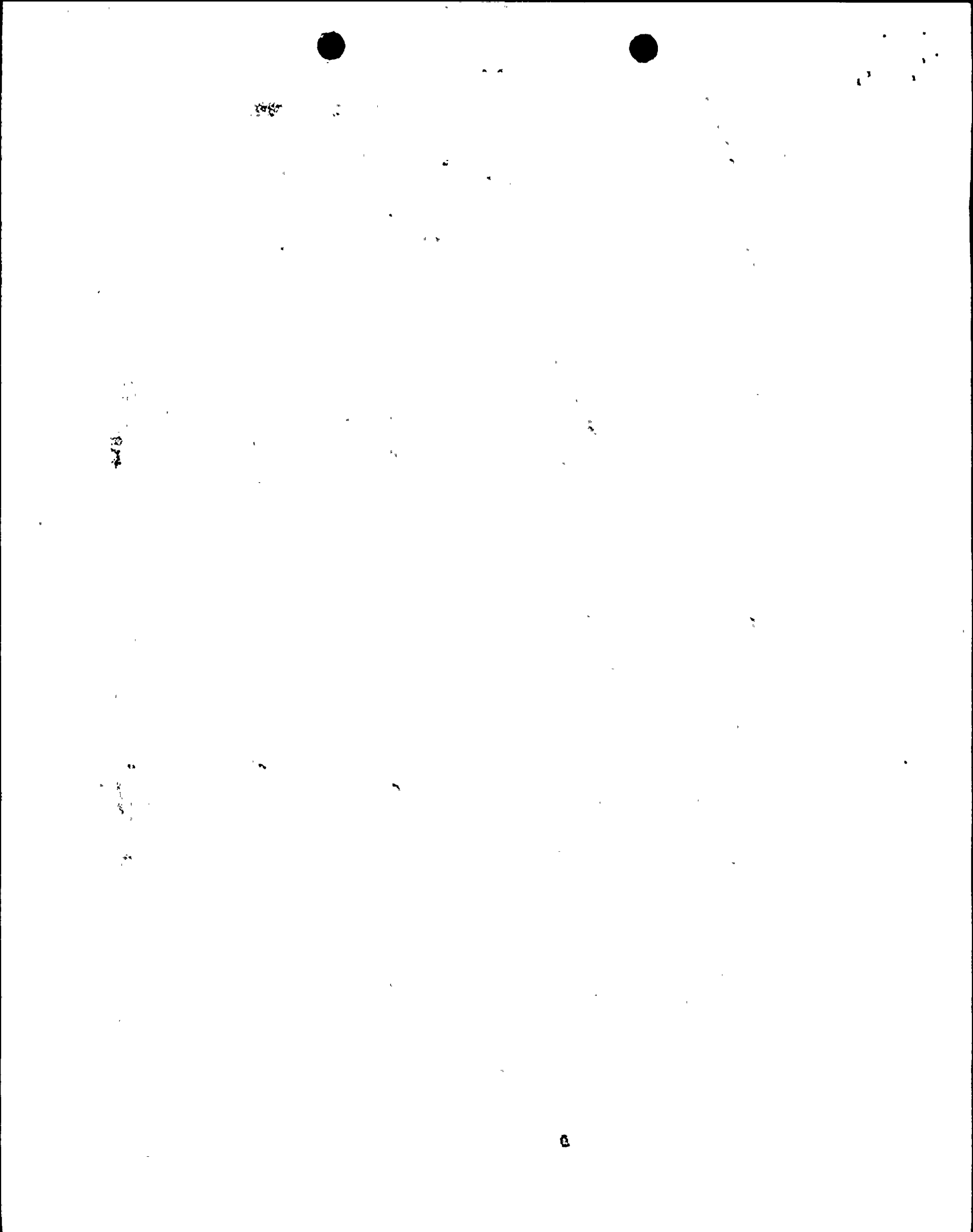
ABOVE VESSEL ZERO (REF. 6)

$$\Rightarrow \text{STATIC HEAD IN VESSEL} = 654 \text{ IN} = 54.5 \text{ FT}$$

SPARGER MID-POINT EL = 742' 5 1/2" (REF. 6 & ATTACHMENT 1)

PRESSURE GUAGE EL = 752' 4" (REF. 5)

STATIC HEAD IN PIPING = - 9.87 FT.



Dept. NPE-MECH.
Date 9.14.1987
Designed by P.W.H.
Approved by _____

PENNSYLVANIA POWER & LIGHT COMPANY
CALCULATION SHEET
PROJECT _____
CALCULATION OF MAX. ATWS
INJECTION PRESSURE

ER No. _____
Sht. No. 4 of 5

$$P_{STAT} = (54.5 \text{ ft}) \rho (120.5^\circ\text{F}) - (9.87 \text{ ft}) \rho (90^\circ\text{F})$$

$$\left. \begin{aligned} \rho (120.5^\circ\text{F}) &= 61.71 \text{ lb/ft}^3 \\ \rho (90^\circ\text{F}) &= 62.12 \text{ lb/ft}^3 \end{aligned} \right\} \text{Ref. 3 py. A-6}$$

$$P_{STAT} = (54.5 \text{ ft}) (61.71 \text{ lb/ft}^3) - (9.87 \text{ ft}) (62.12 \text{ lb/ft}^3)$$

$$= 3363.2 - 613.1 \text{ lb/ft}^2 = 2750.1 \text{ lb/ft}^2$$

$$P_{STAT} = 19.1 \text{ psig}$$

THEREFORE:

$$H_L = 205 \text{ psig} - 19.1 \text{ psig} = 185.9 \text{ psig}$$

(Ref. 1)

CALCULATING MAX. ATWS INJECTION PRESSURE.

THE MAXIMUM ATWS PRESSURE EQUALS THE SUM OF
THE REACTOR STEAM PRESSURE, STATIC HEAD, CORE ΔP
AND FRICTION LOSS

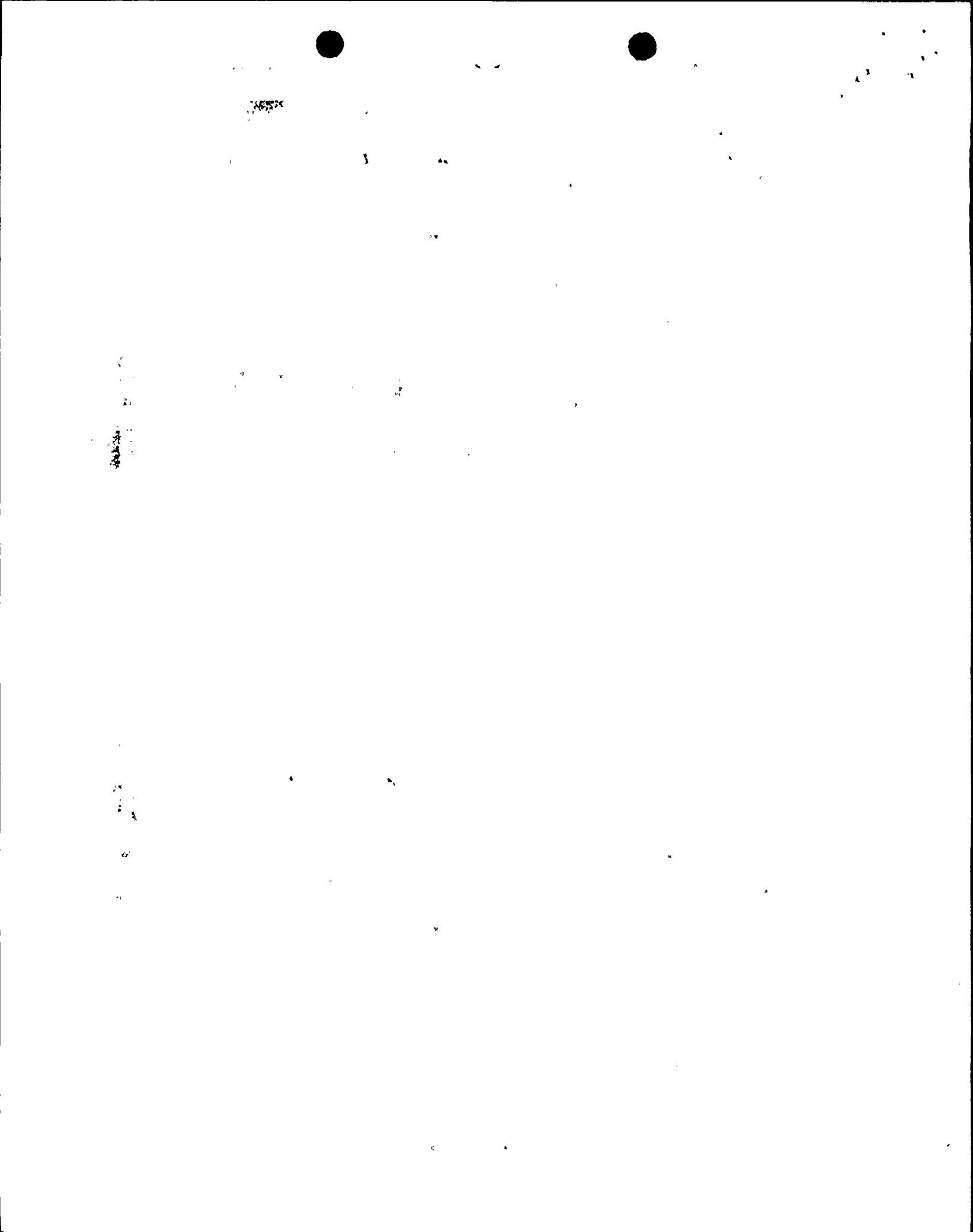
$$P_{REACTOR} = 1076 \text{ psig} \quad (\text{Ref. 2})$$

$$CORE \Delta P = \overset{5.88}{\underset{P.W.H.}{\cancel{4.88}} \text{ psig}} \approx 6 \text{ psig} \quad (\text{Ref. 4})$$

$$H_L = 185.9 \text{ psig}$$

$$\text{MAX. REACTOR WATER LEVEL} = +54 \text{ IN} \quad (\text{Ref. 2})$$

$$T_{ATWS} = 553.5^\circ\text{F}$$



Dept. NPE - MECH.
Date 9-15-19 87
Designed by P.W.N.
Approved by _____

PENNSYLVANIA POWER & LIGHT COMPANY
CALCULATION SHEET

ER No. _____
Sht. No. 5 of 5

PROJECT _____
CALCULATION OF MAX. ATWS
INJECTION PRESSURE

$$P_{STAR} (TOTAL) = P_{STAR} (R.V.) + P_{STAR} (PSPLWG)$$

$$P_{STAR} (PSPLWG) = \frac{(-9.87 \text{ FT}) (62.12 \text{ LB/FT}^3)}{144 \text{ IN}^2/\text{FT}^2} = -4.3 \text{ PSIG}$$

$$P_{STAR} (R.V.) = \frac{(581.5 \text{ EW} - 121.5 \text{ EW}) (45.956 \text{ LB/FT}^3)}{(12 \text{ EW/FT}) (144 \text{ IN}^2/\text{FT}^2)} = 12.2 \text{ PSIG}$$

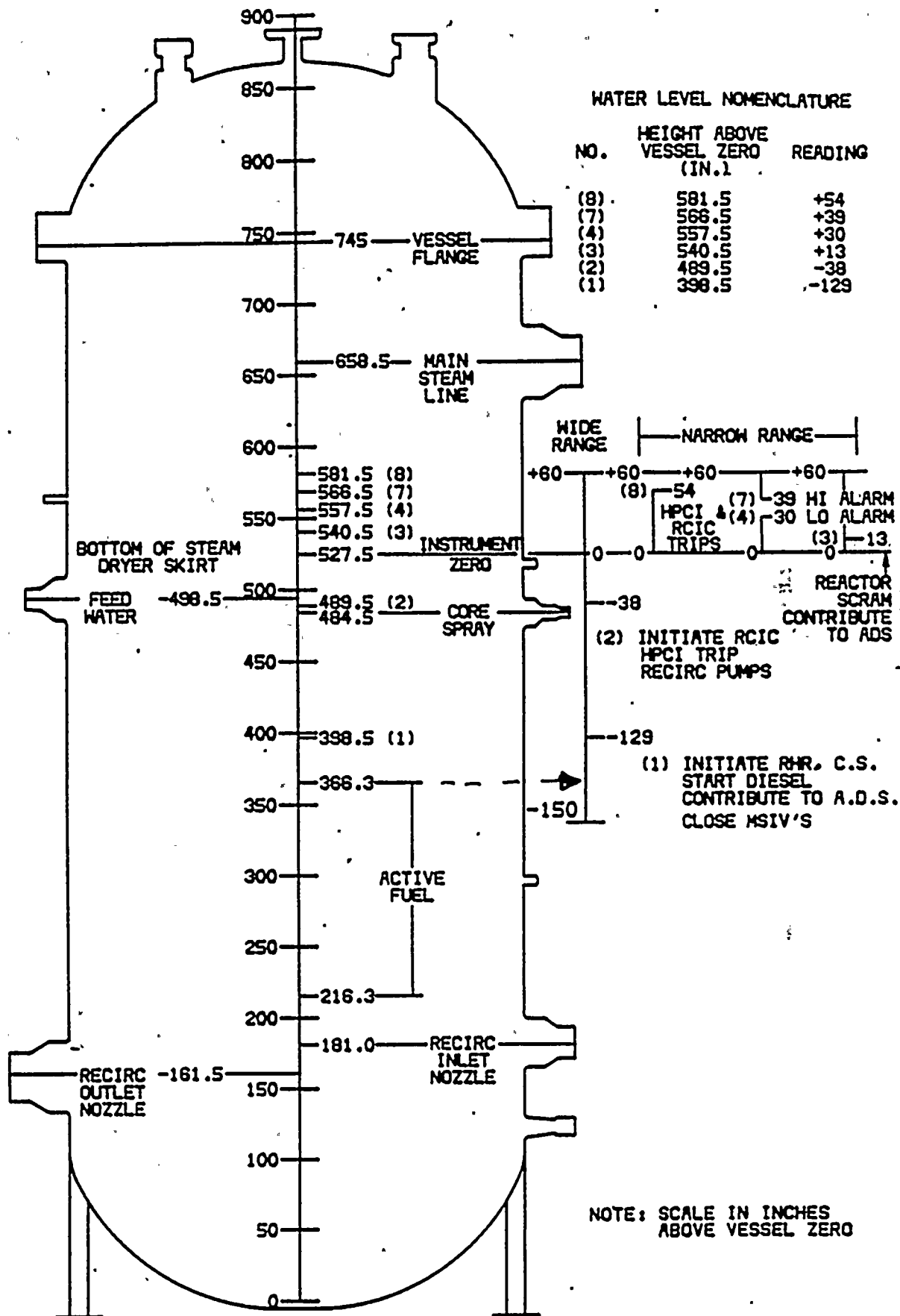
$$P_{STAR} (TOTAL) = 7.9 \text{ PSIG}$$

$$P_{ATWS} (MAX.) = 1076 \text{ PSIG} + 6 \text{ PSIG} + 185.9 \text{ PSIG} + 7.9 \text{ PSIG}$$
$$= 1275.8 \text{ PSIG} \approx 1276 \text{ PSIG}$$

APPROVERS NOTE:

THIS CALC IS BASED UPON OPERATOR COMPLIANCE WITH EMERGENCY OP. PROCEDURES (EOP EO-100-102) WHICH DIRECT HIM TO MAINTAIN LEVEL BELOW +54" AND PRESSURE BELOW 1076 PSIG.

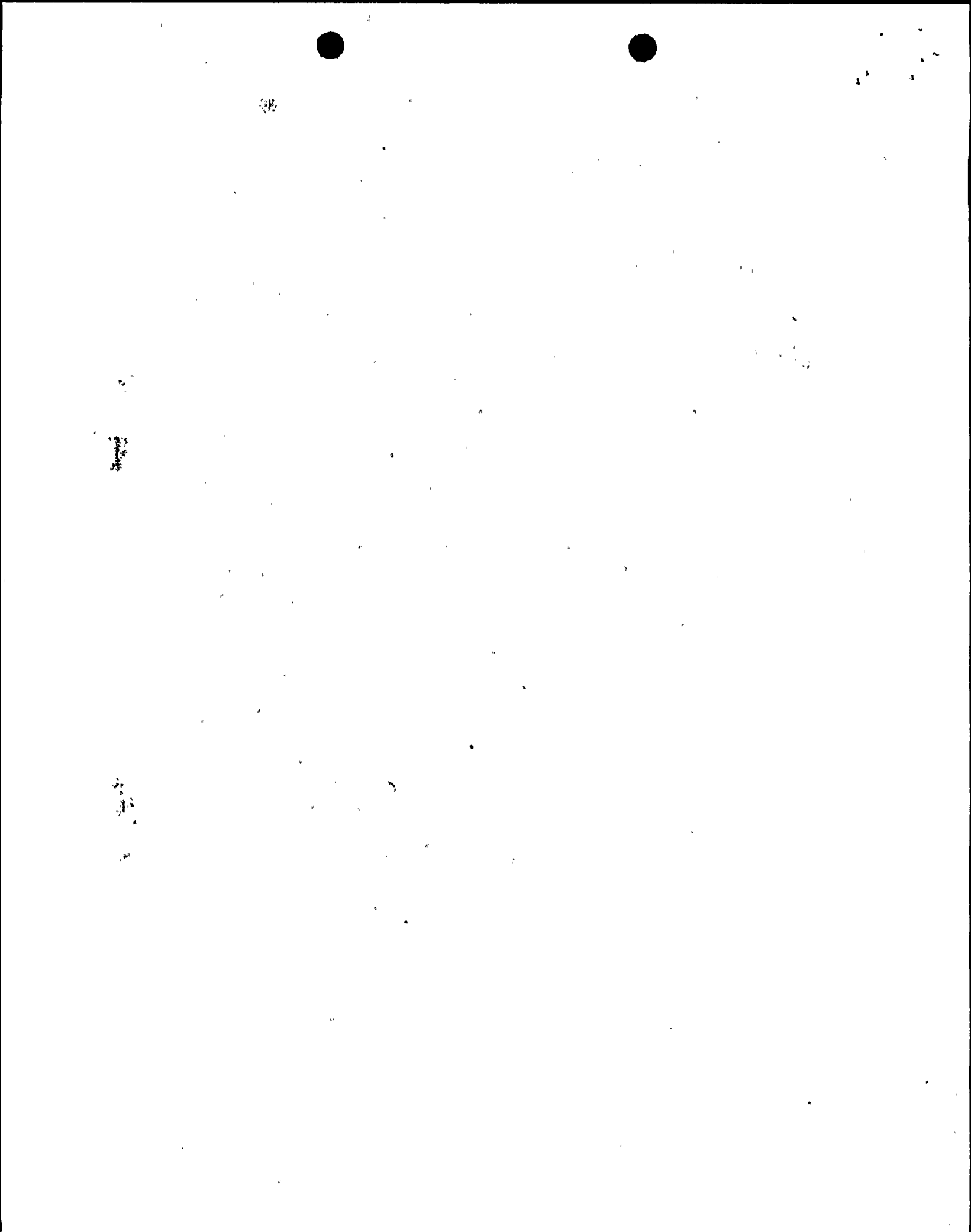
JWP 9/16/87.



732'4"

FIGURE 4
BASES FIGURE B 3/4 3-1
REACTOR VESSEL WATER LEVEL

A 400 SHT. 217 REV. 2 DATE 11/20/85



2 purps (A+B)

2 SQ (A+B)

12:05

... .. 09-13-97 12:05

POINT NO	DESCRIPTION	UNIT	SCALE	TYPE	UNIT	SCALE
PAR17	ARM-17-COND PUMP AREA	Y	0.01	NONE	NR/H	
PAR07	ARM-07-OFFERS B/F AREA	Y	0.01	NONE	NR/H	
PAR18	ARM-18-REFRT AREA	Y	0.08	NONE	NR/H	
PAR40	ARM-40-TURB BLDG ACCESS	Y	0.08	NONE	NR/H	
PAR19	ARM-19-AIR ELECTOR ROOM	Y	0.01	NONE	NR/H	
PAR01	ARM-19-FDWTG HEATER AREA	Y	0.01	NONE	NR/H	
PAR11	ARM-11-DECR HG SET AREA	Y	0.18	NONE	NR/H	
PAR27	ARM-17-TURB ACCESS ROUTE	Y	0.18	NONE	NR/H	
PAR24	ARM-14-TURBINE FRONT END	Y	0.08	NONE	NR/H	
PAR22	ARM-11-GEN B/F AREA	Y	0.18	NONE	NR/H	
PAR23	ARM-13-HVAC EQUIP ROOM	Y	0.01	NONE	NR/H	

NHT01	RHR INLET TEMP TO HX A	Y	120.5	NONE	NONE	DEG F	
NHT02	RHR INLET TEMP TO HX B	*Y	100.0	100.0	NONE	NONE	DEG F
NHT03	RHR HX DSCH LINE A	A	105.	NONE	NONE	DEG F	
NHT04	RHR HX DSCH LINE B	Y	101.	NONE	NONE	DEG F	
NBL01	RX LVL SHTOWN RANGE	Y	248.	NONE	NONE	INCHES	

09-13-97 12:01 55

M.S.L.C.00Y

Attachment 2

