PRESENTATION TO NRC ON MONTICELLO FEEDWATER NOZZLE MODIFICATION

AUGUST 4, 1981

PRESENTED BY:

-NORTHERN STATES POWER CO.
-NUTECH
-GENERAL ELECTRIC CO.
-NEWPORT NEWS INDUSTRIAL CORP.

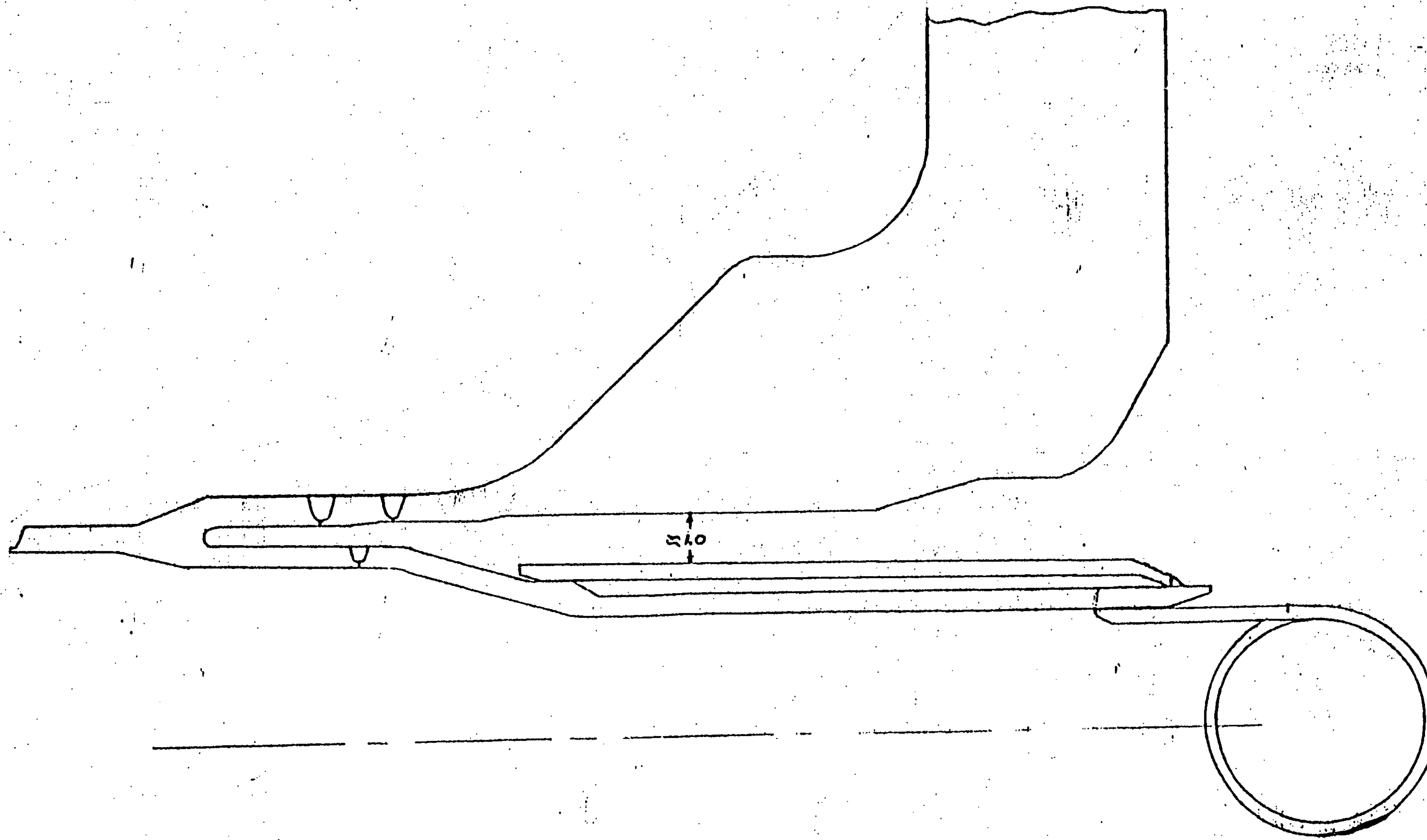
PURPOSE OF MEETING

- PROVIDE NRC STAFF WITH UPDATED STATUS OF MONTICELLO FEEDWATER NOZZLE PLANS FOR OCTOBER, 1981 OUTAGE

- ADDRESS NINE SPECIFIC TOPICS IN NRC REQUEST FOR ADDITIONAL INFORMATION

SEQUENCE OF EVENTS LEADING TO TODAY'S MEETING

FALL, 1977	-- CLAD REMOVED/INTERIM, SINGLE SLEEVE SPARGER INSTALLED -- NOT POSSIBLE TO MACHINE SAFE-END TO ACCEPT TRIPLE SLEEVE SPARGER
FALL, 1978	-- NUTECH LEAKAGE MONITORING SYSTEM INSTALLED -- LEAKAGE INDICATED IN 1 OR 2 SPARGERS
SEP., 1979 -MAR., 1980	-- GE CONDUCTED STUDY OF MONTICELLO SPARGER ALTERNATIVES
APR., 1980	-- NSP DECIDED ON NEW DESIGN CONCEPT -- INFORMALLY BRIEFED NRC -- PRESENTED TECHNICAL DETAILS + MOCKUP TO NRC
MAY, 1980	-- NRC CONCLUDED THAT PROPOSED MODIFICATION SHOULD PREVENT CRACK INITIATION AND GROWTH
DEC., 1980	-- NUREG-0619 ISSUED -- REQUIRED LICENSEE IMPLEMENTATION DATES
JAN., 1981	-- NSP RESPONSE TO NUREG-0619 -- GAVE PLANS & SCHEDULE FOR NEW SPARGER INSTALLATION -- COMMITMENT TO STUDY LOW FLOW CONTROLLER
FEB.-MAR. 1981	-- NRC REQUESTED ADDITIONAL INFORMATION



DESIGN CONCEPT SELECTED IN APRIL, 1980

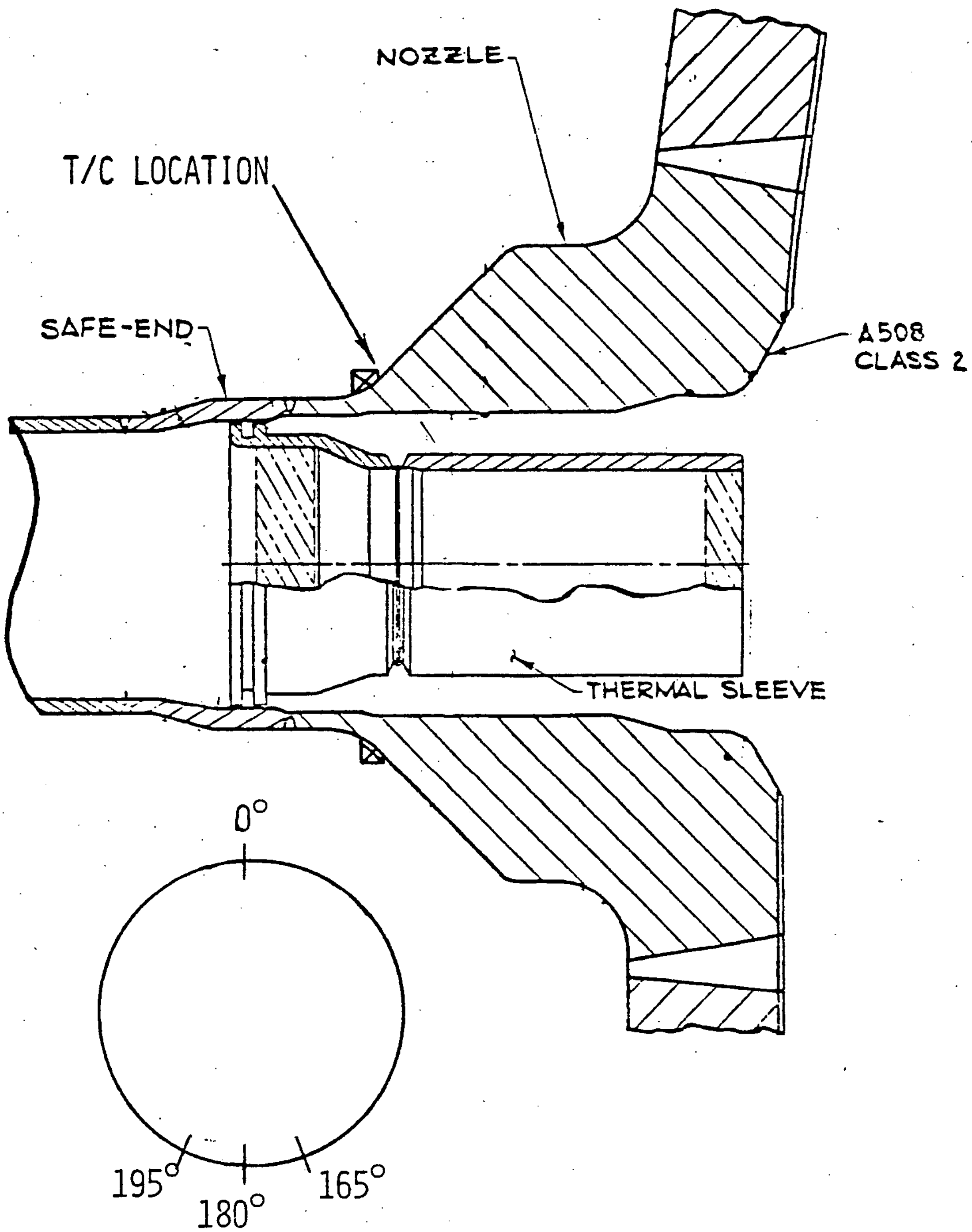
AGENDA

	PRESENTED BY	NRC* TOPIC NO.
• INTRODUCTION	NSP	
• PRESENT STATUS	NUTECH	I
• DESIGN	GE	II, III, VII, VIII
• INSTALLATION	NNI	IV, V, VI
• ALARA	NNI	V
• ISI PROGRAM	NUTECH	IX
• CONCLUSIONS	NSP	

* REFERS TO TOPICS IDENTIFIED IN NRC REQUEST FOR ADDITIONAL INFORMATION IN FEB/MARCH 1981

MONTICELLO FEEDWATER NOZZLE
PRESENT STATUS

- LEAKAGE MONITORING SYSTEM
- LEAKAGE HISTORY
- USAGE FACTOR STATUS
- SYSTEM & OPERATING PROCEDURE MODIFICATIONS



FW NOZZLE T/C LOCATION

FW NOZZLE THERMAL FATIGUE EVALUATION

- LEAKAGE PREDICTION

LEAKAGE RATE → $q = f\,(\Delta T_{T/B},\ Q)$

Q — FW FLOW RATE

$\Delta T_{T/B}$ — TOP-TO-BOTTOM TEMPERATURE DIFFERENTIAL

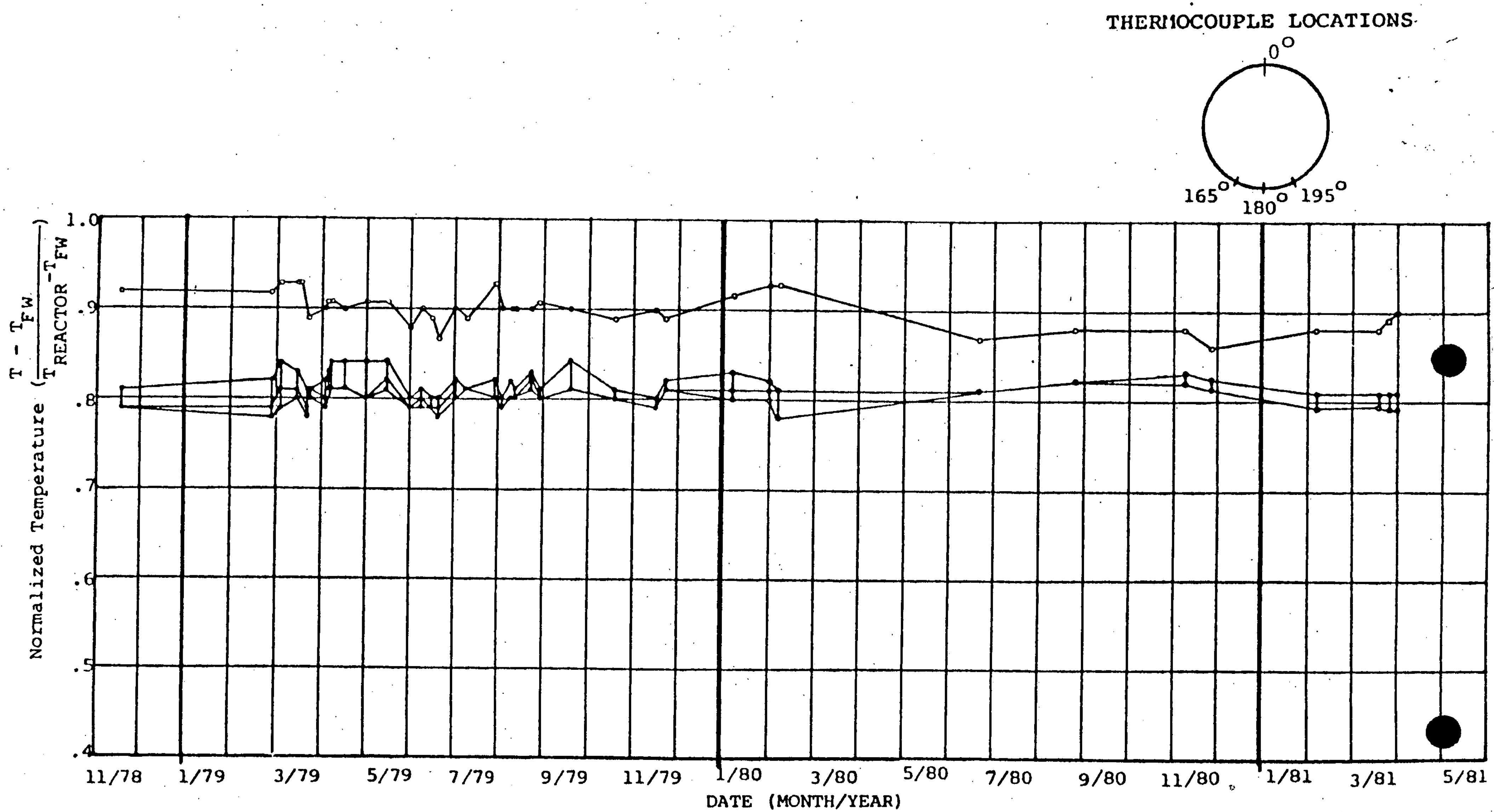
- METAL TEMPERATURE CYCLING

$$\Delta T_{p-p} = f(q,\ Q,\ \text{LOCATION})$$

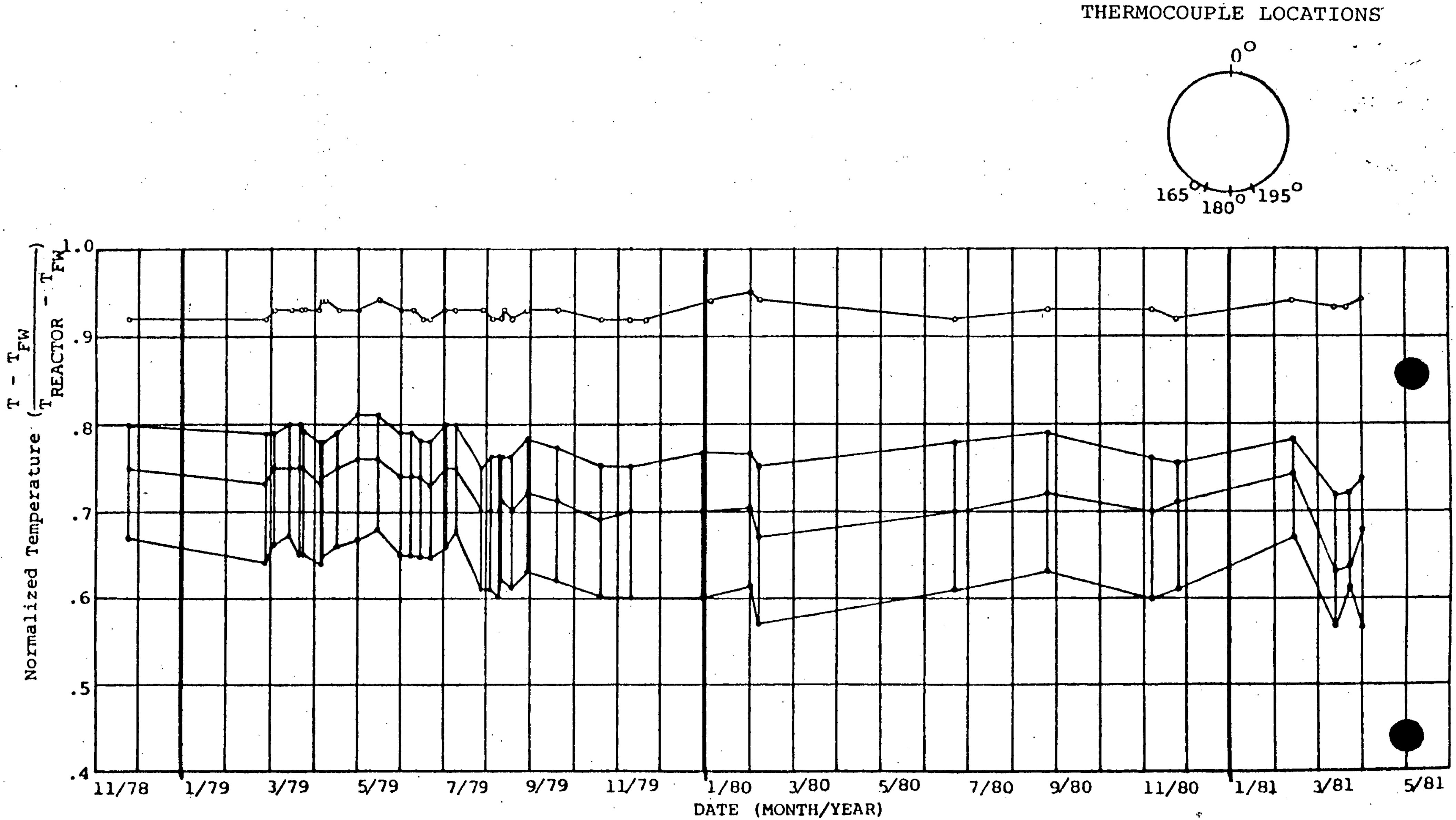
- FATIGUE USAGE FACTOR

$$U = \sum \frac{N_{\text{APPLIED}}}{N_{\text{ALLOWABLE}}} = f(\Delta T_{p-p},\ \text{FLOW MAP})$$

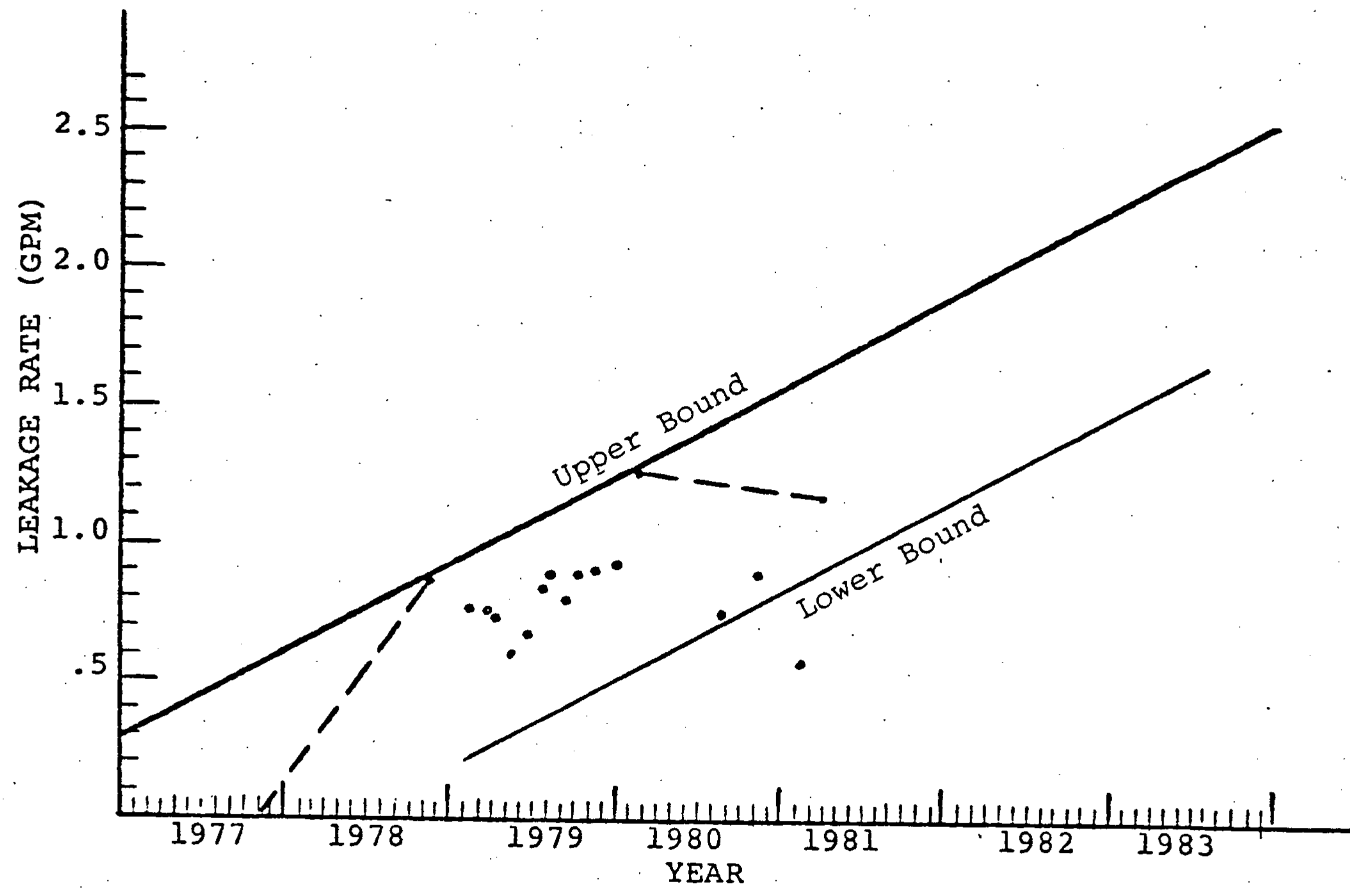
FLOW MAP ← SYSTEM & OPERATIONAL PROCEDURE



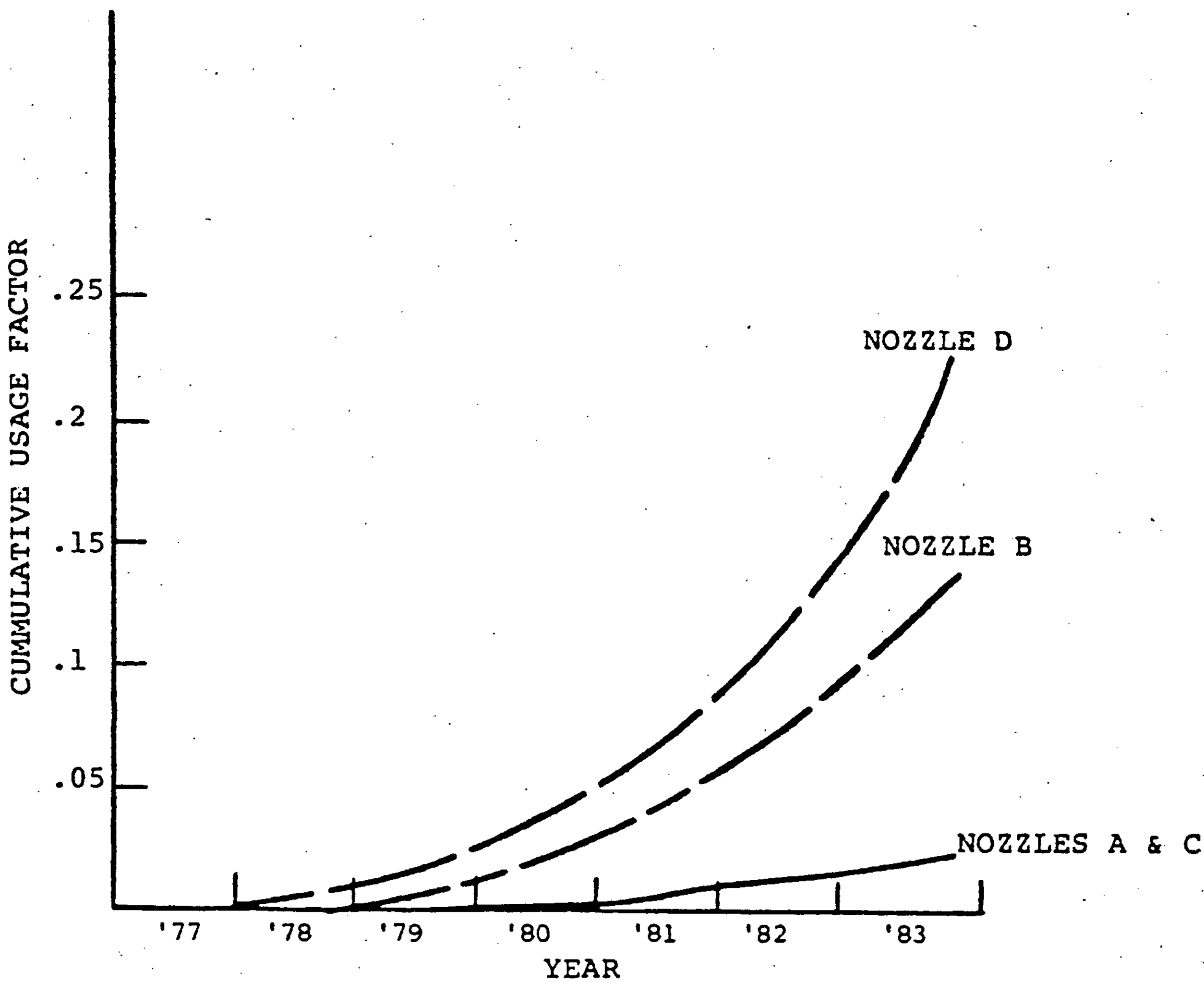
MONTICELLO FEEDWATER NOZZLE A FIELD DATA FROM THE LEAKAGE MONITORING SYSTEM VERSUS TIME (NON-LEAKING)



MONTICELLO FEEDWATER NOZZLE D FIELD DATA FROM THE LEAKAGE MONITORING SYSTEM VERSUS TIME (LEAKING)



LEAKAGE RATE VERSUS TIME CURVE FOR
FEEDWATER NOZZLE D



RAPID CYCLING CUMMULATIVE USAGE FACTOR VERSUS TIME

USAGE FACTOR STATUS

SYSTEM CYCLING

SAFEEND - .015 PER YEAR

BORE - .0055 PER YEAR

BLEND RADIUS REGION - .0045 PER YEAR

RAPID CYCLING

-DEPENDING ON LEAKAGE (BORE & BLEND RADIUS ONLY)

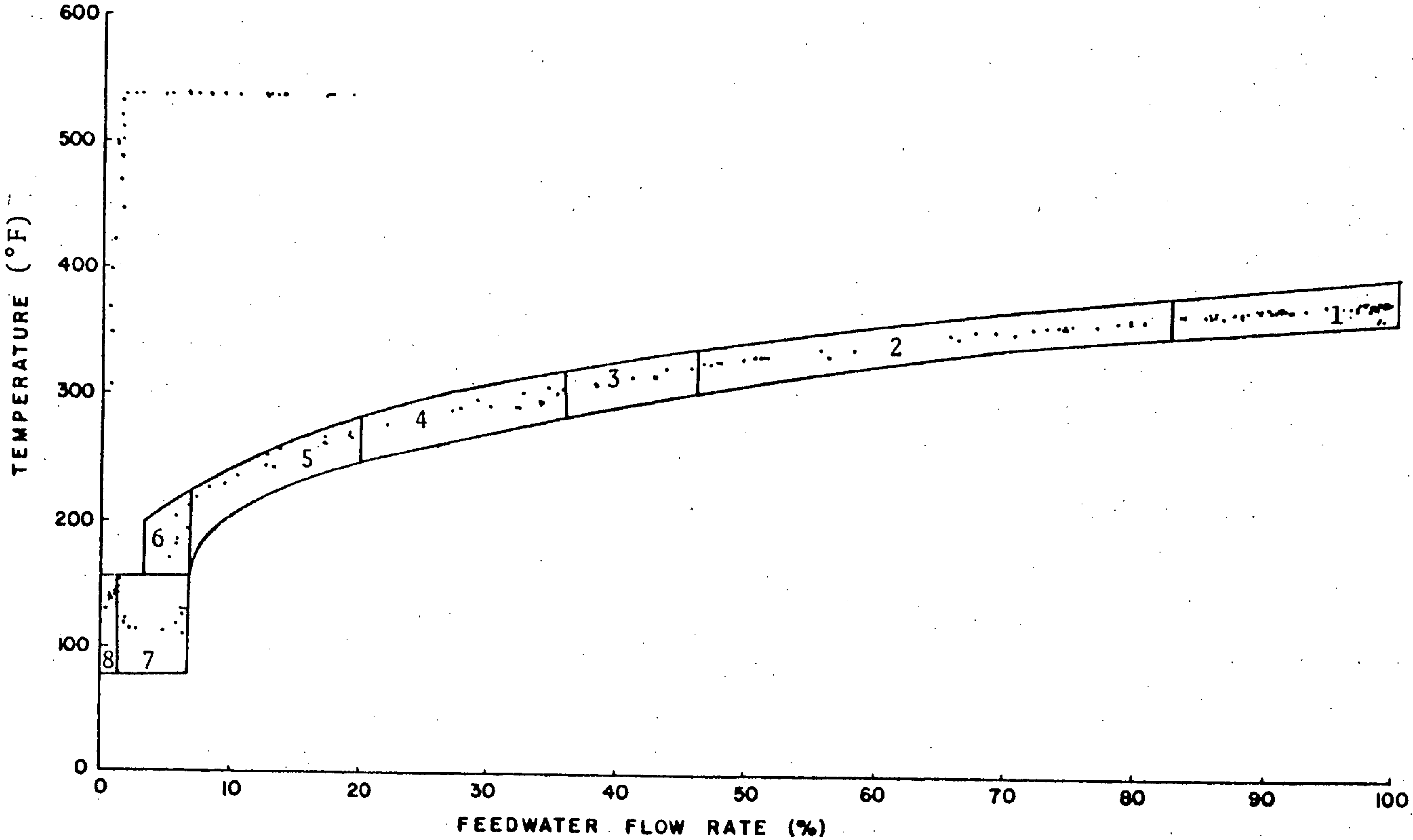
MAX. COMBINED FATIGUE USAGE FACTOR AT TIME OF MODIFICATION

UF = .102 (BORE REGION)

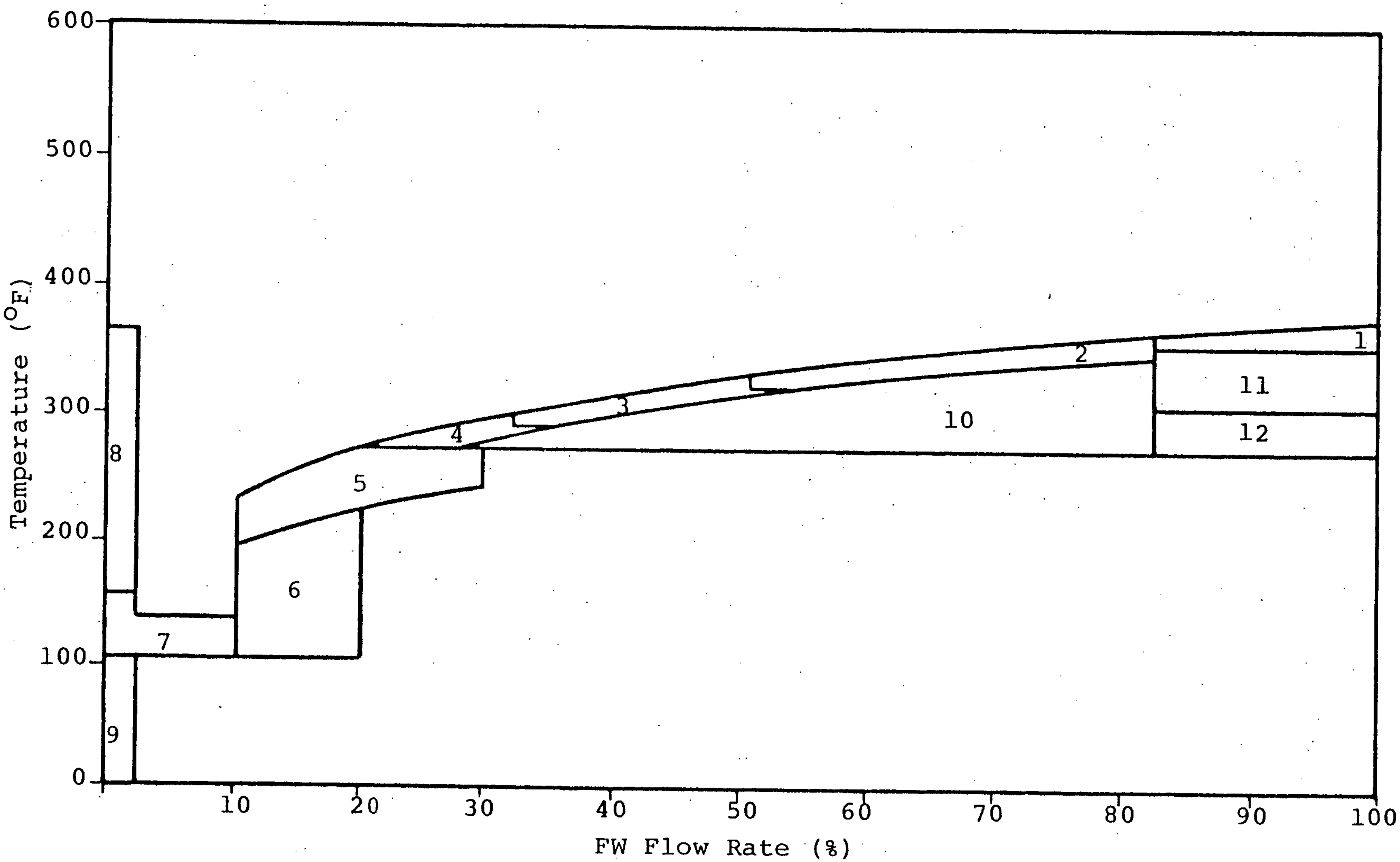
SYSTEMS & OPERATIONAL PROCEDURE

MODIFICATIONS

- FEEDWATER THERMAL DUTY MAP
- LOW FLOW CONTROLLER CHARACTERISTICS
- RWCU REROUTE
- MINIMIZE STEAM FLOW DURING STARTUP
- MAXIMIZE HEAT UP RATE DURING STARTUP



MONTICELLO REACTOR AND FEEDWATER TEMPERATURE DATA
OBTAINED FROM REVIEW OF PLANT OPERATING RECORDS



GE TYPICAL FEEDWATER THERMAL DUTY MAP

MONTICELLO FEEDWATER
LOW FLOW CONTROLLER CHARACTERISTICS

- IMPROVEMENTS IMPLEMENTED

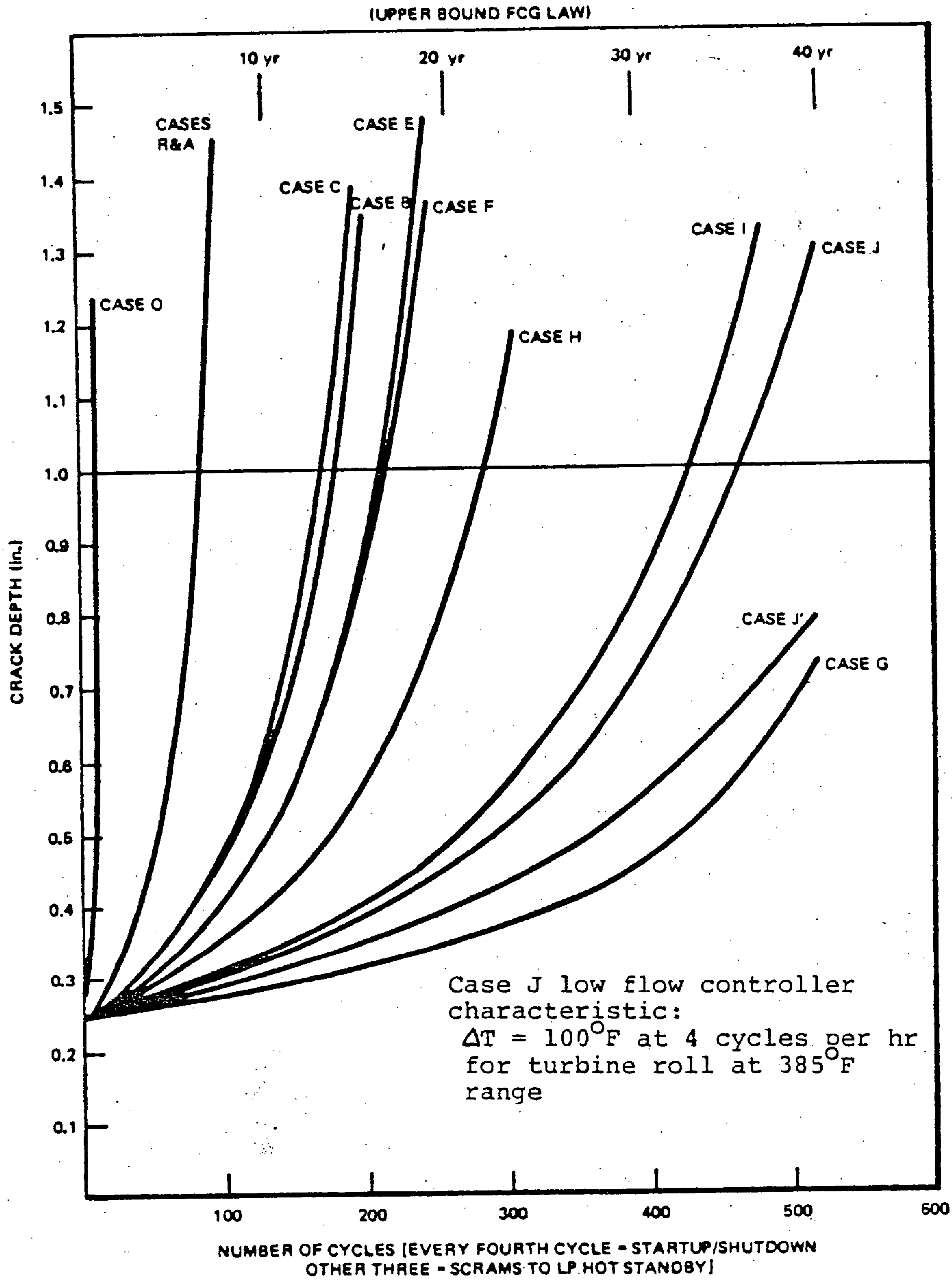
  ~1974 -- AUTOMATIC LEVEL CONTROL CAPABILITY ADDED
  ~1978 -- CONVENTIONAL PLUG VALVE REPLACED BY DRAG VALVE

- COMPARISON TO NUREG -0619/GE RECOMMENDED LOW FLOW CONTROLLER CHARACTERISTICS:

  - GE REFERENCE CRACK GROWTH ANALYSIS (CASE J)
    - ONE "TURBINE ROLL" CYCLE WITH ΔT = 385°F
    - FLOW MODULATION CYCLING WITH ΔT = 100°F AND FREQUENCY = 4 CYCLES/HOUR

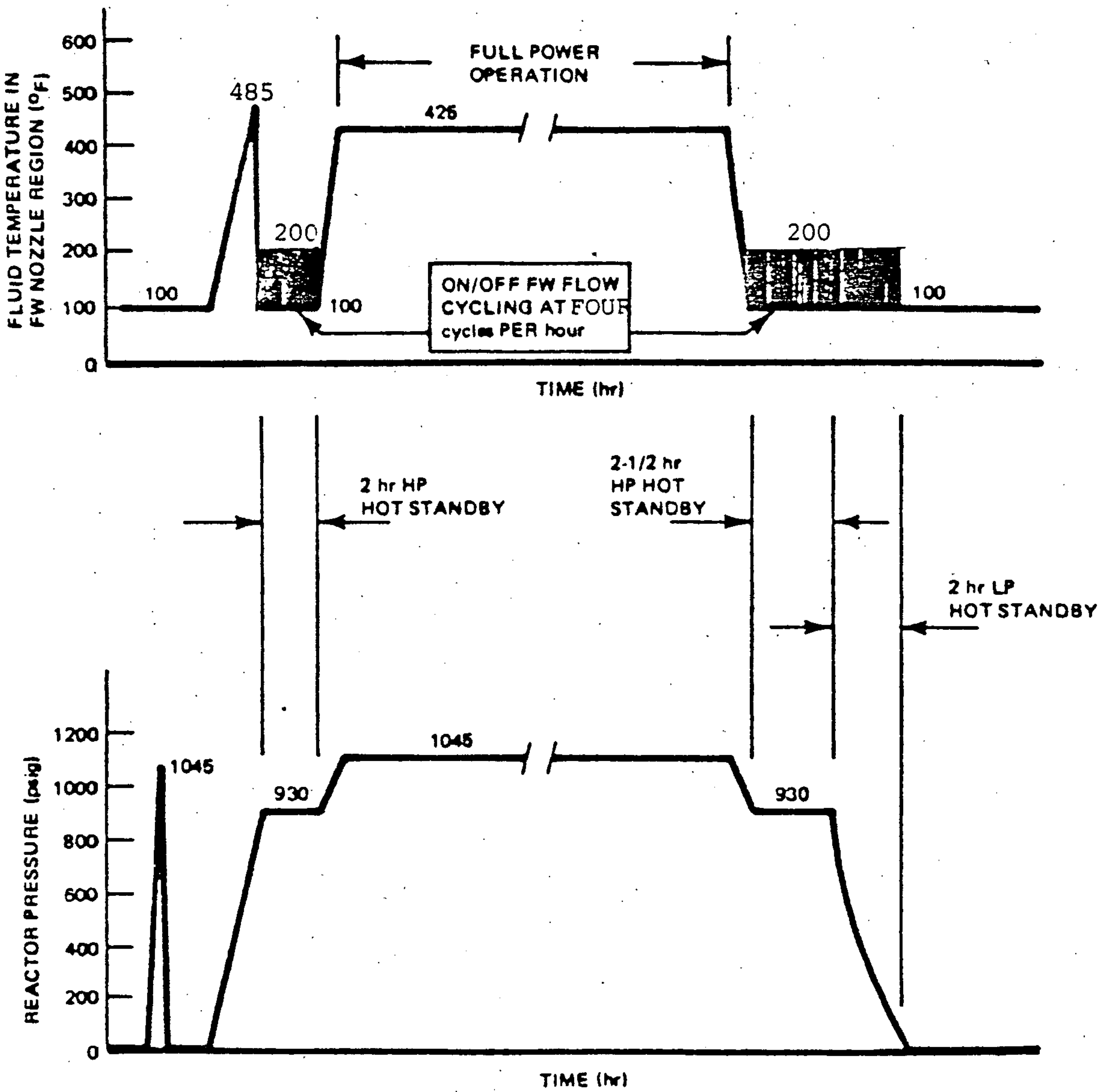
  - OBSERVED LOW FLOW CONTROLLER CYCLING AT MONTICELLO
    - ONE LARGE CYCLE PER STARTUP (ΔT = 385°F)
    - FLOW MODULATION CYCLING AVERAGE ΔT = 100°F AND FREQUENCY = 1.5 CYCLES/HOUR

- <u>CONCLUSION</u> -- EXISTING LOW FLOW CONTROLLER AT MONTICELLO MEETS NUREG- 0619/GENERIC LETTER 81-11 CRACK GROWTH REQUIREMENTS

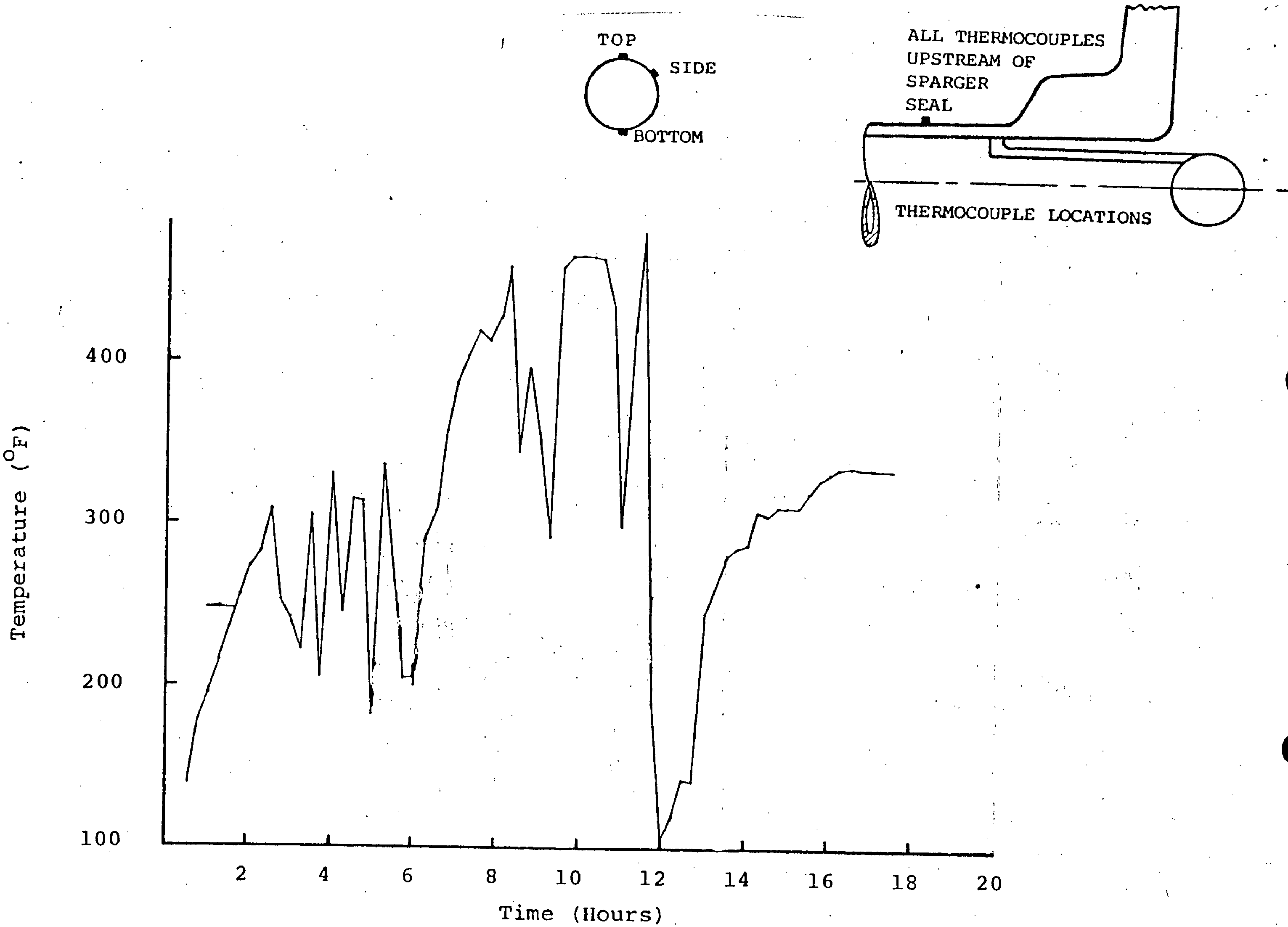


IMPROVED LOW FLOW CONTROLLER PARAMETRIC

CRACK GROWTH RESULTS FROM NEDE - 21821-A



STARTUP/SHUTDOWN CYCLES FOR CASE J
IN NEDE-21821-A CRACK GROWTH ANALYSIS

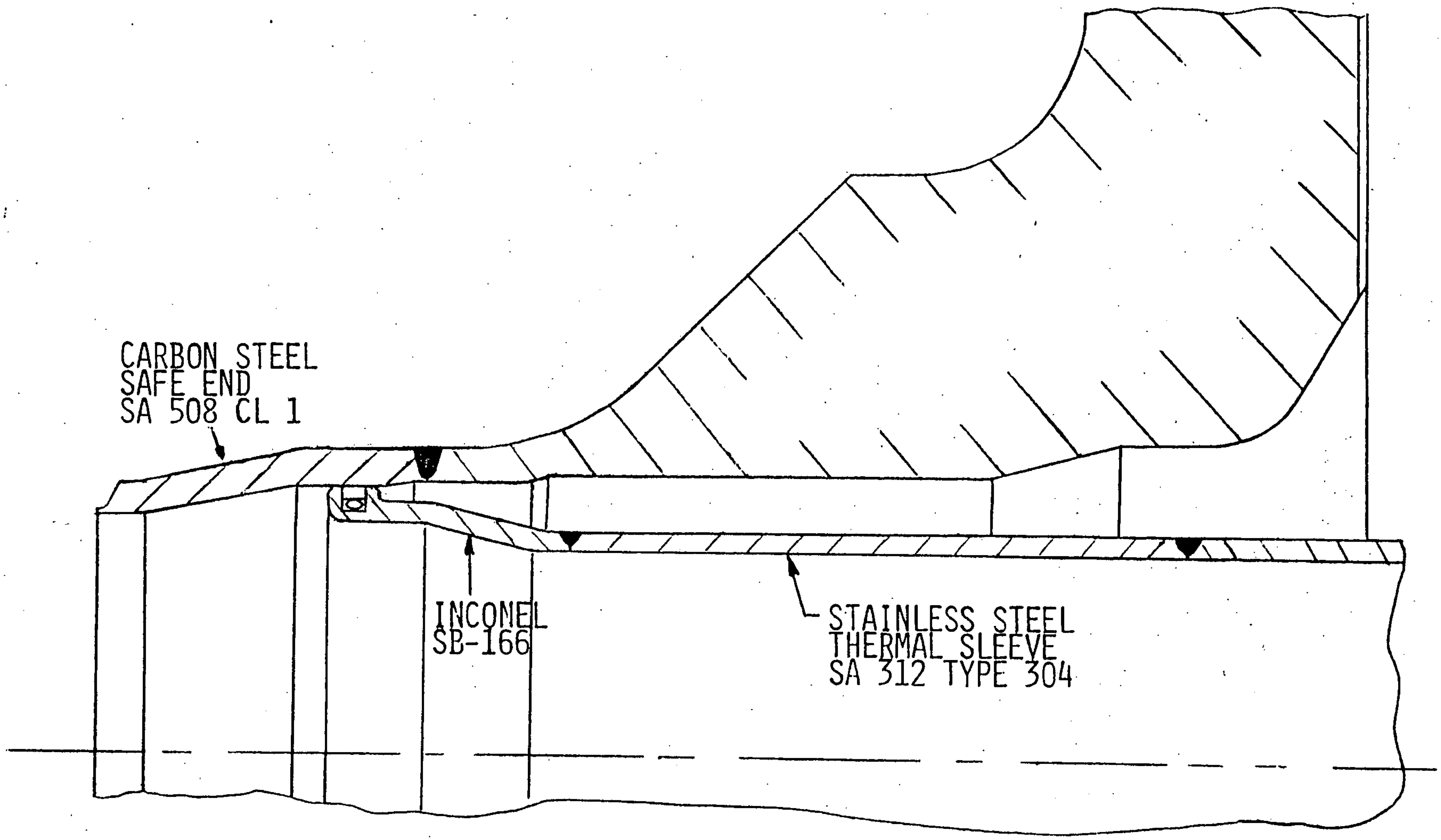


AVERAGE FEEDWATER TEMPERATURE VS
TIME FOR MAY 1980 STARTUP CYCLE

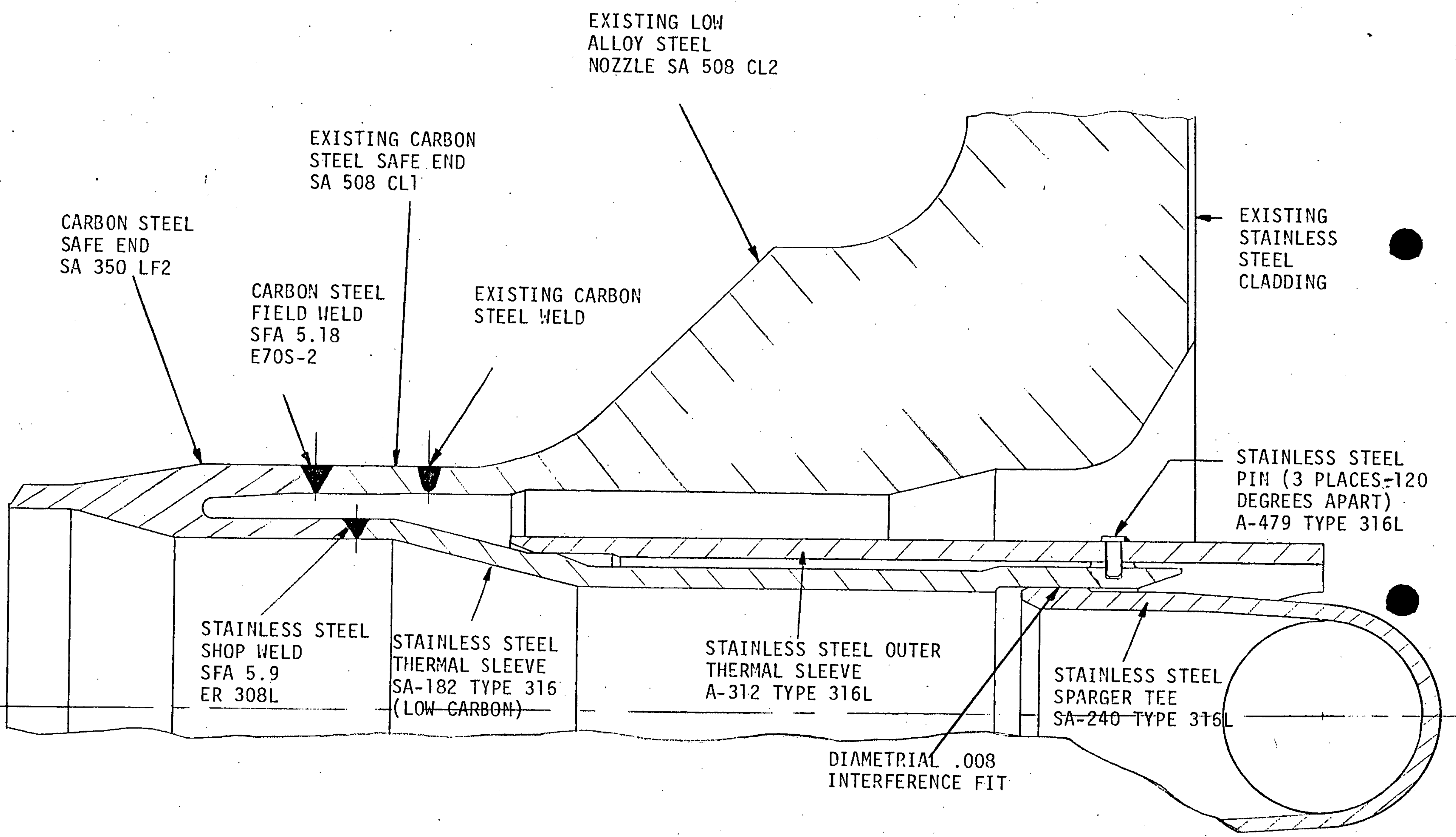
DESIGN

- o CONFIGURATION
- o DESIGN FEATURES
- o DESIGN CRITERIA
- o MATERIALS OF CONSTRUCTION
- o SUMMARY OF ANALYSIS RESULTS
- o THERMAL HYDRAULICS
- o VIBRATION AND CRACK GROWTH

GAD



EXISTING MONTICELLO FEEDWATER NOZZLE



MONTICELLO REPLACEMENT SAFE END AND

THERMAL SLEEVE DESIGN

GAD

DESIGN FEATURES

- o DOUBLE THERMAL SLEEVE PROVIDES ENHANCED THERMAL PROTECTION TO NOZZLE
- o WELDED SAFE END DESIGN ELIMINATES LEAKAGE ON THE NOZZLE BORE
- o REMOVEABLE SPARGER AND OUTER THERMAL SLEEVE PROVIDES ACCESS TO THE NOZZLE INNER BLEND RADIUS AND CRITICAL BORE AREAS FOR INSPECTION
- o EXTENDED OUTER THERMAL SLEEVE DIRECTS ANY LEAKAGE FLOW AT THE INTERFERENCE FIT AWAY FROM THE NOZZLE INNER BLEND RADIUS
- o NO SERVICING REQUIRED SINCE PERFORMANCE IS NOT AFFECTED BY CORROSION RATES OR WEAR ON COMPONENTS
- o THERMAL SLEEVE TO SAFE END WELD IS NOT ON PRESSURE BOUNDARY
- o THERMAL SLEEVE TO SAFE END WELD IS A FULL PENETRATION SHOP WELD WHICH HAS BEEN INSPECTED FROM BOTH SIDES OF THE WELD
- o NO BI-METALLIC WELDS ON THE PRIMARY PRESSURE BOUNDARY
- o PRESSURE BOUNDARY WELDS HAVE ACCESS FOR NON-DESTRUCTIVE EXAMINATIONS
- o SPARGER HAS TOP MOUNTED NOZZLES

GAD

DESIGN CRITERIA

- o REPLACEMENT SAFE END AND THERMAL SLEEVE FURNISHED AS AN ASME SECTION III, CLASS 1 PART USING THE 1977 EDITION WITH ADDENDA TO AN INCLUDING SUMMER 1978 (CODE CASE 1804 INCORPORATED INTO THIS CODE)

- o REACTION LOADS FROM FEEDWATER PIPE STRESS ANALYSIS WERE SPECIFIED FOR THE REPLACEMENT SAFE END DESIGN

- o MECHANICAL LOADS FOR A WELDED THERMAL SLEEVE ATTACHMENT WERE SPECIFIED FOR THE REPLACEMENT SAFE END DESIGN

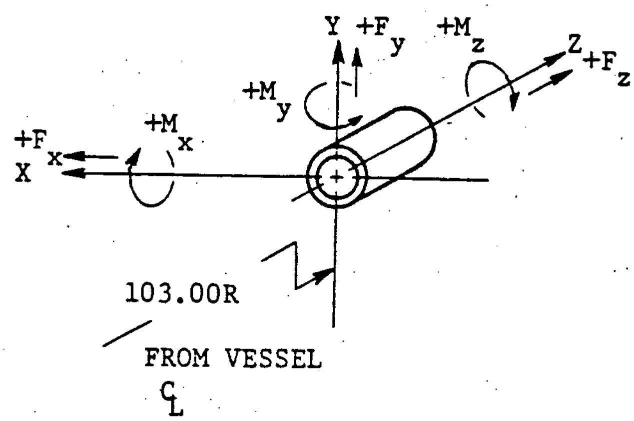
- o SYSTEM THERMAL CYCLING FROM ORIGINAL FEEDWATER NOZZLE DESIGN WAS SPECIFIED

- o GENERIC FORMULAS DEVELOPED BY GE FOR RAPID CYCLING WITH MODIFICATIONS TO ACCOUNT FOR UNIQUE DESIGN FEATURES AND PLANT OPERATING CONDITIONS WERE SPECIFIED

- o SYSTEM AND RAPID CYCLING FATIGUE USAGE REQUIRED TO BE COMBINED WITH THE ACCUMULATED NOZZLE FATIGUE USAGE AND MEET THE ASME LIMIT OF 1.0

- o REPLACEMENT SPARGER DESIGNED IN ACCORDANCE WITH GE DESIGN CRITERIA ESTABLISHED FOR GENERIC SPARGER REPLACEMENTS

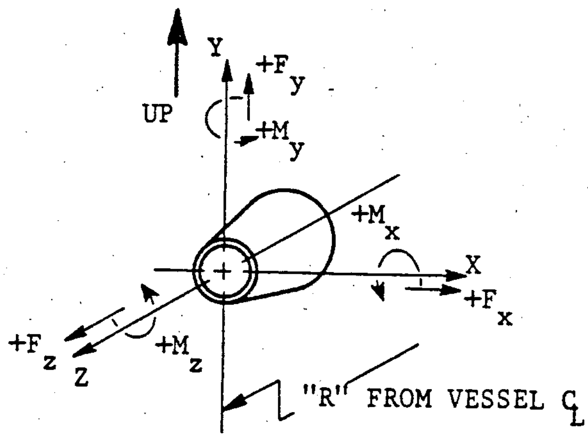
- o DESIGN SOFTWARE WAS PRODUCED IN ACCORDANCE WITH Q.A. PROGRAM WHICH MEETS REQUIREMENTS OF 10CFR50



NOZZLE THERMAL SLEEVE LOADINGS*

	F_x	F_y	F_z	M_x	M_y	M_z
Dead Weight	0	-.3	-.5	-1.2	0	0
Thermal (RFE)	0	0	-1.2	0	0	0
Hydraulic	0	0	-2.5	0	0	0
Seismic	± 2.5	± .3	± 1.5	± 1.2	± 2.0	0

* Design Mechanical Loads are to be taken as the sum of the hydraulic, seismic, and dead weight loads.



LOADING FROM ATTACHED PIPE

Nozzle	Loads	Kips			In-Kips			
		F_x	F_y	F_z	M_x	M_y	M_z	R
Nozzle A and B	Design Mechanical	2.54	3.15	2.28	387.6	172.9	324.6	131.6
Nozzle 'A' (operating loads)	Dead Weight	-.11	-.63	.15	11.6	-14.1	-11.1	131.6
	Seismic	± .29	± 2.51	± 2.23	± 9.3	± 158.9	± 313.4	131.6
	Thermal	.02	.16	-.21	-12.0	12.1	-45.0	131.6
Nozzle 'B' (operating loads)	Dead Weight	-.07	.18	-.04	-7.0	-2.1	-7.3	131.6
	Seismic	± 2.44	± 1.97	± .26	± 376.0	± 106.3	± 10.6	131.6
	Thermal	.82	-4.34	1.37	267.2	66.7	1.4	131.6

MATERIALS

o SUMMARY OF MATERIALS USED FOR CONSTRUCTION

COMPONENT	MATERIAL
SAFE END ASSEMBLY	
SAFE END	ASME SA-350 LF2
THERMAL SLEEVE	ASME SA-182 TYPE F316 (LOW CARBON)
SPARGER ASSEMBLY	
HEADER PIPE	ASME/ASTM SA-312 TYPE 316L
ADAPTER	ASME SA-479 TYPE 316L
EXTENSION PIPE	ASME SA-312 TYPE 316L
ORIFICE	ASME SA-479 TYPE 316L
ELBOW	ASTM A-403 TYPE WP316L
TEE	ASME SA-240 TYPE 316L
END PLATE	ASME SA-182 TYPE 316L
LIFTING LUG	ASME/ASTM SA-479 TYPE 316L
OUTER THERMAL SLEEVE	ASTM A-312 TYPE 316L
5/8" SQUARE PIN	ASTM A-479 TYPE 316L
END BRACKET	ASME SA-351 GRADE CF3
END PIN	ASTM A479 TYPE 316L
STOP	ASTM A479 TYPE 316L
STAINLESS STEEL FILLER METAL	SFA 5.9 ER308L
CARBON STEEL FILLER METAL	SFA 5.18 E70S-3

GAD

MATERIALS (CONTINUED)

- THE CORROSION ALLOWANCES FOR DESIGN OF THE CARBON STEEL SAFE END WERE .06 FOR INTERNAL SURFACES IN CONTACT WITH REACTOR WATER, AND .03 FOR EXTERNAL SURFACES. FOR STAINLESS STEEL .003 INCHES WAS USED.

- GENERAL CORROSION RATES FOR CARBON STEEL AND STAINLESS STEEL ARE WELL ESTABLISHED FOR THE BWR ENVIRONMENT. THERE IS NO APPRECIABLE DIFFERENCE IN RATES FOR BASE METAL, WELD METAL OR WELD HEAT AFFECTED ZONES.

- ALTHOUGH NOT REQUIRED, THE SPARGER MATERIALS WERE PURCHASED AND FABRICATED UNDER A Q.A. PROGRAM WHICH MEETS THE REQUIREMENTS OF 10CFR50.

- REPLACEMENT SAFE ENDS WERE FABRICATED AS A SAFETY ESSENTIAL COMPONENT UNDER Q.A. PROGRAM WHICH MEETS THE REQUIREMENTS OF 10CFR50.

MEASURES TAKEN TO PREVENT IGSCC

- ALL WROUGHT STAINLESS STEEL IS TYPE 316 OR 316L WITH THE FOLLOWING ADDITIONAL CONTROLS:
  - CHEMISTRY CONTROL (<0.02% CARBON)
  - SOLUTION HEAT TREATMENT CONTROL
  - EXAMINATION FOR INTERGRANULAR ATTACK
  - TESTING FOR SENSITIZATION
  - HARDNESS CONTROL
- STAINLESS STEEL WELD FILLER METAL IS TYPE 308L WITH FERRITE CONTROLLED
- FABRICATION CONTROLS
  - WELD HEAT INPUT CONTROLLED
  - COLD DEFORMATION LIMITED
  - PROCESSING MATERIALS CONTROLLED
  - CREVICES AT WELDS ELIMINATED IN DESIGN
- IGSCC IN CARBON STEEL BASE MATERIAL AND WELD METAL HAS NOT BEEN OBSERVED IN THE FIELD OR IN THE LABORATORY

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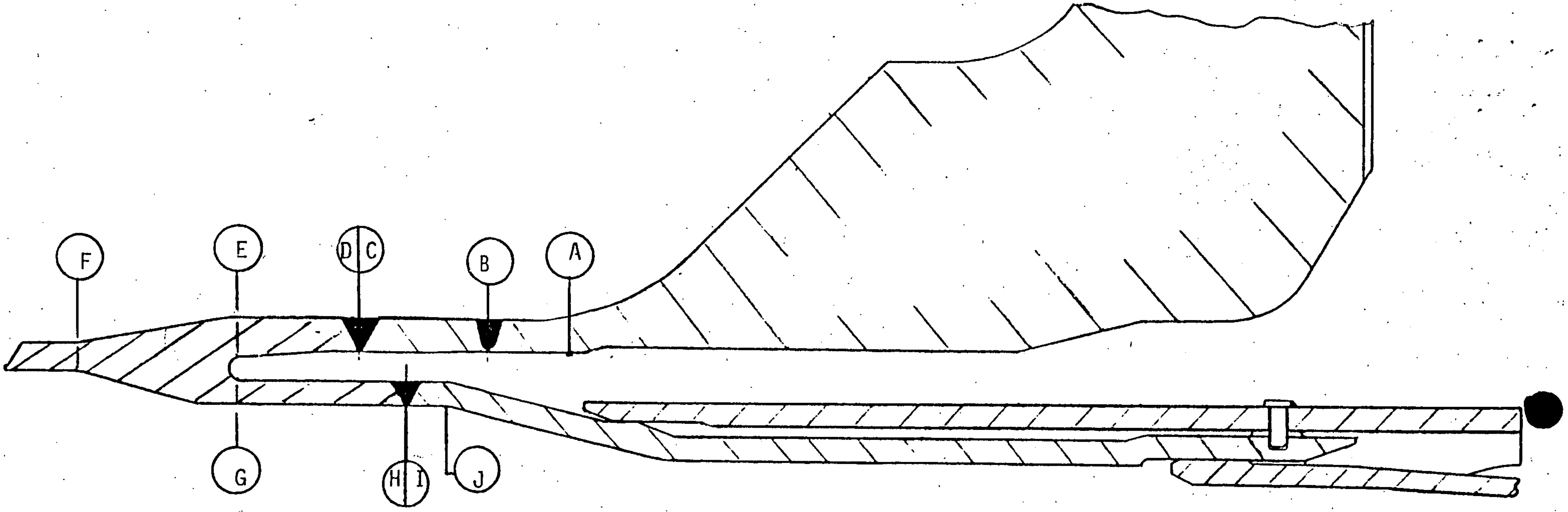


STRESS CATEGORY	COMPONENT	MAX.STRESS (KSI)	ALLOWABLE (KSI)	LOCATION
PRIMARY MEMBRANE (PM) SERVICE LEVEL C	EXISTING NOZZLE	15.46	42.60	A
	EXISTING SAFE END	15.46	27.10	B&C
	SAFE END	15.46	27.85	D&E
	THERMAL SLEEVE	3.16	19.2	I&J
PRIMARY MEMBRANE PLUS BENDING (PM+B) SERVICE LEVEL C	EXISTING NOZZLE	27.73	63.90	A
	EXISTING SAFE END	27.65	40.65	B
	SAFE END	33.28	41.77	F
	THERMAL SLEEVE	17.18	28.80	I
PRIMARY PLUS SECONDARY (P+Q) SERVICE LEVEL A&B	EXISTING NOZZLE	32.22	80.1	B
	EXISTING SAFE END	39.27	54.3	C
	SAFE END	45.42*	55.8	H
	THERMAL SLEEVE	33.19*	48.0	I
FATIGUE USAGE	EXISTING NOZZLE	.2458**	1.0	B
	EXISTING SAFE END	.2810	1.0	C
	SAFE END	.4100	1.0	H
	THERMAL SLEEVE	.2007	1.0	I

* VALUE SHOWN IS WITH THERMAL BENDING REMOVED

**FATIGUE USAGE ON MACHINED NOZZLE BORE & BLEND RADIUS LESS THAN VALUE SHOWN.

GAD

THERMAL/HYDRAULICS

- EXCEPT FOR THE SINGLE THERMAL SLEEVE REGION OF THE NEW SAFE END, THE REPLACEMENT DESIGN IS ESSENTIALLY IDENTICAL TO THE GE DOUBLE PISTON RING DESIGN FROM A THERMAL HYDRAULIC VIEWPOINT.

- SAFE END THERMAL STRESSES ARE LOWER WHEN A SINGLE THERMAL SLEEVE JOINS TO THE SAFE END.

- THE THERMAL SLEEVE TO NOZZLE ANNULUS FLUID TEMPERATURES USED IN THE THERMAL ANALYSIS WERE ADJUSTED USING EXISTING GE THERMAL DATA TO CORRECT FOR THERMAL VARIATIONS FROM THE SINGLE SLEEVE REGION.

- GE FEEDWATER THERMAL TEST DATA BASE WAS UTILIZED TO DEMONSTRATE ACCEPTABILITY OF REPLACEMENT DESIGN.

- IN-VESSEL THERMAL MONITORING AT DUANE ARNOLD (SIMILAR DESIGN) ON THE NOZZLE INNER BLEND RADIUS DEMONSTRATED THAT FATIGUE USAGE FROM RAPID CYCLING WAS LOW.

- EROSION CAUSED BY HYDRAULIC FLOW WILL BE INSIGNIFICANT SINCE FLOW VELOCITIES AT ALL LOCATIONS ARE LESS THAN 50 FT/SEC.

GAD

VIBRATION

- EXISTING G.E. VIBRATIONAL TEST DATA IS REPRESENTATIVE OF THE MONTICELLO REPLACEMENT SPARGER DESIGN.
- VIBRATION TESTING OF DUANE ARNOLD DESIGN (SIMILAR THERMAL SLEEVE/SPARGER INTERFACE) DEMONSTRATED THAT FLOW INDUCED VIBRATION WILL NOT OCCUR UNTIL A RADIAL GAP IN EXCESS OF .015 INCHES IS PRESENT.
- SINCE THE REPLACEMENT SPARGER HEADER IS THE SAME SIZE AS THE EXISTING SPARGER, DOWNCOMER FLOW INDUCED VIBRATION WILL NOT BE A PROBLEM.
- IN GENERAL, GE VIBRATION TESTING WHERE A TIGHT THERMAL SLEEVE GAP WAS MAINTAINED HAS FOUND EXTREMELY LOW VIBRATION LEVELS WHICH ARE WELL BELOW THE GE DESIGN CRITERIA.

VIBRATION/CRACK GROWTH ANALYSIS SUMMARY

- LOCATION - SAFE END TO THERMAL SLEEVE DISSIMILAR METAL WELD (CARBON STEEL & STAINLESS STEEL)

- LOADING - PRESSURE, THERMAL, EXTERNAL LOADS, RESIDUAL AND VIBRATORY

- FATIGUE CRACK GROWTH LAW
  - CARBON STEEL - ASME SECT. XI, APP. A
  - STAINLESS STEEL - ASTM STP513, POOK.

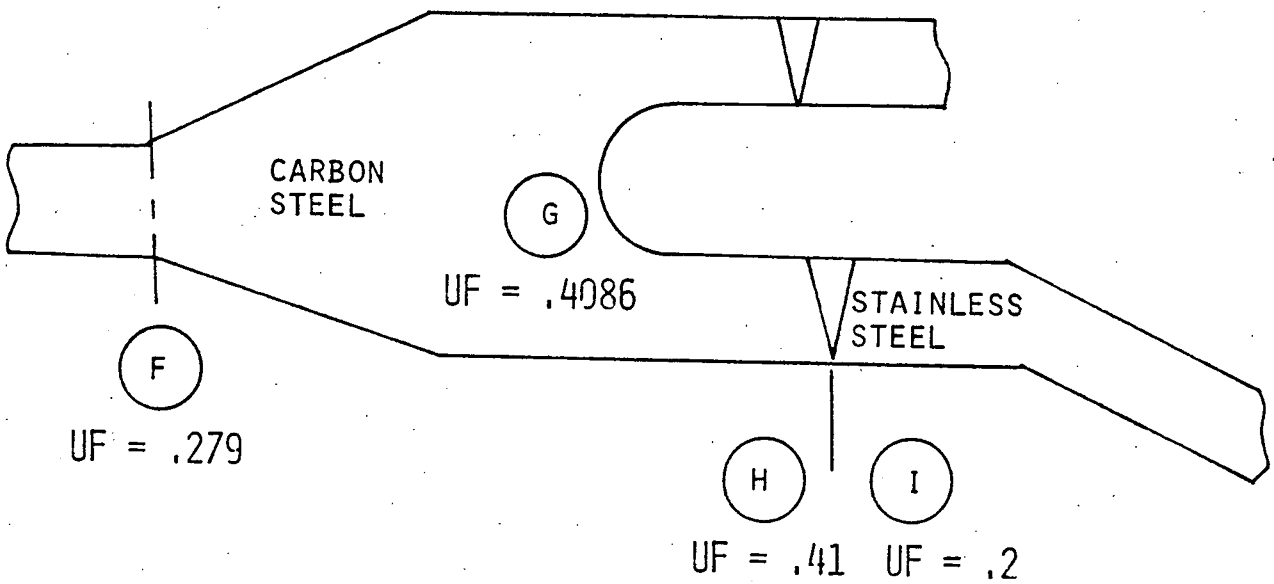
- ANALYTICAL MODEL - CIRCUMFERENTIAL CRACK IN A CYLINDER (INITIAL CRACK SIZE = .1t)

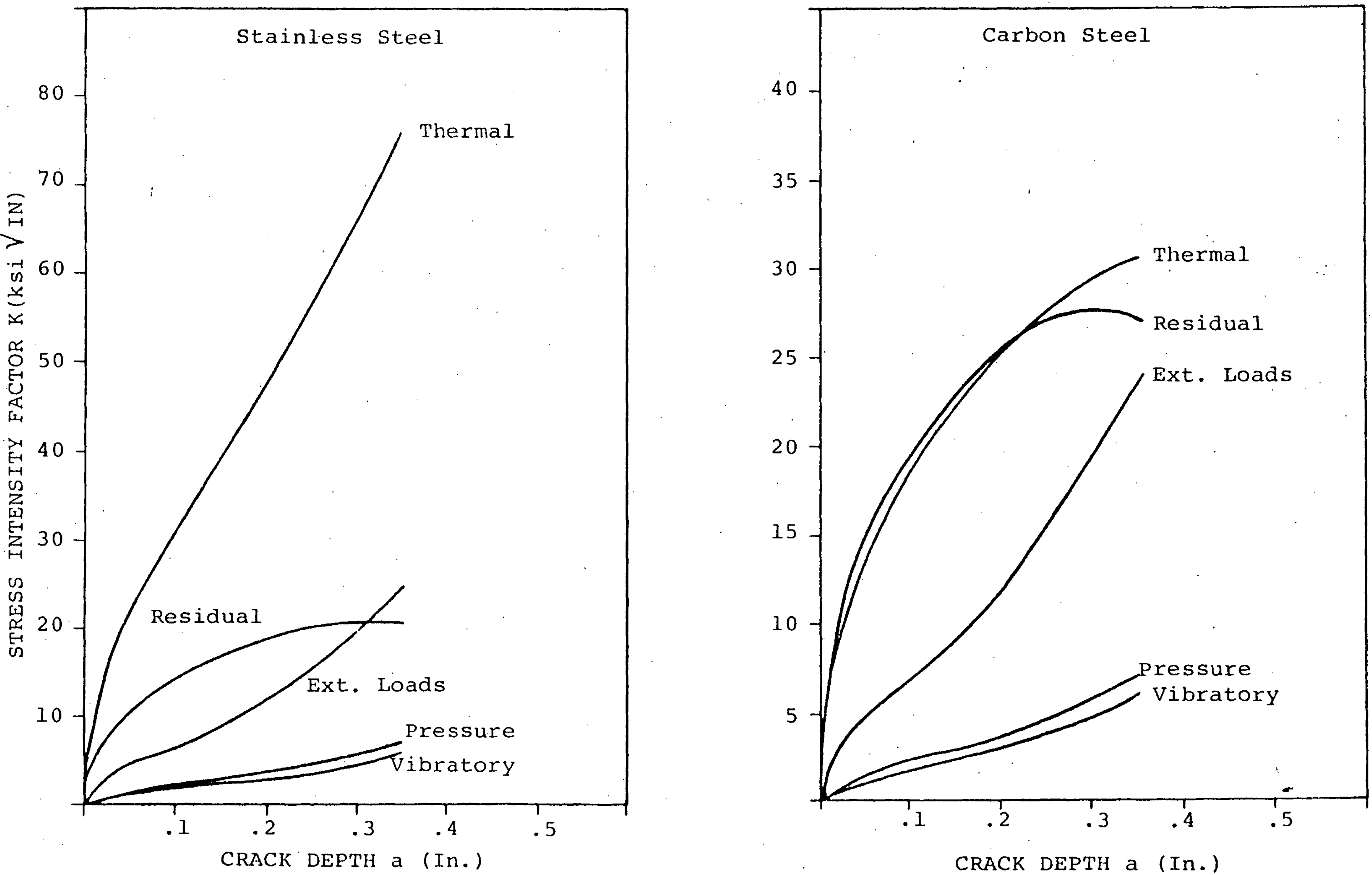
- LOADING CYCLES - CONSISTENT W/GE USAGE FACTOR CALCS.

- VIBRATORY STRESS
  - 2.40 KSI $\leq$ 10 KSI (ENDURANCE LIMIT)
    $\Delta K = 1.08$ KSI $\sqrt{IN} \leq 4$ KSI $\sqrt{IN}$ (THRESHHOLD)
  - NO CRACK GROWTH DUE TO VIBRATORY STRESS

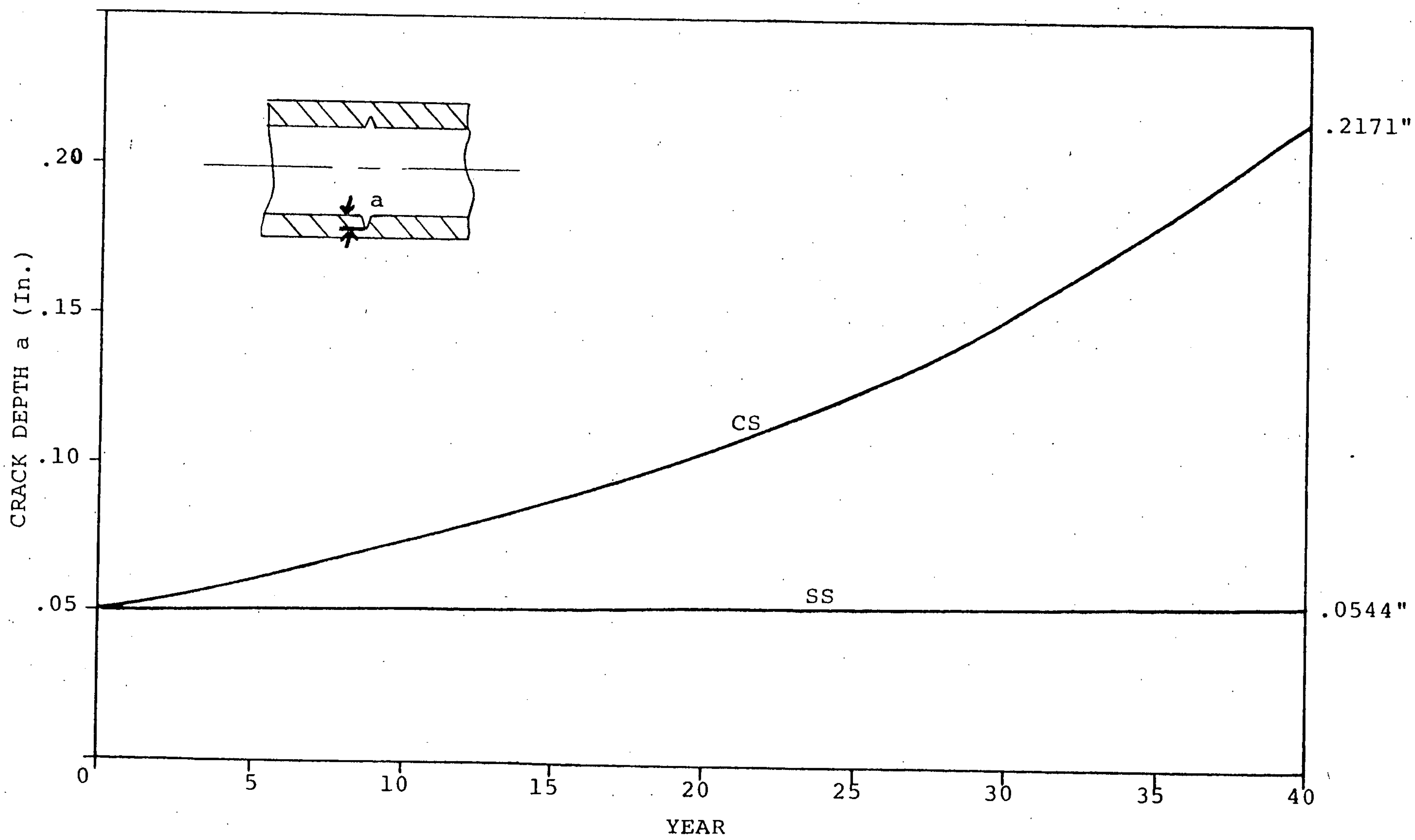
- FINAL CALCULATED CRACK SIZE WITHIN SECTION XI ALLOWABLE
  - $A_{FINAL} = .16$ IN
  - $K_{APPLIED} = 60$ KSI $\sqrt{IN} < K_{IR}/3$

FEEDWATER NOZZLE SAFE-END





APPLIED STRESS INTENSITY FACTORS



PREDICTED CRACK GROWTH RATES

PREPARATION FOR INSTALLATION

- NORMAL VESSEL DISASSEMBLY AND ABOVE CORE INTERNALS REMOVAL (AS IN REFUELING)
- DRAIN & DECONTAMINATE CAVITY
- DROP WATER LEVEL
- DECONTAMINATE VESSEL (HYDROLASER)
- INSTALL WORK PLATFORM & SHIELDING
- INSTALL VESSEL LEVEL INSTRUMENTS
- REMOVE OLD SPARGERS
- CLEAN NOZZLE & BORE

INSTALLATION

- ESTABLISH EXTERNAL PIPING CUT LOCATIONS
  - ROUGH CUT OF SAFE END REFERENCED FROM CENTERLINE OF EXISTING SAFE END-TO-NOZZLE WELD, ALLOWING APPROXIMATELY 3/4" EXCESS STOCK
  - CUT BELOW ELBOW REFERENCED FROM CENTERLINE OF NOZZLE

- CUT AND REMOVE PIPING

- PREPARE NOZZLE BORE AND BLEND RADIUS AND PERFORM SURFACE INSPECTION

- TRIAL FIT ACTUAL SPARGER AND DUMMY SLEEVE
  - ESTABLISH PROPER ALIGNMENT OF SPARGER TO REACTOR WALL
  - ESTABLISH PROPER ALIGNMENT OF DUMMY SLEEVE TO OUTBOARD END OF NOZZLE
  - ESTABLISH AND MARK FINAL WELD PREP LOCATION

- WELD PREP EXISTING SAFE END STUB

- MEASURE AND CUT OUTER THERMAL SLEEVE TO LENGTH AND DRILL HOLES FOR STAKING PINS

- FIT NEW SAFE END ASSEMBLY TO EXISTING SAFE END STUB

- INSTALL "DUMMY" SPARGER, A DEVICE WHICH MONITORS WELD SHRINKAGE AND DISTORTION BY REFERENCING OFF INNER VESSEL WALL

- WELD NEW SAFE END TO EXISTING SAFE END STUB, MONITORING WELD SHRINKAGE/DISTORTION BY USING DUMMY SPARGER.
  - IN PROCESS CORRECTION IF NEEDED

- INSTALL OUTER THERMAL SLEEVE USING STAKING PINS

- SHRINK SPARGER TEE USING LIQUID NITROGEN AND INSTALL

- PIN SPARGER ARMS

- REPLACE PIPING IN DRYWELL USING NEW MATERIALS

- RESTORE WORK AREA TO ORIGINAL CONDITION

WELDING OF SAFE ENDS

A. WELDING PROCEDURE HIGHLIGHTS

- AUTOMATIC, ORBITAL GAS TUNGSTEN ARC (GTAW) PIPE WELDER
- SINGLE V-GROOVE WITH 75^{o} INCLUDED ANGLE AND 1/32" LAND USING CONSUMABLE "K" RING
- 60 F MINIMUM PREHEAT TEMPERATURE
- 60 F - 500 F INTERPASS TEMPERATURE
- NO POST WELD HEAT TREATMENT

B. WELDING PROCEDURE QUALIFICATION

- PER APPLICABLE REQUIREMENTS OF ASME III, IX AND XI
- MECHANICAL TESTING TO INCLUDE:
  - BEND TESTS
  - TENSILE TESTS
  - CHARPY V-NOTCH IMPACT TESTS OF WELD METAL, BASE METAL, AND HEAT AFFECTED ZONE (HAZ)
- MAXIMUM HEAT INPUT ESTABLISHED IN QUALIFICATION WILL NOT BE EXCEEDED IN PRODUCTION

C. PREVENTION OF CREVICES IN WELD ROOT AREA

- INTERNAL COUNTERBORE TRANSITION ANGLE WILL BE 14^{o} MAXIMUM
- VOLUMETRIC WELD INSPECTION BY RADIOGRAPHY (RT) AND ULTRASONICS (UT) WILL VERIFY THAT NO DETRIMENTAL CREVICES EXIST .

INSPECTION/NDE

A. IN-PROCESS INSPECTION

1. FULL PENETRATION WELDS - PRESSURE BOUNDRY

   - RADIOGRAPHY (RT) PLUS MAGNETIC PARTICLE (MT) OR LIQUID PENETRANT (PT) INSPECTION
   - TECHNIQUE PER ASME V
   - ACCEPTANCE CRITERIA PER ASME III NB-5000
   - ACCEPTANCE CRITERIA PER ASME XI IWB-3000 MAY BE INVOKED ON A CASE BASIS

2. PARTIAL PENETRATION AND FILLET WELDS

   - MAGNETIC PARTICLE (MT) OR LIQUID PENETRANT (PT) INSPECTION
   - TECHNIQUE PER ASME V
   - ACCEPTANCE CRITERIA PER ASME III NB-5000

B. PRESERVICE INSPECTION

1. BASELINE ISI ULTRASONIC (UT) INSPECTION PER ASME XI
2. SYSTEM LEAK TEST PER ASME XI

REVIEW OF THERMAL SLEEVE/SPARGER

DESIGN FEATURES

- Positive Assurance of No Bypass Leakage at Thermal Sleeve/Safe-End Attachment
  - Shop-Welded Joint
  - Inspectable From Both Sides
  - No Crevices

- Multiple Sleeve Protection of Nozzle From Effects of Feedwater

- Potential Leakage at Sparger/Thermal Sleeve Attachment Minimal Concern Because:
  - Stainless-to-Stainless Interference Fit
  - Iso-Thermal
  - No Differential Pressure Expansion
  - Still Separated From Nozzle by Thermal Sleeve

- CONSERVATIVE ANAL. SHOWS NEGLIGIBLE RAPID CYCLE FATIGUE USAGE IN NOZZLE BLEND RADIUS/BORE REGIONS

REVIEW OF OTHER FEEDWATER NOZZLE IMPROVEMENTS AT MONTICELLO

- Clad Removed
- RWCU Reroute Implemented
- Improved Operating Procedures/Duty Map
- Low Flow Controller Satisfies NUREG-0619/Generic Letter 81-11
- Leakage Monitoring

ALARA SUMMARY

- PROCEDURE PREPARATION
- WORK SEQUENCE
- PLANNING
- SHIELDING
- CORE SPRAY SPARGER TO BE FLUSHED
- DECON
- EXPOSURE CONTROL SUPERVISION - NSP
- TRAINING - MOCK UP
- IN PROCESS CLEANUP TO MINIMIZE SPREAD OF CONTAMINATION
- PIPING TO BE REMOVED FROM AREA AND REPLACED WITH CLEAN, NEW PIPE

PLANNED ISI PROGRAM FOLLOWING MODIFICATION

- Pressure Boundary Welds Receive Standard UT/PT/VT Per Section XI

- Nozzle Blend Radius and Bore Region

  - UT One Nozzle Every Second Refueling Outage
  - VT Spargers Every Fourth Refueling Outage
  - No Internal PT as Long as Leakage Monitor Confirms No Leakage
  - Establish Action Plan If Leakage Monitor or Sparger VT Reveal Anything Unexpected

CONCLUSIONS

- DESIGN CONCEPT PREVIOUSLY APPROVED
- DETAILED DESIGN ANALYSIS CONFIRMS WIDE MARGINS ON FATIGUE USAGE
- DESIGN NOT SUBJECT TO SERVICE DETERIORATION
- HARDWARE ON-SITE
- INSTALLATION SOFTWARE 90% DONE
- MOCKUP ORDERED AND IN FABRICATION
- INSTALLATION SCHEDULED FOR FALL '81

(10-80)

U.S. NUCLEAR REGULATORY COMMISSION

REACTOR FACILITY FEE DETERMINATION

1. FEE FORM TYPE *(Check one)*
- [X] PRELIMINARY
- [X] FINAL
- [ ] AMENDED

INSTRUCTIONS. Fill-in items 1 through 14, as applicable, and send the original copy to the License Fee Management Branch.

2. DOCKET NUMBER(S): 50-263

3. ACCESSION NUMBER: 8008080328

4. LICENSEE: Northern States Power Company

5. PLANT NAME AND UNIT(S): Monticello

6. DATE OF APPLICATION: 7/31/80

7. FEE REMITTED: YES [ ] NO [X]

8. LICENSEE FEE DETERMINATION

CLASS I	CLASS II	CLASS III	CLASS IV	CLASS V	CLASS VI	EXEMPT	NONE
						X	

9. SUBJECT: Fire Protection TS Changes

10. TAC NUMBER ASSIGNED *(If available)*:

11. APPROVAL: LETTER [ ] ORDER [ ]

AMENDMENT NUMBER(S): 7

DATE OF ISSUANCE: 6/30/81

12. NRC FEE DETERMINATION

- [X] The above application has been reviewed in accordance with Section 170.22 of Part 170 and is properly categorized.
- [ ] The above application has been reviewed in accordance with Section 170.22 of Part 170 and is incorrectly classified.

Fee should be class(es):

JUSTIFICATION FOR CLASSIFICATION OR RECLASSIFICATION:

10-21-81 P.M. B.G.S.

This application is a Class III type of action and is exempt from fees because it is:

- [X] Filed by a nonprofit educational institution.
- [ ] Filed by a Government agency and is not for a power reactor.
- [ ] For a Class I, II, or III amendment which results from an NRC request dated ______ for the application and the amendment is to simplify or clarify License or Technical Specifications; has only minor safety significance; and is being issued for the convenience of NRC *(must meet all of the criteria)*.
- [✓] Other *(State reason therefor)*

Application meets requirements of 4/26/79 memo from V. Wambach to R. Diggs

13. SIGNATURE *(Branch Chief)*: KT — [signature] DATE: 10/20/81

14. FINAL CERTIFICATION: The preliminary fee determination has been reassessed and is hereby affirmed.
SIGNATURE *(Project Manager or Branch Chief)*: KT DATE:

FOR LICENSE FEE MANAGEMENT BRANCH USE ONLY *(All others do not write below this line)*

The above exemption request has been reviewed and is hereby accepted as being exempt.
SIGNATURE *(Chief, LFMB)*: W. O. Miller DATE: 10/26/81

DISTRIBUTION BY LFMB

✓	Records Services Branch		DL Branch Chief		LFMB Exemption File		LFMB Reactor File