May 19, 1986

Docket 50-289

NOTE TO: John Stolz, Director
PWR Project Directorate #6
Division of PWR Licensing-B

FROM: John Thoma, Project Manager
PWR Project Directorate #6
Division of PWR Licensing-B

SUBJECT: MEETING WITH GPUN CONCERNING STEAM GENERATOR REPAIR CRITERIA (TSCR 148)

On May 15, 1986 a meeting was held in Bethesda between GPUN and the NRC. The purpose of the meeting was to discuss steam generator repair criteria as described in the licensee's technical specification change request (TSCR) 148. Enclosure (1) contains a list of attendees. Enclosure (2) contains the licensee's presentation.

At the close of the meeting NRC staff advised the licensee that they would get back to the licensee in a few days if additional data were necessary. The staff also announced that they intended to publish their SER by July 31, 1986.

Original signed by

John Thoma, Project Manager
PWR Project Directorate #6
Division of PWR Licensing-B

PBD-6
JThoma;jak
5/15/86

RAW
PBD-6
RWeller
5/19/86

ENLCOSURE 1
LIST OF ATTENDEES

NAME	REPRESENTING
J. Thoma	NRC/PBR-6
J.R.N. Rajan	NRC/PWR-B/EB
R. Weller	NRC/PWR-B/PBD#6
C. McCracken	NRC/PBD#6
D. Crutchfield	NRC/NRR/PWR-B
H.F. Conrad	NRC/NRR/BWREB
C.Y. Cheng	NRC/PWR-B/EB
K.R. Wichman	NRC/PWR-B/EB
R.B. Borsum	Babock & Wilcox-Bethesda
L. Connor	Doc-Search Associates
A.K. Bhattacharyya	Pennsylvania State/BRP.
S.D. Leshnoff	GPUN
T.L. Gerber	Structural Integrity Assoc.
F.S. Giacobbe	GPUN
D.K. Croneberger	GPUN
W.O. Dornsife	PA DER
M.F. Wagner	NRC/OELD
W.A. Paulson	NRC/NRR/PWR-B
J. Herring	Bechtel
E. Murphy	NRC
P. Cortland	NRC/OTE
N.C. Kazanas	GPUN
M. Torborg	GPUN
J.S. Jandovitz	GPUN
S.M. Kowkabany	GPUN
C. Dodd	Oak Ridge National Lab

TSCR 148

REVISED TMI-1 OTSG REPAIR LIMITS

INTRODUCTION — F. S. GIACOBBE

STRUCTURAL BASIS

PREVIOUS WORK — S. D. LESHNOFF

- STRUCTURAL CAPABILITY W.R.T. FATIGUE
- STRUCTURAL CAPABILITY W.R.T. RUPTURE

ASSESSMENT OF STRUCTURAL MARGIN INHERENT IN PROPOSED PLUGGING CRITERIA — T. L. GERBER

EDDY CURRENT TESTING — N. KAZANAS

- REVIEW OF ECT RESULTS
- REVIEW OF 8 X 1 CAPABILITIES
- FUTURE EXAMINATION (6R)

GPU NUCLEAR CORPORATION

MAY 15, 1986

GPUN PRESENTATION
TO THE NRC

MAY 15, 1986

F. S. GIACOBBE

OTSG TUBE CONDITION

History

Cause:	Tube damage occurred in 1981 as a result of inadvertent intrusion of sodium thiosulfate into the reactor coolant system.
Location/ Type	Damage was initiated on the ID surface of the OTSG tubing primarily in the upper tube sheet (UTS) region. Damage was in the form of IGA and circumferentially oriented stress assisted cracks. Some damage occurred below the UTS.

History (Cont'd)

Mitigation:

- Clean up RCS water via ion exchange
- Peroxide clean RCS surfaces to remove residual sulfur
- Implement controlled layup conditions
- Implement revised RCS chemistry specifications
  - Raise minimum Lithium level to 1.0 ppm
  - Limit sulfate/total sulfur to 100 ppb

Confirmation:

- Extensive corrosion testing including long term corrosion test
- Leak rate testing
- Repeat eddy current tests

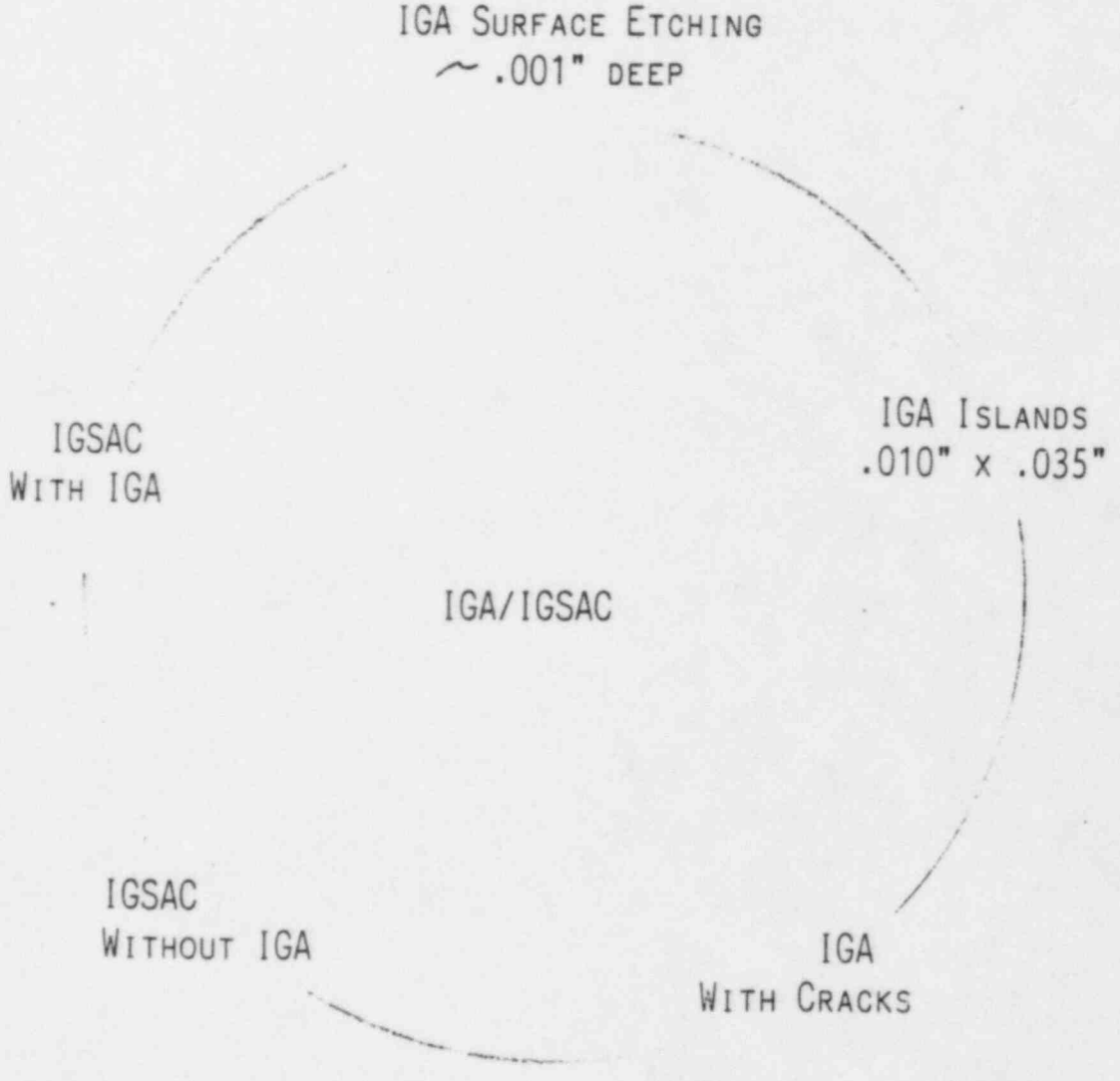
Conclusion: Additional sulfur related damage is not occurring nor expected to recur.

TYPE OF DAMAGE

CIRCUMFERENTIAL INTERGRANULAR CRACKS INITIATING ON THE ID SURFACE PENETRATING THROUGH WALL WAS THE PRIMARY FORM OF DAMAGE. THE MAJORITY OF THIS DAMAGE WAS IN THE UTS REGION.

IGA WITH AND WITHOUT IGSAC WAS ALSO OBSERVED TO A LESSER EXTENT BELOW THE UTS.

SCOPE OF DAMAGE



CONCLUSIONS

- Damage to OTSG tubing occurred in 1981 and represents a continuum of attack from minor IGA to throughwall IGSAC. No additional damage has occurred since 1981.

- No IGA without IGSAC was observed greater than 50% throughwall.

- IGA islands can have grain fallout which produces the appearance of pitting.

- Damage is localized to region of attack. Tube integrity away from attack is maintained.

- IGA does exist below the threshold of detectability by eddy current.

- IGA detection can be enhanced by mechanical strain or grain dropout.

LOGIC OF PRESENTATION

STRUCTURAL BASIS

PREVIOUS WORK

- o INITIATED (1982) TO DEMONSTRATE MARGIN W.R.T. EDDY CURRENT DETECTION CAPABILITY
- o METHODOLOGY FOUND ACCEPTABLE IN NUREG 1019
- o PRESENT APPLICATION TO DEMONSTRATE MARGIN W.R.T. PROPOSED OTSG REPAIR LIMITS

RECENT WORK (TSCR 148)

- o INITIATED TO DEMONSTRATE CONFORMANCE WITH REG. GUIDE 1.121 STRUCTURAL CONSIDERATIONS

PREVIOUS WORK

STRUCTURAL CAPABILITY W.R.T. FATIGUE

- DESIGN BASIS (ASME III - CRACK INITIATION)
- INSERVICE RULES (ASME XI - CRACK PROPAGATION)

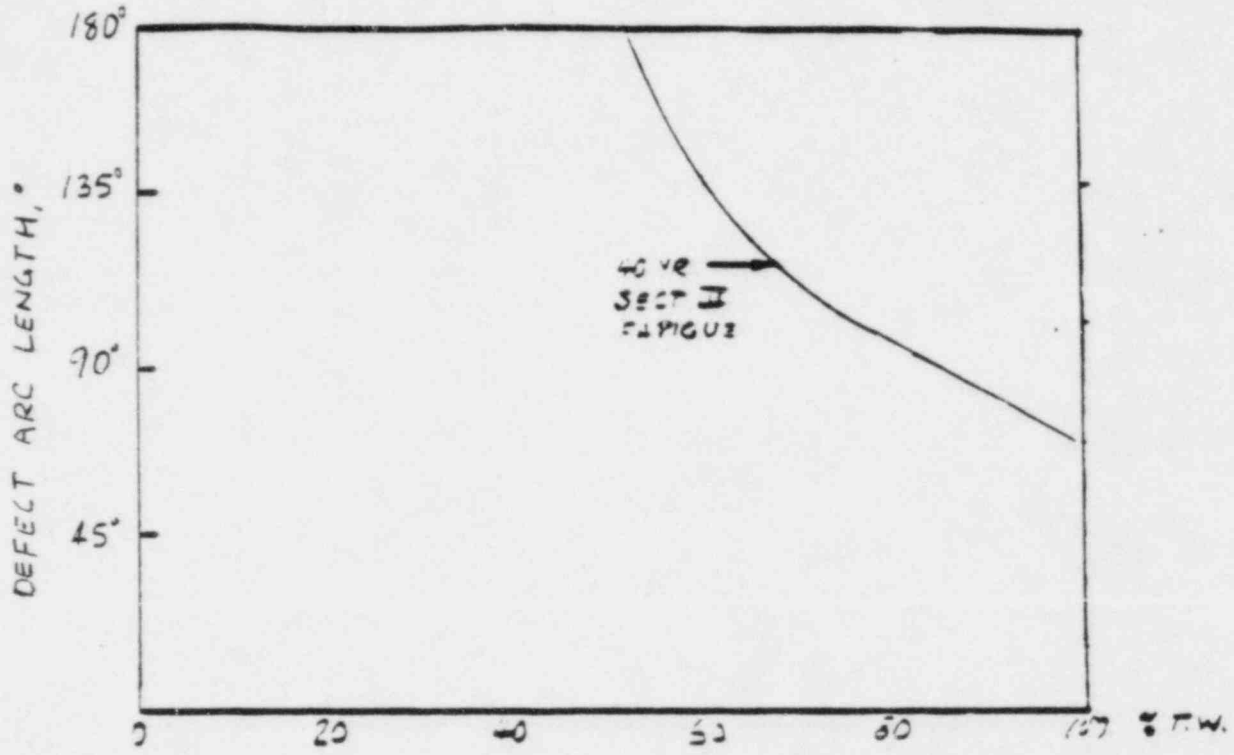
STRUCTURAL CAPABILITY W.R.T. RUPTURE

- ONE TIME ONLY - MAIN STEAM LINE BREAK LOADING

FATIGUE EVALUATION

DESIGN BASIS - ASME III

- PREDICTS LOCAL FATIGUE DAMAGE DURING DESIGN LIFETIME
- REPRESENTS CODIFIED APPROACH
  - METHODOLOGY
  - MATERIALS
- USES DESIGN BASIS LOADINGS
  - MAGNITUDE
  - FREQUENCY
- IN ADDITION, CONSIDERS FLOW INDUCED VIBRATION

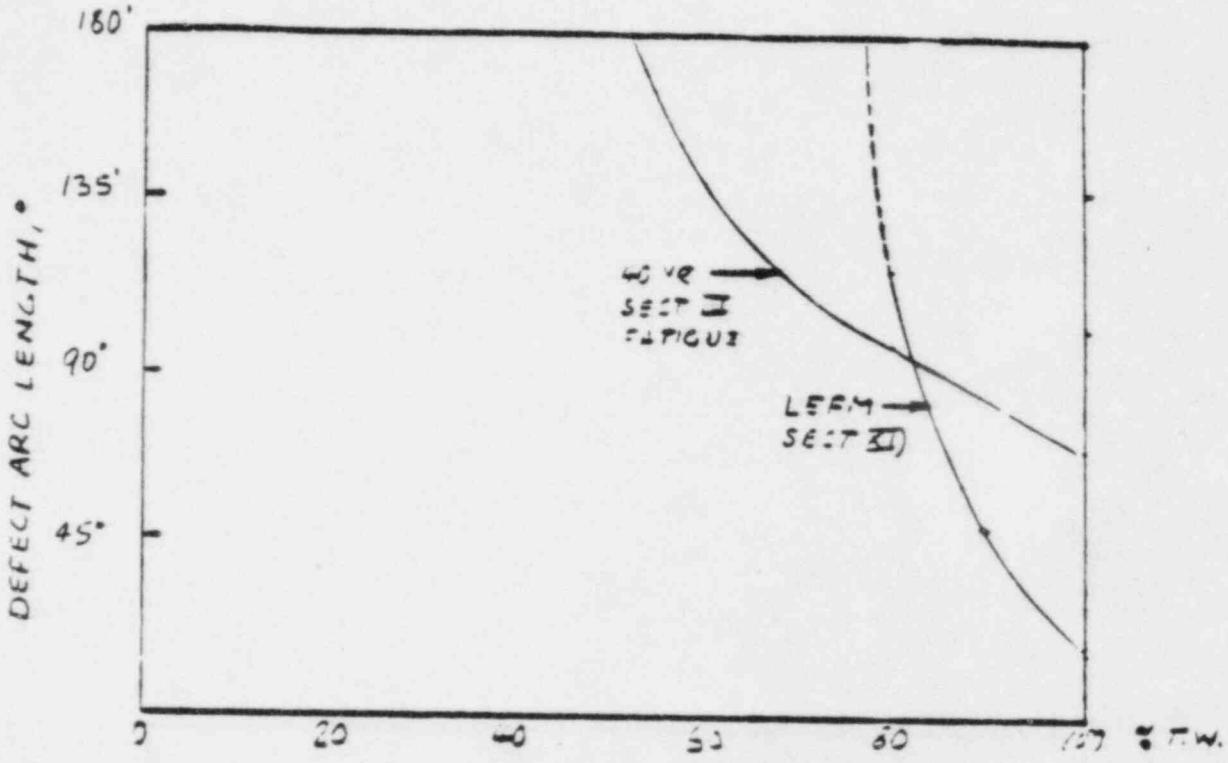


RESULTS OF PREVIOUS ANALYSES

FATIGUE EVALUATIONS (Continued)

INSERVICE RULES - ASME XI

- METHODOLOGY DEMONSTRATES MINIMUM DEFECT WHICH COULD PROPAGATE UNDER SERVICE CONDITIONS
- REPRESENTS CODIFIED APPROACH
- USES DESIGN BASIS LOADING
  - MAGNITUDE
  - FREQUENCY
- CONSIDERS FLOW INDUCED VIBRATION
- CONSIDERS ACTUAL OPERATING WATER CHEMISTRY
  - LITERATURE
  - TESTING



RESULTS OF PREVIOUS ANALYSES

(MAIN STEAM LINE) RUPTURE EVALUATION

- SOLID MECHANICS: FIRST PRINCIPLES METHODOLOGY

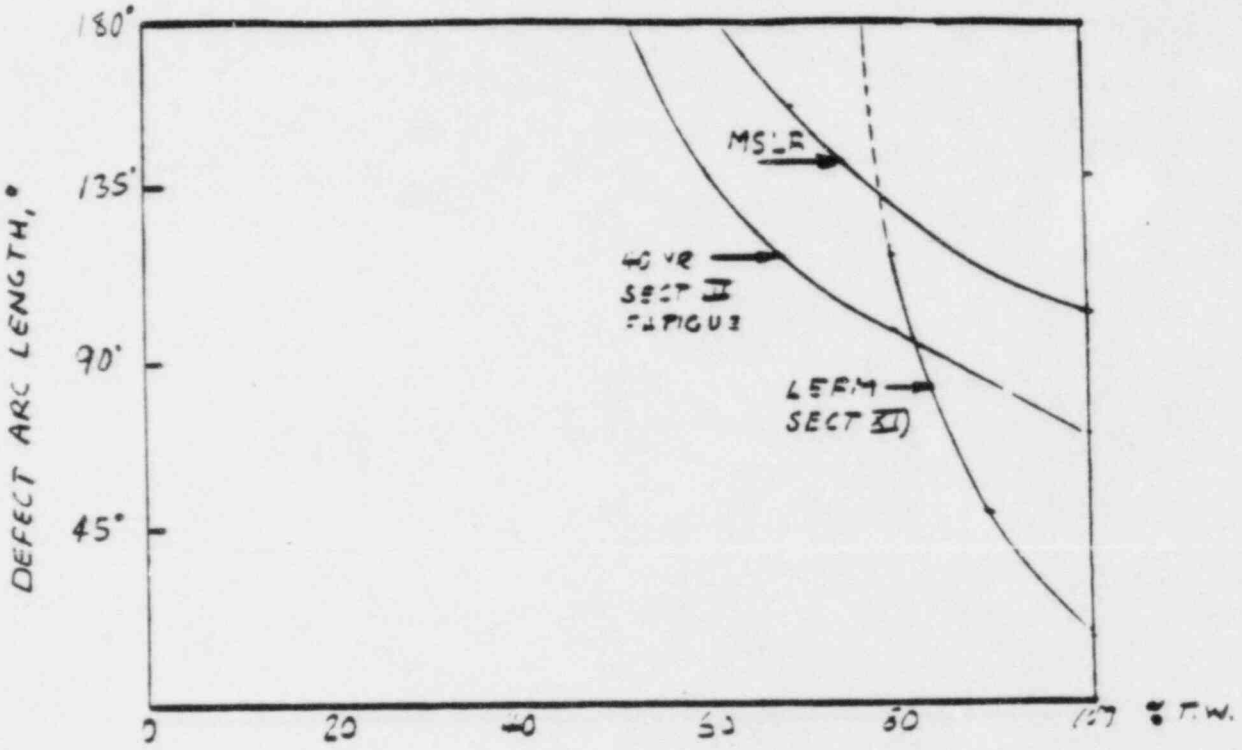
  EQUILIBRIUM OF FORCES AND MOMENTS

  COMPATIBILITY OF SLOPES AND DISPLACEMENTS

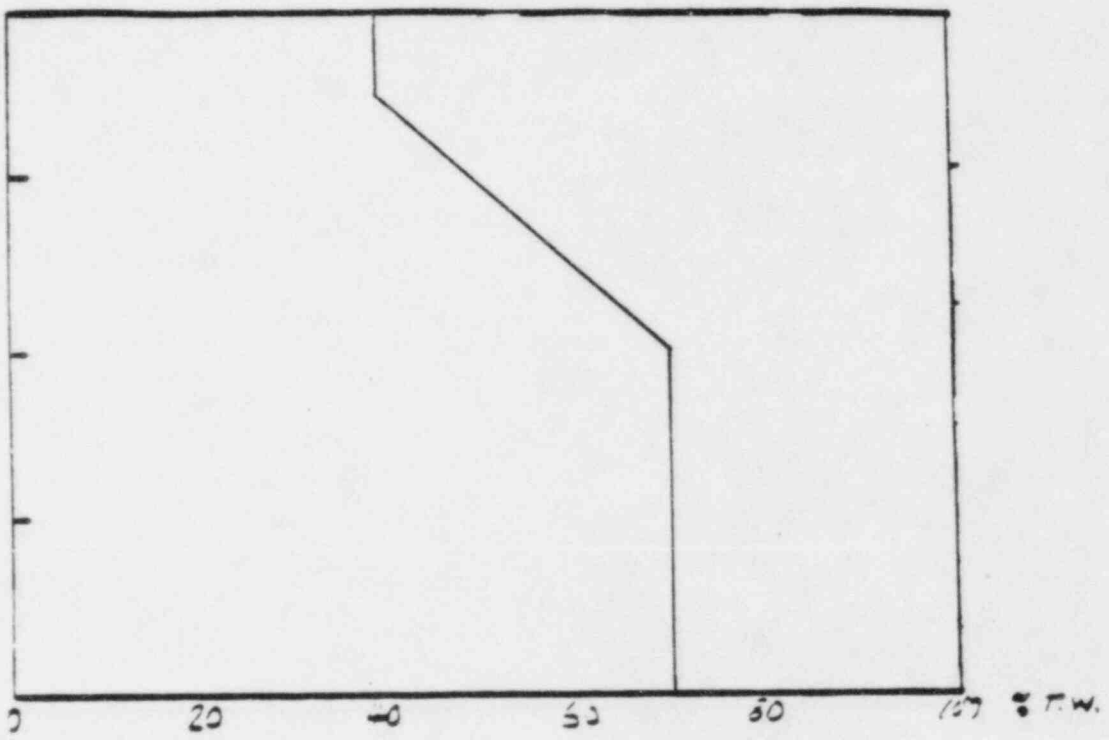
- LOCUS OF POINTS REPRESENTING MAXIMUM

  STRUCTURAL CAPABILITY AS DETERMINED

  BY MATERIAL FLOW STRESS



RESULTS OF PREVIOUS ANALYSES



SHOWING PROPOSED PLUGGING CRITERIA

CONCLUSIONS

- TSCR 148 REPAIR LIMITS SEPARATED FROM ANALTYICAL RESULTS BY 10% ON NOMINAL THROUGHWALL (MINIMUM)

- MINIMUM MARGIN DEFINED AGAINST MOST LIMITING ANALYTICAL RESULT

ASSESSMENT OF STRUCTURAL MARGIN INHERENT IN GPUN PROPOSED OTSG TUBE PLUGGING CRITERIA

PRESENTATION TO:

NRC STAFF

MAY 15, 1986

T. L. GERBER
STRUCTURAL INTEGRITY ASSOCIATES

OBJECTIVE: EVALUATE THE STRUCTURAL MARGINS INHERENT IN GPUN PROPOSED OTSG TUBE PLUGGING CRITERIA (TSC 148, TDR 645)

MEANS: UTILIZE STATE-OF-THE-ART DUCTILE FAILURE THEORIES

CONSERVATIVELY ESTIMATE TUBE LOADS AND MATERIAL PROPERTIES

EMPLOY REG GUIDE 1.121 RECOMMENDED SAFETY MARGINS

FLAW ORIENTATIONS (ID FLAWS OF FINITE LENGTH AND DEPTH)

CIRCUMFERENTIAL

AXIAL

DUCTILE FAILURE THEORIES

NET SECTION COLLAPSE

TEARING INSTABILITY

MATERIAL PROPERTIES

FLOW STRESS FROM ASME CODE ($3S_M$)

LOWER BOUND STRESS-STRAIN CURVES

REPRESENTATIVE J-R DATA

EVALUATIONS BASED ON
STATE-OF-THE-ART THEORIES AND LOWER BOUND
MATERIAL PROPERTIES

NET SECTION COLLAPSE

- ASSUMES FAILURE OCCURES WHEN STRESS AT NET SECTION EQUALS FLOW STRESS (THE LIMIT LOAD)

- ACCOUNTS FOR BENDING DUE TO NON-SYMMETRICAL CRACKING (CIRCUMFERENTIAL CRACKS)

- ACCOUNTS FOR BULGING (AXIAL CRACKS)

- BASIS FOR FLAW ACCEPTANCE CRITERIA OF ASME CODE, SECTION XI

- USED EXTENSIVELY TO EVALUATE BWR PIPING FLAWS

TEARING INSTABILITY

- BASED ON ELASTIC-PLASTIC FRACTURE MECHANICS THEORY AND THE WORK OF PARIS ET AL.

- ASSUMES FAILURE OCCURS WHEN APPLIED TEARING FORCE EXCEEDS THE TEARING RESISTANCE OF THE MATERIAL

- BASIS FOR RECOMMENDED EVALUATIONS OF LEAK-BEFORE-BREAK OF LWR PIPING (NUREG-1061, VOL. 3)

- USED RECENTLY TO EVALUATE LOW TOUGHNESS WELD METAL CONCERNS IN BWR PIPING

OTSG TUBE LOADS USED IN THESE EVALUATIONS

NORMAL OPERATING	LOAD	STRESS
AXIAL	1107 LBS	17.1 KSI
PRESSURE	1350 PSI	12.1 KSI

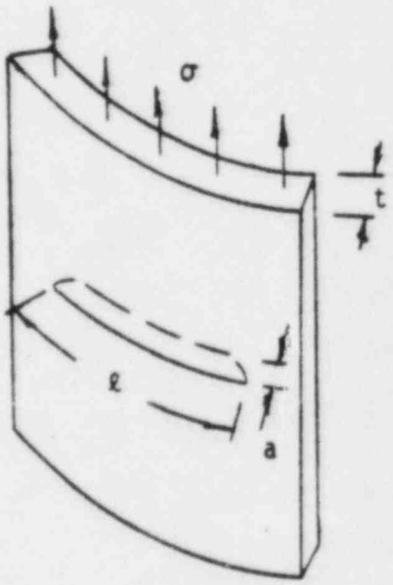
FAULTED		
AXIAL	3140 LBS	49.4 KSI
PRESSURE	2672 PSI	23.9 KSI

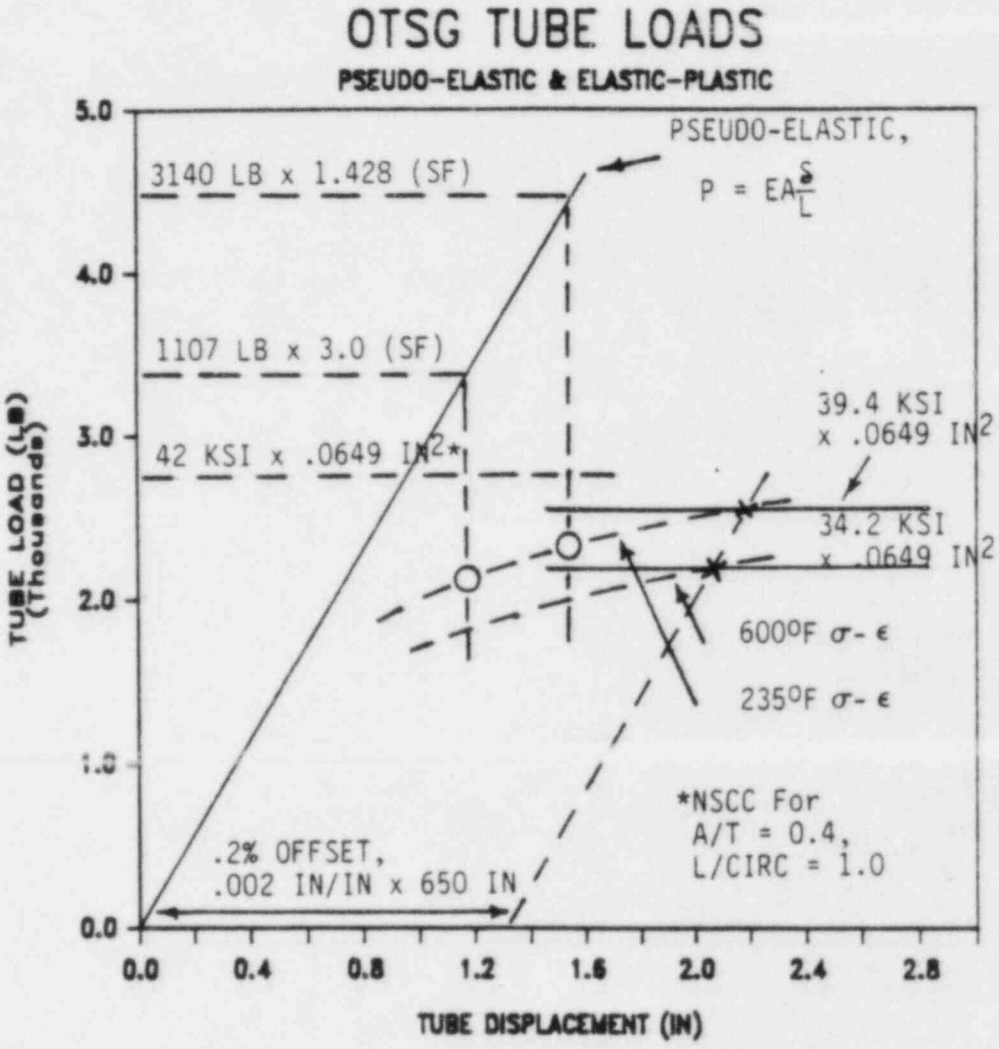
REG. GUIDE 1.121 RECOMMENDED MARGINS

NORMAL OPERATING	3.0
FAULTED	1.428

EVALUATIONS BASED ON
DESIGN LOADS AND REG. GUIDE 1.121 MARGINS

CIRCUMFERENTIAL CRACKS





ELASTICALLY CALCULATED AND EXPECTED
OTSG AXIAL TUBE LOADS

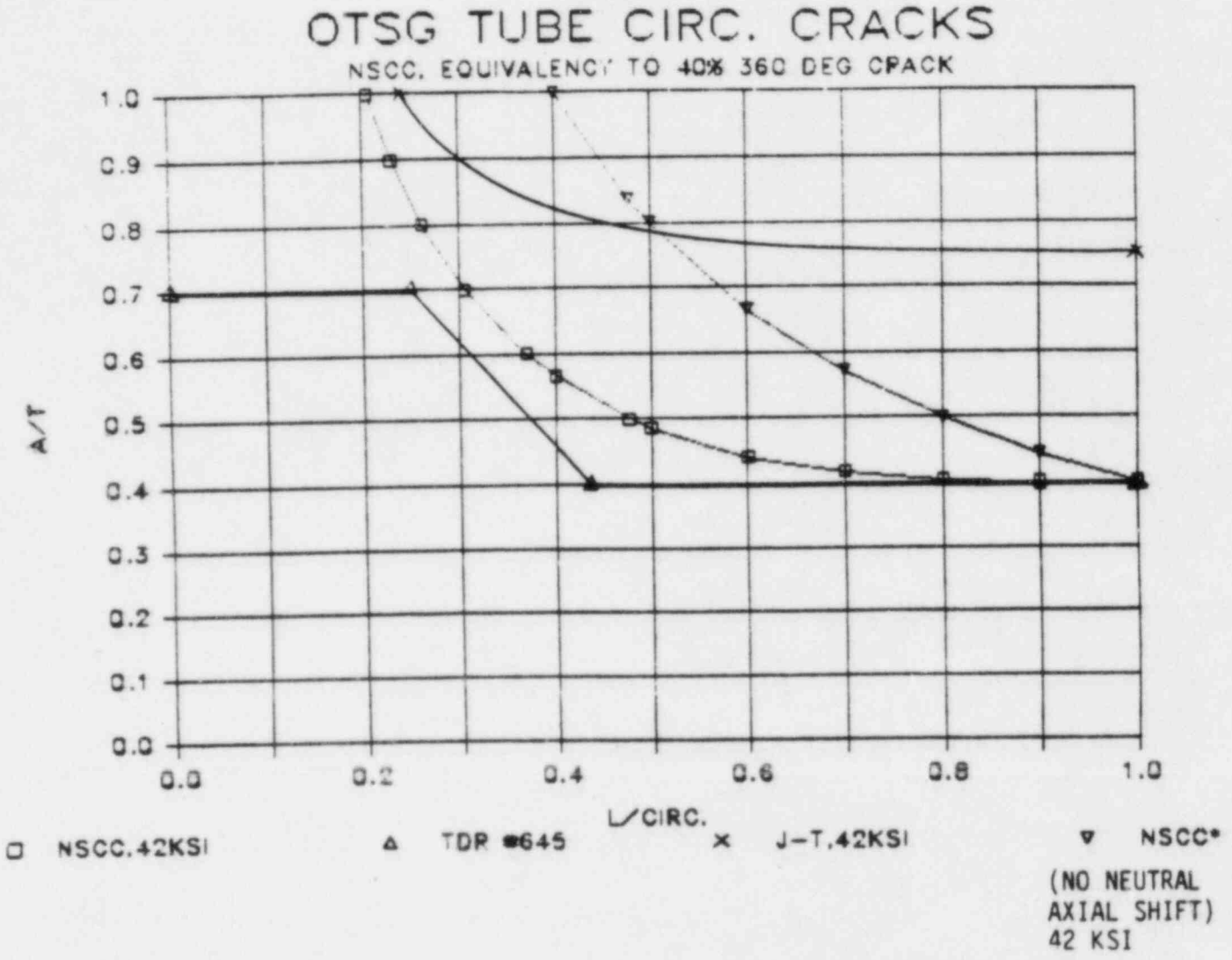
TUBE AXIAL LOADS

- TUBE AXIAL LOADS ARE (PRIMARILY) DUE TO DISPLACEMENT (DIFFERENTIAL THERMAL EXPANSION)

- ELASTICALLY CALCULATED LOADS WITH REG. GUIDE 1.121 RECOMMENDED MARGINS EXCEED THE YIELD LOAD

- ACTUAL TUBE LOADS ARE LESS THAN THE YIELD LOAD

- TUBE LOAD WHICH IS ACCEPTABLE FOR 40% OF WALL, 360^{0} CRACKS, USED IN THESE EVALUATIONS



COMPARISON OF PROPOSED TUBE PLUGGING CRITERIA WITH FAILURE THEORIES FOR CIRCUMFERENTIAL DEFECTS, TUBE LOAD ADJUSTED TO REFLECT 40% OF WALL PLUGGING CRITERION

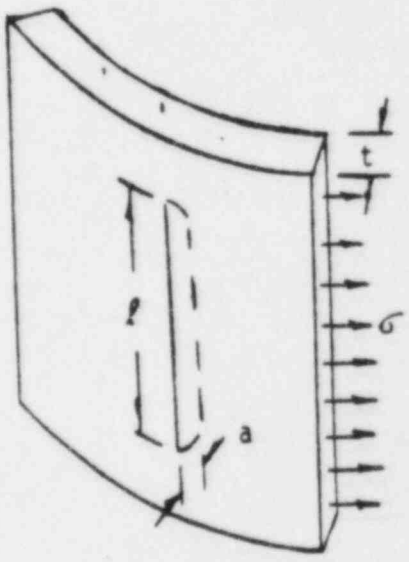
CIRCUMFERENTIAL CRACKS CONCLUSIONS

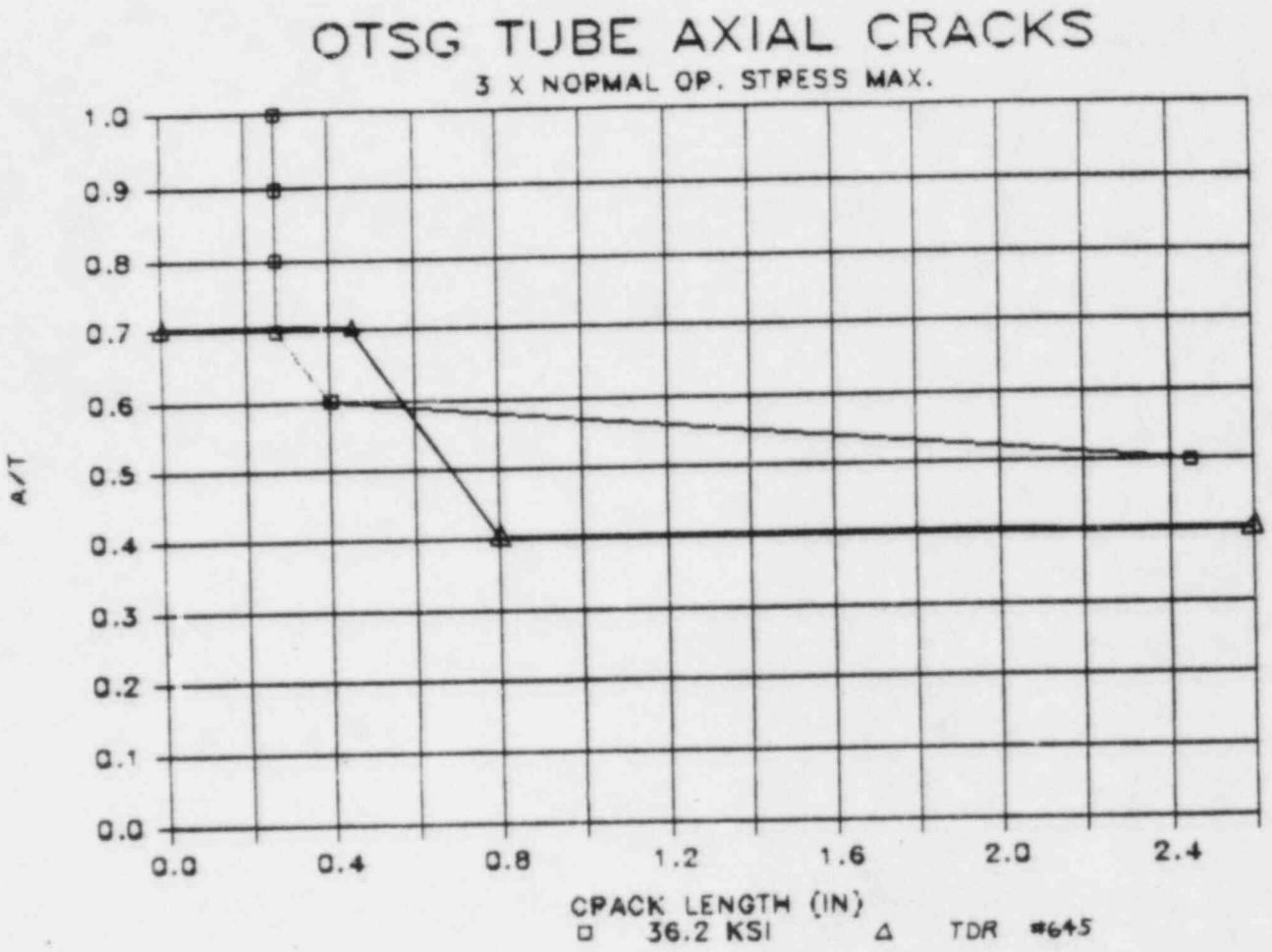
- PROPOSED TUBE PLUGGING CRITERIA MEET REG. GUIDE 1.121 RECOMMENDED MARGINS FOR ALL CRACK SIZES

- SHORT, DEEP CRACK (70% OF WALL, 0.5 INCH LONG) HAVE MORE MARGIN THAN 40% OF WALL, 360^{o} CRACKS

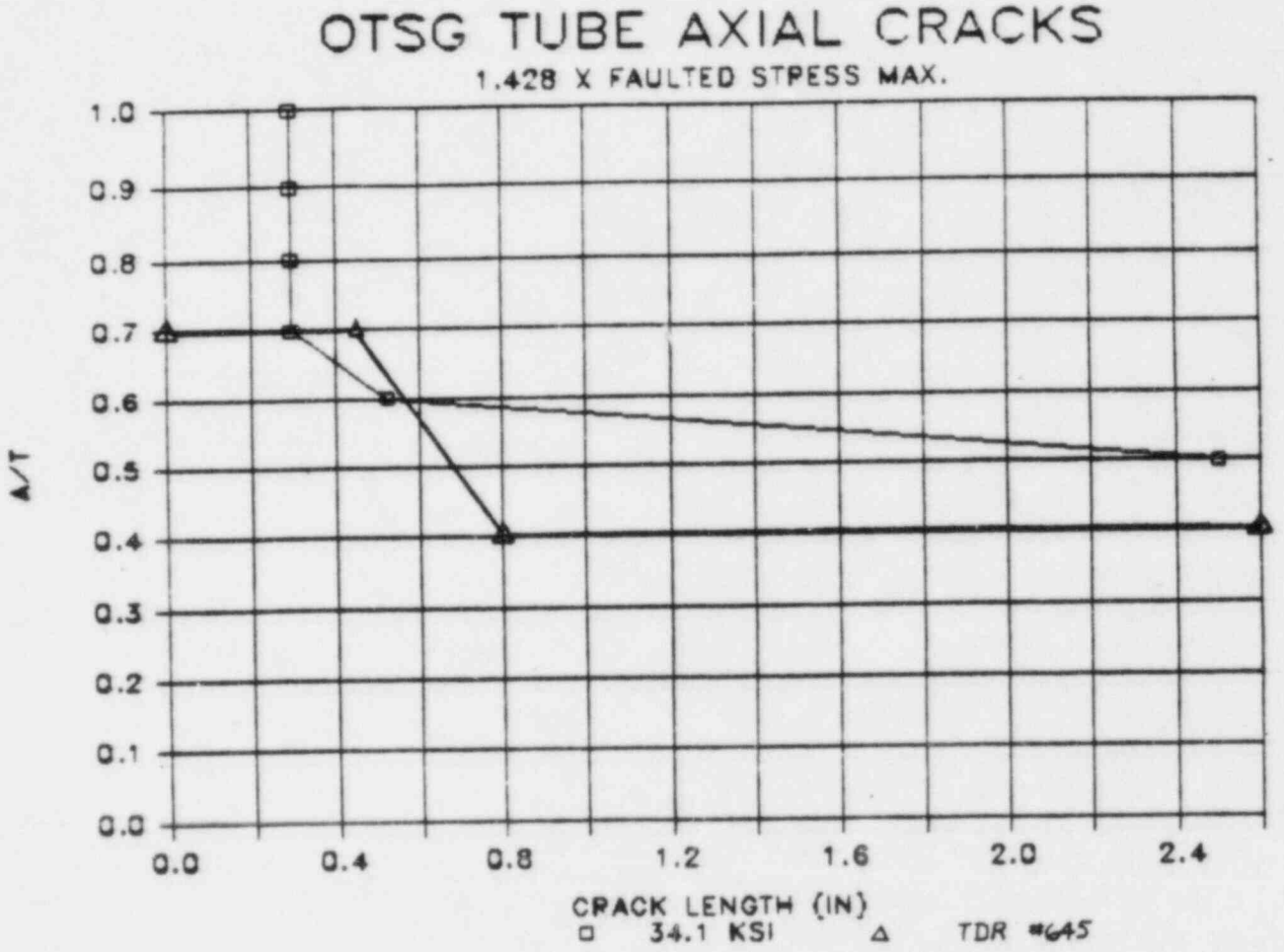
- LATERAL RESTRAINT (NEAR SUPPORTS) PROVIDES ADDITIONAL MARGINS

AXIAL CRACKS

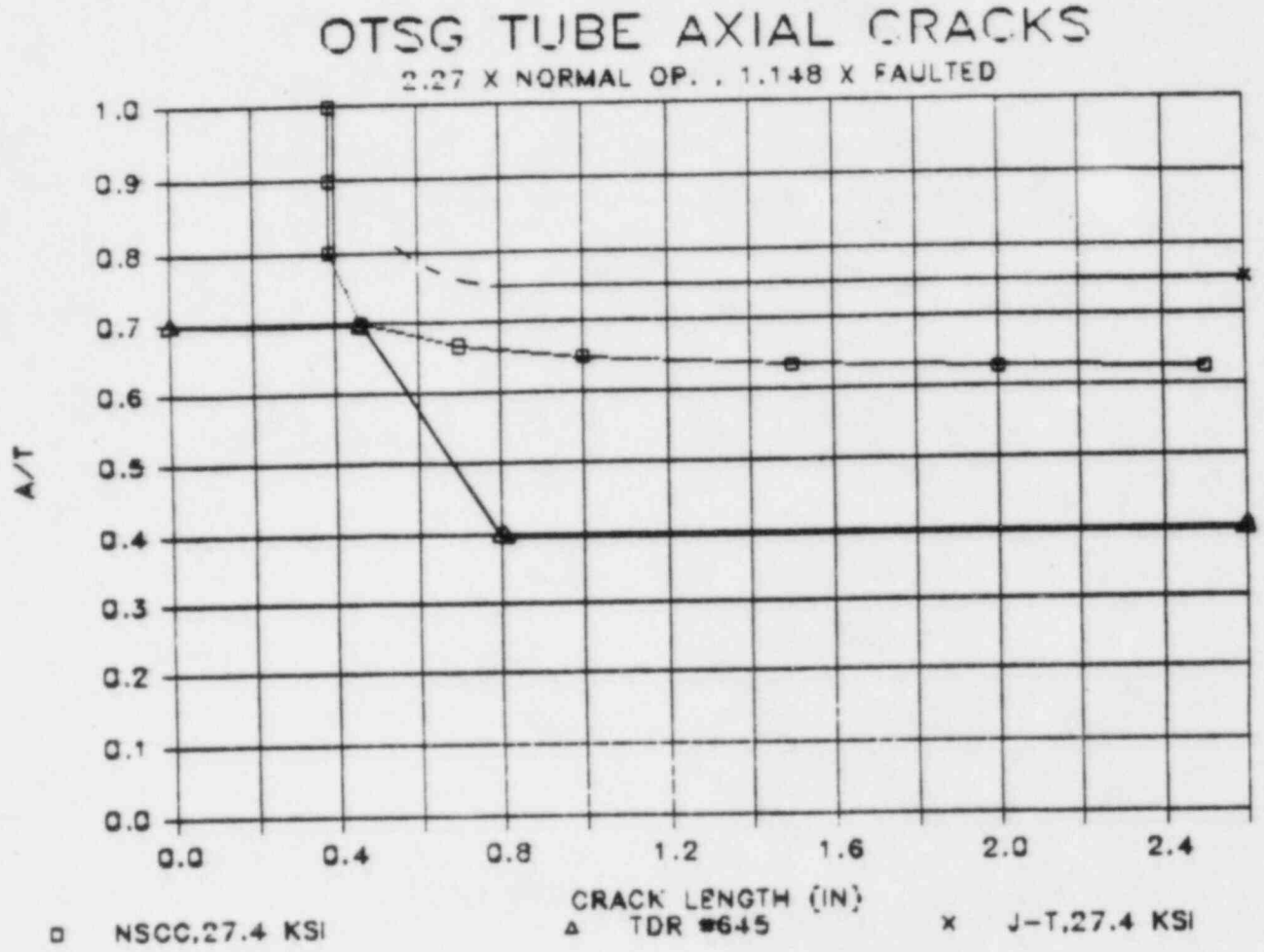




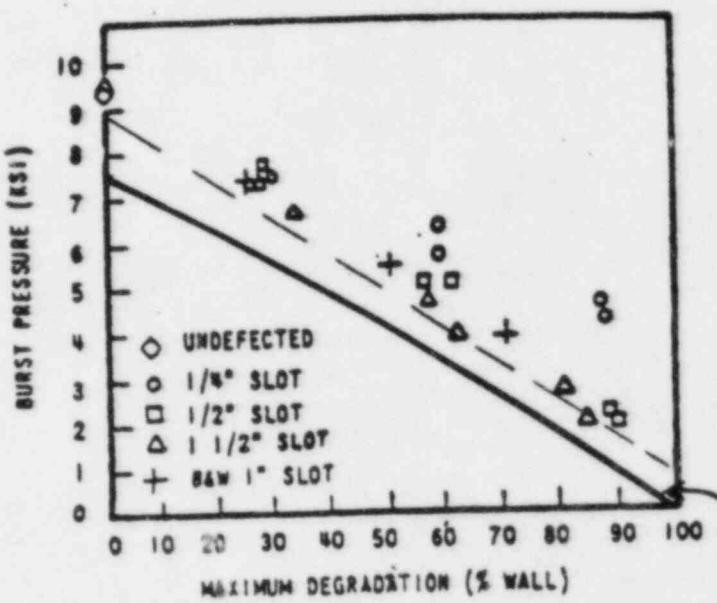
COMPARISON OF PROPOSED TUBE PLUGGING CRITERIA WITH FAILURE THEORIES FOR AXIAL CRACKS, TUBE STRESS 3 X OPERATING STRESS



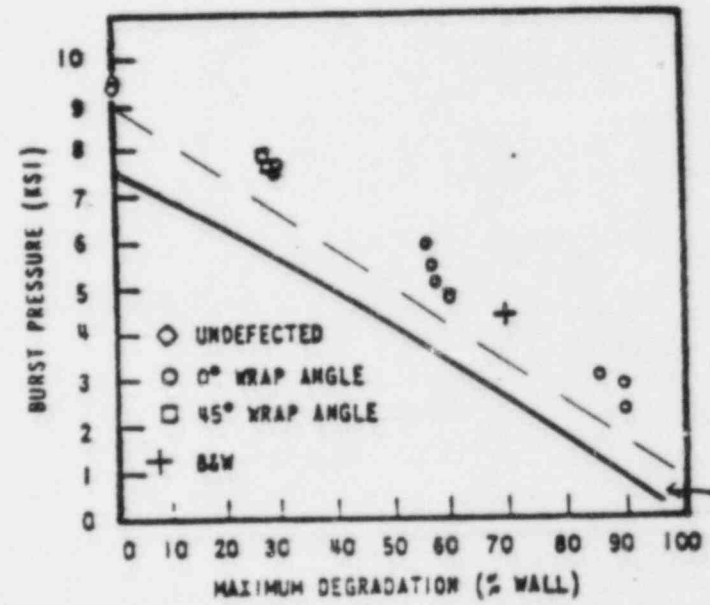
COMPARISON OF PROPOSED TUBE PLUGGING
CRITERIA WITH FAILURE THEORIES FOR AXIAL CRACKS,
TUBE STRESS 1.428 X FAULTED STRESS



COMPARISON OF PROPOSED TUBE
PLUGGING CRITERIA WITH FAILURE THEORIES FOR
AXIAL CRACKS, TUBE STRESS 2.27xOPERATING STRESS,
1.15 X FAULTED STRESS

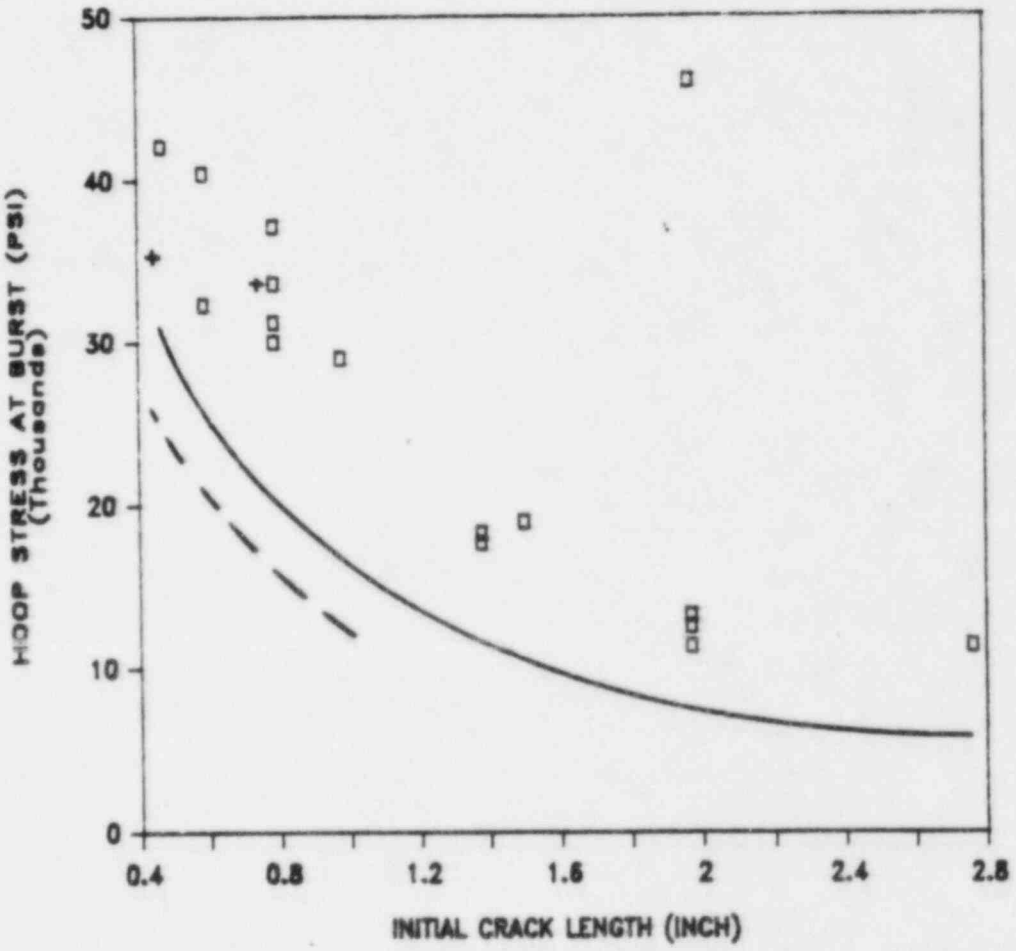


BURST PRESSURES FOR 0.625 x 0.034 IN. EDM SLOTS



BURST PRESSURES FOR 0.625 x 0.034 IN. ELLIPTICAL WASTAGE

BURST TEST RESULTS AND PREDICTIONS FOR TUBES WITH PART THROUGH-WALL DEFECTS



□ 0.050 inch wall thickness data [11]
—— 0.050 inch wall thickness prediction
\+ 0.030 inch wall thickness data [12]
--- 0.030 inch wall thickness prediction

BURST TEST RESULTS AND PREDICTIONS FOR
TUBES WITH THROUGH-WALL DEFECTS

AXIAL CRACK CONCLUSIONS

- PROPOSED TUBE PLUGGING CRITERIA MEET REG. GUIDE 1.121 RECOMMENDED MARGINS FOR ALL CRACK SIZES EXCEPT SOME DEEP CRACKS ($\geq$60% OF WALL)

- BASED ON FAILURE THEORIES AND MIN. MATERIAL PROPERTIES, MARGINS ARE:

NORMAL OPERATING	2.27
FAULTED	1.15

- TUBE BURST TEST DATA SHOW SIGNIFICANT MARGINS OVER PREDICTIONS (BASED ON METHODS USED TO EVALUATE PROPOSED PLUGGING CRITERIA)

OVERVIEW:

OTSG TUBE PLUGGING CRITERIA PROPOSED BY GPUN CONTAIN MARGINS TO FAILURE EQUAL TO OR GREATER THAN

- REG. GUIDE 1.121 RECOMMENDED MARGINS
- MARGINS INHERENT IN 40% OF WALL PLUGGING CRITERION

POSSIBLE EXCEPTION TO THIS CONCLUSION IS DEEP, RELATIVELY SHORT, AXIAL CRACKS. BURST TEST DATA SHOW THAT MARGIN INHERENT IN EVALUATION METHODS MAKES UP FOR THIS DISCREPANCY.

PURPOSE

I. REVIEW OF ECT RESULTS TO DETERMINE:

1. IF CORROSION IS ACTIVE
2. IF KNOWN INDICATIONS ARE PROPAGATING

II. REVIEW OF 1982, 1984, AND 1986 ECT RESULTS

III. REVIEW OF THE 8X1 ECT CAPABILITIES

1. SENSITIVITY
2. EXTENT OF COVERAGE

IV. FUTURE EXAMINATIONS REQUIREMENTS

1. T.S. SAMPLES
2. AUGMENTED EXAMS

Review of 1982, 1984, 1986
Eddy Current Examination Results

	1982		1984		1986	
Generator	A	B	A	B	A	B
Number Tubes Examined/ Percent	15,530 100%	15,530 100%	14,615 100%	6,500 42%	1,500 10%	1,219 8%
Number Tubes Removed from Service	885	273	298	30	16	15
Number of Degraded Tubes	13*	50*	266*	44*	170	22

NOTE: Examinations performed following kinetic expansion (1983) and detection of leakage (July 1984) are not included.

* Many indications conservatively included as degraded conditions in 1982 and 1984 have been determined to be non-relevant during subsequent examinations.

ECT EVALUATIONS

- RESULTS OF 1984 INSPECTION DOCUMENTED IN TDR 652 CONCLUDED THAT NO SIGNIFICANT TREND OF THROUGH WALL GROWTH WAS ESTABLISHED
  - ECT DATA COMPARISON FROM 1982 TO 1984 SHOWS A DECREASE IN THROUGH WALL PENETRATION OF 6.9%
  - MAJORITY OF INDICATIONS FIRST IDENTIFIED IN 1984 WERE DETECTABLE IN 1982 AFTER REANALYSIS
  - 1982 SIGNAL AMPLITUDES WERE LESS THAN A 3:1 SIGNAL TO NOISE RATIO
  - INDICATIONS WITH SIGNAL AMPLITUDES LESS THAN 3:1 WOULD BE OVERCALLED FOR THROUGH WALL DEPTH

- THE 1986 RESULTS
  - NO NEW CORROSION
  - ISI SUBSET REVEALS NO PROPAGATION
  - RANDOM 3% SAMPLE INSPECTION REVEALS ONLY 1 TUBE FOR REMOVAL FROM SERVICE
  - INSPECTIONS FROM HIGH DEFECT AREAS REVEALED SOME MINOR REFINEMENTS REQUIRED (13 TUBES REMOVED)

Characterization Of 1982, 1984, 1986 Eddy Current Indications *

	OTSG	1982	1984	1986
Indication Amplitude (Voltage)	A	76% <2 volts	75% <2 volts	91% <2 volts
	B	51% <2 volts	47% <2 volts	57% <2 volts
Percent Through Wall	A	50% >90% T.W. 96% >40% T.W.	2% >90% T.W. 40% >40% T.W.	1 tube >90% T.W. 6 tubes >40% T.W.
	B	16% >90% T.W. 60% >40% T.W.	1% >90% T.W. 27% >40% T.W.	3 tubes >90% T.W. 9 tubes >40% T.W.
Circumferential Extent	A	Indications Ranged 1-8 coils	Indications Ranged 1-3 coils	Indications Ranged 1-2 coils
	B	Indications Ranged 1-8 coils	Indications Ranged 1-3 coils	Indications Ranged 1-3 coils

NOTE: 1986 data does not include indications in previously degraded tubes.

LOCATION OF 1982, 1984, 1986
EDDY CURRENT INDICATIONS

	1982	1984	1986
RADIAL DISTRIBUTION	OUTER PERIPHERY OF BOTH A & B	OUTER PERIPHERY OF BOTH A & B	OUTER PERIPHERY AND ALONG LANE AREA OF BOTH A & B
AXIAL DISTRIBUTION	MOST IN UTS AND 16TH SPAN BOTH A & B	MOST IN UTS AND 16TH SPAN BOTH A & B	MOST IN UTS AND AND 16TH SPAN BOTH A & B

EFFECT OF SIGNAL TO NOISE ON
ECT SIGNAL INTERPRETATION

- ECT INDICATIONS OF AMPLITUDES LESS THAN THREE TO ONE SIGNAL TO NOISE (S/N) RATIOS RESULTS IN OVERCALLING THROUGH WALL (T/W) DEPTH

  - METALLURGICAL ANALYSIS RESULTS REVEALS

    1) INDICATIONS WITH SIGNAL AMPLITUDE OF LESS THAN 3:1 S/N RATIO - MEAN OVERCALL OF 31%

    2) INDICATIONS SIGNAL AMPLITUDE EXCEEDING 1 VOLT (3:1 SIGNAL TO NOISE) - MEAN OVERCALL OF 3.8% T.W.

- GROWTH PROGRAM (INDICATION FIRST SEEN IN 1984 - REANALYSIS OF 1982 REVEALS PRESENCE)

  CONCLUSIONS:

  A) MEAN AMPLITUDE + 1.0 VOLT INCREASE

  B) THROUGH WALL - 6.9%

  C) SUBSET OF NOMINAL 2:1 S/N REVEALS THROUGH WALL - 4.3%

- DEGRADED TUBES (HIGH AMPLITUDE INDICATIONS IN 1983 AND 1984)

  CONCLUSIONS:

  A) MEAN AMPLITUDE + 0.9 VOLTS INCREASE

  B) THROUGH WALL + 2.9% INCREASE

1986 ECT RESULTS
TMI-1

INSPECTION POPULATION	TOTAL TUBES INSPECTED			NO. OF TUBES INDICATIONS <50% AND ≥20%*			NO. OF TUBES INDICATIONS ≥50%*		
	A	B	TOTAL	A	B	TOTAL	A	B	TOTAL
ISI TUBES (1984 INDICATIONS <40%)	266	44	310	170	22	192	0	2	2
.540 SD INDICATIONS NOT CONFIRMED BY 8X1 IN 1984	228	50	278	21	2	23	3	0	3
LANE/WEDGE REGION	414	473	887	2	2	4	1	7	8
HI DEFECT/PLUG AREAS	113	169	282	1	2	3	0	0	0
3% RANDOM SAMPLE	479	483	962	1	3	4	1	0	1
TOTAL	1500 10%	1219 8%	2719 9%				5	9	14

* CONFIRMED BY THE 8x1 EXAM.

STATISTICAL EVALUATION OF DEGRADED TUBES

OTSG	Number Indications	No Inds % T.W. Increased 84-86	No Inds % T.W. Decreased 84-86	No Inds % T.W. Unchanged 84-86	Mean Change % T.W. 84-86	Std Deviation % T.W. 84-86
A	139	33	96	10	-3.0	6.1
B	13	6	3	4	+2.2	4.1
Both A&B	152	39	99	14	-2.6	6.1

DETERMINATION OF CIRCUMFERENTIAL EXTENT

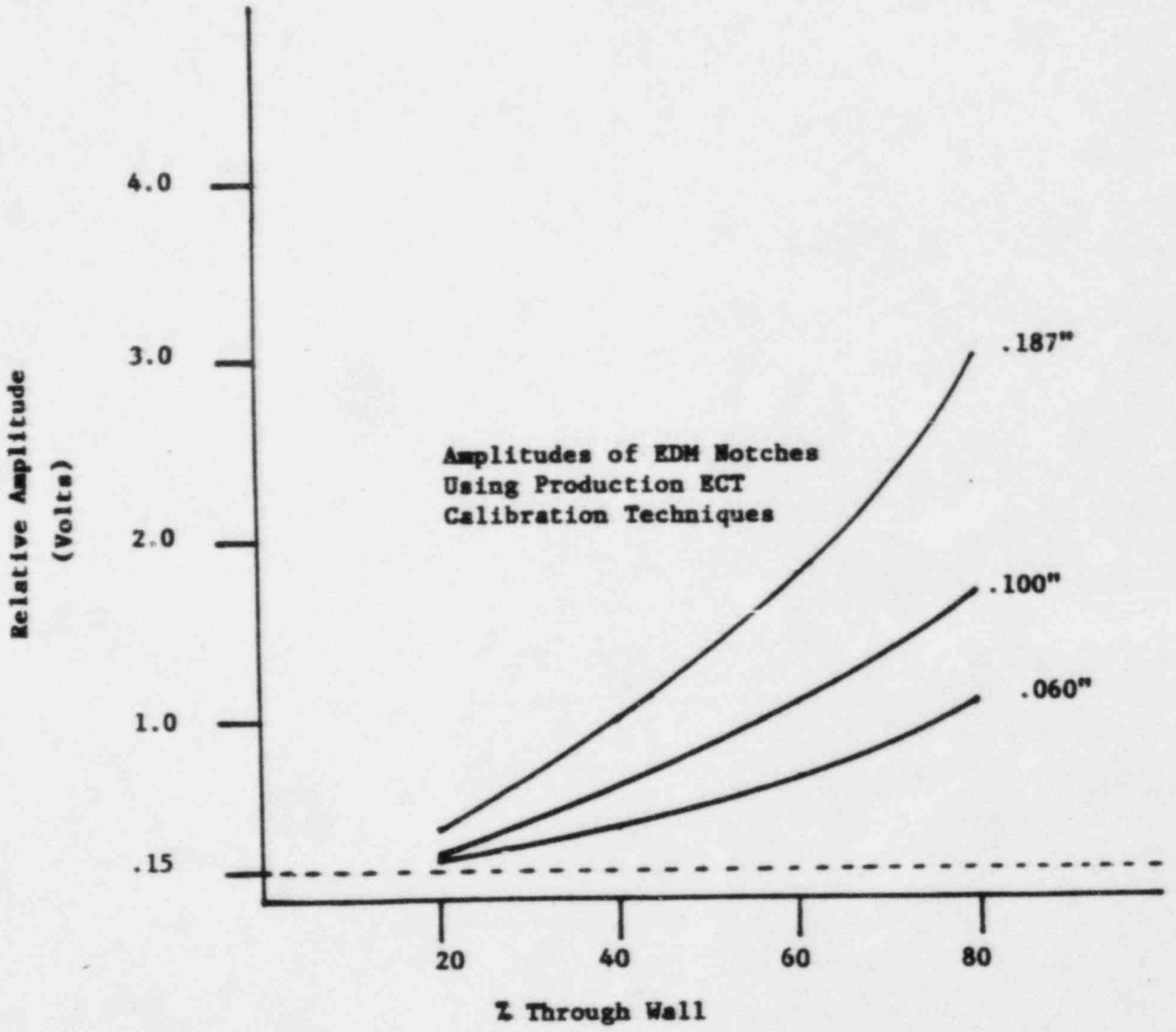
- THE 8X1 TECHNIQUE CAN MEASURE THE CIRCUMFERENTIAL EXTENT OF AN INDICATION.

- CIRCUMFERENTIAL EXTENT IS NOT NECESSARILY THE LENGTH OF THE INDICATION. THE DISPOSITION OF THE TUBE IS BASED ON THE CIRCUMFERENTIAL EXTENT, NOT THE LENGTH.

- THE DETERMINATION OF CIRCUMFERENTIAL EXTENT IS BASED UPON THE NUMBER OF COILS WHICH RESPOND WITH A GIVEN AMPLITUDE SIGNAL.

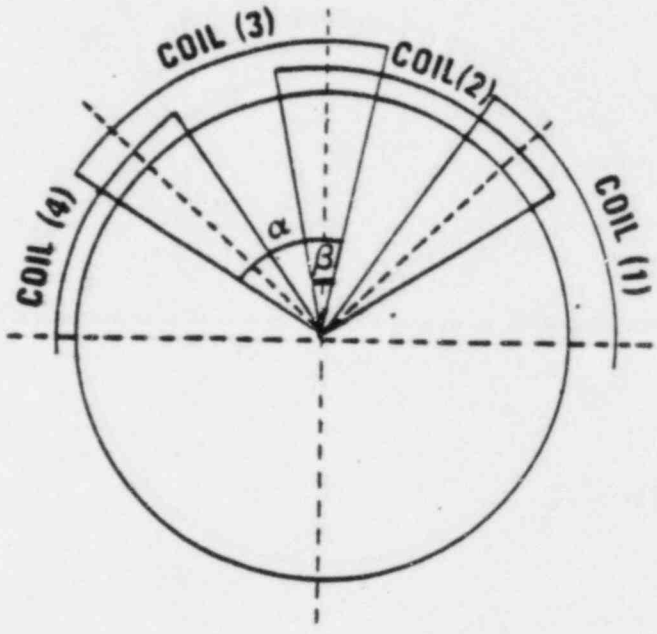
- WHEN DETERMINING CIRCUMFERENTIAL EXTENT OF CONFIRMED INDICATIONS, COIL RESPONSES OF ANY AMPLITUDE GREATER THAN .15 VOLTS ARE EVALUATED. THIS IS MORE CONSERVATIVE THAN THE .3 VOLT THRESHOLD USED TO ESTABLISH 360° COVERAGE.

AMPLITUDE OF 8x1
ABSOLUTE (.187" COILS)



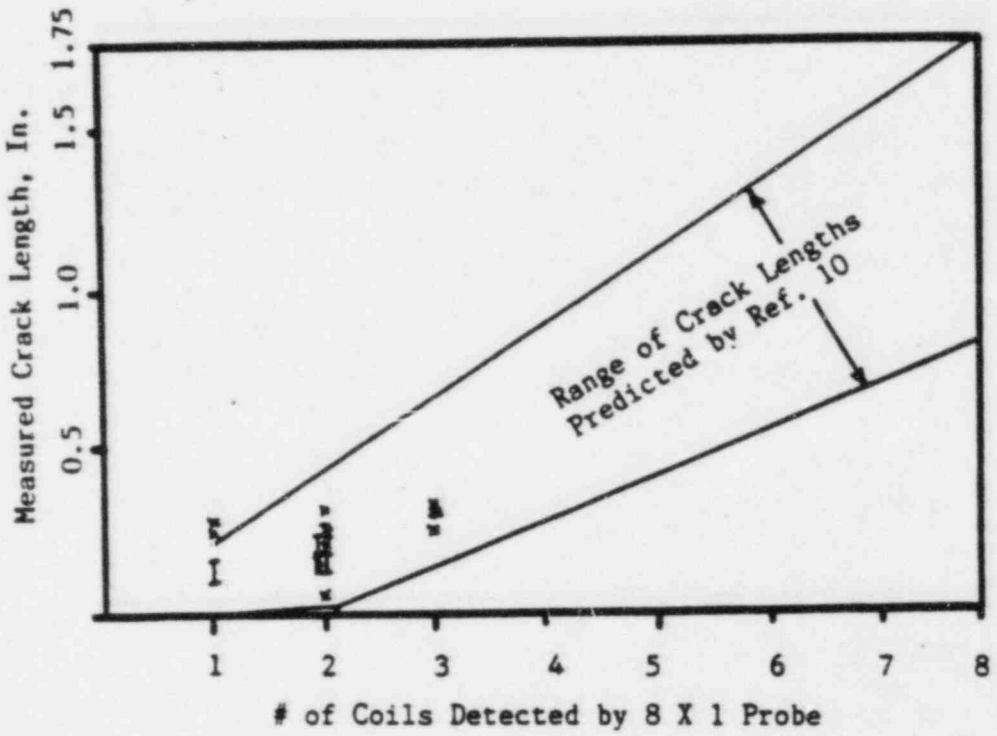
8 x 1° PROBE THRESHOLD OF DETECTION

Tube OD	.625
Min. wall X (2)	.068
Tube ID	.557
Circumf ID	1.75
Coil dia.	.187
1 volt peak calibration	
.300 volt response	
50° coverage per coil	α
5° overlap	β



COILS	MAXIMUM		MINIMUM	
			Threshold of	Detection
1	< 40°	.194"	|5°|	.024"
2	< 85°	.413"	> 45°	.219"
3	<130°	.632"	> 90°	.438"
4	<175°	.851"	>135°	.656"
5	<220°	1.07"	>180°	.875"
6	<265°	1.29"	>225°	1.09"
7	<310°	1.51"	>270°	1.31"
8	360°	1.75"		

MEASURED IGSAC LENGTH
VERSUS NUMBER OF COILS
(8x1 ABSOLUTE)
REFERENCE TDR 686



POSSIBLE FACTORS ASSOCIATED WITH MEASUREMENT ERROR

1. PRECISION OF METALLURGICAL MEASUREMENTS
2. ORIENTATION OF IGSAC, LENGTH IS NOT EQUAL TO CIRCUMFERENTIAL EXTENT
3. VARIATIONS IN PROBE SPEED RESULTS IN
   1-2 COIL INDICATION BEING RECORDED AS
   2-1 COIL INDICATIONS.

NOTE: THE INDICATIONS SHOWN TO BE UNDERCALLED ABOVE, ARE FROM A TUBE WITH MULTIPLE INDICATIONS AND WOULD HAVE BEEN COMBINED WITH ADJACENT INDICATIONS AND THE TUBE DISPOSITIONED PROPERLY.

OUTAGE 6R SCOPE
(AS CONTAINED IN TR-008)

INSPECTIONS CONSIDERED "TECH SPEC" EXAMINATIONS

INSPECTION POPULATION	ECT TECHNIQUES/ LENGTH OF INSPECTION	COMMENTS
- DEGRADED TUBES ALL TUBES WITH INDICATIONS $\geq$ 20% T.W. AND $<$ 50% T.W. FROM PREVIOUS INSPECTIONS	A) .540" H.G.S.D/FULL LENGTH B) 8X1 ABSOLUTE/AREA OF .540 INDICATIONS	
- RANDOM SAMPLE 3% OF ALL TUBES REMAINING IN SERVICE IN EACH OTSG	A) .540" H.G.S.D/FULL LENGTH B) 8X1 ABSOLUTE/AREAS OF .540 INDICATIONS	

OUTAGE 6R SCOPE
(AS CONTAINED IN TR-008)

INSPECTIONS CONSIDERED "AUGMENTED" EXAMINATIONS

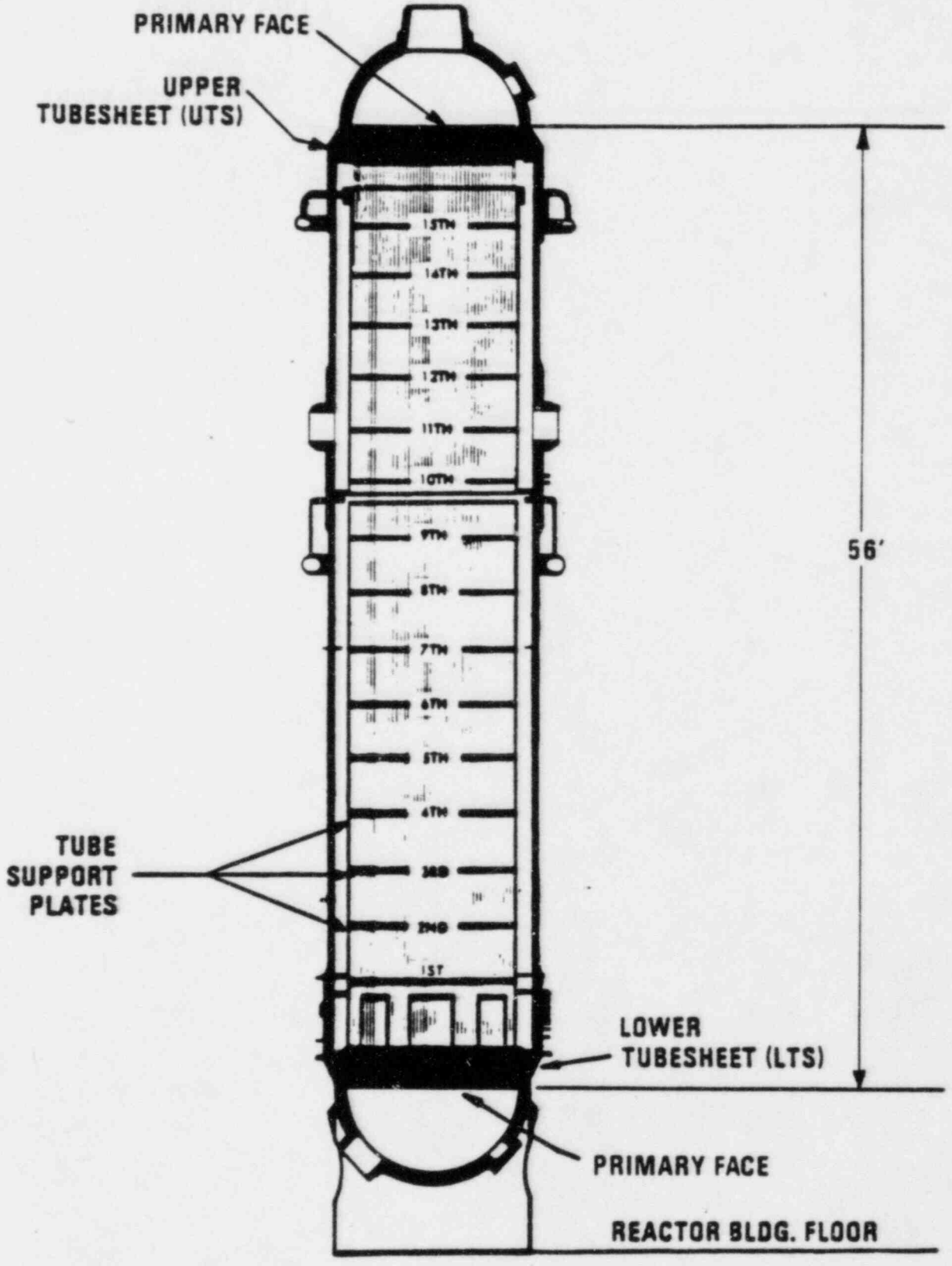
INSPECTION POPULATION	ECT TECHNIQUES/ LENGTH OF INSPECTION	COMMENTS
1 - WEAR INSPECTIONS		
(A) ALL TUBES ADJACENT TO 10 SELECTED PLUGGED BUT NOT STABILIZED TUBES WITH DEFECTS IN THE 15TH. 10TH AND 1ST SPANS IN EACH OTSG	A) .540" H.G.S.D/FULL LENGTH B) 8X1 ABSOLUTE/AS NECESSARY TO FURTHER CHARACTERIZE .540" INDICATIONS	SAME TUBES EXAMINED DURING OUTAGE 5M (1986)
(B) ALL TUBES ADJACENT TO 10 SELECTED PLUGGED BUT NOT STABILIZED TUBES IN THE PERIPHERY OF EACH OTSG	SAME AS ABOVE	SAME AS ABOVE
(C) ALL TUBES ADJACENT TO 5 PLUGGED TUBES WITH 3.0 VOLT INDICATIONS IN THE LOWER PART OF EACH OTSG	SAME AS ABOVE	SAME AS ABOVE
2 - HIGH DENSITY PLUGGING AREA 50 TUBES IN HIGH DENSITY PLUGGING AREAS IN EACH OTSG	A) .540" H.G.S.D/FULL LENGTH B) 8X1 ABSOLUTE/AS NECESSARY TO CONFIRM 540 INDICATIONS	SAME TUBES EXAMINED IN OUTAGE 5M (1986)

OUTAGE 6R SCOPE
(AS CONTAINED IN TR-008)

INSPECTIONS CONSIDERED "AUGMENTED" EXAMINATIONS

INSPECTION POPULATION	ECT TECHNIQUES/ LENGTH OF INSPECTION	COMMENTS
3 - TUBESHEET EXAMS TUBES WITH NEW INDICATIONS IN THE 6" QUAL. LENGTH IN EACH OTSG	A) 8X1 ABSOLUTE/6" QUALIFICATION LENGTH	SAME TUBES EXAMINED IN OUTAGE 5M IN ADDITION TO ANY NEW INDICATIONS FOUND DURING 5M
THE STATUS OF THE FOLLOWING INSPECTION HAS NOT BEEN DETERMINED. E.G., MAY OR MAY NOT BE REPEATED DURING OUTAGE 6R		
1 - 3% OF TUBES IN EACH OTSG	A) 8X1 ABSOLUTE/TOP OF 6" QUAL. LENGTH TO LOWER SURFACE OF UTS	

OTSG Longitudinal Section



DMB-016

MEETING SUMMARY DISTRIBUTION

Licensee: GPU Nuclear Corporation

*Copies also sent to those people on service (cc) list for subject plant(s).

Docket File
NRC PDR
L PDR
PBD-6 Rdg
JStolz
PM
OELD
EJordan
BGrimes
ACRS-10
NRC Participants
JThoma
JRojan
RWeller
CMcCracken
DCrutchfield
HConrad
CYCheng
KWichman
MWagner
WPaulson
EMurphy
PCortland