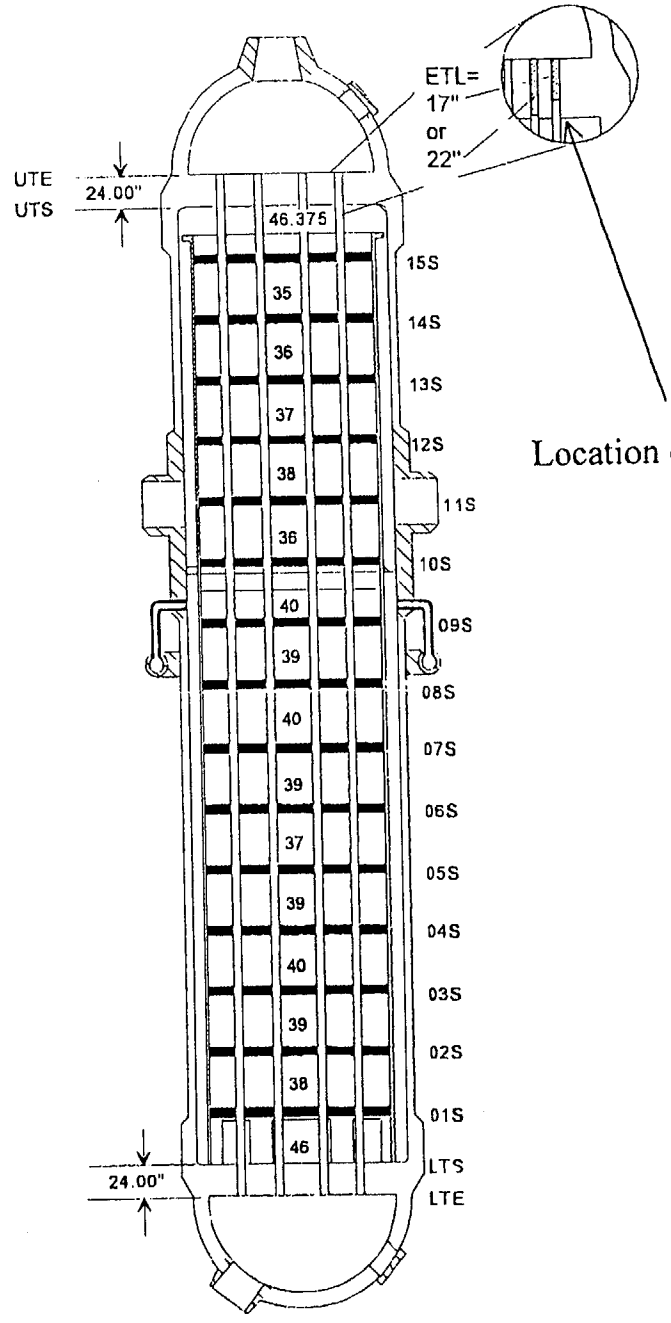
TMI Tube R66-T130 SG B Update

10/26/01

Enclosure 3

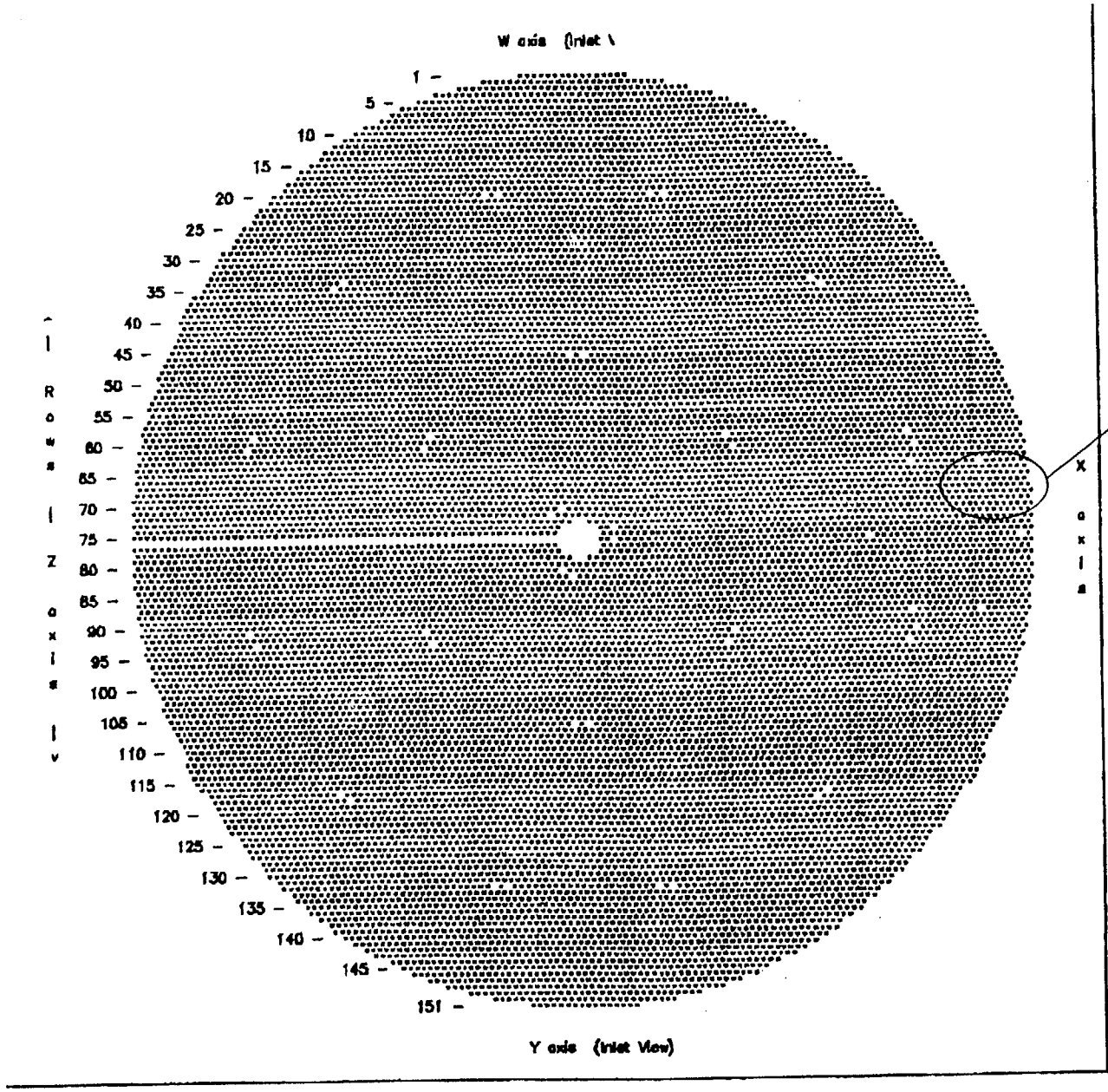
Background

- Bobbin inspection identified 4 tubes with OD wear at secondary face of upper tube sheet, confirmed through Plus Point
- Based on pattern of wear on adjacent tubes plugged tube R66-T130 was suspected (see drwg next page)
- Tube R66-T130
  - Plugged in 1986 (1R5) due to ID/IGA near 5th TSP
  - No degradation identified at UTS based on bobbin and 8x1 probe in 1986
  - UTS I-600 plug was replaced in 1997 (1R12)



Location of tube severance

OTSG Tube Sheet Map



Corrosion Assisted Fatigue

- Review ID and OD corrosion experience of OTSG's
- Perform inspection of deplugged tubes in OTSG A and B outer periphery (high velocity) for unexpected corrosion
- Define a critical flaw size
- Laboratory analysis of pulled tubes to identify failure mechanism

Corrosion

- Deplugged tube inspections
- Tube pull analysis
- Review of Degradation Assessment for industry experience and inspection capabilities
- In situ pressure testing of tubes with corrosion related degradation in vicinity of UTS

Other Potential Failure Mechanisms

- Foreign Objects
  - Secondary side visual inspection in vicinity of R66-T130
  - Laboratory Analysis for failure mechanism
  - Loose parts monitoring
  - ECT data for presence of Foreign Object
- Mechanical Failure
  - Review operating cycle and cooldown history
  - Evaluate tube loads during shutdown
  - Evaluate impact of tube locking at TSP for cooldown loads
  - Tube pull failure mechanism
- Leaking tube plug
  - Tube pull dimensional analysis
  - Primary to secondary leak experience

Tube Pull Plans

- R165-T130 (Largest Wear Scar)
  - Dimensional measurement of wear
  - Leak test leading to potential burst
  - Characterize leak opening
  - Pressure test with bladder over full length of wear
  - Corrosion analysis
  - SEM of fracture surface
  - Correlation to ECT results

Results to Date

- Inspection of deplugged unstabilized tubes in OTSG A and B outer periphery (~outer 3 rows) for unexpected degradation
  - 44 deplugged tubes in OTSG A inspected with +Pt +/- 2" of secondary face of upper tube sheet
    - No unexpected indications - ID/IGA well within repair criteria
  - 20 deplugged tubes in OTSG B to be inspected with +Pt +/- 2" of secondary face of upper tube sheet - 10/29 0900

Neighbor Tube Wear

Tube	Max Depth (%)	Avg. Depth	Length	Calculated Burst Press. (90/50) psi	In Situ Pressure (psi)	In Situ Leak Rate (gpm)
R65-T129	37	30	2"	6000	4350	0
R66-T131	62	25	~8.5"	4000	4360	3.2 @ 450 psi
R67-T130	41	24	~4.6"	5500	4350	0
R65-T130	92	35	~4.6	1800	N/A	N/A

- Structural requirement of 3ΔP is 3950 psi corrected test pressure is 4350 p
- R66-T131 attained the target test pressure of 4350 psi. Prior to reaching the required 2 minute hold time the tube began to leak greater the the test pump capacity
- R66-T131 will be pulled and laboratory tested to determine if a burst occurred
- R65-T130 will be leak and burst tested in the laboratory

of R66-T130

o inspection

ube severed at

be sheet

om upper tube end

dentified

Extent of Condition

- 100% inspection of in service tubes with qualified techniques
- Identification of other plugged and unstabilized tubes in the periphery
- Inspection of deplugged tubes in OTSG A and OTSG B
- Bobbin inspection of severed tube R66-T130
- Identify SG secondary side velocity profiles
- Define critical flaw size

Industry OTSG Feedwater Chemistry Standards

- EPRI Secondary Chemistry Water Chemistry Guideline Limits for OTSG Feedwater
  - Action Level 1 Limits
    - Sodium - 1.0 ppb
    - Chloride - 3.0 ppb
    - Sulfate - 1.0 ppb
    - Iron - 5 ppb
- INPO Industry Median Values for Calculating Chemistry Performance Index (CPI)
  - Sodium - 0.3 ppb
  - Chloride - 0.5 ppb
  - Sulfate - 0.75 ppb
  - Iron - 1.8 ppb

TMI Feedwater Chemistry Cycle 14 Results

Statistical Analysis of All Feedwater Chemistry Results For Cycle 14

	Cl, ppb	Fe, ppb	SO_4, ppb	Na, ppb
Average	0.36	0.73	0.32	0.23
Standard Deviation	0.18	0.49	0.11	0.22
Median	0.30	0.69	0.37	0.21

Data Shows That Feedwater Chemistry Met or Exceeded Industry Standards for Contaminant Control

Summary

- Potential failure mechanisms have been identified
- Actions are being taken to assess the potential root cause
- Impact of root cause on the operational assessment is being considered
- Significant actions being taken to obtain necessary information to support root cause investigation

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