Bottom Mounted Instrument Penetration Condition Resolution

7/17/03

STP Participants

Tom Jordan	VP, Engineering & Tech Services
Mark McBurnett	Manager, Quality & Licensing
Steve Thomas	Manager, Plant Design
Tim Bowman	Unit 1 Operations Manager
Michael Lashley	Test Engineering Supervisor
Bill Humble	NSSS Supervisor
Wayne Harrison	Licensing Engineer
Ulhas Patil	Design Engineer

INTRODUCTORY REMARKS

Mark McBurnett

Manager, Quality & Licensing

Agenda

Introductory Remarks	Mark McBurnett
Summary	Tom Jordan
Root Cause Process and Monitoring / Inspection Plan	Steve Thomas
Return to Service	Tim Bowman

Desired Meeting Outcome

NRC has sufficient information to

complete their assessment

SUMMARY

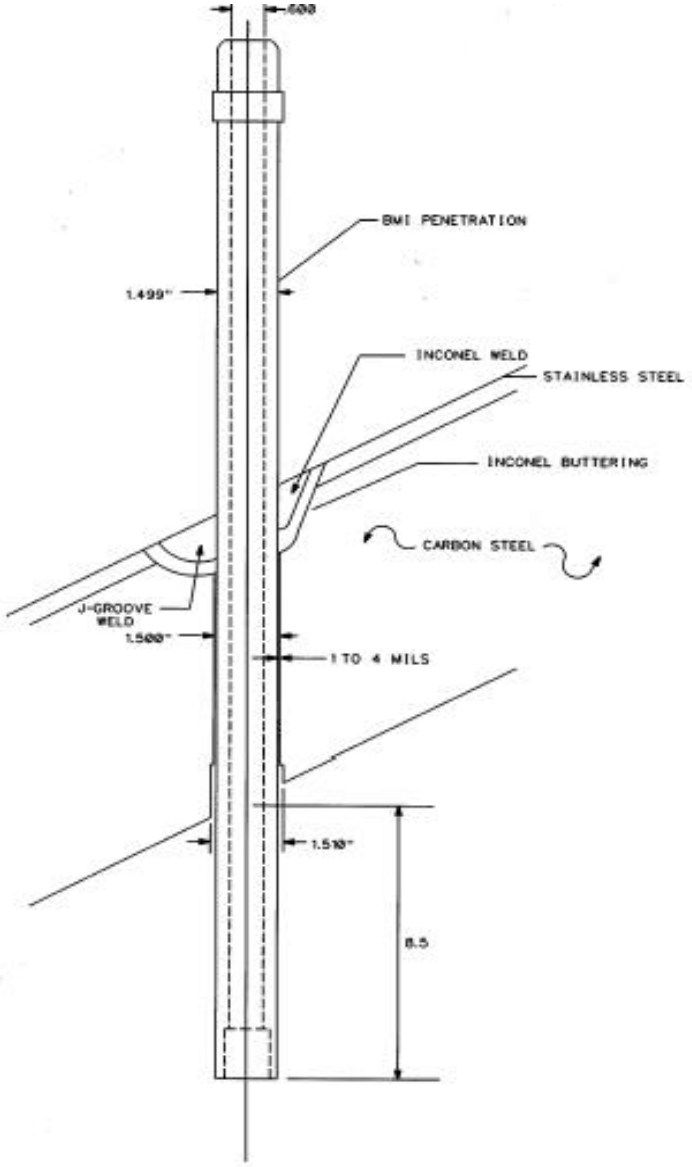
Tom Jordan

Vice President,

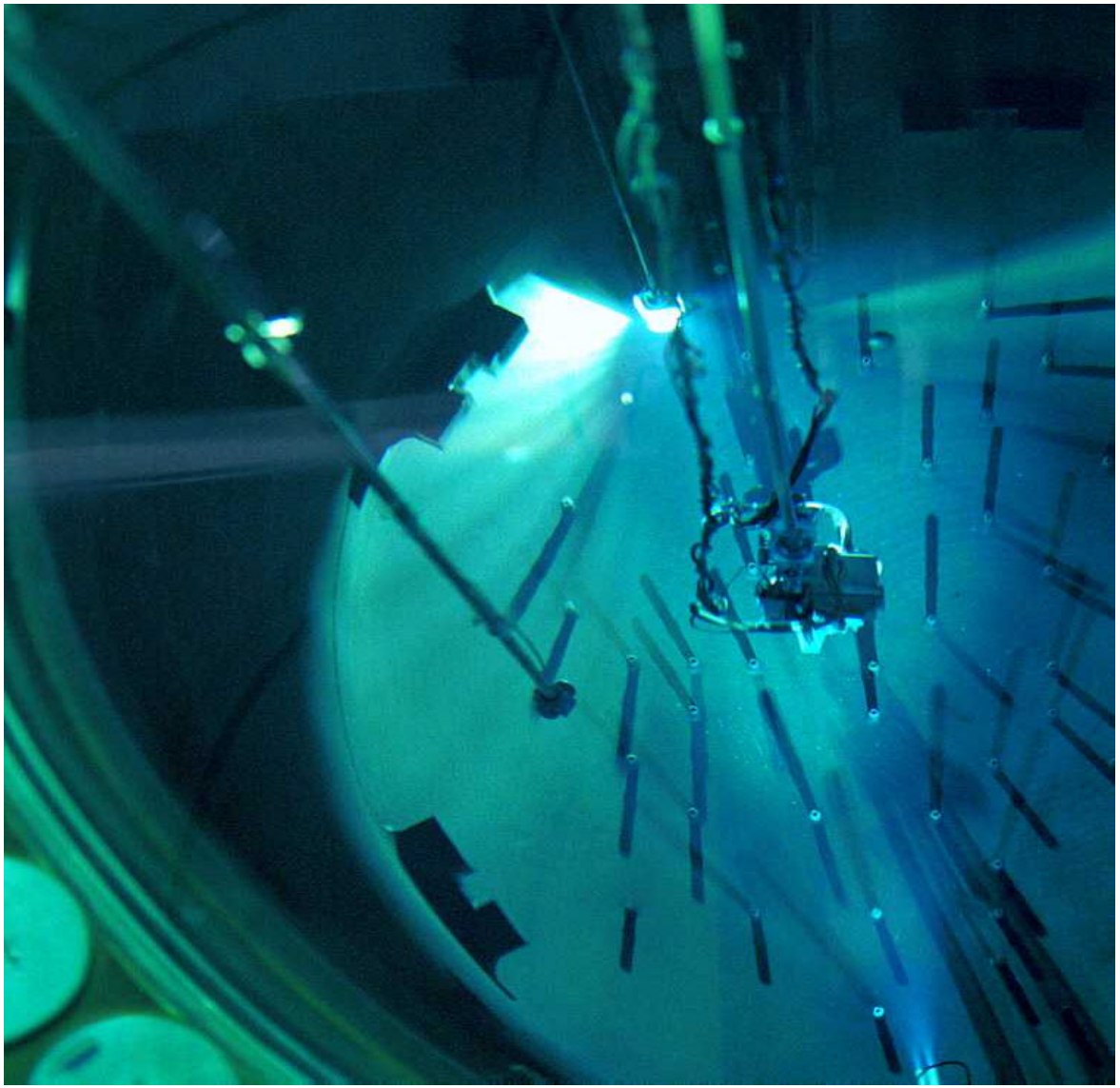
Engineering & Technical Services

Evidence of Very Small Leakage Found in Routine Inspection

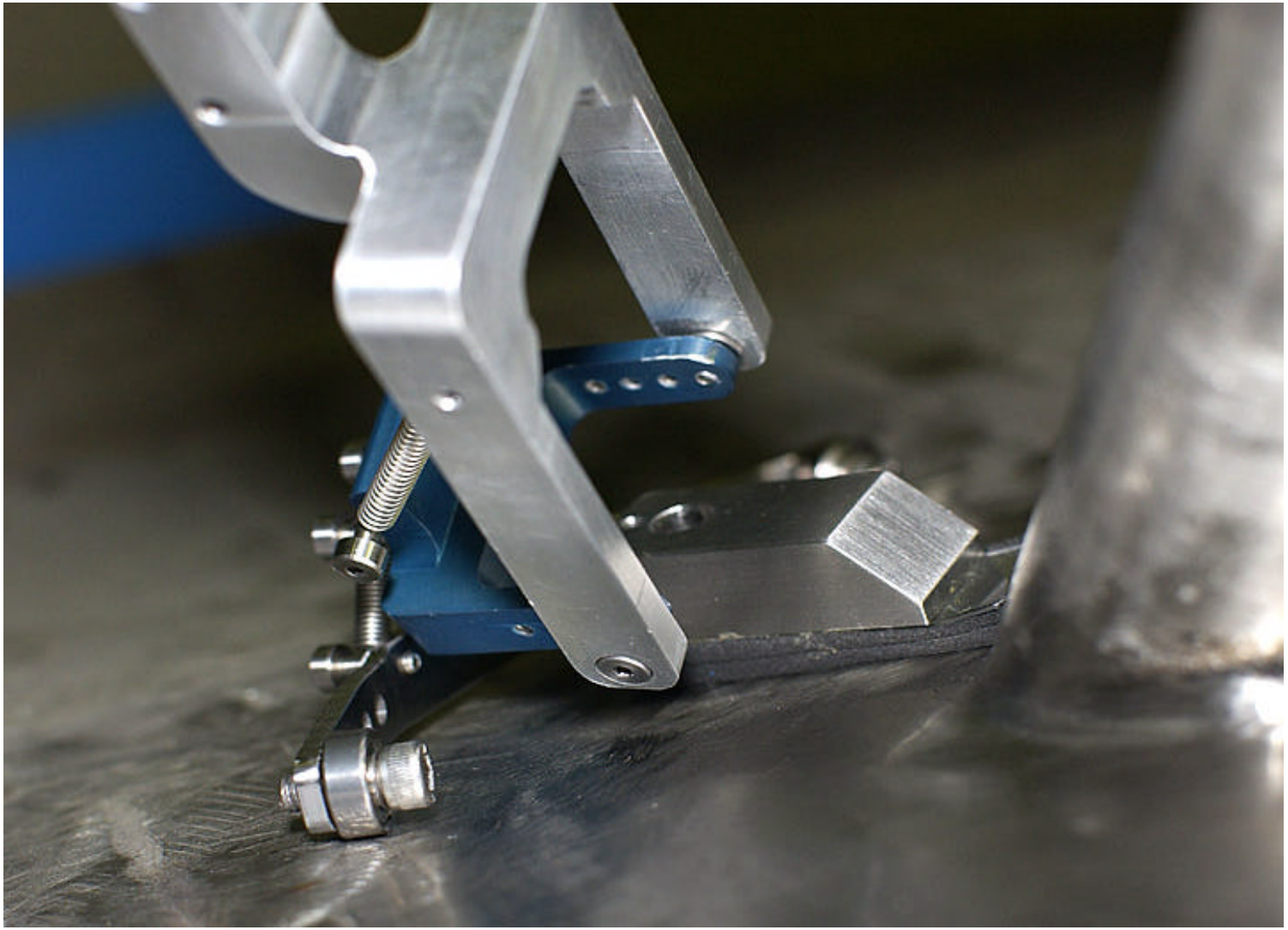
BMI Guide Tube Penetration



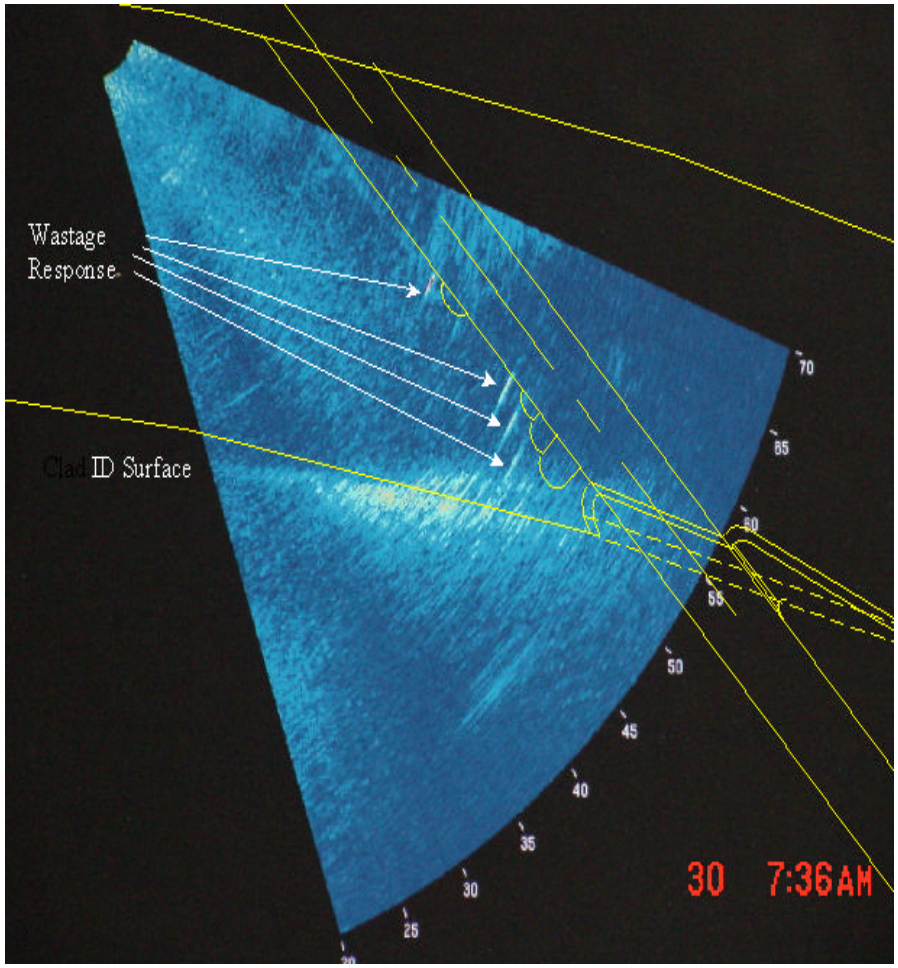
Extensive NDE Campaign Conducted

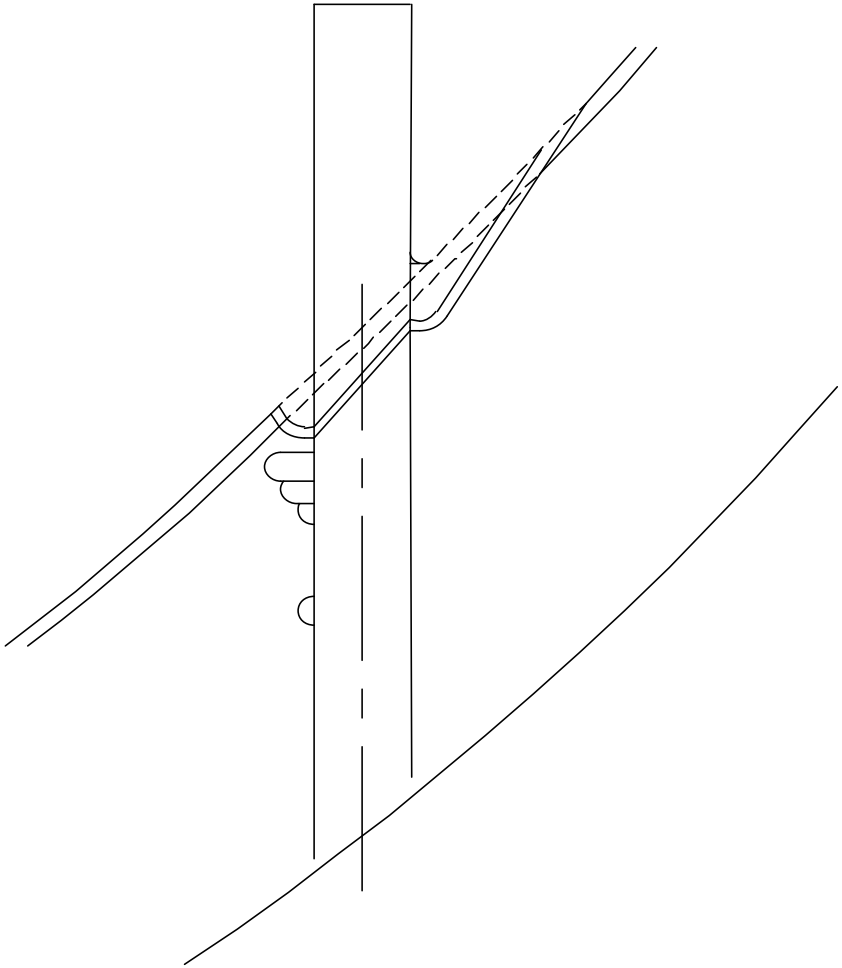


Eddy Current J-Groove Probe



Developed Technology to Identify Wastage





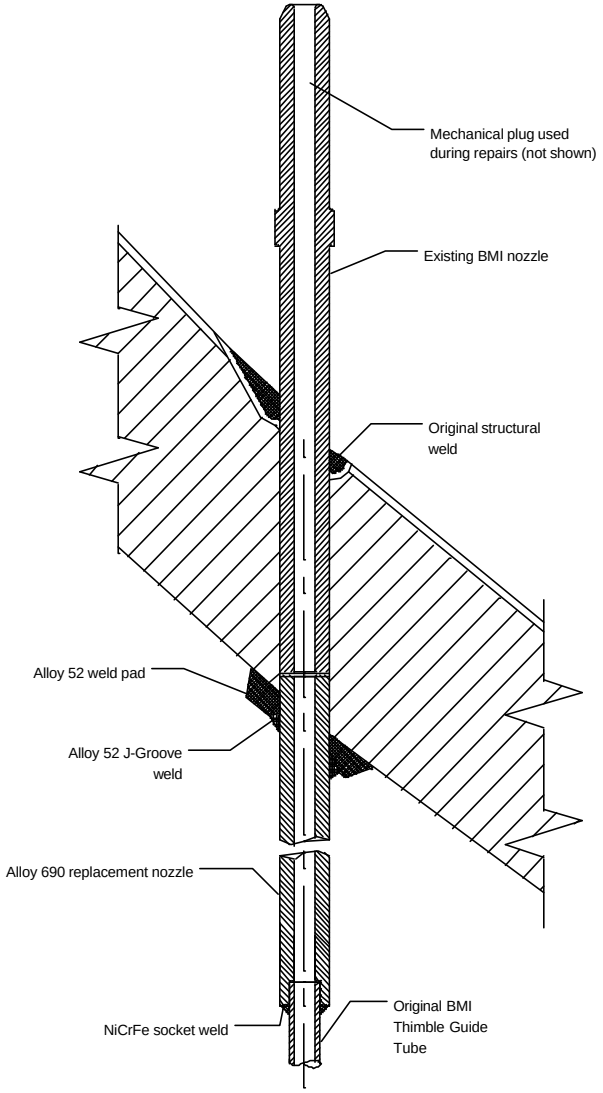
Comprehensive Examination Performed Using Industry Experts

- UT from penetration tube ID
- Enhanced visual exam of J-groove weld surface
- Volumetrically interrogate vessel base metal for wastage
- ET from penetration tube ID
- ET of J-groove weld surface
- Profilometry
- Borescope examinations
- Helium tests
- Metallurgical analyses of removed nozzle remnants
- Boat sample analyses

Examination Results

- Penetration #1
  - Three axial indications, one leak path
- Penetration #46
  - Two axial indications, one leak path

Permanent Half-Nozzle Repair



Repair of Both Nozzles Complete

Remaining Activities

Boat sample analysis	Sep 21
Nozzle remnants analysis	Sep 21
LER supplement	Oct 12

Condition Limited to the Two Identified Nozzles

- Routine inspection identified very low leakage
- Extensive NDE confirmed condition limited to two penetrations
  - Axial cracks in tubes
  - No wastage
- Substantial safety margin existed
- Repairs are complete
- Monitoring / inspection plan developed

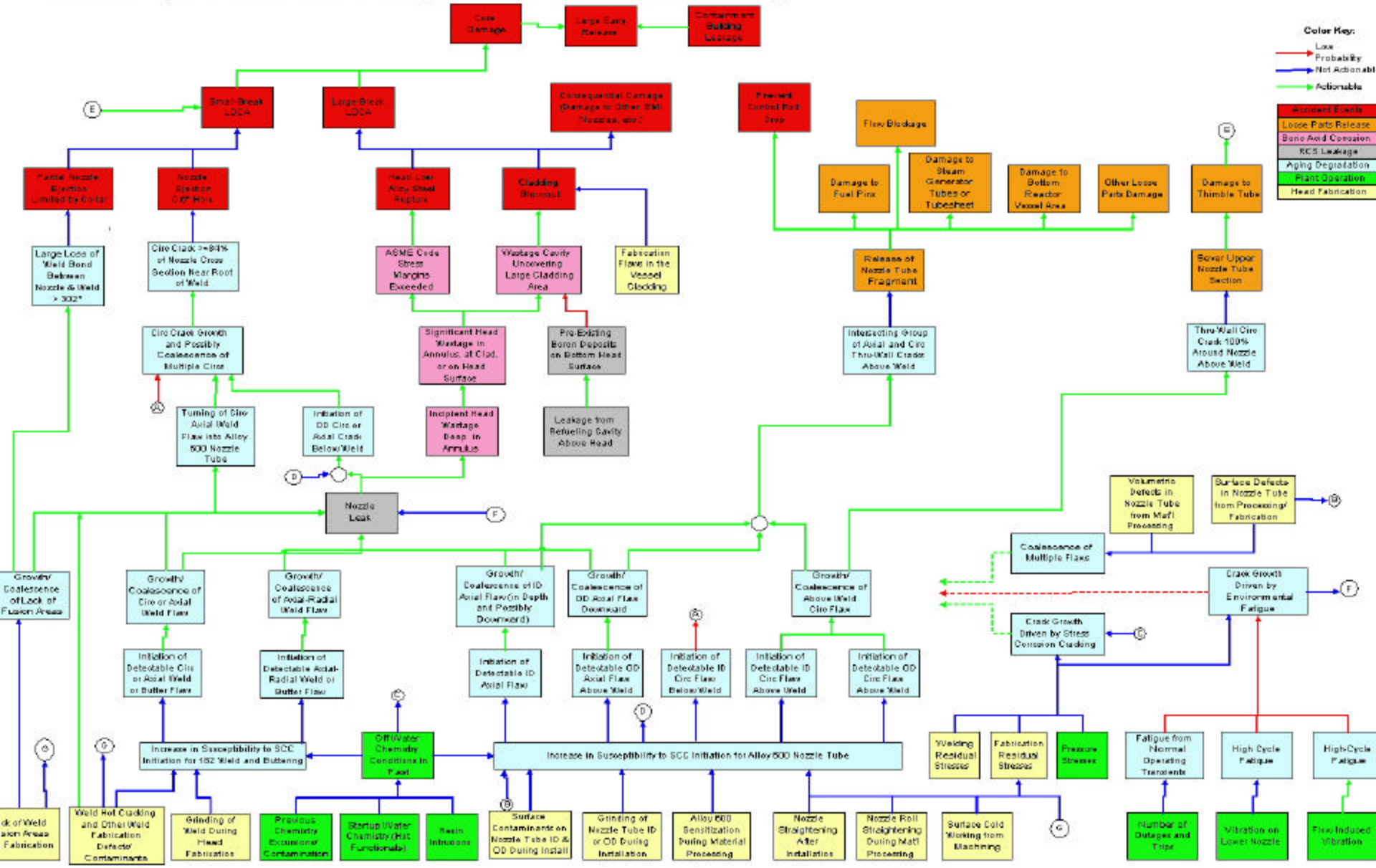
ROOT CAUSE PROCESS and MONITORING / INSPECTION PLAN

Steve Thomas

Manager, Plant Design

South Texas Project's Failure Modes and Effects Analysis for Bottom Mounted Instrument Nozzle Leakage

July 11, 2003

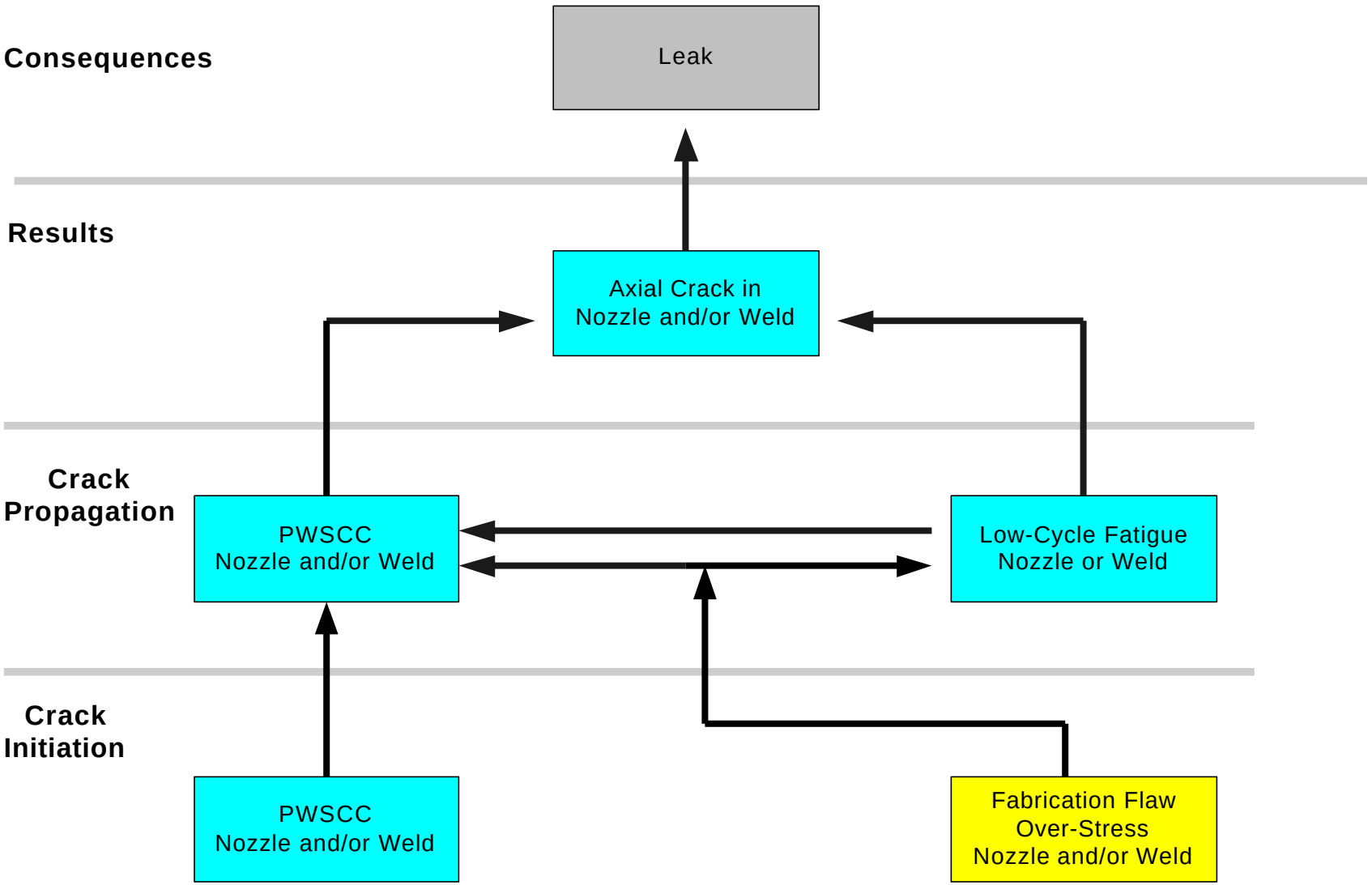


Comprehensive NDE Narrows Consequences

- No circumferential cracks
- No cracks above or below J-groove weld
- No wastage
  - UT examination
  - Visual examination
  - No iron in residue
  - Very small deposits and leak rates

Conclusion: Leakage is the only expected and observed consequence

Two Possible Causes



Facts Inconsistent with PWSCC

- No cracks identified except in #1 and #46
- Cracks relatively old (3-5 yrs), about same age
- Cracks not ID initiated

What Might be Expected Assuming PWSCC

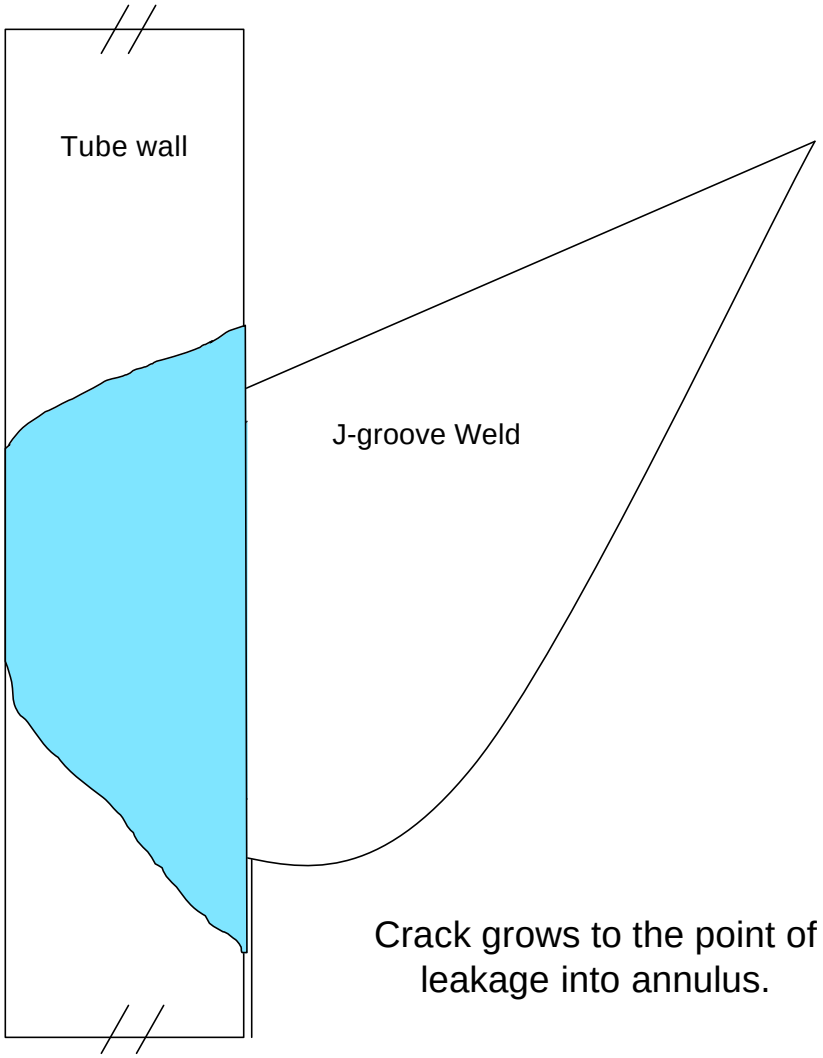
The industry has inspected 543 upper head CRDM nozzles and found 114 TW or partial TW defects.

Therefore, if PWSCC were the cause and STP inspected 58 nozzles, we would expect to find 12 nozzles with TW or partial TW defects.

Facts Suggesting Fabrication Flaws

- Cracks not at highest residual stress locations
- Penetrations #1 and #46 are different in terms of residual stress
- Some cracks do not appear to be in contact with primary water

Crack Propagation Scenario



Boat Sample Objectives

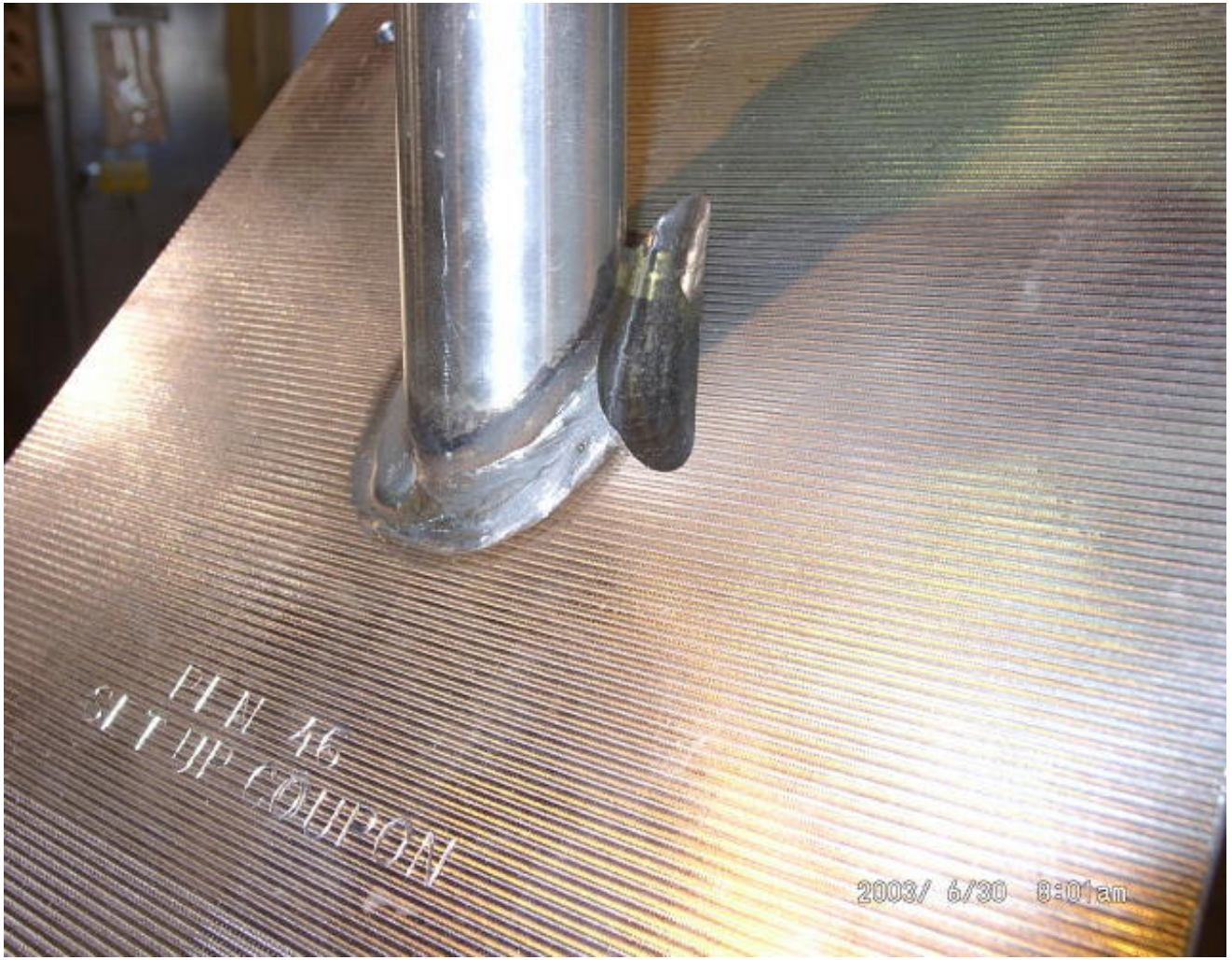
Nozzle 1

- Capture portion of leaking crack including part of nozzle wall, part of weld, and site of observed helium leakage

Nozzle 46

- Capture portion of crack shown by UT not to connect with the surface

Mock-up Penetration #46 Boat Sample



Monitoring / Inspection Plan Confirms Effective Corrective Action

- Continue bare metal visual inspections under boric acid control program
- Perform UT and EVT of penetrations at next Unit 1 vessel inservice inspection
- Perform periodic UT of vessel base material around repaired penetrations
- Perform volumetric examination of Unit 2 penetrations at next refueling outage with core barrel removal

Condition Limited to the Two Identified Nozzles

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RETURN to SERVICE

Tim Bowman

Unit 1 Operations Manager

Unit 1 is Ready to Return to Service

- Extent of condition known
- Probable causes identified
- Engineering work complete
- Condition corrected
- Confidence in repair
- Plant staff prepared