Savannah River Remediation

We do the right thing.

SRS Tank Structural Integrity Program

Presentation to:
EM Waste Processing Technical Exchange

Date: November 17, 2010
Author: Matthew Maryak, PE
Position: Senior Technical Adviser
Savannah River Remediation

SRR-MS-2010-00240

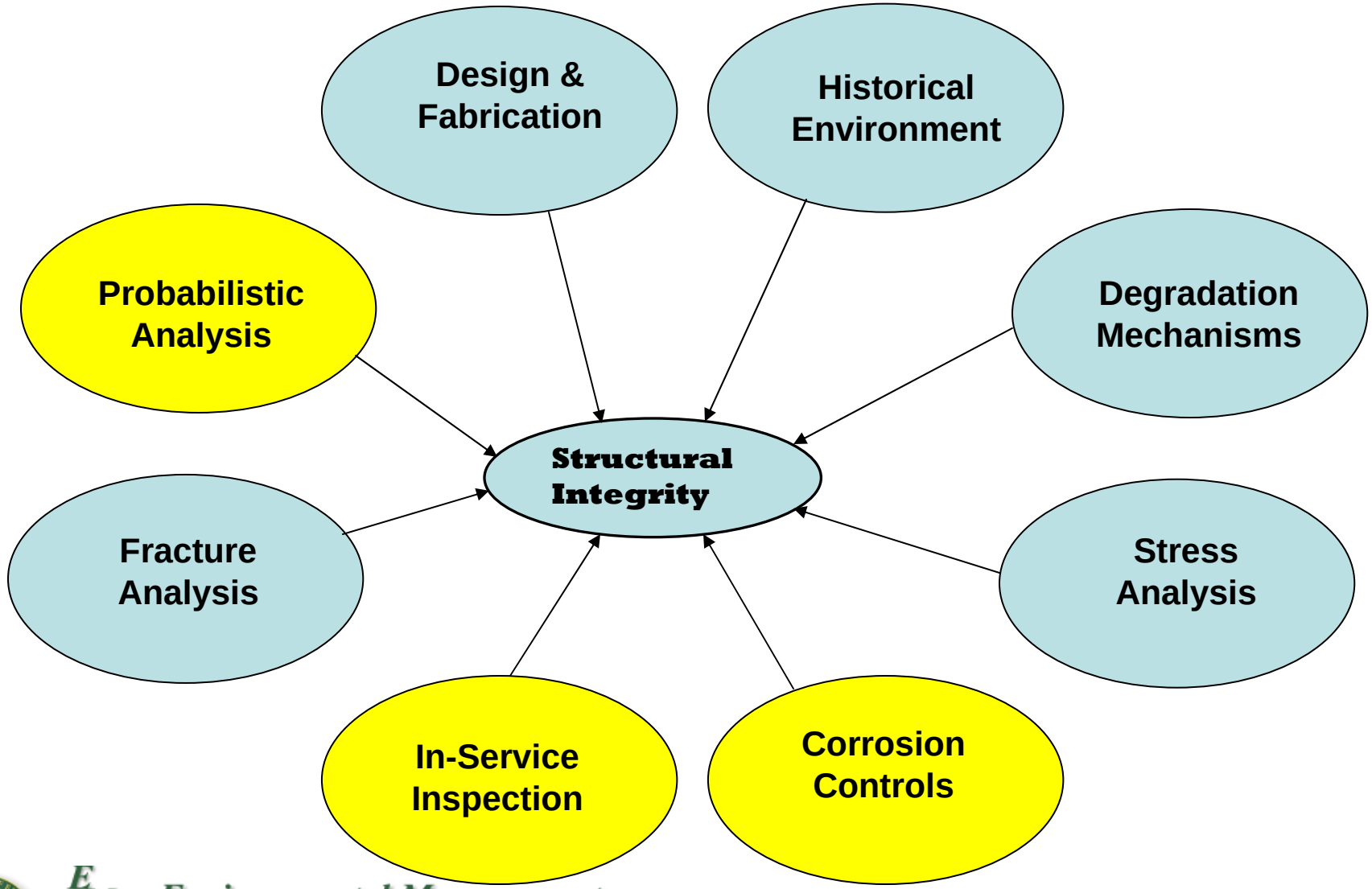
Over View

- Mission
- Tank Integrity Program
- Tank Details
- Corrosion Control Program
- Historical Inspection Results
- Independent Panel Assessment
- Assimilation of Panel Comments
- Recent Analysis Results
- Conclusions
- Where to Now?

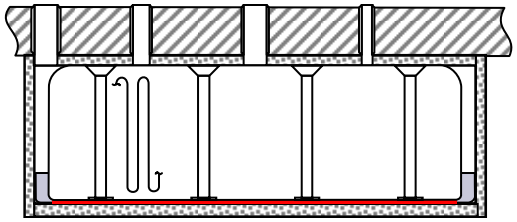
Mission

- Mission of Structural Integrity Program: To ensure continued safe management and operation of the waste tanks for whatever period of time these tanks are required.

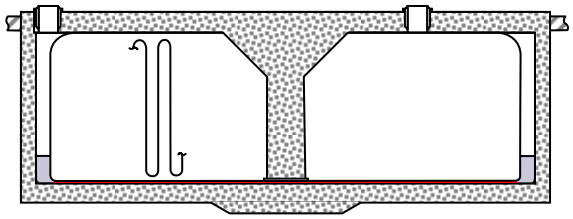
SI Program Elements



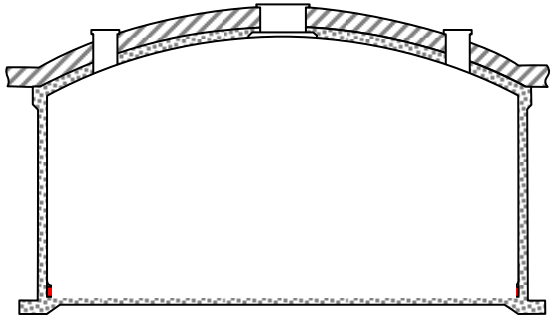
Waste Tanks



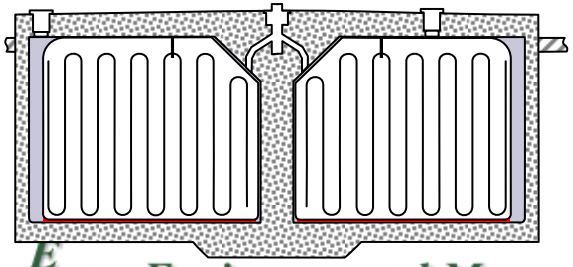
Type I (12)
Old Style
750 kgal
1951-1953



Type II (4)
Old Style
1.0 Mgal
1955-1956



Type IV (8)
Old Style
1.3 Mgal
1956-1960



Type III (27)
New Style
1.3 Mgal
1966-1981

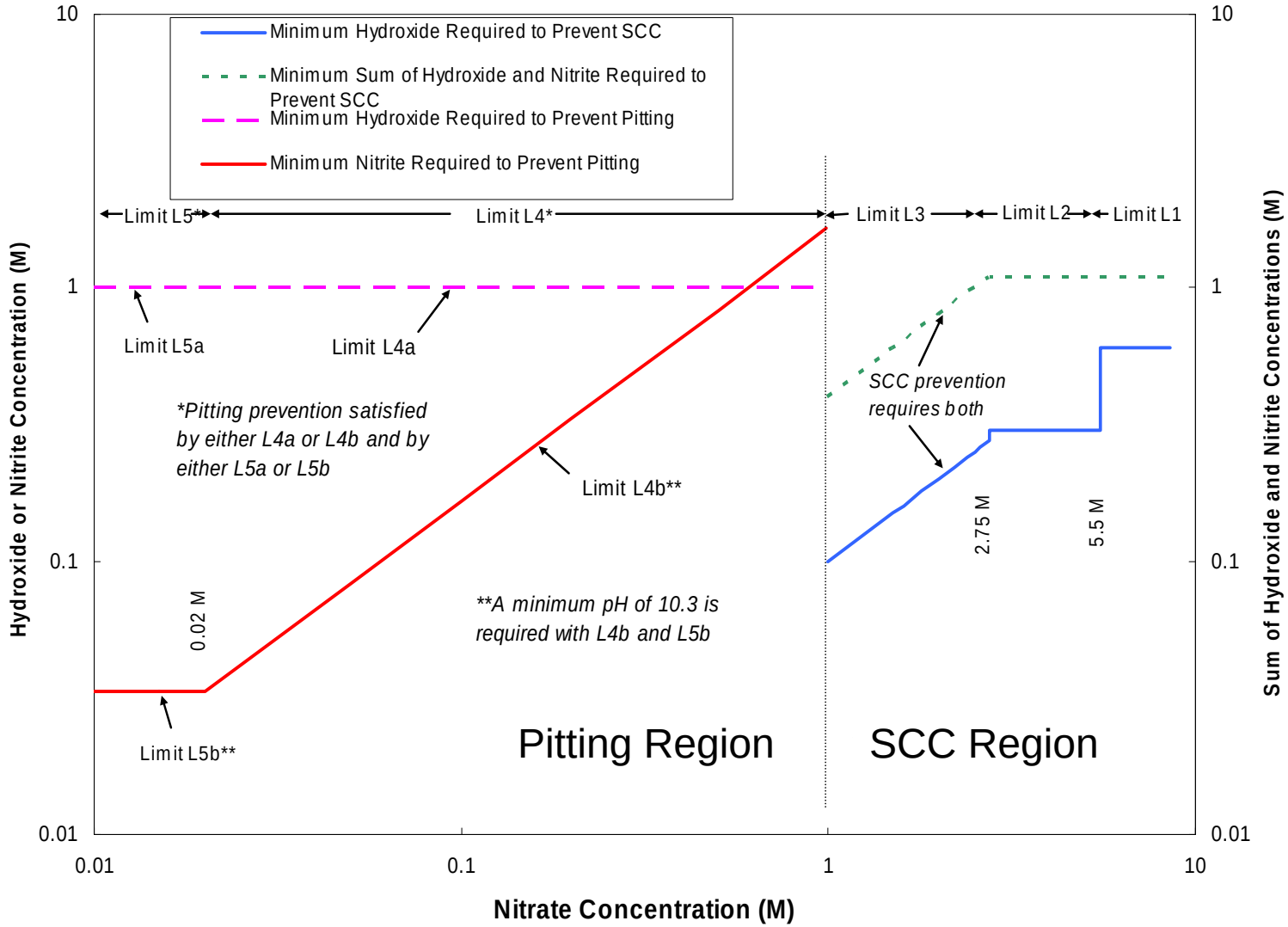
- (24) Old Style Tanks
  - Type I/II: partial secondary containment
    - Routine visual inspections of annulus
    - Monitor and visually inspect during waste removal activities
  - Type IV: single shell tanks (SST)
    - Routine internal visual inspections
  - Up to 50 years old
  - Do not have full secondary containment
  - (2) have been closed
  - No active leak sites today
- (27) New-Style Tanks
  - Full secondary containment
  - PWHT
  - No leakage history
  - Receive all new waste
  - Used for all processing activities
  - Comprehensive inspection program
    - Visual inspections
    - Volumetric inspection

Tank Construction

Photographic Inspection

- Annual Photographic Inspections (~5000/yr)
- Certified inspectors
- No evidence of leaks or identified changes in the Type III tanks.

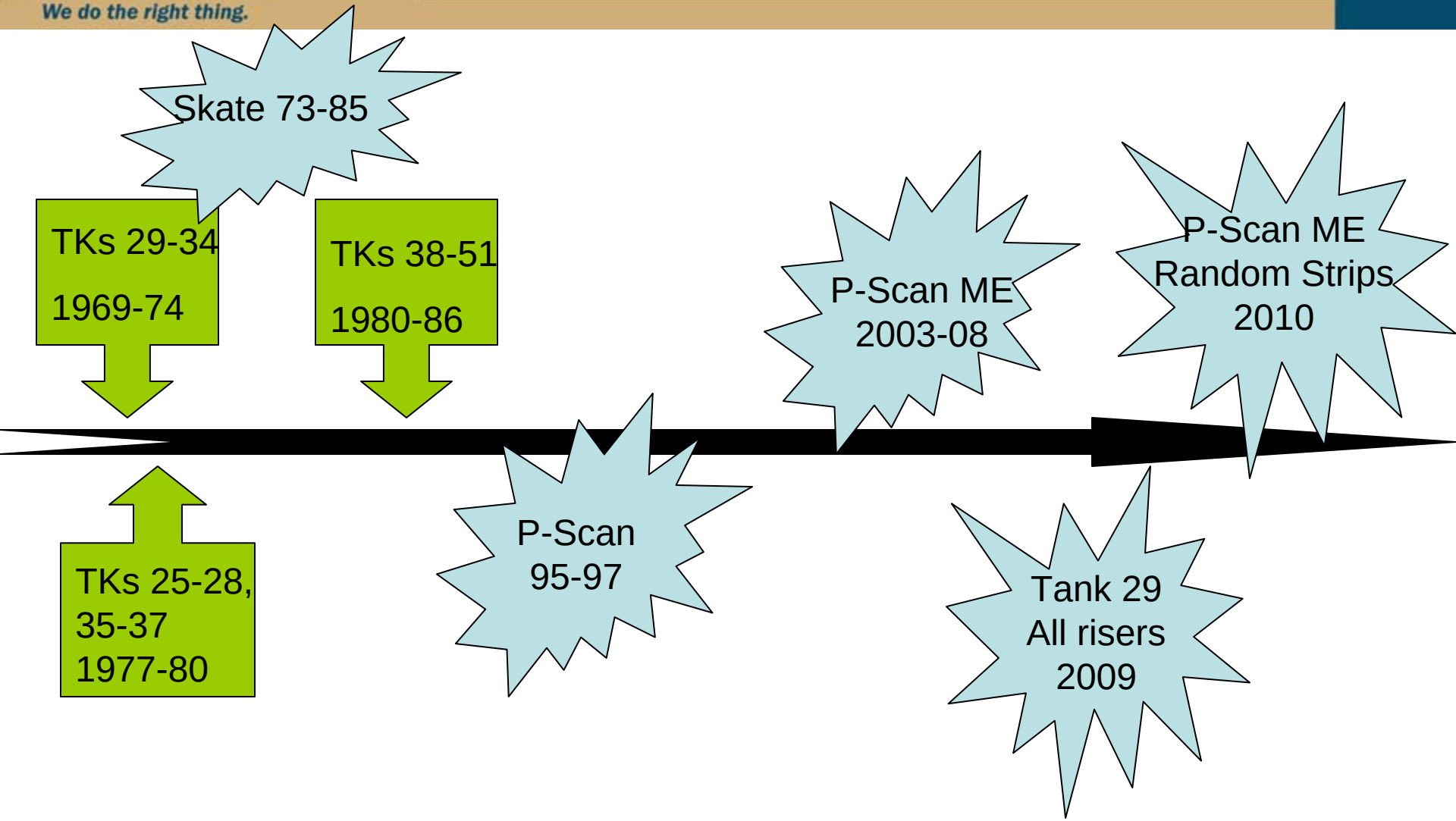
Current Chemistry Controls



Chemistry Control

- Re-examining corrosion control across 1.0 M nitrate threshold for operational efficiency.
- High nitrate solutions for Salt Dissolution.
- Corrosion in liquid air interface and vapor space environment.
- Waste removal from older tanks and processing for vitrification present new challenges.

Operation Start vs Inspection



UT Results

- Wall Thickness Measurements 1971-1985 (Type I, II, III, IV)
  - > 24,000 point measurements
  - No reportable wall thinning
- P-scan 1994 (selected Type IIIA: Tanks 40, 42 & 48-51)
  - No reportable wall thinning or pitting observed
- P-scan ME 2002-2007 (Type III/IIIA Tanks & 1 Type II Tank)
  - No reportable wall thinning or pitting observed
  - No cracks observed on Type III/IIIA tanks
- P-scan ME 2009 (18 vertical strips in Tank 29)
  - No reportable wall thinning or pitting observed
  - No cracks observed
- P-scan ME 2010 (5 vertical strips each in Tanks 30, 31 & 32)
  - No reportable wall thinning or pitting observed
  - No cracks observed

Tank 29 UT Results

- The tank 29 results were used to project pitting using extreme value statistics.
- The analysis approach resulted in a 99% upper tolerance limit of 70 mils with 95% confidence.
- Corrosion rates were uniformly controlled circumferentially and vertically within the tank.
- These results were presented to an independent review committee in the fall of 2009.
- SRS felt the results were representative of the entire tank farm and justified our use of a vertical strip inspection.

Panel Recommendations

Scope of Inference

Develop a Random Sampling

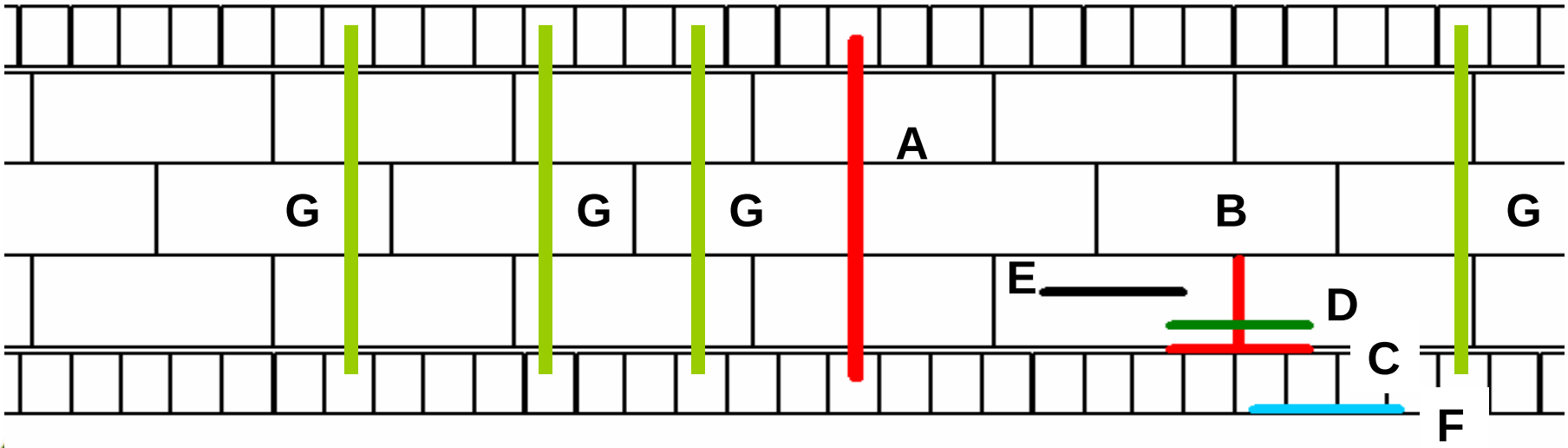
Establish a Defensible Corrosion Rate

Assimilation

- The new inspection program is testing two questions.
  1. How well is the corrosion control program working across the tank farms.
  2. What confidence do I have in the individual tanks inspected.
- Additionally it monitors:
  - Tank corrosion rates

Stratified Random Sampling

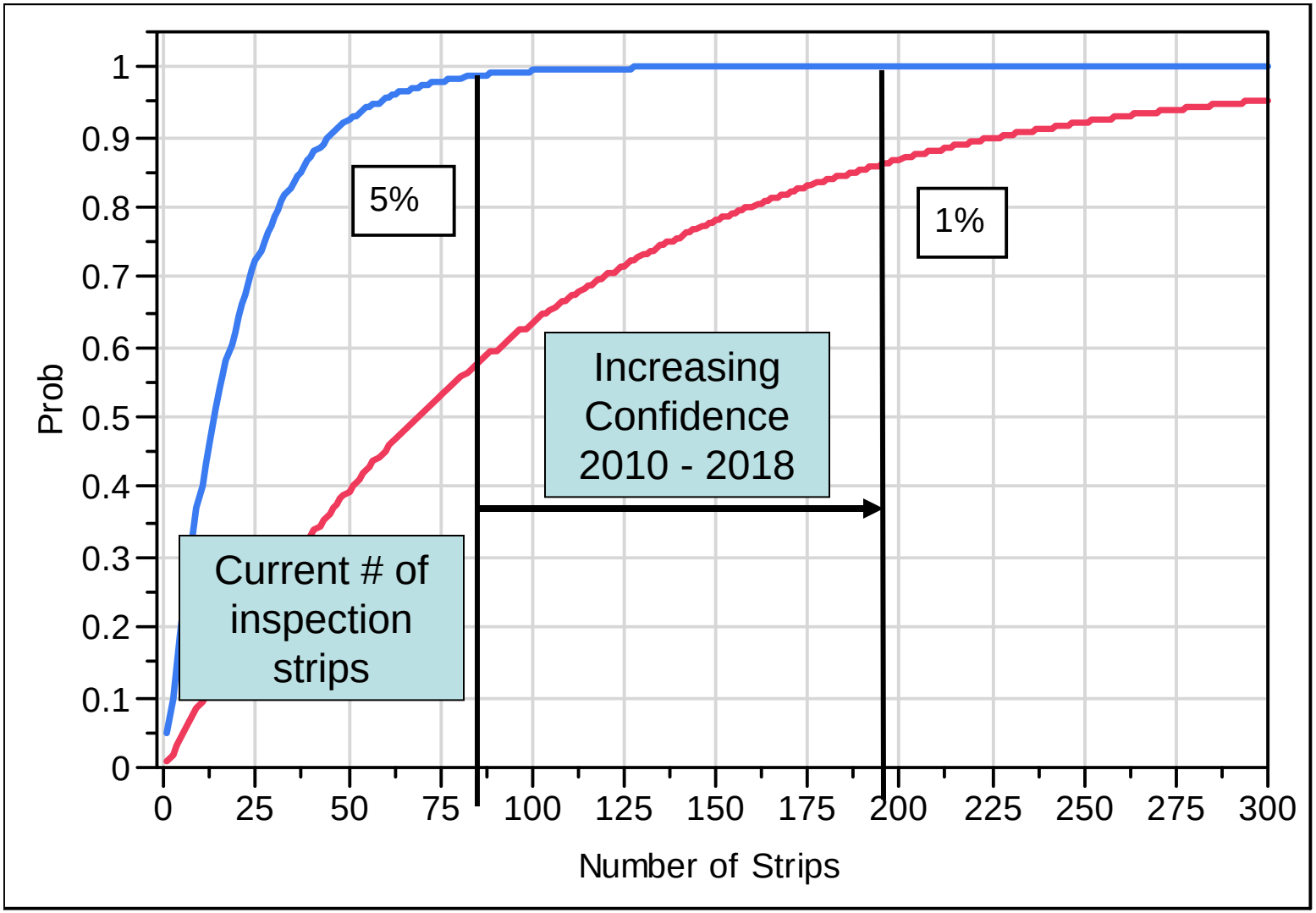
- Representative of tank condition and corrosion control program.
- All data is utilized in analysis
- Baseline strip (A) is used for corrosion rates.



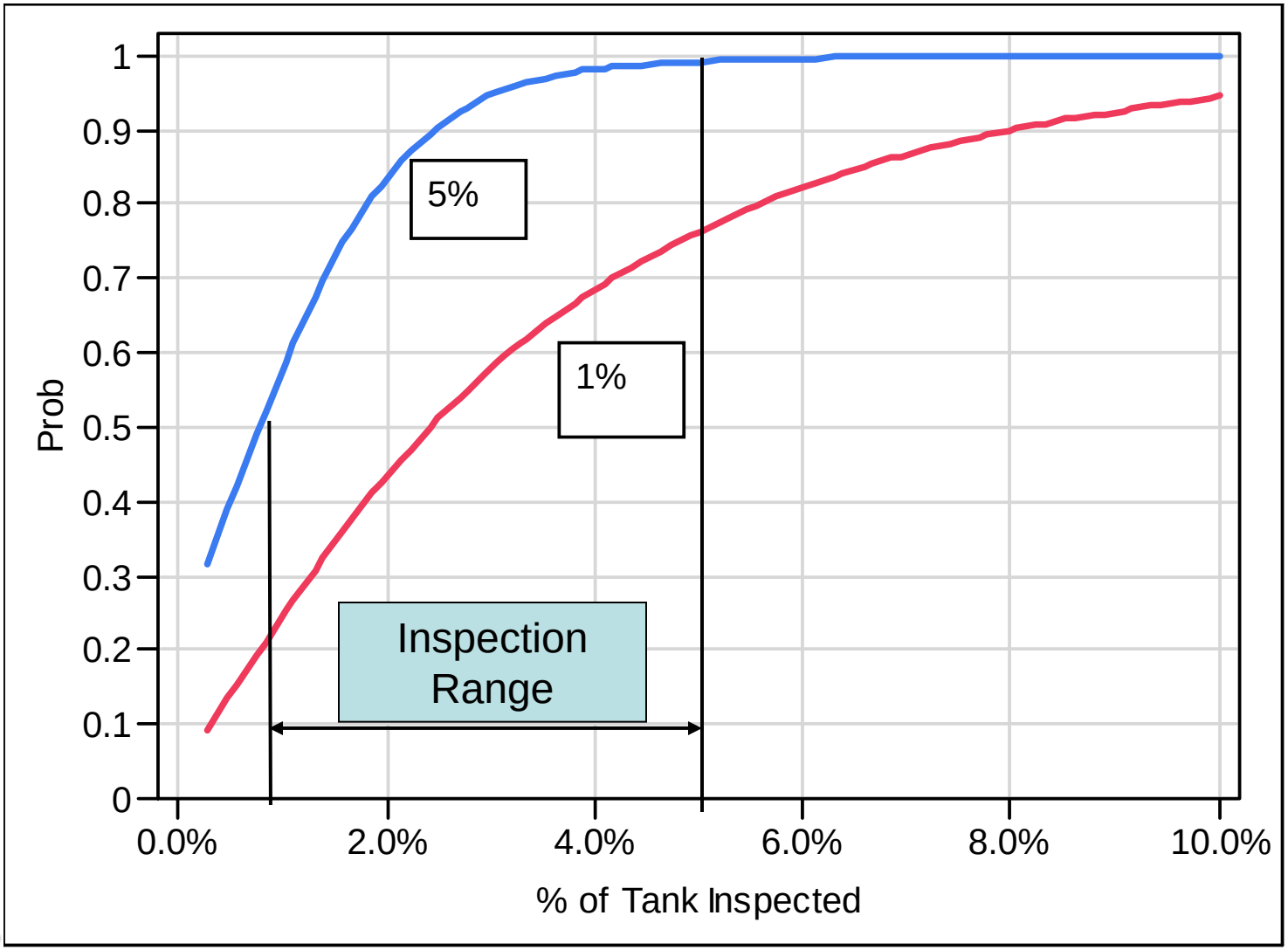
Statistical Methodology

- The methodology was borrowed from the "Selection of 3013 Containers for Field Surveillance"
- Sampling plan should be based upon a large population.
- The random samples should provide a level confidence that at least one of the strips sampled is in the worst 5%.
- Our sample population was based upon the number of potential inspection strips in our tanks

Confidence in Corrosion Control Program

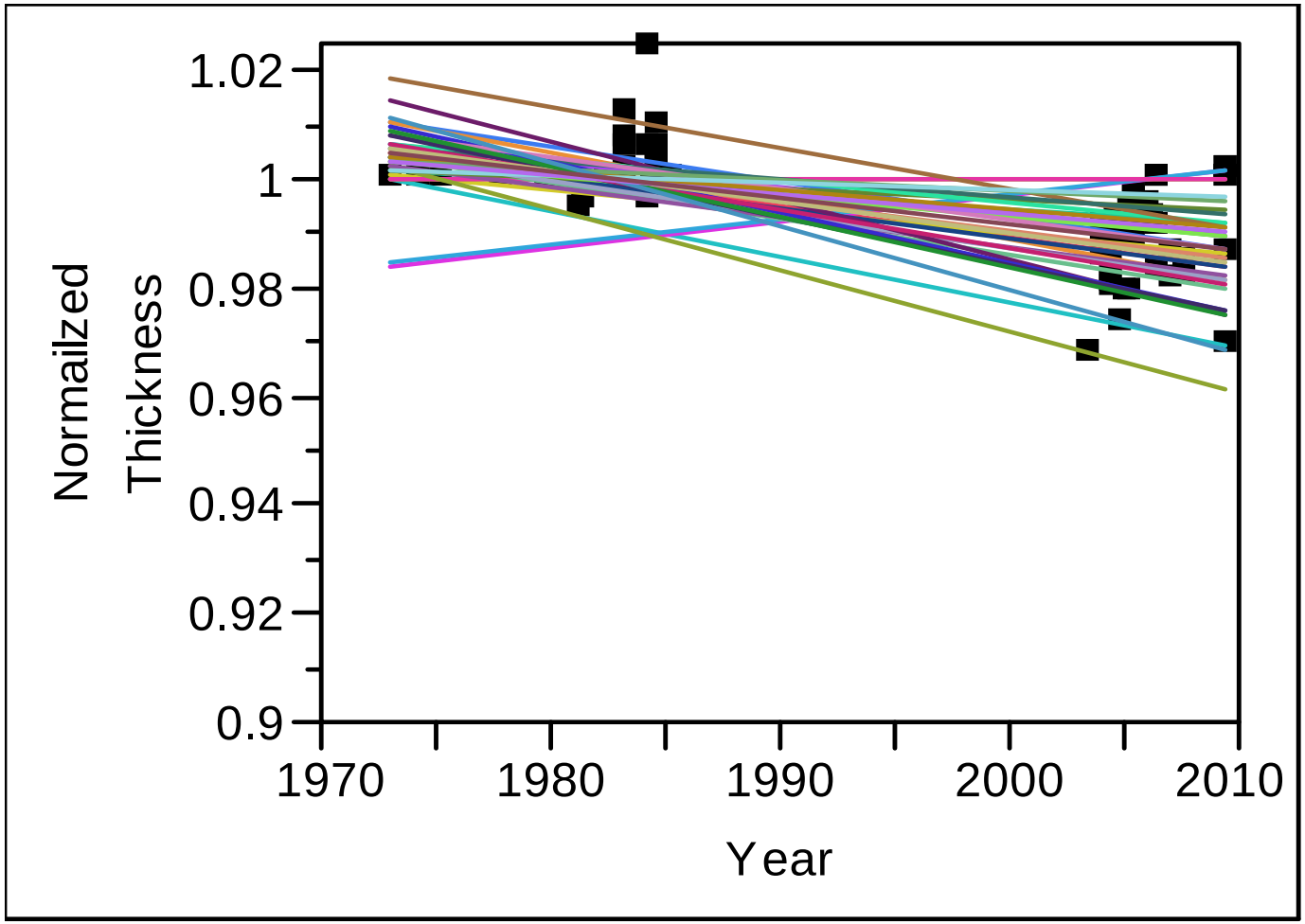


% 0f Tank Inspected



Thinning Rates ’72 to’09

Top Plate



Thinning rate is 0.73 mils per year with 95% confidence that 99% are less than this rate.

Projected Plate Thinning

Tank	Pla	Corro Ba	ar 10	g	inning
			Occ		curs
43	Upper				2127
26	Mid		2077		2159
51	L	0.65	2111		2246

2032

Conclusions

- With each new inspection our confidence is increased in our knowledge of the tank condition and corrosion control program.
- The corrosion control program has mitigated the corrosion rate to a level that places the tank life expectancy decades beyond the current process need date.
- This investigative process does not end here. New chemistry challenges will appear as we move closer to final closure.

Where to???

The Inspections and analysis continue while new developments guide our future in support of our Mission. Maintaining tank integrity though the operational life of the tanks!

Click on Photo Above to Play Music

- Phil Zapp
- Elizabeth Hoffman
- Stephen Harris
- James Elder
- Bruce Wiersma, PhD

Questions?

Questions???

Matthew Maryak
SRR
803-208-8642
Matthew.Maryak@SRS.GOV