



U. S. Department of Transportation

Pipeline and Hazardous Materials
Safety Administration

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Hazardous Liquid Pipeline Safety Seminar

Royal Sonesta Hotel

July 9, 2009

Joe Mataich

U.S. DOT/PHMSA Southern Region

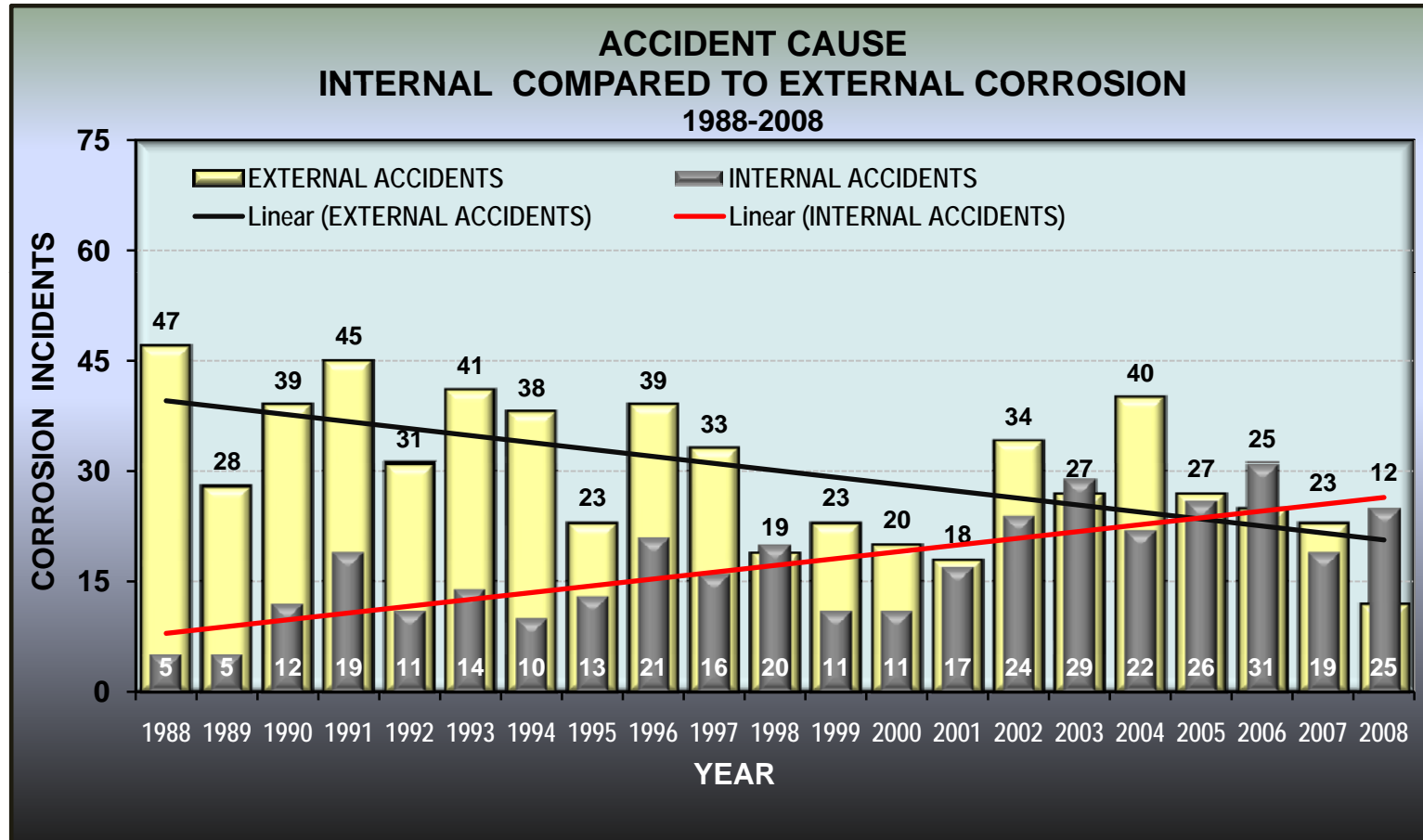


Presentation Outline

- Internal Corrosion (ADB-08-08)
- Pipeline Coatings
- Casing Workshop

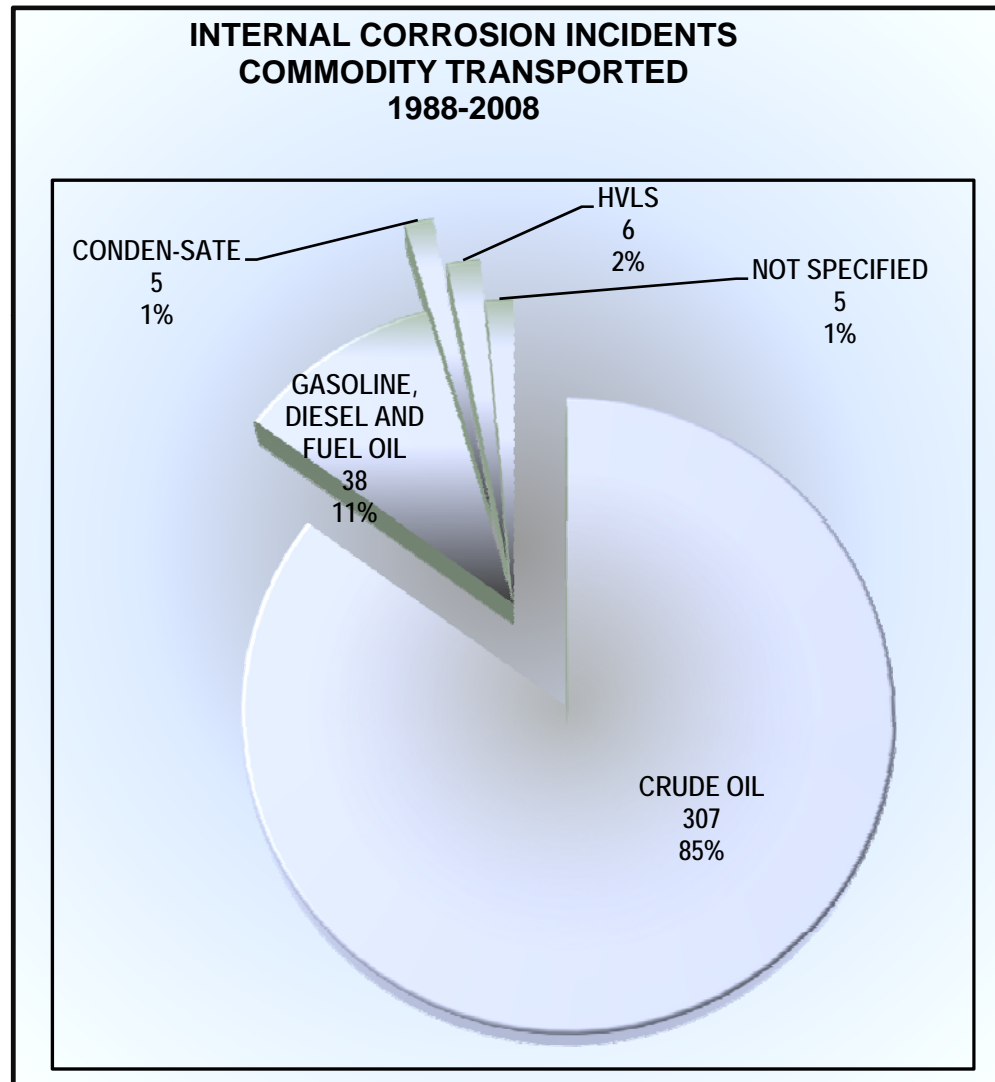
ALL CORROSION ACCIDENTS

INTERNAL VS EXTERNAL 1988-2008



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CORROSION ACCIDENTS COMMODITY TRANSPORTED





INTERNAL CORROSION ACCIDENTS

BARRELS RELEASED

1988-2008

- Over 217,000 barrels released as a result of internal corrosion accidents
- Prudhoe Bay pipeline leak March 2006
 - 4800 barrels released and 2 acres of tundra were affected



PIPES ACT

■ Section 22:

“The Secretary ... shall review the internal corrosion regulations ... to determine if such regulations are currently adequate to ensure that the pipeline facilities subject to such regulations will not present a hazard to public safety or the environment.”

RESPONSE TO CONGRESSIONAL MANDATE



- Thorough review of
 - Federal pipeline safety internal corrosion control regulations
 - Accident history
 - Research findings
 - Activities in consensus standards organizations
- Technical HL Pipeline Standards Committee briefing in July 2007
- Published review of key points in *Federal Register* for public comment in August 2007⁸

RESPONSE TO CONGRESSIONAL MANDATE



- Report submitted June 23, 2008
 - PHMSA web site [link: "Reports to Congress"]
 - Summarized regulations, accident history, research, standards development activities
- Committed to Congress
 - Advisory Bulletin (ADB-08-08)
 - Public Workshop (March 26, 09 – NACE Conference)
 - Evaluate opportunities to improve best practices
 - Evaluate adoption of consensus standards
 - Consider Need for Rulemaking



Regulatory Requirement

- **§195.579 What must I do to mitigate internal corrosion?**
- (a) *General.* If you transport any hazardous liquid or carbon dioxide that would corrode the pipeline, you must **investigate the corrosive effect** of the hazardous liquid or carbon dioxide on the pipeline and take adequate steps to mitigate internal corrosion.



Advisory Bulletin (ADB-08-08)

Nov. 24, 2008

- Advises Hazardous Liquid Pipeline Operators to Review and Analyze Appropriate Risk Factors to determine if the Commodity Transported could Corrode the Pipeline



PHMSA EXPECTATIONS

“Investigate” Corrosive Risk Factors

- Material being transported
 - Commodity
 - Foreign material/contaminants
 - Sand/silt
 - Water
 - Other contaminants that could cause IC
 - Sulfur, salts, acids, CO₂, H₂S
 - Microbes



PHMSA EXPECTATIONS

“Investigate” Corrosive Risk Factors

- Operating environment
 - Flow rate/ velocity
 - Operating pressure
 - Topography
 - Temperature
 - Pipe configuration, design, and material specifications



PHMSA EXPECTATIONS

“Investigate” Corrosive Risk Factors

- Operating Conditions
 - Steady state
 - Slack line
 - Upsets (in pipeline and upstream facilities)
- Any other circumstance or condition that could cause, promote, or increase the likelihood of internal corrosion



PHMSA EXPECTATIONS

“Investigate” Corrosive Risk Factors

- Any significant change in risk factor must result in re-investigation of potential for internal corrosion
- Investigation results must be
 - Valid for current state of pipeline internal corrosion risk factors
 - Documented in accordance with 195.589(c)
 - Available for inspection



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Pipeline Coatings



Pipeline Coatings

- First Line of Defense against Corrosion
- Must be properly Applied
- Must be properly Inspected
- PHMSA has seen numerous coating problems on new construction projects

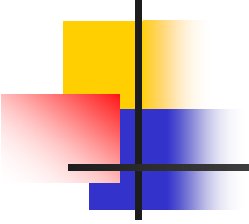


Surface Preparation

- Must be applied on a properly prepared surface
- Clean and Abrade Surface
- Specify by Industry Standards
 - SSPC & NACE

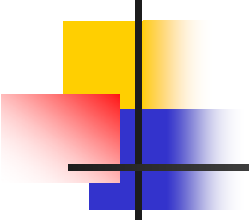
Surface Prep. Standards

- SSPC-SP 1 Solvent Cleaning
- SSPC-SP 2 Hand Tool Cleaning
- SSPC-SP 3 Power Tool Cleaning
- SSPC-SP 10/NACE No. 2 Near White Blast Cleaning
- SSPC-SP 6/NACE No. 3 Commercial Blast Cleaning
- SSPC SP 11 Power Tool Cleaning to Bare Metal



§195.559 What coating material may I use for external corrosion control?

- Coating material for external corrosion control under Sec. 195.557 must--
- (b) Have sufficient adhesion to the metal surface to prevent under film migration of moisture;
- (c) Be sufficiently ductile to resist cracking;



§195.559 What coating material may I use for external corrosion control?

- (d) Have enough strength to resist damage due to handling and soil stress;
- (e) Support any supplemental cathodic protection; and
- (f) If the coating is an insulating type, have low moisture absorption and provide high electrical resistance.



Coating Procedures

- **§195.402(a)** Each operator shall prepare and follow ... a manual of written procedures for;
 - (c)(3) Operating, maintaining, and repairing the pipeline system in accordance with...
- Coating Procedures need to List Approved Coating Materials (Manufacturer & Product #)
- Operator should be able to justify requirements of § 195.559 (a) – (f)



Coating Procedures

- Surface Preparation Requirements
 - Specify by Industry Standards (SSPC & NACE)
- Application Method
 - Spray, Brush or Roller?
- Application Conditions
 - Air & Surface Temperature
 - Pre-Heat Requirements (FBE)
 - Relative Humidity & Dew Point (Epoxies & Urethanes)



Coating Procedures

- Thickness Requirements
 - Dry Fill Thickness (mils) per Coat for Liquid/Powder Coatings
- Overlap Requirements
 - Tape Coating & Shrink Sleeves
 - Minimum Overlap of Consecutive Wraps
 - Minimum Overlap of Existing Coatings
- Cure Time prior to Recoating or Burying



§195.206 Material inspection

- No pipe or other component may be installed in a pipeline system unless it has been **visually inspected at the site of installation to ensure that it is not damaged** in a manner that could impair its strength or reduce its serviceability



§195.561 When must I inspect pipe coating used for external corrosion control?

- (a) You must inspect all external pipe coating required by Sec. 195.557 just prior to lowering the pipe into the ditch or submerging the pipe.
- (b) You must repair any coating damage discovered.



Coating Inspection

- Visual

- Runs, Drips, Blisters, Foreign Inclusions
- Areas of Coating Damage
- Wrinkles and Insufficient Overlap in Tape & Shrink Sleeves

- Thickness Measurement

- Critical for Liquid Applied Coatings

- Holiday Testing (jeeping)

- Electrical Test for Small Defects

Bored Crossing – Failed Hydrotest



Joint Coating Applied over Dirt/Debris



Construction Damage

Section of Pipe was Replaced

found by DCVG Survey-Line was in Service



Corrosion Found Less than 1 Year of Service



Gouge in Pipe

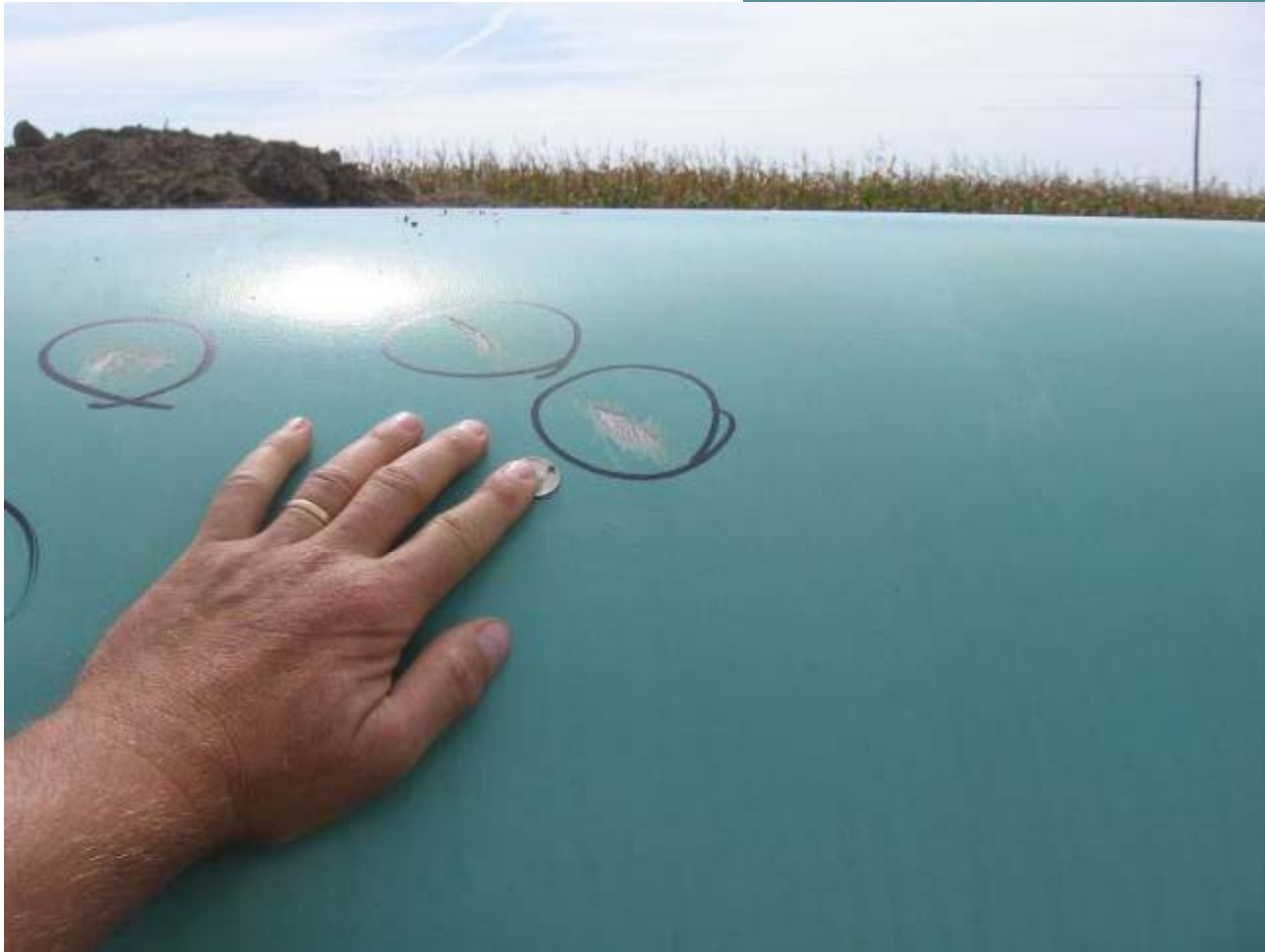
found by DCVG Survey-Line was in Service



Manufacturer's procedures for patch stick application must be followed.



Patch Sticks are only for
pinhole or abrasion repair.
2 part epoxy should have
been used.



Inappropriate Bundling of Patch Sticks

Use One Only-Small Areas



Excessively Large Patch Stick Application Use for Pinholes Only



A bent jeep spring can miss coating holidays



Tape on Pipe

Preventing proper Holiday Detection



Rocks against pipe (No screening for over 1 mile)



Casings and Assessments

PHMSA Workshop
July 15-16, 2008
Chicago



Casings and Assessments

Regulatory Requirements

- 192 Subpart O Requires Assessment in HCA's
 - §192.901 – Limited to Gas Transmission
 - §192.919(b) – Assessment Methods must align with threats
 - §192.921 – Requires one of four Assessment Methods
 - *PT, ILI, DA, Other Technology*
 - §192.925 – Refers to NACE RP0502-2002 for ECDA

How does NACE RP0502-2002 address Casings?



- Section 3: Pre-Assessment
 - Casings require separate ECDA region (Table 1)
 - May preclude use of some indirect inspection tools (Table 1)
 - Additional tools and other assessment activities may be required (Table 1)
 - Other methods may be needed for casings as per section 3.3.2



How does NACE RP0502-2002 address Casings?

- Table 2: ECDA Tool Selection Matrix
 - indirect inspection tools for casings require special engineering considerations (Footnote 3)
 - "3 = Not Applicable: Not applicable to this tool or not applicable to this tool without additional considerations"
 - NACE TG 041 proposing to change: "3 = Applicable with an engineering assessment ..."
- May 18, 2007 NACE issues letter clarifying intent of Footnote 3



How does NACE RP0502-2002 address Casings?

- Tools must be selected to reliably detect corrosion activity and/or coating holidays (*Section 3.4.1.1*)
- Strengths of one complement weaknesses of other (*Section 3.4.1.2*)
- Must obtain readings along the entire length of pipe (*Sections 1.2.2.2, 4.1.2, 4.2.1.1 and 4.2.2*)
- Must align, compare, and classify indications from two tools (*Sections 4.1.2.2, 4.3.2*)



Casings and Assessments

PHMSA Letter of October 25, 2007 (to AGA)

- Recognized acceptable to classify casings as low risk pipe
- Acknowledged HCA mileage could be reported as completed without casings
- Recognized NACE clarification of ECDA application with properly supported engineering and implementation plans per §192.925(b)(1)(ii)



Casings and Assessments

PHMSA Letter of April, 2008 (to AGA)

- Agreed - nothing explicit in rule requiring use of Guided Wave as an indirect inspection tool for assessing casings
- Highlighted rule did not allow risk assessment in lieu of assessing pipe in an HCA
- Highlighted PHMSA efforts for developing guided wave technology
- Suggested workshop for all stakeholders



Casings and Assessments

- PHMSA held workshop July 2008
 - Presentations/Reports available at PHMSA website (Stakeholder Communications)
- PHMSA reached out to Industry and Industry Associations for specific proposals
- PHMSA met w/AGA to form Joint Technical Committee
 - Cased Pipeline Quality Action Team (CASQAT)
 - *NAPSR, Operators, Service Providers, PHMSA*



Casings and Assessments

- CASQAT met in February, March and April
 - Minutes posted on PHMSA Gas IMP site.
- PHMSA supplied the CASQAT task group with several Key Documents:
 - Suggested methodology to combine similar casings into regions using NACE RP 0502
 - Guidance on maximizing time between assessments of casings
 - Suggested methodology to remove threat of external corrosion from properly filled casings
(but still could have internal and SCC threats)



Casings and Assessments

- Draft Guidance due June 1, 2009
- 2nd Workshop (September?)



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For Additional Information

<https://phmsa.dot.gov>

<https://primis.phmsa.dot.gov/meetings>

<http://primis.phmsa.dot.gov/gasimp>



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Thank You



Questions

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