IDENTIFYING INTERACTIVE THREATS AND UNDERSTANDING OPTIONS

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TOPICS

1. COMMON GOALS
2. KEY ATTRIBUTES OF PIPELINES TO BE ASSESSED
3. THREATS AND INTERACTIVE THREATS
4. OPPORTUNITIES FOR IMPROVEMENTS
5. QUALITY ASSURANCE PROGRAM
6. PRESCRIPTIVE IMP
7. PERFORMANCE BASED IMP AS AN ALTERNATIVE
8. POTENTIAL ROLE FOR ASME
9. QUESTIONS

INTERACTIVE THREATS
AND
UNDERSTANDING OPTIONS

- **OBJECTIVE**

- ***WHAT CAN BE DONE BY STANDARD DEVELOPING ORGANIZATIONS, OPERATORS, AND REGULATORS TO:***

  - ***FOSTER MORE RISK ASSESSMENT OPTIONS AND***
  - ***TO IMPROVE UPON CURRENT METHODS?***

INTERACTIVE THREATS
AND
UNDERSTANDING OPTIONS

- **GOALS OF STANDARDS DEVELOPMENT ORGANIZATIONS, OPERATORS, AND REGULATORS**
  - **TO PROVIDE "*SMART*" REQUIREMENTS, IN ADDITION TO GUIDANCE, RECOMMENDATIONS, CONSIDERATIONS, AND OPTIONS (OR ALTERNATIVES).**
  - **TO ACHIEVE AND VERIFY QUALITY OF CONSTRUCTION OF NEW PIPELINES.**
  - **TO ASSESS, EVALUATE, AND ESTABLISH CONDITION OF PIPELINES PERIODICALLY FOR CONTINUED SAFE OPERATION.**

INTERACTIVE THREATS
AND
UNDERSTANDING OPTIONS

- ***SMART*** **REQUIREMENTS**

  - ***S*** **SPECIFIC**
  - ***M*** **MEASURABLE**
  - ***A*** **ACHIEVABLE**
  - ***R*** **REASONABLE**
  - ***T*** **TIMELY**

INTERACTIVE THREATS AND UNDERSTANDING OPTIONS

- **REQUIREMENTS, RECOMMENDATIONS, AND OPTIONS**
  - ***SHALL*** — **"shall perform hydrostatic test…." This is a requirement.**
  - ***SHOULD*** — ***"should perform hydrostatic test…" This is a recommendation.***
  - ***MAY*** — **"may perform initial leak test in lieu of hydrostatic test…." This is an option or an alternative.**

INTERACTIVE THREATS
AND
UNDERSTANDING OPTIONS

- **WHAT ARE THE MOST IMPORTANT ATTRIBUTES OF PIPELINES?**

  1. **PRESSURE INTEGRITY**
  2. **STRUCTURAL INTEGRITY**
  3. **OPERABILITY OF EQUIPMENT, SUCH AS PUMPS, VALVES, COMRESSORS, ETC.**
  4. **LEAKTIGHTNESS – NO LEAKAGE THROUGH GASKETED JOINTS, PACKINGS, AND SEALS**

- **AN INTEGRITY MANAGEMENT PROGRAM MUST PROVIDE FOR QUALITATIVE AND QUANTITATIVE ASSESSMENT OF ABOVE ATTRIBUTES.**

REGULATION AND INTEGRITY PROGRAM

- **49 CFR 192.917 (a) REQUIRES AN OPERATOR TO:**
  - **IDENTIFY POTENTIAL THREATS TO PIPELINE INTEGRITY**
  - **CONSIDER, BUT NOT LIMITED TO, THREATS LISTED IN ASME B31.8S (REFERENCED IN 192.7)**
  - **CATEGORIZE THREATS IN FOUR CATEGORIES**
    - **TIME DEPENDENT**
    - **STATIC OR RESIDENT THREATS**
    - **TIME INDEPENDENT THREATS**
    - **HUMAN ERROR**

"Integrity Threats" B31.8S, §2.2 and 49 CFR 192.917a

Root Cause	Integrity Threat	Category
Internal corrosion	Internal corrosion	Time dependent
External corrosion	External corrosion	
Stress corrosion cracking	Stress corrosion cracking	
Pipe seam defect	Manufacturing defects	Time stable
Pipe body defect		
Girth weld defect	Defective construction or fabrication	
Fabrication weld defect		
Wrinkle bend		
Broken thread or coupling		
Gasket or O-ring failure	Equipment	
Pressure control equipment		
Seal or packing failure		
Miscellaneous equipment		
Immediate damage to pipe	Mechanical damage	Time independent (random)
Previously damaged pipe		
Vandalism		
Incorrect operation	Incorrect operation	
Cold weather	Natural events	
Lightning		
Flooding or heavy rain		
Soil movement		

INTERACTING INTEGRITY THREATS

- **FOLLOWING ARE EXAMPLES OF THREATS LIKELY TO INTERACT TO PRODUCE ENHANCED RISK GREATER THAN THE SUM OF EITHER THREAT ACTING SEPARATELY.**

1. **CORROSION THREAT PLUS OLD VINTAGE ERW PIPE**

   - **OLDER VINTAGE ERW PIPE IS SUSCEPTIBLE TO SELECTIVE CORROSION, WHICH PRODUCES DEEP CORROSION GROOVE CENTERED ON THE SEAM BOND LINE**
   - **ORDINARY METAL LOSS CORROSION INTERSECTS THE SEAM**
   - **SELECTIVE CORROSION APPEARS TO BE RELATED TO CONCENTRATION AND PERHAPS SHAPE OF SULFIDE INCLUSIONS LOCATED NEAR THE BOND LINE**
   - **ENHANCED RISK ARISES FROM:**

     1. **ACCELERATED CORROSION RATE IN THE GROOVE**
     2. **CORROSION GROOVE PRODUCES A LONG-NOTCH LIKE DEFECT IN POTENTIALLY LOW TOUGHNESS MATERIAL**
     3. **CONVENTIONAL MAGNETIC INLINE INSPECTION DOES NOT DETECT LONGITUDINALLY ORIENTED NARROW DEFECT. A SPECIAL TRANSVERSE MAGNETIC TOOL IS REQUIRED.**

INTERACTING INTEGRITY THREATS

- **OLDER VINTAGE GIRTH WELDS AND SOIL MOVEMENT**

1. **OXY-ACETYLENE WELDS AND EARLY VINTAGE ELECTRIC ARC WELDS COULD CONTAIN SIGNIFICANT AND UNKNOWN WORKMANSHIP DEFECTS.**

2. **RADIOGRAPHIC EXAMINATIONS WERE A RARITY THROUGH THE 1950s.**

3. **WHEN SOIL MOVEMENTS ARE INVOLVED, PIPE MAY BE SUBJECTED TO HIGH TENSILE STRESSES DUE TO BENDING OR AXIAL TENSION**

4. **HIGH SOIL STRAINS CAN CAUSE FAILURE OF DEFECTIVE GIRTH WELDS**

REGULATION AND INTEGRITY PROGRAM

- **49 CFR 192.917 REQUIRES AN OPERATOR TO:**
  - **Perform data gathering and integration in accordance with Section 4 of ASME B31.8S.**
  - **Gather and evaluate the set of data specified in Appendix A of ASME B31.8S.**
  - **Perform risk assessment in accordance with Section 5 of ASME B31.8S.**

REGULATION AND INTEGRITY PROGRAM

- **49 CFR 192.917 REQUIRES AN OPERATOR TO:**
  - **Determine preventive and mitigating measures.**
  - **An operator must select the method or methods best suited to address the threats identified.**
- **REGULATION REQUIRES OPERATOR TO PERORM OTHER TASKS IN ACCORDANCE WITH VARIOUS SECTIONS OF ASME B31.8S:**
  - **PERFORMANCE PLAN IN ACCORDANCE WITH SECION 9**
  - **COMMUNICATION PLAN IN ACCORDANCE WITH SECTION 10**
  - **SELECT INTERNAL INSPECTION TOOLS IN ACCORDANCE WITH SECTION 6.2**
  - **TEST PRESSURES IN ACCORDANCE WITH TABLE 3 OF SECTION 5**
  - **OTHERS**

REGULATION AND INTEGRITY PROGRAM

- **REGULATION REFERS TO:**
  - **NACE RP 0502 FOR DIRECT ASSESSMENT OF EXTERNAL CORROSION (EXTERNAL CORRSOION DIRECT ASSESSMENT - ECDA)**
  - **FOR INTERNAL CORROSION DIRECT ASSESSMENT (ICDA), REGULATION REQUIRES THAT ICDA REGION BE IDENTIFIED USING MODEL IN GRI 02-0057**
  - **STRESS CORROSION CRACKING DIRECT ASSESSMENT (SCCDA), REFERENCE IS MADE TO APPENDIX 3 OF ASME B31.8S**
  - **SECTION 7 OF ASME B31.8S FOR EVALUATION AND REMEDIATION**
    - **IMMEDIATE**
    - **SCHEDULED**
    - **MONITORED**

REGULATION AND INTEGRITY PROGRAM

- **OPPORTUNITIES FOR IMPROVEMENT IN REGULATION AND STANDARDS**

1. ***REGULATION NEEDS TO MAKE REFERENCE TO A STANDARD(S), WHICH SPECIFIES THE METHODS OR TECHNIQUES TO BE USED TO GATHER DATA.***

2. ***REGULATION NEEDS TO MAKE REFERENCE TO A STANDARD(S) FOR QUALITATIVE AND QUANTITATIVE ACCEPTANCE CRITERIA FOR EVALUATION OF DATA COLLECTED.***

3. ***PRESCRIPTIVE INTEGRITY MANAGEMENT PROGRAM (IMP) BE THE PRIMARY IMP AND THE PERFORMANCE BASED IMP AS AN ALTERNATIVE IMP. ASME B31.8S DOES NOT SPECIFY WHAT DATA TO BE COLLECTED FOR PERFORMANCE BASED IMP.***

REGULATION AND INTEGRITY PROGRAM

- **OPPORTUNITIES FOR IMPROVEMENT IN REGULATION AND STANDARDS**

4. ***APPENDIX A, THREAT PROCESS CHARTS AND PRESCRIPTIVE INTEGRITY MANAGEMENT PLANS, IS A NONMANDATORY APPENDIX. APPENDIX A NEEDS TO BE UPDATED AND UPGRADED TO A MANDATORY APPENDIX.***

5. ***USE OF WORDS LIKE "CONSIDER, SHOULD, RECOMMENDATION, ETC." IN THE ASME B31.8S AND CODES LIKE B31.4 AND B31.8 DO NOT MAKE THE GUIDANCE OR RECOMMENDATION MANDATORY.***

6. ***DEVELOP OPERABILITY TESTING REQUIREMENTS***

REGULATION AND INTEGRITY PROGRAM

- **OPPORTUNITIES FOR IMPROVEMENT IN REGULATION AND STANDARDS**
  - **DEVELOP ASME B31.4S FOR MANAGING SYSTEM INTEGRITY OF HAZARDOUS LIQUID PIPELINES.**
  - **CROSS REFERENCE OR INTERCONNECT ASME B31.8S AND ASME B31.8.**
  - **CLARIFY DEFECT GROWTH RATE ASSUMPTIONS EMBODIED IN THE ANOMALY RESPONSE TIMES OR REASSESSMENT INTERVALS SHOWN IN FIGURE 4 OF ASME B31.8S.**
  - **ADD A CURVE TO FIGURE 4 TO CONSIDER PIPE OPERATING ABOVE 72% OF SMYS.**
  - **DEVELOP A FORMULA SUBSTITUTE FOR FIGURE 4 THAT ACCOUNTS FOR SPECIFIC OPERATING STRESS LEVELS INSTEAD OF BROAD RANGES.**

IMPLEMENT QUALITY ASSURANCE PROGRAMS

- **REQUIRE OPERATORS TO:**

1. **DEVELOP QUALITY ASSURANCE PROGRAM SIMILAR TO (NOT ESSENTIALLY SAME AS) THOSE USED IN NUCLEAR FACILITES.**

2. **HAVE A CONTRACT WITH AN ACCREDITED AUTHORIZED INSPECTION AGENCY FOR THIRD PARTY VERIFICATION OF COMPLIANCE TO AN APPROVED QA PRGRAM.**

3. **ACTIVITIES TO BE PERFORMED UNDER AN INTEGRITY MANAGEMENT PROGRAM MUST BE PERFORMED IN ACCORDANCE WITH WRITTEN PROCEDURES ASSURING COMPLIANCE TO QA PROGRAM.**

IMPLEMENT QUALITY ASSURANCE PROGRAMS

- **REQUIRE OPERATORS TO:**

4. **PHMSA SHALL MAINTAIN OVERALL CONTROL AND MAY CONDUCT SELECTIVE AUDITS TO ASSURE OPERATOR'S COMPLIANCE.**

5. **AUTHORIZED INSPECTION AGENCIES SHALL BE ACCREDITED BY AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME).**

6. **AN ACCREDITED AUTHORIZED INSPECTION AGENCY CAN PERFORM THEIR DUTIES ONLY WHEN IT IS DESIGNATED, OR IS ACCEPTABLE TO PHMSA.**

7. **THIS APPROACH WILL STRENGTHEN AND ENHANCE PHMSA CAPABILITIES TO MONITOR COMPLIANCE TO REGULATORY REQUIREMENTS.**

PROPOSAL FOR A NEW OR UPGRADED IMP APPROACH

- UPDATE ASME B31.8S AND OTHER STANDARDS
- DEVELOP NEW STANDARD, OR AN APPENDIX FOR IMP FOR PIPELINES
- THE NEW APPROACH FOR IMP SHALL BE PRESCRIPTIVE NOT PERFORMANCE BASED
- REGULATION CAN PERMIT PERFORMANCE BASED APPROACH AS AN OPTION OR AS AN ALATERNATIVE

PROPOSAL FOR A NEW OR UPGRADED IMP APPROACH

- **PERFORMANCE BASED IMP APPROACH**
  - **MUST BE SUBJECTED TO REVIEW AND APPROVAL BY PHMSA PRIOR TO IMPLEMENTATION**
  - **PERFORMANCE BASED APPROACH MUST BE DEMONSTRATED TO MEET OR EXCEED THE OBJECTIVES OF PRESCRIPTIVE APPROACH**
  - **ALLOWED ONLY WHEN IMPLEMENTATION OF PRESCRIPTIVE APPROACH IS NOT PRACTICAL DUE TO:**
    - **DESIGN AND AS-BUILT LIMITATIONS**
    - **ACCESS CONSIDERATIONS OR LIMITATIONS**
    - **NON-AVAILBILITY OF STATE OF THE ART TECHNOLOGY**

PROPOSAL FOR A NEW OR UPGRADED IMP APPROACH

- **CRITERIA FOR PRESCRIPTIVE IMP**
  - **DEVELOP CRITERIA FOR EACH OF THE FOLLOWING *HCA CATEGORIES* OF PIPELINES AND/OR SEGMENTS THEREOF FOR INLINE INSPECTION:**

    1. **HIGH CONSEQUENCES AREA (*HCA*) *CATEGORY* 1**
    2. **HIGH CONSEQUENCES AREA *(HCA) CATEGORY* 2**
    3. **HIGH CONSEQUENCES AREA *(HCA) CATEGORY* 3**
    4. **NON HCA (OTHER THAN *CATEGORY* 1, 2, AND 3)**

    THESE HCA CATEGORIES ARE DIFFERENT FROM LOCATION CLASSES IN ASME B31.8

  - **CRITERIA FOR CATEGORIZATION OF *HCA CATEGORY* 1 PIPELINE OR SEGMENT THEREOF SHALL BE MOST STRINGENT, WHILE IT WILL DECREASINGLY BE LESS STRINGENT FOR *HCA CATEGORY* 2 AND 3.**

PROPOSAL FOR A NEW OR UPGRADED IMP APPROACH

- **CRITERIA FOR PRESCRIPTIVE IMP**

  - **SPECIFY INLINE INSPECTION, EXAMINATION, AND TESTING REQUIREMENTS FOR EACH *HCA CATEGORY* SEPARATELY. THE FOLLOWING SHALL BE SPECIFIED:**

    1. **ITEM NUMBER**
    2. **DESCRIPTION OF ITEM TO BE EXAMINED**
    3. **EXAMINATION AND TESTING REQUIREMENT(S)**
    4. **EXAMINATION AND TEST METHOD**
    5. **ACCEPTANCE STANDARD**
    6. **EXTENT AND FREQUENCY OF EXAMINATION AND TESTS**
    7. **SPECIAL PROVISIONS (EXTENSION OF INSPECTION INTERVAL, DEFERRAL OF EXAMINATION AND TESTS, AND OTHERS)**

PROPOSAL FOR A NEW OR UPGRADED IMP APPROACH

- **CRITERIA FOR PRESCRIPTIVE IMP**
  - **EXAMINATIONS AND TESTS REQUIRED SHALL BE SPECIFIED BASED ON THREATS AND INTERACTIVE THREATS IDENTIFIED.**
  - **FREQUENCY OF EXAMINATION AND TESTS SHALL BE BASED ON *HCA CATEGORY* AND THE ASSOCIATED RISK ASSESSMENT AND CONSEQUENCES.**
  - **FREQUENCY OF OPERABILITY TESTS AND EVALUATIONS**
  - **REPAIRS AND REPLACEMENTS SHALL BE MADE BASED ON EVALUATION OF DATA COLLECTED AND ITS EVALUATION AGAINST THE ACCEPTANCE CRITERIA. SPECIFIED IN THE STANDARD.**

PROPOSAL FOR A NEW OR UPGRADED IMP APPROACH

- **IMP RECORDS TO BE MAINTAINED**

1. RECORDS INDEX
2. BASELINE AND INLINE INSPECTION PLANS AND SCHEDULES
3. BASELINE AND INLINE INSPECTION REPORTS
4. NONDESRUCTIVE EXAMINATION PROCEDURES
5. NONDESTRUCTIVE EXAMIANTION RECORDS
6. PRESSURE TEST PROCEDURES
7. OPERABILITY TEST PROCEDURES AND RECORDS
8. PRESSURE TEST RECORDS
9. EVALUATION RECORDS
10. REVIEW AND DISPOSITION RECORDS

PROPOSAL FOR A NEW OR UPGRADED IMP APPROACH

- **REPAIR AND REPLACEMENT RECORDS TO BE MAINTAINED**

1. **EVALUATION RECORDS**
2. **REPAIR AND REPLACEMENT PROGRAM AND PLANS**
3. **RECORDS AND REPORTS OF REPAIR AND REPLACEMENT ACTIVITIES**
4. **RECONCILIATION DOCUMENTATION**
5. **FUTURE MONITORING PLANS**

PROPOSAL FOR A NEW OR UPGRADED IMP APPROACH

- **COMPLIANCE TO QA PROGRAM**

  - **ALL ACTIVITIES ASSOCIATED WITH BASELINE AND INSERVICE INLINE INSPECTION SHALL BE PERFORMED IN ACCORDANCE WITH WRITTEN AND APPROVED PROCEDURES TO ASSURE COMPLIANCE WITH QA PROGRAM.**

  - **REPAIRS AND REPLACEMENT ACTIVITIES SHALL ALSO COMPLY WITH QA PROGRAM.**

HOW TO ACCOMPLISH

- **ASME CAN CONSIDER ESTABLISHING A COMMITTEE OR A TASK FORCE CONSISTING OF:**

  1. **INDUSTRY EXPERTS**
  2. **REGULATORS (PHMSA)**
  3. **ASME STAFF AND VOLUNTEERS**

- **DEVELOP QA REQUIREMNTS, PRESCRIPTIVE IMP STANDARD 0R AN APPENDIX.**

- **PHMSA TO INCORPORATE NEW AND/OR UPDATED STANDARD(S) IN REGULATION BY REFERENCE.**

SUMMARY

1. ENHANCE QUALITY AND SAFETY OF PIPELINES

2. PRESSURE INTEGRITY, STRUCTURAL INTEGRITY, LEAKTIGHTNESS, AND OPERABILTY AS KEY ATTRIBUTES

3. IDENTIFICATION AND CATEGORIZATION OF THREATS

4. QUALITY ASSURANCE PROGRAM

5. AUTHORIZED INSPECTION AGENCY – THIRD PARTY VERIFICATION OF COMPLIANCE TO QA PROGRAM

SUMMARY

6. PRESCRIPTIVE INTEGRITY MANAGEMENT PROGRAM (IMP)
7. PERFORMANCE BASED IMP AS AN ALTERNATIVE
8. CRITERIA FOR PRESCRIPTIVE IMP
9. CLASSIFICATION OF PIPELINES OR SEGMENTS
10. RECORDS TO BE MAINTAINED
11. ASME TO ASSIST IN DEVELOPMENT OF NEW AND/OR UPDATED STANDARD(S)
12. QUESTIONS?????