INTEGRITY MANAGEMENT

CASE STUDIES

WHAT IS RISK MANAGEMENT PROGRAM?

Risk management - systematic application of management policies, procedures, finite resources, and practices to the tasks of identifying, analyzing, assessing, reducing, and controlling risk in order to protect employees, the general public, the environment, and pipeline facilities;

Risk management plan - management plan utilized by a gas or hazardous liquid pipeline facility owner or operator that encompasses risk management

USC §60101

WHAT IS AN INTEGRITY MANAGEMENT PROGRAM?

A set of safety management, analytical, operations and maintenance processes that are implemented in an integrated and rigorous manner to assure operators provide protection for HCAs. While the rules provide some flexibility for an operator to develop a program best suited for its pipeline system(s) and operations, there are certain required features – called “program elements” – which each IM program must have.

Primis.phmsa.dot.gov/comm/lm.htm

WHAT IS AN INTEGRITY MANAGEMENT PROGRAM?

ASME B31.8S defines as:

- Integrity management describes a process that an operator of a pipeline system can use to assess and mitigate risks in order to reduce both the likelihood and consequences of incidents. It covers both a prescriptive- and a performance-based IM program.

- A comprehensive, systematic and integrated IM program provides the means to improve the safety of pipeline systems.

WHAT IS AN INTEGRITY MANAGEMENT PROGRAM?

Integrity management program means an overall approach by an operator to ensure the integrity of its gas distribution system. *(§192.1001)*

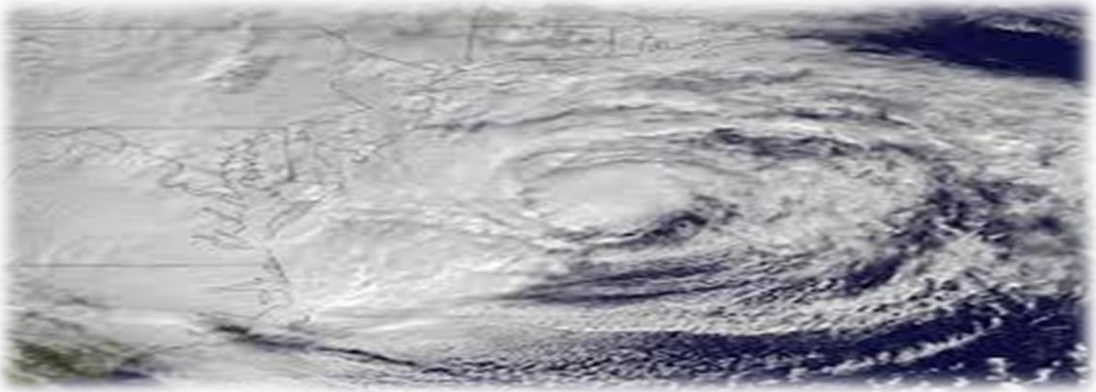
Integrity management plan means a written explanation of the mechanisms or procedures the operator will use to implement its integrity management program and to ensure compliance with this subpart. *(§192.1001)*

INTEGRITY MANAGEMENT

- Principles or theory the same
- Related to pipe, not the product
- Regulatory differences between gas transmission, HL and distribution programs
- Common elements

COMMONALITIES OF IM

- **Identify risks or threats**



COMMONALITIES OF IM

- **Evaluate risk/risk ranking**

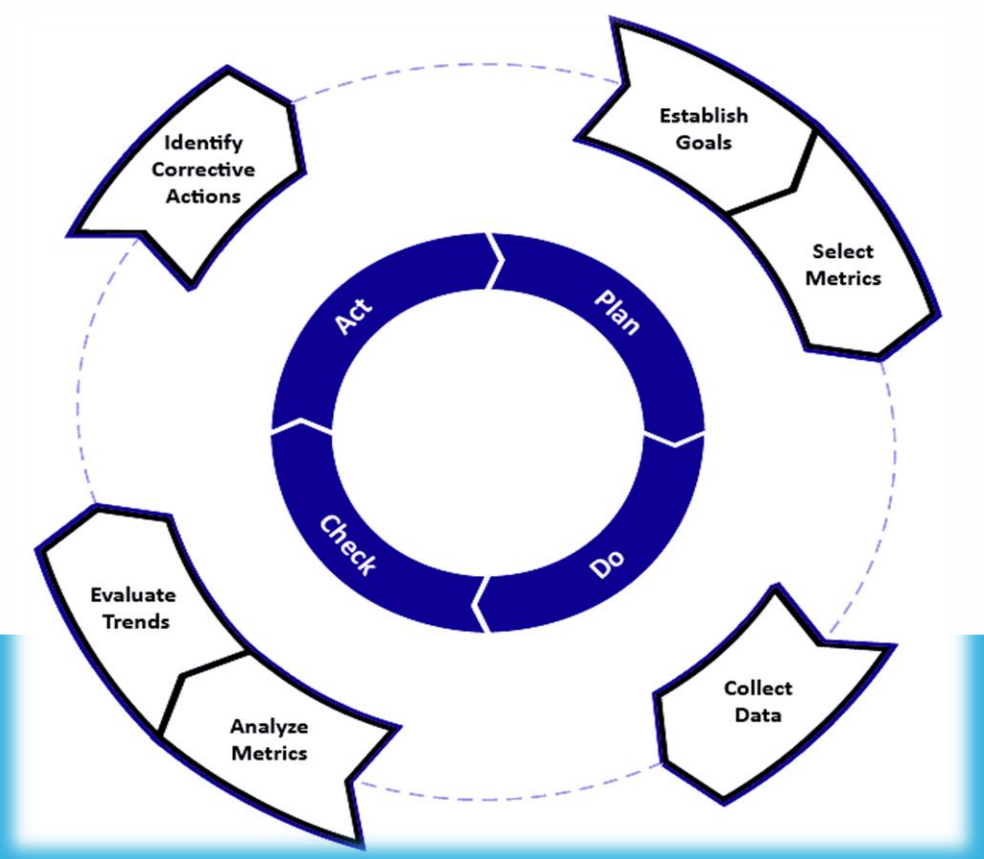
Risk = Likelihood X Consequences

COMMONALITIES OF IM

- **Preventative and mitigative (P&M) measures**
  - Reduce possibility (preventative) or consequence (mitigative)

COMMONALITIES OF IM

- **Continual evaluation, including monitoring of performance measures**



UNIQUE TO TRANSMISSION LINES

HCA identification

Baseline assessment plan (BAP)

UNIQUE TO TRANSMISSION LINES

Assessments

Pigging, Pressure Tests, DA

Repair and remediation

Case Studies to determine impact to integrity programs

CHANGING THREATS

- **Gas distribution system on New Jersey shore**
  - Both barrier islands and mainland
- **Superstorm Sandy**
  - Landfall on 10/29/2012
  - Storm surge ≥13.3 feet
  - System pressurized during storm

CHANGING THREATS

After storm hit

- Curtailed service to 31,000 customers
- Repressurized or replaced 270 miles of main in less that 6 weeks
- Installed one mile of new 12” steel main in three weeks


12” 60lb main

CHANGING THREATS

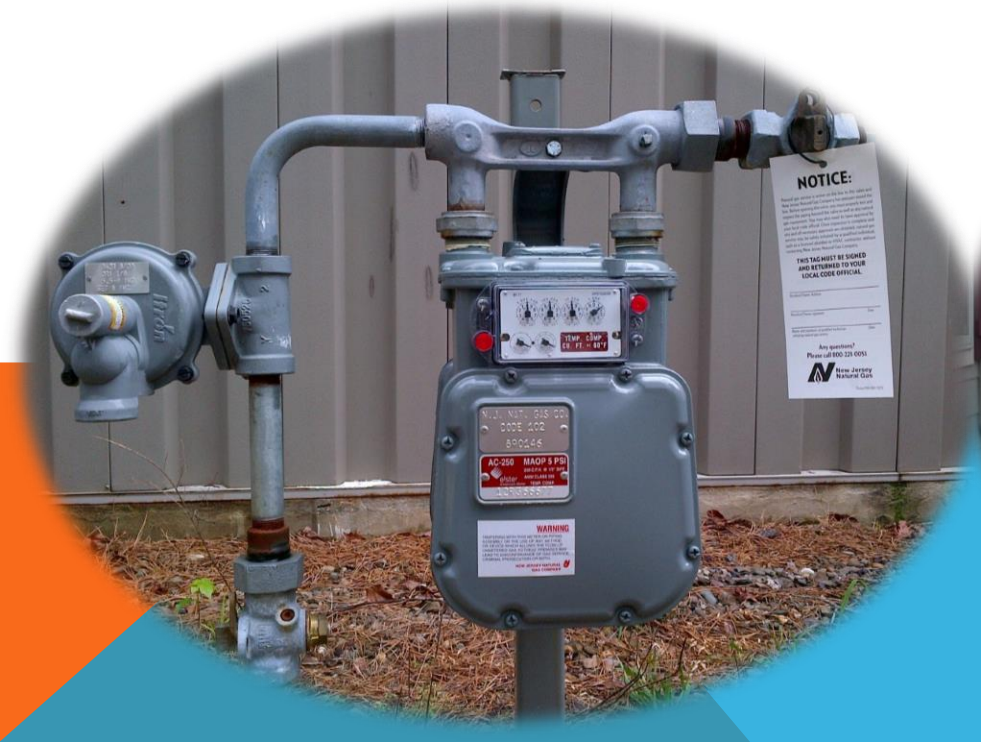
- Roads and bridges washed away
- Sand drifts 7 feet tall
- Debris and flooding
- Leaks
- Valves and other equipment buried

CHANGING THREATS

- **Threats have changed**
- **Corrosion threats**
  - External
  - Internal

CHANGING THREATS

- **Threats have changed**
  - Outside force damage
  - Third party damage
  - Materials and construction



PLAN EVALUATION

Identified threats and therefore risk rankings should change

Plan evaluation frequency

- **Long enough for meaningful changes**
- **Short enough to recognize trends**
- **Additional evaluations as needed**

Should this event trigger an integrity management evaluation?

CHANGING THREATS

Pipeline crossing failure on the Yellowstone River July 1, 2011

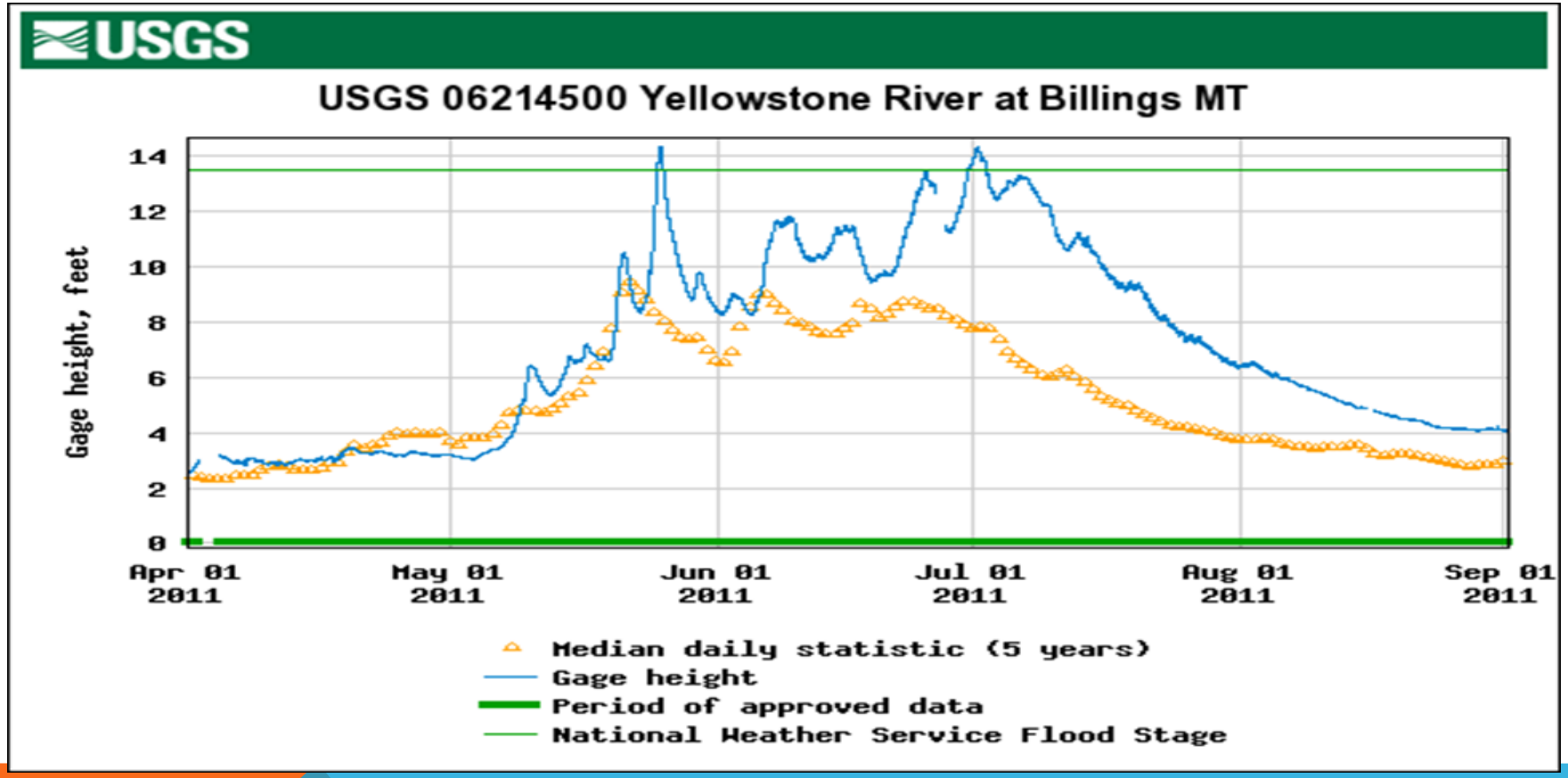

10/10


5/11


6/11

July 2011

YELLOWSTONE RIVER GAUGE HEIGHT



Graph of gauge height April 1, 2011 through September 1, 2011.

MONTANA WATER CROSSING SURVEY

Collaborate with State of Montana to compile an inventory of petroleum pipelines at major water crossings, determine if they are currently safe and ensure the integrity of the petroleum pipelines.

MONTANA RIVER CROSSINGS

Major River Crossings (open-cut, > 100 feet)	Remediation Not Necessary	Remediation to be Completed by 2012	2013 and beyond Remediation (Lower Priority)
4	1	3	N/A
3	1	1	1
16	4	3	9
0	0	N/A	N/A
3	3	N/A	N/A
4	4	N/A	N/A
1 (HVL)	1	N/A	N/A
2	2	N/A	N/A

P&M MEASURES

Task force revealed few pipeline companies incorporate river and geotechnical risks when determining P&M measures

Potential for Damage to Pipeline Facilities Caused by Severe Flooding (ADBs 11-04, 13-02, 16-01, 19-010

POTENTIAL FOR DAMAGE TO PIPELINE FACILITIES CAUSED BY SEVERE FLOODING

- Utilize hydrologist to evaluate for scour or channel migration at crossings
- Evaluate crossings for installation methods and determine withstand risks, use HDD to avoid damage
- Determine max flow of flooding conditions and have contingency plans to shut down or isolate facilities

POTENTIAL FOR DAMAGE TO PIPELINE FACILITIES CAUSED BY SEVERE FLOODING

Evaluate the accessibility of pipeline facilities that may be in jeopardy,

Extend regulator vents and relief stacks

Coordinate with emergency and spill responders on pipeline location and condition

Deploy personnel so that they will be in position to take emergency actions, such as shut down, isolation, or containment.

POTENTIAL FOR DAMAGE TO PIPELINE FACILITIES CAUSED BY SEVERE FLOODING

- Open communications with official to address concerns regarding integrity
- Perform frequent patrols, including appropriate overflights, to evaluate right-of-way conditions at water crossings during flooding and after waters subside.
- Determine if flooding has exposed or undermined pipelines

POTENTIAL FOR DAMAGE TO PIPELINE FACILITIES CAUSED BY SEVERE FLOODING

- Perform surveys to determine the depth of cover over pipelines and the visual condition of any exposed pipelines
- Ensure that line markers are still in place or replaced in a timely manner.
- Notify contractors, highway departments, and others involved in post-flood restoration activities of the presence of pipelines and the risks posed by reduced cover.

P&M MEASURES

- **Ideas for P&M Measures**
  - Yearly visual inspection of crossing
  - Additional inspections as needed
  - Periodic depth of cover surveys
  - Replacement or remediation of crossing
  - Changing or relocating facilities
  - Extending stacks
  - Properly marked
  - PAP and liaison
  - Contingency plans

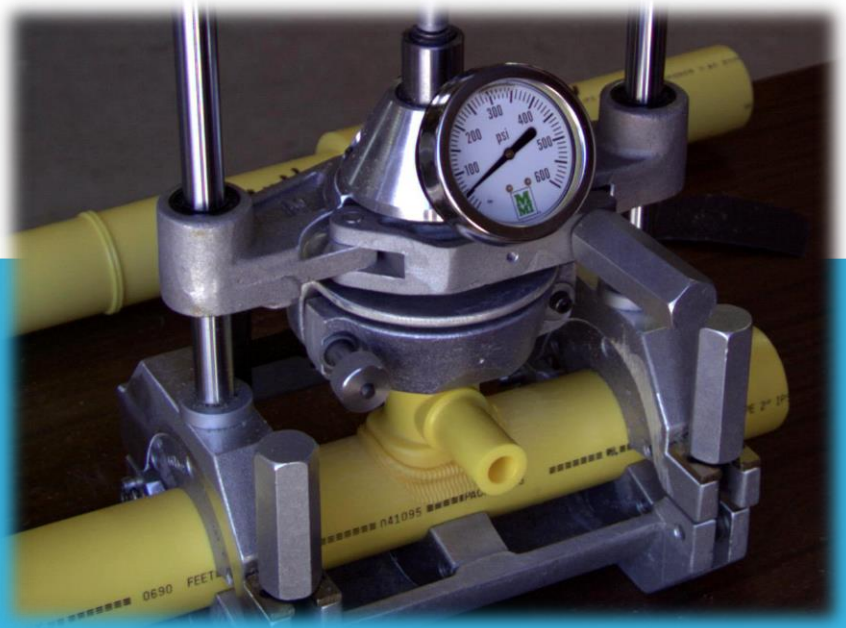
PERFORMANCE MEASURES

The P&M measures may also be rolled into performance measures

- **Short-term measures**
  - Number of crossings replaced according to plan
- **Long-term measures**
  - Number of crossings inspections
  - Number of additional inspections
  - Number of depth of cover surveys

CHANGING THREATS

- Inspector watching a saddle fusion in the field
- Identified that joiner was not following company procedures
- Inspector asked to cut out and test fusion



BACKGROUND

Joint passed visual examination

BACKGROUND

Joint after testing

BACKGROUND

- Joiner worked for 5 years
- At least 135 installations in past 2 years – known locations
- No location or number history for other 3 years

IMPACT ON IM

Change in threats

- Incorrect operations
- Construction/joining
- Once all bad joints removed does the threat decrease?

Change in risk

- Risk increases for system because of unknown number and locations

IMPACT ON IM

P&M measures

- Remove all known fusions by joiner
- Determine other potential locations
- Monitor other installations

Performance measures

- Number of fusions removed

OTHER IMPACTS

Training
Operator qualification
O&M manual
Inspection

BACKGROUND

- As performance measure for damage prevention and public awareness, operator wanted to reduce third-party hits
- Study discovered large percentage of damage caused by city/ county/ township/ parish activities with no one call

BACKGROUND

- Met with government officials as line hits occurred
- Resulted in a reduction in the number of third party damage by government entities

IMPACT ON IM

Threats

- reduced risk of third party damage or other outside force

Performance measure

- used for integrity management, damage prevention and public awareness

CHANGING THREATS

Sissonville WV

- Not in HCA
- Common right-of-way

CHANGING THREATS

- External corrosion on bottom of pipeline
- Other locations with similar conditions
  - Pipe characteristics, soil conditions, coating
- Adjacent pipelines

IMPACT ON IM

Changing threats

P&M measures

- Review of corrosion records
- More frequent readings, including other electrical surveys
- Changes in procedures for IR drop

PERFORMANCE MEASURES

Review of corrosion readings

- Number of low readings/number of low readings corrected
- Number of electrical surveys conducted
- New rectifiers/ground beds/anodes installed
- Ratio of repaired to unrepaired issues
- Recoating similar pipelines

CHANGING THREATS

- **ADB – 2013-04**
  - July 17, 2013, TDS issued a recall of their Leak Repair Clamp (LRC)
  - Covers all pressure classes and sizes
  - Manufactured between 9/02 and 8/12
  - Contact TDW to follow up on recall

IMPACT ON IM

Changing threats

P&M measures

- Review of leak repairs records
- More frequent leak surveys at known locations
- Replacement of these clamps as per TDW recommendations

PERFORMANCE MEASURES

- Number of LRCs repaired or replaced


CAUTION
GAS
PIPELINE
BEFORE
DIGGING
CALL COLLECT
COOKEVILLE
GAS DEPT.
931-526-9591
1-800-351-1111

REVIEW

CHANGING THREATS

- Identify threats to pipelines
- Changes can occur very quickly!
- Threats, and therefore risk, is not constant
- Can diminish through construction or P&M measures
- Can increase through environmental or other events
- Cannot entirely remove threat (ADB 17-01 – Deactivation of threats)

RISK AND P&M MEASURES

Risk = Likelihood X Consequences

Reduce risk by changing likelihood or consequence

P&M MEASURES

- Additional actions to enhance public safety or environmental protection
- Prevent the occurrence of events contributing to the likelihood of an event
- Serve to mitigate (reduce) the consequences

P&M MEASURES

- Tied to specific pipelines or conditions
- Short term or long term measures
- Additional patrols, inspections, or measurements

DOCUMENT!

PLAN EVALUATION

Plan evaluation frequency

- **Long enough for meaningful changes**
- **Short enough to recognize trends**
- **Additional evaluations as needed**

Modifications to assessment intervals

PERFORMANCE MEASURES

- **ADB 2012-10 – Using meaningful metrics in conducting IM Program evaluations**
- **ADB 14-05 – Guidance for Strengthening Pipeline Safety Through Rigorous Program Evaluation and Meaningful Metrics**
- **Challenge to define performance measures**

PERFORMANCE MEASURES

Certain measures required to be reported annually as part of annual report and include

- **Leaks**
- **Miles assessed and remediated**
- **One call tickets and third party damage**

PERFORMANCE MEASURES

- **Were all integrity management program objectives accomplished?**
  - **Monitor surveillance and preventative activities**
  - **Monitor O&M trends or P&M measures**
  - **Is desired outcome being achieved?**

PERFORMANCE MEASURES

- Short and long term measures
- Can share measures with other programs (public awareness)
- Tied to O&M activities or P&M measures

Are your metrics meaningful?

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