Gas HCA – Final Rule
(High Consequence Areas)

• Class 3 and 4 locations
• Impact radius 300/660/1000* feet
  = 1000 ft for pipe D > 30” & P > 1000 psi
  = 300 ft for pipe D < 12” & P < 1200 psi
• Building or facility having persons who are difficult to evacuate (e.g., schools, hospitals, nursing homes, prisons)
• Places where people congregate (e.g., playgrounds, camping grounds, recreational facilities)
Gas IMP – NPRM
HCA Definitions (cont.)

• New HCA component: area of an impact circle of threshold radius 1000 ft or larger that has 20 or more buildings

Potential Impact Radius: Use C-FER equation

Potential Impact Circle: Contains 20 or more buildings within a circle of threshold radius 1000 ft, or hard to evacuate place in 300/660/1000 ft circle, or a place where people gather in 300/660/1000 ft circle

Potential Impact Zone: Determined by sliding ‘Potential Impact Circle’ along the pipe
Class Location Determination

Class 1

Class 3

M.P. 0 | M.P. 1 | M.P. 2 | M.P. 3

46 buildings

660 ft
Example of an HCA

As buildings and facilities are identified, the distance is measured from the pipeline to the building.
**Example of an HCA Segment**

*ABC Pipeline*
- Diameter = 24"
- Pressure = 800 psi
- PIR = 468 ft
- TR = R = 660 ft

**R = distance from closest point of prison to pipeline.**

Distance of 660 ft. is specified in final rule 192.761(e)
Continuous Sliding Mile (example of MRA)

Class 1

HCA or MRA?

Class 2

1 mile

Class 3

MRA

13 yr (CDA 7 yr)

HCA

10 yr

MRA

13 yr (CDA -7 yr)
Determining Potential Impact Zone

School

ABC Pipeline

Pipe dia = 30 inch
MAOP = 1000 psi
PIR (C-FER) = 655 ft
TR = r = 660 ft
Pipeline Integrity Management
Gas Transmission Pipelines

Mike Israni
February 20-21, 2003
Gas IMP – NPRM
(Scope)

- All gas transmission lines including those transporting petroleum gas, hydrogen, or other gases covered under Part 192

- No gathering or distribution lines
Pipeline Integrity Management

- Our main goals
- Gas HCA - Final rule
- Gas IMP - NPRM
- Milestones
Our Main Goals

- Provide for increased assurance to the public
- Accelerate integrity assessment of pipelines in high consequence areas (HCA)
- Improve integrity management systems within companies
- Improve the government’s role in validating integrity management
Gas IMP – NPRM (Elements)

- Identify HCA segments (12 months)
- Develop IMP framework (12 months)
- Develop a plan (12 months)
  - Baseline assessment & DA (if applicable)
    - Performance-Based option
- Identify and evaluate threats & Remedial actions
- Continual evaluation and assessment
- Preventive and mitigative measures
- Performance measures & Record keeping
- Management of change & Quality assurance
- Communication plan; Copy of IMP to State
- Environmental and safety risk during assessment
Select Assessment Technology:

- Select technology best suited for type of threat
- Acceptable technologies: ILI, pressure testing, direct assessment (DA) & other equivalent technology
- DA- External Corrosion, Internal Corrosion & SCC
Gas IMP - NPRM
(Direct Assessment)

• DA is an integrity assessment method utilizing a process to evaluate certain threats (e.g. EC, IC, SCC) to a pipeline’s integrity.

• Use of DA as primary method conditional
  - Other assessment methods cannot be applied
  - Substantial impact on consumers
  - Pipeline operates at MAOP <30% SMYS
  - Operator will excavates entire segment
Gas IMP - NPRM
Direct Assessment (cont.)

- If used, DA Plan is required (ECDA example)
  ° Four Step Process
  ° Minimum Data Requirements
  ° Criteria for Feasibility Evaluation
  ° Selection Basis for Two Complementary Tools
  ° Criteria for Identifying Candidate Indications
  ° Criteria for Characterizing Indication Severity
  ° Criteria for Urgency of Direct Examination
  ° Criteria for Scheduling Excavation
  ° Criteria for Excavation Data Gathering
  ° Criteria for Qualification of Results Interpreters
  ° Criteria for Evaluating Long-Term Effectiveness of DA
Gas IMP - NPRM
(ECDA Regions)

- ECDA Regions not necessarily contiguous
- Similar physical characteristics
- Similar operating and corrosion history
- Similar expected future corrosion conditions
- Same indirect examination methods apply
- Regions can be redefined if observed conditions indicate appropriateness
Gas IMP - NPRM
(ICDA Regions)

• Continuous segment
• Begins where water may enter line
• Ends where water can no longer be transported (no water film)
• Mathematical flow model defines segment end point based on presence of critical pipe incline beyond which water film cannot be transported by gas flow
• Model must consider local gas velocity and pipe slope
Gas IMP - NPRM
(Confirmatory Direct Assessment)

- Confirmatory DA is a streamlined integrity assessment method that utilizes process steps similar to DA to evaluate for presence of corrosion and third party damage.
- If used, CDA Plan is required (ECDA example)

  Process similar to DA except:
  - Indirect examination by one tool
  - Excavation of all immediate action indications
  - Excavation of one indication in the scheduled action category
  - No excavation in the monitored indications
  - Remediation similar to DA
Gas IMP - NPRM
(Baseline Assessment Intervals)

- Start date is December 17, 2002 (Date of the new Pipeline Safety Law)
- Operators using ILI or pressure testing
  - Must complete Baseline within 10 yrs
  - 50% of covered pipe must be assessed within 5 Years (Focus on highest risk segments)
  - Exception: “Moderate Risk Areas” must be assessed within 13 Years
Gas IMP - NPRM
Baseline Assessment Intervals (cont.)

- **Start date is December 17, 2002** (Date of the new Pipeline Safety Law)
- **Operators using direct assessment**
  - Must complete Baseline within 7 yrs
  - 50% of covered pipe must be assessed within 4 Yrs (Focus on highest risk segments)
  - Exception: “Moderate Risk Areas” must be assessed within 10 Years
• The use of prior assessments
  ° Integrity assessments satisfying requirements of this rule conducted subsequent to 12/17/97 may be used as the baseline
  ° The date of this earlier assessment is that when the reassessment interval begins
Gas IMP - NPRM
Baseline Assessment Intervals (Cont.)

• Newly identified HCAs
  ° Newly identified HCAs must be incorporated within baseline assessment plans within one year of identification
  ° Baseline assessment must be completed within 10 years of identification (7 years if DA is used)
Gas IMP - NPRM

Actions to address integrity issues:

- Immediate repair conditions, 180-day remediation, and longer than 180-day remediations per OPS and ASME B31.8S std.
Gas IMP - NPRM

Preventive and Mitigative Measures

• Operators to consider additional actions specific to their systems to enhance public safety

• P & M measures include considering remote control valves or emergency shut-off valves, computerized monitoring and leak detection systems, extensive inspection and maintenance

• Reference ASME B31.8S std.
Gas IMP - NPRM
(Reassessment Intervals)

- Reassessment period (for segment) begins upon completion of previous assessment
- Periodic evaluation based on data integration
  - Operators using ILI or pressure testing
    - Consider applicable threats as in ASME B31.8S, Table 8-2
    - Consider stress level as in ASME B31.8S, Table 8-1
    - Maximum interval of 10 Yrs (Hoop Stress ≥ 50% SMYS); or 15 Yrs (Hoop Stress < 50% SMYS)
Operator using direct assessment
- Consider Largest Defect Likely to Remain
- Reassessment Interval Estimated as Half Time Needed to Grow to Critical Size
- Reassessment Interval Cannot Exceed 5 Yrs (Defect Samples Directly Examined) or 10 Yrs (Directly Examine all Defects)

If interval is longer than 7 years, operator must conduct “Confirmatory Direct Assessment” within 7 years
Gas IMP – NPRM
(Performance Measures)

Monitor Effectiveness:


- Four overall performance measures accessible to OPS and State
Gas IMP - NPRM
(Required 4 Performance Measures)

- Miles Assessed vs. Program Requirements
- Number of Immediate Repairs Completed
- Number of Scheduled Repairs Completed
- Number of Leaks, Failures, Incidents (by Cause)
Gas IMP - NPRM  
(Public Comments Invited)

- Should rural buildings (e.g. rural churches, etc.) be designated as MRAs requiring less frequent assessments or enhanced P&M?
- Should we allow max. 20 yr reassessment interval (w/ a CDA – 7th and 14th yr) for pipe operating below 30% SMYS? (applicable to press test or ILI methods)
- Should we allow reassessment every 7 yrs by CDA method only for pipe operating below 20% SMYS?
- Should we allow 10 yr reassessment interval (by DA method) for pipe operating less than 30% SMYS, if the operator excavates and remediates at least highest risk anomalies?
- Should OPS accept NACE std. for DA (external corrosion) without extensive requirements?
A separate rulemaking (under development) will require operators to provide a database that contains the location and selected attributes of gas and liquid pipelines.

As of January 2003:
- 61% of natural gas transmission mileage
- 99% of hazardous liquid mileage
Milestones

- Final Rule - HCA definition … 08/06/02
- NPRM - Gas IMP……………… 01/28/03
- NPRM - Mapping ………… Spring 2003
- Final Rule – Gas IMP ……….. 12/17/03
Potential Impact Radius (PIR)

ABC Pipeline
Potential Impact Radius (PIR)

ABC Pipeline

4000 BTU's

5000 BTU's

4000 BTU's
If it is, the HCA is determined by the radius calculated by the formula $r = 0.69 \sqrt{(P)(d)^2}$, and the limits of the HCA are the calculated radius + 15% from the extremities of the facility.

If the radius calculates to 1044 ft., the HCA is established by striking a 1200 ft. (1044+15%) arc from the extremities of the facility.
DIRECT ASSESSMENT

What are the tools of Direct Assessment?

Close Interval Survey (CIS)
Direct Current Voltage Gradient
C- Scan
Current Mapper
CLOSE INTERVAL SURVEY

Technician walks the pipeline

Uses 2 Cu/CuSO4 half cells

Normally spaced 2 ½ feet apart
DCVG Survey methodology

- Walking over pipeline
- IR drop creates voltage gradient in soil
- Gradient leads to epicenter
- Soil contact important
- One surveyor
C-Scan

Similar to DCVG

Utilizes its own signal generator
Current Mapper

A 2 Hz signal is impressed on the pipeline

Current magnitude and direction are measured