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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)

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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

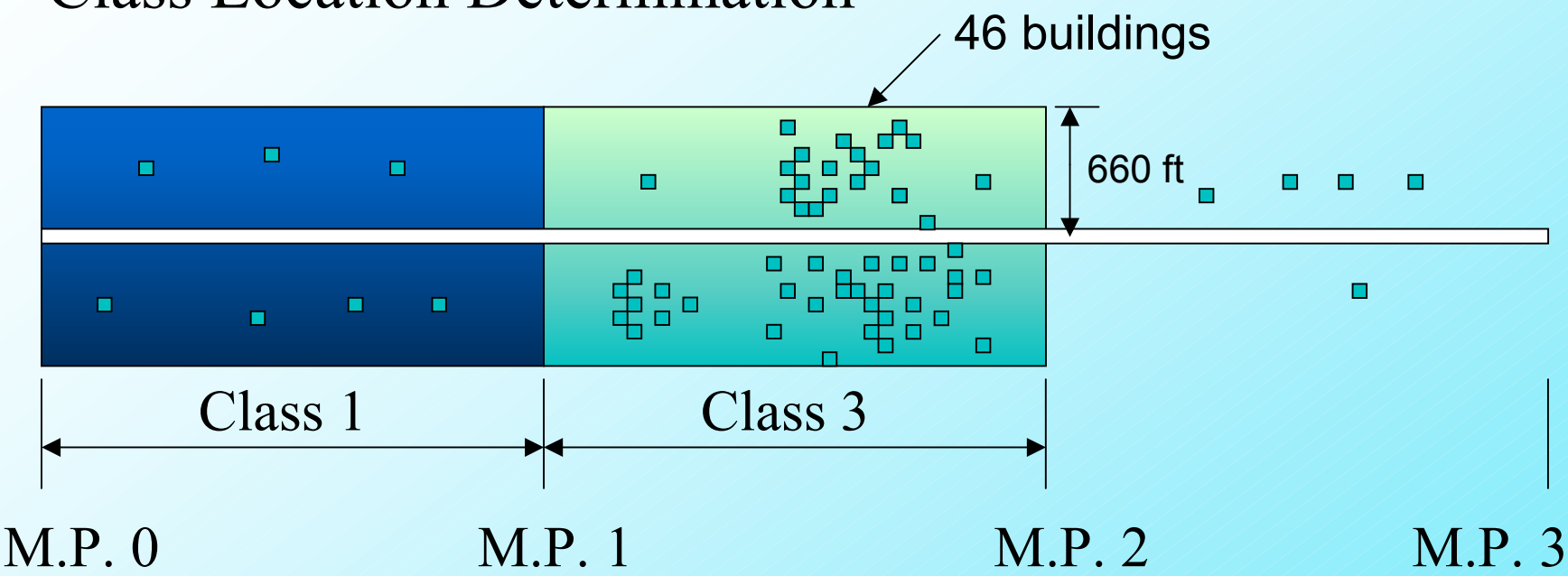
……

Potential Impact Radius : Use C-FER equation

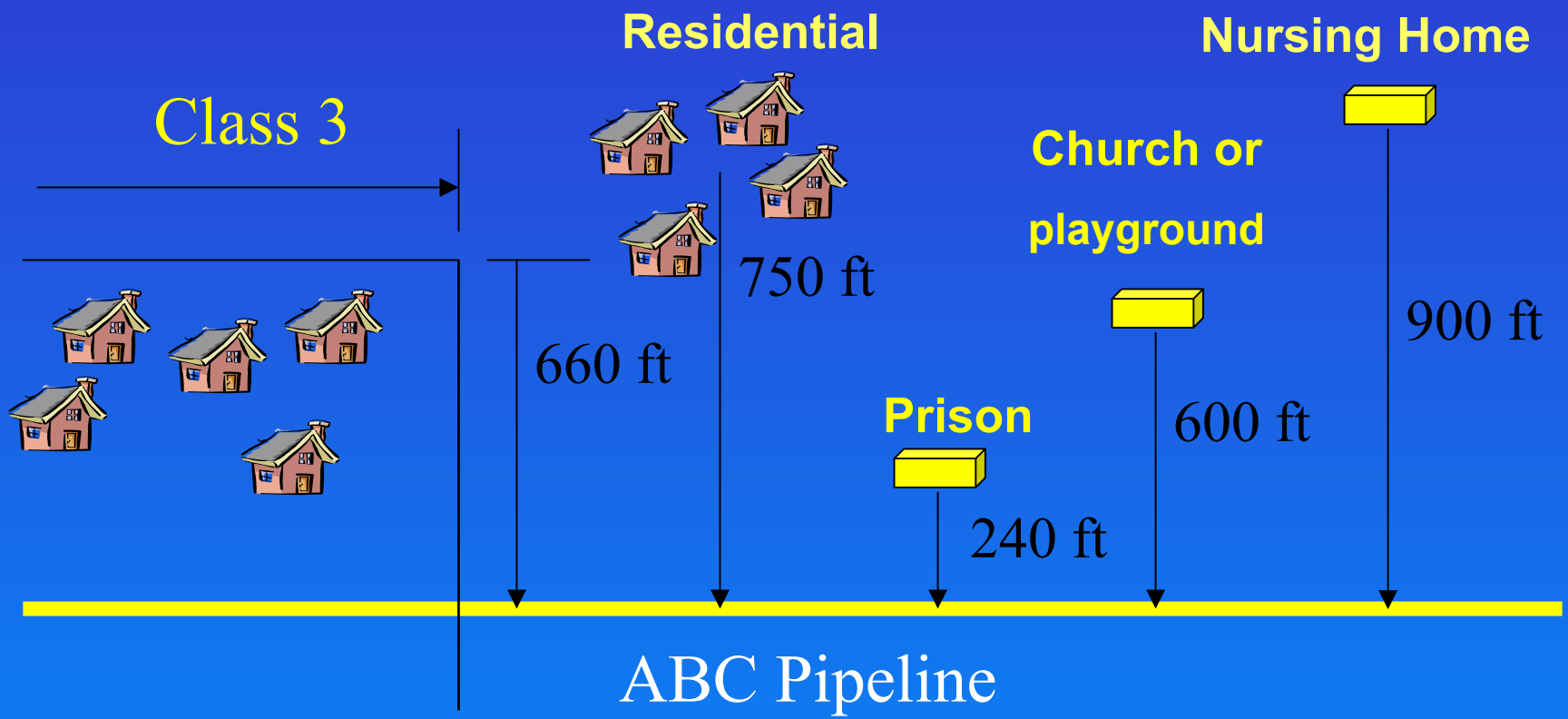
Potential Impact Circle: Contains 20 or more buildings within a circle of threshold radius 1000 ft, or hard to evacuate place in 300/660/1000 ft circle, or a place where people gather in 300/660/1000 ft circle

Potential Impact Zone : Determined by sliding 'Potential Impact Circle' along the pipe

Class Location Determination

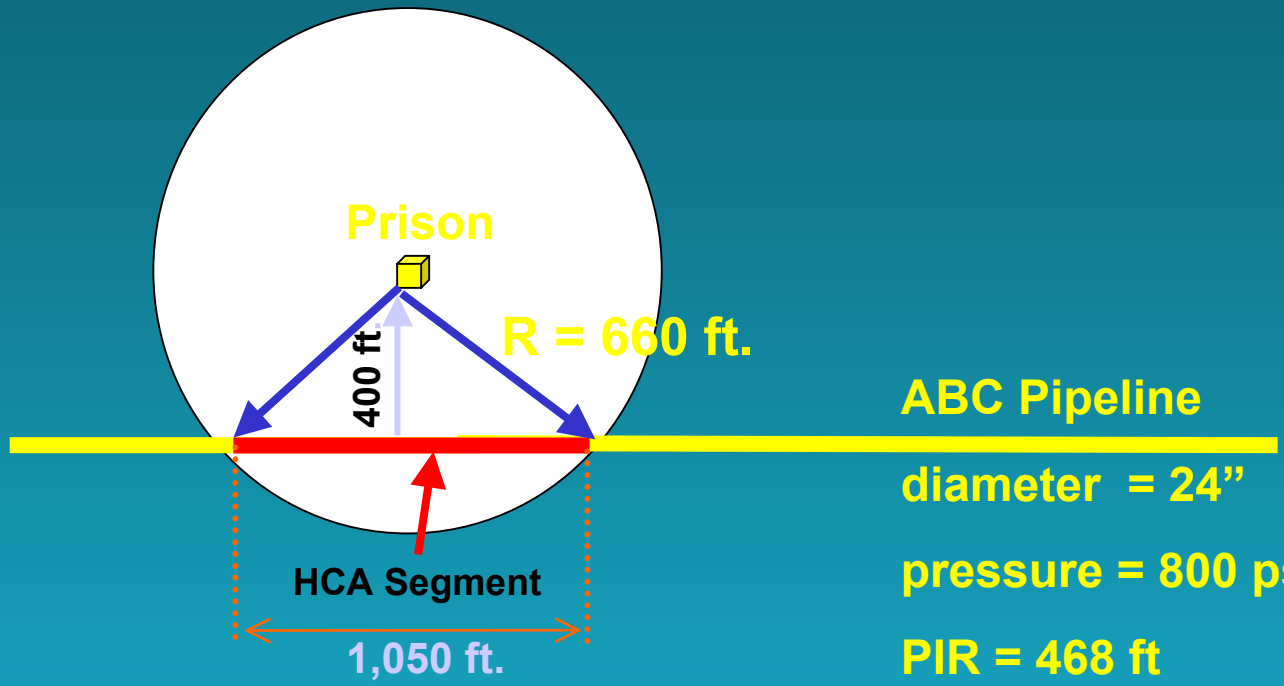


Example of an HCA



As buildings and facilities are identified, the distance is measured from the pipeline to the building.

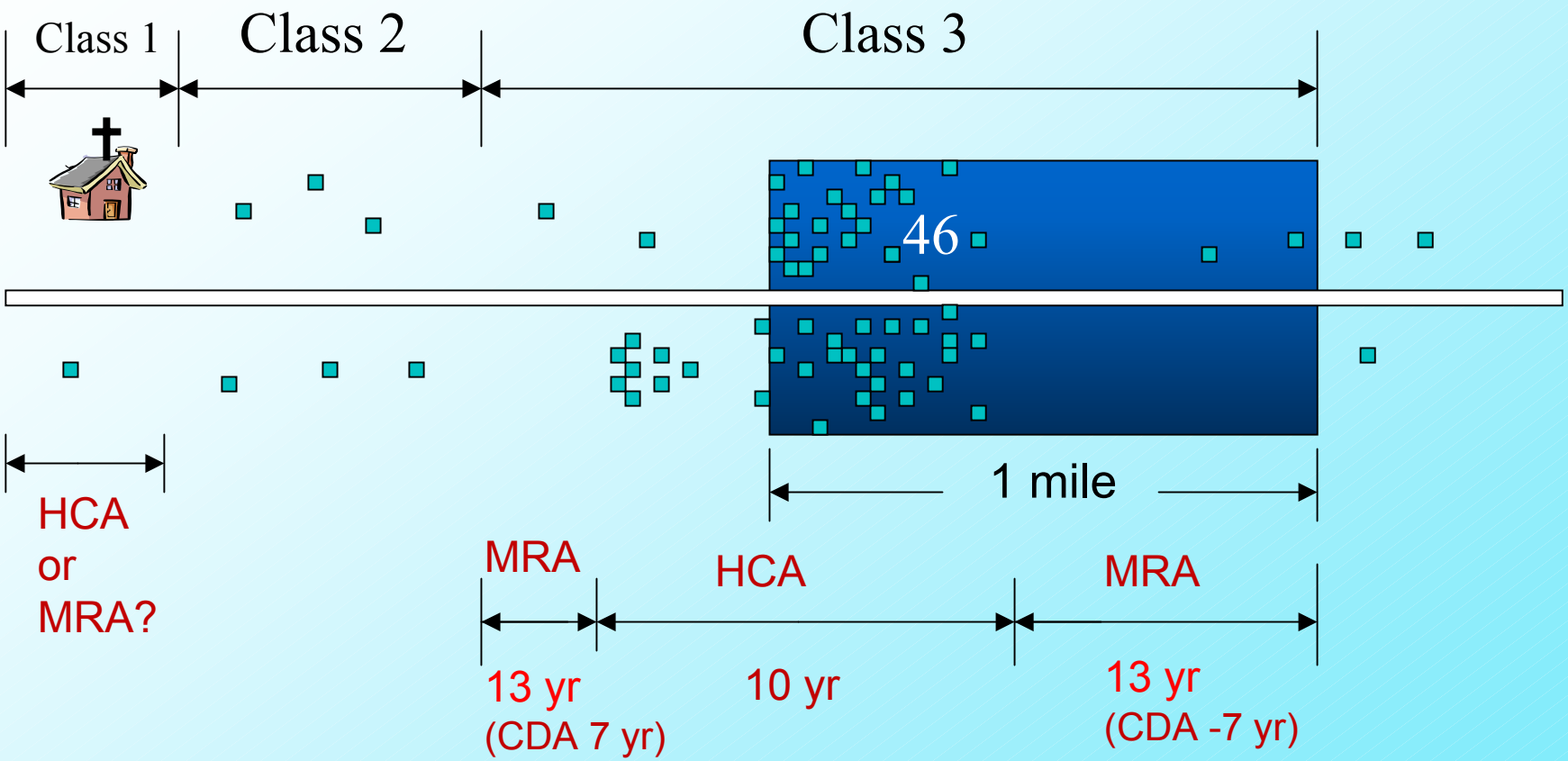
Example of an HCA Segment



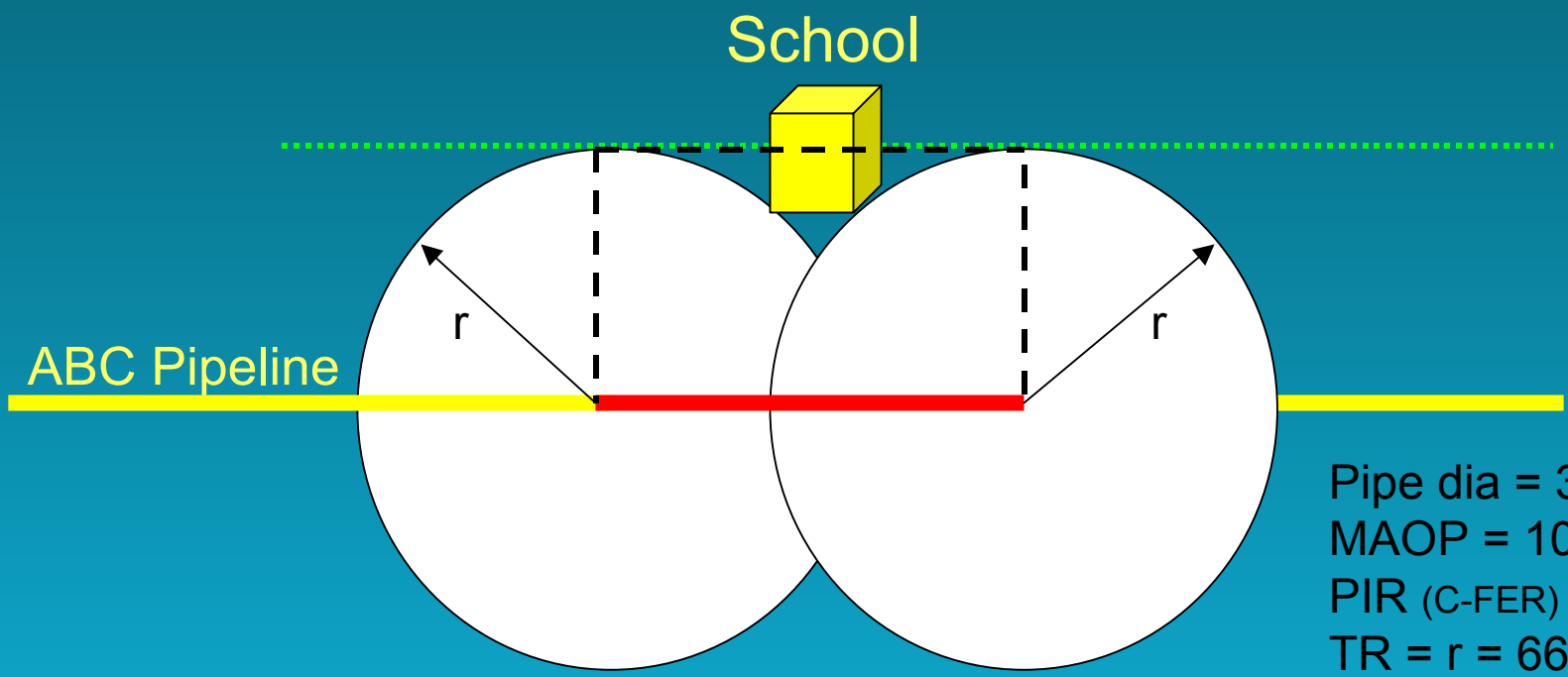
R = distance from closest point of prison to pipeline.

Distance of 660 ft. is specified in final rule 192.761(e)

Continuous Sliding Mile (example of MRA)

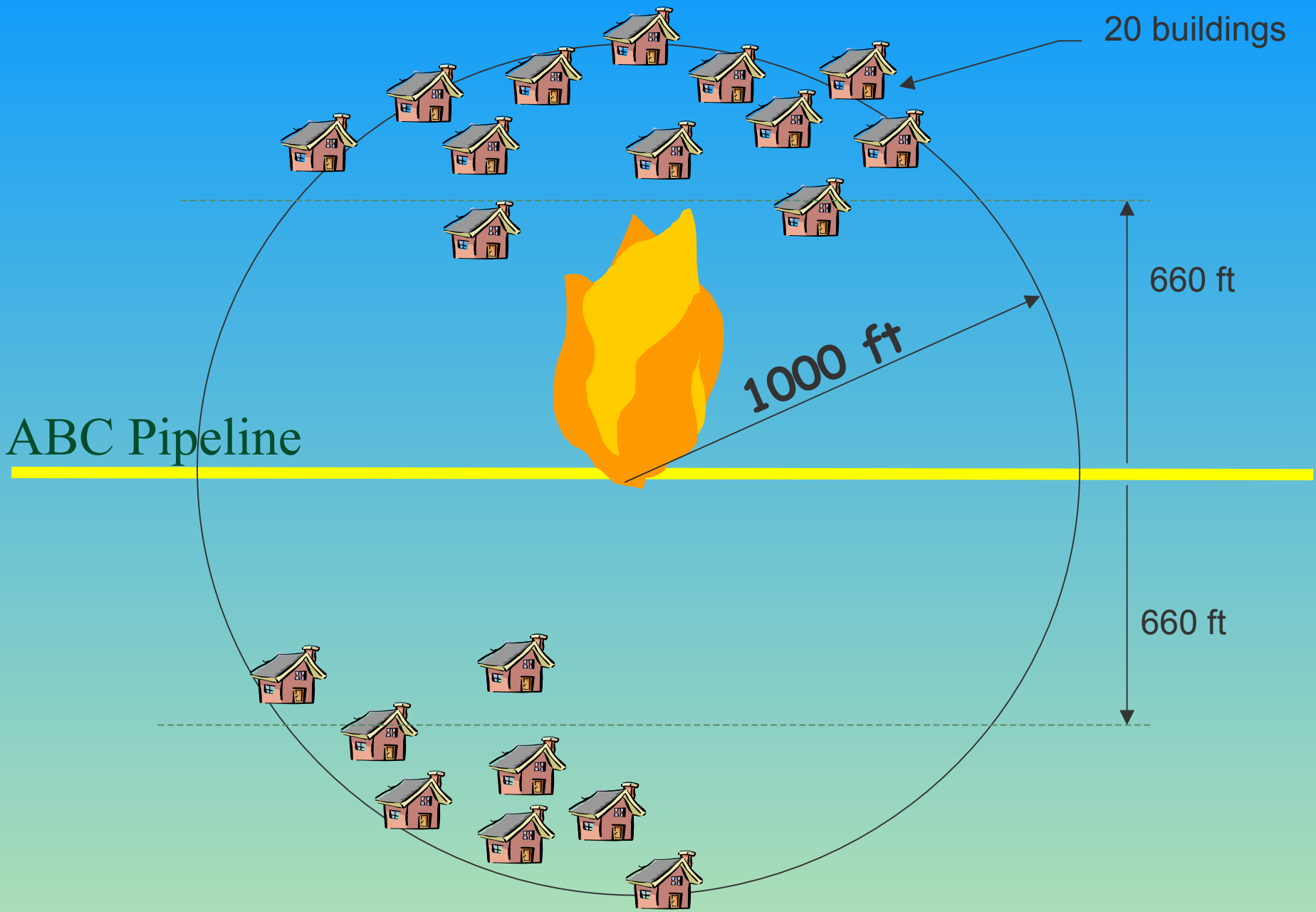


Determining PotentialImpact Zone

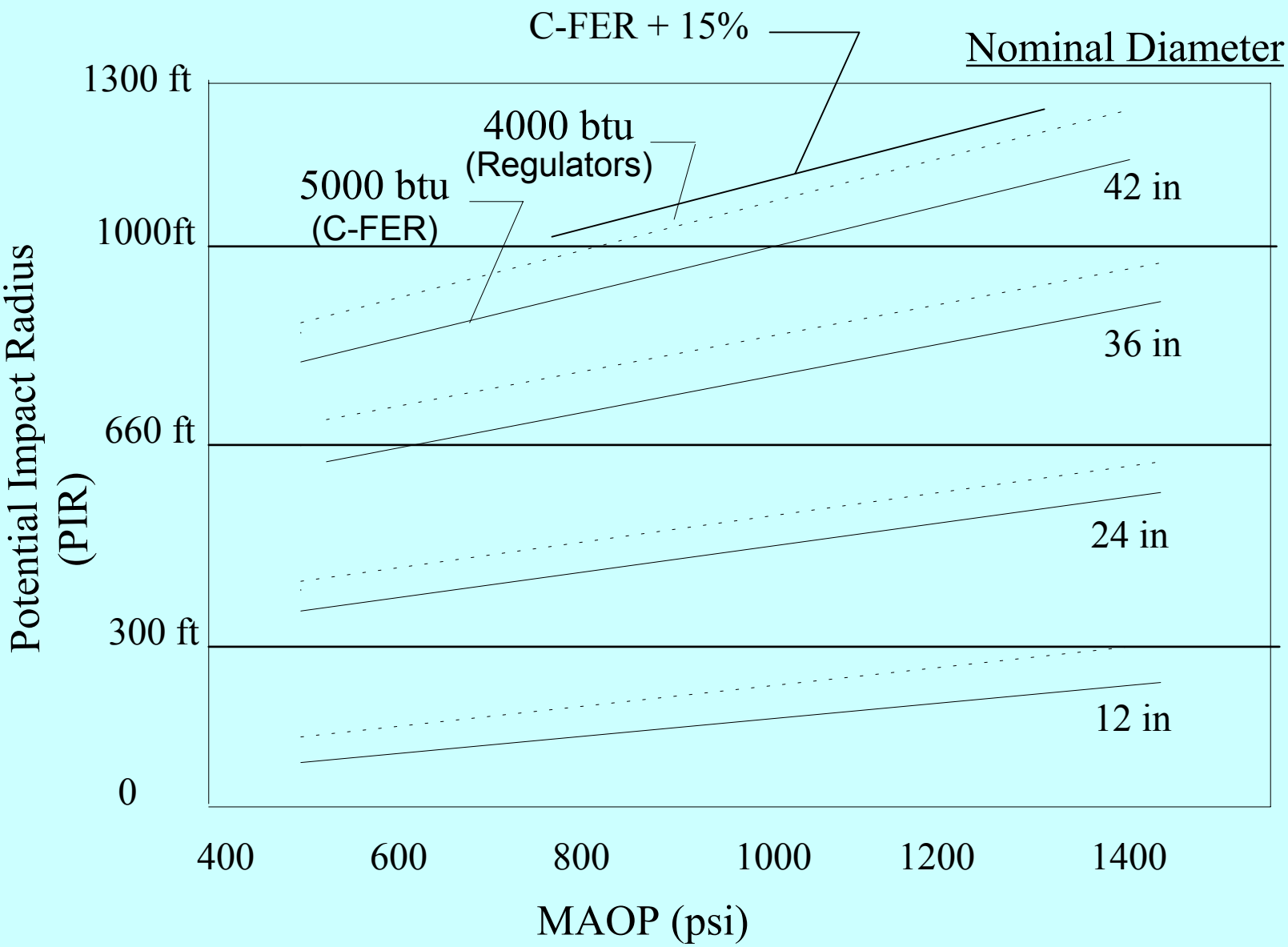


Pipe dia = 30 inch
MAOP = 1000 psi
PIR (C-FER) = 655 ft
TR = r = 660 ft

Potential Impact Circle



Potential Impact Zones



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Pipeline Integrity Management Gas Transmission Pipelines

Mike Israni

February 20-21, 2003

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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

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Pipeline Integrity Management

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

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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

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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

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Gas IMP - NPRM

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

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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

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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

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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

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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

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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

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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

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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

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Baseline Assessment Intervals (Cont.)

- 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

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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)

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Actions to address integrity issues:

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

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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.

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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)

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Gas IMP - NPRM

Reassessment Intervals (cont.)

- 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

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Gas IMP – NPRM

(Performance Measures)

Monitor Effectiveness :

- Measures needed to track actual performance & value of assessment & repair activities - Ref. ASME B31.8S std.
- Four overall performance measures accessible to OPS and State

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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)

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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?

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National Pipeline Mapping System (NPMS)- Rulemaking

- A separate rulemaking (under development) will require operators to provide 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*

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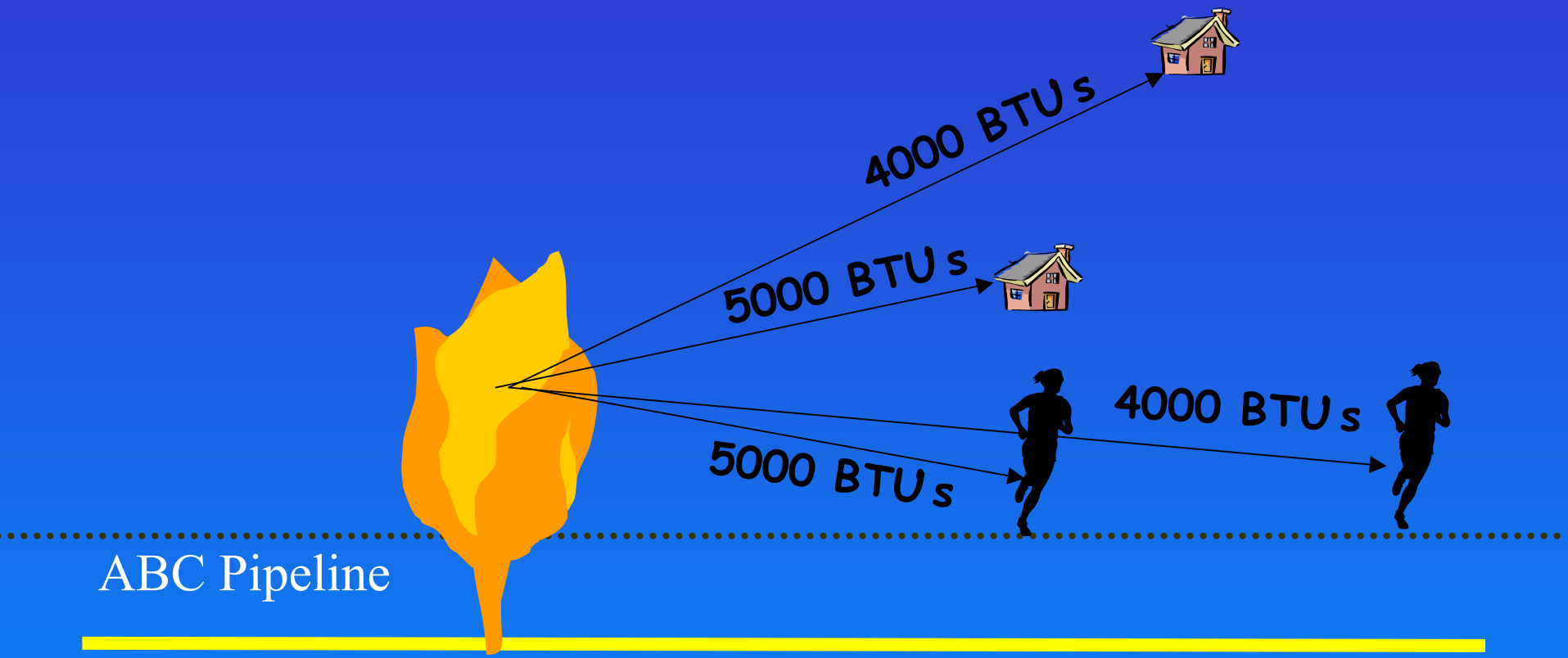
Milestones

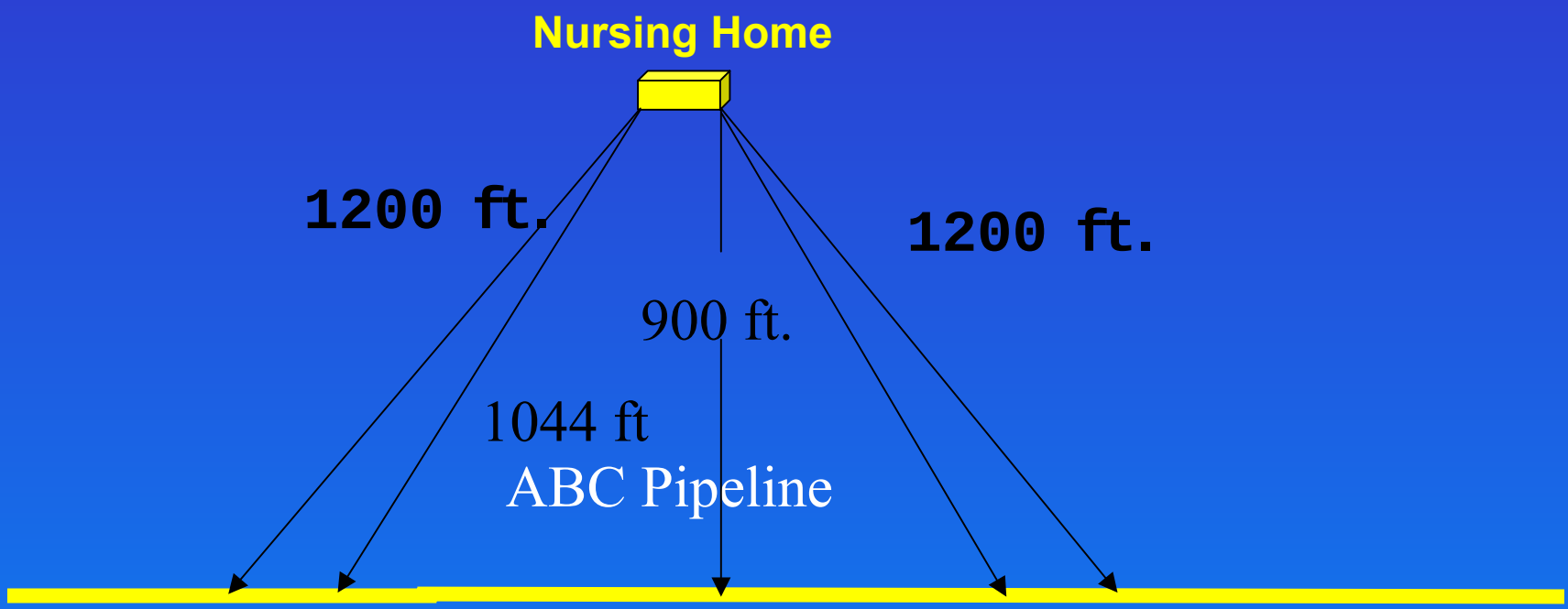
- **Final Rule - HCA definition … 08/06/02**
- **NPRM - Gas IMP…… 01/28/03**
- **NPRM - Mapping …….. Spring 2003**
- **Final Rule – Gas IMP ……. 12/17/03**

Potential Impact Radius (PIR)



Potential Impact Radius (PIR)

Example of an HCA Segment



If it is, the HCA is determined by the radius calculated by the formula $r = .69\sqrt{(P)(d)^2}$, 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**

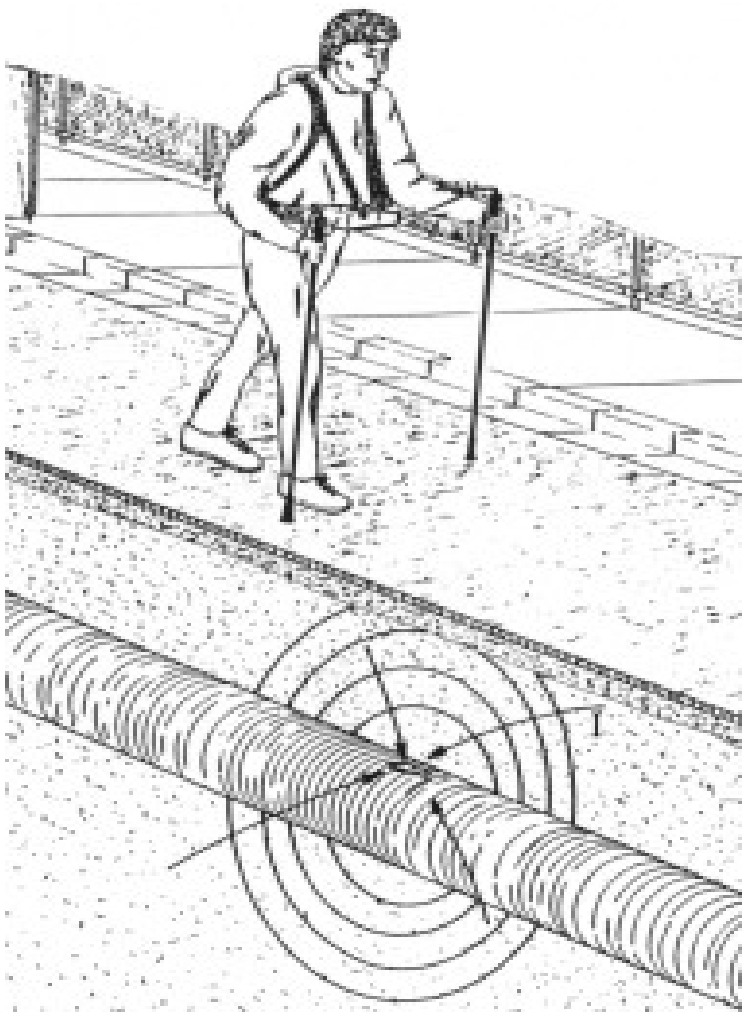
CLOSE INTERVAL SURVEY

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

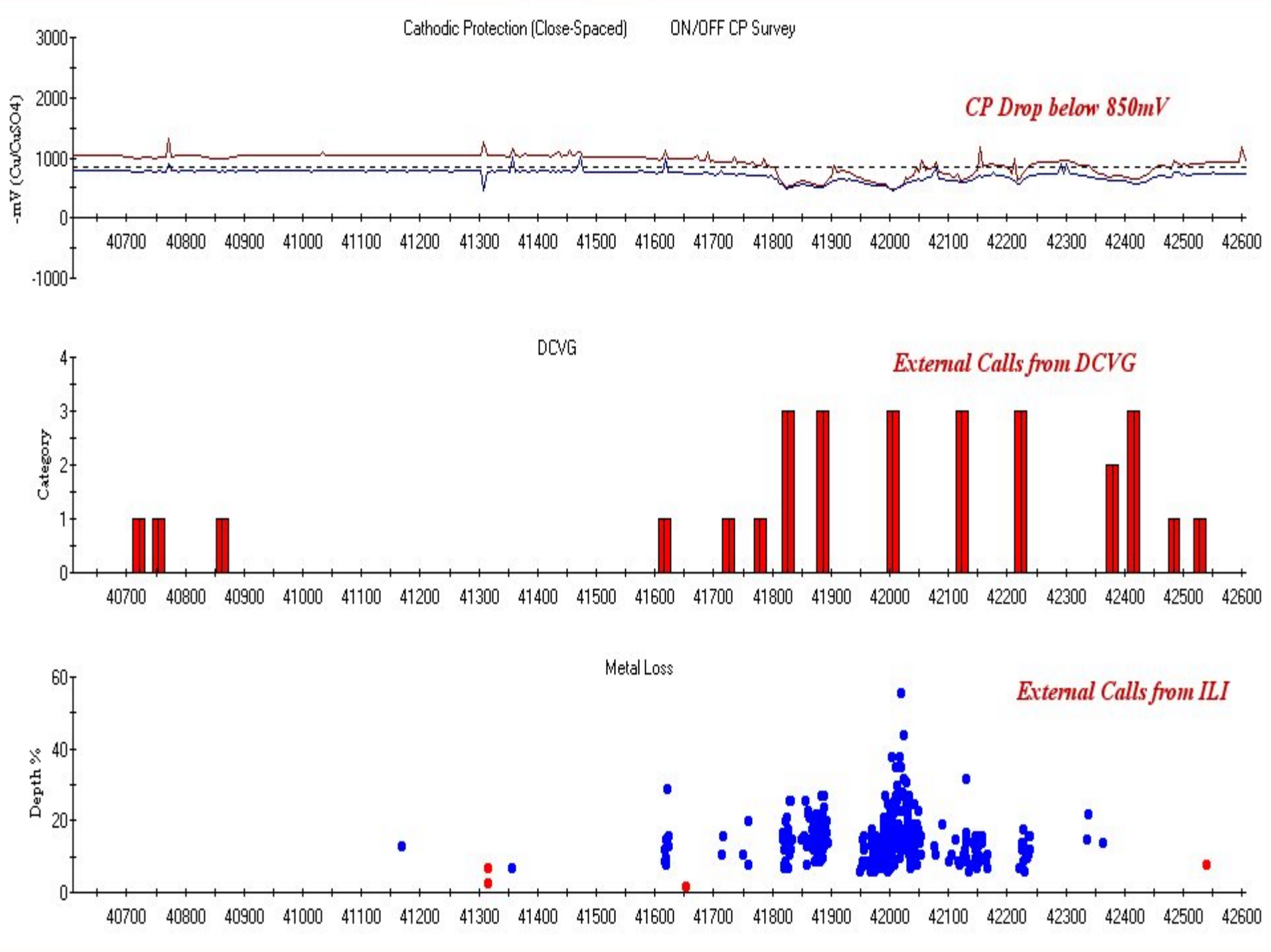
Similar to DCVG

Utilizes its own signal generator

Current Mapper

A 2 Hz signal is impressed on the pipeline

Current magnitude and direction are measured


Cathodic Protection (Close-Spaced)
ON/OFF CP Survey
-mV (Cu/CuSO4)
3000
2000
1000
0
-1000
CP Drop below 850mV
40700 40800 40900 41000 41100 41200 41300 41400 41500 41600 41700 41800 41900 42000 42100 42200 42300 42400 42500 42600
DCVG
Category
4
3
2
1
0
External Calls from DCVG
40700 40800 40900 41000 41100 41200 41300 41400 41500 41600 41700 41800 41900 42000 42100 42200 42300 42400 42500 42600
Metal Loss
Depth %
60
40
20
0
External Calls from ILI
40700 40800 40900 41000 41100 41200 41300 41400 41500 41600 41700 41800 41900 42000 42100 42200 42300 42400 42500 42600