High Consequence Areas

Industry Presentation

March 14, 2003

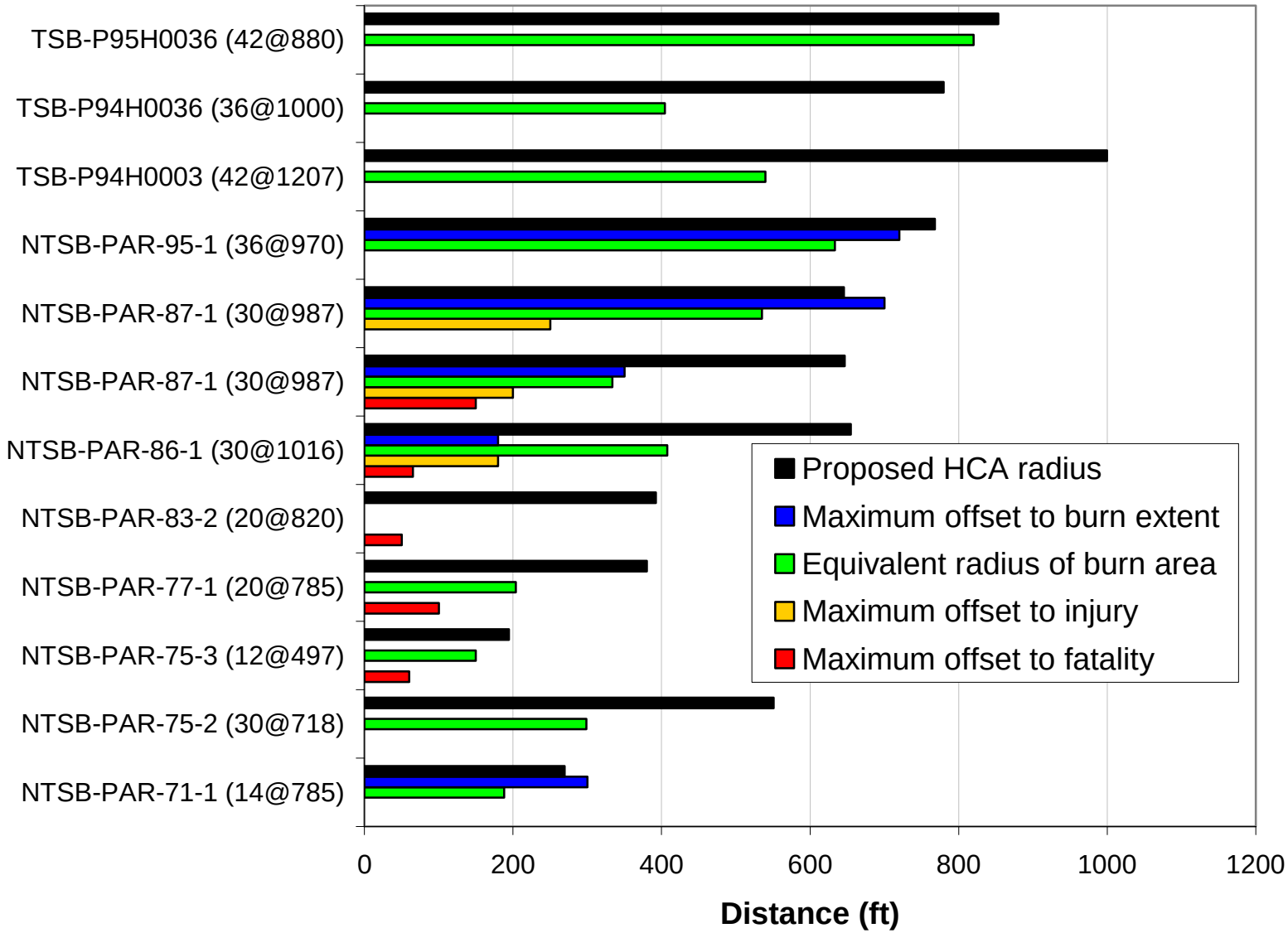
Outline of Presentation

- Describe Industry Work in Defining HCAs
- Discussion of January 28, 2003, Integrity Management for Natural Gas Pipelines NPRM (HCA Focus)
- Discuss Intent of HCA Definitions
- Discuss Proposed Industry Definition
  - Scientific Basis
  - Proposed Language
- Compare and Contrast OPS/Industry Approaches

How to Define HCA's?

- INGAA began work to determine a valid technical basis in 1999
- Led to Pure Technical Approach ("C-FER Circle")
- Empirical Model Validated With Real Data
- Led to INGAA / AGA Proposed Definition in 2000
- OPS Adopted C-FER Methodology in NPRM

Model Validation – North American Incidents



Pure Technical Approach ("C-FER " Circle)

192.761 Definitions
The following definitions apply to this section and 192.763:

High consequence area means any of the following areas:

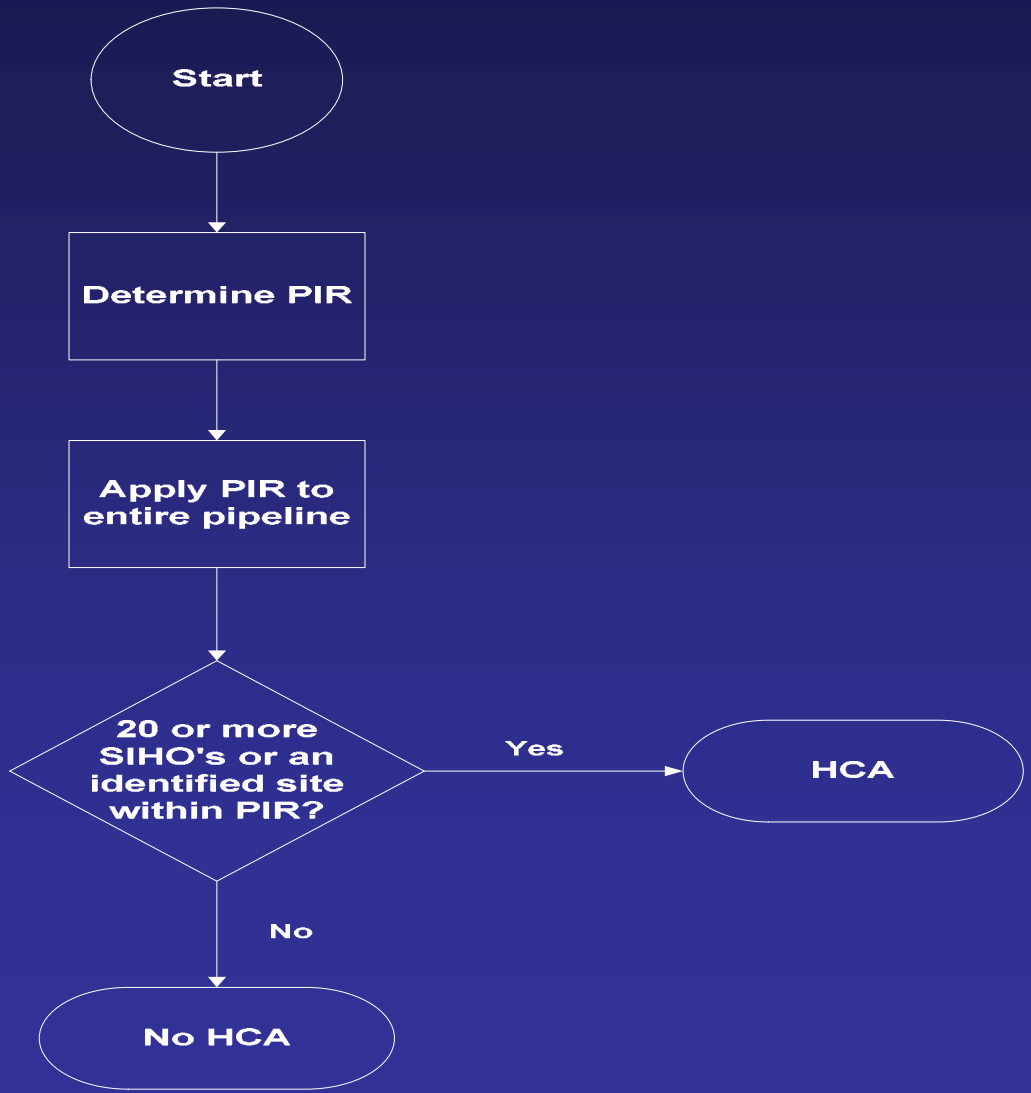
(a) A potential impact zone which contains 20 or more structures intended for human occupancy or an identified site,

(b) An ***identified site*** is:
(1) A building occupied by 50 or more persons 5 days a week 10 weeks a year (the days and weeks need not be consecutive), or
(2) A small, well defined outside area occupied by 20 or more persons 5 days a week 10 weeks a year (the days and weeks need not be consecutive), and
(i) Is visibly marked;
(ii) Is licensed or registered by a Federal, State, or local agency;
(iii) Is known by public safety officials; or
(iv) Is on a list or map maintained by or available from a Federal, State, or local agency.

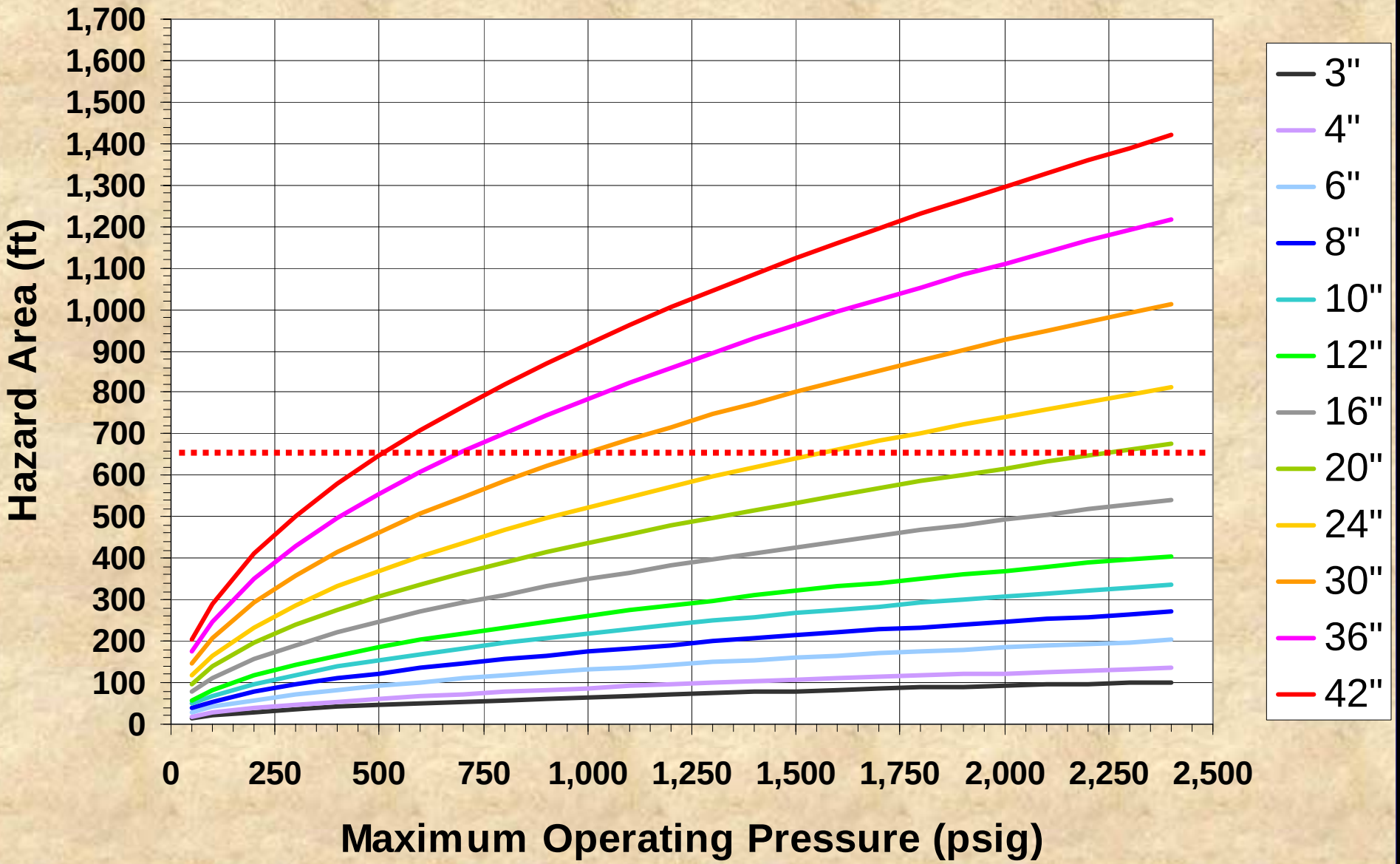
A ***potential impact zone (PIZ)*** is defined as that circular area within the PIR distance of the pipeline.

A ***potential impact radius (PIR)*** is defined as the radius of a circle within which the potential failure of a pipeline could have significant impact on people or property. PIR is determined by the formula r = 0.685 * (square root of (p*d^2)), where “r” is the radius of a circular area surrounding the point of failure (ft), “p” is the maximum allowable operating pressure (MAOP) in the pipeline segment (psi) and “d” is the diameter of the pipeline (inches). **Note:** 0.685 is the factor for natural gas. This number will vary for other gases depending upon their heat of combustion. An operator transporting gas other than natural gas must use Section 3.2 of ASME/ANSI B31.8S to calculate the impact radius formula.

Flowchart for Pure Technical Approach ("C-FER" Circle)



Hazard Area vs. Pres. & Diameter



NPRM HCA Definition of January 28, 2003

- Not technically based
- Extremely complex with many variables (Complexity)
- Many conflicting and inconsistent solutions (Inconsistency)
- Extremely burdensome for low pressure systems
- Small impact of low pressure/small diameter systems is not recognized

NPRM HCA Definition of January 28, 2003 (cont)

- Data on houses not readily available outside the existing 660 foot corridor (Data)
- Language is inconsistent with other language in 192
- Proposed HCA definition is inconsistent with liquid rule on 1000 persons per square mile
- Impaired mobility is not sufficiently defined
- Operator compliance will be extremely difficult, and in some instances impossible to demonstrate

NPRM HCA Definition of January 28, 2003 (Not Technically Based)

- The 15% addition to the C-FER equation is arbitrary and not based on science
- The threshold radius is arbitrary and not based on science
- The use of class locations is not the best scientific solution available today
- The use of "20 or more buildings" only for PIC's greater than 1000 foot radius is not based on science

INGAA / AGA Agrees With OPS On "20 or More Buildings"

- NPRM states for pipelines with PIR > 1,000 feet operator is to examine PIC for 20 houses
- The existing Hazardous Liquid HCA definition utilizes 20 houses, based on 1,000 people/sq mile

Constant Consequence

Pipeline diameter “d” (inches) = 36”

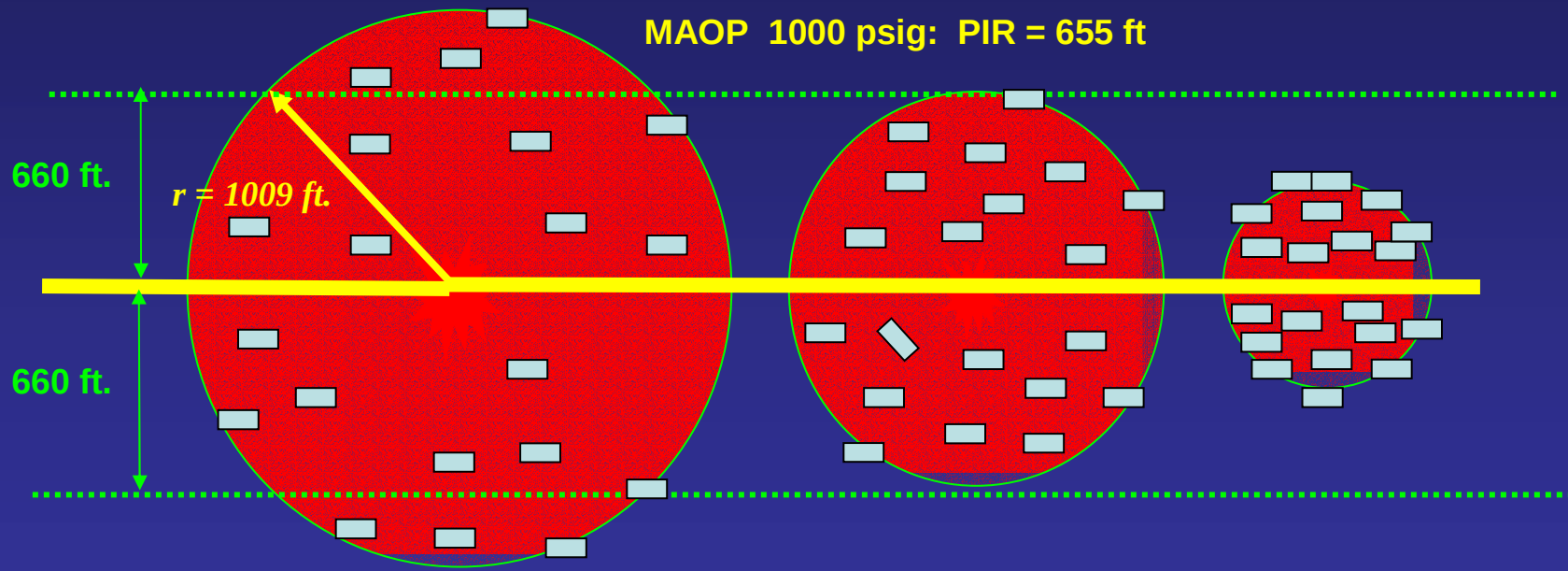
MAOP 1650 psig: PIR = 1000 ft

Pipeline diameter “d” (inches) = 18”

MAOP 600 psig: PIR = 304 ft

Pipeline diameter “d” (inches) = 30”

MAOP 1000 psig: PIR = 655 ft



$$PIR = 0.69\sqrt{pd^2}$$

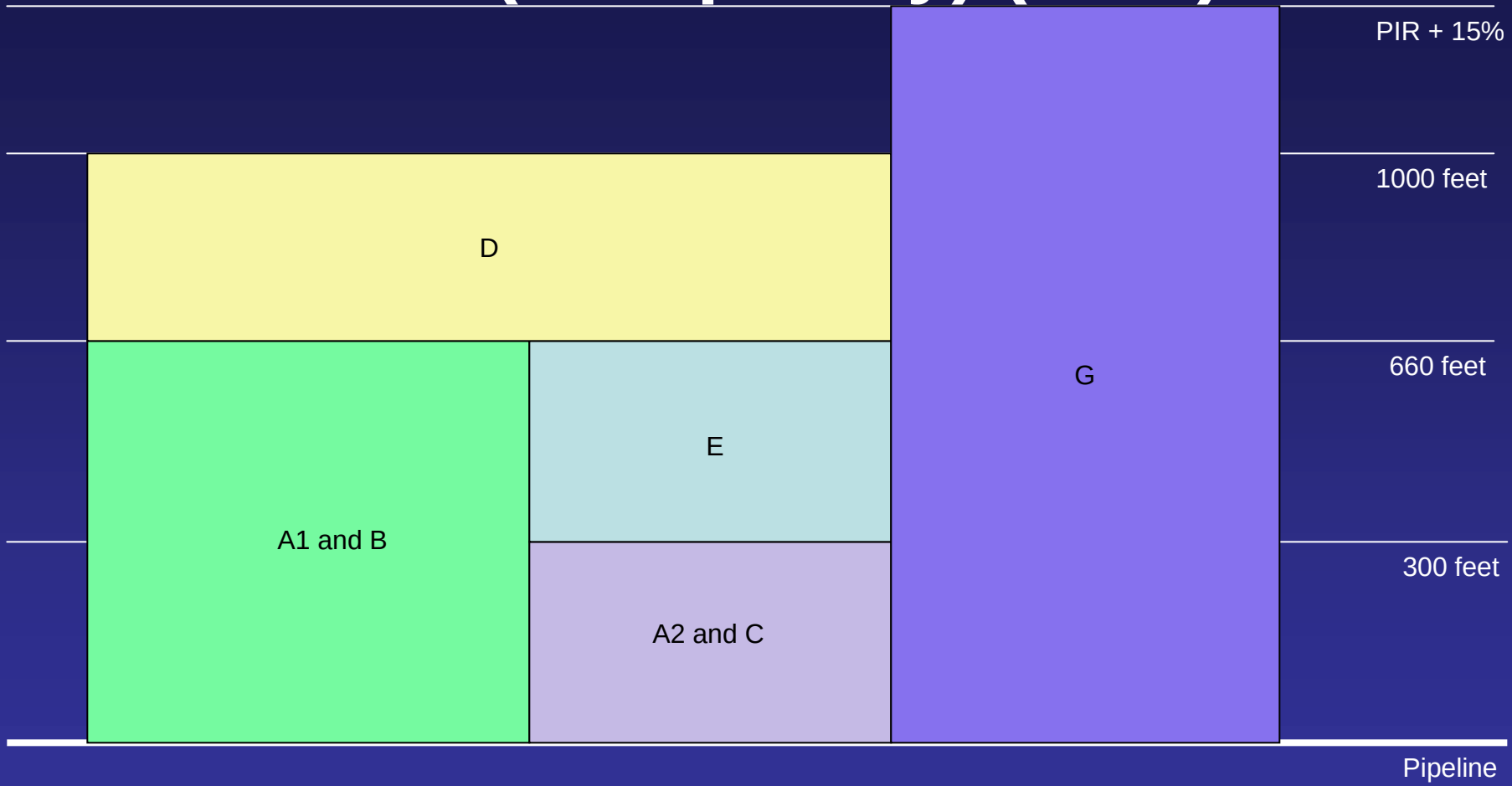
20 houses within circle

NPRM HCA Definition of January 28, 2003 (Complexity)

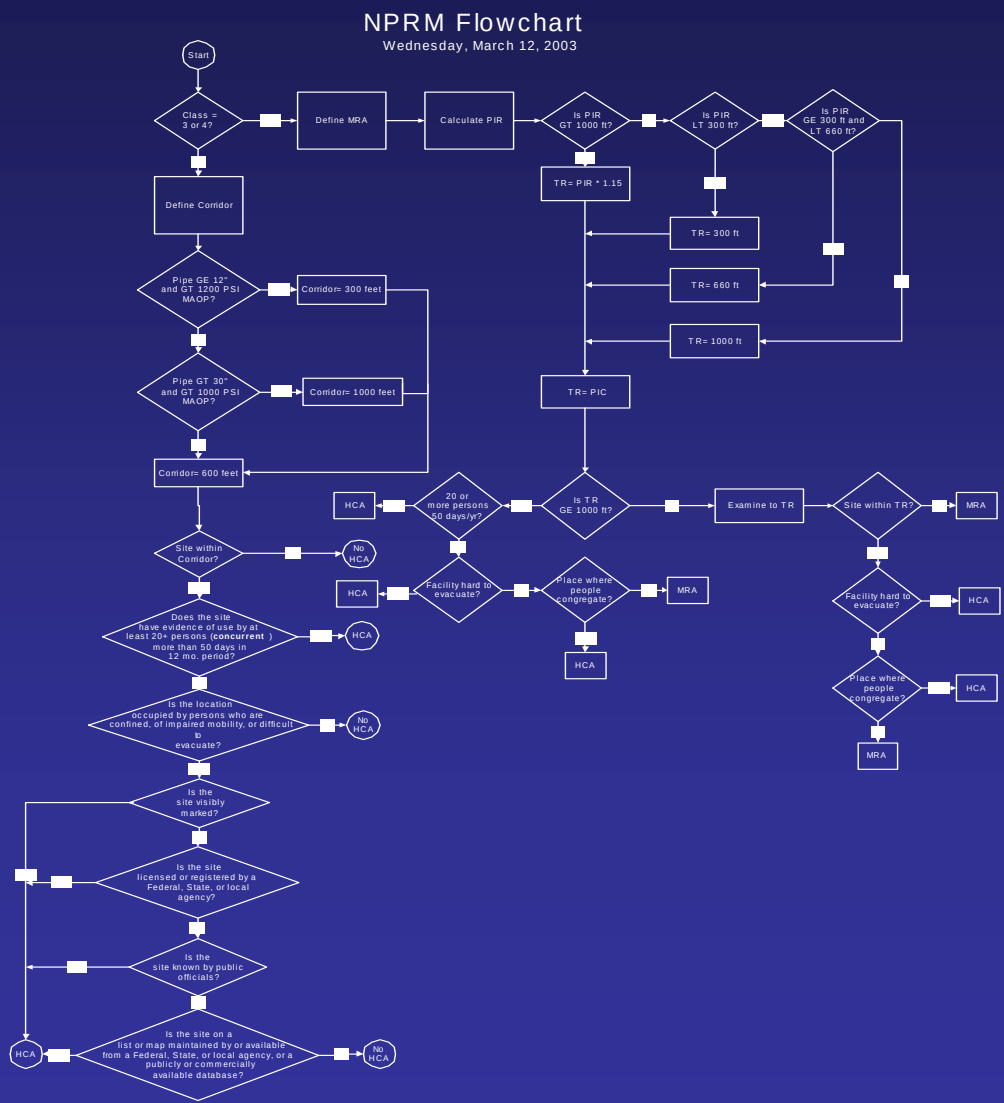
192.761	A1	Class 3 with 46 or more houses
	A2	Class 3 with building or small well defined outside area with 20 or more persons in at least 5 days per week, 10 weeks per year
	B	Class 4 area
	C	Identified sites for pipes not more than 12 inches in diameter and not more than 1000 psig operating pressure
	D	Identified sites for pipes greater than 30 inches in diameter and greater than 1000 psig operating pressure
	E	Identified sites for pipes not in C or D
	G	20 or more buildings intended for human for pipes with a threshold radius of 1000 feet or greater
	Note:	F defines an identified site.

Additional complications arise when determining moderate risk areas, and applying the definitions of PIC, PIR, PIZ and threshold radius.

NPRM HCA Definition of January 28, 2003 (Complexity) (cont)



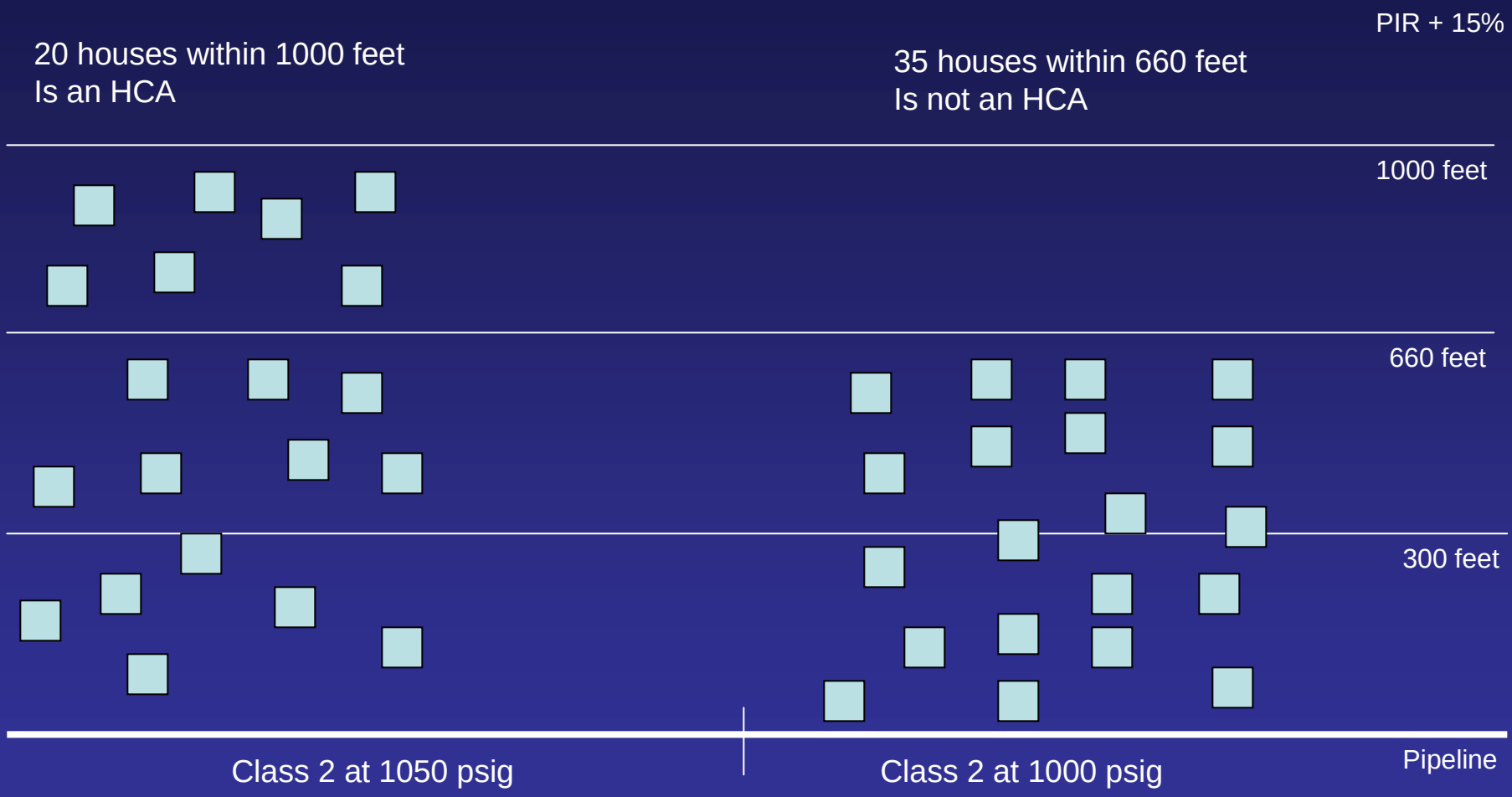
NPRM HCA Definition of January 28, 2003



NPRM HCA Definition of January 28, 2003 (Inconsistency)

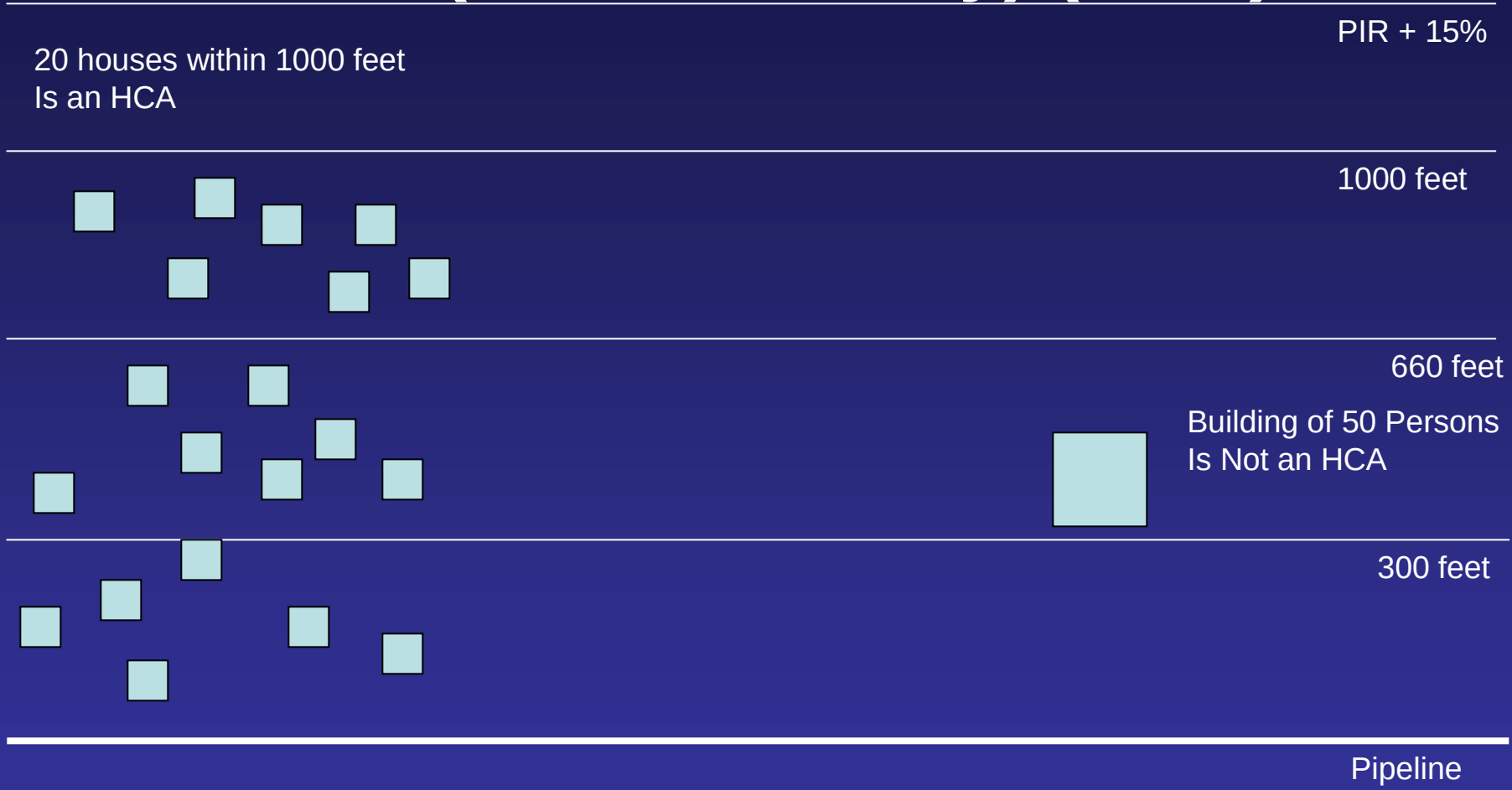
30 Inch Diameter Pipeline at 1050 psig (PIR = 671 ft.)

NPRM HCA Definition of January 28, 2003 (Inconsistency) (cont)



30 Inch Diameter Pipeline at 1050 / 1000 psig (PIR = 671 / 655 ft.)

NPRM HCA Definition of January 28, 2003 (Inconsistency) (cont)



30 Inch Diameter Pipeline at 1050 psig (PIR = 671 ft.)

NPRM HCA Definition of January 28, 2003 (Inconsistency) (cont)

30 Inch Diameter Pipeline at 1000 psig (PIR = 655 ft.)

NPRM HCA Definition of January 28, 2003 (Inconsistency) (cont)

Diameter	MAOP	PIR	PIZ
4	100	28	300
6	200	59	300
8	300	96	300
10	400	138	300
12	500	185	300
16	700	292	300
20	600	338	660
24	1000	524	660
30	1000	655	660
30	1020	661	1000
36	700	657	660
42	800	820	1000
36	2180	1160	1334

NPRM HCA Definition of January 28, 2003 (Data Issues)

- Industry has collected house data since 1970 to 660 feet from pipelines
- Industry has collected "outside area" data since 1970 to 300 feet from pipelines
- Collecting house data within one year beyond 660 feet is unrealistic
- Collecting data beyond 49 CFR 192 definitions will create undue burden on operators

NPRM HCA Definition of January 28, 2003 (Language Consistency with 49 CFR 192 and 195)

- Identified Site
  - Inclusion of buildings
  - 50 days/year instead of 5 days/week
- 20 Persons is not consistent with Hazardous Liquid HCA definition
- Use of evenly spaced Class 3 density does not address the reality of population distribution

The Goal of Integrity Management

- The law says to "*conduct an analysis of the risks to each facility located in an area identified*" as a high consequence area, "*and shall adopt and implement a written integrity management program for such facility to reduce the risks*."

The Goal of Integrity Management (cont)

- The January 28, 2003, Preamble says to "*establish a rule to require operators to develop integrity management programs for gas transmission pipelines that, in the event of failure, could impact high consequence areas*."

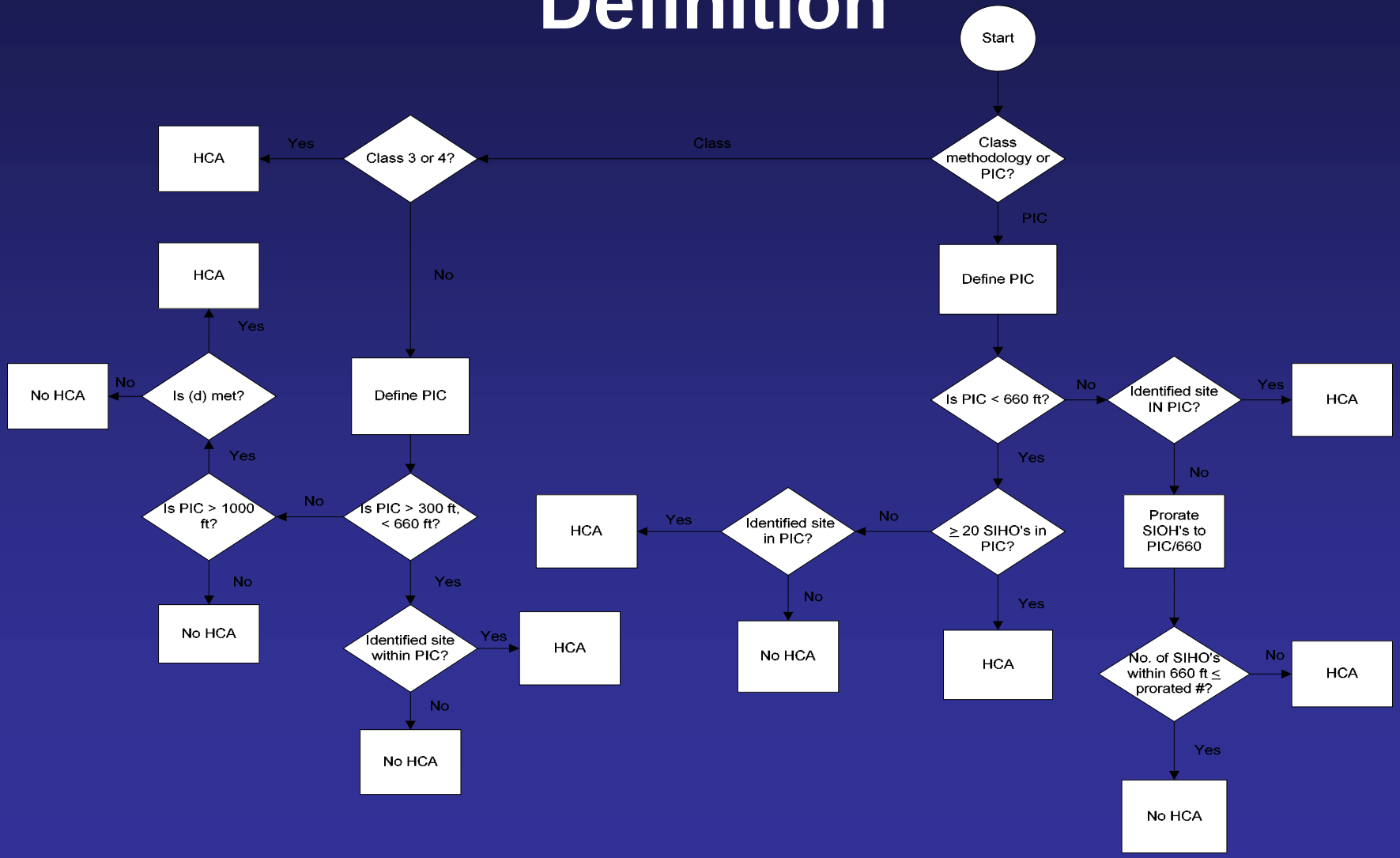
The Goal of Integrity Management (cont)

- Industry's goals within these broad requirements are and have always been:
  - Any determination of HCA or any inspection requirement should be technically based
  - New requirements should, to the degree practical, follow existing practices and processes used by the industry
  - Maximum use of existing house data

Alternate INGAA / AGA Proposed Definition

Recognizing that the Pure approach is not practical at this time, the proposal offered will bridge the gap of regulatory practicality with the science of identifying high consequence areas within the confines of the law, existing regulations and historical applications of the regulations

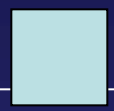
Flowchart for Alternate INGAA / AGA Proposed HCA Definition



Examples of How Alternate INGAA / AGA Proposed HCA Definition Will Work

Application of INGAA / AGA Proposed HCA Definition

PIR + 15%



Single Licensed Day Care With 3 Persons Is Not an HCA (Revised from NPRM)

1000 feet

660 feet

Office Building with 50 Persons Is an HCA (Revised from NPRM)

300 feet

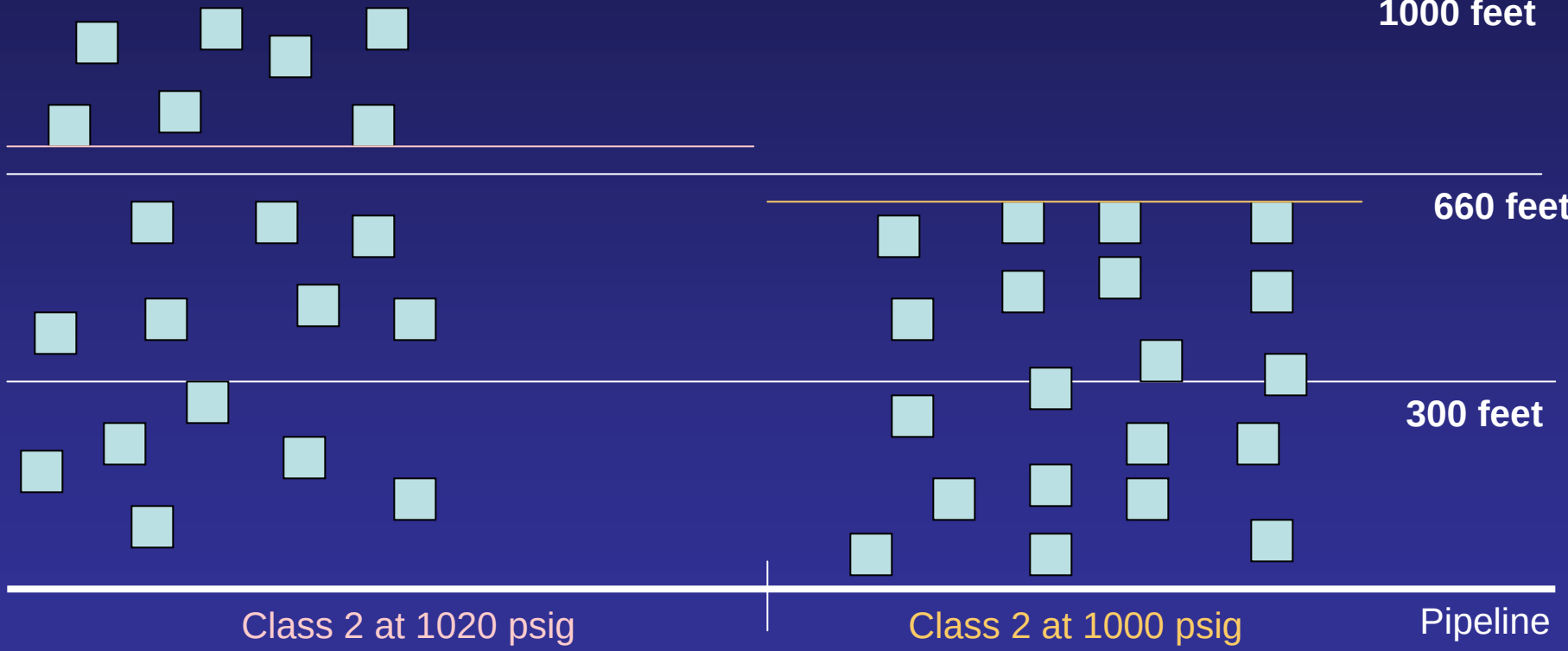
Pipeline

30 Inch Diameter Pipeline at 1050 psig (PIR = 671 ft.)

Application of INGAA / AGA Proposed HCA Definition

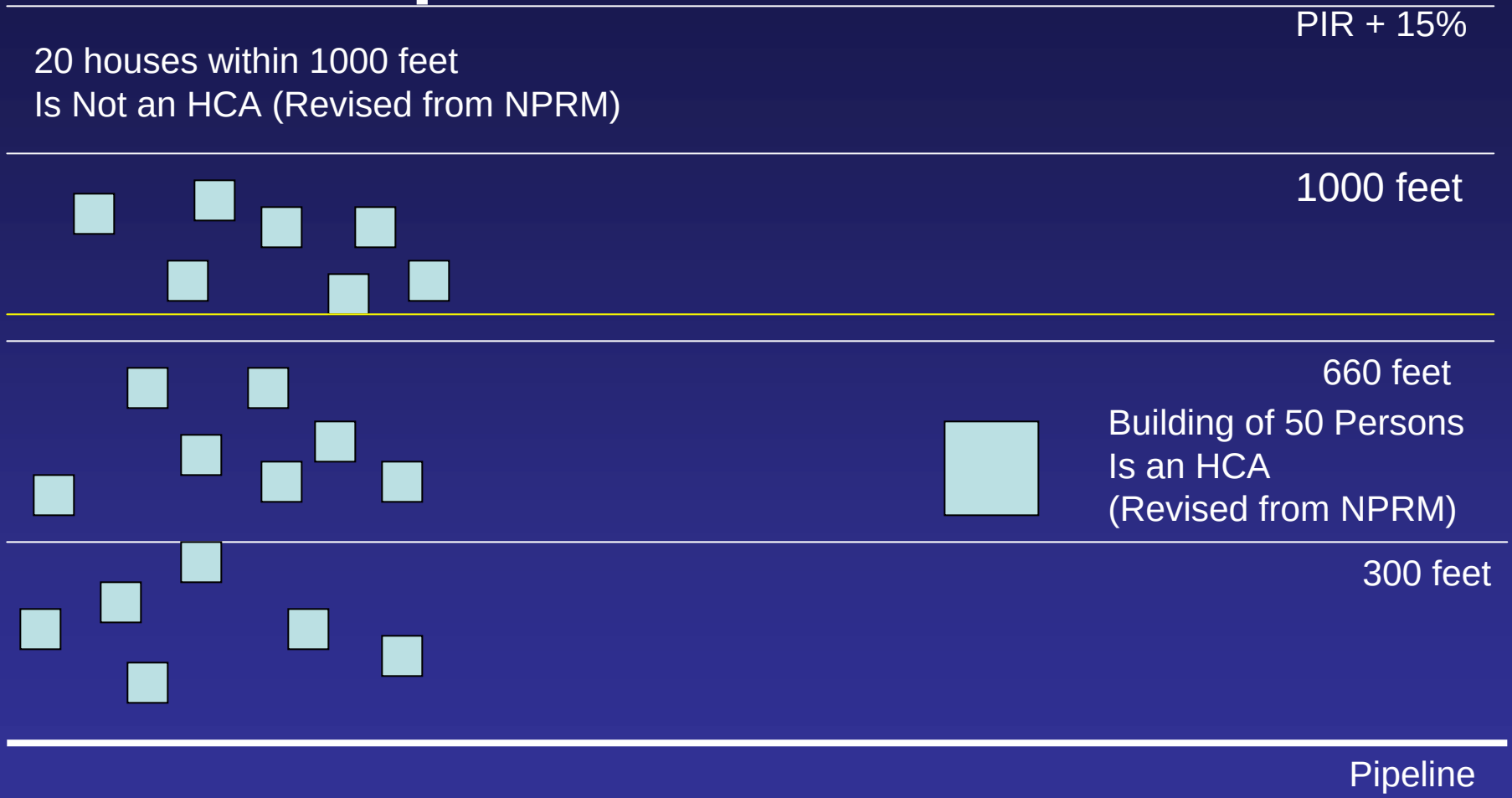
20 houses within 1000 feet
Is Not an HCA (Revised from NPRM)

35 houses within 660 feet
Is an HCA (Revised from NPRM)



30 Inch Diameter Pipeline at 1050 / 1000 psig (PIR = 671 / 655 ft.)

Application of INGAA / AGA Proposed HCA Definition



30 Inch Diameter Pipeline at 1050 psig (PIR = 671 ft.)

Application of INGAA / AGA Proposed HCA Definition

30 Inch Diameter Pipeline at 1000 psig (PIR = 655 ft)

Contrasting the NPRM HCA Definition With the INGAA / AGA Proposed HCA Definition

INGAA / AGA Proposed HCA Definition

- Examines every foot of pipeline for HCA's
- Extensively uses data developed over 30 years to precisely examine land use for true HCA's
- Enables operator to evaluate the entire system for HCA’s on much higher resolution regardless of class

INGAA / AGA Proposed HCA Definition (cont)

- Uses science, proven by field experience, to greatest extent possible
- Treats all areas the same, i.e. 20 houses equals 20 houses regardless of class location
- Existing processes are maximized without loss of pipeline safety (5 days/week vs. 50 days/year)

INGAA / AGA Proposed HCA Definition (cont)

- Focus is on inspections of pipelines, not gathering large amounts of data to define potential HCA's
- Is not confusing in application, so public, regulators, and operators understand definition

INGAA / AGA Proposed HCA Definition (cont)

- Addresses structures housing impaired mobility through usage level and existing processes, not intensive data collection
- Includes reasonable, technically-based portions of NPRM (definitions of identified site, Class 3 and 4, 20 houses)

INGAA / AGA Proposed HCA Definition (cont)

- With bifurcation, HCA definition permits operator to largely use Final Rule of August 6, 2002, or intensively examine PIC with best science
- Permits focus to be on true HCA's while eliminating inconsistent applications

Questions?