



**National
Transportation
Safety Board**

Meaningful Performance Metrics: Their Role and Value in Pipeline Safety

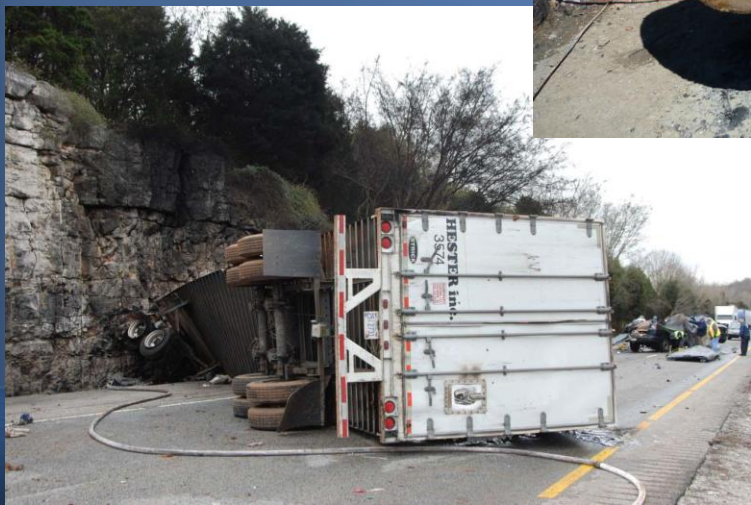
Mark R. Rosekind, Ph.D.
Board Member

PHMSA Pipeline Data Workshop
January 7, 2013



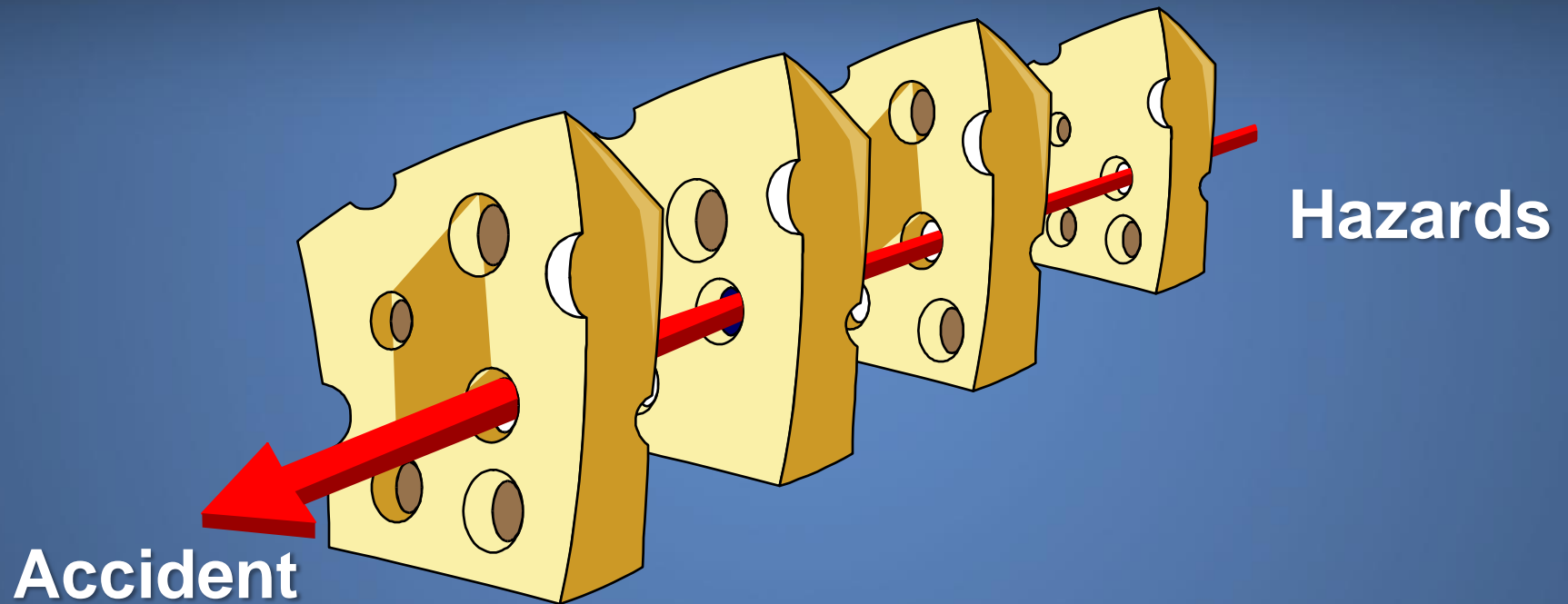
- 1) determining the probable cause of transportation accidents**
- 2) making recommendations to prevent their recurrence**





All Modes

“Swiss Cheese” Model (Reason)

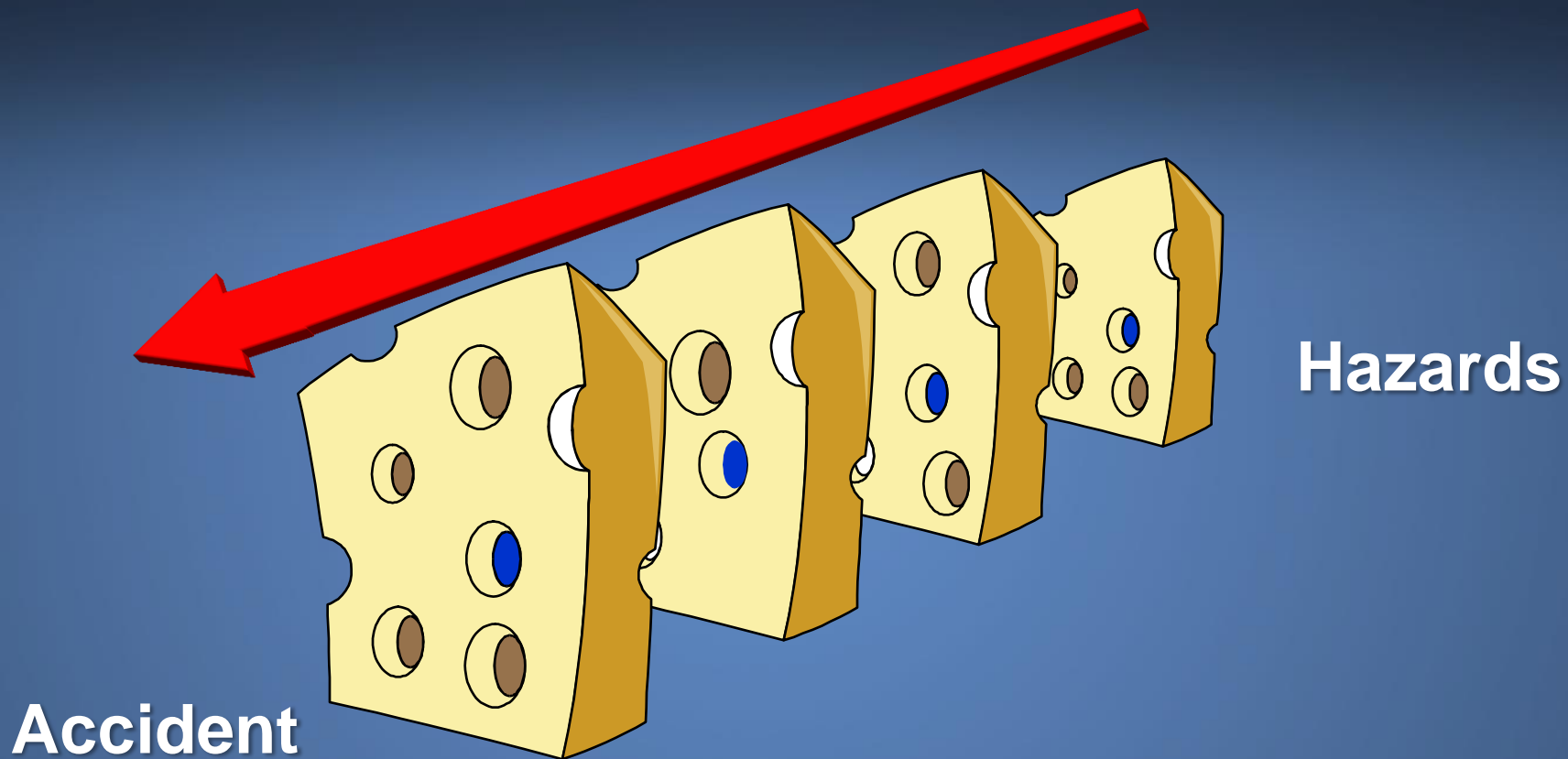


Successive layers of defenses, barriers, and safeguards



NTSB

The Challenge (Haueter)



Successive layers of defenses, barriers, and safeguards



NTSB

NTSB Characterized as:

‘moral compass and industry conscience’

NTSB Chairman Deborah A.P. Hersman



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Pacific Gas and Electric Company
Natural Gas Transmission Pipeline Rupture and Fire
San Bruno, California
September 9, 2010



Accident Report

NTSB/PAR-11/01
PB2011-916501

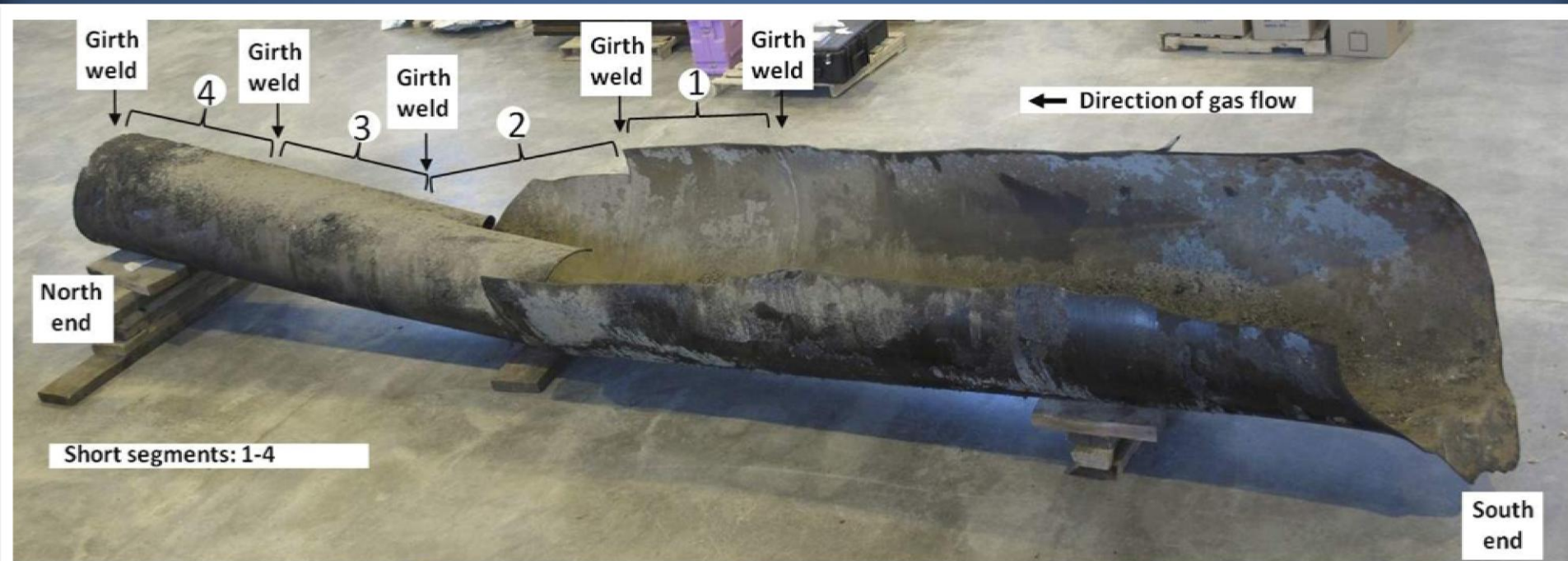


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Ruptured Pipe



Photograph of the 28-foot-long ruptured section of pipeline

PG&E/San Bruno Gas Pipeline Explosion

- 8 fatalities
- 10 serious injuries
- 48 minor injuries



- 108 homes affected
 - 38 destroyed
 - 17 sev - mod damage
 - 53 minor damage



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Safety Recommendations: 39

- PHMSA (16)
- PG&E (12)
- CPUC (5)
- U.S. Secretary of Transportation (4)
- INGAA and AGA (1)
- Governor of California (1)



Enbridge Incorporated
Hazardous Liquid Pipeline Rupture and Release
Marshall, Michigan
July 25, 2010



Accident Report

NTSB/PAR-12/01
PB2012-916501



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Enbridge Rupture and Release Marshall, Michigan (July 25, 2010)



Enbridge Rupture and Release Marshall, Michigan (July 25, 2010)



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Safety Recommendations: 19

- U.S. Secretary of Transportation (2)
- PHMSA (8)
- Enbridge Incorporated (6)
- American Petroleum Institute (1)
- Pipeline Research Council International (1)
- International Association of Fire Chiefs & National Emergency Number Association (1)



Managing Safety: There is No Magic Bullet



NTSB Recommendation (P-11-19)

- (1) Develop and implement standards for integrity management and other performance-based safety programs that require operators of all types of pipeline systems to regularly assess the effectiveness of their programs using clear and meaningful metrics, and to identify and then correct deficiencies; and
- (2) make those metrics available in a centralized database.



Processes: The Concept

integrity management regulations
require operators to establish processes
to evaluate the effectiveness of their
integrity management programs
(PHMSA)



Translation Challenge

Concept



Operation



Safety



#1: Meaningful Performance Metrics

- Define objectives/outcomes
- Performance-based standards
(vs. risk-based)
- Measureable



The Challenge . . .

Operationalize meaningful safety objectives
that can be measured with
meaningful performance metrics



#1: Meaningful Performance Metrics

- Records
- Testing
- Emergency response
- Risk management models



Testing and Inspection



DuBois pipe failure



DuBois



DuBois house destruction

DuBois, PA

#2: Data Driven

- Decisions
- Actions
- Improvements



Challenge: Big Data

sources

Collection frequency

quality

validation

analysis

DATA

portrayal

quality assurance

interpretation

collection methods

meaningful?



NTSB

#2: Data Driven

- Do Not Compete on Safety!
- Share:
 - data
 - best practices
 - problems/solutions
- Non-punitive reporting systems
- Transparency
- Develop/test industry models



Timely Response: ASV/RCSV



Rancho Cordova: 2 hrs 47 mins

Rancho Cordova Damaged 1



San Bruno: 95 mins

©2010 Google
©2010 Europa Technologies



Carmichael: 2 hrs

2-14-01



San Francisco: 9+ hrs (1981)

#3: Beyond Meaningful Metrics: Proactive Safety Culture

- Focus/enhance proactive safety culture
- Entire industry shared responsibility:
companies, federal, state, public
- Do Not Compete on Safety!



#3: Beyond Meaningful Metrics: Proactive Safety Culture

- Transparency
- Share/cooperation
- Evaluations: all stakeholders
(independent audits/reviews)
(internal and external)
- Non-punitive reporting systems



Reactive/Proactive Safety

- Accident investigations
 → reactive
- Safety recommendations
 → proactive



Proactive Safety Culture

Self initiated actions based on:
meaningful safety metrics and objectives



Changing Safety Culture

Reactive → proactive



Major Safety Challenge

Proving the null
hypothesis



Changing Safety Culture

Safety goal . . .

→ 0



Evaluation Questions . . .

- Meaningful safety objectives?
- Evaluated with meaningful metrics?
- Effective performance?





National Transportation Safety Board