CPUC Safety En Banc on Safety Management Systems - 5 Pitfalls from 5 Big Accidents

My top **5** ***SERIOUS***

LIVE *from the*

REAL WORKPLACE

of

1173 IMPLEMENTATION

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G2 INTEGRATED SOLUTIONS

My “Why”

“The burden of these catastrophes is uniquely and unfairly borne by the victims, their families, and their friends.

This was the case for the Texas City victims—men and women who were providing a livelihood for themselves and their families.

These victims were fathers and mothers, husbands and wives, sons and daughters, and friends”.

Baker Report [extract]

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CPUC Safety En Banc on Safety Management System 5 Pitfalls from 5 Big Accidents

Framework/ System

Organization & Structure

Policies & Procedures

Compliance

Safety Culture

API 1173

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Elgin
Inverness
Aberdeen
Scotland
Dundee
Perth
Kirkcaldy
Glasgow
Kilmarnock
Ayr
Londonderry / Derry
Northern Ireland
Bangor
Sligo
United Kingdom
Middlesbrough
Isle of Man
Dundalk
Castlebar
Drogheda
Blackpool
Leeds
Hull
Liverpool
Sheffield
Dublin
Galway
Ireland
Naas
Bray
Stoke-on-Trent
Nottingham
Derby
Limerick
Carlow
Kilkenny
Norwich
Great Yarmouth
England
Clonmel
Waterford
Cork
Ipswich
Wales
Headington
Swansea
Bristol
London
Leigh-on-Sea
Cardiff
Reading
Bruges
Barnstaple
Southampton
Exeter
Portsmouth
Lille
Plymouth
Google
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Terms


Piper Alpha

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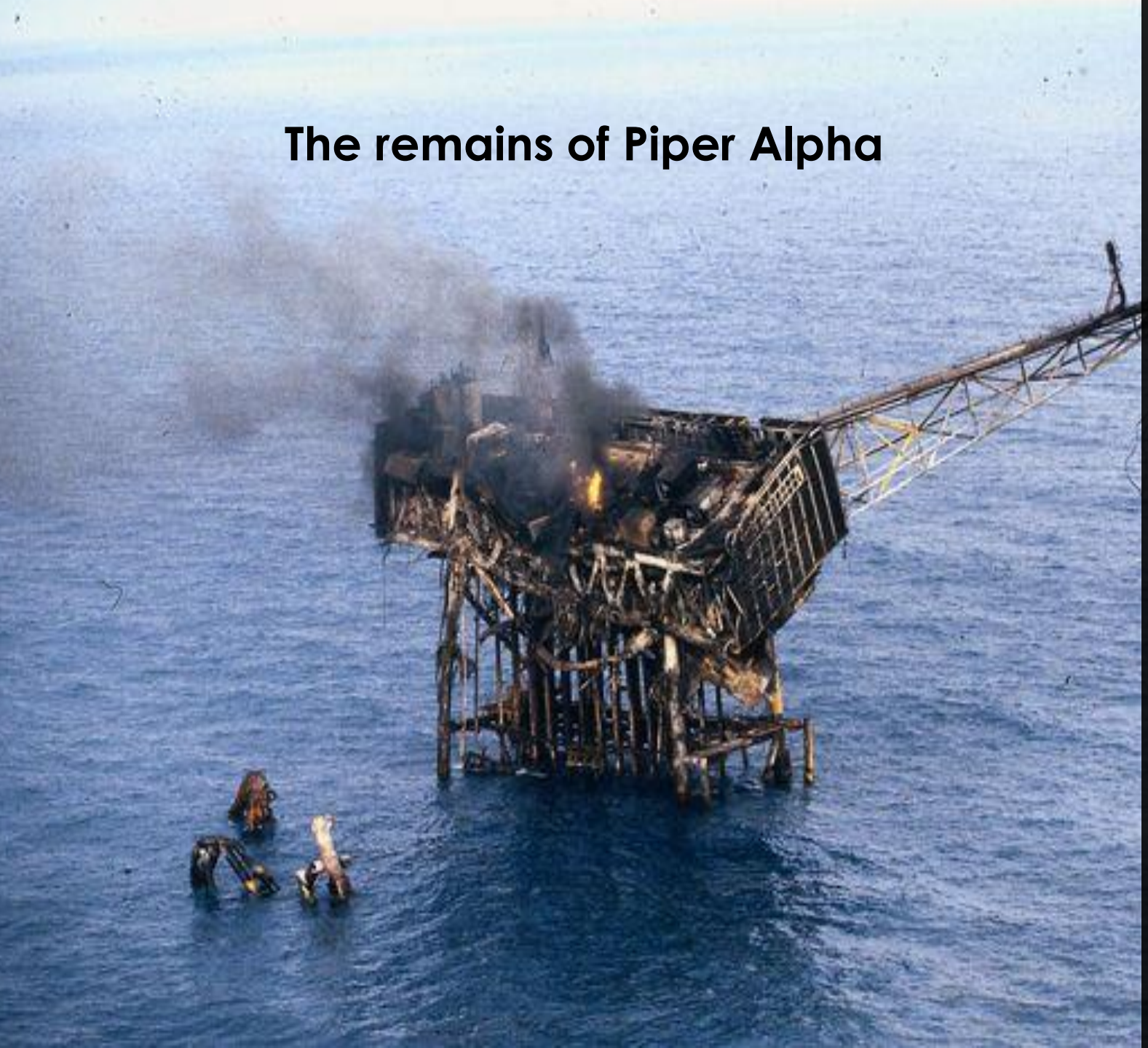
The remains of Piper Alpha



167 Died

Total loss of facility

Occidental pull out of UK

Insured loss $3.4 Billion

Public Enquiry led by Lord Cullen

Fundamental change in regulation

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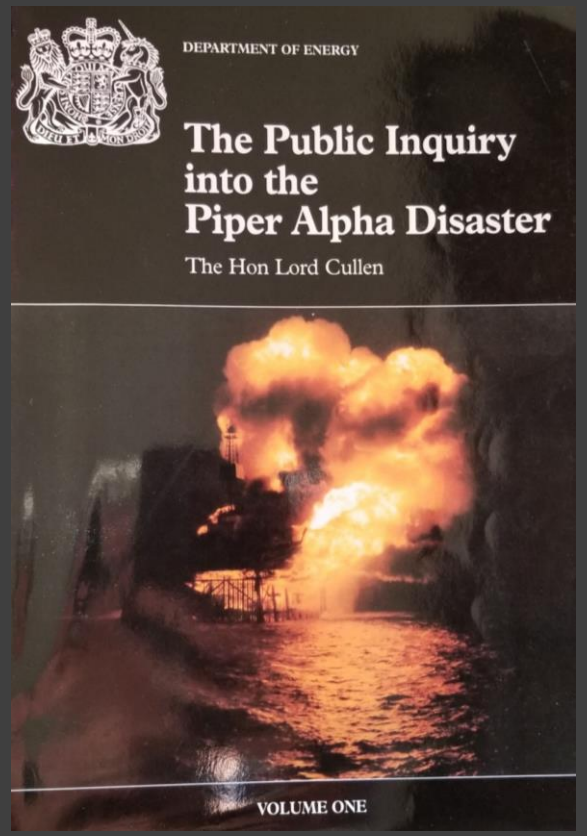
Pitfall #1 - No system to quantitatively assess risk to make better decisions



- *"..the witnesses' reliance on merely a **qualitative opinion** showed, in my view, **a dangerously superficial approach** to a major hazard."* –

The Public Inquiry into the Piper Alpha Disaster.

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Avoid Pitfall #1 - Quantitatively assess risk to feed into a process to make better decisions

- **System** to continually identify hazards, and quantify the risks.
- **Decision process** that includes definitions of risk acceptance/tolerability criteria

UNDERSTAND the hazards and risks

If management actually decides to do nothing, it is based on a defensible, repeatable and robust process.

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Esso's Longford Gas Plant

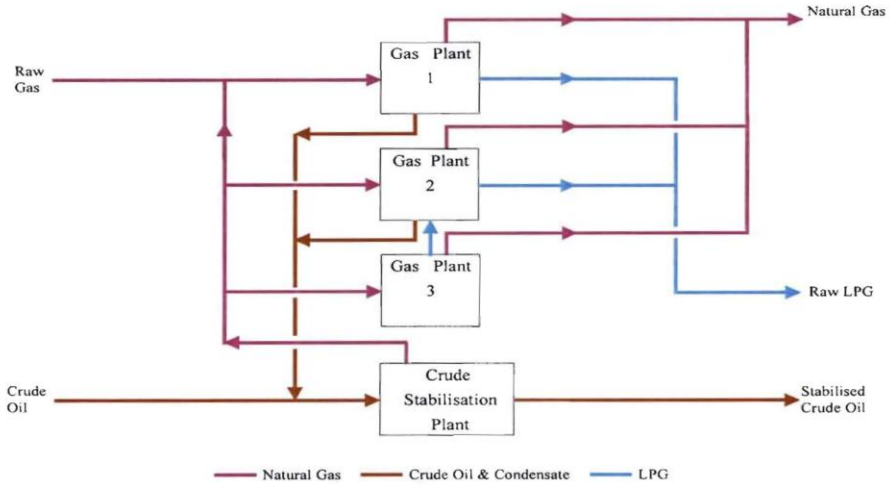
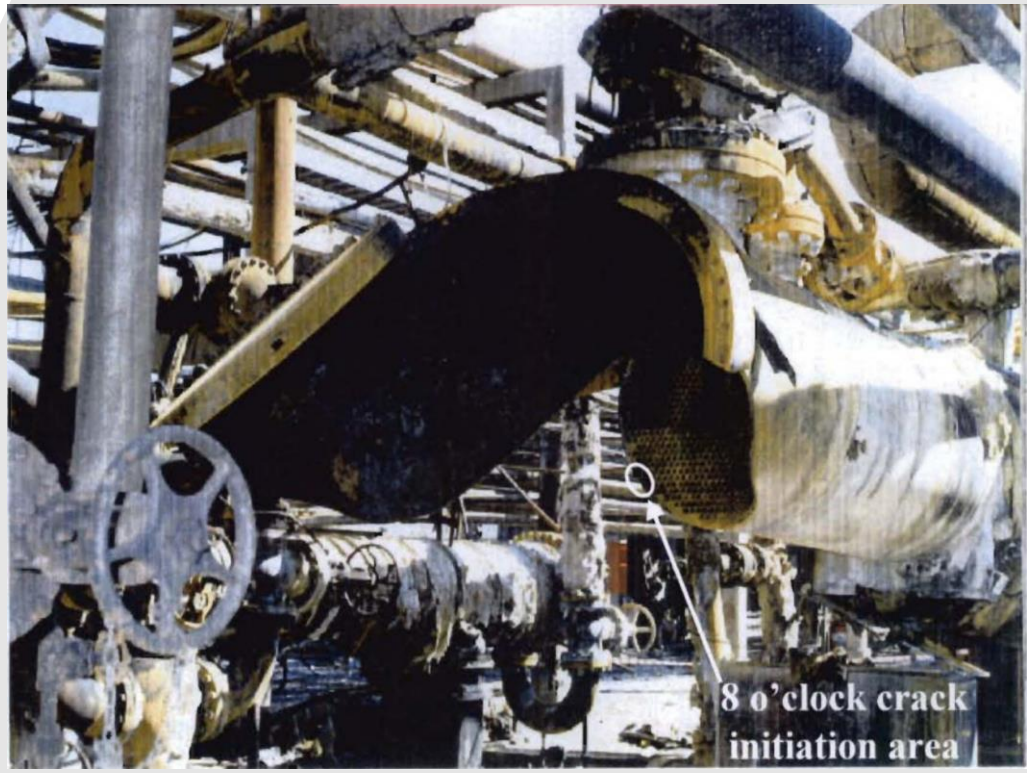


Figure 2.2 Overview of primary hydrocarbon flows to and from the Longford operating units

Longford Gas Plant Fire
September 25, 1998

- Large fire
- 2 workers died, 8 workers injured
- Businesses severely impacted
- One billion dollar class action
- Esso blamed the workers
- Royal Commission severely criticized Esso's management system (OIMS)



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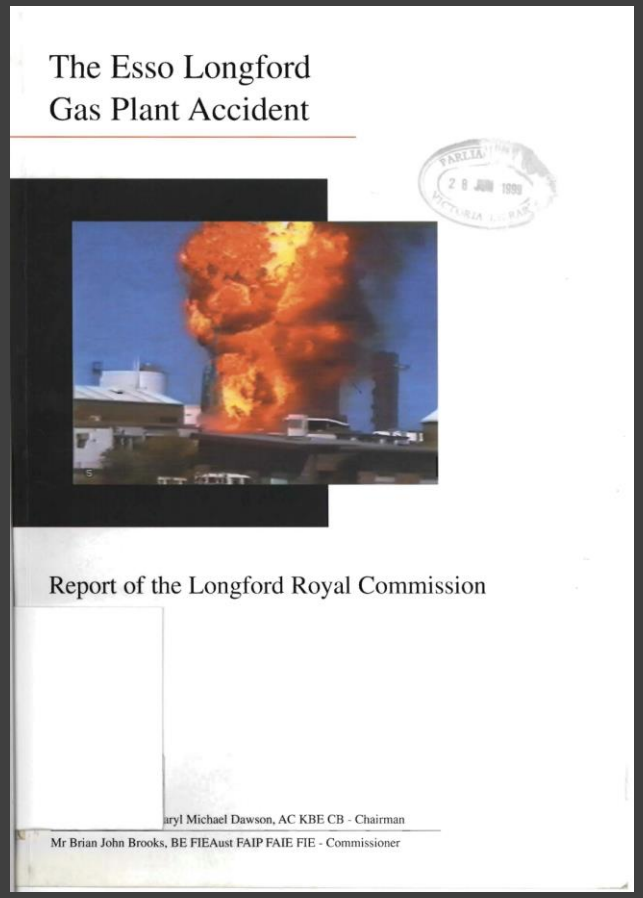
Pitfall #2-Unclear Systems and Procedures



- *"OIMS, together with all the supporting manuals, comprised a **complex** management system.*
- ***difficult to comprehend** both by management and operations personnel*
- Procedures were **deficient** "

Royal Commission Report Dawson, 1999:2000

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Avoid Pitfall #2 - Simple but detailed systems and procedures

- Clear
- Detailed
- Who, what, when and **WHY!**
- Very beneficial for workers – define exactly what to do
- Also USEFUL for auditing – clear, unambiguous requirements

Exxon's OIMS and compliance with OIMS – is MUCH MUCH better today

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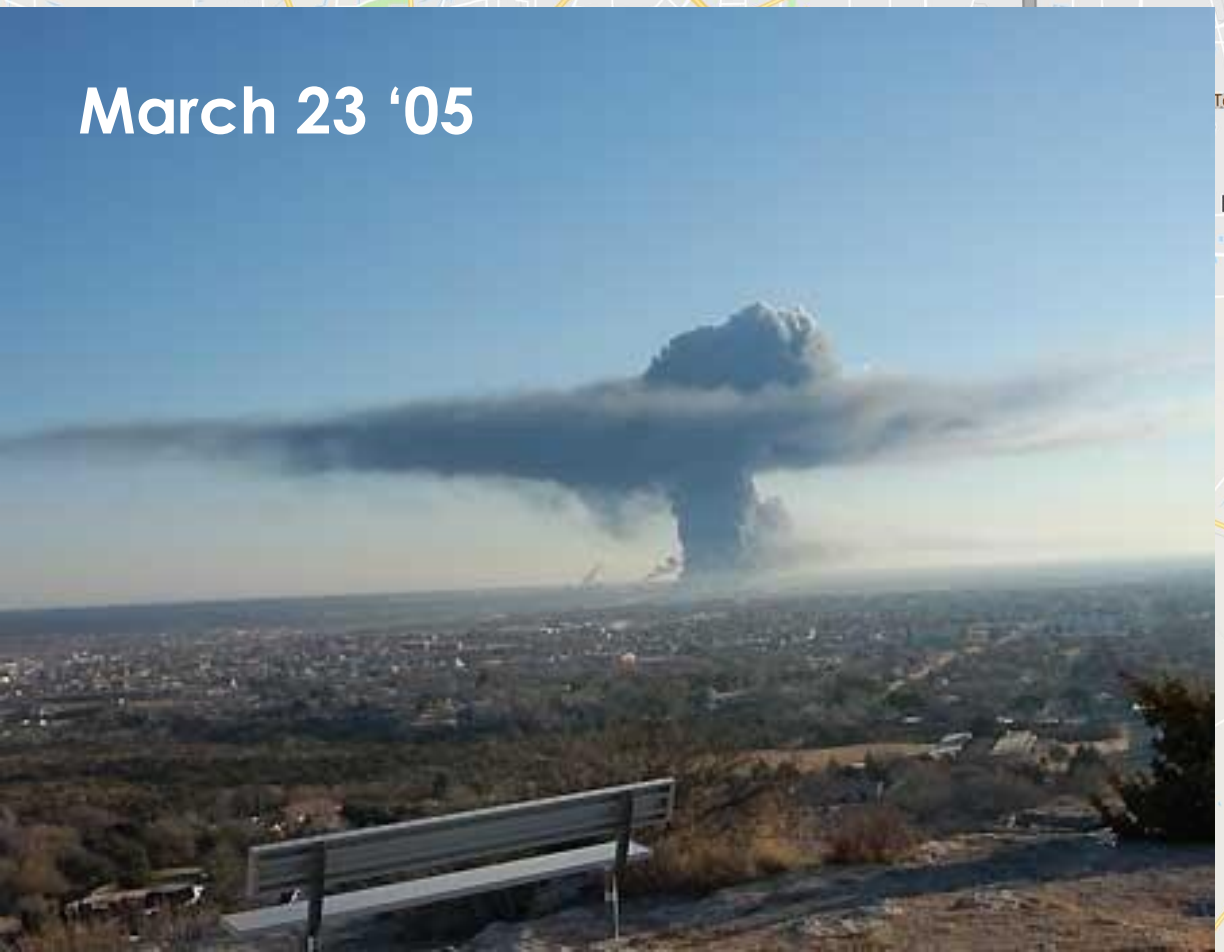
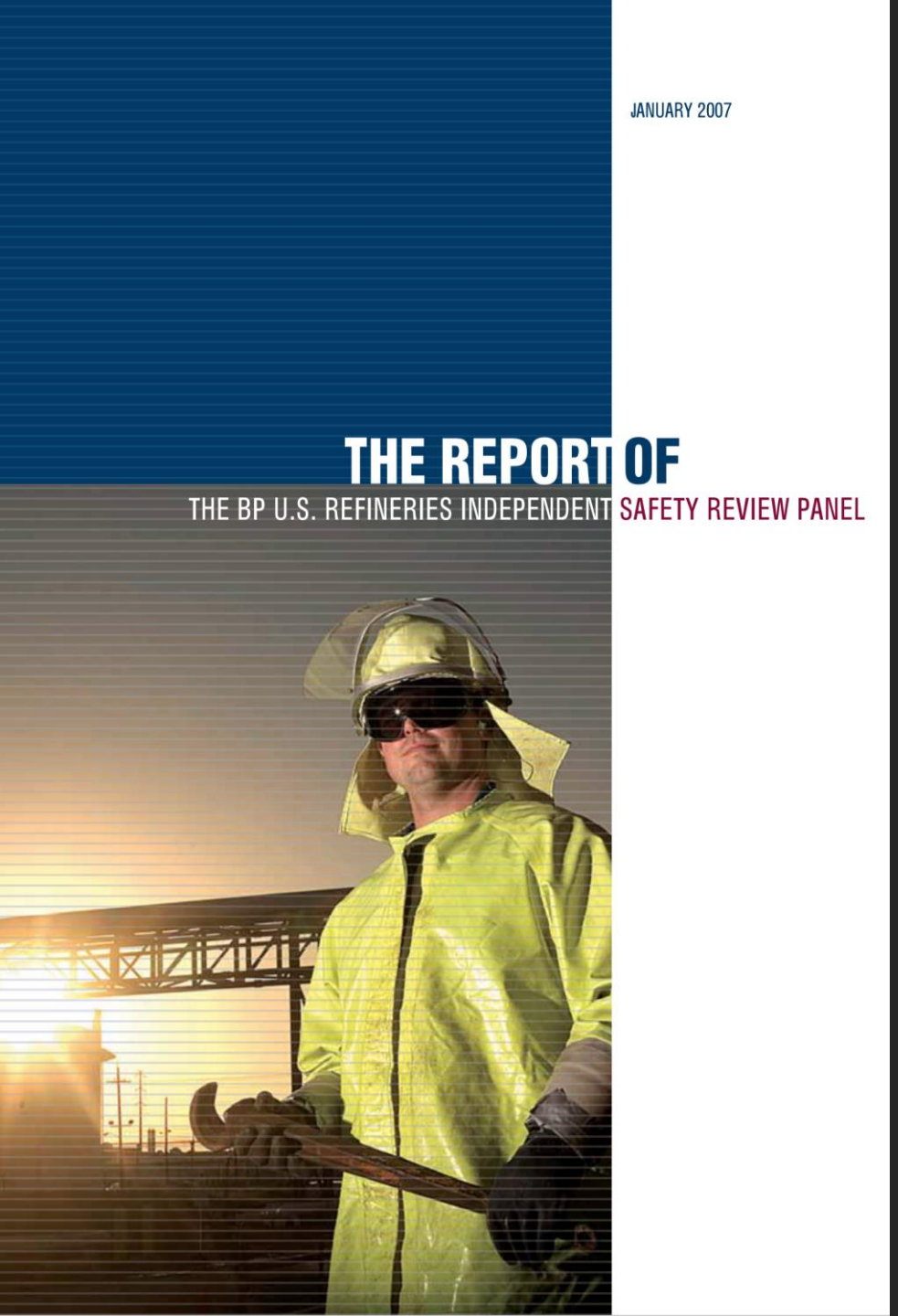
March 23 ‘05



54 min
56.4 miles

47 min
45.4 miles

Houston
Cullen Park
Hedwig Village
Piney Point Village
Cinco Ranch
Westpark Tollway
Clodine
Mission Bend
Four Corners
Meadows Place
Bellaire
Galena Park
Cloverleaf
McNair
Coady
Baytown
Beach City
South Houston
Morgan's Point
La Porte
Trinity Bay
Pearland
El Lago
Seabrook
Nassau Bay
Kemah
Smith Point
Friendswood
League City
Bacliff
San Leon
Dickinson
Alvin
Algoa
Hillcrest
Santa Fe
Moses Lake
Texas City
La Marque
Bayou Vista
Galveston



Texas City
March, 23, 2005

- Texas City explosion and fire
- 15 died
- 180 severely injured
- BP Commissioned the Baker report
- Large “process safety” accident

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Personal safety V Process safety

- Personal safety – killing or injuring one at a time
- Process safety – release of toxic or flammable fluid – kill or injure many. Onsite or offsite
- Process can have catastrophic effects - multiple fatalities, severe economic loss, widespread property damage, and disastrous environmental impacts.
- Generally, managing personal safety will not help with process safety risks

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Pitfall #3 – Poor process safety management due to focus on personal safety

Examples of Process Safety findings from Baker Report:

1. Poor process safety knowledge and competence.
2. Training inadequate.
3. Risk assessment and analysis system - **inadequate** identification and **rigorous analysis** of those hazards
4. Delayed implementation of good engineering practices to improve process safety
5. Corporate SMS did not translate corporate expectations into measurable criteria (KPIs) for management of process risk

"The findings above, together with other information that the Panel obtained during its examination, lead the Panel to conclude that material deficiencies in process safety performance exist at BP's five U.S. refineries"

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Avoid Pitfall #3 – Build-in process safety to policies, systems, standards and procedures

Examples of building-in process safety:

- Organizational structure
- Policies
- Procedures, e.g. management of change, learning, inspection, testing, maintenance, contractor management
- Process risk assessments and threat management
- Training, skills and competence – Board down
- Key performance indicators – leading and lagging
- Tools, e.g. Hazop, quantitative risk analysis, consequence models
- Standards – design, hazard assessment, materials, valve specs,

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Avoid Pitfall #3 - Build in process safety to policies, systems, standards and procedures

Examples of building in process safety:

- Key performance indicators – leading (and lagging) – API 754, HSG 254 (UK HSE)
- Training, skills and competence – Board down
- Process risk assessments and threat management using appropriate tools, e.g.
  - Bow-tie diagrams
  - Hazop
  - quantitative risk analysis
  - consequence models

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April 20, 2010

11 workers were killed,

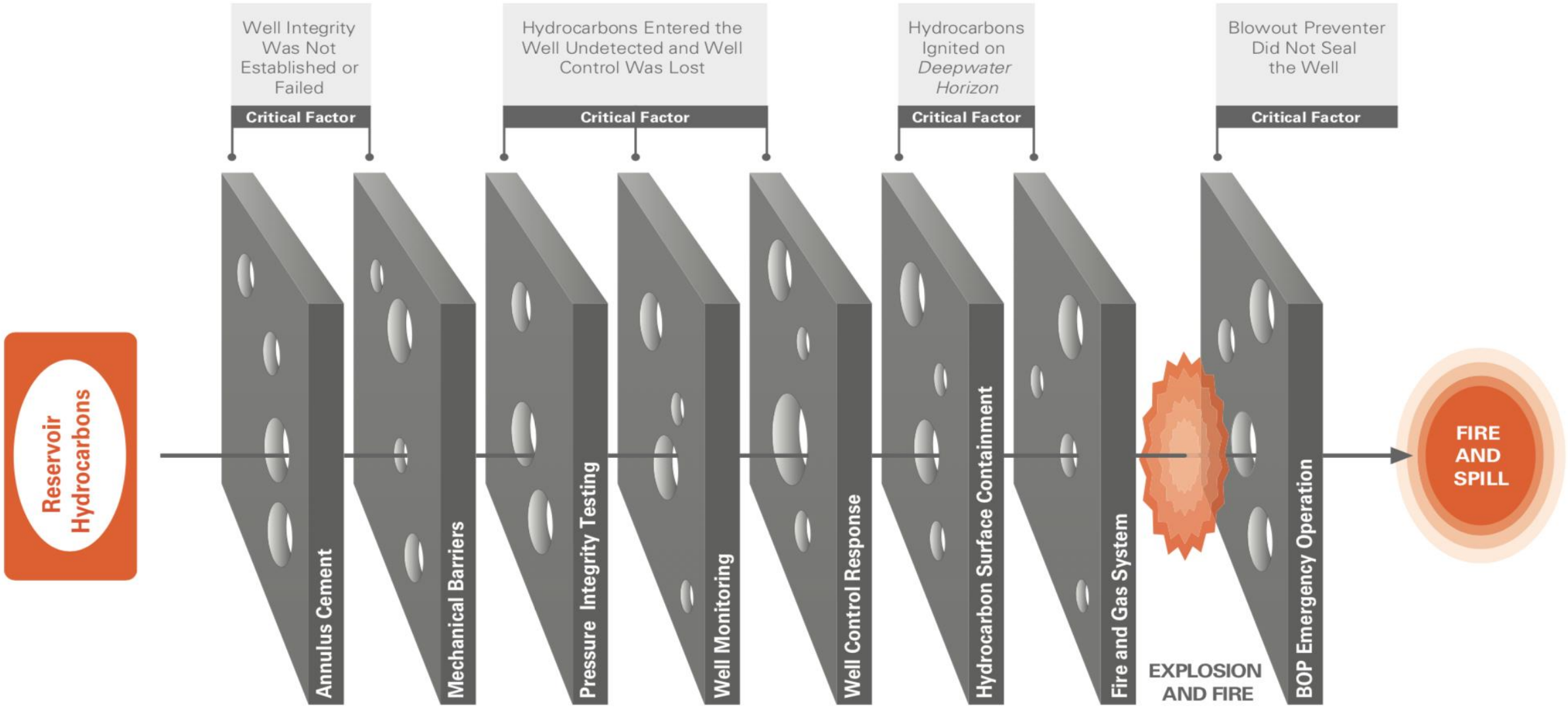
17 were injured.

Initial large environmental impact

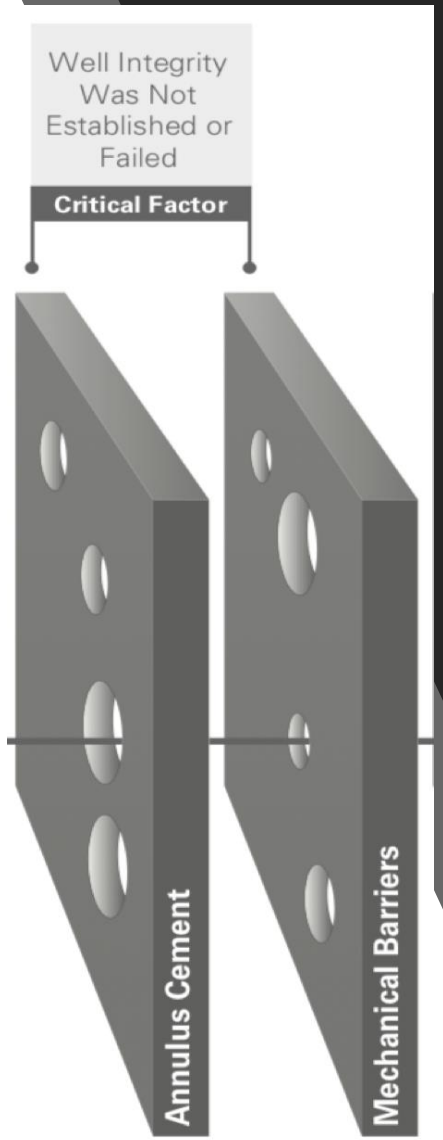
Cost $65Bn
(Jan 16 ‘18)

(Testified as an expert for BP)

April 20, 2010



Adapted from James Reason (Hampshire: Ashgate Publishing Limited, 1997).



Pitfall #4 - Failure to learn from elsewhere

- Critical Factors and Performance standards
- Required elsewhere in BP, e.g. North Sea
- Required of all operators in other parts of the world, e.g. Australia and UK

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Avoid Pitfall #4 - Build a learning and teaching system, and cast the net wide

1. Learn from accidents, incidents, near misses **ANYWHERE**

2. Find out what is being done elsewhere – best practices, best technology

3. Incorporate the lessons in the way the company works: Processes, procedures and standards need updating

4. Teach people (properly) who need to know - who's daily job is to prevent major accidents – that can be a lot of people!

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Could the cause of all accidents be procedures?

- Missing procedures
- Poor procedures
- People not following procedures – slips, lapses and deliberate violations

BUT……..

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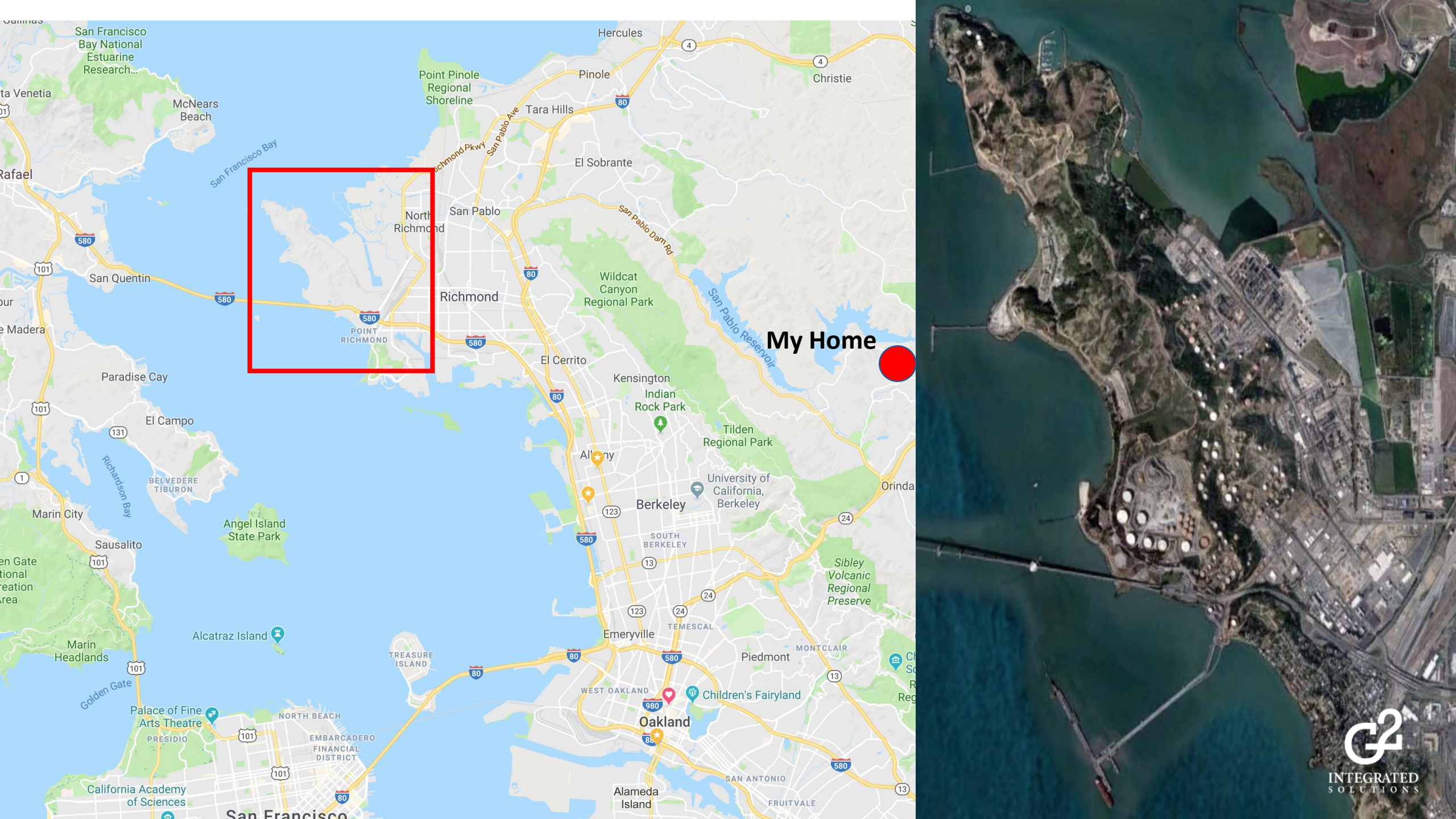
San Francisco Bay National Estuarine Research...
Hercules
Point Pinole Regional Shoreline
Pinole
Christie
McNears Beach
Tara Hills
San Pablo Ave
Richmond Pkwy
San Francisco Bay
El Sobrante
San Pablo
San Pablo Dam Rd
Wildcat Canyon Regional Park
San Quentin
Richmond
POINT RICHMOND
My Home
San Pablo Reservoir
El Cerrito
Kensington
Indian Rock Park
Tilden Regional Park
Paradise Cay
El Campo
University of California, Berkeley
Berkeley
Orinda
BELVEDERE TIBURON
Richardson Bay
Marin City
Angel Island State Park
Sausalito
SOUTH BERKELEY
Sibley Volcanic Regional Preserve
Alcatraz Island
Emeryville
TEMESCAL
Marin Headlands
TREASURE ISLAND
Piedmont
MONTCLAIR
Golden Gate
WEST OAKLAND
Children's Fairyland
Palace of Fine Arts Theatre
NORTH BEACH
PRESIDIO
EMBARCADERO FINANCIAL DISTRICT
Oakland
SAN ANTONIO
California Academy of Sciences
Alameda Island
FRUITVALE
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15,000 people sought treatment

6 Workers were injured

Immediate cause of pipe failure - corrosion

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Figure 14. Photo of the burned remains of the fire truck that was consumed by the fire. A firefighter was in the cab when the light gas oil ignited. The fire truck was positioned in the cold zone approximately 65 feet from the leak location.

Pitfall #5 - Failure to build a culture of safety

Some Chemical Safety Board (CSB) Findings:

1. Refinery ignored Chevron corporate in-house experts
2. Continued operation of a unit despite hazardous leaks
3. Decreasing willingness to use Stop Work Authority
4. Substandard equipment maintenance practices
5. Normalization of deviance

Weaknesses in Process Safety culture

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Organizations tend to forget about accidents

RICHMOND REFINERY: not building, or not maintaining, a solid safety culture – particularly a process safety culture.

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PROCEDURES + PEOPLE

Framework/ System

Organization & Structure

Policies & Procedures

Compliance

Safety Culture

API 1173

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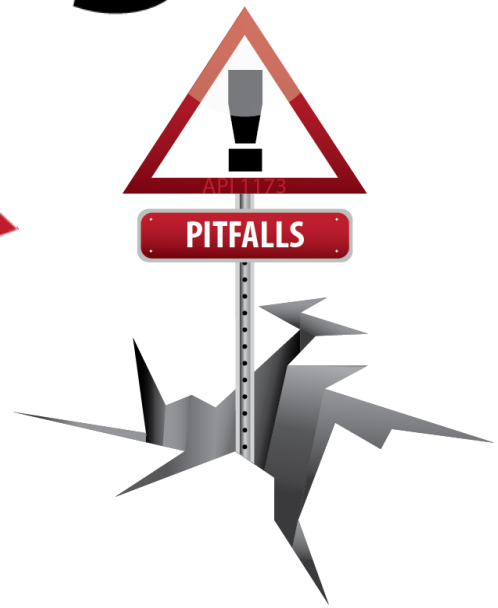

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API RP 1173 Covers Culture – but what is it?

The product of individual and group values, attitudes, competencies and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization's health and safety programs (HSE, 2002).

Translated it's "**the way we do things around here**"

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Avoid Pitfall #5 - Build a strong culture of safety

1. “Tone from the top” - Board and leadership. Set CLEAR expectations.
2. “Walk the talk” at all levels of leadership and management
3. Organize for personal safety and process safety – get the right people in the right positions and make sure they are doing the right things
4. Stamp out – normalization of deviance
5. Discipline - Culture is about doing the right thing – particularly when nobody is looking.

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Summary How to avoid the five pitfalls

1. Use quantitative risk assessment to make better, informed decisions [Piper Alpha]
2. Simple but detailed systems, policies, standards and procedures + WHY [Longford]
3. Build-in process safety to policies, systems, procedures and standards [Texas City]
4. Build a learning and teaching system and cast the net wide [Deepwater Horizon]
5. Build a strong culture of safety [Richmond Refinery]

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As with all Major Accidents

"The burden of these catastrophes is uniquely and unfairly borne by the victims, their families, and their friends.

This was the case for the Texas City victims—men and women who were providing a livelihood for themselves and their families.

These victims were fathers and mothers, husbands and wives, sons and daughters, and friends".

Baker Report [extract]

Please have a POWERFUL "why" – it'll help you become a safer company

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ACCIDENT DEFINITION - BOW-TIE