



Process safety incident
impacts on a company's
environmental social and
governance (ESG)
performance

Session speaker

Andy Bartlett

Solution Engineer, Sphera



1970-1977
Chemical Operator,
INEOS

1977-2012
Operations/HSE Engineering
Saudi Aramco

2012-2024
Solution Engineering
Sphera

Agenda

Stats from Sphera's 2023 Process Safety Report

ESG & Business Strategy

Progression of PSM & ESG

Process Safety Incidents and Impacts

ESG 5X5 RAM

Summary

Questions

ESG/PSM Stats From 2023 Sphera PSM Safety Survey

**ONE
THIRD**

of safety-critical maintenance is **not achieved** in a typical month.

**TWO
THIRDS**

have pointed to **gaps between** their organizations' safety goals and reality.

63%

report that **human factors negatively impact** safety performance.

71%

believe the most significant impacts of a process safety incident scenario are **“loss of production capabilities”** (affecting profitability) and **“environmental impact”** (risking fines and sanctions)

86%

believe **process safety management remains significant and important** to a company's ESG performance



ESG & Business Strategy

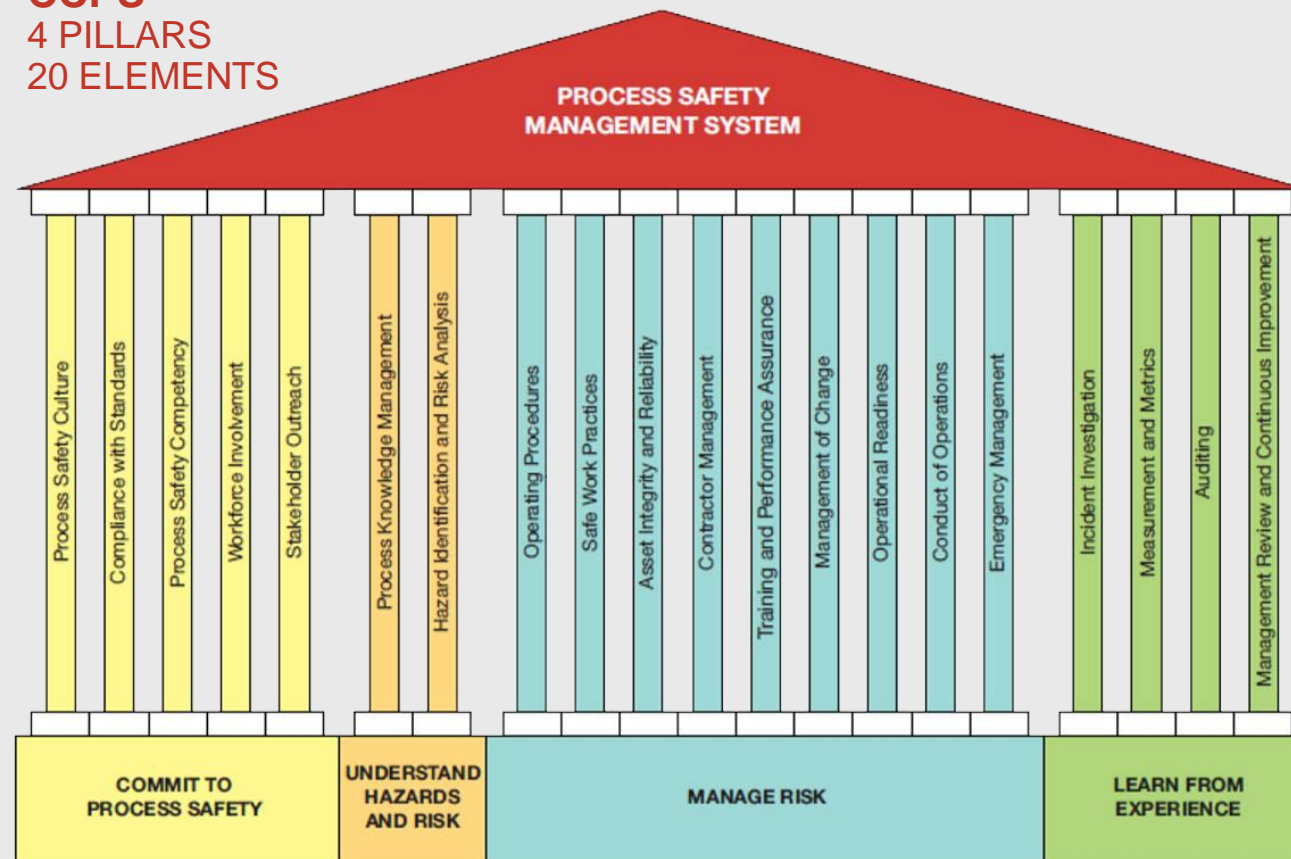
Environmental, Social and Governance (ESG) performance is now an essential **metric** for successful businesses and is one of today's hottest topics in boardrooms around the world.



Progression of PSM & ESG



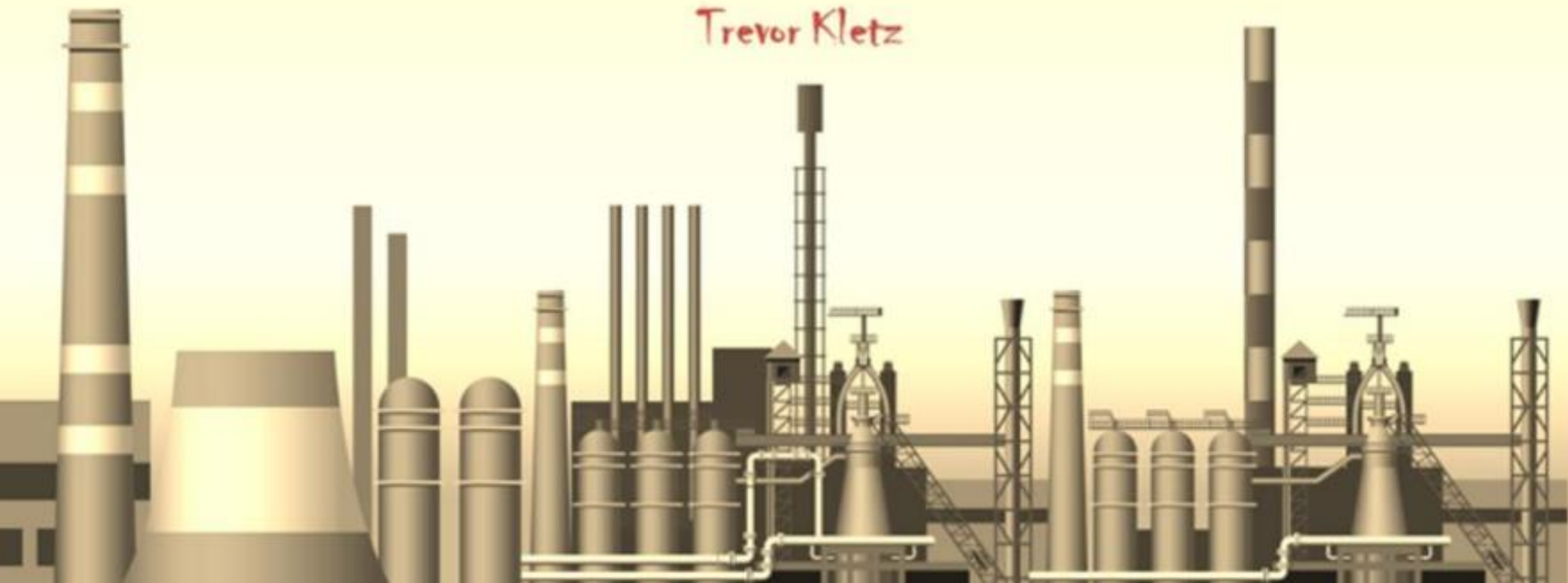
CCPS
4 PILLARS
20 ELEMENTS



If a Process Safety incident harms people, the investigation and determining the cause can negatively impact ESG social performance and result in litigation and fines. Additionally, equality, social cohesion, social integration, and labour relations are all affected.

If you think safety is expensive, try an accident

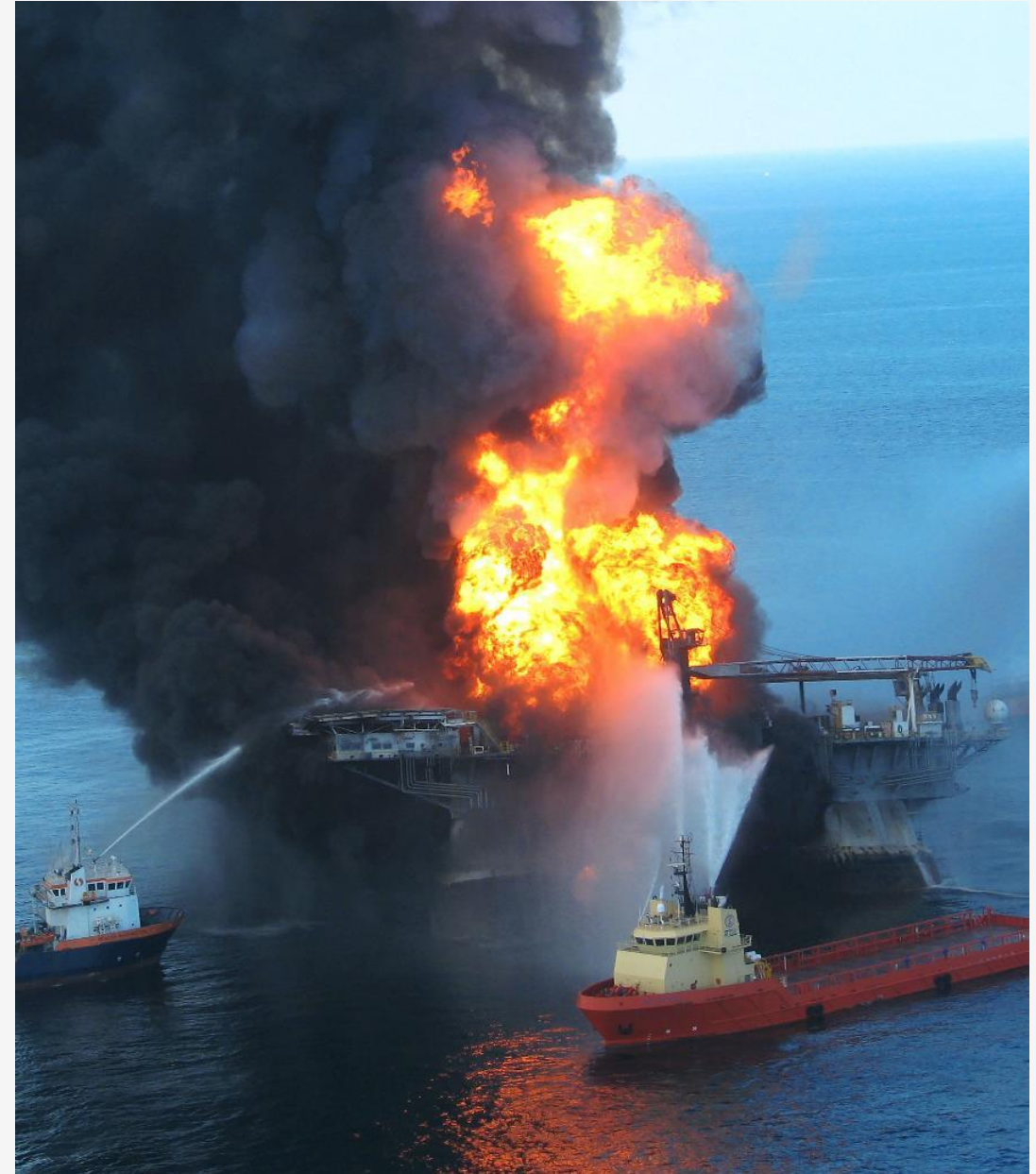
Trevor Kletz



Process safety incident

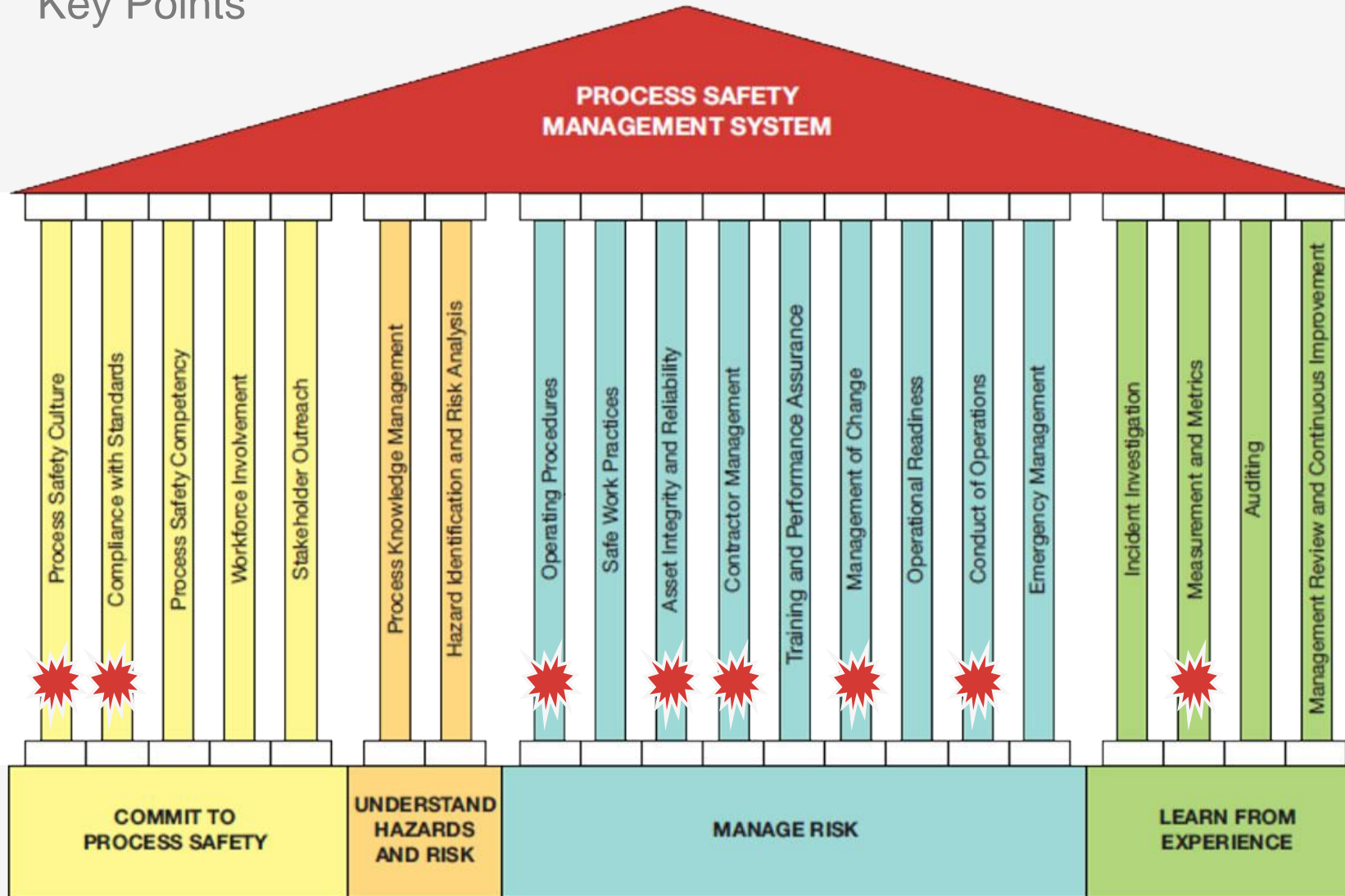
BP, Deepwater Horizon oil rig On April 20, 2010

Life for BP changed on April 20, 2010, when a blowout a mile under water sent oil and gas surging up to the Deepwater Horizon exploration rig, setting it on fire, sinking it and killing 11 crew members.



BP, Deepwater Horizon oil rig On April 20, 2010, PSM

Key Points



Process safety incidents impacting ESG metrics – illustration!

ESG			<div>\$65bn</div> <div>BP, Deepwater Horizon</div>
Environmental	Environmental	Energy Efficiency	
Environmental	Environmental	Water & Effluents \$20bn	
Environmental	Environmental	Emissions	
Environmental	Environmental	Waste	
Social	Employment	Staff Turnover	
Social	Employment	Training & Qualification	
Social	Employment	Maturity of Workforce	
Social	Employment	Absenteeism rate	
Social	Occupational Health and Safety	Work-related fatalities 11	
Governance	Economic	Performance	
Governance	Economic	Litigation Risks/Fines \$4bn	
Governance	Economic	Anti Corruption	

Process safety incident

Chevron Refinery

On August 6, 2012, the Chevron U.S.A. Inc. Refinery in Richmond, California (“the Chevron Richmond Refinery”) experienced a catastrophic pipe rupture in the #4 Crude Unit.

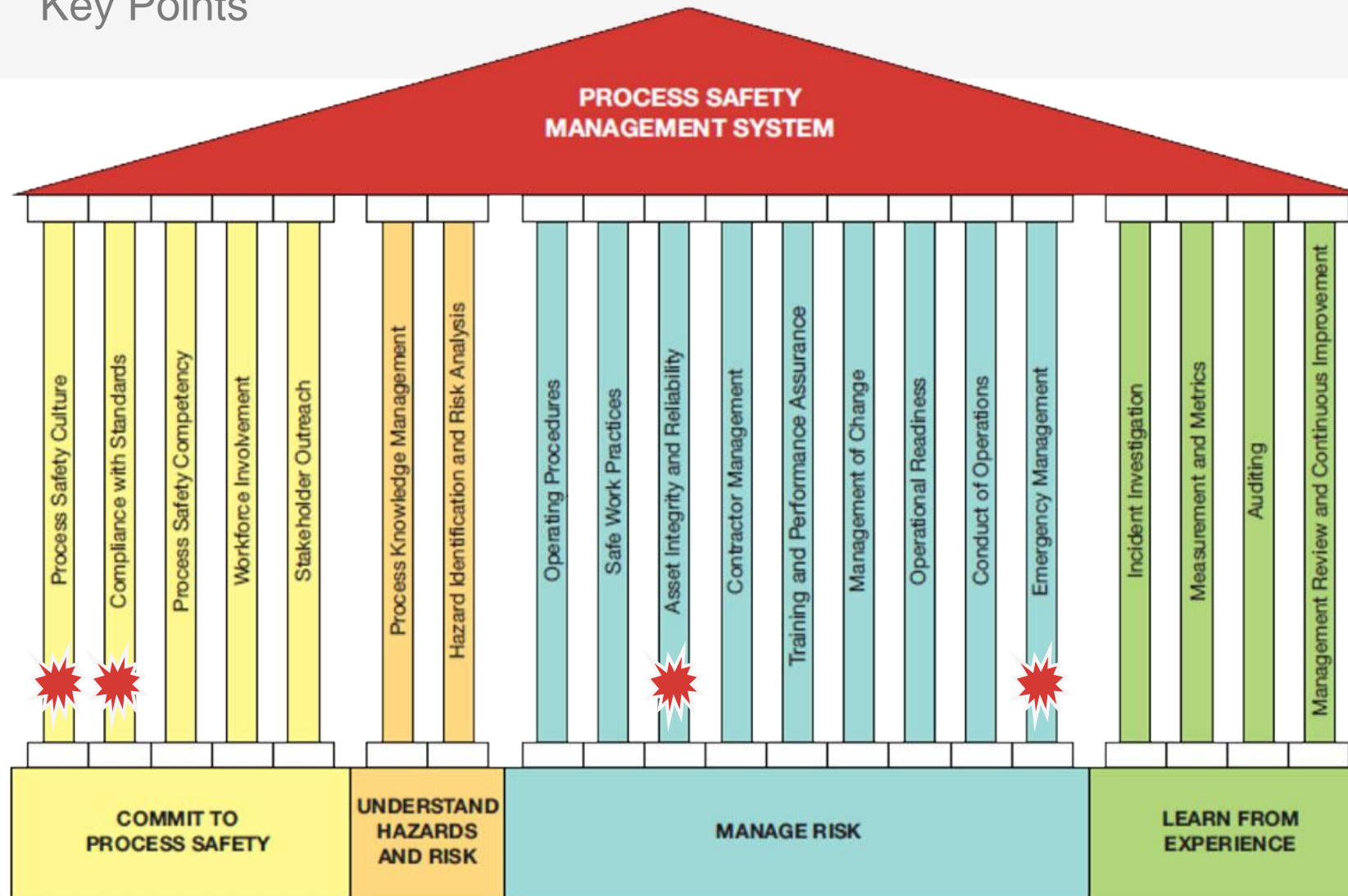
At 6:33 p.m., approximately two minutes following the release, the released process fluid ignited.

<https://www.youtube.com/watch?v=QilLbGbK8Qk&t=342s>



Chevron U.S.A. Inc. Refinery, PSM

Key Points



Key Points

Process Safety Culture – Embrace process safety culture from the highest levels in the organization down, not from the bottom up. Otherwise employees will not be sure if management really believes process safety is important.

Asset Integrity and Reliability – Understand corrosion damage mechanisms. Make sure that proper metallurgy and inspection protocols are used to minimize the potential for corrosion.

Emergency Management – Stand clear! There have been countless instances where people move in close to see the situation, seemingly unaware of the hazards and risks. Crowd control, and even positioning of responders, should be clearly addressed in emergency response plans and drills.

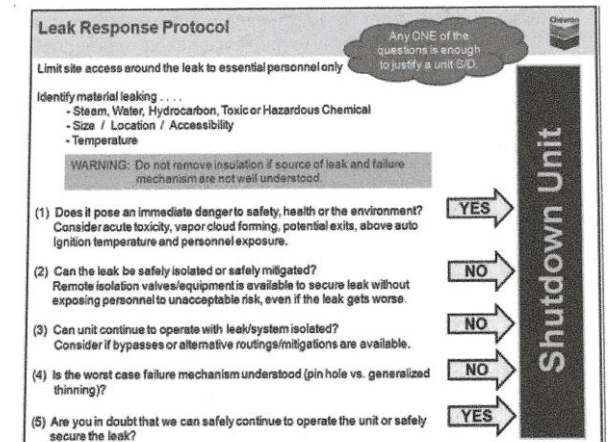


Figure 3.3-6. Chevron's new Leak Response Protocol (courtesy CSB).

Process safety incidents impacting ESG metrics – illustration!

ESG			
Environmental	Environmental	Energy Efficiency	<div>Chevron U.S.A.</div>
Environmental	Environmental	Water & Effluents	
Environmental	Environmental	Emissions	
Environmental	Environmental	Waste	
Social	Employment	Staff Turnover	
Social	Employment	Training & Qualification	
Social	Employment	Maturity of Workforce	
Social	Employment	Absenteeism rate	
Social	Occupational Health and Safety	Work-related Injuries	
Governance	Economic	Performance	
Governance	Economic	Litigation Risks	
Governance	Economic	Anti Corruption	

ESG 5X5 RAM

5	Social		Environment	Governance	Client Specific	
	Personnel	Public	Environment	Business Interruption	Asset / Property	Media
5	Multiple fatalities	Single fatality	Extensive, persistent or irreversible damage to ecosystem function	Disruption to dependent operations for more than 1 year	Total or extensive damage to on-site equipment requiring complete replacement and significant (in excess of US\$50 MM). Extensive damage to off-site property (in excess US\$ 1MM) Dwelling(s) off-site damage and uninhabitable	International media attention. Severe adverse public reaction threatening facility operations.
4	Single fatality	Multiple injury - Impairment to several persons. Hospitalization > 24 hrs. Delayed recovery	Widespread moderate-long term ecosystem damage	Disruption to dependent operations for 3 to 12 months	Major damage to onsite equipment repaired within 4 to 12 months, requiring significant capital expenditure (US\$25MM to US\$50 MM). Major damage to offsite property (up to US \$ 1MM) Dwelling off-site damage an uninhabitable.	National media attention Moderate public concern / reaction
3	Multiple injury - impairment to several persons. Hospitalization > 24 hrs. Delayed recovery	Medical treatment injury with rapid recovery. Hospitalization < 24 hrs	Short term damage impairing local ecosystem	Disruption to dependent operations for 70 to 90 days	On-site equipment damage repaired within 7 to 120 days with loss of production, requiring capital expenditure (US\$10 MM to US \$25 MM)	State media attention. Adverse public reaction
2	Medical treatment injury with rapid recovery. Hospitalization < 24 hrs	First aid treatment	Minor biological effects across limited area onsite	Disruption to dependent operations for less than 7 days	On-site damage repaired within 7 days with loss of production, requiring capital expenditure (US\$ 1MM to US \$ 10MM)	Local media attention. Possible adverse public reaction
1	First aid treatment	No effect	On-site release immediately contained and readily cleaned up with onsite or locally available technology	Disruption to dependent operations for less than one day	On-site equipment damage repaired within 24 hours, without loss of production, requiring capital expenditure (less than US\$ 1MM)	No effect

Summary

- Process Safety incident observation “Reliance on the low personal injury rate at Texas City as a safety indicator failed to provide a true picture of process safety performance and the health of the safety culture”.
- ESG reporting is now a requirement in several countries around the world.
- Process safety incidents have a cost to the environment air and water, to the social, workers and surrounding residents and to the business governance in poor ESG reporting and share price drops.
- The effect on ESG of a PS incident will be a point of focus and could justify more \$\$\$ capital available for the provision of technology to improve process safety management.



About Sphera

Sphera is the leading provider of Environmental, Social and Governance (ESG) performance and risk management software, data and consulting services focusing on Environment, Health, Safety & Sustainability (EHS&S), Operational Risk Management (ORM), Product Stewardship and Supply Chain Risk Management (SCRM).

Our Mission

To create a **safer**, more **sustainable** & **productive** world.



Questions?

Contact:

amudie@sphera.com

upusch@sphera.com

abartlett@sphera.com



Sphera is the leading global provider of integrated sustainability, risk & performance management software, data and services.

Address

130 East Randolph St, Suite 1900
Chicago, IL 60601 USA

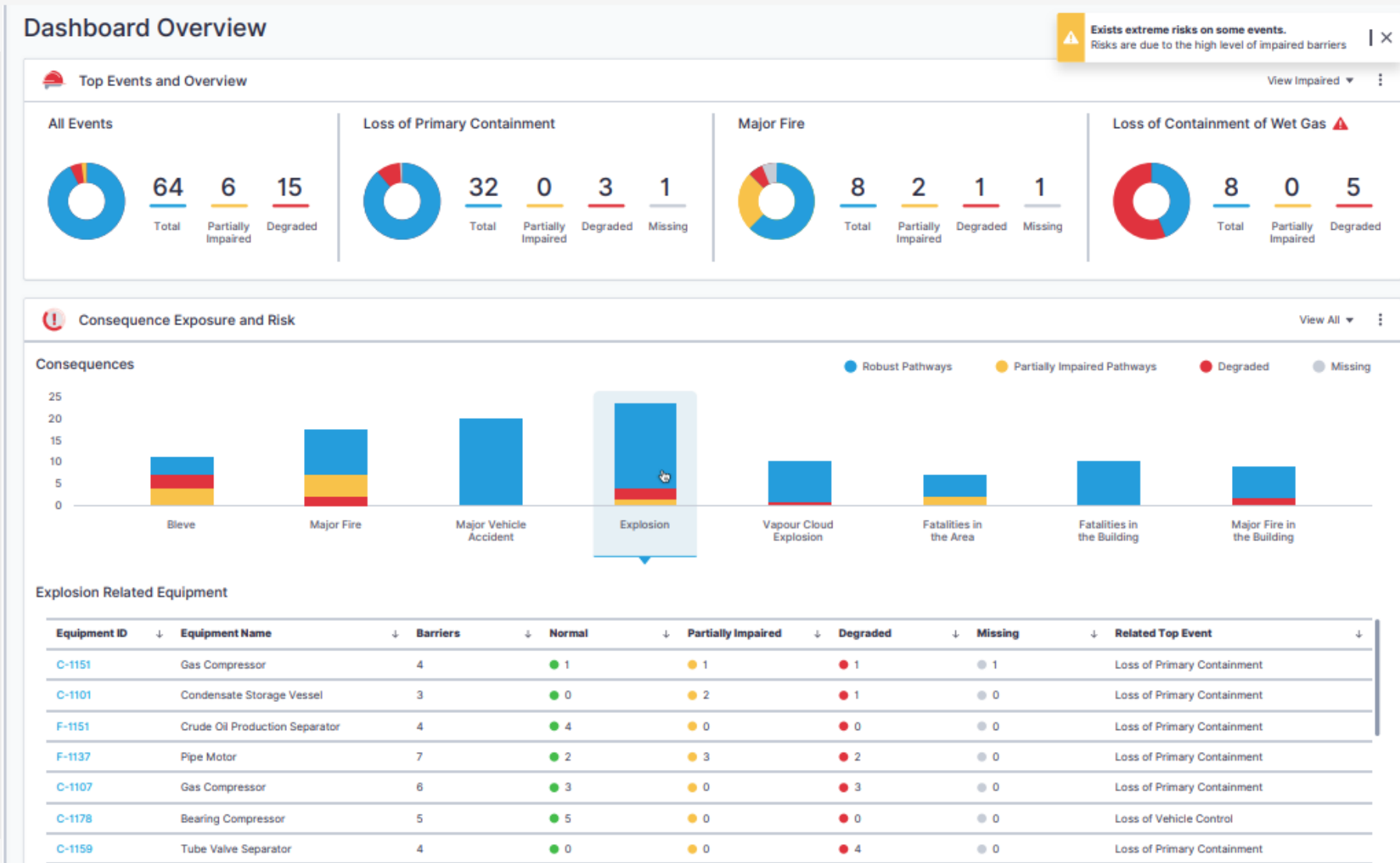
Phone

(312) 796-7160

Online

sphera.com/contact-us

Be Proactive, Use Pathways to Visualise Your Process Safety Status



Matrix Based on CCPS book

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1			COMMIT TO PROCESS SAFETY					UNDER STAND HAZARDS AND RISK		MANAGE RISK								LEARN FROM EXPERIENCE				
		Incident Key Points	Process safety Culture	Compliance with standards	Process safety Competency	Workplace involvement	Stakeholder Outreach	Process safety Knowledge Management	Hazard Identification & Risk Analysis	Operating Procedures	Safe Work Practices	Asset integrity & Reliability	Contractor Management	Training & Performance Assurance	Management of Change MOC	Operational Readiness	Conduct of Operations	Emergency Management	Incident Investigation	Measurement & Metrics	Auditing	Management Review & Continuous Improvement
2		HEAT MAP																				
3	USA	T2 LABORATORIES, FLORIDA 2007	X	X	X				X						X			X	X			
4	GERMANY	HOECHST GRIESHEIM, GERMANY 1993			X									X			X					
5	USA	ARCO, TEXAS, 1990			X							X										
6	USA	WEST FERTILISER, TEXAS 2013	X	X			X			X	X							X				
7	CHINA	RUI HAI, TIANJIN, CHINA, 2015	X	X																		
8	USA	PORT NEAL, IOWA, 1994							X	X												
9	UK	HICKSON & WELCH, UK, 1992		X					X	X		X			X							
10	USA	HOEGANES, TENNESSEE, 2011		X						X									X			
11	USA	CHEVRON RICHMOND, CALIFORNIA, 20	X	X								X						X				
12	USA	VALERO-MCKEE, TEXAS, 2007		X					X						X							
13	USA	BLSR, TEXAS, 2003		X				X		X			X									
14	UK	BUNCEFIELD STORAGE, UK, 2005	X	X					X	X		X			X							
15	POERTO RICO	CAPECO STORAGE, 2009	X									X						X				
16	INDIA	POL, JAIPUR, INDIA, 2009							X									X	X			
17	USA	CELANESE, TEXAS, 1987			X				X									X				
18	USA	WILLIAMS OLEFINS, LOUISIANA, 2013								X		X			X			X				
19	USA	IMPERIAL SUGAR, GEORGIA, 2008		X	X				X			X		X	X			X		X		
20	USA	HAYES LEMMERZ, INDIANA, 2003		X	X			X	X	X		X		X	X			X		X		
21	AUSTRALIA	VARANUS ISLAND, AUSTRALIA, 2008	X	X	X							X										
22	USA	KLEEN ENERGY, CONNECTICUT		X	X						X								X			
23	USA	CONAGRA FOODS, NORTH CAROLINA		X	X						X								X			
24	ITALY	OIL STORAGE, ITALY, 2006						X	X			X										
25	USA	NDK CRYSTAL, ILLINOIS 2009	X	X														X				

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
22	USA	KLEEN ENERGY, CONNECTICUT		X	X						X							X				
23	USA	CONAGRA FOODS, NORTH CAROLINA		X	X						X							X				
24	ITALY	OIL STORAGE, ITALY, 2006						X	X			X						X				
25	USA	NDK CRYSTAL, ILLINOIS, 2009	X	X														X				
26	USA	BP MACONDO, GULF OF MEXICO, 2010	X	X						X		X	X		X		X	X				
27	USA	FREEDOM INDUSTRIES, VIRGINIA, 2010		X								X						X				
28	USA	MILLARD REFRIGERATED, ALABAMA, 2010						X	X									X				
29	USA	DUPONT METHYL, TEXAS, 2010							X	X	X					X		X				
30	USA	DUPONT PHOSGENE, WEST VIRGINIA, 2011	X	X					X	X		X						X	X		X	
31	USA	DPC ENTERPRISES, MISSOURI, 2002										X						X				
32	USA	GEORGIA-PACIFIC, ALABAMA, 2007							X	X					X			X				
33	USA	CITGO, HF RELEASE, TEXAS, 2009																X			X	
34	S.KOREA	HUBE GLOBAL, GUMI, SOUTH KOREA, 2012	X															X				
35	CANADA	MONTREAL, QUEBEC, CANADA, 2013		X								X			X			X				
36	USA	HORFOLK SOUTHERN COLLISION, SOUTH CAROLINA, 2005							X									X				
37	USA	GAYLORD CHEMICAL, LOUISIANA, 1995																X	X			
38	USA	PACIFIC GAS & ELECTRIC, CALIFORNIA, 2010								X	X			X				X				
39	USA	OLYMPIC PIPELINE, WASHINGTON 1993							X					X				X				
40	USA	ENTERPRISE PRODUCTS, KANSAS, 2004							X					X				X				
41	NIGERIA	NIGERIA, 2006							X					X				X				
42	BRAZIL	AIR FRANCE, RIO JANEIRO, 2009									X							X				
43	JAPAN	FUKUSHIMA, JAPAN, 2011			X				X									X				
44	S.KOREA	SEWOL FERRY SINKING, SOUTH KOREA,	X											X				X				
45	NEW ZEALAND	PIKE RIVER, NEW ZEALAND, 2010												X			X	X				X
46	USA	BIG BRANCH MINE, WEST VIRGINIA, 20																X	X		X	
47	USA	UNIVERSITY OF HAWAII LAB, 2016	X															X				
48	USA	TEXAS TECH LAB, 2010	X															X				
49	USA	UNIVERSITY OF CALIFORNIA LAB, 2009	X															X				
50	MARS	MARS CLIMATE ORBITER, 1999												X				X				

Please contact me for a copy of the spread sheet