



SCOTTISHPOWER

Avoiding asset damage through a risk based approach to process safety

November 2013

Why Focus on Process Safety?



BP Texas City



Piper Alpha



Longford



Deep Water Horizon



Chernobyl



Fukushima



Duvha



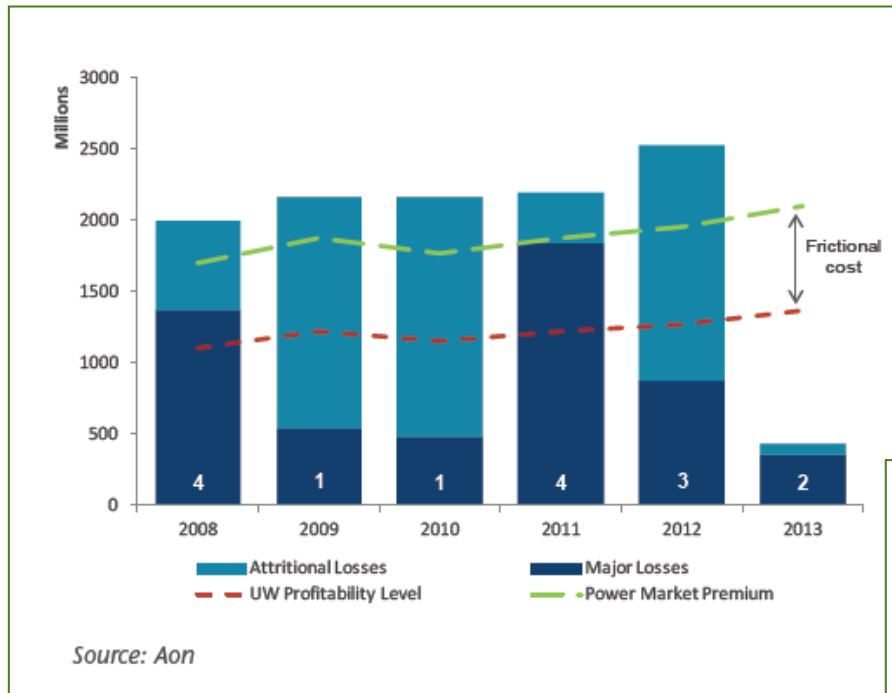
Sayano-Shushenskaya



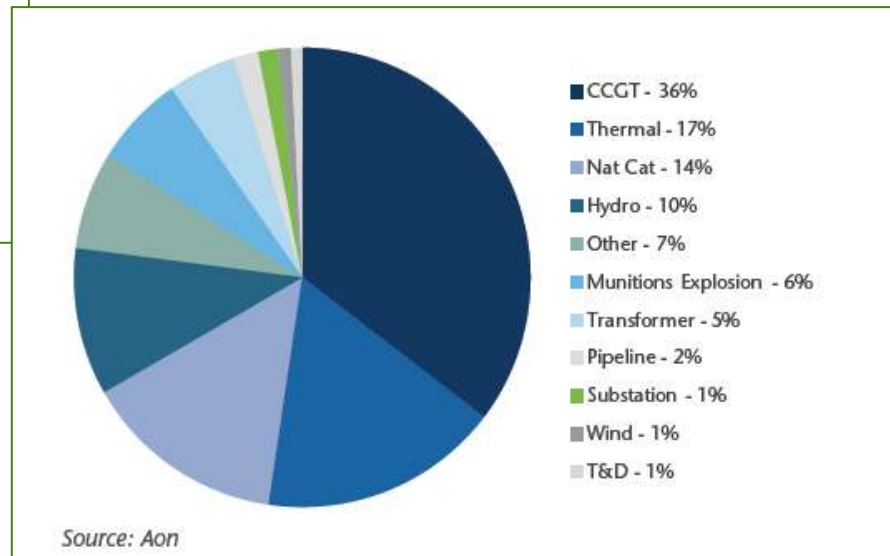
Kleen Energy



Georgia Power



The power sector has always produced a level of attritional losses by the very nature of the risk profile, however, the attritional trend has escalated within the past 7 years and has been accompanied by a constant flow of severity losses year on year. Attritional losses would be defined as losses with a value of \$25m or lower, whereas severity losses would be above this amount. Insurers often highlight that deductibles have not risen in line with inflation over the past 15 years as an important factor in the increase in attritional loss exposure.





“No successful company could stay in business for long without accurate information on its financial performance – so why act differently when it comes to process safety?”
Judith Hackitt Chair of the HSE

ScottishPower was the second power company in the world to achieve PAS-55 accreditation

ScottishPower received the IChemE health and safety award for the process safety KPI dashboard project and the **Global Award for innovation in Risk Management 2013**

Key Witness for CSB Deep Water Horizon Public Hearing **July 2012**

Significant benefits have been realised to date.....

	2008	2009	2010	2011	2012
Plant Availability	64.5%	77.0%	83.9%	86.9%	84.9%
EFOR ¹	10.1%	7.5%	6.4%	5.5%	4.9%

Generation Costs (Opex £m)



- **36% reduction in Operations and Maintenance costs**
- **22% increase in plant availability**
- **52% reduction in plant forced outage rates**
- **Reduction in Insurance costs and deductible period**



- Relationship spans 15 years +
- Aim to help other companies fast track a similar approach
- Best of breed Industry and implementation knowledge
- Providing access to recognised Industry leading expertise
- Providing access to proven tools and delivery methodology
- Jointly developed range of tool kits and training material
- Integrating technologies to deliver a sustainable solution

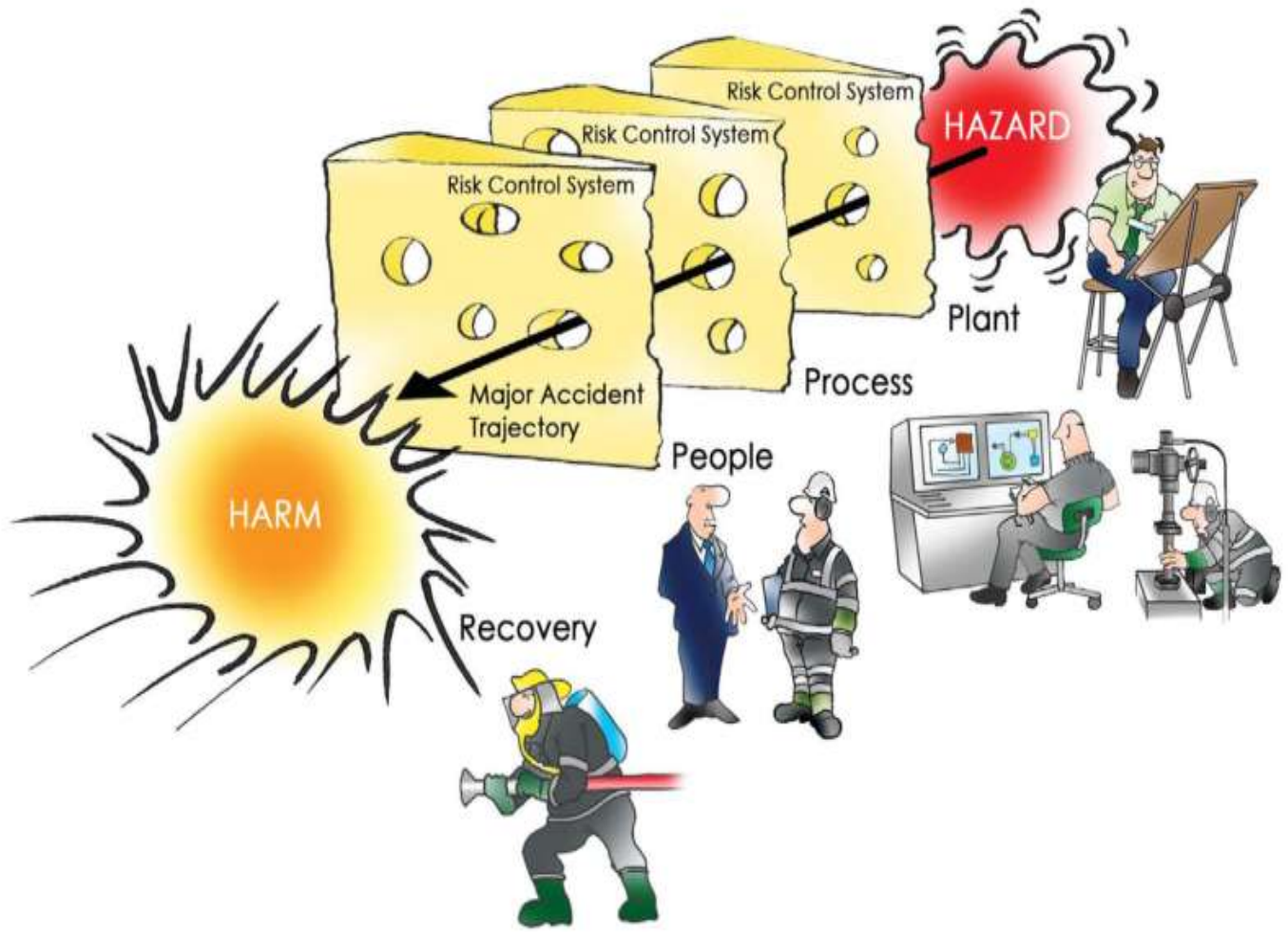


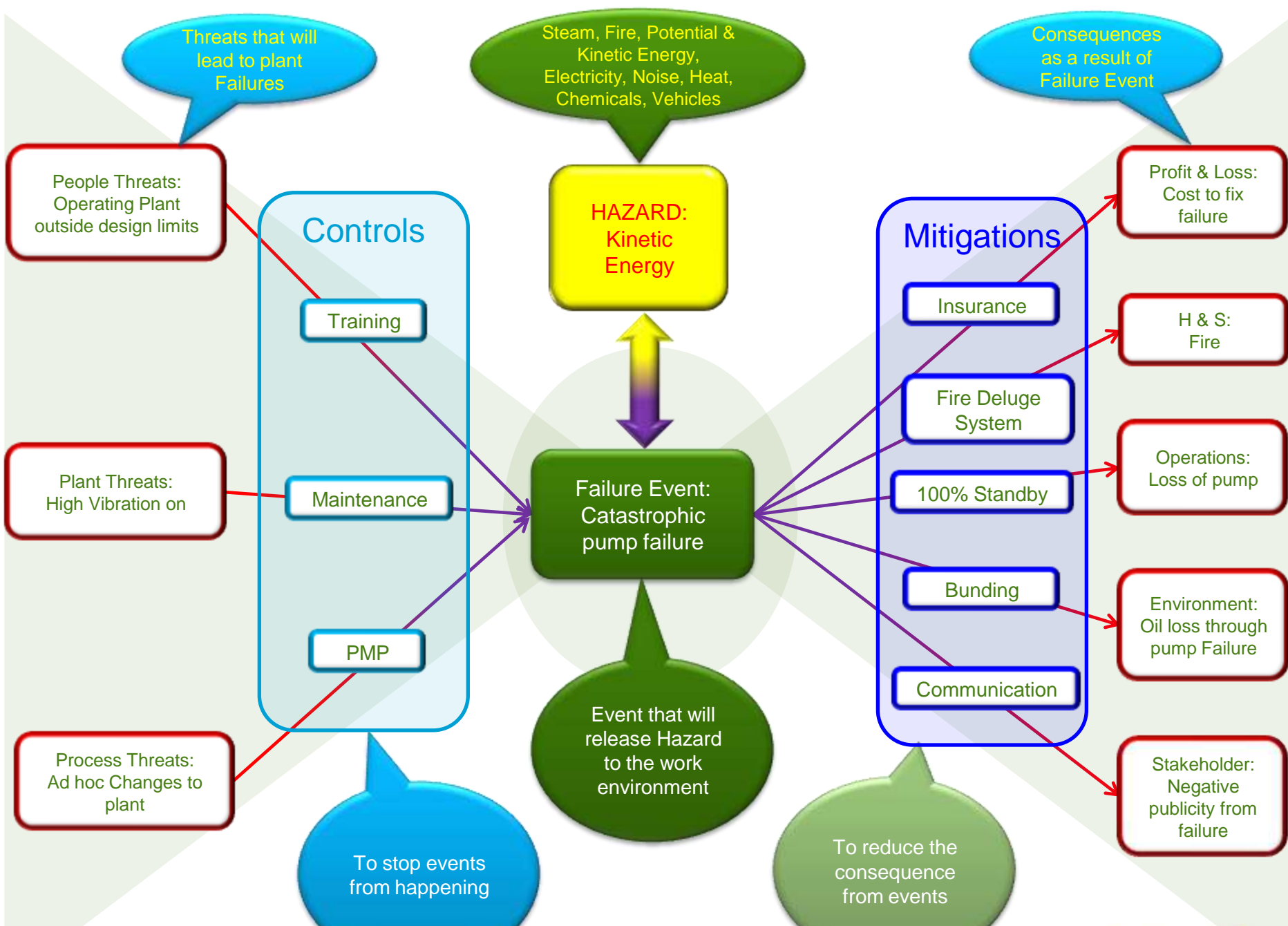
Measuring Process Safety

What if PS risks were as visible as Health & Safety risks?



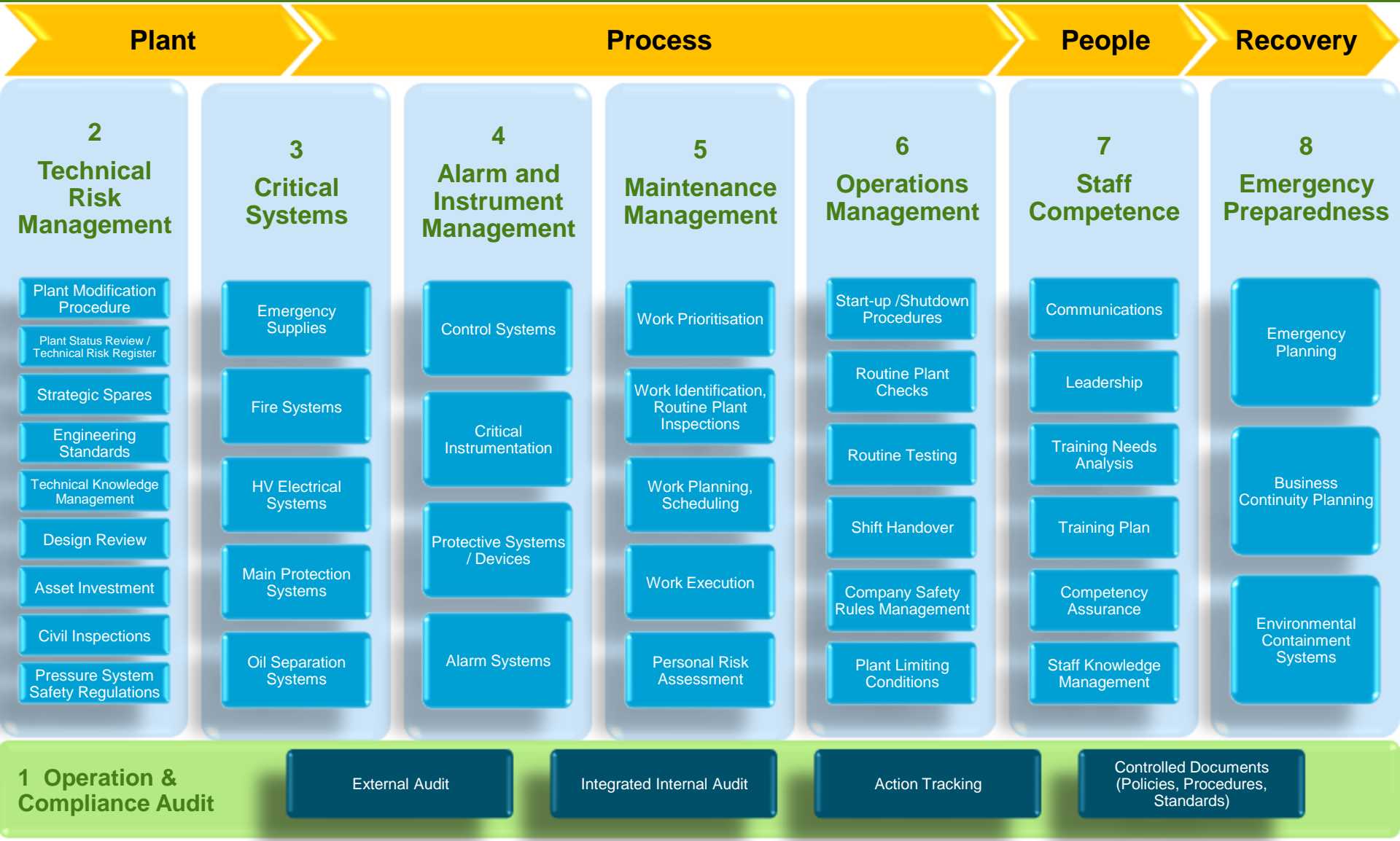
Understanding hazards & creating barriers (People, Process & Plant)...



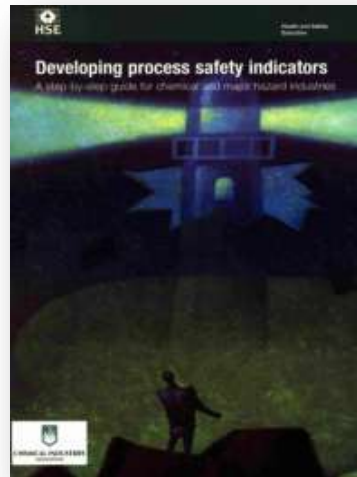


Risk Control Areas

Understanding hazards & creating barriers (People, Process & Plant)...



Understanding hazards & creating barriers (People, Process & Plant)...

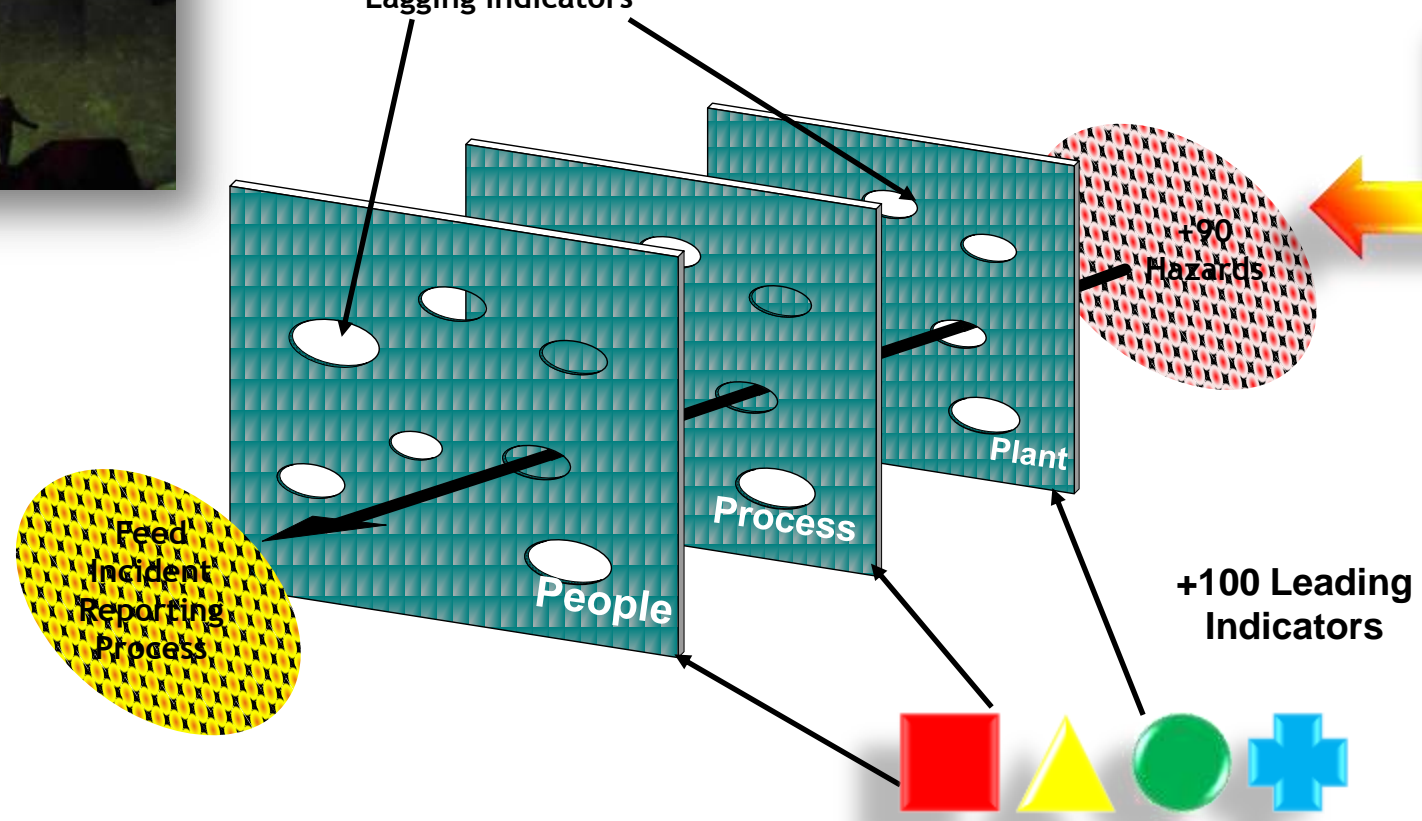


42 Risk Control Systems

Priority	System	Priority	Priority	Priority	Priority	Hazard
1	PS01	3	1	1	1	Failure of critical system operation
1	PS02	3	1	1	1	Failure of critical system operation
1	PS03	3	1	1	1	Failure of critical system operation
1	PS04	3	1	1	1	Failure of critical system operation
1	PS05	3	1	1	1	Failure of critical system operation
1	PS06	3	1	1	1	Failure of critical system operation
1	PS07	3	1	1	1	Failure of critical system operation
1	PS08	3	1	1	1	Failure of critical system operation
1	PS09	3	1	1	1	Failure of critical system operation
1	PS10	3	1	1	1	Failure of critical system operation
1	PS11	3	1	1	1	Failure of critical system operation
1	PS12	3	1	1	1	Failure of critical system operation
1	PS13	3	1	1	1	Failure of critical system operation
1	PS14	3	1	1	1	Failure of critical system operation
1	PS15	3	1	1	1	Failure of critical system operation
1	PS16	3	1	1	1	Failure of critical system operation
1	PS17	3	1	1	1	Failure of critical system operation
1	PS18	3	1	1	1	Failure of critical system operation
1	PS19	3	1	1	1	Failure of critical system operation
1	PS20	3	1	1	1	Failure of critical system operation
1	PS21	3	1	1	1	Failure of critical system operation
1	PS22	3	1	1	1	Failure of critical system operation
1	PS23	3	1	1	1	Failure of critical system operation
1	PS24	3	1	1	1	Failure of critical system operation
1	PS25	3	1	1	1	Failure of critical system operation
1	PS26	3	1	1	1	Failure of critical system operation
1	PS27	3	1	1	1	Failure of critical system operation
1	PS28	3	1	1	1	Failure of critical system operation
1	PS29	3	1	1	1	Failure of critical system operation
1	PS30	3	1	1	1	Failure of critical system operation
1	PS31	3	1	1	1	Failure of critical system operation
1	PS32	3	1	1	1	Failure of critical system operation
1	PS33	3	1	1	1	Failure of critical system operation
1	PS34	3	1	1	1	Failure of critical system operation
1	PS35	3	1	1	1	Failure of critical system operation
1	PS36	3	1	1	1	Failure of critical system operation
1	PS37	3	1	1	1	Failure of critical system operation
1	PS38	3	1	1	1	Failure of critical system operation
1	PS39	3	1	1	1	Failure of critical system operation
1	PS40	3	1	1	1	Failure of critical system operation
1	PS41	3	1	1	1	Failure of critical system operation
1	PS42	3	1	1	1	Failure of critical system operation

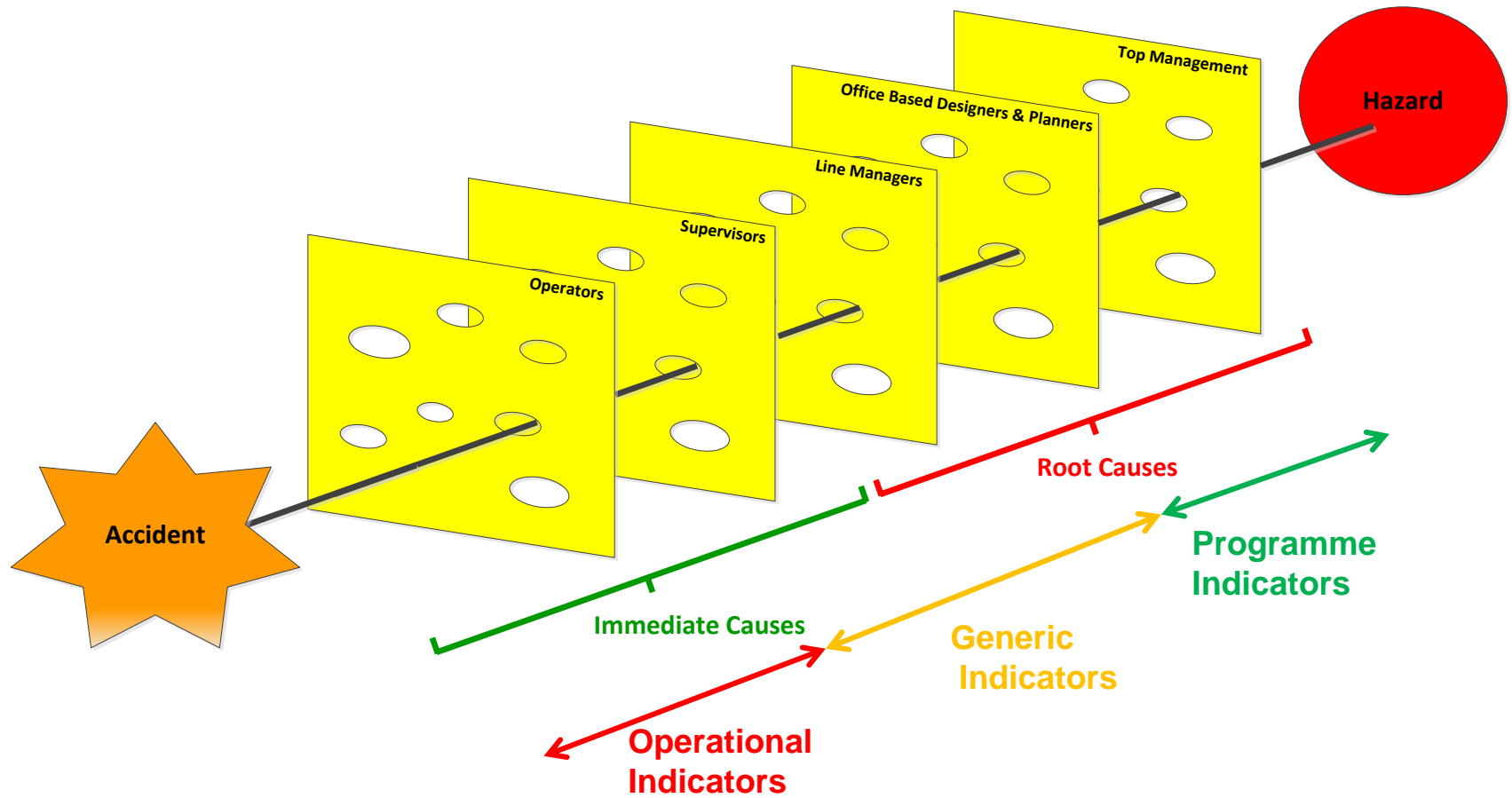


3 Classifications Of Lagging Indicators



What Causes Major Accidents?

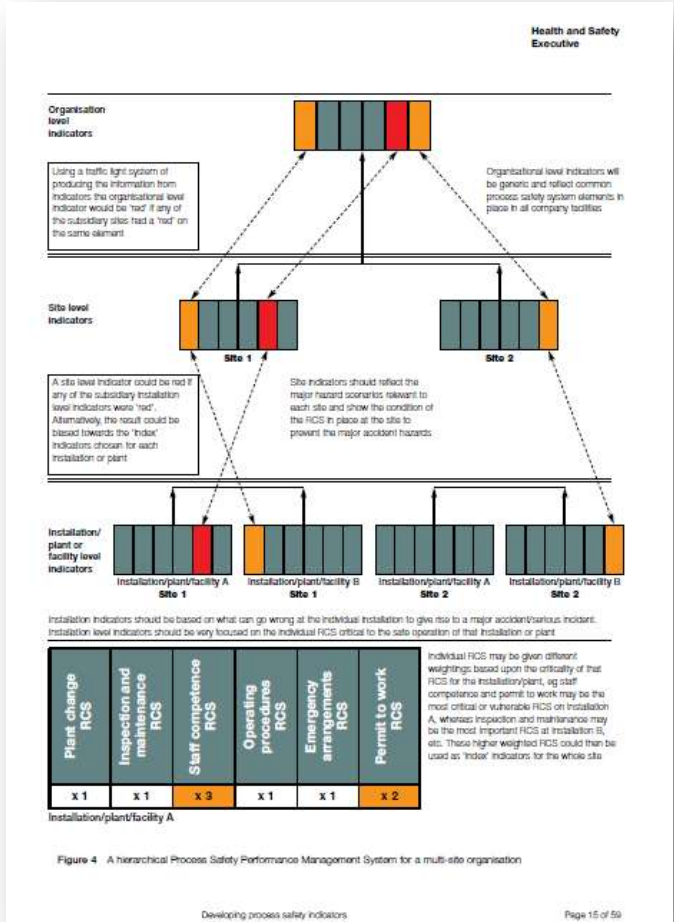
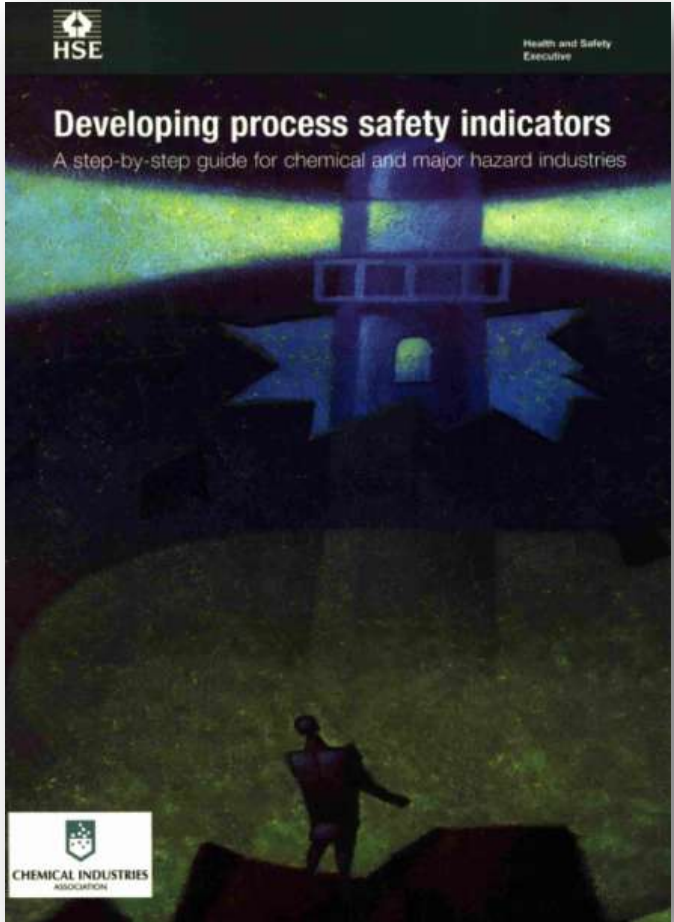
- The Link to Indicators



Operational RCS examples	Generic RCS examples	Programme Indicator examples
Process/operating envelope. Control of: <ul style="list-style-type: none"> ■ Overfill ■ Overpressure ■ Corrosion/ageing ■ Overtemperature ■ Flow rate ■ Accidental leakage 	PTW Management of Change Inspections completed to time Instrumentation and alarms	Audits done to time Audit actions closed out Staff trained to specified competence Safety tours / toolbox talks completed

KPI Development

Based on Key Concepts in HSG 254...



Measuring Performance

Overall Site Matrix

Matrix

Euan Fenelon (Business Unit Manager)

Matrix
Manual Data
Reports
User Preferences
Links
Help
Print

FILTER:

Date: **IndicatorType:** All Show All

	Technical Risk Management	Critical System Management	Alarm / Instrumentation Management	Maintenance Management	Operations Management	Operational and Compliance Audits	Staff Competence	Emergency Preparedness
Coal	■ ● 1 5	■ ▲ 1 1	● ● 5 6	■ + 5 0	■ ● 2 5	■ + 2 0	▲ ● 3 1	■ ● 1 1
Leogannet	■ ● 1 5	■ ▲ 1 1	● ● 5 8	■ + 5 0	■ ● 2 5	■ + 2 0	▲ ● 3 1	■ ● 1 1
Cockenzie	■ + 0 0	■ + 0 0	■ + 0 0	■ + 0 0	■ + 0 0	■ + 0 0	■ + 0 0	■ + 0 0
Gas	■ + 8 0	■ + 11 0	▲ + 1 0	■ + 8 0	■ + 3 0	● + 34 0	■ + 2 0	■ + 3 0
Damhead Creek	■ + 1 0	■ + 1 0	▲ + 1 0	■ + 2 0	● + 1 0	● + 5 0	■ + 2 0	■ + 3 0
Rye House	■ + 1 0	■ + 2 0	● + 3 0	■ + 2 0	■ + 1 0	● + 8 0	● + 2 0	● + 3 0
Shoreham	■ + 1 0	■ + 6 0	● + 2 0	■ + 4 0	■ + 1 0	● + 5 0	● + 3 0	▲ + 1 0
Blackburn	■ + 1 0	● + 4 0	● + 4 0	● + 3 0	■ + 1 0	● + 6 0	● + 3 0	● + 1 0
Hatfield Moors	■ + 1 0	● + 7 0	● + 1 0	● + 3 0	+ + 8 0	● + 3 0	● + 2 0	● + 1 0

Operational, Generic and Programme Indicators...

Top Risks Report

Martin Sedgwick (Group Manager)

Matrix
Manual Data
Reports
User Preferences
Links
Help
Print

FILTER

Date: 07/10/2013 Show Top: 20

Group/Business Unit: Generation \ Gas \ Damhead Creek

Risk Control Area/System: Generation

[Modify](#)

LEADING

Links	KPI Name	Business Unit	Metric Type	Target	Tolerance	Best Practice	Status	Actual	Calculated Risk	Risk Category	Adjusted Risk
	Critical Environmental Routine Check Compliance (0 of 2)	Damhead Creek	>	2	1	2	■	0	0	Operational	0
	Testing of Emergency Arrangements and Equipment (0 of 0)	Damhead Creek	>	6	1	6	■	0	0	Operational	0
	Control Loop Performance Index (0 of 0)	Damhead Creek	>	0.75	0.25	0.9	■	0.364	0.73	Operational	0.73
	Percentage of Stale Alarms (0 of 0)	Damhead Creek	<	1%	1%	0.5%	■	6.92%	0.95	Operational	0.95
	Assets Reviewed in Last Year (0 of 0)	Damhead Creek	>	30%	10%	100%	■	0%	0	Generic	1
	Alarm System Performance Index (0 of 0)	Damhead Creek	>	4	1	5	▲	3.429	1.43	Operational	1.43
	Fire Systems PM to CM (60.583 of 88.583)	Damhead Creek	>	80%	10%	80%	▲	77%	1.78	Operational	1.78

	Calculated Risk	Risk Category	Adjusted Risk
0	0	Operational	0
0	0	Operational	0
64	0.73	Operational	0.73
2%	0.95	Operational	0.95
1%	0	Generic	1
29	1.43	Operational	1.43
1%	1.78	Operational	1.78
1%	0.6	Generic	1.8

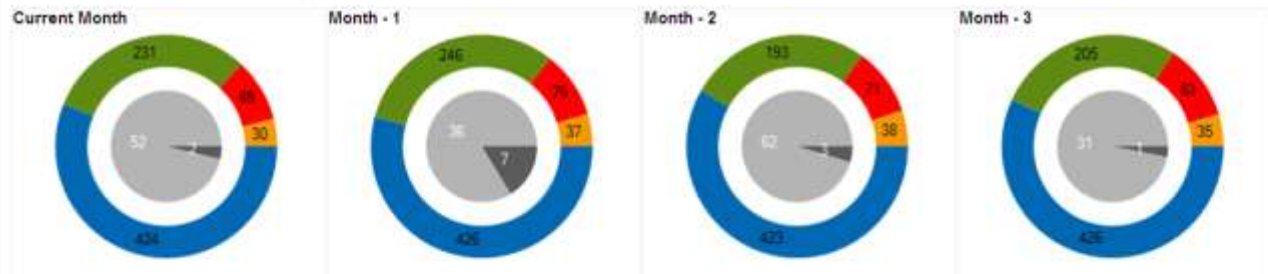
	Outage Defects Backlog Size in Months (54 of 10)	Damhead Creek	<	2m	1m	2m	▲	3m	1	Generic	2
	Main Protection Systems CMC (0 of 0)	Damhead Creek	>	50%	15%	80%	■	0%	2	Operational	2
	HV Electrical Systems CMC (0 of 0)	Damhead Creek	>	50%	15%	80%	■	0%	2	Operational	2
	BC4- Stability Index (how much the process oscillates) (0 of 0)	Damhead Creek	>	0.5	0.25	0.75	▲	0.45	2	Operational	2
	BC3- Response Index (ability to react to plant upsets) (0 of 0)	Damhead Creek	>	0.5	0.25	0.75	■	0.653	2.61	Operational	2.61
	OHS Handheld Plant Check Compliance (132 of 137)	Damhead Creek	>	80%	5%	100%	■	96%	2.84	Operational	2.84
	Critical Environmental Defects Backlog Size in Months (0 of 0)	Damhead Creek	<	2m	1m	2m	■	0m	3	Operational	3
	Safety Rule Audit Process Compliance (1 of 1)	Damhead Creek	>	1	0	1	■	1	3	Operational	3
	Business Continuity (1 of 4)	Damhead Creek	>	3	1	4	■	1	1	Programme	3
	Routine Operational Testing Plan Compliance (193 of 193)	Damhead Creek	>	80%	5%	100%	■	100%	3	Operational	3
	BC2- Service index (time loop is in control of process) (0 of 0)	Damhead Creek	>	0.5	0.25	0.75	■	0.753	3	Operational	3
	Main Protection Systems PM to CM (16	Damhead Creek	>	50%	15%	80%	■	0%	3	Operational	3



Measuring Performance

Monthly Reports for Governance

MONTHLY REPORT FOR DIVISION GENERATION (APRIL 2013)



LAGGING

Status	Current Month	Change Current Month / M1	Month - 1	Change M1 / M2	Month - 2	Change M2 / M3	Month - 3
■	0	N/C	0	N/C	0	N/C	0
▲	2	-5 ↓	7	4 ↑	3	2 ↑	1
●	52	16 ↑	36	-26 ↓	62	31 ↑	31
Total	54	11 ↑	43	-22 ↓	65	33 ↑	32

LEADING

Status	Current Month	Change Current Month / M1	Month - 1	Change M1 / M2	Month - 2	Change M2 / M3	Month - 3
■	69	-7 ↓	76	5 ↑	71	-12 ↓	83
▲	30	-7 ↓	37	-1 ↓	38	3 ↑	36
●	231	-15 ↓	246	53 ↑	193	-12 ↓	205
+	424	-2 ↓	426	3 ↑	423	-3 ↓	426
■	0	N/C	0	N/C	0	N/C	0
Added/Deleted	0	-4 ↓	4	4 ↑	0	N/C	0
% of Blue & Green	86.87%	1.26 ↑	85.61%	0.64 ↑	84.97%	0.72 ↑	84.25%
Total	754	-31 ↓	785	80 ↑	725	-24 ↓	749

The collage features four overlapping dashboards from Iberdrola:

- Longannet - Dashboard:** Shows three circular gauges for Week 1, Week 2, and Week 3, along with a data table.
- Longannet - Top Risks:** A table listing various risks with columns for risk name, priority, and status.
- Longannet - Incidents:** A table titled "May 2013 Significant and above inc..." listing incident dates, numbers, and responsible departments.
- Longannet - Actions:** A line graph titled "Open Actions Due Date" showing the number of open actions over time.

- Leading Indicators Performance (KPI Dashboard)
- Incident Reviews (Cintellate)
- Risks
- Action Tracking



12. LOSS ESTIMATES

12.1. Maximum Foreseeable Loss (MFL)

The largest financial loss (property damage plus business interruption when coverage is provided) within one (fire) division that may be expected to result from a single fire when this is the governing factor, or another insured peril, with fire protection impaired and the control of the fire is mainly dependent on physical barriers or separations, and delayed manual fire fighting by public and/or private fire brigades.

MFL Description – Property/BI:

Combustion turbine fire/explosion causing major damage to all equipment and turbine hall structure.

MFL Description – Machinery breakdown/BI:

GT Overspeed – total loss steam turbine/generator with consequential damage. The combustion turbines are not arranged to operate in open cycle

	MFL	Business Interruption
Property	150 million GBP	20 months
Machinery Breakdown	38 million GBP	18 months

12.2. Probable Maximum Loss (PML)

The largest financial loss (property damage plus business interruption when coverage is provided) within one fire division caused by an insured peril, with private and public protection systems in service and manual fire fighting unimpaired.

MFL Event Description - Machinery Breakdown/BI:
Overspeed. Total loss steam turbine/generator with consequential damage to adjacent units

Property Damage: Clear up and re-engineering £5m Replacement parts £45m for main unit plus £22.5m for repairs to adjacent units. Total GBP £72.5m.

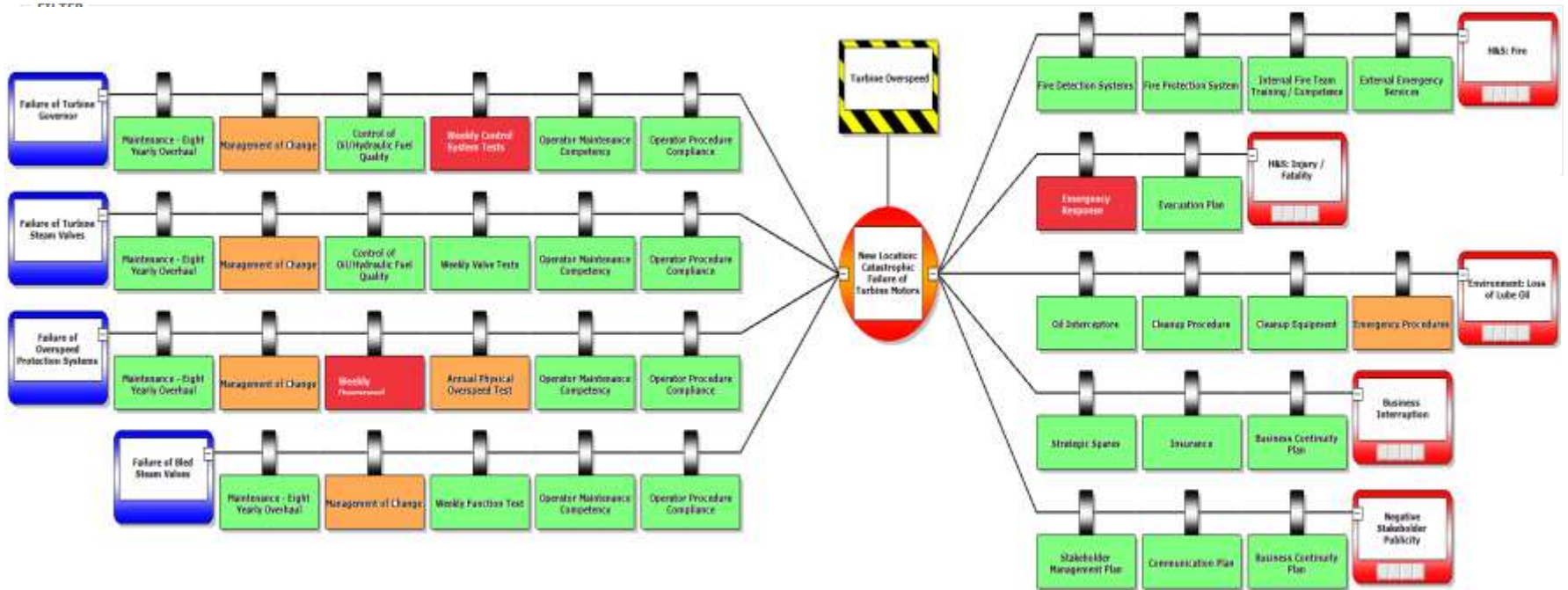
Business Interruption: Adjacent units out of commission for 60 days; Main unit out of commission for 420 days.

Typical Hazard Report

Turbine Overspeed...

Hazard Report

Matrix Manual Data Reports User Preferences Links Help Admin Print



Key success factors

- Buy in and commitment from senior management
- Involvement of staff in designing, developing and embedding
- Clear definition of each KPI is essential
- Common processes across all business units
- Delivery of sustainable solution can only be achieved using integrated IT platforms – i.e. automatic generation of KPIs

