



Engineers India Limited



**EMBRACING PSM AND
DEVELOPING KEY PERFORMANCE
INDICATORS FOR SAFE, SMOOTH
& UNINTERRUPTED OPERATIONS**



Delivering Excellence Through People

December 16, 2024

Slide for Agenda Items

PROCESS SAFETY V/S OCCUPATIONAL SAFETY

PROCESS SAFETY CORE PRINCIPLES

DEVELOPMENT AND IMPLEMENTATION OF KPI

REGULATORY BODY ROLE IN DEVELOPMENT & MONITORING OF KPI

PROCESS SAFETY V/S OCCUPATIONAL SAFETY



VS



PROCESS SAFETY V/S OCCUPATIONAL SAFETY

Process Safety

- A disciplined framework for managing the integrity of hazardous operating systems and processes by applying good design principles, engineering, and operating and maintenance practices
- Associated exclusively with loss of containment scenario where hazardous material releases accidentally
- Impacts are more severe and affect society, environment and economy
- Regulatory or statutory requirement is not well defined for management of process safety in most of the country
- Followed as per API RP754, CCPS Guideline, IOGP Report 456, OECD Guiding Principles etc.
- It has 20 elements
- Event shall lead to production interruption in most of the scenario. Hence management gets distracted from routine business operation



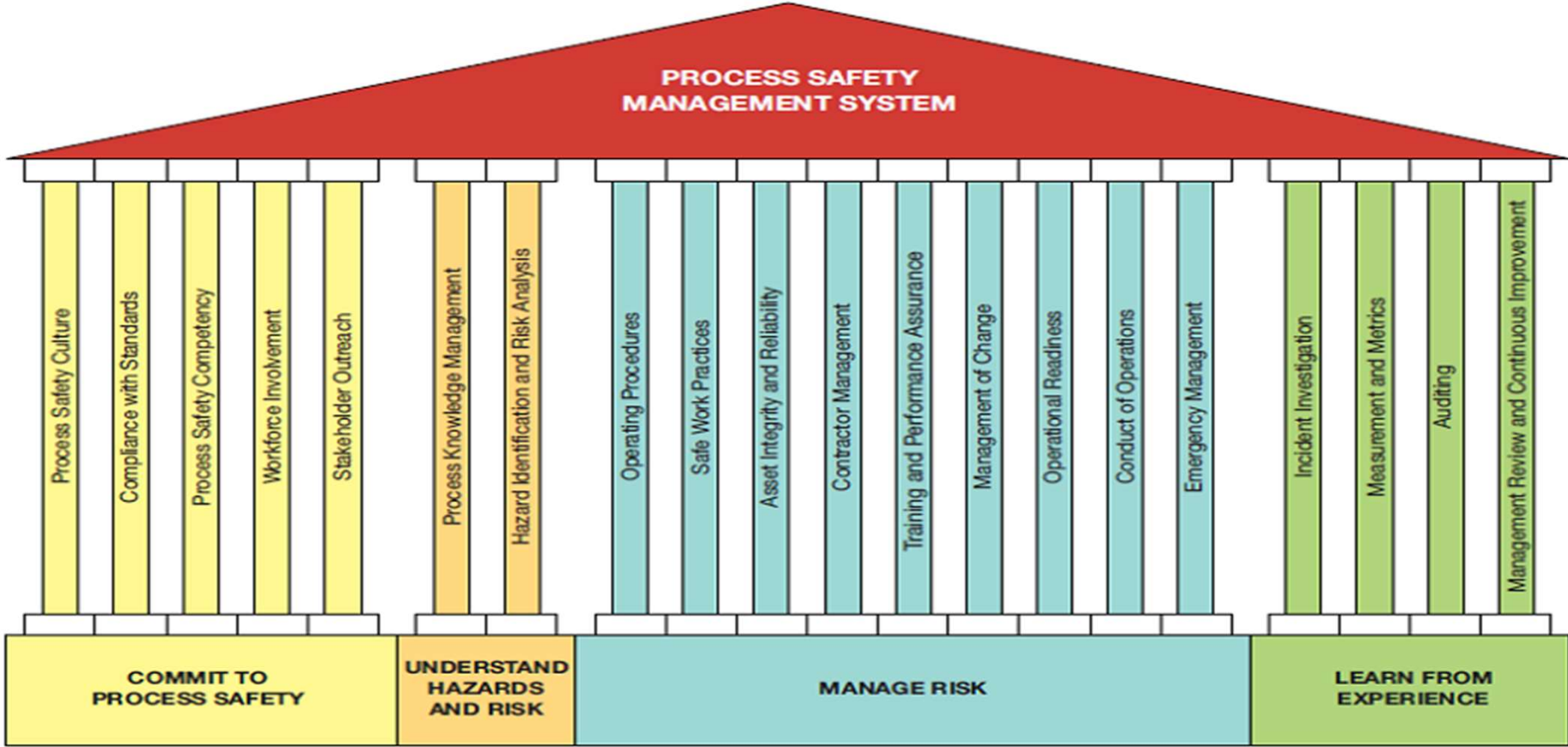
VS



Occupational Safety

- A scientific approach for anticipating, recognizing, & evaluating hazards arising from workplace and its control for well being of workers/employees
- Associated with chronic as well as acute release of hazardous material
- Affect primarily workers involved with hazardous activities or people present in hazardous facility
- Regulatory or statutory requirement is well defined for occupational safety in all country
- Complied as per act, rules and regulation prescribed by local authority
- It has 14 elements as per OSHA
- Event does not lead to production interruption in most of the scenario. Hence management does not get distracted

PROCESS SAFETY CORE PRINCIPLES



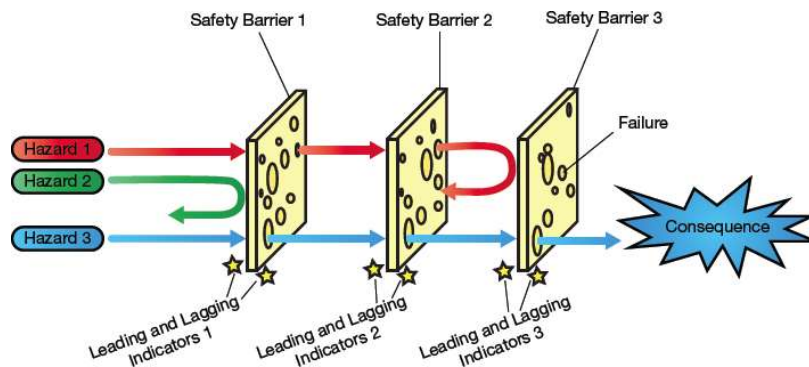
DEVELOPMENT AND IMPLEMENTATION OF KPI



- The PSM Performance or effectiveness can be monitored by selecting appropriate KPI. These KPI are required to be monitored on continuous basis by organization to enhance safety and reduce likelihood of a major accident.
- KPI shall be SMART i.e. Specific, Measurable, Achievable, Relevant & Time Bound so that PSM system performance can be monitored effectively
- KPI shall be defined based on either safety barrier approach or tier approach
- KPI shall be defined after consultation with all employees/workers who are involved for achieving target set as per KPI
- KPI shall be site specific or industry specific
- KPI shall be developed considering organisation HSE policy
- KPI shall be developed based on internal and external stakeholder expectation
- KPI shall be aligned with industry standard

DEVELOPMENT AND IMPLEMENTATION OF KPI

Barrier Based Approach



- Defined by UK HSE in HSG 254
- It is based on Swiss cheese Model which shows how a series of safety barriers can break down and allow hazards to propagate to loss events

Tier Based Approach

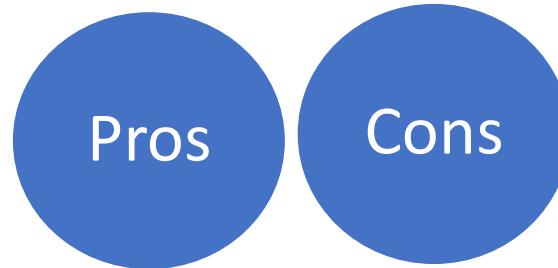


- Defined by CCPS & API RP 754 and followed by IOGP and European Chemical Industry Council

DEVELOPMENT AND IMPLEMENTATION OF KPI



Pros & Cons of Barrier based and Tier based approach



DEVELOPMENT AND IMPLEMENTATION OF KPI



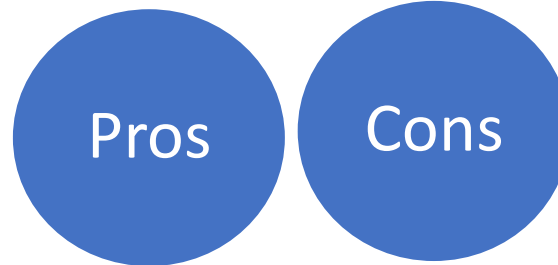
Pros & Cons of Barrier based and Tier based approach

Barrier Based Approach

The performance indicators are typically site specific i.e. tailor made so it provides more insight on plant facility

Tier Based Approach

The performance indicators are generic so it can be benchmarked across different sites or different organization having similar type of facility



DEVELOPMENT AND IMPLEMENTATION OF KPI



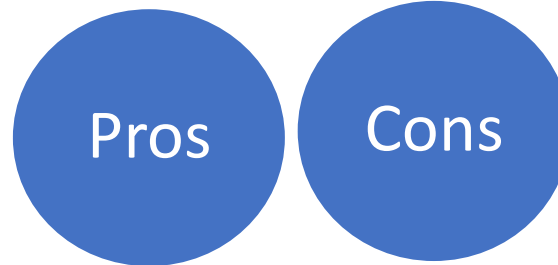
Pros & Cons of Barrier based and Tier based approach

Barrier Based Approach

The performance indicators are typically site specific i.e. tailor made so it provides more insight on plant facility

Tier Based Approach

The performance indicators are generic so it can be benchmarked across different sites or different organization having similar type of facility



Barrier Based Approach

- Difficult to benchmark unless facilities are identical and requires more effort to identify the hazards and safeguards

Tier Based Approach

- Generic performance indicator may not cover critical safety aspects of a facility

DEVELOPMENT AND IMPLEMENTATION OF KPI



SUGGESTED KPI FOR PSM PERFORMANCE MONITORING

- No of Employee/worker reported to first aid center

- No of Fire/Explosion/Toxic release incident reported to regulatory authority where emergency response plan has been activated and public evacuation necessitated in a year

- No of events where hazardous material has been released (exceeding threshold qty) to atmosphere through PSV or other emergency device



DEVELOPMENT AND IMPLEMENTATION OF KPI

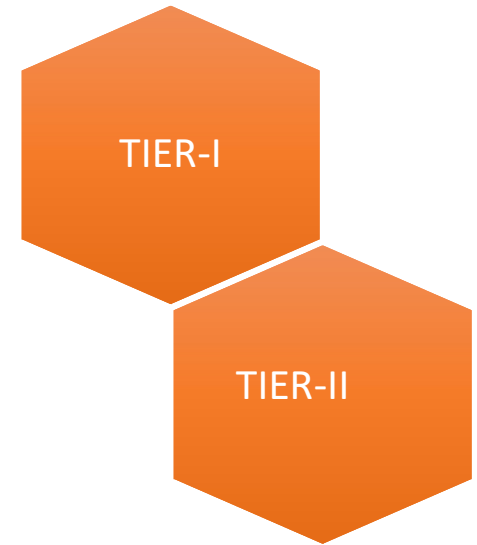


SUGGESTED KPI FOR PSM PERFORMANCE MONITORING

- No of Fatality in a year or Loss time injury per year

- No of Fire/Explosion/Toxic release incident reported to regulatory authority where no emergency response plan has been activated and public evacuation necessitated in a year

- No of events where hazardous material has been released (exceeding threshold qty) to atmosphere through PSV or other emergency device



DEVELOPMENT AND IMPLEMENTATION OF KPI

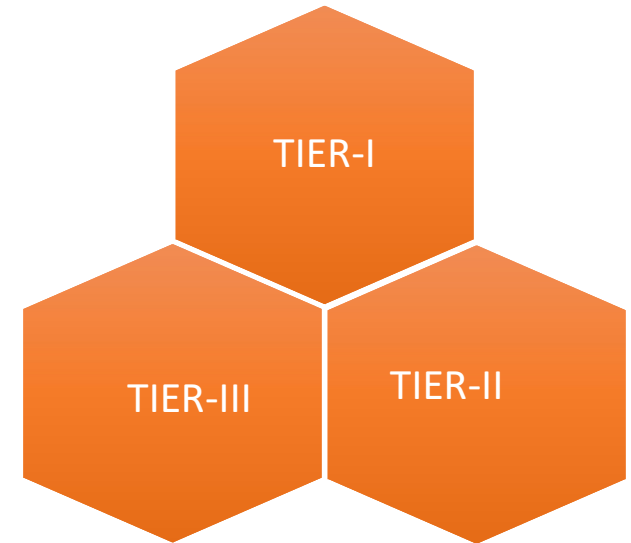


SUGGESTED KPI FOR PSM PERFORMANCE MONITORING

- No of demand on safety instrument system in a year for each plant/facility

- No of times PSV activation not counted in Tier-1 or Tier-2 events i.e. PSV released to flare or other closed blow down system

- LOPC events not counted as Tier-1 or 2 events

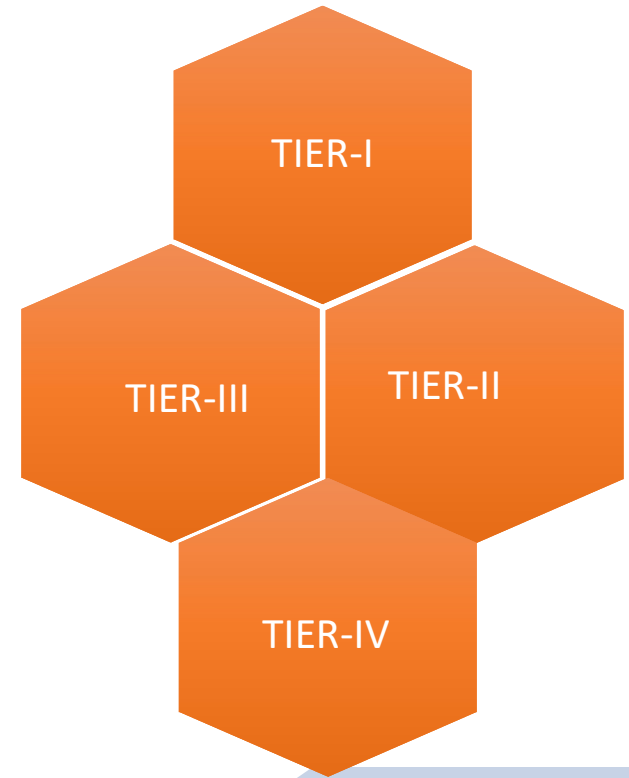


DEVELOPMENT AND IMPLEMENTATION OF KPI



SUGGESTED KPI FOR PSM PERFORMANCE MONITORING

- No of Process Hazard Analysis completed against planned or scheduled PHA
- % Of action items emerged from PHA/Safety Audit/Incident Investigation closed
- No of Employees/Workers imparted training on PSM against planned
- No of SOP/Operating Procedure/Maintenance Procedure Reviewed/Updated

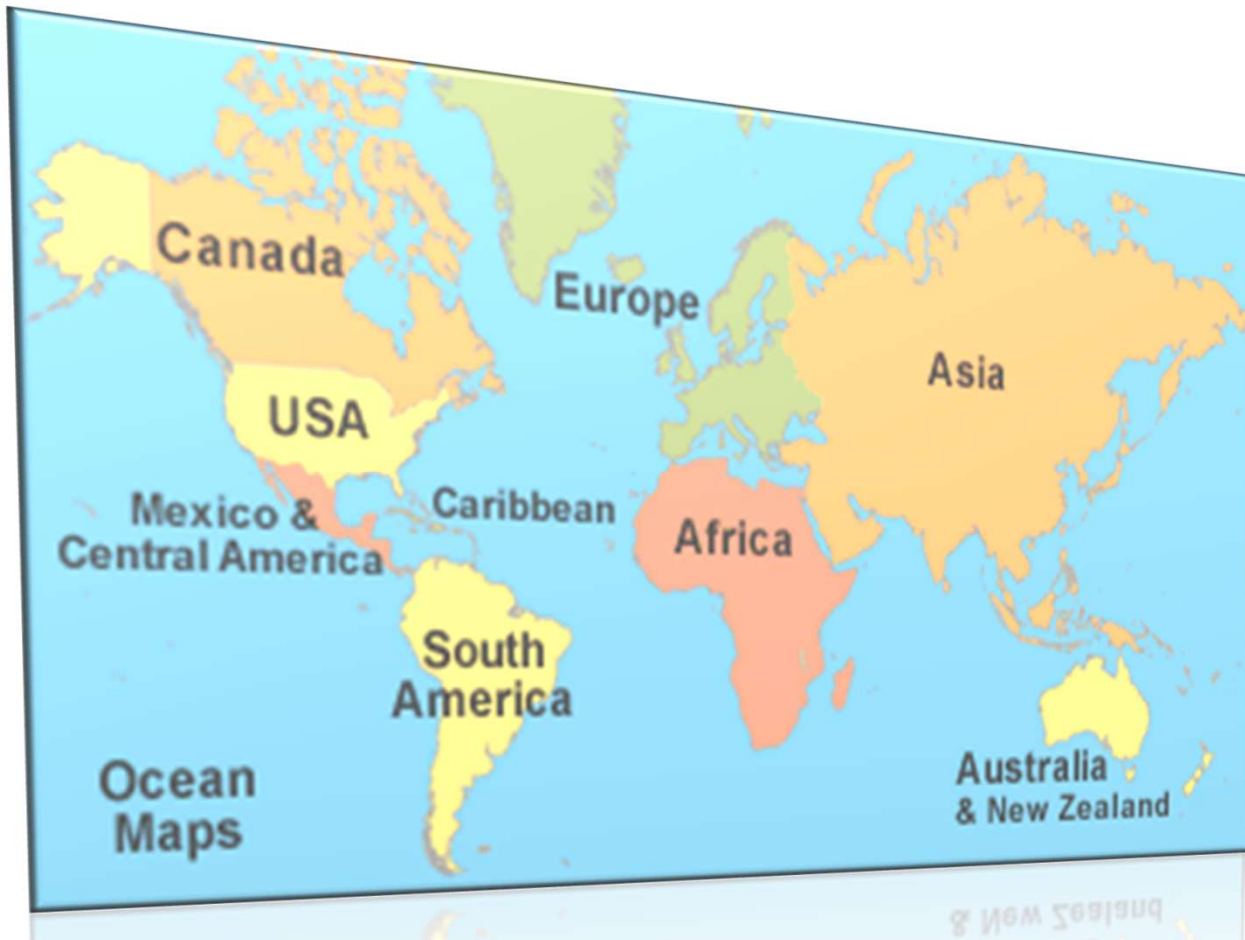


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DEVELOPMENT AND IMPLEMENTATION OF KPI

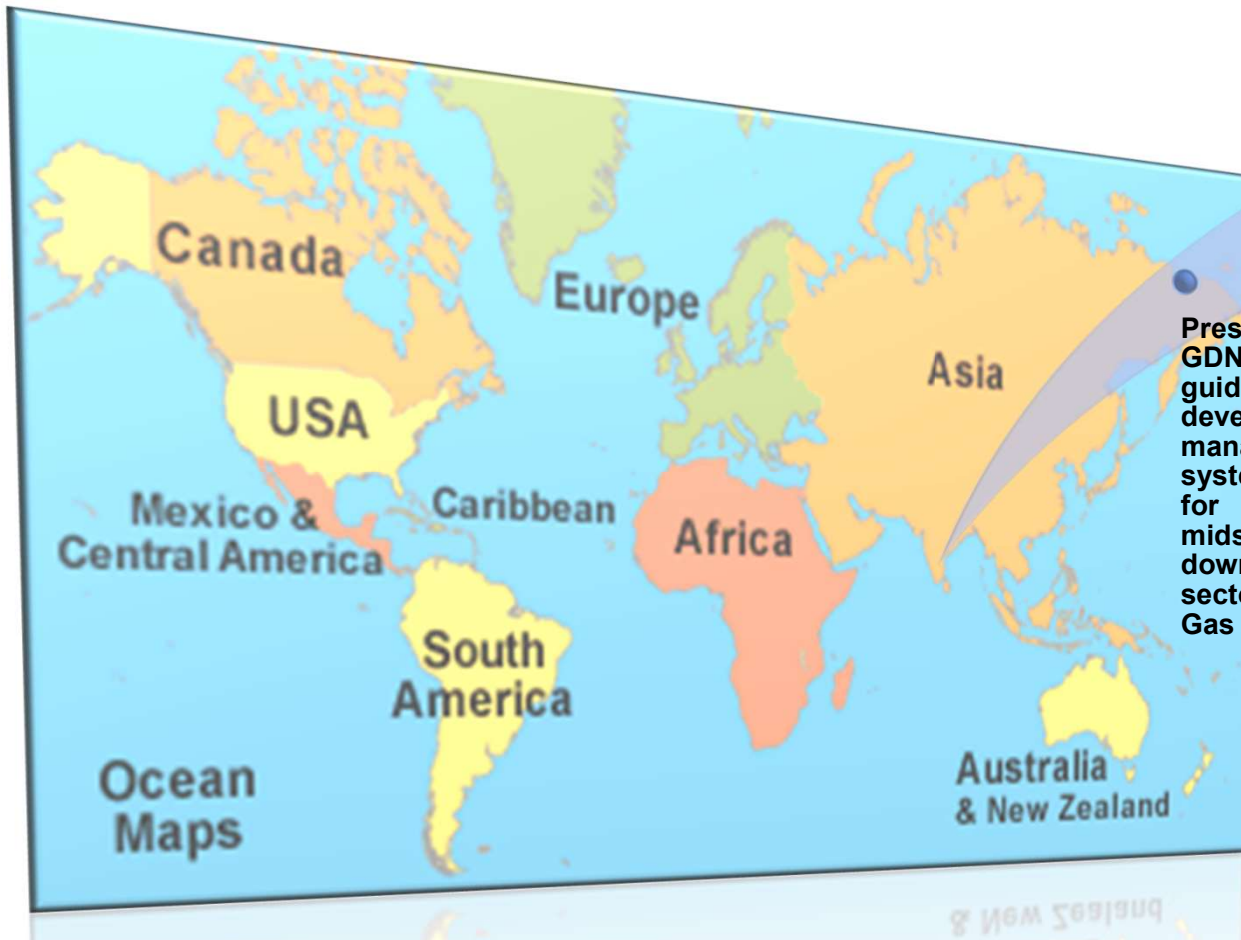


REGULATORY BODY ROLE IN DEVELOPMENT & MONITORING OF KPI



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REGULATORY BODY ROLE IN DEVELOPMENT & MONITORING OF KPI

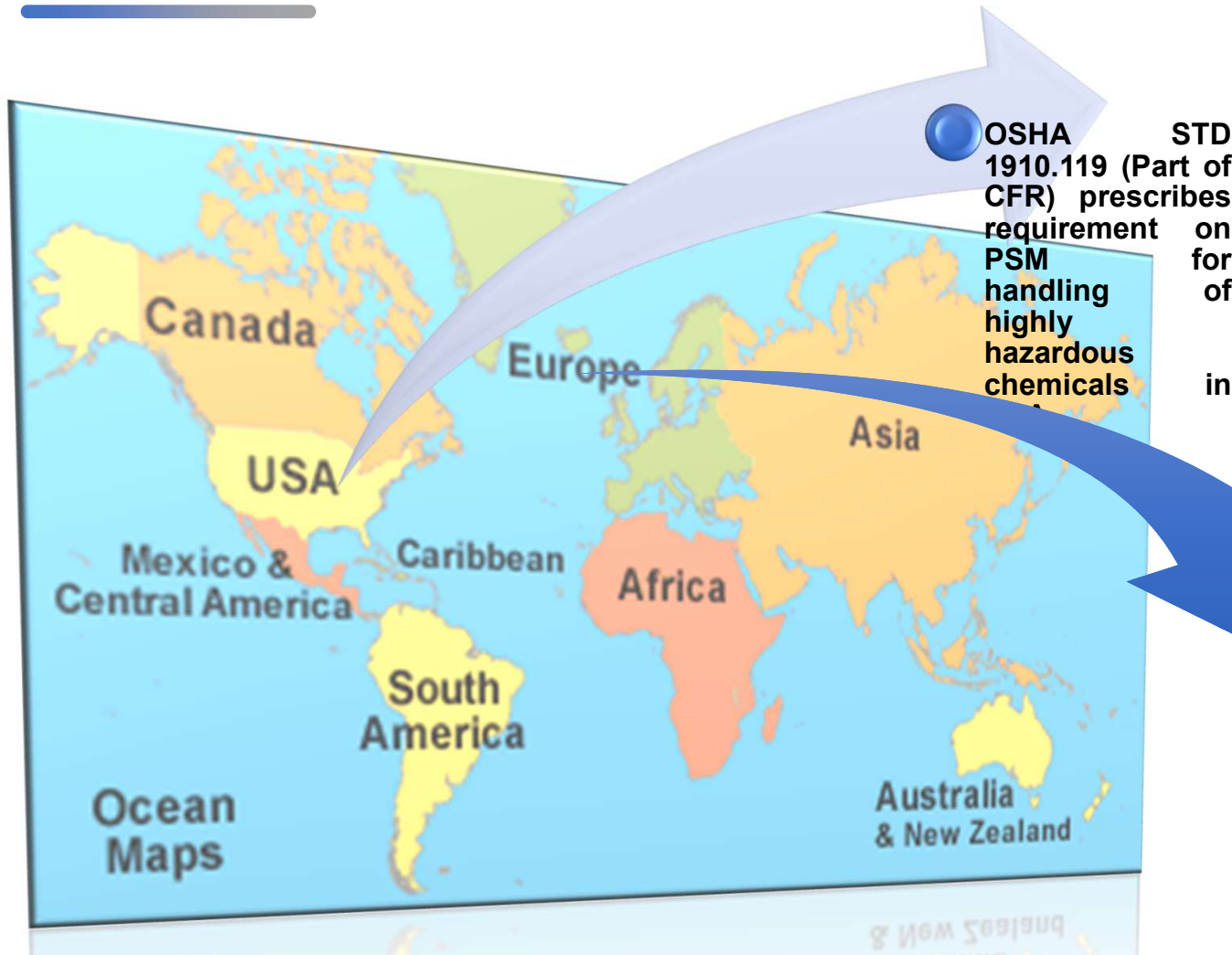


Presently OISD-GDN-206 provides guideline for developing safety management system applicable for upstream, midstream and downstream sectors of Oil & Gas industry.

PNGRB T4S for refinery and gas processing plants published in year 2023 covers PSM and its elements as part of safety management system

PNGRB has constituted high level expert committee in year 2024 for review of extant safety framework for downstream oil & gas sector and committee recommended that existing regulations of PNGRB should include PSM elements for carrying out effective process safety audit

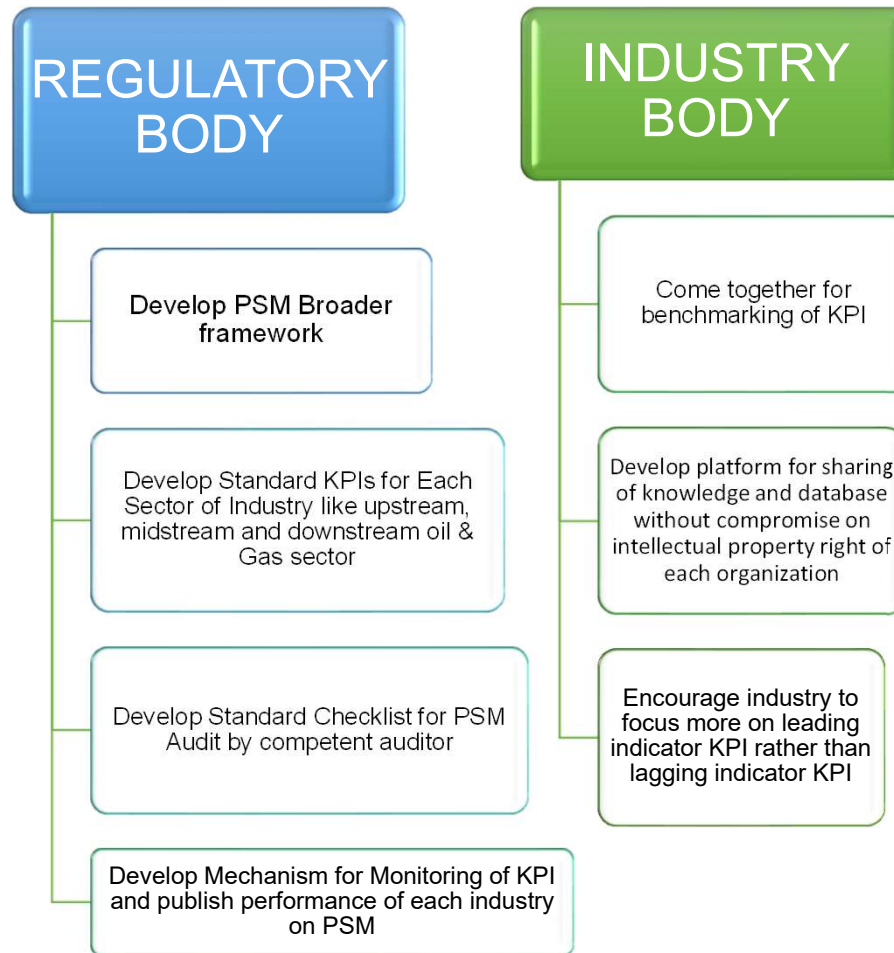
REGULATORY BODY ROLE IN DEVELOPMENT & MONITORING OF KPI



OSHA STD 1910.119 (Part of CFR) prescribes requirement on PSM handling highly hazardous chemicals in

UK HSE (Great Britain Regulator) prescribes guideline HSG 254 for developing process safety indicators for hazardous organization in UK

REGULATORY BODY ROLE IN DEVELOPING AND MONITORING KPI





THANK YOU