12th Chemical Process Safety Sharing (CPSS)

How to manage PSI for the PHA effectiveness

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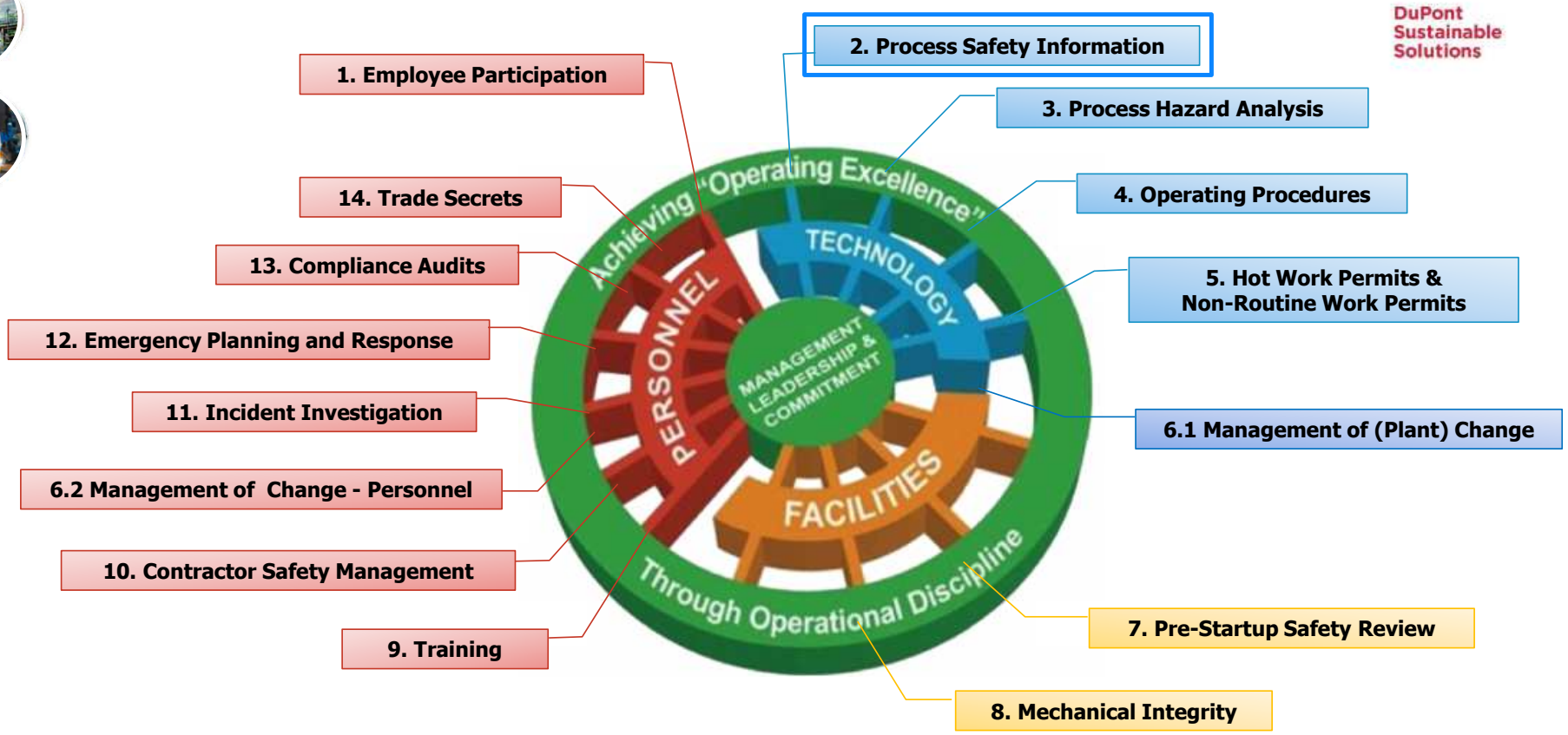
PTT Global Chemical Public Company Limited

Contents

14 PSM Elements

What is PSI?
Why PSI important for PHA?

DuPont Sustainable Solutions



What is PSI?

PSI definition in OSHA (PSM IEAT)

- Information on the **hazards of the highly hazardous chemicals**
- Information on the **technology** of the process
- Information on the **equipment** in the process

Process Safety Information 7

Employers must complete a compilation of written process safety information before conducting any process hazard analysis required by the standard. The compilation of written process safety information, completed under the same schedule required for process hazard analyses, will help the employer and the employees involved in operating the process to identify and understand the hazards posed by those processes involving highly hazardous chemicals. Process safety information must include information on the hazards of the highly hazardous chemicals used or produced by the process, information on the technology of the process, and information on the equipment in the process.

Information on the hazards of the highly hazardous chemicals in the process shall consist of at least the following:

- Toxicity,
- Permissible exposure limits,
- Physical data,
- Reactivity data,
- Corrosivity data, and
- Thermal and chemical stability data, and hazardous effects of inadvertent mixing of different materials.

Information on the technology of the process must include at least the following:

- A block flow diagram or simplified process flow diagram,
- Process chemistry,
- Maximum intended inventory,
- Safe upper and lower limits for such items as temperatures, pressures, flows or compositions, and
- An evaluation of the consequences of deviations, including those affecting the safety and health of employees.

Where the original technical information no longer exists, such information may be developed in conjunction with the process hazard analysis in sufficient detail to support the analysis.

Information on the equipment in the process must include the following:

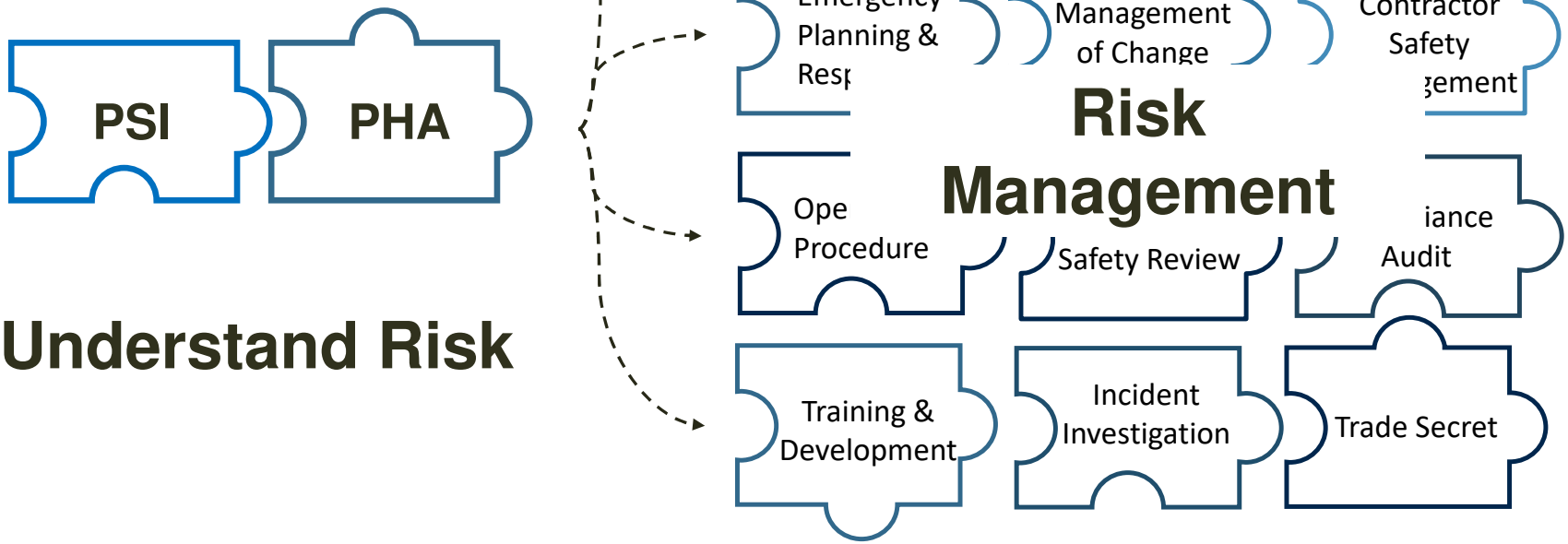
- Materials of construction,
- Piping and instrument diagrams (P&IDs),
- Electrical classification,
- Relief system design and design basis,
- Ventilation system design,
- Design codes and standards employed,
- Material and energy balances for processes built after May 26, 1992, and
- Safety systems (e.g., interlocks, detection, or suppression systems).

The employer shall document that equipment complies with recognized and generally accepted good engineering practices. For existing equipment designed and constructed in accordance with codes, standards, or practices that are no longer in general use, the employer shall determine and document that the equipment is designed, maintained, inspected, tested, and operated in a safe manner.

The compilation of the above described process safety information provides the basis for identifying and understanding the hazards of a process and is necessary in developing the process hazard analysis and may be necessary for complying with other provisions of PSM such as management of change and incident investigations.

PSI relate to other PSM Elements

What is PSI?
Why PSI important for PHA?



Incident related to PSI

T2 Laboratories, Inc. Runaway Reaction

On December 19, 2007, a powerful explosion and subsequent chemical fire

- killed four employees
- destroyed T2 Laboratories, Inc. (T2),
- Injured 32, including four employees and 28 members of the public

T2 did not recognize the runaway reaction hazard associated with the MCMT it was producing.

Full report by CSB: SEPTEMBER 2009

PSI Weak Signal

- Incompleteness of PSI Documents
- Inaccurate of PSI documents
- Inconsistent of field implementation and PSI documents
- Out-of-date of PSI Documents (related to MoC process)

Contents

- What is PSI? and Why PSI important for PHA?
  - 14 PSM Elements
  - What is PSI?
  - PSI relates to other PSM Elements
  - Risk-Based Approach to Operation Risk Management
  - Incident related to PSI
  - PSI Weak Signal
- **How to implement PSI management system in GC**
  - Develop PSI Corporate Procedure
  - Implement and Roll-out
  - Sustain
- Linkage between PSI and PHA

How to implement PSI management system in GC

2019 | 2020 | 2021

Develop PSI Corporate Procedure

- ❑ **Draft PSI Corporate Procedure**
  - **Set up team**
  - **Role & Responsibility**
  - Workflow
  - **Related KPI**
- ❑ **PSI Index & Heat Map**
  - **4 PSI Categories**
  - **PSI Verification (Heat Map)**
  - Chemical Interaction Matrix
- ❑ Trial with Pilot Plant
- ❑ Endorse PSI Corporate Procedure

Implement & Roll-out

Implement

- ❑ PSI Kick-off
- ❑ PSI Training to PSI working Team
- ❑ CIM Workshop
- ❑ **PSI Index & Heat Map Review**
- ❑ **PSI Training and communication to Organization**

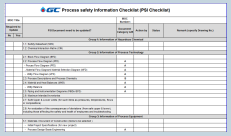
Roll-out

- Wave 1
  - Refinery
  - Olefins
- Wave 2
  - Aromatics
  - EO
- Wave 3
  - Polymers
  - Phenol
- Wave 4
  - Utilities

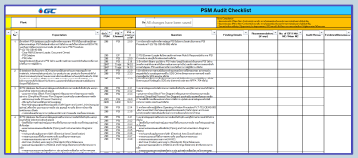
Sustain

- ❑ **PSI Element Review**

- ❑ **PSI Checklist in MoC Process**



- ❑ **PSI Audit -Yearly PSM Internal Audit**



Develop PSI Corporate Procedure

How to implement PSI management system in GC

2019

Develop PSI Corporate Procedure

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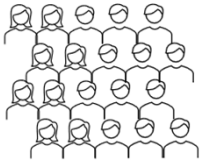
  - **Set up team**
  - **Role & Responsibility**
  - Workflow
  - **Related KPI**

Set up team

PSI Corporate Team	PSI Element Leader (20 Plant Technical)	Pilot Plant

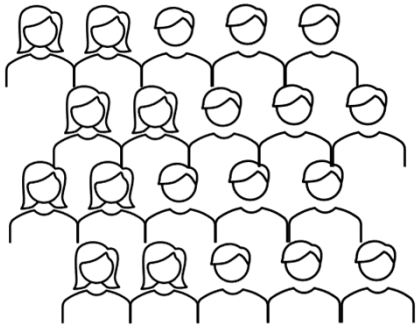


Role & Responsibility

- **Plant PSI Element Leader**
- **PSI Document Owner**
  - Plant Technical
  - Maintenance
  - SHE
- **Document Keeper**
- **User**

Role & Responsibility

Plant PSI Element Leader



Plant PSI Element Leader, assigned to Plant Technical Division Manager

- **Ensure employees are aware and understand the requirements** outlined in this procedure
- **Work with document owner(s)** to ensure PSI Document are completeness, up-to-date, accessible and control by governing procedures/systems
- **Monitoring health** of PSI Document/system and **raise concern** to Plant PSM Committee
- **Feedback concern issues** to PSI System Owner for improve PSI system
- **Focal point for PSM IEAT** Internal/External audit

Role & Responsibility

PSI Document Owner

Plant's Division Managers have been assigned to act as the PSI Document Owners, as follows:

1. **Plant SHE Area Division Manager**
2. **Plant Technical Division Manager**
3. **Area Maintenance Division Manager**

- **Complete and keep a PSI Index** showing the Document Owners and locations.
- **Found any document is incorrect or concern, Document Owner shall inform PSI element leader** and coordinate with related discipline (s) to collect, review and adjudge for updating PSI Document before subsequently submit to Document Keeper(s)
- **Ensure the PSI Documents** have been **frequently reviewed by governing procedures/systems**.

Role & Responsibility

Document Keeper

- **Maintain PSI Documents** collected by various individual(s) and/or department(s) within the Document Keeping Systems
- **Distribute and communicate the updated PSI Documents** to all affected Document Users thru the Document Keeping Systems
- **Ensure** maintaining **up-to-date PSI Documents and removing all out-of-date PSI Documents** from the Document Keeping Systems
- **Generate a summary of status** of engineering documents being updated, make available on Live Link and communicate to PSI Element Leader
- **Coordinate** with Users, Plant PSI Element Leader and Document Owner to maintain, and **improve the Document Keeping Systems**, based on the existing workflows

Develop PSI Corporate Procedure

2019

Develop PSI Corporate Procedure

- **Draft PSI Corporate Procedure**
  - Set up team
  - Role & Responsibility
  - Workflow
  - **Related KPI**

Related KPI

KPI Measure	Description / Calculation	Target (unit)
PSI updated as per change in time	No. of MOC which PSI Documents are not updated in time as per governing procedure/system specific	0 case
No incident related to PSI document	No. of incident that related to inaccuracy of PSI document	0 case

Develop PSI Corporate Procedure

How to implement PSI management system in GC

2019

Develop PSI Corporate Procedure

- **PSI Index & Heat Map**
  - **4 PSI Categories**
  - PSI Verification (Heat Map)
  - Chemical Interaction Matrix

4 PSI Categories

Information of hazardous chemicals

- Safety Datasheet (SDS)
- Chemical Interaction Matrix (CIM)

Information of Process Technologies

- Process Flow Diagram
- Piping and Instrumentation Diagrams (P&IDs)

Information of Process Equipment

- Equipment Datasheets
- Hazardous Area Classification
- RAGAGEP

GC Specific Requirement

- Plot Plan / Plant Layout
- Process Hazard Analysis (PHA) Reports

PSI Index

How to implement PSI management system in GC

PSI Categories | Name of Document | Location | Control Procedure | Document Owner | Access Link

Group	PSI Document	Master File Location*	Governing Procedure	Document owner	Access Link
1	**Information of Hazardous Chemical**				
1.1	Safety Datasheet (SDS)	DCC (SDS Online)	- P-(Q-EH-OH)-003 Hazard Communication Procedure - P-(Q-QM)-OEMS-005 New Process Consumable Materials/ Chemicals Registration - P-(TP-PM)-OEMS-002 Management of Change Procedure	SHE area	SDS Online
1.2	Chemical Interaction Matrix (CIM)	Share Drive	- P-(TP-PM)-OEMS-002 Management of Change Procedure	SHE area	ARO2 Chemical Interaction Matrix (CIM)
2	**Information of Process Technology**				
2.1	Block Flow Diagram (BFD)	Share Drive	- P-(TP-PM)-OEMS-002 Management of Change Procedure	Plant Tech.	Block flow diagram
2.2	Process Flow Diagram (PFD) & Utility Flow Diagram	DCC (EDMS)	- P-(TP-PM)-OEMS-003Plant Engineering Document Control Procedure	Plant Tech	PFD/UFD
2.3	Process Descriptions and Process Chemistry	Share Drive	- P-(TP-PM)-OEMS-002 Management of Change Procedure	Plant Tech	UOP Process Description ARDB Process Description Utility and ETP Manual
2.4	Material and Heat Balances (MHB)	Share Drive	- P-(TP-PM)-OEMS-002 Management of Change Procedure	Plant Tech	Original EDI ARDB
2.5	Piping and Instrumentation Diagrams (P&IDs)	DCC (EDMS)	- P-(TP-PM)-OEMS-003Plant Engineering Document Control Procedure	Plant Tech	EFD
2.6	Maximum Intended Inventories	Share drive	- P-(TP-PM)-OEMS-002 Management of Change Procedure	Plant Tech	Maximum Intended Inventories
2.7	Safe Upper & Lower Limits (for such items as pressures, temperatures, flows or compositions)	Share Drive	- P-(T-TE)-OEMS-003 Operating Window Procedure	Plant Tech	DCM (Operating Window A-P2)
2.8	An evaluation of the consequences of deviations (from safe upper & lower), including those affecting the safety and health of employees and troubleshooting	Share Drive	- P-(T-TE)-OEMS-003 Operating Window Procedure	Plant Tech	Consequence of operating window

Develop PSI Corporate Procedure

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2019

Develop PSI Corporate Procedure

- **PSI Index & Heat Map**
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PSI Verification (Heat Map)

- **Completeness of PSI**
- **Centralized location**
- **Availability to Users**
- **Control Process**
- **Clear Ownership**

PSI Index & Heat Map

How to implement PSI management system in GC

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2.5	Piping and Instrumentation Diagrams (P&IDs)	DCC (EDMS)	- P-(TP-PM)-OEMS-003Plant Engineering Document Control Procedure	Plant Tech	EFD
2.6	Maximum Intended Inventories	Share drive	- P-(TP-PM)-OEMS-002 Management of Change Procedure	Plant Tech	Maximum Intended Inventories
2.7	Safe Upper & Lower Limits (for such items as pressures, temperatures, flows or compositions)	Share Drive	- P-(T-TE)-OEMS-003 Operating Window Procedure	Plant Tech	DCM (Operating Window A-P2)
2.8	An evaluation of the consequences of deviations (from safe upper & lower), including those affecting the safety and health of employees and troubleshooting	Share Drive	- P-(T-TE)-OEMS-003 Operating Window Procedure	Plant Tech	Consequence of operating window
3	**Information of Process Equipment**				
3.1	**Materials of Construction** - Initial Project Specifications - Equipment Design Documents	Share Drive (EDMS)	- P-(TP-PM)-OEMS-003Plant Engineering Document Control Procedure	Project (TP-PP-PB)	Engineering Specification (Original) (Share drive TP-PP-PB) Original Engineering Standard (Livelink)
3.2	Hazadous Area Classification (HAC), Electrical Classification	DCC (EDMS)	- P-(TP-PM)-OEMS-003Plant Engineering Document Control Procedure	Maintenance	HAC
3.3	Relief System Design and Design Basis	DCC (EDMS)	- P-(TP-PM)-OEMS-003Plant Engineering Document Control Procedure	Plant Tech	PSV, Flare (ARDB) Volume - 28 (Reformer) PSV Calculation Sheet (Heat Integration)
3.4	Ventilation System Design (and HVAC) for CCB and Process Building	DCC (EDMS)	- P-(TP-PM)-OEMS-003Plant Engineering Document Control Procedure	Maintenance	HVAC Drawing HVAC System

Completeness of PSI	Centralised location	Accessibility / Availability to Users	Clear Ownership	Control Process to keep it live

ครบถ้วนสมบรูณ์

ขาดบางส่วน

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How to implement PSI management system in GC

2019 → **Develop PSI Corporate Procedure**

- ❑ **Draft PSI Corporate Procedure**
  - **Set up team**
  - **Role & Responsibility**
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  - **Related KPI**
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  - **PSI Verification (Heat Map)**
  - Chemical Interaction Matrix
- ❑ Trial with Pilot Plant
- ❑ Endorse PSI Corporate Procedure

2020 → **Implement & Roll-out**

Implement

- ❑ PSI Kick-off
- ❑ PSI Training to PSI working Team
- ❑ CIM Workshop
- ❑ **PSI Index & Heat Map Review**
- ❑ **PSI Training and communication to Organization**

Roll-out

- Wave 1
  - Refinery
  - Olefins
- Wave 2
  - Aromatics
  - EO
- Wave 3
  - Polymers
  - Phenol
- Wave 4
  - Utilities

Implement & Roll-out

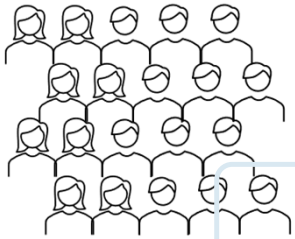
How to implement PSI management system in GC

2019 — **Develop PSI Corporate Procedure**

2020 — **Implement & Roll-out**

PSI Corporate Team

PSI Element Leader (20 Plant Technical)



PSI Corporate Team

PSI Element Leader

- **Document Owner**
  - Plant Technical
  - Maintenance
  - SHE
- **Document Keeper**
- **User**

Implement & Roll-out

How to implement PSI management system in GC

2020

Implement

- **PSI Kick-off**
- **PSI Training to PSI working Team**
- **CIM Workshop**
- **PSI Index & Heat Map Review**
- **PSI Training to organization**

Roll-out 7 BU, 20 Plants

Wave 1
- Refinery
- Olefins

Wave 2
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Implement & Roll-out

How to implement PSI management system in GC

PSI Index & Heat Map Review

Initial PSI Heat Map

Group	PSI Document	Completeness of PSI	Centralised location	Assessibility / Availability to Users	Clear Ownership	Control Process to keep it live
1	**Information of Hazardous Chemical**					
1.1	Safety Datasheet (SDS)					
1.2	Chemical Interaction Matrix (CIM)					
2	**Information of Process Technology**					
2.1	Block Flow Diagram (BFD)					
2.2	Process Flow Diagram (PFD) & Utility Flow Diagram					
2.3	Process Descriptions and Process Chemistry					
2.4	Material and Heat Balances (MHB)					
2.5	Piping and Instrumentation Diagrams (P&IDs)					
2.6	Maximum Intended Inventories					
2..7	Safe Upper & Lower Limits (for such items as pressures, temperatures, flows or compositions)					
2.8	An evaluation of the consequences of deviations (from safe upper & lower), including those affecting the safety and health of employees and troubleshooting					
3	**Information of Process Equipment**					
3.1	**Materials of Construction**					
	- Initial Project Specifications					
	- Equipment Design Documents (mechanical)					
	- Equipment Design Documents (electrical)					
	- Equipment Design Documents (Instrument)					
3.2	Hazadous Area Classification (HAC), Electrical Classification					
3.3	Relief System Design and Design Basis					
3.4	Ventilation System Design (and HVAC) for CCB and Process Building					
	- ventilation system design					
	- Positive pressure transmitter					
	- Fire and Gas System and fire alarm for building					
3.5	List of Design Codes and Standards - Applied RAGAGEP (e.g. GCEP, API, NFPA, etc.)					
3.6	Safety Interlocks System, SIL Report (Interlocks, detection or suppression systems)					
3.7	**Fire and Gas Detection & Alarm Systems (including firefighting systems)**					
	- System design of Gas detection system					
	- System design of Fire system					
	- System design of Smoke detection system					

Improvement of PSI Heat Map

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	- Positive pressure transmitter					
	- Fire and Gas System and fire alarm for building					
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3.7	**Fire and Gas Detection & Alarm Systems (including firefighting systems)**					
	- System design of Gas detection system					
	- System design of Fire system					
	- System design of Smoke detection system					

Implement & Roll-out

How to implement PSI management system in GC

PSI Training and communication to Organization

❑ Training Matrix

No.	Training Course	Participants	Method of Training	Sessions	Duration	Outcome
1	PSI communication for Management Level	- SVP	Safety Committee	1	5 Mins	- Leadership Support & Commitment - Overview progress PSI
2	PSI communication for Management Level	- VP Plant, VP MN - DM	Plant PSM Committee	1	10 min	- Leadership Support & Commitment - Understand why PSI
3	PSI Awareness for Day Staff and operation	- Shift A - Shift B - Shift C - Shift D - TE Staffs - OP Day staffs - MN Staffs - SHE Staffs	PSI Training (Via MS Team)	4	90 min	- Understand why PSI - Procedure requirement - PSI Index - R&R - Doc. System - CIM Result - Safe Upper and Lower Limit
4	PSI News	User	email			- Understand why PSI - Procedure requirement - PSI Index - R&R

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2019 | 2020 | 2021

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Implement & Roll-out

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Roll-out

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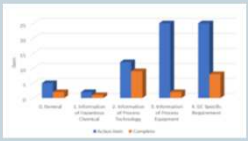
Sustain

- ❑ **PSI Element Review**



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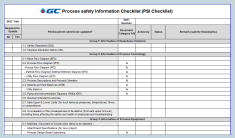

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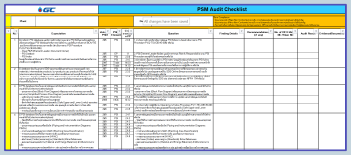
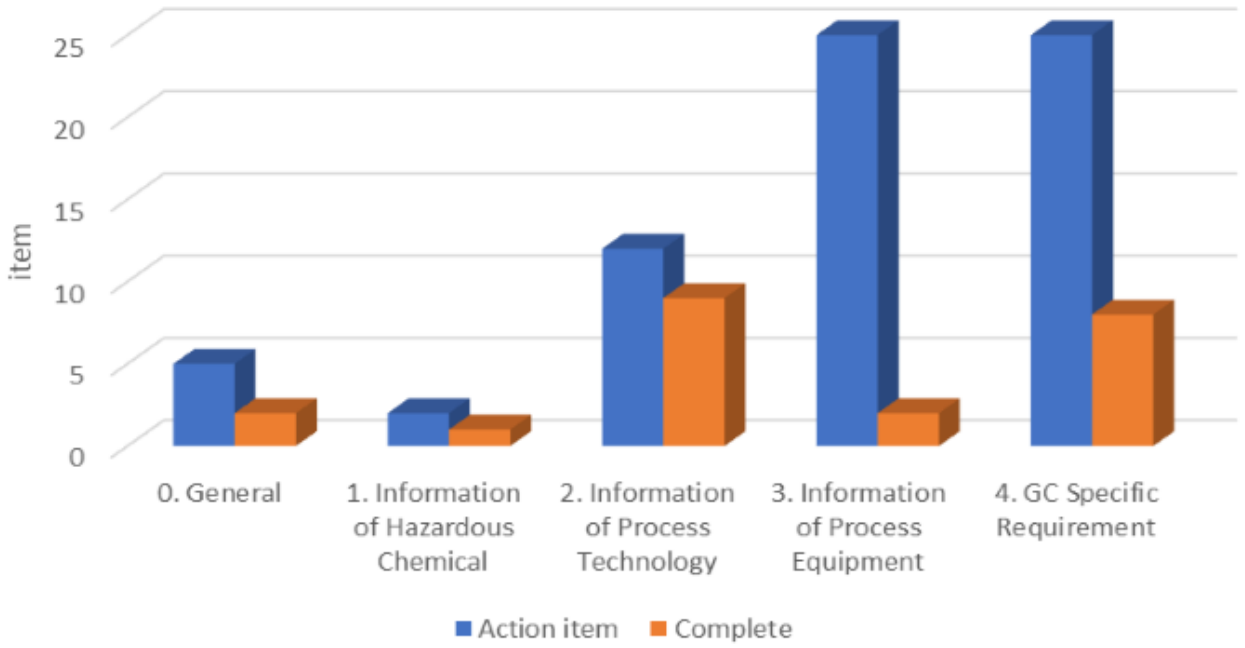


Sustain

PSI Element Review- Action follow-up from PSI Index& Heat Map



Sustain

PSI Checklist in MoC Process

MoC Part 1: Initiation

↓

MoC Part 2: Technical Review ←

↓

MoC Part 3: Field Implementation

↓

MoC Part 4: Sign-off ←

GC Process safety Information Checklist (PSI Checklist)

MOC Title			MOC Number:			
Required to Update		PSI Document need to be updated?	Document Category A/B	Action by	Status	Remark (specify Drawing No.)
No	Yes					
		Group 1: Information of Hazardous Chemical				
		1.1: Safety Datasheet (SDS)				
		1.2: Chemical Interaction Matrix (CIM)				
		Group 2: Information of Process Technology				
		2.1: Block Flow Diagram (BFD)				
		2.2: Process Flow Diagram (PFD)	A			
		- Proces Flow Diagram (PFD)	A			
		- Material Flow Diagram/ Material Selection Diagram (MFD)	A			
		- Utility Flow Diagram (UFD)	A			
		2.3: Process Descriptions and Process Chemistry	B			
		2.4: Material and Heat Balances (MHB)	A			
		- Utility Balance	A			
		2.5: Piping and Instrumentation Diagrams (P&IDs /EFD)	A			
		2.6: Maximum Intended Inventories				
		2.7: Safe Upper & Lower Limits (for such items as pressures, temperatures, flows or compositions)				
		2.8: An evaluation of the consequences of deviations (from safe upper & lower), including those affecting the safety and health of employees and troubleshooting				
		Group 3: Information of Process Equipment				
		3.1: Materials / Document of Construction (items to be selected)				
		- Initial Project Specifications (for new project)				
		- Process Design Basis Engineering	A			

Sustain

PSI Audit- Yearly PSM Internal Audit

No.	Expectation	ข้อบังคับ PSM	PSI Element	หัวข้อตามระบบ e-PP	Question
1	มีการจัดทำ PSI database และมีการบริหารจัดการเอกสาร PSI ที่เป็นลายลักษณ์อักษร เพื่อรวบรวมข้อมูล PSI ให้พร้อมสำหรับการนำไปใช้งาน และใช้ในการวิเคราะห์ BOWTIE และวิเคราะห์อันตรายกระบวนการผลิต (ดำเนินการตาม PSI Procedure P-(Q-TS)-OEMS-006) - Clear R&R (Element Leader, Document Owner) - PSI Databse - PSI Index โดยผู้เกี่ยวข้องเข้าถึงเอกสาร PSI ได้ง่าย และมีการสร้างความตระหนักในอันตรายที่อาจจะเกิดขึ้นจากการปฏิบัติงาน	29/6	PSI	2.0.0	1. ทางโรงงานมีการบริหารจัดการข้อมูล PSI ในโรงงาน โดยดำเนินการตาม PSI Procedure P-(Q-TS)-OEMS-006) หรือไม่
		29/5	EP	1.1	2. PSI Element Leader คือใคร และมีการกำหนด Role & Responsibility ตาม PSI Procedure ของผู้ที่เกี่ยวข้องครบถ้วนหรือไม่
		29/6	PSI	2.0.0	
		29/6	PSI	2.1.0	3. มีการจัดทำ สื่อสาร และใช้งาน PSI Index โดยผู้เกี่ยวข้องเข้าถึงเอกสาร PSI ได้ง่าย (รวมถึงการเข้าถึงเอกสารที่เป็นความลับตามความจำเป็น) และมีการสร้างความตระหนักถึงความสำคัญของ PSI และอันตรายที่อาจจะเกิดขึ้นจากการปฏิบัติงาน หรือไม่
		29/47	Trade	14.0.0	
		29/47	Trade	14.1.0	
2	มี database จัดเก็บเอกสาร SDS ของสารเคมีอันตรายร้ายแรง ครอบคลุมถึง raw materials, intermediate products, by-products และ products ที่ทุกคนเข้าถึงได้ (electronice/workplace) โดยเฉพาะอย่างยิ่งสารเคมีอันตรายร้ายแรงที่เกี่ยวข้องกับ MAE ของโรงงาน โดยข้อมูล SDS ของสารเคมีอันตรายร้ายแรงครบถ้วนทั้ง 8 หัวข้อ และพนักงานทุกคนที่เกี่ยวข้องเข้าใจ รับทราบ และตระหนักถึงอันตรายของสารเคมีอันตรายร้ายแรงที่ใช้ในโรงงาน	29/7	PSI	2.2.0	1. มีการจัดทำรายการสารเคมีอันตรายร้ายแรงของโรงงานที่มีครอบครอง อย่างครบถ้วน สมบูรณ์หรือไม่ และข้อมูลสารเคมีใน SDS Online มีครบตามรายการสารเคมี รวมถึงรายละเอียดใน SDS ครบถ้วน หรือไม่
		29/8	PSI	2.3.3	
		29/7	PSI	2.2.0	1. มีการสื่อสารเรื่องความเป็นอันตรายของสารเคมี ให้กับพนักงานและผู้ปฏิบัติงาน เพื่อให้รับทราบและเข้าใจข้อมูลใน SDS เช่น diamond code ของ NFPA 704 หรือไม่

How to implement PSI management system in GC

2019 | 2020 | 2021

Develop PSI Corporate Procedure

- ❑ **Draft PSI Corporate Procedure**
  - **Set up team**
  - **Role & Responsibility**
  - Workflow
  - **Related KPI**
- ❑ **PSI Index & Heat Map**
  - **4 PSI Categories**
  - **PSI Verification (Heat-Map)**
  - Chemical Interaction Matrix
- ❑ Trial with Pilot Plant
- ❑ Endorse PSI Corporate Procedure

Implement & Roll-out

Implement

- ❑ PSI Kick-off
- ❑ PSI Training to PSI working Team
- ❑ CIM Workshop
- ❑ **PSI Index & Heat Map Review**
- ❑ **PSI Training and communication to Organization**

Roll-out

Wave 1
- Refinery
- Olefins

Wave 2
- Aromatics
- EO

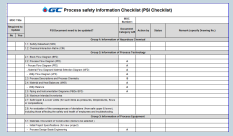
Wave 3
- Polymers
- Phenol

Wave 4
- Utilities

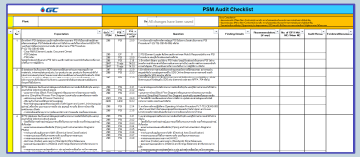
Sustain

- ❑ **PSI Element Review**

- ❑ **PSI Checklist in MoC Process**



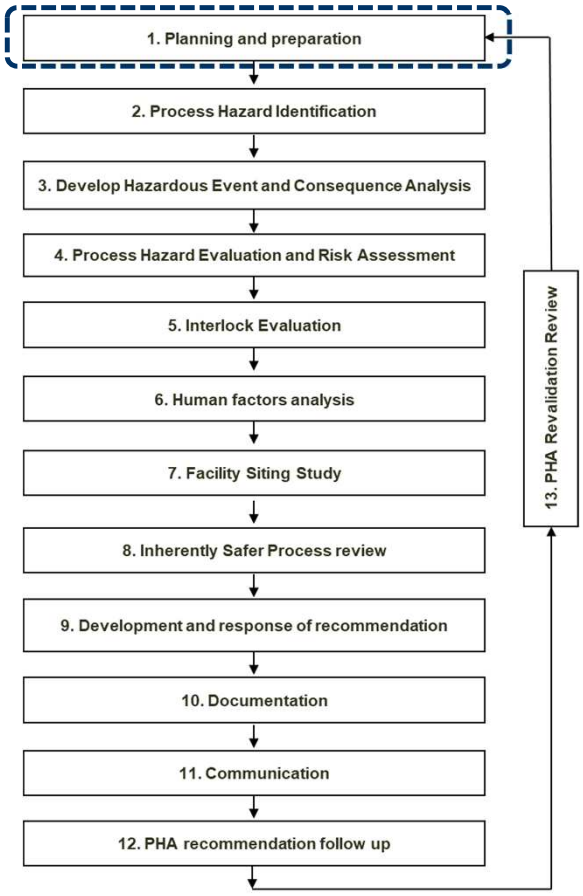
- ❑ **PSI Audit -Yearly PSM Internal Audit**



Contents

- What is PSI? and Why PSI important for PHA?
  - 14 PSM Elements
  - What is PSI?
  - PSI relates to other PSM Elements
  - Risk-Based Approach to Operation Risk Management
  - Incident related to PSI
  - PSI Weak Signal
- How to implement PSI management system in GC
  - Develop PSI Corporate Procedure
  - Implement and Roll-out
  - Sustain
- **Linkage between PSI and PHA**

PHA Step



Readiness of process safety information and other support document

- PHA team shall prepare the list of related Process Safety Information (PSI) and other support document and distributed to all member for reviewing prior PHA study.

  a) For the operating facility not undergoing modification, Process Safety Information (PSI) shall be signed off to "As-built" revision.

  b) For the operating facility undergoing the modification or the new facility which is confirmed to include the scope of study, PHA team shall evaluate the adequacy and accuracy of the information to be used for assess the risk (e.g. new facility that complete PHA Report). if the information is not sufficient for the risk assessment, PHA team shall evaluate the necessary to cut that facility out of study scope.

  c) MoC documents (since prior PHA), Relevant process safety incident reports (since prior PHA), SIF (safety interlock) Report, True Demand History Report (since prior PHA) shall be collected or accessed electronically for review and use in the PHA

  d) Other important documents and information that should be collected for review and use in the PHA include Alarm management reports and evaluations, Maintenance records including testing and inspection (i.e. PSV, SIF), Prior PHA Reposts (within the same boundaries), PHA Reports from similar processes, if applicable.

- PHA team shall review the Process Safety Information (PSI) and other support document for the process or system to be studied and be satisfied that the information is sufficiently accurate to conduct the PHA. The result of review shall be recorded in the report.

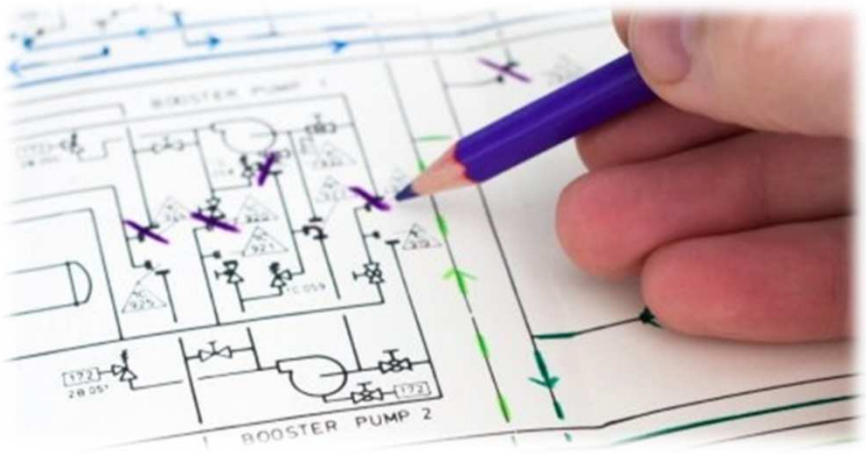
  a) If the minor deficiencies exist, PHA team should correct **minor deficiencies** as applicable (e.g. Hand mark-up) and record the need for updates and corrections as recommendation B for follow-up outside of the PHA report.

  b) If the **major deficiencies** exist which may lead to low quality of PHA study (e.g. Lead to misunderstanding of the hazard of the process under study, potential lead to incorrect identification of possible event/cause/consequence and safeguard), PHA team shall evaluate the necessary to stop the PHA study (for related part), record the deficiencies and inform the deficiency to PSI Document owner to get the correct the information.

HAZOP Preparation

Assemble all Documents

to avoid evaluation base on incorrect information



Typical Process Safety Information for HAZOP Study

- Process and Instrument Diagrams
- Process flow diagram
- Process equipment data sheet
- Control narratives
- Alarm and Trip Schedules
- Relief Vale Schedules
- Details of Hazardous Materials
- Isolation Philosophy

"Reviewing of PSI and other support information shall not be conducted during the HAZOP session"

"Incorrect information may lead to incorrect evaluation even meeting is effective brainstorming"

Contents

Key Takeaway

- **PSI is important** in PSM system as it **provides accurate information to PHA** in order to understand and manage risk
- **PSI assessment is essential before conducting PHA** to lead an effective result
- **Good PSI management** system should be set up with the **involvement of relevant discipline**
- **PSI Element Leader is the main person** to implement and sustain PSI system
  - Mindset and Behaviors
  - Ownership
- **Managing and Governance processes** are significant to ensure an **effective system**
  - Element Review
  - PSI Checklist in MoC Process
  - Audit

Thank you for your attention