SCIC- Joint Agencies Dialogue Session 2025: Updates by MOM

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Empowered *Workforce*,
Thriving *Workplaces*

Presentation Agenda

1. Major Hazard Installation (MHI) Info Sharing

2. Introduction to Major Hazards Department (MHD)’s Thematic Operations

3. Introduction to MHD’s Hydrogen Safety Guidelines

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MHI Info Sharing

Under the Safety Case (SC) regime, Major Hazard Installations (MHIs) must communicate off-site consequences from major accidents to prevent domino impacts

- MHIs process, manufacture or store large quantities of dangerous substances that are flammable or toxic
  - Examples of MHIs include oil refineries, petrochemical plants, chemical specialty companies, bulk storage terminals and warehouses
- MHIs[1] are regulated under the WSH (MHI) Regulations 2017
  - SC Regime – MHIs demonstrate responsibilities in proactively managing risks
  - Sharing of information by MHIs when notified by Commissioner, as required under Regulations 22 and 23

Sharing information with neighboring MHIs is crucial to prepare for potential domino effects and minimise casualties, especially in the event of a major accident.

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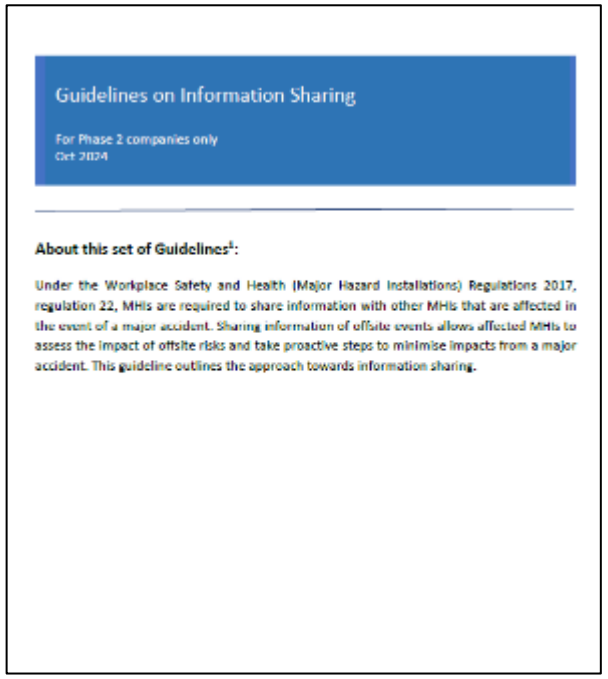
Affected parties understand potential hazards from neighbours and enhance emergency response plans

MHIs are required to provide other MHIs in the designated group the following info:

- **Basic information** of the MHI
- **General information** of substances causing the offsite impacts and their general properties and
- **Scenario-specific information** (fire, overpressure and toxic release scenarios) of how the affected MHI(s) may be impacted and recommended actions to take, based on actual contour(s) encroaching into neighbours

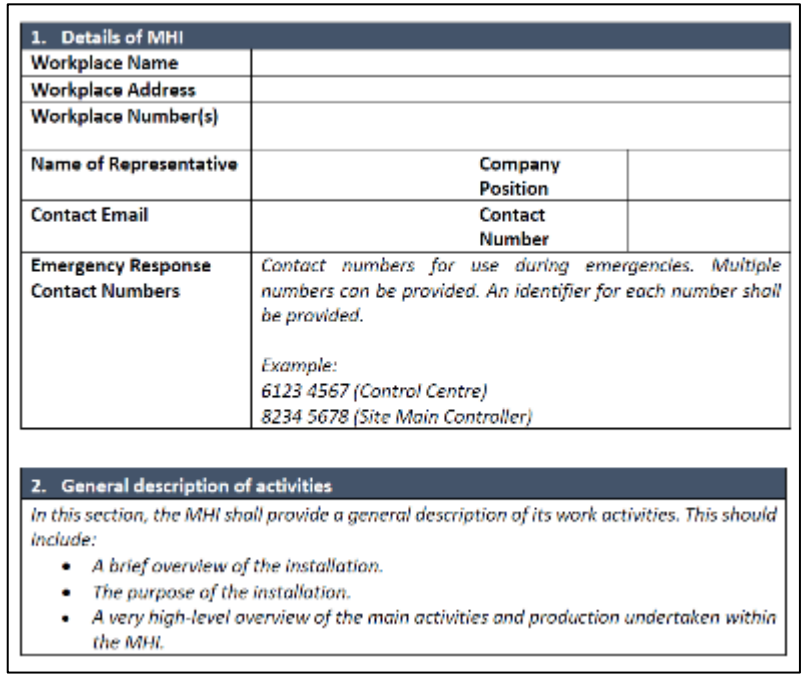


Guidelines on Information Sharing

For Phase 2 companies only
Oct 2024

About this set of Guidelines[1]:

Under the Workplace Safety and Health (Major Hazard Installations) Regulations 2017, regulation 22, MHIs are required to share information with other MHIs that are affected in the event of a major accident. Sharing information of offsite events allows affected MHIs to assess the impact of offsite risks and take proactive steps to minimise impacts from a major accident. This guideline outlines the approach towards information sharing.



1. Details of MHI			
Workplace Name			
Workplace Address			
Workplace Number(s)			
Name of Representative		Company Position	
Contact Email		Contact Number	
Emergency Response Contact Numbers	*Contact numbers for use during emergencies. Multiple numbers can be provided. An identifier for each number shall be provided.* *Example:* *6123 4567 (Control Centre)* *8234 5678 (Site Main Controller)*		

2. General description of activities
In this section, the MHI shall provide a general description of its work activities. This should include: • *A brief overview of the installation.* • *The purpose of the installation.* • *A very high-level overview of the main activities and production undertaken within the MHI.*

To ensure that MHIs are sharing sufficient info, MHD has prepared guidelines with examples, templates and FAQs. They were drafted in consultation with industry partners.

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Confidentiality and liability concerns were initially raised but eventually addressed through industry consultation and guidelines

Confidentiality concerns

- Scope of information sharing carefully scoped to broad aspects
- For example: General properties of substances that could have off-site impacts and partial contours that impact the respective MHIs

Liability concerns

- Complying with the WSH (MHI) Regulations on information sharing serves to prevent undesirable knock-on effects from major accidents.

- The mandatory sharing should not result in any civil legal lawsuits for mitigation control costs.

- Liability issues typically stem from actual major accidents rather than from the mandated information sharing process. Such liabilities may exist regardless of whether information sharing was in place. This distinction has been clearly articulated in the guidelines

To MHI C:

To MHI D:

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Designation of groups is based on geographical clustering and MHIs will be notified by OSHD's Major Hazards Department (MHD)

- Designated 8 groups on Jurong Island (JI) & outlying offshore islands (OFS). The groups were mainly separated by major roads, highways or canals
- MHD will notify MHIs which group they are in, the details of other MHIs in the group and the timeline of implementation
- MHIs will have 6 months to share the required information and subsequently incorporate the information they have received into their Safety Case[1] and ERP[2]

Phase 1

Ayer Merbau group

- Conducted in **May 23 to Nov 23**

✓ **Completed**

Phase 2A

Sakra group

- Conducted in **Oct 24 to Apr 25**

✓ **Completed**

Phase 2B

Rest of Jurong Island (JI) / Offshore

- **To commence from 4Q2025**

Upcoming

[1] *Review how risks arising from a major accident from neighbouring MHI will be managed and update Safety case as necessary.*

[2] *Update Emergency Response Plans based on info received, e.g. revise Company Assembly Area to be sited away from impact zone and conduct joint emergency drills with neighbour.*

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MHD’s Thematic Operations

MHD has started to focus on thematic inspections to focus on emerging threats/concerns to MHIs

Since 2025, we have identified themes based on emerging areas of concerns to help MHIs ensure their Safety Cases remain relevant and robust in the face of emerging risks or threats.

Identify key safety themes

- Analysis of past incidents (PRIs)
- Emerging threat scans
- New regulatory areas

Communicate themes to MHIs

- Highlight areas of focus
- Provide guidance when necessary

Conduct thematic inspections

- As part of safety case assessment
- Incorporate into regular inspections on intervention plans

Identified Themes for 2025

Combustible Dust

Adverse Weather Effects

Mechanical Integrity Programme

Owing to global climate change, extreme weather events was identified as one of the top risks in the global risks severity ranking

Global Risks Severity Ranking

Adverse Weather Event in Singapore in 2024

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Inspections focus on adverse weather risk assessment and management

Adverse Weather Effects (AWE) inspections to address the following areas:

- Assessing Safety Critical Events (SCE)/Major Accident Scenario (MAS) risks associated with adverse weather events
- Preparing adequate response and emergency plans
- Planning for longer-term risks and managing SCE/MAS risks to as low as reasonably practicable (ALARP)

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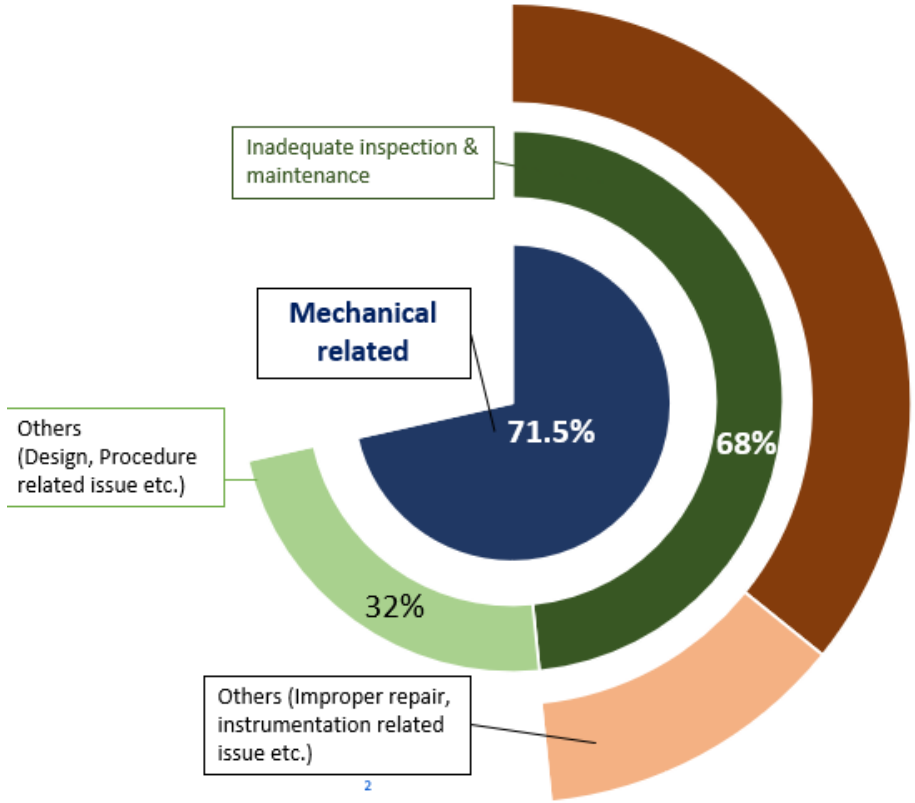
Majority of reported incidents to MHD were attributed to mechanical-related causes

Over the past 7 years, about 72% of reported process-related incidents (PRI) were attributed to mechanical-related causes



MHD Process Related Incident (PRI) analysis (2018 - 2024)

Within Mechanical related incidents, majority **(68%) was due to inadequate inspection and maintenance**.

Top 3 issues (75%) identified:

- Corrosion
- Flange
- Ageing-related mechanism

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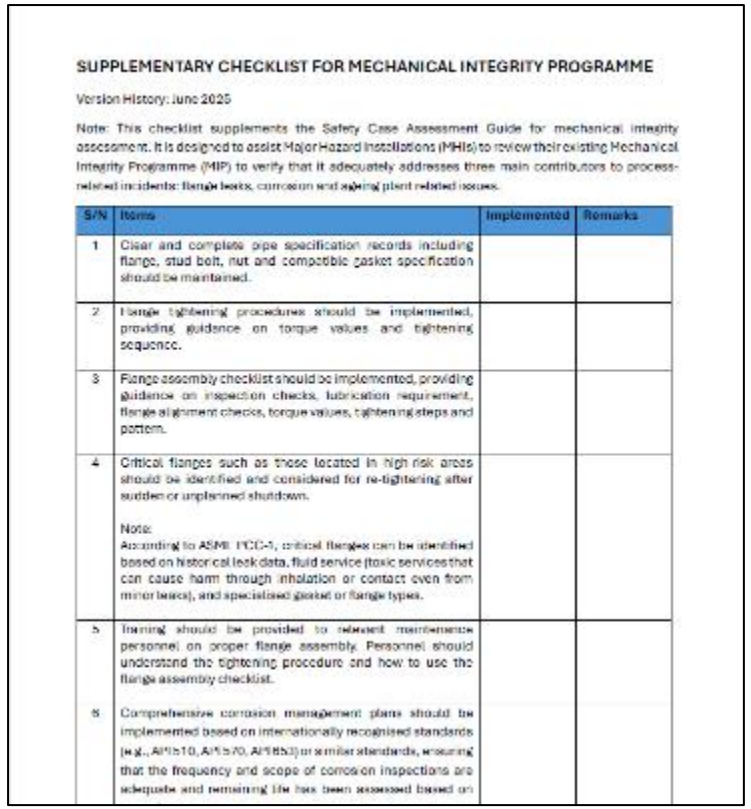
Mechanical integrity programme to help address maintenance and plant ageing related issues

MHIs have been provided with a supplementary checklist to improve their mechanical integrity programme.



SUPPLEMENTARY CHECKLIST FOR MECHANICAL INTEGRITY PROGRAMME

Version History: June 2025

Note: This checklist supplements the Safety Case Assessment Guide for mechanical integrity assessment. It is designed to assist Major Hazard Installations (MHIs) to review their existing Mechanical Integrity Programme (MIP) to verify that it adequately addresses three main contributors to process-related incidents: flange leaks, corrosion and ageing plant related issues.

S/N	Items	Implemented	Remarks
1	Clear and complete pipe specification records including flange, stud bolt, nut and compatible gasket specification should be maintained.		
2	Flange tightening procedures should be implemented, providing guidance on torque values and tightening sequence.		
3	Flange assembly checklist should be implemented, providing guidance on inspection checks, lubrication requirement, flange alignment checks, torque values, tightening steps and pattern.		
4	Critical flanges such as those located in high risk areas should be identified and considered for re-tightening after sudden or unplanned shutdown. Note: According to ASME PCC-1, critical flanges can be identified based on historical leak data, fluid service (toxic services that can cause harm through inhalation or contact even from minor leaks), and specialised gasket or flange types.		
5	Training should be provided to relevant maintenance personnel on proper flange assembly. Personnel should understand the tightening procedure and how to use the flange assembly checklist.		
6	Comprehensive corrosion management plans should be implemented based on internationally recognised standards (e.g., API 510, API 570, API 653) or similar standards, ensuring that the frequency and scope of corrosion inspections are adequate and remaining life has been assessed based on		

Flange management

- Flange make-up checklist and procedure
- Pipe specification with compatible gasket
- Torque values

Pipe inspection

- API 570 (process piping) inspection
- Corrosion rates and remaining life
- CUI and dead leg programmes

Tank inspection

- API 653 (atm tank) inspection
- Shell and base plate corrosion rates and remaining life

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Introduction to Hydrogen Safety Guidelines

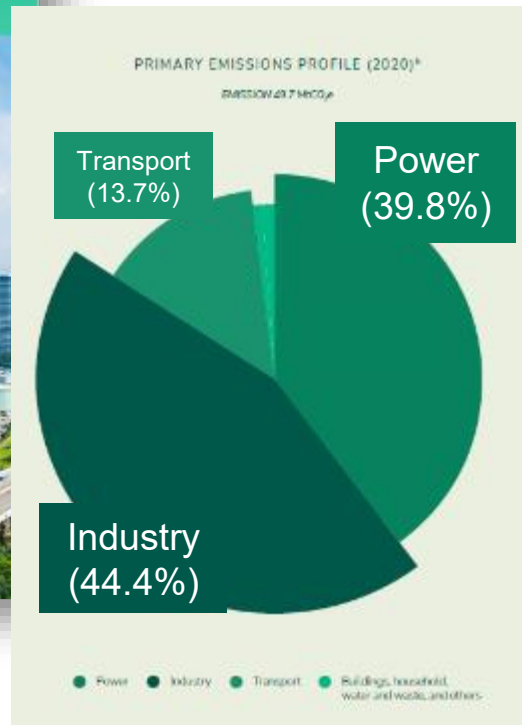
Singapore's National Hydrogen Strategy part of plans to achieve net zero by the year 2050

- Singapore has identified **clean energy industry** as a strategic growth area and is actively exploring adoption of low-carbon technologies, which offer a scalable decarbonisation pathway for Singapore

- **Hydrogen** plays an important role in decarbonising different sectors in Singapore

- Companies are encouraged to consider alternative energies, for a more sustainable manufacturing, including the use of **hydrogen** and **ammonia**

Towards Net Zero, what are the key areas to reduce emissions?



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Cleantech fuels could pose major accident hazards due to their hazardous nature

Unknowns in nascent technologies

- Hazards associated with novel approaches might not be fully understood (e.g. storage of hydrogen in metal hydrides)

Upscaling challenges

- Different risks dealing with commodity chemicals vs specialty chemicals
- Operational complexities (e.g. larger scale mitigative measures and emergency response requirements)

Degradation concerns

- Material degradation mechanism (e.g. hydrogen embrittlement)
- Limited data of new processes (e.g. temperature cycling on material fatigue)

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Need to understand the inherent risks and take proactive steps to mitigate associated risks

Hydrogen

- ❑ Stored / transported as compressed gas, cryogenic liquid or in solid hydride
- ❑ Produced using electrolysis. Used in fuel cell and gas turbine

- **Very flammable with low ignition energy**
- Difficult to detect with naked eyes due to pale blue flame
- High risk of explosion under confinement
- High diffusivity leads to material degradation, e.g. hydrogen embrittlement and high temperature hydrogen attack

Source: *Hydrogen & Energy Information Resource*

Hydrogen tank explosion at Gangwon Technopark In Gangneung, South Korea (23 May 2019)

Source: The Korea Times

Precautionary approach should be applied when there is greater uncertainty

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Adopted from *Hydrogen & Energy Information Resource*

Publication to provide guidance on hydrogen safety management

Clean technology: Hydrogen safety guide

Rev 0 April 2025

Purpose and scope

This guide focuses on the safe handling of hydrogen and is developed for:

- Industry professionals involved in hydrogen projects
- Safety professionals and trainers
- Emergency responders.

The content highlights industry best practices, current standards and practical experience to provide guidance on hydrogen safety management.

For suggestions to improve the guide, please email contact_MHD@mom.gov.sg.

Published by Major Hazards Department (MHD)

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Hydrogen Safety Guide

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Key takeaways

MHIs/companies should:

- Prepare for information sharing to other neighbouring MHIs
- Ensure risk management framework is up-to-date to tackle adverse weather effects
- Develop robust inspection and maintenance plan that address mechanical integrity issues
- Prepare for clean energy transition and be aware of the risks of such technology

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Thank you

For further feedback/ suggestions:

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