



Petrochemical Corporation of Singapore (Private) Limited

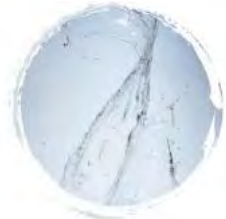


*SECURING THE SAFETY AND HEALTH
OF OUR WORKFORCE
SAFEGUARDING OUR COMMUNITY*

RESPONSIBLE CARE® OBJECTIVES & TARGETS 2020

Er. Bernard Leong LW
Health, Safety & Environment cum Quality Control Manager

**Annual PCS-Contractors HSE Meeting 2020
21 January 2020**

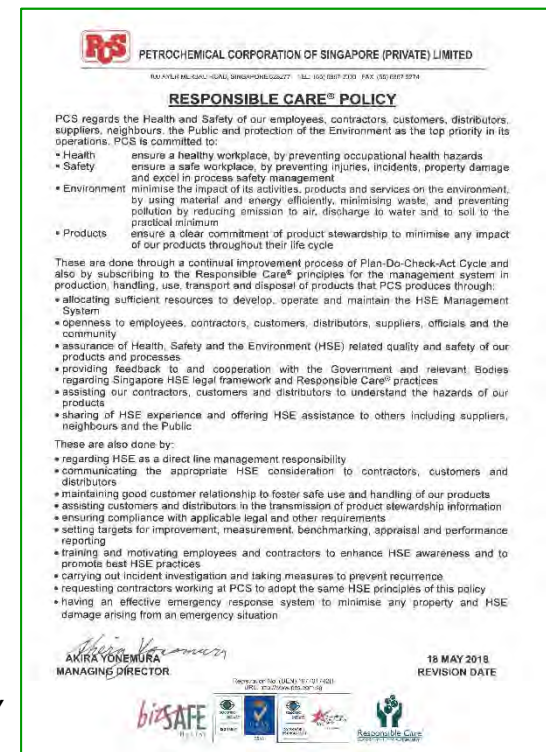


Responsible Care®



1. global chemical industry's commitment
2. continuous improvement in health, safety and environmental performance
3. open and transparent communication

- signatory since October 1999
- PCS RC Policy* spells out **philosophy and principles**
 - ➔ governing all decisions related to health, safety and environment, in all business activities
- applies to all employees and contractors
- mindset of identifying and removing hazards at workplace



* Responsible Care® Policy is PCS' manifestation of generic "Health, Safety & Environment Policy", as PCS is a signatory of Responsible Care®

Objectives & Targets



Responsible Care® → HSE (Health, Safety & Environment)

- Responsible Care® launched in 1985 in Canada
- International Council of Chemical Associations (ICCA) is the Steward
 - world body representing chemical manufacturers and producers
 - initiative that drives continuous improvement in HSE performance
 - lead in promoting and implementing Responsible Care® initiatives
 - PCS' Responsible Care® Objectives and Targets encompass HSE objectives and targets
 - as signatory, PCS is committed to improve HSE & Security performance through Responsible Care®



| RESPONSIBLE CARE® OBJECTIVES AND TARGETS FOR 2020 | |
|---|--|
| Objectives | Targets |
| 1. Maintain a Healthy, Safe Workplace and best in class Environment | 1.1 Zero Lost Time Incident |
| | 1.2 Total Recordable Case Frequency < 1.4 (TRCF) per million hours worked |
| | 1.3 Zero Environmental Incident (EIM) Consequence Rating of 5+ |
| | 1.4 Zero Hazardous Exposure Level to Occupational Diseases |
| | 1.5 Zero Process Safety Incident (PSI) Consequence Rating of 3+ |
| 2. Maintain Good HSE Performance and Management System | 2.1 MAINTAIN ZERO non-conformity in external and internal HSE audits |
| | 2.2 Enhance Contractor Competency by SCF capacity uplift through PCS Maintenance Contractors (HSE Committee) (HSE) programmes as defined in RCM |
| | 2.3 Ensure Safety Case written preservation as a live document and propagate to all scope via knowledge management and external industry development |
| | 2.4 Propagate HSE standards culture on workers from management leaders to support established HSE program and better engagement and training approach |
| | 2.5 Promote technology-enabled HSE, create possibilities for workplace HSE management, and HSE lighting where it is shown effective |
| | 2.6 Ensure Water, Zero, control on a global level at all work related to, Sp and HSE health & environment |
| 3. Ensure a HSE competent Workforce | 3.1 Review full competency based processes to determine level of competency management framework for operation and associated planning, document and maintain organized and structured HSE strategies |
| | 3.2 RCM to benchmark by occupying period and knowledge capability, provide immediate feedback through digital as common information repository and ensure seamless and easy access for competency development beyond HSE |
| | 3.3 Evaluate to increase human trust on with process to reduce transition control and human error, raise awareness of features to provide workforce health and well-being |
| | 3.4 Sustain level of HSE competence and competency development across Commercial Functions |
| 4. Strengthen Responsible Care® Practices | 4.1 Continue outreach activities sharing practical and sustainable approaches in Responsible Care® programs as Responsible Care® Local and Responsible Care® in working together initiatives |
| | 4.2 Active regional participation in national workplace health and safety initiatives |
| | 4.3 Review and plan, policies and processes to drive continuous improvement, a carbon emission and waste management |
| | 4.4 Improve manufacturing efficiency through equipment and process enhancements to reduce energy consumption, continue to seek energy efficiency opportunities through assessment approach |
| 5. Ensure Compliance with Legal and Other Requirements | 5.1 Ensure workplace health and safety awareness are continuous through regular inspection, identify and control potential risks and/or incidents, safety |
| | 5.2 Ensure compliance to Globally Harmonized System requirements |
| | 5.3 Ensure Chemical Compliance demonstrate commitment to competence in the proper management of HSE, as an essential factor in the reduction and control of pollution |
| | 5.4 Ensure relevant workforce have a clear understanding of policies and procedures, and the importance of putting them into practice |
| 6. Achieve Safe and Successful Execution of Projects | 6.1 Continually improve the effectiveness of safety planning and management system |
| | 6.2 Ensure safe execution and completion of all operations projects, including capital projects |
| | 6.3 Ensure ongoing communication on HSE issues, coordination of activities and proper work practices |
| | 6.4 Ensure consistency of subcontractor process, knowledge and competency levels through training and mentoring system |

Amita Yonemura
Managing Director

01 December 2019

Objectives & Targets 2020 - 1



1. Maintain a Healthy, Safe Workplace and best in class Environment

- Zero Lost Time Incident
- Total Recordable Case Frequency ≤ 1.4
(TRCF per million hours worked)
- Zero Environmental Incident
(RAM* Consequence > Rating of 3) ** see slide 5*
- Zero Hazardous Exposure leading to Occupational Diseases
- Zero Process Safety** Incident
(RAM Consequence > Rating of 3) ***see slide 6*

Risk Assessment Matrix



| Potential Consequence | | | | | Probability of Occurrence | | | | |
|-----------------------|---------------------|------------------|------------------|---------------------|---|--------------------------------------|-------------------------------|--|---|
| | | | | | A | B | C | D | E |
| Rating | People | Asset | Environment | Reputation | Very Unlikely Never heard of in our industry | Unlikely Heard of in our industry | Likely Has occurred in PCS | Occasional Occurred several times per year in PCS | Routine Occurred several times per year in PCS |
| 0 | No injury | No damage | No effect | No impact | | | | | |
| 1 | Slight injury | Slight damage | Slight effect | Slight impact | | | | | |
| 2 | Minor injury | Minor damage | Minor effect | Limited impact | | | | | |
| 3 | Major injury | Localised damage | Localised effect | Considerable impact | | | | | |
| 4 | Single fatality | Major damage | Major effect | Major national | | | | | |
| 5 | Multiple fatalities | Extensive damage | Massive effect | Major international | | | | | |

ZONES - LOW RISK MEDIUM RISK HIGH RISK

HARM TO PEOPLE

| RATING | DESCRIPTION |
|--------|--|
| 0 | No injury or health effect. |
| 1 | Slight injury or health effect (including First Aid and Medical Treatment cases) - not affecting work performance or causing disability. |
| 2 | Minor injury or health effect - affecting work performance, such as restriction on activities (Restricted Workday Case). Limited health effect, which is reversible, eg. skin irritation, food poisoning. |
| 3 | Major injury or health effect - affecting work performance, such as Lost Time Injury, or a need to take a few days to recover. Irreversible health damage without loss of life, eg. noise induced deafness, chronic back injury. |
| 4 | Single fatality or Permanent Total Disability (including Permanent Partial Disability) - from an incident or occupational illness, eg. poisoning, cancer. |
| 5 | Multiple fatalities - from an incident or occupational illness, eg. poisoning, cancer. |

Process Safety



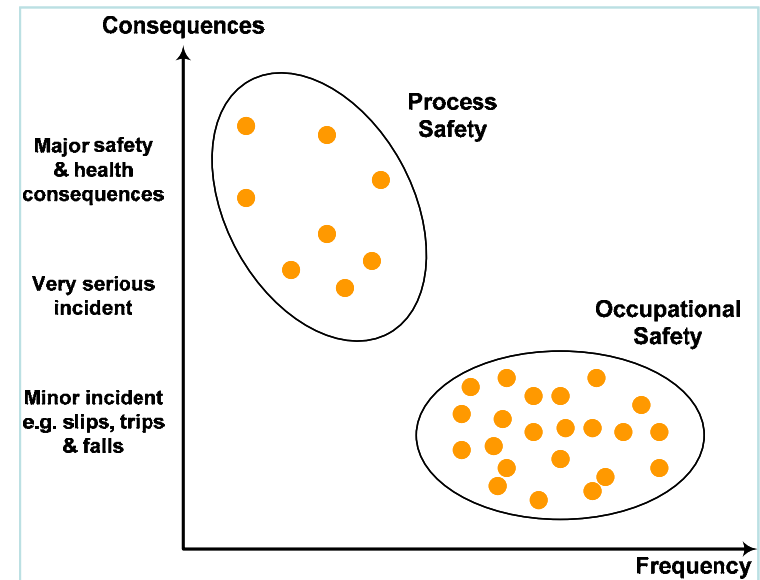
■ What

- engineering and management skills focused on preventing catastrophic accidents, associated with use of chemicals
- appropriate process technologies to manage hazards of chemical plant (processing activities) by elimination / control

■ distinction between personal (occupational) and process safety

- process safety hazards are those arising from processing activity
- personal safety hazards affect individuals but less impact to processing activity

■ promote Process Safety without sacrificing effort on personal safety



Objectives & Targets 2020 – 2a

2. Maintain Good HSE Performance and Management System

- Maintain zero major non-conformity in external and internal HSE audits
- Enhance Contractor Companies bizSAFE capacity building through PCS Maintenance Contractors HSE Committee's (PCC) championship as bizSAFE Mentor
- Ensure Safety Case* written presentation as a live document
 - ✓ propagate its purpose as knowledge management and retention
 - ✓ competency development

**see slides 9 & 10*

Objectives & Targets 2020 – 2b

2. Maintain Good HSE Performance and Management System

- Propagate HSE ownership culture on workforce from management leadership
 - ✓ embrace established HSE programmes for learning lessons and eliminating incidents
- Promote technology-enabled HSE
 - ✓ create possibilities for workplace HSE management, and HSE training where it is shown effective
- Embrace Vision Zero*, centred on a belief that all work related injuries and ill health are preventable

**see slides 11 & 12*



Safety Case



- MOM announced on 9 March 2015 that Singapore would introduce a Safety Case Regime for Major Hazard Installations (MHIs)
 - While likelihood of major accident is low for MHIs, complex operating environment and large volumes of highly hazardous chemicals mean that any accident can potentially result in catastrophic consequences
 - Core feature of Workplace Safety and Health (MHI) Regulations is Safety Case Regime
 - Under Safety Case Regime, MHIs are expected to:
 - ✓ take on greater responsibilities
 - ✓ proactively identify and manage Health, Safety and Environment (HSE) risks through integration of all HSE protocols
 - ✓ demonstrate to regulators that their risks are as low as reasonably practicable (ALARP)
-

Why Safety Case ?



- argument why an activity is as safe as it needs to be
 - ✓ sufficiently rigorous and systematic process
 - ✓ link between measures taken and major accident scenario
 - ✓ evidence that necessary measures have been taken
 - SC regime places onus on Owner to find ways of operating safely
 - ✓ simulates considerable thought
 - ✓ workforce involvement / participation; higher level of “**ownership**”
 - ✓ better workforce communication, understanding and co-operation on safety issues
 - ✓ *PCS submitted its Safety Case written presentation to MOM on 27 August 2018*
 - ✓ *Safety Case Conclusion Meeting was held on 12 June 2019, marking the completion of the Initial submission of the Safety Case*
-

Vision Zero



“A movement that aims to inculcate a mindset that all injuries and ill health at work are preventable and a belief that zero harm is possible.”



Jurong Island Vision Zero Cluster

- Jurong Island Vision Zero Working Group formed in Jan 2018, under the Workplace Safety and Health Council (Chemical Industries) Committee; led by industry
- target for companies on Jurong Island to have unified culture for Workplace Safety and Health (WSH)
- leadership and commitment key to creating robust WSH culture
- Jurong Island community first in Singapore to form Vision Zero cluster; launched on 23 Nov 2018

Vision Zero



Pledges to uphold five key attributes

1. adopting **mindset that all incidents are preventable**, opposing to statistical occurrences
2. implementing **pre-emptive measures rather than just responding when incidents happen**
3. coming up with **comprehensive solutions** for prevention **besides looking at the root cause**
4. including all within the company's **supply chain in cultivating WSH culture**
5. **going beyond basic compliance with regulations**, for instance, to implement a holistic management system



Objectives & Targets 2020 – 3



3. Ensure a HSE competent Workforce

- Review critical competency-based processes
 - ✓ determine / develop knowledge management framework
 - ✓ preservation and succession planning
 - ✓ document and maintain organisational, operational and HSE strategies
- Refine framework for e-learning portal and knowledge retention
 - ✓ ensure seamless and easy access for competency development beyond HSE
- Strategise to increase human interaction with process to reduce **transient operations human error*** **see slide 14*
 - ✓ raise awareness of measures to promote workforce health and well-being

Human Error in Process Safety



- Human error led to two of most significant incidents
- ✓ Piper Alpha (1988)
 - failure to fit blind correctly
 - shift changeover
 - contractor failed to report status of work
- ✓ BP Texas City (2005)
(underlying problems)
 - historical deviations of startup
 - lack of communication
 - fatigued operators

Classification

- ✓ Learning gap
[don't know]
- ✓ Memory gap
[know but don't remember]
- ✓ Inconsistency
[have knowledge but variability in method]
- ✓ Application
[know but incorrect action]
- ✓ Omission
[know but missing step or action]
- ✓ Decision
[wrong decision in a given situation]

Objectives & Targets 2020 – 4a



4. Strengthen Responsible Care[®] Practices

- *Continue outreach activities, sharing practical and sustainable approaches in Responsible Care[®] programmes as Responsible Care[®] Leader*
 - ✓ *embed Responsible Care[®] in marketing collateral and outreach programmes*
- Active support and participation in national workplace health and safety initiatives
- Review principles, policies and processes to drive continuous improvement in carbon emission and waste management

Objectives & Targets 2020 – 4b

4. Strengthen Responsible Care[®] Practices

- Improve manufacturing efficiency through equipment and process enhancements to further reduce energy consumption
 - ✓ adopt energy efficiency opportunities through assessment approach
- Active outreach / sharing of HSE experience / expertise, within Complex, and through SCIC / industry avenues

Objectives & Targets 2020 – 5a



5. Ensure Compliance with Legal and Other Requirements

- Ensure workplace health and safety awareness and compliance through regular site inspection* **see slide 19*
 - ✓ identify and control potential risk situations to eliminate injuries
- Ensure continued compliance to Globally Harmonised System (GHS) requirements
- Ensure Contractor Companies demonstrable commitment to, and competence in, the proper management of HSE
 - ✓ essential factor in selection and continued participation** ***see slide 20*

Objectives & Targets 2020 – 5b

5. Ensure Compliance with Legal and Other Requirements

- Ensure relevant workforce have a clear understanding of policies and procedures
 - ✓ importance of putting them into practice
- Continually improve the effectiveness of quality planning and management system

Formal inspections



- Monthly
 - √ Management Team
 - √ Safety & Health Working Committee
 - √ PCS Maintenance Contractors HSE Committee (PCC)
- Bi-weekly
 - √ HSE Officer, support functions (Technology & Optimisation, Maintenance, Contractor)

Evaluation, Selection, Audit



- Regulations for Evaluation & Selection of Contractors

- Procedure for conducting HSE Audits on Maintenance Contractors

| PETROCHEMICAL CORPORATION OF SINGAPORE (PRIVATE) LIMITED RULES AND REGULATIONS (P-027) EVALUATION & SELECTION OF CONTRACTORS Effective Date : 16 August 2004 | | | |
|--|----------------|----------|----------------|
| 03 | 01 Aug 2014 | | |
| 02 | 20 Apr 2009 | | |
| 01 | 5 Sep 2007 | | |
| REVISION | EFFECTIVE DATE | REVISION | EFFECTIVE DATE |

| Doc No. : MGP-36 PETROCHEMICAL CORPORATION OF SINGAPORE (PRIVATE) LIMITED PROCEDURE FOR CONDUCTING HSE AUDITS ON MAINTENANCE CONTRACTORS | | | | |
|---|----------|-------------|-------------|-------------|
| <2> | Feb 2013 | Krishnan | --- | |
| <1> | Feb 2009 | Krishnan | --- | Chew T H |
| <0> | Sep 2007 | Krishnan | --- | Chew T H |
| Rev. | Date | Prepared by | Reviewed by | Approved by |

- 7.2 Contractors failing to achieve the minimum score of 75% may be subjected to one or more actions as given below, as decided by the Maintenance Manager –
- Re-audit within three months (only if there is reason to believe that the failure was due to administrative discrepancies and not due to inadequacy of their HSE Management System)
 - Eviction from PCS facilities (land, office or store)
 - Not considered for any new work under PCS Maintenance
 - Termination of contract and/or removal from the 'Approved contractor list' (this shall be on consultation with the Purchasing Manager)

| Score in previous audit | Status | Audit |
|---|--------|---------|
| Score ≥ 85% | Star | 4 years |
| 85% > Score ≥ 75% | Passed | 3 years |
| Score < 75% (Failed in 1 st attempt) | Failed | 1 year |

Objectives & Targets 2020 – 6



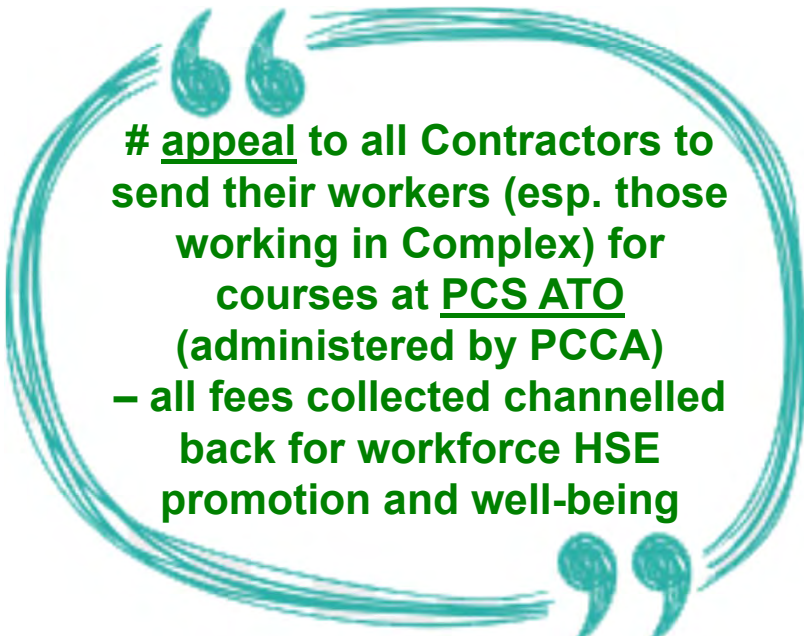
6. Achieve Safe and Successful Execution of Projects

- Ensure safe execution and completion of rejuvenation projects, including small Capex projects
- Ensure ongoing communication on HSE issues, coordination of activities and proper work interface
- Ensure contractors / subcontractors possess adequate knowledge and competency levels through training and mentoring system*
**see slide 22*
- ✓ requirement of **bizSAFE Level 3** (minimum) for sub-contractors

Knowledge & Competency



- Apply Workplace Safety & Health in Process Plant (AWSHPP) #
- Complex Safety Induction Training (CSIT) [site specific safety and health awareness] #
- basic language/communication (conversational English)
- where applicable
 - ✓ Work-at-Height Course for Workers
 - ✓ Perform Work in Confined Space Operation #
- trade/skill-based training
- behavioural / culture assimilation
 - ✓ SOS, STAR, BBS

A large, hand-drawn style teal speech bubble graphic that frames the text on the right side of the slide. It has a thick, brush-stroke-like border and contains two teal quotation marks at the top and bottom.

appeal to all Contractors to send their workers (esp. those working in Complex) for courses at PCS ATO (administered by PCCA) – all fees collected channelled back for workforce HSE promotion and well-being

Collaborative Partnership



RECOGNITION: SCIC RC Award 2018

Collaborative Partnership



VISIBILITY: NWSH Campaign 2019

Collaborative Partnership



CCPS
GLOBAL
SUMMIT
ON PROCESS SAFETY



COMPETENCY DEVELOPMENT: 5th CCPS Global Summit on Process Safety

Collaborative Partnership



OUTREACH: BBS sharing with Changi Airport Group

Recent news and concerns



- National statistics - high number of accidents and fatalities in Nov / Dec 2019
 - √ Vehicular, crane and related accidents
 - ❖ 4 Nov - Worker killed during lifting operation
 - ❖ 7 Nov - Worker electrocuted and fell from height
 - ❖ 14 Nov - Worker fell through partition board
 - ❖ 21 Nov - Worker fell with work platform
 - ❖ 22 Nov - Worker caught between crawler crane and metal barricade
 - ❖ 22 Nov - Worker struck by fallen brick wall
 - ❖ 26 Nov - Worker fell within cargo hold of vessel
 - ❖ 20 Dec - Worker found lying near excavator
 - ❖ 22 Dec - Worker fell from aircraft during maintenance work
 - ❖ 23 Dec - Worker struck by falling objects at warehouse

Recent news and concerns



Singapore

8 fatal workplace accidents in November, MOM to step up checks



Minister of State for Manpower Zaqy Mohamad said the ministry takes every workplace fatality very seriously. (Photo: Facebook/Zaqy Mohamad)

SINGAPORE: The Ministry of Manpower (MOM) will step up enforcement on high-risk workplaces following the deaths of eight workers while on the job in November.

This number is the highest in a month for this year. MOM data shows that a total of 25 workers died on the job from January to September this year.

Video - Safe Driving



**source: WSH Council*

In-situ Risk Assessment



13. IN-SITU RISK ASSESSMENT (iRA)

Kiken Yochi Training (KYT) (Japanese 危険予知訓練)

Hazard prediction training

K: kiken – hazard

Y: yochi – prediction

T: training

1. Prior to performing work, discuss in small group, hazardous factors in workplace and work conditions (unsafe conditions and unsafe behaviour that may lead to incidents)
2. Discuss, think about, and understand (or ask yourself) type of incidents that may arise
3. Determine danger points and kind of action to take, confirming these with pointing and calling

KYT 4-Round Method (“Finger Pointing”)

- Round 1: What are the hidden hazards? (understand the situation)
- Round 2: These are the danger points (investigate the reality)
- Round 3: What would you do? (establish countermeasures)
- Round 4: These are the danger points (set targets)



In-situ Risk Assessment (iRA)

Situation Awareness



Situation Awareness

5. SITUATION AWARENESS

You must always be alert in every situation.

1. Perception

You must **SEE**. In every situation, you must see what is around you.

2. Comprehension

You must **UNDERSTAND**. If you see or hear anything you do not understand, you must ask.

3. Projection

You must **THINK AHEAD**. Before you do anything, you must think about what will likely happen next.



22 Contractors Health & Safety Guide

Chronic Unease

Important state of mind – awareness of the situation for behavioural adjustment

Chronic Unease is a preoccupation with failure

- very mindful of risk
- proactive to reduce risk
- aware that small failures are signs that something needs to be fixed to reduce risk

Being Chronically Unease means being sensitive to the risks and accidents that could happen, and always ready to manage all risks



Video – Blind Spot

A word on Housekeeping



- A time for “spring cleaning” for Chinese celebrating Lunar New Year
- Process plants, workshop, office, work area also require regular housekeeping
- CCPS Process Safety Beacon (January 2020 issue)
 - *Housekeeping is more than “pretty” – it’s about safety*
 - Plugged chute created dust cloud that ignited – 14 killed, 38 injured
 - Spills and leaks, metals as dust or filings are fire hazard
 - Accumulated materials become fuel in event of fire

The screenshot shows the January 2020 issue of the CCPS Process Safety Beacon. The main article is titled "Housekeeping is more than 'pretty' - it's about safety". It includes a photograph of a destroyed industrial facility. The article is divided into sections: "What happened?", "Why did it happen?", "Did you know?", and "What can you do?".

What happened?
A sugar mill had been operating for over 100 years; poor housekeeping procedures allowed sugar to accumulate around equipment and on structures. A plugged chute created a dust cloud that ignited and caused other explosions and fires. 14 people were killed, 38 were injured, and the plant was destroyed.

Why did it happen?
Sugar is combustible, while it is hard to ignite, explosions provide more than enough energy to cause damaging explosions and fires. The initial explosion created additional explosions fueled by sugar residue left in the process areas. The first event would have been severe, but the presence of accumulated sugar allowed secondary explosions and fires that greatly increased the impact. Housekeeping practices at that site were not well followed. Over years, a number of fires had occurred that were reported, but corrective actions were not effective nor sustainable.

Did you know?

- Accumulated materials, from your process and also packaging materials (plastic, paper/cardboard, wood), become fuel in the event of a fire or explosion. Minimizing it through housekeeping is essential.
- Safety systems such as fire protection may not be designed for extra fuel, including dust or other spilled materials.
- Spills & leaks of raw materials, process intermediates or finished products also represent lost material decreasing the process yield.
- Housekeeping is more than removing spills; other clutter such as unused equipment and packaging need to be properly stored.
- Metals as dust or filings are also fire and explosion hazards. They need the same level of care as other combustible materials.

What can you do?

- Know the housekeeping expectations for your area and follow them.
- Ensure that proper handling and disposal methods are applied for materials that are collected during housekeeping activities.
- Metallic wastes are a unique hazard that requires special disposal methods; find out what they are and follow them.
- Also, if the material source is unknown, consult with safety personnel about proper PPE for clean-up.
- Note substandard housekeeping during rounds and report this to your supervisor. Better still, clean them up then and there while applying proper safety methods.

Keeping areas clean makes them safer!

The Beacon is usually available in Afrikaans, Arabic, Catalan, Chinese, Czech, Danish, Dutch, English, Filipino, French, German, Greek, Gujarati, Hebrew, Hindi, Hungarian, Indonesian, Italian, Japanese, Korean, Malay, Marathi, Mongolian, Persian (Farsi), Polish, Portuguese, Romanian, Russian, Spanish, Swedish, Thai, Tagalog, Urdu, and Vietnamese.

Keeping it in place



Poor Housekeeping

Industry Examples



Corridor



Outdoor storage



Workshop



Storeroom

Source: Ministry of Manpower

Keeping it in place



PCS Contractors Health & Safety Guide

10. HOUSEKEEPING

General housekeeping practices

1. Do not block passageway, staircase or exits; ensure passageway is clear for movement
2. Do not put things within 2 metres of fire fighting equipment; do not block the way to access the fire fighting equipment
3. Perform housekeeping in-between work, upon work completion and at end of workday
4. Perform Post-Job Inspection to ensure that all waste / unwanted material, *like used gaskets, empty silicone tubes, concrete waste, etc.* are removed from work area
5. If there is an oil spill on the floor, remove the oil and clean the floor immediately
6. Have rest and meals at proper places that have been authorised and designated for you

So...
On-the-Job housekeeping is
PART OF YOUR JOB.
Remember, your housekeeping
habits go a long way in determining your:

SAFETY PRODUCTIVITY



Keeping it in place



Video – Housekeeping



On-going HSE Initiatives



Open Communication/ Sharing

Speak Out for Safety (SOS) programme
Promote open communication channel on
occupational safety and process safety issues



Empowerment/ Intervention

STop And Report (STAR) programme
Intervene / Report on unsafe situation



Peer-to-Peer

Behaviour Based Safety (BBS) programme
Peer observation and feedback;
cultivate safe work behaviour

VISION ZERO

Jurong Island

THANK YOU



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