



## Grating Incident resulting in LTI



# Agenda

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- » Background and Medical Condition
- » Incident Description
- » Immediate Causes and Latent Failures
- » Swiss Cheese Model
- » Key HSSE Themes from the Grating Incident
- » Weak Signals from Previous BLNG Incidents
- » Action Plans
  
- » *Supporting Slides:*
  - » *Brief Description of Previous BLNG Incidents*

# Background and Medical Condition

## Personal Details:

- Paryono Japarno
- Indonesian, 30 years old
- Married with 1 child (2 y/o daughter)
- 2 years working in BLNG
- Works as Scaffold Helper in Adinin Works and Engineering (AWE – BLNG Project Contractor)



**Paryono Japarno**

## Injury and Medical Condition:

- Paryono suffered multiple left rib fractures, small hemopneumothorax and subcutaneous emphysema on his right chest.
- Hospitalized for 3 days
- Given medical leave for 8 days
- Re-assessed and admitted again for another 2 days for observation due to liquid build up in his lung.
- Additional 10 days medical leave given
- Certified fit by BSJV Occupational Health Doctor and took home leave in Indonesia
- Awaiting contract extension

DESCRIPTION	Actual	Potential
People	3	4C
Asset	1	1C
Environment	0	0
Reputation	3	3C

### RAM rating

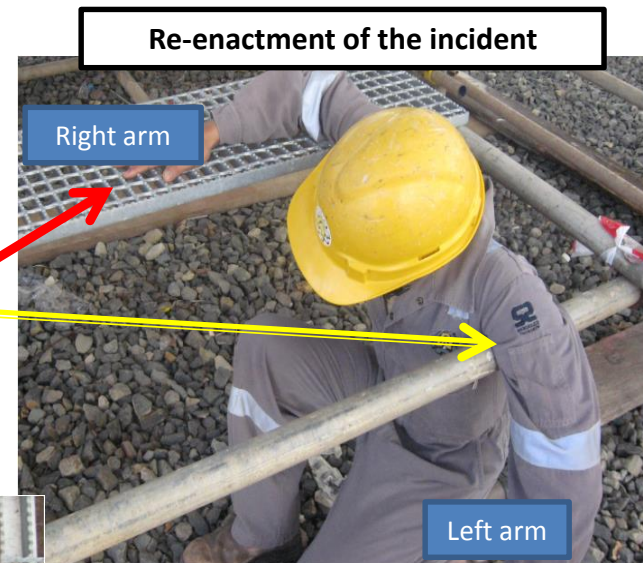
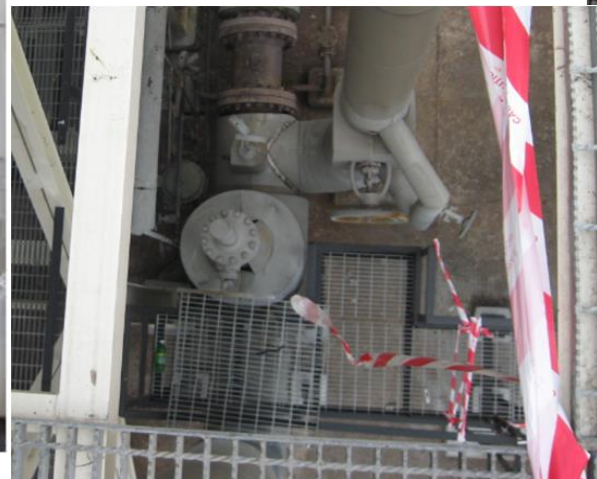
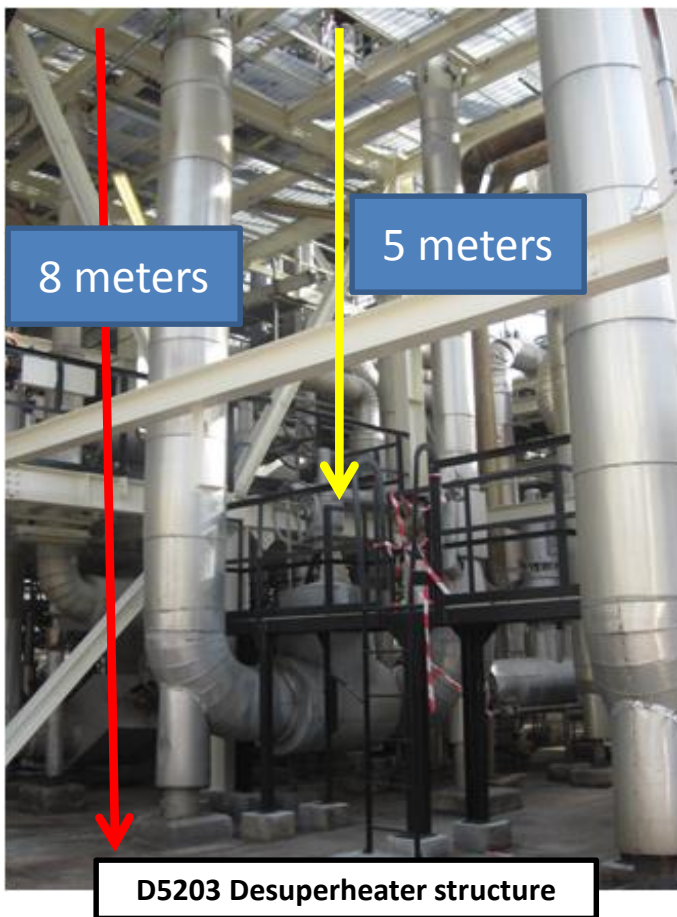
**Actual: People 3**

**Potential: People 4C**

**Medium, Yellow**

# Incident Description

- On the 7<sup>th</sup> March 2015, three (3) scaffolders were carrying out final housekeeping on the second level platform of D5203 after scaffolding dismantling activity was completed.
- One of the scaffolders (Paryano) was picking up remaining scaffold clamps when the grating he stepped on suddenly gave way and the grating fell to the ground.
- Paryano managed to grab and hang on the I-beam and nearby gratings before being pulled out by his co-worker. He was later attended by BLNG medic and taken to the hospital for further assessment.
- The incident was classified as Lost Workday Case and reported as LTI.



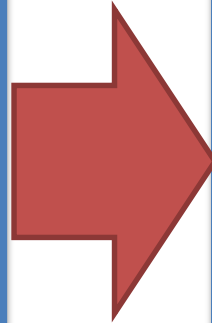
Directly below the gap is a steam valve where Paryano could fatally fall

# Immediate Causes and Latent Failures

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## IMMEDIATE CAUSES

1. Ineffective change management (from checkered plate to grating – before 2000) during execution of Plant Change.
2. Existing flaw in the design of grating was not spotted during the periodic Inspection (every 5 years – last inspection in 2012).
3. Inadequate situational risk awareness of the loose gratings and piles of clips lying around the platform by Operators who carry out operational daily rounds.
4. Ineffective PTW handover by BLNG Work Supervisor and Operator of the work area after completion of blasting and painting job which requires removal of grating – as per HSER-CP-221 procedure.
5. Grating platforms are perceived as safe working area which leads to lack of assessment of the working area.



## LATENT FAILURES

- 1.1 The design did not adhere to Industry Standards. Legacy issue from the past.
- 2.1 The periodic inspection are only focused on structure corrosion and integrity throughout the plant.
- 3.1 Lack of chronic unease within the organization.
  - Risk Normalization
- 4.1 Failed accountability and responsibility within the organization.
  - Assume rather than verify
  - Shifting accountability
  - Trust to avoid conflicts
- 5.1 Lack of chronic unease within the organization.
  - Hazard awareness
  - Risk Normalization



# Swiss Cheese Model

**Working at Height**

Flooring design as per industry standard and MOC/Plant Change

Periodic Grating Inspection

Operator's Daily Rounds – Situational Awareness

Temporary Removal and Re-instate of Floor Grating Procedure (i.e. PTW, JHA, TA/AOT verification)

Last Minute Risk Assessment (e.g. Stepback 5x5) of the job in the area

**A worker was injured when grating gave way**



# Swiss Cheese Model

**Working at Height**

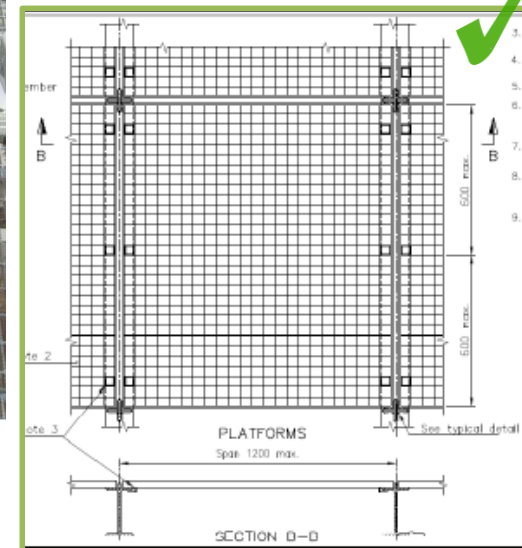
**Flooring design as per industry standard and MOC/Plant Change**

- The requirement for change of flooring from checkered plates to galvanized grating is not effectively managed (MOC or Plant Change).
- The original design was changed and the installation of platform flooring replacement did not comply with industry standards and was inherently unsafe.
- One side of the grating was barely touching the I-beam. And the other support of the grating is located in the middle. These design creates a risk of unbalance to the grating.
- There is a gap in the data and information availability with regards to changes made on the flooring design and installation after 1974.

No support found on the other side of the grating.

The other support of the grating is located in the middle.

One side of the grating was barely touching the I-beam.



# Working at Height

## Periodic Grating Inspection

- Inspection during operate phase is focused on structural corrosion. No explicit formal process of inspecting existing gratings with respect to design.
- Existing flaw in the design of grating was not spotted during the periodic inspection (every 5 years – last inspection in 2012).

ECE FIELD INSPECTION REPORT

To: EPO14

Unit Number/Location:  
RU BLNG

Inspection Report Reference:  
006-FR-13-Civil Inspection-U27500

Cc: EPO1, ECE

Equipment Tag C.I. Tag:  
RU BLNG Utility 1700 Voltag  
RU BLNG Utility 1700 Voltage  
RU BLNG Utility 1700 Voltage  
RU BLNG Utility 1700 Voltag

ECE FIELD INSPECTION REPORT

Date Inspected/Man hours:

From:  
EPO14X ECE/3

Unit Number/Location:  
RU BLNG

Inspection Report Reference:  
006-FR-12-Civil Inspection-U25200

Last IR Date/Last IR No:

Criticality:  
CMPT : 6

Cc: EPO1, ECE

Equipment Tag C.I. Tag:  
RU BLNG Utility 1700 Voltag  
RU BLNG Utility 1700 Voltage  
RU BLNG Utility 1700 Voltage  
RU BLNG Utility 1700 Voltag

SAP Notification/NA  
EPO1 Excavation/201 Plan

Diagram 1

Date Inspected/Man hours:

From:  
EPO14X ECE/3

Attachments:

Last IR Date/Last IR No:

Criticality:  
CMPT : 6

Work Type: NA

Subject: Unit 5700 & U5200 Finding & Condition Category.

Introduction:

This report is established for the purpose to determine the finding and their condition category on detected pipe rack structures for the whole U-5700 / U5200.

The majority inspection has been provided FR using this report to review the condition and summarize recommendations.

All BLNG pipe rack system is to safely support pipe, personnel access facilities, itself etc. Function failure is fail to support pipe, personnel access facilities etc.

Defected pipe rack have been found, all of them is started with degradation of coating then followed by corrosion leading to metal loss and reduction of strength and integrity of structure.

Most of them were designed by using JIS standard (Japanese standard) but some was designed by using either British or Euro standard. The BLNG pipe rack inspection will refer to criteria as given below for the better ones criteria and reference as mentioned above.

Coating and structural survey carried out at U5700 & U5200 including of Pipe rack along Dewaterers & bfw pumps. Pipe rack along boiler to NBL. Pipe rack from utilities to SBL & F3501. Pipe rack at U5700. Pipe rack of south steam condensate tanks. Steam gen & main distribution, Instrument & Tool air system. Not much findings for structure replacements or repair, but mostly coating have been deteriorated as listed photos and recommendation as below:-

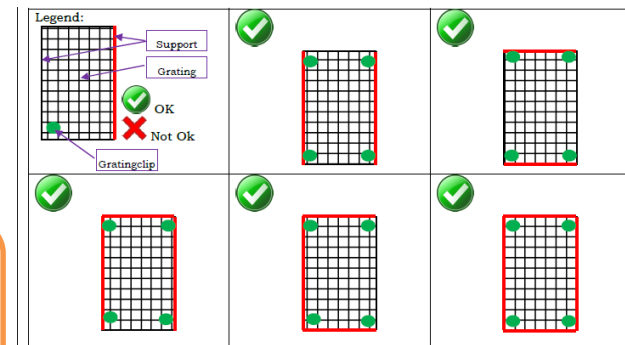
I. General information and limited displacement

Table1: General information for reference.

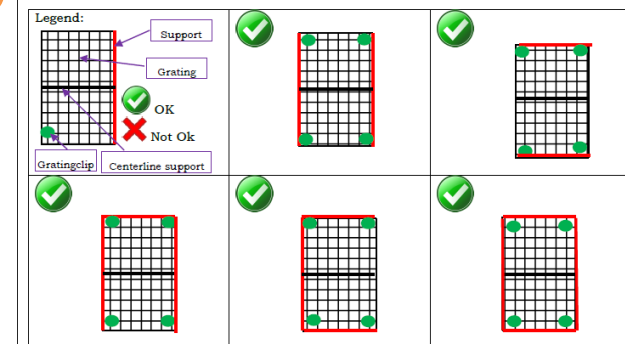
Material	A57M A36
Bolt	4333 Allowable tension stress 2,800 ksi, Yield stress 3,200 ksi
Concrete Grad	30 - BSJ2
Concrete reinforcement	F70 x 400 ksi and 3,000 ksi for deformed bar.
Allowable soil bearing capacity	100 kN/m <sup>2</sup> max
Wind speed	32 m/sec
Maximum beam vertical deflection	1/600 of the span
Maximum cantilever beam vertical deflection	1/750 of the span
Maximum horizontal displacement	1/150 of the height
Thermal load	13% of the maximum weight

No. 1, 2, 3 & 4 are required refurbishment (full blast / paint to No.5 is required Renovation/per BLNG spec system-IC)

2012 Inspection Report of U5200 /U5700.  
This report is established for the purpose to  
determine the finding and their condition  
category on defected pipe rack structures  
for U5700 / U5200 (Not on grating design)



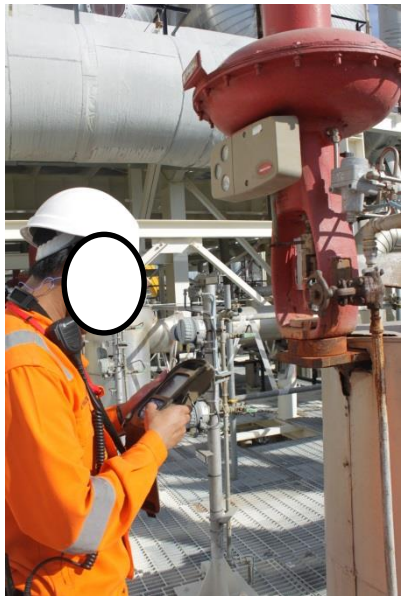
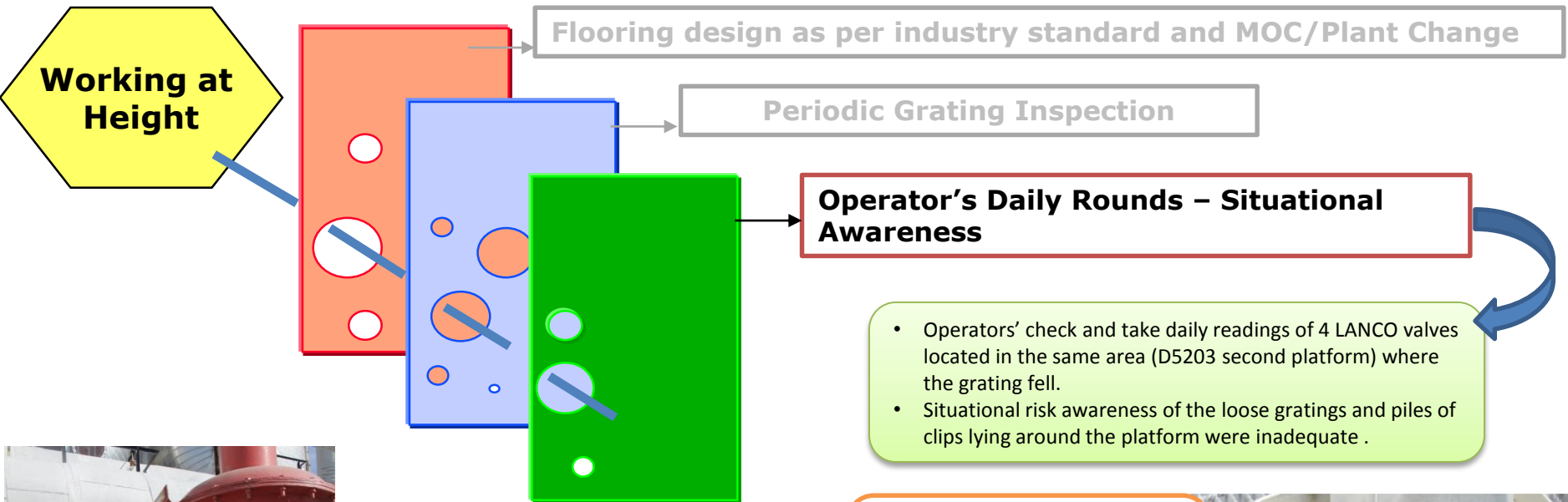
Single Span grating. Note minimum 4 clips required or 4 per m<sup>2</sup>.



Multi-Span grating. Note minimum 4 clips required or 4 per m<sup>2</sup>. Span shall not exceed the grating design limits.



# Swiss Cheese Model



Operator's Daily Rounds at D5203

Grating clips found lying on the platform, level 2 of D5203, where Operators do daily rounds and take daily readings of LANCO valves.



# Swiss Cheese Model

## Working at Height

Flooring design as per industry standard and MOC/Plant Change

Periodic Grating Inspection

Operator's Daily Rounds – Situational Awareness

**Temporary Removal and Re-instate of Floor Grating Procedure (i.e. PTW, JHA, TA/AOT verification)**

- Ineffective PTW handover by Work Supervisor and Area OT of the work area after completion of blasting and painting job which involves removal of grating.

- PTW for Blasting and Painting at U5200 aux. area (PTW 500183518)
- No Permit for grating removal
- No assurance for re-instate of floor grating

**Brunei LNG Sendirian Berhad**  
**Permit to Work**  
 500183518

If you believe that a job cannot be done safely, the job shall not be started or continued

Nature of Work: GLD	Permit Attached:
Permit Number: 500184363	Risk Number: 6
Work Order: 22278739	Date Printed: 03/04/2015
Work Center: BLNGTIRP	Expiry Date: 01/08/2015
Functional Location: BN.BLNG.LTLTY.5200	Main Act Type: CPM Follow-on from PM work
Priority: 6	

Functional Location Text: STEAM GENERATION

**Non-SCE**

Permit Requester: Jafar Sengul

Description of Work: Blasting & Painting @ U5200 aux. area

This permit is renewal of WAP #: 500176152

Description of work:

To carry out wet/dry blasting and painting of Deaerating steel structure Area and structural steel pipe racks at U5200 aux. area.

Scope of work:

- 1) Set up of tools, materials and preparation of habitat for blasting and painting activities.
- 2) Wet/dry blasting and power tooling activities within confined space area and with scaffolding platform / access.
- 3) Spray painting activities within confined space area and with scaffolding platform / access.
- 4) Housekeeping.

Tools and equipment to be used:

Air compressor, air receiver, air cooler, air manifold, blasting pot, blasting nozzle, blasting hose, air hose, pneumatic mixing agitator, airless spray pump, spray hose, spray gun, automatic mixing agitator, airless spray pump, spray gun, air filter, air filter, air fed blasting hood, blower, air ejector, wheel barrow, scraper, adjustable wrench, paint brush, paint roller, wire brush, cup brush, blade cutter, screw driver, hammer, spanner wrench, pipe wrench, open wrench, GI wire, white canvas, blasting grit, drums and shovel.

Measures To Be Taken by Operator:

On Equipment:

- ☐ Blocked in
- ☐ Depressurized
- ☐ Tagged
- ☐ Permit Out (NOC)
- ☐ Spotted / Blinded
- ☐ Ventilated
- ☐ Gas freed
- ☐ Process stopped on overrid
- ☐ Return all access
- ☐ DES, PCC, BUC
- ☐ Machine NG stop
- ☐ Other:

At Worksite:

- PTW for Touch up painting U-5200 structures (PTW 500184353)
- No Permit for grating removal
- No assurance for re-instate of floor grating

**Brunei LNG Sendirian Berhad**  
**Permit to Work**  
 500184353

If you believe that a job cannot be done safely, the job shall not be started or continued

Nature of Work: GLD	Permit Attached:
Permit Number: 500184363	Risk Number: 6
Work Order: 22278739	Date Printed: 03/04/2015
Work Center: BLNGTIRP	Expiry Date: 01/08/2015
Functional Location: BN.BLNG.LTLTY.5200	Main Act Type: CPM Follow-on from PM work
Priority: 6	

Functional Location Text: STEAM GENERATION

**Non-SCE**

Permit Requester: Jafar Sengul

Description of Work: Touch up painting U-5200 structures

Description of Work:

To carry out manual painting of Deaerating steel structure Area and structural steel pipe racks at U5200 aux. area.

Scope of work:

1. Manual cleaning and touch up painting on structures.
2. Housekeeping.

The tools and equipment's to be used:

Wire brush, sanding paper, wheel barrow, scraper, paint brush and paint roller.

Measures To Be Taken by Operator:

On Equipment:

- ☐ Blocked in
- ☐ Depressurized
- ☐ Tagged
- ☐ Permit Out (NOC)
- ☐ Spotted / Blinded
- ☐ Ventilated
- ☐ Gas freed
- ☐ Process stopped on overrid
- ☐ Return all access
- ☐ DES, PCC, BUC
- ☐ Machine NG stop
- ☐ Other:

At Worksite:

TEMPORARY REMOVAL AND RE-INSTATE OF FLOOR GRATING AND GUARDRAIL

Control Procedure

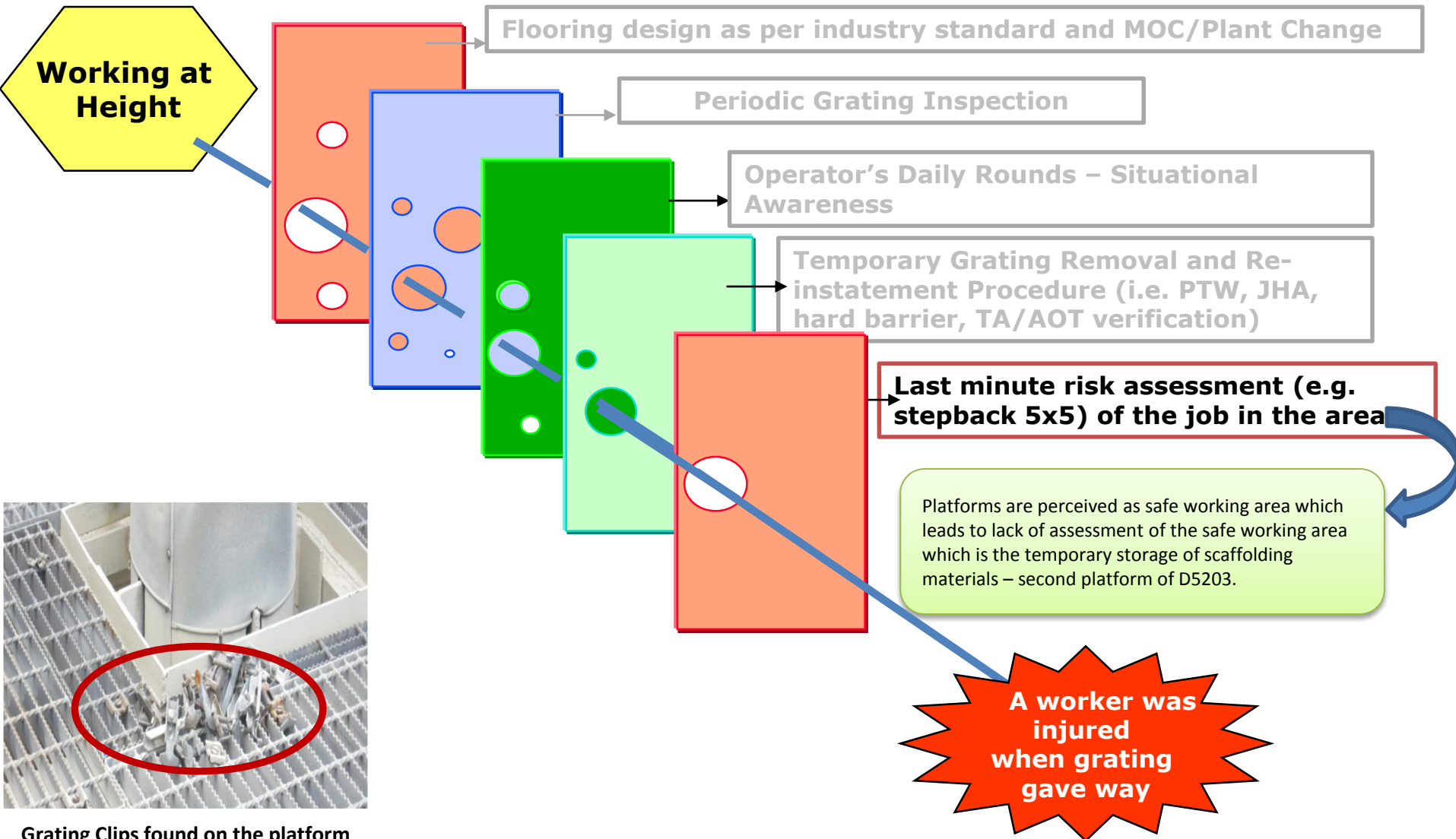
- Procedure requires a separate PTW and JHA for opening and reinstating gratings.
- Provide hard barrier if opening will be kept for a day.
- Requirement of Technical Authority and AOT for

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Process Focal Point/Doc. Custodian:	HSER	Date: 26-11-14
Document Controller:	HSEG	Date: 16-12-2014
Site Process Owner:	HSQ	Date: 16-12-2014

# Swiss Cheese Model



Grating Clips found on the platform

# **Key HSSE Themes from the Grating Incident**

## **1. Safety Intervention Culture / Risk Normalization**

- Operations, Engineering and Maintenance did not highlight the grating clips which are lying around the platform.
- Nobody intervened that the area was not assessed before the housekeeping starts.
- Nobody intervened that the supervisor has no radio.
- Operators and Contractors are used to see gratings without clips and clips left on the platform.

## **2. Roles & Responsibilities -Delegation of accountabilities/ownership (Trust vs Verify)**

- Operators rely on BLNG Supervisors to ensure the area is back to it's safe condition.
- BLNG Supervisors rely on Operators to verify that area is safe when they signed off the Permit.
- No ownership of gratings.

## **3. Management of Change ( MOC)**

- No proper MOC process when checker plates were changed to gratings.
- No proper cascade of the new procedure HSER-CP-221 (Temporary Removal and Re-instate of Floor Grating) to relevant parties.



# **Weak Signals from Previous BLNG Incidents\***

## **1. Safety Intervention Culture / Risk Normalization**

- Unbalance Load during Dismantling of Tower Crane incident:
  - Lack of intervention to avoid conflicts.
- Worker fell down from a jack in piling rig incident:
  - Lack of intervention culture, Normalization of risk.
- M-Spool U/S NRV Leak incident:
  - Culture of avoiding challenge to the Line Management.
- Confine Space Entry into Vessel under N2 Condition incident:
  - Contractor Specialist not involved in method statement discussion and JHA discussion, No Toolbox talks with the Contractor Specialist.

## **2. Roles & Responsibilities -Delegation of accountabilities/ownership (Trust vs Verify)**

- Unbalance Load during Dismantling of Tower Crane incident:
  - Shifting responsibilities from PIC to Specialist.
- Worker fell down from a jack in piling rig incident:
  - Lack of supervision.
- M-Spool U/S NRV Leak incident:
  - Management of activities from behind the desk.
- Confine Space Entry into Vessel under N2 Condition incident:
  - Lack of single point accountability of the job (Reliance on Contractor Specialist)
  - Engineering/Operations do not verify work area is safe for execution of the job.

## **3. Management of Change ( MOC)**

- M-Spool U/S NRV Leak incident:
  - Design changes carried out during Execute phase without following MOC.

# Action Plan

NO.	ACTIONS	HSSE THEME	ACTION PARTY	STATUS
1	Inspection of all gratings in U5200 (found that grating is safe but not as per design).	Safety Intervention Culture	ECE/OPS	Completed
2	Plant-wide inspection of grating (design and degradation) and rectification.	Safety Intervention Culture	ECE	Completed
3	Develop Work Instruction for Grating Inspection.	Safety Intervention Culture	ECE/OPS	Completed
4	Safety Leadership : Go and See Management “Turun Padang” schedule – Visible and felt Leadership.	Safety Intervention Culture	EBLT	Ongoing
5	Safety Leadership : Diagnostic study of the organization and commitment workshop subsequently. In addition to the FLS and crucial conversation trainings.	Safety Intervention Culture	MD	8 <sup>th</sup> June (start date)
6	Conduct a reflective learning from the grating incident with the Frontline Supervisors and Operations. In addition to the timeout session conducted after the incident.	Safety Intervention Culture	HSER	15 <sup>th</sup> June
7	Initiate and implement MOC for safe construction of the platform (i.e. 2-weekly inspection is implemented to ensure safe condition of the platform.).	Management of Change	ECE	Ongoing
8	Include change of flooring material as an example in the list of changes requiring MOC.	Management of Change	TTS	Completed
9	Improvement in communicating procedural change to key stakeholders.	Management of Change	HSEG	30 <sup>th</sup> June
10	Review and update requirement of temporary grating removal and reinstating as per procedure (HSER-CP-221).	Roles and Responsibilities	HSER	30 <sup>th</sup> June
11	a. Assure PTW requirement for temporary grating removal and reinstating as per the updated procedure (HSER-CP-221) through PTW level 3 audit. b. Set clear expectations on roles/responsibilities and interface between various disciplines and Operations.	Roles and Responsibilities	OM	30 <sup>th</sup> June
12	Define and cascade roles and responsibilities expected of Supervisory staff including day schedule (site visibility).	Roles and Responsibilities	EPM/OPS	15 <sup>th</sup> June
13	Identify opportunities for improvement in the emergency notification process between Supervisors and Operations.	Roles and Responsibilities	HSER/2	15 <sup>th</sup> June