



中華電力

CLP Power

An Integrated Operational Risk Management Framework for Power Generation

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Introduction



Excellent risk management is one of the keys being able to successfully manage the operation and consistently meet the responsibility.

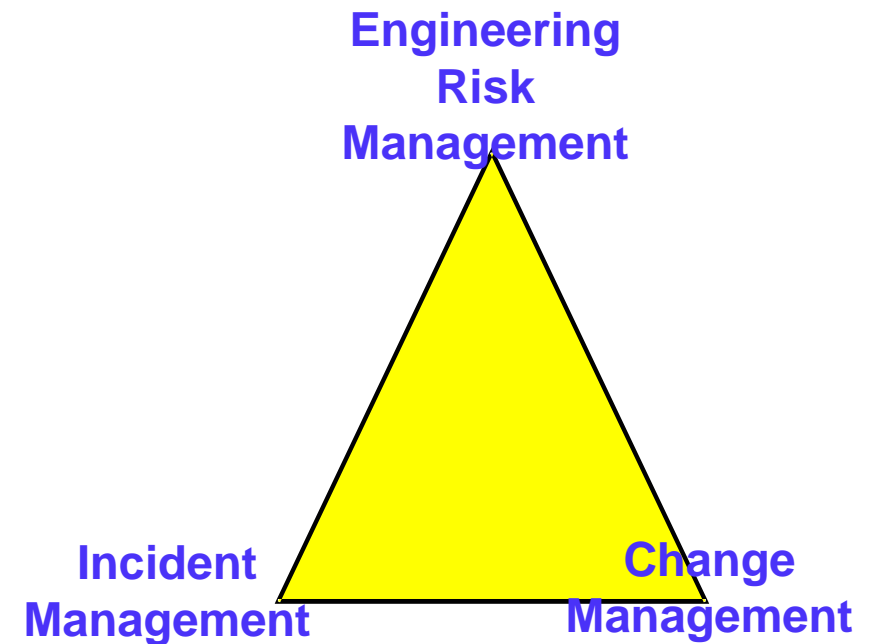
An integrated operational risk management framework was developed and applied in power generation environment.

Key elements in operational risk management



A successful operational risk management framework needs to have the following elements :

- Engineering Risk Management
- Incident Management
- Change Management



Lacking any one of element may lead to severe plant failure or incident.

Definition on Operational Risk Management



Risks should be considered on a business-wide basis including strategic, financial, operational and other hazard

Not all risks are material – It depends on their potential impacts on the value of the business

Uncertainties where actual outcomes may differ from expected outcomes

The approach should be a regular process, not a one-time event

Operational Risk Management – the process of systematically and comprehensively identifying critical risks, quantifying their impacts, and implementing integrated risk management strategies to maximize enterprise value.

The enterprise should develop and execute strategies to avoid, mitigate and finance risks

Optimize the balance between risk and return

Individual risks are prioritized using the common language of 4x5 risk matrix

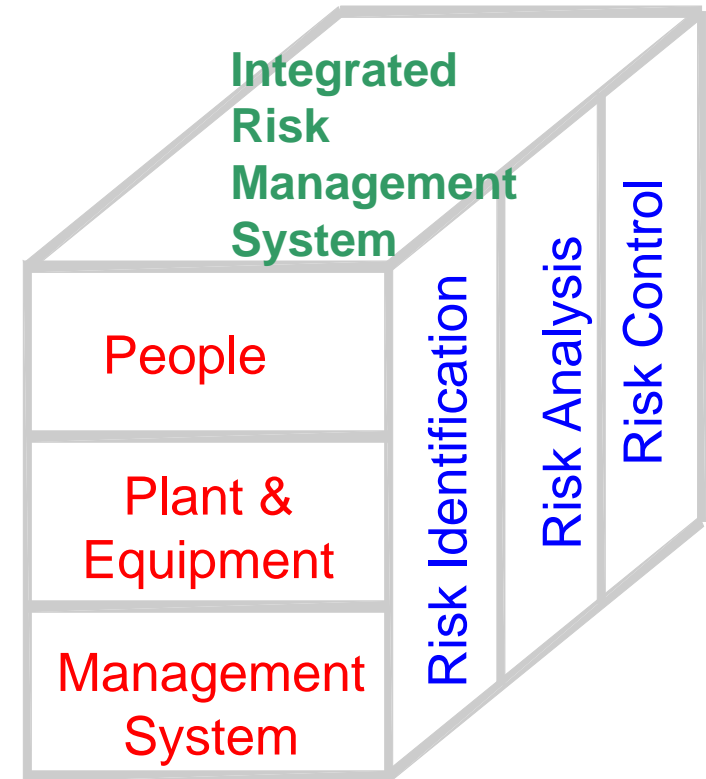
The “Goal” of Operational Risk Management



We recognised that ‘zero risks’ are not possible in real life, operations environment is dynamic.

With a structure and systematic risk management approach, we can migrate risks before they became critical to our business. We can focus sufficient resources and efforts to achieve

- Zero accidents
- Zero non-compliance
- Zero wasted energy



Operational Risk Management Framework

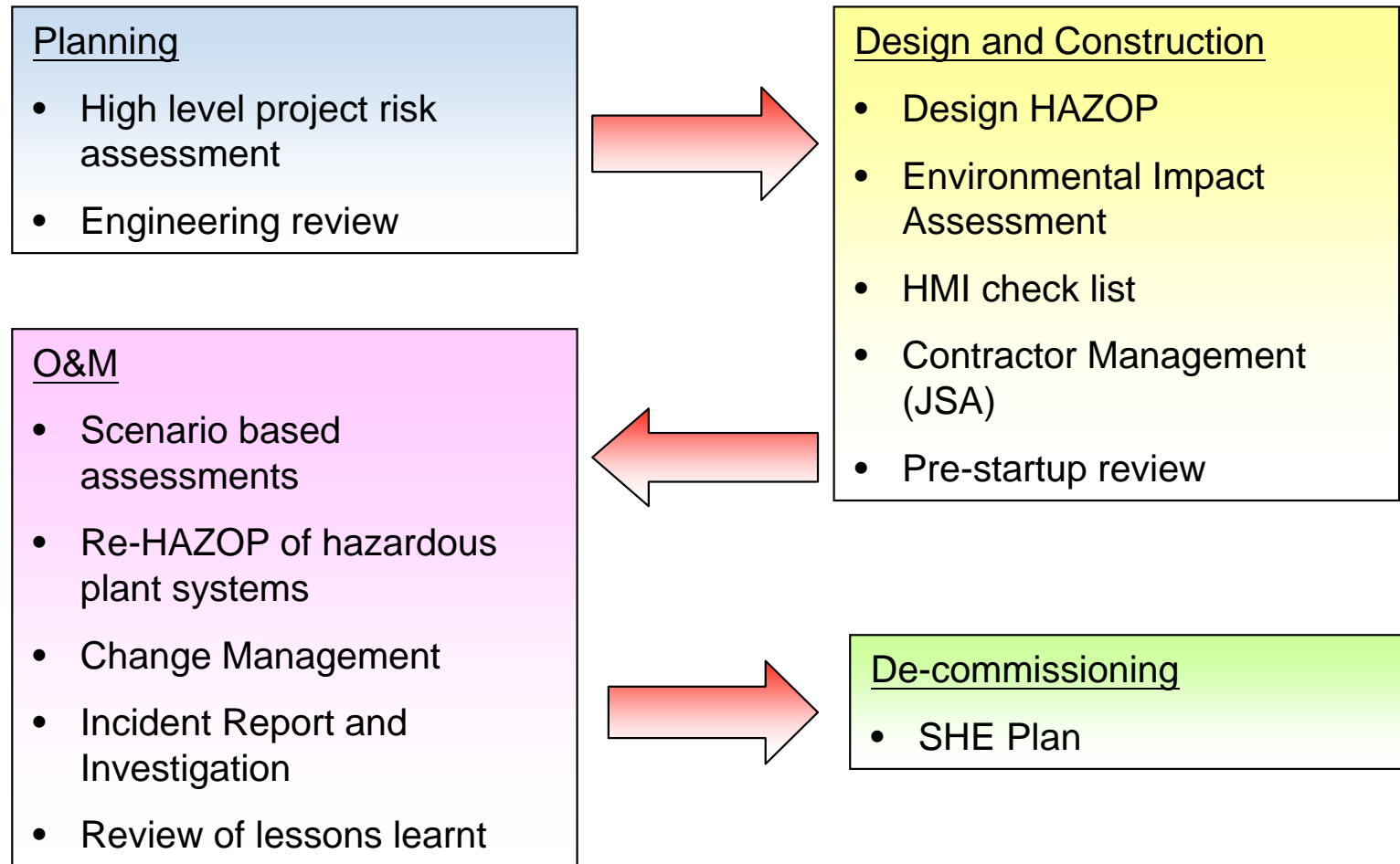


Plan – Do – Check – Act principle applies for continuous improvement

Risk Management in Plant Life

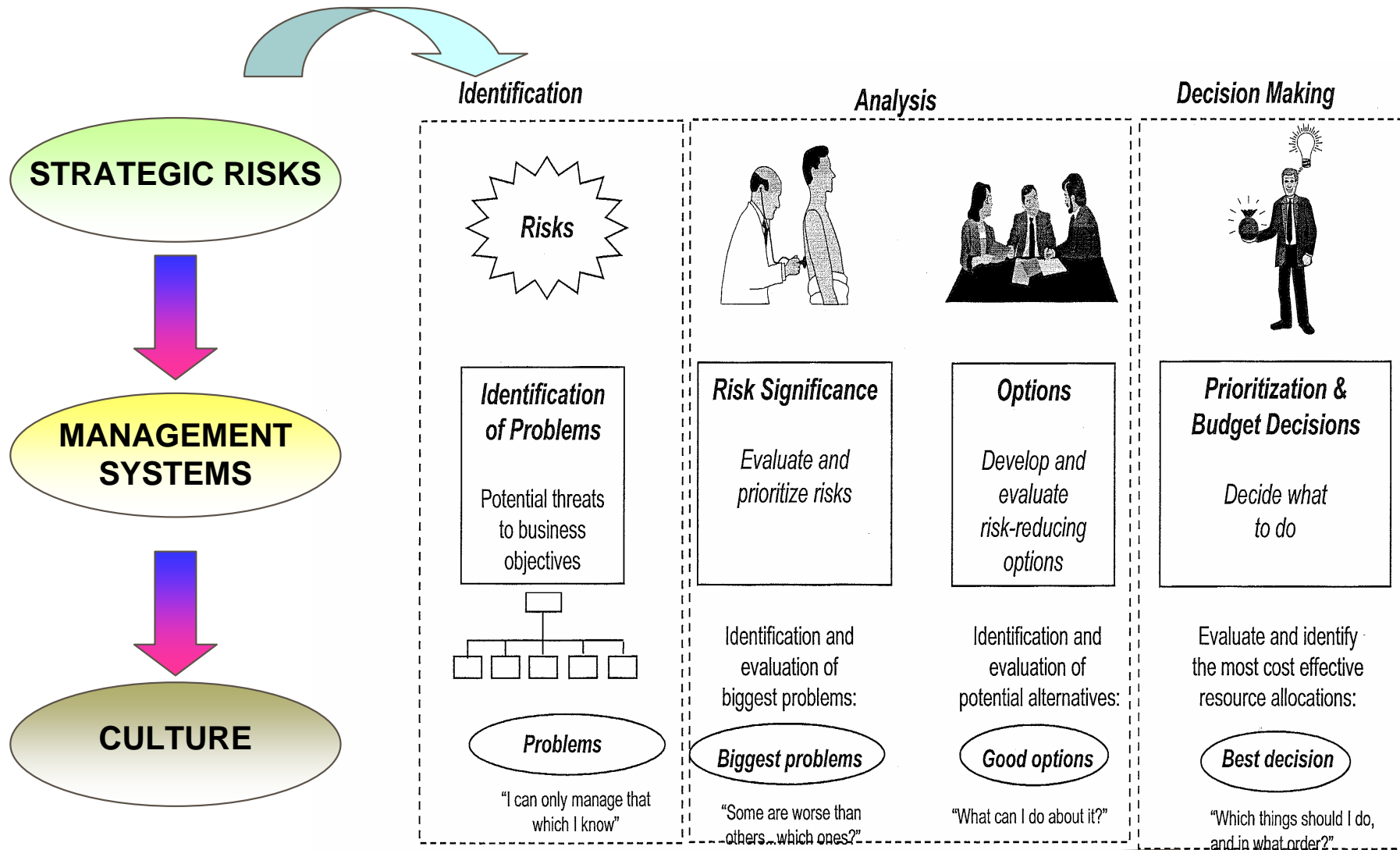


- Risk Management in Power Plant is a journey. It needs to start early.



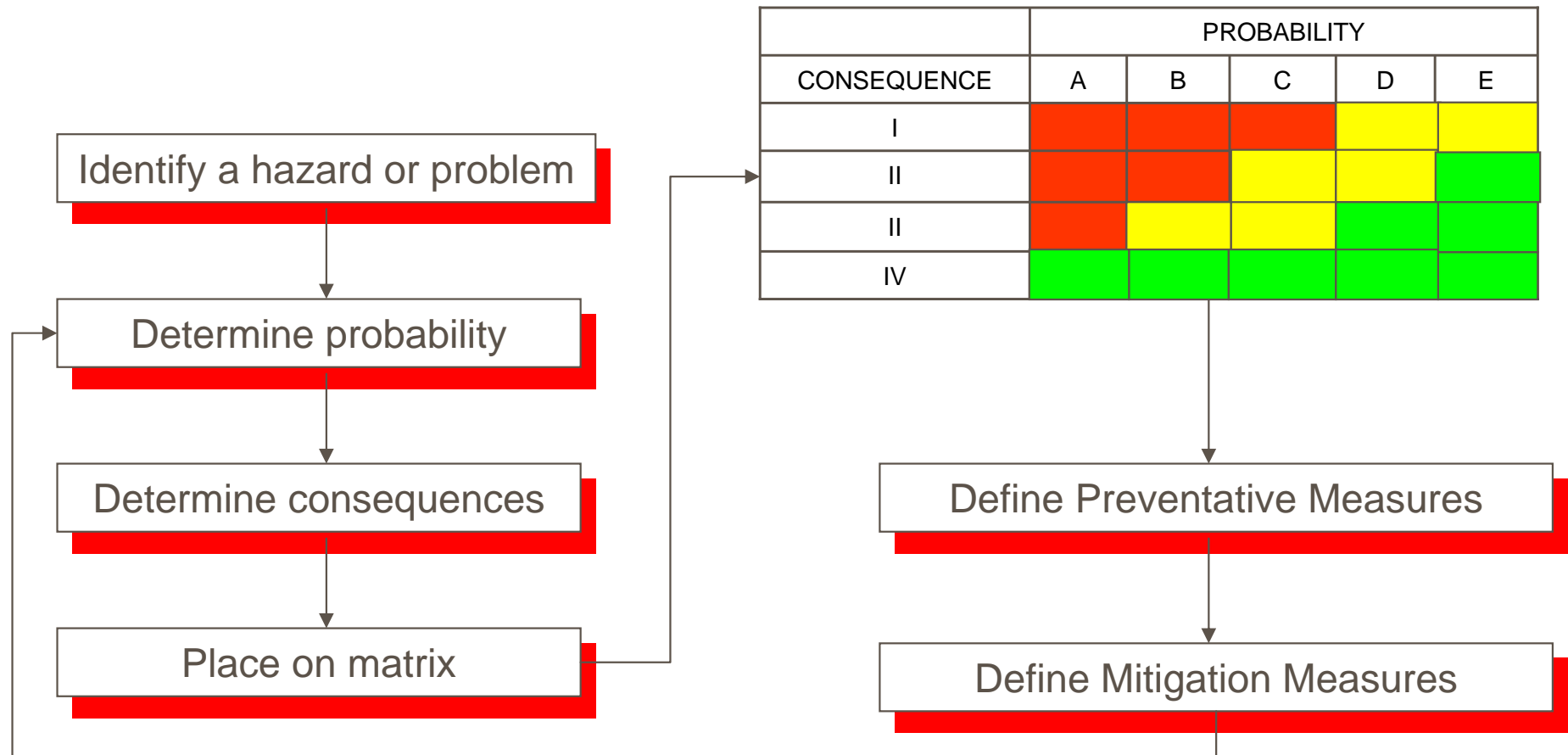
On-going risk-related activities are essential

Risk Assessment





Qualitative Risk Assessment Steps





Risk Reduction Options

- **NOTHING IS ABSOLUTELY SAFE**
- Some risk can be tolerated
 - ❑ Matrix placement defines the view of acceptability of risk
 - ❑ Need to define if “As Low As Reasonably Practicable” (ALARP)
 - ❑ Regulatory requirement to achieve ALARP
 - ❑ Have a duty to implement inexpensive risk reduction measures to achieve ALARP even if risk is otherwise tolerable
- Unacceptably high risk can be reduced to a tolerable level by :
 - ❑ Improving prevention (reducing probability)
 - ❑ Improving mitigation (reducing consequence)

Change Management





Change Management

❖ A change can have the following adverse impact on :

• SHE Risk

• Regulatory Compliance Related

• Plant Integrity and Reliability

❖ The objectives of Change Management are :

• Changes are identified and documented

• SHE impacts, regulatory compliance and plant integrity impact are assessed and managed

• Changes are communicated to affected parties



Three Types of Changes

- ❖ **Emergency Change** – Emergency basis and need to carry out as soon as possible.
- ❖ **Temporary Change** – Temporary basis such as trial run for a period.
- ❖ **Permanent Change** – Permanent on plant system and proper documentations are required.

Change Management Process Diagram



Applicable to all changes that can have:-

- Adverse Impact on Safety, Health & Environmental.
- Impact on Plant Integrity & Reliability.
- Regulatory Compliance aspects of the business activities.

GBG CHANGE REQUEST FORM

CR NUMBER: _____ DATE RAISED: _____
 OBLIGATOR: _____ (Approved by MOC Administrator) SIGNATURE: _____
 DEPARTMENT: _____ BRANCH/SECTION: _____

A. INITIATION to be completed by Originator

A1. Nature of Change
 Permanent
 Temporary Sun. Date: _____ End Date: _____
 Emergency Sun. Date: _____ End Date: _____

A2. Location of Change
 Area: CVPS EPSS VEPS MB Tel: _____
 Others: _____ (Please specify)

A3. Description of Change _____

A4. Reason for Justification of Change _____

A5. Change Identification
 Does the result from the questionnaire justify the change?
 Yes, proceed as above unless advised from your
 No, abandon Change Request. You decide, state
 Change Responsible Person (CRP) assigned: _____ Name: _____
 Initiated by Branch Head: _____ Name: _____

Preparation and Initiation

Risk Assessment Work Sheet

Project: EPFS OT Gas Filter Replacement Revision: _____ Date: 20 June 2003 Leader: Anthony Session No.: _____
 System: Change of Podet Type Prefilter Node No. _____ Member: W.K. Yip, C.K. Lo, W.C. Shui, C.F. Yau, H.T. Leung

Design Intention: _____
 Drawing No. _____

| Issues | Possible Causes | Possible Consequences | Control Measures | C | L | R | Recommendation | By | Priority |
|----------------------|---------------------------|--|---|---|---|---|--|---------|----------|
| 1. Water penetration | Heavy Rain storm, Typhoon | The roofdrains are wet, and water droplets are formed and accumulated on the corridor floor inside filter house. | According to the supplier response, the prefilters and collector function. The rain water should be directed to the existing collector drains at the front where the drain pipes are available to drain away the water. | | | | 1. To regularly check and ensure the filter house drainage system is free from blockages. 2. To drill additional drain holes near the filter houses, connect with the existing drain pipes to improve drainage. 3. Consider to install a curb along the floor side of the filter house to prevent water ingress in event of flooding due to blockage of drainage. 4. Conduct water jet test to test the water holding capability of | GMG/MPG | M |
| | | | | | | | | GMG/MPG | H |
| | | | | | | | | GMG/MPG | L |
| | | | | | | | | GMG/MPG | M |

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Risk Assessment

F. CLOSE OUT REVIEW to be completed by Change Responsible Person

Completion of Change

Documents updated: Drawings updated? Yes N/A
 Operating Instructions updated? Yes N/A
 Maintenance Instructions updated? Yes N/A
 Other Documents reported (please specify) _____

Recommendation of Risk Assessment implemented? Yes N/A

Comments: _____

Change Responsible Person Signed: _____ Date: _____ Branch / Section: _____
 Branch Head signed: _____ Date: _____ Branch / Section: _____
 MOC Administrator Signed: _____ Date: _____ Branch / Section: _____

Close- Out

E. IMPLEMENTATION to be completed by Change Responsible Person

Implementation

E1. For Permanent Change:
 Change / Modification implemented by: _____ Branch / Section: _____
 Start Date: _____
 Completion Date: _____
 Is additional training required? No Yes (Please specify) _____

E2. For Temporary/Emergency Change: (cross out wherever not applicable)
 Proposed Temporary Change Expiry Date: _____
 Restore to Normal Date: _____
 Remarks: _____

Implementation



Committee Approval

Incident Management



Incident Management



Key objective of incident management is to share the lessons learnt from incidents and hence prevent reoccurrence of incident. It relies on:

- Consistent and systematic investigation methodologies
- Neutral and independent investigation team
- Quality of investigation and the implementation progress of remedial actions
- Total Involvements from relevant departments

Minimises Risk, Establishes Safe Working Environment, Achieving
Zero Accidents

Incident Management



The following incidents were classified :

- Plant related incident
- Safety, Health and Environment related incident
- Security and miscellaneous incident
- Near miss cases

All the incident must be reported within a defined timeframe and a computerized reporting system is used to manage the process.



“From Cradle to Grave”

1. Report Incident (via web based IT system).
2. Verification by respective incident administrators.
3. Investigation Team Formation according to incident severity (0,1,2 &3).
4. Conduct investigation & issued investigation report.
5. Incident Review Committee meets every month to review all incidents.

Formation of incident investigation team



| Level | Chairman of Investigation Team | Investigation Team Member |
|-------|--|--|
| 0 | Team Leader of line department | Team Leader of relevant department |
| 1 | Branch Head of Line Department | Team leader of relevant department |
| 2 | Independent Department Head | Branch head of relevant department |
| 3 | Enquiry board appointed by senior management | Enquiry board appointed by senior management |



Investigators must receive proper investigation training

Incident Review Committee and Meeting



❖ Purposes:

- All incidents are properly investigated according to the Investigation team formation guideline
- Root cause of major incidents are identified
- Appropriate action is taken to avoid recurrence of similar incidents.
- Implementation of the actions is taken in a timely manner
- Learning from the incidents is disseminated.



Meeting is arranged every month to discuss the incident

Incident Management Process Diagram



- One –stop web base IT platform
- Automation for incident reporting, notification and monitoring of follow-up actions

Welcome to GBGIRIAS

Reporting

GBG Incident Reporting, Investigation and Analysis System

Near Miss Incident Report Form

Notification

Notification of incident 00690 - Message (HTML)

From: Wong, Chi Ho
Sent: Tuesday, September 03, 2002 1:26 PM
To: Wong, Joe Nam
Subject: Notification of incident 00690

Incident Information Summary

Incident No. 00690
Status Confirmed
Incident Type Near Miss Case
Incident Date 2002-08-27
Location Black Point Power Station - Common Plant
Incident Description STP Total Chlorine High

Incident Recommendation Input Form (Logon User: KL05646)

UPDATE recommendation for incident 00690:

Recommendation: Fine tune the total chlorine alarm setting at BPPS OCR

Action Progress: The new STP high level alarm activated in BP OCR was due to defect of two circulation pumps. No effluent circulation caused chlorine trapped at the dosing point.

Status: Action completed

Action Department: Generation Operations

ODMS System: []

Causal Factor: []

Estimated Completion Date: 2002-10-31

Actual Completion Date: 2002-10-11

Remarks:

Input Field Labels: Label, Mandatory, Label, Optional

Follow-up

Incident Recommendation Update Form

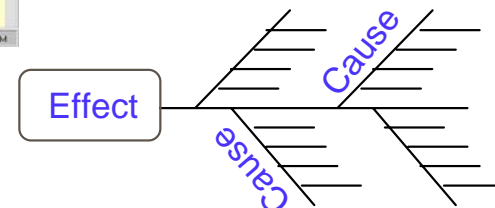
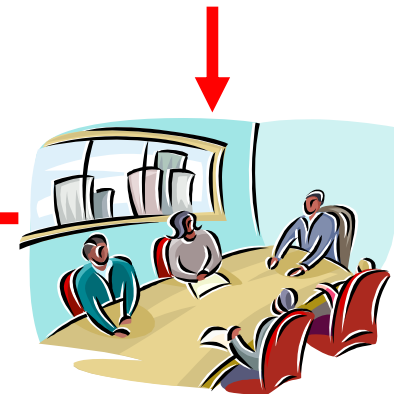
Incident Information

| | | | |
|--------------------|--|------------|---------------------|
| Incident No. | 00690 | Risk Level | |
| Init. By | CK04390 | Date/Time | 2002-09-02 16:49:00 |
| Incident Date/Time | 2002-08-27 04:08:00 | Status | Confirmed |
| Location | Black Point Power Station - Common Plant | | |
| Incident Type | Near Miss Case | | |
| Short Description | STP Total Chlorine High | | |

Solution

| No. | Details | Action |
|-----|--|-------------|
| 1 | Fine tune the total chlorine alarm setting at BPPS OCR. | [V] [E] [D] |
| 2 | Prepare procedure for the scenario of high level total chlorine alarm | [V] [E] [D] |
| 3 | Display the total chlorine level (reading) in the BPPS OCR. | [V] [E] [D] |
| 4 | Add a remote controllable gate valve at chlorination tank discharge point. It would allow operator to stop effluent discharge and the transfer pump. | [V] [E] [D] |

Root Cause Analysis



Relationship between Each Element

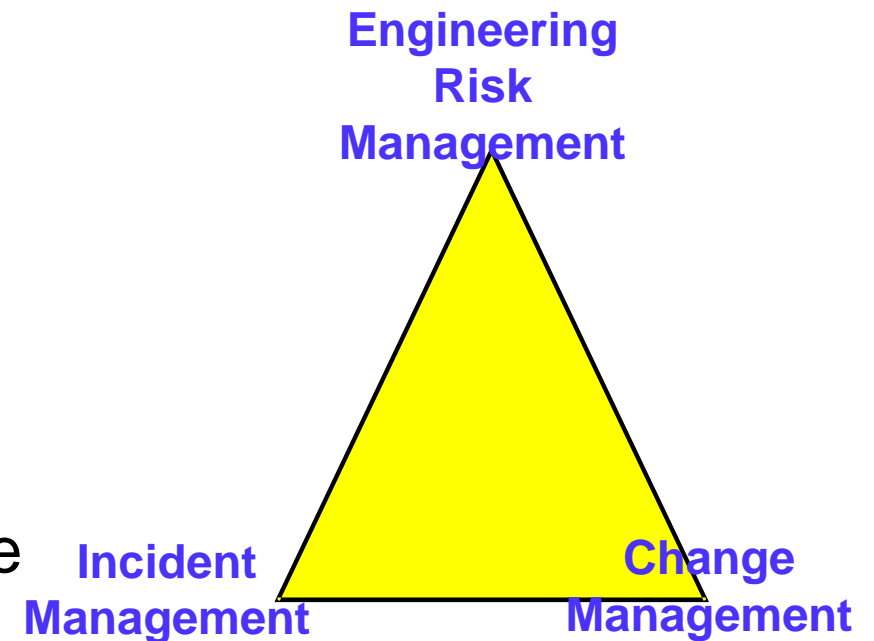


- In order to prevent the occurrence of **incident**, proper **risk management** are required on different plant system.
- When **changes** are required on the plant system, **risk assessment** and appropriate approval is required for the changes.
- Most of the potential risk can be reduced after the risk identification and appropriate mitigation measures.
- In case of **incident**, lessons learnt and sharing is the key to prevent re-occurrence of incident. Further **risk assessment** will be carried out if required.



Conclusion

- The operational risk in the power generation can be proactively managed by integrated operational risk management framework.
- The key elements including engineering risk management, incident management and change management.
- Strong belief of risk culture is required for implementation of the framework into day-to-day business.





Thank You !!

