Emergency Aspects of Safety Case

CPT Teo Soon Chye, SCDF

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MINISTRY OF MANPOWER

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Introduction

Aim of Chapter 6:

- MHIs to demonstrate that they have taken the measures necessary to limit the consequences of a major accident and an emergency response plan has been developed to take these into account

- The emergency response measures should be fit for purpose and cross-referenced to the MASs described in the Safety Case

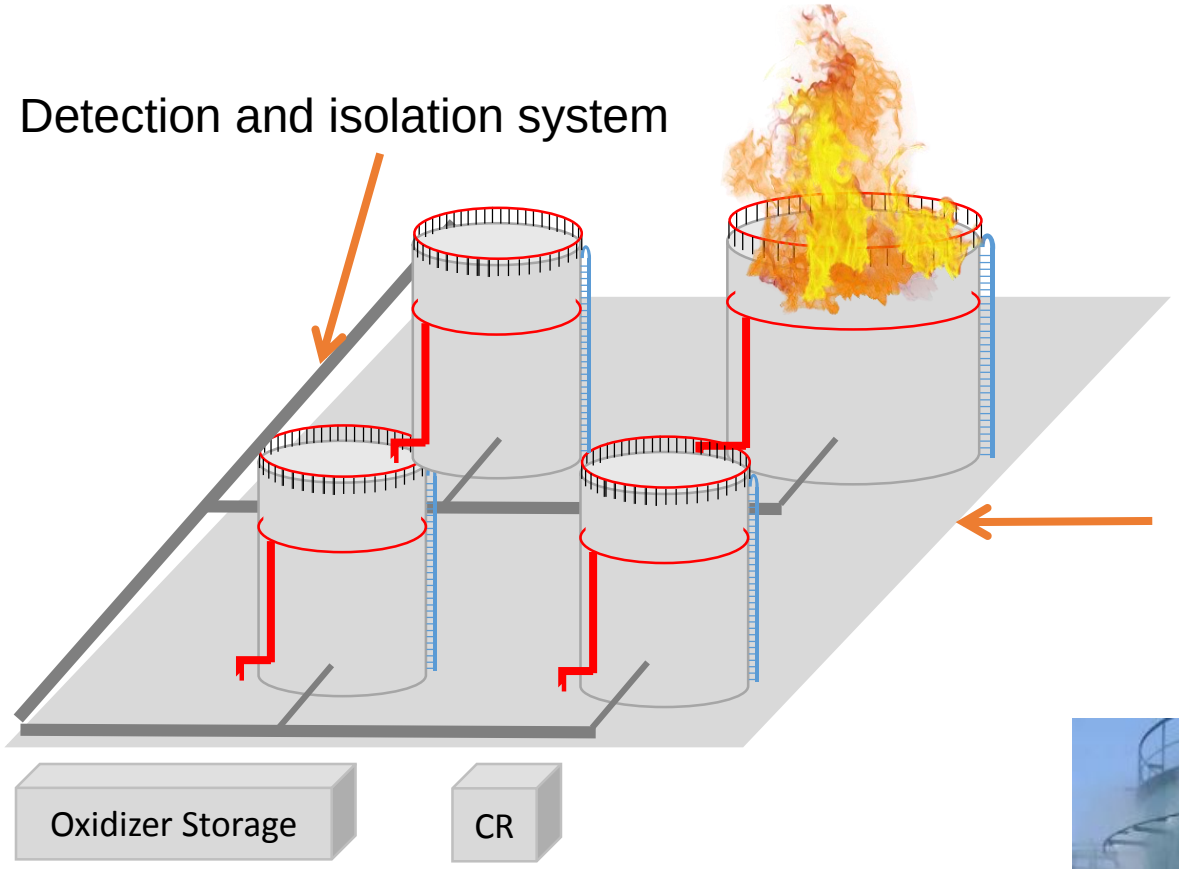
- The safety case shall also provide, wherever relevant, the list of applicable regulations, standards and codes of practice that have been followed

Assessment Guide Criterion

Technical Criterion	Description
Criterion 6.1	Equipment and systems installed to limit consequence of major accidents
Criterion 6.2	Organisation, arrangements and provisions for the alerting and intervening in the event of a major accident
Criterion 6.3	Description of mobilisable resources
Criterion 6.4	Maintenance and inspection of emergency response equipment
Criterion 6.5	Training for emergency response
Criterion 6.6	Testing of emergency response plan
Criterion 6.7	Preparing the emergency response plan
Criterion 6.8	Review of ERP

Criterion 6.1: Equipment and Systems Installed

Hypothetical Crude Oil Storage Tank on Fire (One of the representative MASs)



Foam pourer system

Water deluge system

Criterion 6.2: Organisation, Arrangements and Provisions for Alerting and Intervening in the Event of a Major Accident

SINGAPORE POLICE FORCE

XYZ Pte Ltd

SCDF
The Life Saving Force

National Environment Agency
Safeguard · Nurture · Cherish

Mutual Aids

Criterion 6.2: Organisation, Arrangements and Provisions for Alerting and Intervening in the Event of a Major Accident

- Nature and Location of:
  - Key control points (e.g. staging, assembly area)
  - First aid point
  - IPP facilities
  - Facilities that requires special rescue operations (e.g. confined space) or special protection (e.g. nearby oxidizer storage)
- Location of access routes for emergency services, escape routes etc
- Occupancy load during peak and non peak periods
- Establishment of communication during incident

Criterion 6.3: Description of Mobilisable Resources

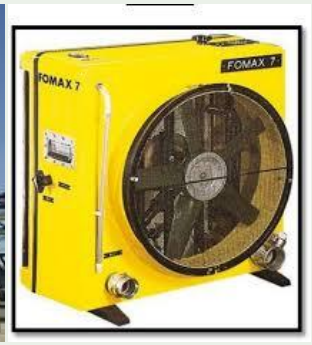
- The safety case shall describe the resources which can be mobilised. The description should be in sufficient detail and relate to MASs described elsewhere in the safety case. In this way, MHIs should be able to demonstrate that there are necessary and suitable resources available to contribute to the overall measures necessary to limit the consequences of a major accident to people and to the vicinity.

- The information required are:
  - Human resources;
  - Hardware fit for purpose when called upon;
  - Personal protective equipment;
  - Fire-fighting and fire protection;
  - Minimising the release and limiting the consequence of dangerous substances;
  - Monitoring and sampling;
  - Provisions for clean-up;
  - First aid and medical treatment; and
  - Ancillary equipment.

Criterion 6.3: Description of Mobilisable Resources

Mobilisable Resources	Description
Human resources	 
Equipment	   
PPE	   

Criterion 6.3: Description of Mobilisable Resources

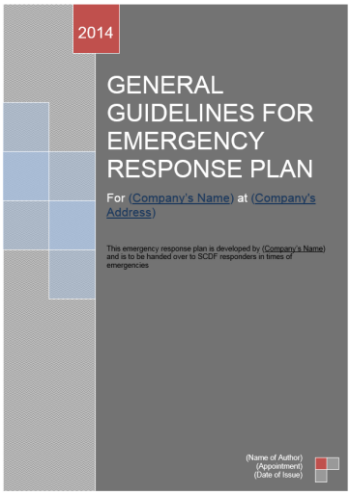
Mobilisable Resources	Description
Firefighting and fire protection provisions	  
Provisions to minimize consequence of LOC of toxic and flammable substances	   
Monitoring and sampling	 

Criterion 6.3: Description of Mobilisable Resources

Mobilisable Resources	Description
Provisions for clean-up	 
Provisions for first aid, decontamination points etc	  
Ancillary equipment	 

Criterion 6.7: Preparing the Emergency Response Plan

- MHI shall prepare a series of scenario-specific emergency plans that can be used by incident responders
- They should cover, as a minimum, SCEs identified in a safety case and off-site consequences from neighbouring MHIs encroaching into your premises
- It aims to achieve the following objectives:
  - Better appreciation of on site risks for all parties who play a part in emergency response
  - Helps MHIs conduct an assessment whether they are sufficiently resourced to handle the SCEs identified
- An example of a scenario specific emergency plan is given in the assessment guide
- These plans shall form part of Chapter 3.2.3.2 of the SCDF Emergency Response Plan template



3.2.3.2 Fire Fighting, Hazmat Monitoring, Containment and Rescue Procedures*

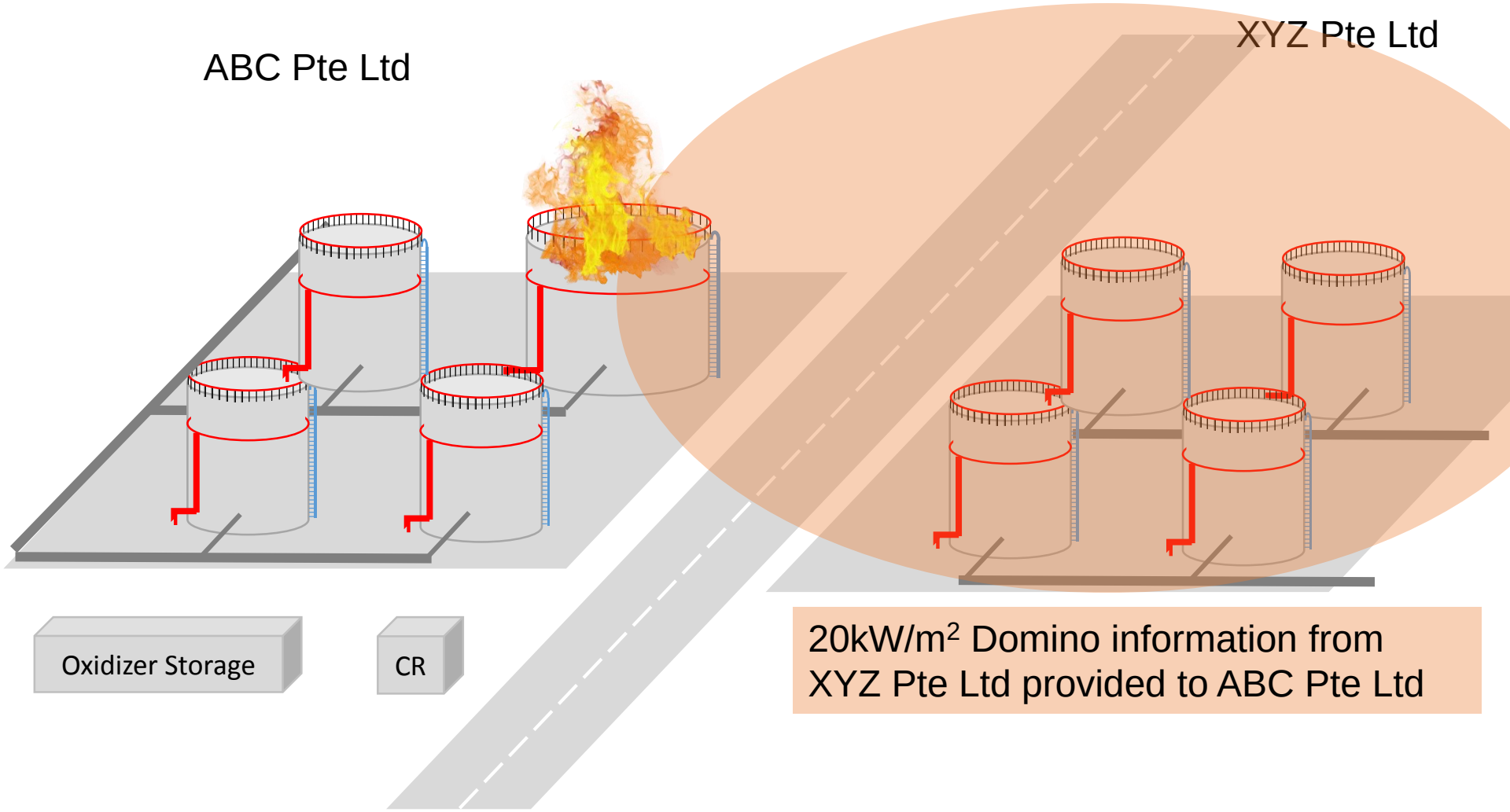
To describe the fire fighting, hazmat containment and monitoring (from spill, leak, vapour release, etc), rescue and any other procedures which will be carried out to mitigate the incident.

To tabulate the information (type, quantity, general function/purpose and location) of the portable and deployable fire fighting, hazmat containment and monitoring and rescue equipment (e.g. fire hoses, fire nozzles, fire engine, foam concentrate, spillage kit, portable gas detectors, harness, ropes, etc) and fixed fire safety provision (e.g. fire hydrant, fixed monitor, etc) that are available in the installation.

* **MHIs** should use safety critical events from their safety case to develop scenario-specific emergency plans. (An example is provided in **Annex E1)**.

Criterion 6.7: Preparing the Emergency Response Plan

Hypothetical Crude Oil Storage Tank on Fire (One of the representative MASs)



Criterion 6.7: Preparing the ERP (SCE Example)

Emergency plan for:		**Full Surface Fire of Tank 21**		
Strategy:		The major accident mitigation strategy which states the overall objectives to prevent escalation and bring the incident under control		
Immediately	Actions	Equipment	Resources	Comments
Usually control room or site personnel who will notify relevant authorities and companies, alert, shutdown and evacuate etc.	First person who discovered the fire activate the nearest fire alarm call point / Notify FCC of the incident. Call 995, activate CERT and/or 3rd party fire brigades and SMEs, isolate pipelines, initiate evacuation procedures, notify XYZ Pte Ltd etc.	What equipment are required to carry out the actions? Valves or devices to isolate.	Can be CERT, fire wardens, FSM etc.	As required.

Criterion 6.7: Preparing the ERP (SCE Example)

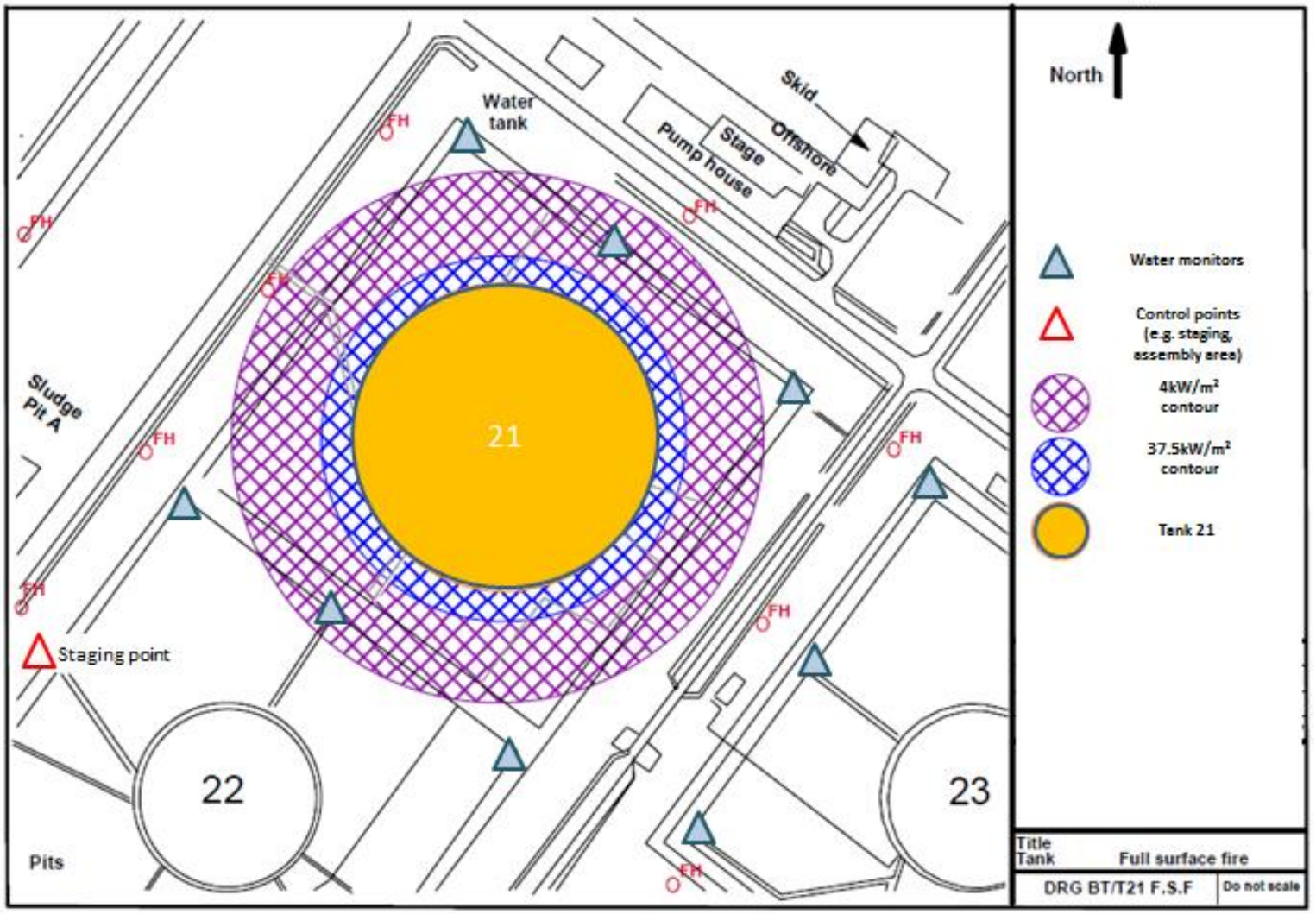
1st response	Actions	Equipment	Resources	Comments
May be CERT and/or 3rd party fire brigade.	Sizing up of incident. Logical step-by-step actions necessary to isolate the fuel, or carry out initial incident control actions.	Fixed equipment systems installed onsite such as deluge system, foam pourer. Portable fire equipment for initial control. Any water or foam monitors required. Appropriate PPE etc.	Amount of foam concentrate and water required. Fire hose/nozzles required. The number of hose will be based on the hydrant locations and fire vehicles used. The fire vehicles from CERT or 3rd party fire brigades.	As required.

Criterion 6.7: Preparing the ERP (SCE Example)

2nd response	Actions	Equipment	Resources	Comments
Linking up with SCDF. Site personnel may be required to do other tasks at this stage.	Logical step-by-step actions necessary to control and mitigate the incident.	Fixed equipment systems installed onsite. Any water /foam monitors required.	Resources available to assist SCDF operations: e.g. foam concentrate and water supply	Foam applied at pertinent application rate etc.
Ongoing potential hazards: If uncontrolled, a boilover may take place. May cause neighbouring tanks to catch fire. Consider shifting oxidizer to a safer location or conduct cooling etc.				
Other issues: Any other issues, e.g. combustion gas releases, public exposure. Is water supply sufficient if large monitors and water deluge system are activated at the same time?				

Criterion 6.7: Preparing the ERP (SCE Example)

Example of Hazard Effects Map for Scenario-Specific Emergency Plans



Criterion 6.7: Preparing the ERP (Domino Impact Example)

Emergency plan for:		**Oil tank fire in XYZ Pte Ltd**		
Strategy:		Conduct cooling operations on Tank 21, 22, 23 and 24		
Immediately	Actions	Equipment	Resources	Comments
Usually control room or site personnel who will alert personnel on-site, shutdown and evacuate etc.	Isolate pipelines filling up the tanks. Activate water deluge systems / water monitors Initiation evacuation	Fixed deluge systems / fixed water monitors for cooling operations	Can be CERT, fire wardens, FSM etc.	As required.
Ongoing potential hazards: If uncontrolled, a boilover may take place. May cause neighbouring tanks to catch fire. Consider shifting oxidizer to a safer location or conduct cooling etc.				
Other issues: Is water supply sufficient if large monitors and water deluge system are activated at the same time?				

Criterion 6.7: Preparing the Emergency Response Plan

- With the relevant justifications, MHIs are given flexibility to submit their ERP together with the scenario-specific emergency plans as an annex to the Safety Case during:
  - 1st submission;
  - Interventions or;
  - by the 2nd Safety Case submission

- While preparing your scenario-specific plans, MHIs are still required to submit their ERP to NEA or SCDF annually as part of the licensing requirements

Thank You