11th Chemical Process Safety Sharing (CPSS)

# Thai Oil's Emergency Management Journey


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# Brief History of Presenter

## SUMMARY

Globally recognized Crisis, Emergency management, Emergency Response, Oil spill, fire protection, Health, Safety, Security professional with experience and expertise in oil and gas, manufacturing, power generation, aviation, & mining sectors.

Lived/worked in and from Thailand since 1995.

## WORK EXPERIENCE

- Thai Oil CFP Fire, Safety and Emergency Response Specialist
- Kiwi Resource Protection Thailand - General Manager
- Shell Global Solutions – Global Fire Safety Systems and Emergency Management Specialist
- New Zealand Refining Company – Crisis and Emergency Response Manager
- New Zealand Refining Company – Senior Shift Emergency Responder
- 1995 – 2001. Thailand. Kiwi Fire Emergency Response Specialist. General Motors Project Manager.
- New Zealand Electrical & Instrumentation certified technician

## CERTIFICATIONS & MEMBERSHIPS

- NFPA Member since 2012
- Institute of Fire Engineers (Member) Degree equivalent
- IMO Levels 1,2 & 3
- Incident Command Systems 100,200,220,300
- Global Wind Organization Instructor
- International Technical Rescue Association Instructor
- TEEX Instructor
- Thailand Safety Officer in Management
- Experienced with QRA, HAZOP, HAZID, Technical process safety
- Shell Technical Process Safety TA3
- Shell FRED/Shepherd/PIPA user-instructor.

**New Zealand Qualifications**

- National Certificate in Advanced Industrial Fire and Rescue Services – Incident Commander.
- National Certificate in Industrial Emergency Response Advanced Responder
- National Certificate in Specialist Confined Space Rescue
- National Certificate in Specialist Rope Rescue
- National Certificate in Urban Search & Rescue Services
- National Certificate in Occupational Health and Safety
- National Certificate in Business (First Line Management)

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# Our Emergency Management Journey

- We understand that Emergency Management is not just responding to an incident but also includes the preparation and recovery phases.
- For many years, TOP has utilized the services of Royal Dutch Shells global solutions (SGS) organization to provide third-party assessments and recommendations.
- In 2011, after Shell experienced a large manufacturing incident that required multiple ER agency participation, Shell recognized the need for a more unified and global approach to emergency management.
- Subsequently Shell assembled a small project team of emergency management experts from around the world, drafted and implemented the Shell Emergency Management Control Framework which became a mandatory requirement in the business.
- Shell consultants who undertook the TOP annual emergency management and fire safety systems assessment recommended to TOP to consider the same approach.
- In 2017, TOP initiated a project to transition from our local crisis and emergency management system to a system that mirrors the global IPIECA emergency management system and a localized version of Shells competence framework.

# 1 - Defining our credible emergency scenarios utilizing our process safety tools

- The emergency scenarios we concluded are focused on equipment failures that are likely to occur and which involve the leakage of flammable products and flammable gases, toxic products and gases, of which the frequency of occurrence and the severity of the consequences have been taken into consideration.
- Utilizing our process safety tools (HEMP), and our risk assessment matrix (RAM), we were able to determine the scenarios to design an emergency management system that best utilizes our resources to be effective, safe and reliable while understanding it needed to fit with our current growth phase.
- One positive outcome from this process is we were able to significantly reduce the overall number of pre-fire plans to a manageable number whereas each operations shift can now practice every plan over a six-year period.
- To be all inclusive we included the other common emergency disciplines to assure we are fully prepared for any event.
    - Fire (both interior and exterior)
    - Rescue (Confined space, from height, entrapment)
    - Hazardous materials (includes spills to AOC/COC)
    - Medical
    - Spill to public water systems
    - Natural weather vents (Flooding, Lightning)
    - Incident from neighbouring facilities/people that may affect TOPs business as usual
    - Security incidents (Internal & external threats) Political matters, cyber attack, contractor/staff.

# 1 - Defining our credible emergency scenarios utilizing our process safety tools

- In our hazardous areas, we focus on the following equipment and events.

**Storage areas**

a. Full Surface fire for a cone (fixed) roof and Geodesic dome tanks.
b. Rim Seal Fire for an open top floating roof tank.
c. Rim seal fire for an Internal Floating Roof Tank with GRE, Steel pan or steel pontoon roof (NFPA excludes GRE).
d. Full Surface fire for an Internal Floating Roof tank with an Aluminum floater.
e. Full surface floating roof-tank fire and large Bund Fire
f. Pressure vessels such as spheres and bullets

**Process & marine areas**

a. Jet Fires
b. Pool Fires
c. Combined Jet/Pool Fires
d. Flash Fires
e. Confined and Congested Vapor Cloud Explosions (VCE)
f. Boiling Liquid Expanding Vapor Explosion (BLEVE)

# 2 - Assessing the suitability and reliability of our passive fire protection systems

- **Passive Fire Protection**
  - Passive fire protection (e.g., fireproofing) performs its function without relying on activation. The objective of fireproofing for structural steel is to prevent collapse of the structure which could result in failure of process connections between equipment and piping, and which would escalate the fire emergency. Equipment to be observed includes process vessels, flare headers, main pipe racks in plants.

- In our hazardous areas, we referred to our plant design documents, and current practices to ensure we are meeting the intended criteria.

- We then undertook a detailed site assessment with an experienced fire protection specialist to determine the suitability and condition of our passive protection.

  a. Review the extent of fireproofing of structural steel with respect to the credible fires in the area concerned.
  b. Review the safeguarding of ESD/EDP valves and their control cables. Are the valves in a fire area? Do they have or need passive fire protection?
  c. Check that equipment with an increased likelihood of being the cause of a fire (LPG pumps, pumps handling product above auto ignition temperature) are not located underneath pipe racks or air coolers at low elevation. Is there Active Fire Protection in the area for protection? Are there Pre-Incident Plans for these scenarios?
  d. Check that incidental spills (on fire) do not collect under equipment and are directed away to safe areas.
  e. Assess the adequacy of the capacity of the surface drainage per area with respect to the firewater quantities supplied in that area via exposure protection systems and manual firefighting operations.
  f. Does the drainage capacity of the operating areas exceed water supply that can be applied via fixed and mobile equipment

# 2 - Assessing the suitability and reliability of our active fire protection systems

- **Active Fire Protection**
  - An active fire protection system is a dormant system that requires to be activated in order to perform its function (e.g., water spray systems, deluge systems, sprinkler systems, fire-water monitors and steam rings around flanges). Such systems are activated once the information is received from the scene of the fire that protection is required. Systems may be automatically or manually activated. If manual, actuation points shall be outside any potential fire area. Their function is to protect against escalation of the fire emergency and avoid the need for manual intervention in the fire area.
- During our assessment we reviewed the fire protection / fighting infrastructure to ensure it was suitable for the identified scenarios. This includes foam stocks, foam type firewater supply, firewater pumps, pumping capacity, pressure control, location of fire water headers, size and condition of fire hydrants, firewater system valves, mobile and portable firefighting equipment, road system, distance of response, access and escape for firefighting in the plant.
- For our fire water network design, we assure that firewater can be provided at the required flow rate in all plant sections under all credible circumstances. Our fire water header management system ensures the isolation of a section of the firewater distribution main should not affect the firewater availability elsewhere in the plant. If it does, then we install temporary systems.
- Additionally, we assigned specific equipment to be classified as Safety Critical (SCE) whereas in the preventative maintenance system the repair of any faults found to this equipment are actioned with priority.

# 3 - Design of our emergency management and emergency response organization & facility

- Initially we reviewed the structure and preparedness of the overall organization and the available resources.
- This included the tactical and pre-fire plans, Incident Command Structure, firefighting training, Mutual Aid schemes, communications, line of command with external fire departments, Emergency Coordination Center (ECC), and the call out procedure for additional resources.
- We concluded that most of the resources were already available, it was a matter of aligning them to the credible scenarios, alarm levels, and ensuring the people in the organisation know how to use them.
- We designed and built a new and secure ECC with specialist equipment and breakout rooms for section chiefs to work with their teams.
- With the Incident Command Structure, we had to make a significant change which was quite a challenge. Transitioning from a structure that has been in place for many years that people are comfortable with to a new structure (ICS), position names and responsibilities created a lot of renewed interest in emergency management.
- Although we had some push back, the organisation understood this was necessary in preparation for operating a large and complex facility with the possible need for external assistance.
- For our emergency responders at the front line, we identified that their tactical response to emergencies was very much the same as it had been for many years and this response philosophy did not match the complexities of the scenarios identified.
- This prompted us to re-think the skill and competence profile of all positions in the organisation and subsequently implement the competence framework for emergency managers and emergency responders.

# 4. Determine the mobile equipment required to manage and respond to the identified scenarios

- We took a detailed look at the mobile emergency response equipment, its age, capabilities, and suitability.
- This included the fire & foam trucks, fire hose, portable and trailer monitors, nozzles, SCBA, rescue equipment, Haz Mat equipment etc. and how we manage the inspection and maintenance of all this equipment.
- We identified that while we had a lot of equipment, we didn't in all cases have the right equipment to manage some of the scenarios.
- This initiated a project to upgrade and purchase some new equipment of which we now have at site.
- We identified that our pre-incident plans referenced generically, not specifically, the equipment that would be required to manage the scenarios. By being specific with the equipment list has helped the emergency management organisations on-scene commander & planning and logistics teams when identifying what needs to be deployed and when.
- We identified that our fire team who are responsible for inspecting and maintaining the equipment needed some upskilling to ensure the equipment was ready first time every time. By referencing the appropriate NFPA guidelines & check sheets, and utilising the services of skilled, competent and certified emergency management contractors ensures we have reliable equipment ready to immediately deploy.

# 5 - Determine the competencies required to manage and respond to the identified scenarios

- We took the lead from Shell when it came to deciding on the competencies the organisation required. *Why recreate the wheel !*
- These competencies are not specific to Shell, in fact they came from global guidance's such as NFPA, Joiff, IPIECA, AIIMS, AS/NZ and many others. Shell put them in a single document that made it easy to read.
- We developed an assessment process for each position to determine if any up-skilling was required.
- Like most organizations, the Incident Command Team ticked most of the boxes as these are natural management positions.
- Our on-scene commanders, who are typically the shift managers, continued as they normally have in the past doing a great job. Their biggest challenge has been staying out of the hot zone and overseeing the management of the incident.
- We did find that our front-line teams needed the most work. We identified that the training we had been providing was, to be blunt, old. We were still teaching tactics for units that were mostly operated manually and the structures low height (30 to 40mtrs)
- This initiated a change in how we determine who qualifies to deliver the training that we as an organization need to manage our scenarios, not what the training organization thinks we need.
- I would say in this emergency management journey, sourcing certified emergency management and emergency response instructors, who have real life experiences in large process unit and tank fires, and can communicate in Thai is our biggest challenge.

# 6 - Determine the training and exercise requirements to assure our staff are competent

- Training and exercises should be designed to simulate the response and actions of the credible scenarios identified in point 1.
- As part of our emergency management system, we identified specific skills our team need to remain safe and effective .

  One key skill is to know when to stop.
- We all know that when we conduct hot fire training, everyone puts on their fire suits and waits to light the fire. Right or wrong? Is this reality?
- How often do we exercise responding from the control room or fire station?
- This initial phase (first 10 minutes) of any emergency is the most critical part of the response.
- Ensuring the team is prepared, they have the right equipment for the scenario, they are responding from an up-wind position, fire pumps are started, communications are established, and they have an identified meeting point with the on-scene commander is critical to a successful outcome.
- We set KPI's for our exercises as without these we have no measure of success or failure. KPI's are identified from specific points in the pre-incident plan.
- Additionally sourcing training organizations that will deliver what we need to manage our scenarios is also a challenge.
- I would recommend when employing instructors and training organizations, be very clear on what your emergency scenarios are, and your company's emergency response philosophy. Its difficult to get the time to send staff for training so we need to get the most benefit from that time.
- Lastly, we owe a gratitude of respect to our frontline firefighters. They put their lives at risk in the worst of times to make sure our assets are protected and continue to operate.

# Summary

1. Know your scenarios.
2. Ensure your systems are well maintained and reliable
3. Make sure your emergency management and response organization fits your business.
4. Emergency management and response equipment must serve a purpose. Consult known experts, not salespeople.
5. Make sure your competencies match your scenarios.
6. And ensure your training delivers the skill and knowledge for the risks, hazards and equipment on your site.

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# Thank you for your attention

# Q & A

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# Rating the Session

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