Case Study-1

ONGC Hazira Fire Incident

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PNGRB Knowledge Sharing Workshop

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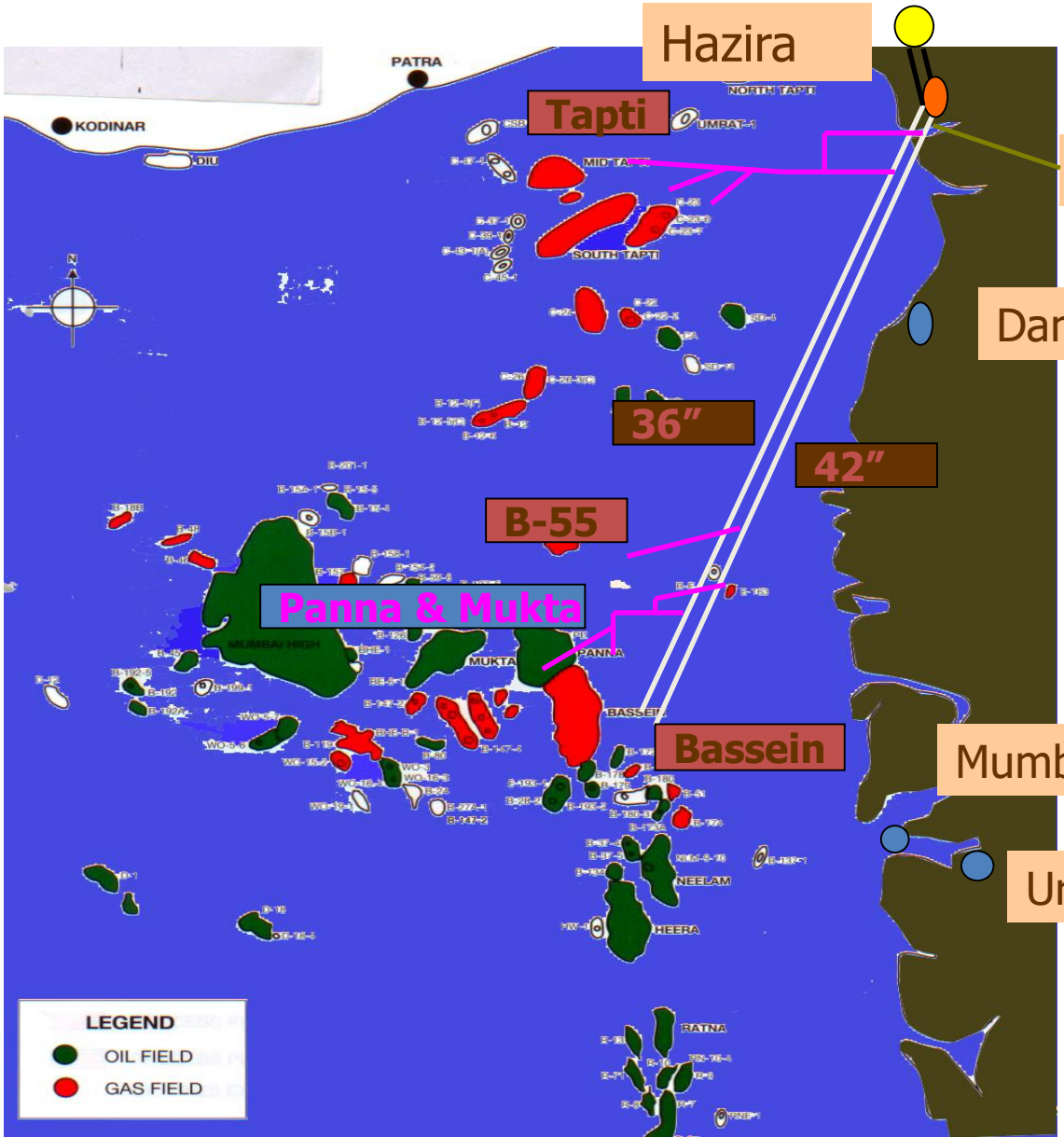
Hazira Plant – A Background

Largest Sour Gas Processing Plant in India

Schematic gas flow Offshore to Hazira Plant



Incident Brief

Title : Incident of Major Fire

Location : Gas Terminal of Gas Processing Plant.

Activity Type : Normal Operation

Result/ outcome : Major Fire, Damage to Installation Assets

Sequence of Events:

- HC condensate leaked in late night hrs from the condensate metering skid and was reported to the control room.
- Operating staff observed wide spread vapour cloud around the metering skid area. Source of leakage could not be approached and ascertained.
- Operating people could close the isolation valves of the unit / pipeline after 30 minutes. However vapour cloud that was formed got ignited. Fire was put under control after three hours.
- There was no human injury. But extensive damage occurred in Gas Terminal Area

Major Observations:

- The leakage originated from the sealing bar of the orifice meter (OM) on the 6” Gas condensate line near Gas Receipt Area
- The traceability of the O-ring could not be established
- Orifice meter sealing bar was held in position by 08 fasteners and they were not of uniform standard. So, there was a possibility that the O-ring was not getting clamped firmly & uniformly all around by the fasteners
- ESD/Remote operations for valves was not available
- Alarm had actuated on GD Panel; but the area was not approachable for local action.
- A damaged illumination bulb at a nearby workstation may be the ignition source.

Commencement of leakage

The sealing Bar opened up and created a leakage path

The Nuts were missing and threads were totally wiped out from these 4 fasteners

Clear picture of facilities (at 02:11:43) (CCTV footage)

Commencement of leakage (at 02:12:50 hrs)

Vapour cloud in piping area

Dense vapour cloud all around

Fire occurred (03:08:16 hrs)

Major fire occurred

View from Main Gate

Overview of both the meters of condensate pipelines

Damaged condensate metering area

Damaged pipelines

Incident Site

ROOT CAUSE(s)

- Loss of primary containment from the orifice meter. due to failure of ‘O’ ring of the retaining plate of orifice in the condensate metering skid.
- Delayed response to isolate and depressurise the HC circuits.
- Inadequate automation of Fire & Gas detection and Emergency shutdown system (ESD).
- Use of Nonstandard ‘O’ ring
- Lack of control over material sourcing.
- Ignition of gas cloud due to exposed electrical fitting
- Inadequate preventive maintenance systems

Lessons Learnt

- In case of non-availability of OEM supplied spares, if a decision is taken to develop/procure spares from local market, such decision is to be documented with proper authorization from appropriate authority, preferably through Management of Change. For such procurement, proper specification and quality control check must be ensured.
- The electrical system shut down of effected area should be carried out in case of presence of HC/any leakage of flammable material.
- Integrity of all flame proof electrical fittings must be maintained and wire joints should not be allowed.
- Emergency Shutdown (ESD) is to be provided to effect timely, safe and orderly shutdown of affected area/facility so as to reduce potential for uncontrolled release of flammable and toxic materials to atmosphere.

Lessons Learnt

- **Unused/ Unwanted Infrastructure should be removed**
- **Cooling / Blanketing for fire or Vapour Cloud should have Remote Operation Facility.**
- **ESD/Remote Operations for Gas leakage scenarios. Gas detection system should be configured to activate emergency shutdown before gas leakage reaches to dangerous concentration**
- **Better Training & Preparedness for Disaster Management**
- **Need for Advanced Technologies for Fire and Gas Leakage Detection and Emergency Response**
  - **Audio/Visual Based sensors and AI platforms**
  - **Dynamic Vapor Cloud movement predictions based on weather conditions**

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