तेल उद्योग सुरक्षा निदेशालय
Oil Industry Safety Directorate
ISO 9001:2015 certified

OSD Newsletter

January - June 2020, Volume 9, Issue 1

Editorial

Editorial Board

Editor-in-chief

Sh. Arun Mittal
Executive Director, OISD

Advisory Editorial Board

Sh. Ranjan Mehrotra,
Director (MO-LPG)

Sh. L.L. Sahu,
Director (MO-POL)

Sh. Vikas Sharma,
Director (E&P)

Sh. PK. Sarma,
Addl. Director (P&E)

Sh. Leela Prasad Konduri
Addl. Director (Pipelines)

Sh. P Kumar,
Addl. Director (Engg & EDS)

Sh. Vivek Singh,
Jt. Director (Engg)

Dear Colleagues,

As the COVID-19 pandemic continues to develop, Oil and Gas companies have grappled with restrictions, under which they must run their offices and field operations in order to mitigate the spread of the virus. I would like to appreciate the incredible efforts by the Oil and Gas industry to ensure that we get through these testing times. Contribution of our colleagues in the frontline at our rigs and installations, refineries, gas processing plants, LPG plants, marketing terminals, pipelines and other locations is beyond measure. They have done an incredible job during the lockdown period.

Our success in stopping further spread of the virus will depend on individual actions toward hygiene, safety, physical distancing and following guidelines/ directives from Central/ State Government and local authorities. We shall spare no effort to ensure that we have a safe working environment, with extensive disinfection efforts and health protocols, adequately reinforced and continually tested. Sharing of PPEs, such as gloves, aprons, face shields, including equipment used for hazards should be avoided.

At this crucial time, relentless campaigning needs to be pursued amongst the work force and all stakeholders. In recent past, MoP&NG and OISD have circulated circulars on safety during plant start-up and normal operation.

Parliament has passed the 'The Occupational Safety, Health and Working Conditions Code 2020'. This Code envisages repealing 13 extant Acts including the Factory Act 1948 and the Mines Act 1952 related to Safety in Oil and Gas Industry. Further, there is draft Omnibus Chemical Regulation to establish 'National Chemical Authority' under the Environment Protection Act, 1986, and draft Omnibus Technical Regulation (OTR) on Machinery and Electrical Equipment Safety under the Bureau of Indian Standards Act, 2016.

These regulations shall have impact on the industry and hence it is prudent for the industry to carryout gap analysis w.r.t. to the above regulations for smooth transition.

A recent blow out and fire in one of the gas well is a wake-up call for us. In this regard, MoP&NG constituted a high power Inquiry Committee to investigate the incident. Recommendations of incident investigation shall be shared shortly with industry for implementation. It should be our endeavor to strengthen the safety Management System with a goal to achieve nil accident.

OISD, as always, is working with industry for continued focus on safe, efficient and sustainable operations. Face-to-face contact and travel may be restricted; but our officials have adopted a range of technologies including video conferencing to carry out safety audits, organise conference/ workshops as well as conducting functional committee meetings for revision of OISD Standards.

Stay Safe; Stay Healthy!

(Arun Mittal)
ED, OISD

Note: No part of this document shall be reproduced in whole or in part by any means without permission from OISD. The information provided in technical articles by various authors is solely from their sources. The publisher and editors are in no way responsible for the same.

Major OISD activities January – June 2020

External Safety Audits (ESA)

➢ **IOCL**

- Gujarat Refinery during 27th to 31st Jan 2020.
- Single Point Mooring (SPM) system and offshore pipeline (92 km) at Paradip during 29th to 31st Jan 2020.
- POL Terminal at Kanpur, Uttar Pradesh during 08th to 11th Jan 2020.
- POL Terminal at Roorkee, Uttarakhand during 15th to 17th Jan 2020.
- LPG Bottling Plant at Cherlapalli, Telangana during 05th to 07th Jan 2020.
- LPG Bottling Plant at Patna, Bihar during 19th to 21st Feb 2020.
- LPG Bottling Plant at Ennore, Tamil Nadu during 26th to 28th Feb 2020.
- LPG Bottling Plant at Etawah, Uttar Pradesh during 26th to 28th Feb 2020.
- POL Terminal at Wadala, Maharashtra during 20th to 22nd Feb 2020.
- POL Terminal at Cochin, Kerala during 27th to 29th Feb 2020.
- POL Terminal at Mangalore, Karnataka during 16th to 18th Mar 2020.

➢ **HPCL**

- Mundra-Delhi product Pipeline in two phases:
  - o 1st phase audit for Mundra-Awa section (635 km) during 20th to 24th Jan 2020.
  - o 2nd phase for Awa-Delhi section (513 km) during 10th to 13th Feb 2020.
- LPG Bottling Plant at Jammu during 13th to 15th Jan 2020.
- LPG Bottling Plant at Bahadurgarh, Haryana during 22nd to 24th Jan 2020.
- LPG Bottling Plant at Jatni, Odisha during 05th to 07th Feb 2020.
- POL Terminal at Wadala, Maharashtra during 02nd to 04th Jan 2020.
- POL Terminal at Mangalore, Karnataka during 12th to 14th Mar 2020.

➢ **BPCL**

- LPG Bottling Plant at Durgapur, West Bengal during 02nd to 04th Jan 2020.
- POL Terminal at Cherlapally, Telangana during 06th to 08th Jan 2020.
- POL Terminal at Kandla, Gujarat during 21st to 24th Jan 2020.
- POL Terminal at Sangrur, Punjab during 16th to 18th Jan 2020.
- POL Terminal at Paradeep, Odisha during 10th to 12th Feb 2020.
- POL Terminal at Tondiarpet, Tamilnadu during 04th to 06th Mar 2020.
- LPG Bottling Plant at Shikrapur, Maharashtra during 03rd to 05th Mar 2020.

➢ **GAIL**

- Gandhar GPP during 25th to 27th Feb 2020
- Jamnagar – Loni LPG Pipeline in two phases:
  - o 1st phase audit for Jamnagar-Ajmer section (870 km) during 6th to 10th Jan 2020.
  - o 2nd phase for Ajmer-Loni section (544 km) during 27th to 30th Jan 2020.

➢ **ONGC – Onshore / Offshore Installations / rigs:**

- Mallavaram HP-HT OGT during 16th to 18th Mar 2020.
- Two Drilling Rigs - Sagar Shakti and Sagar Kiran at Western Offshore, Mumbai during 20th to 24th Jan 2020
- Process Complex B-193 and FPSO - Armada Sterling at Western Offshore, Mumbai during 27th to 31st Jan 2020
- Two Drilling rigs – Sagar Bhushan and Greatdrill Chitra at western Offshore, Mumbai during 3rd to 7th Mar 2020.

➢ **OIL INDIA LTD.**

- Eight OCS – Tengakhat, Ushapur, Kathalguri, Jaipur, 01-NHK, 02-NHK, 04-NHK, 08-NHK at Duliajan Asset of Oil India Limited during 02nd

to 6th Mar 20

➢ **Vedanta Limited (Formerly Cairn India)**

- CAIRN RAVVA Onshore Gas Terminal (OGT) along with SPM facility, S Yaman during 19th to 21st Mar 2020.

➢ **BORL**

- Bina Refinery during 2nd to 6th Mar 2020.

Surprise Safety Audits (SSA)

➢ **IOCL**

- LPG Bottling Plant at Jammu on 16th Jan 2020.

➢ **ONGC**

- Gandhar CTF /GPP on 28th Feb 2020.

➢ **HPCL**

- LPG Bottling Plant at Patna, Bihar on 18th Feb 2020.

➢ **BPCL**

- LPG Bottling Plant at Khurda, Odisha on 04th Feb 2020.
- POL Terminal at Jobner, Rajasthan on 29th May 2020.

Pre-Commissioning Safety Audits (PCSA)

➢ **IOCL**

- Revamped CDU-I, VDU-II and HGU-II at IOCL, Haldia Refinery during 2nd to 3rd Jan 2020.
- New Tank Farm at Refinery and additional Sludge Distillation Vessel in HDPE unit at IOCL, PRPC on 31st Jan 2020.
- DHDT & HGU revamp project under BS-VI Project at IOCL, BGR during 8th to 9th Feb 2020.
- New DHDT, ARU, SWS & SRU plant under BS-VI Project at IOCL, Panipat Refinery during 25th to 26th Feb 2020.
- New Blast proof control room, VAM Shed & Plate rolling machine at IOCL, Mathura Refinery on 12th Mar 2020.
- Dadri to NTPC 18"x1.3 Km Natural Gas (NG) pipeline and station facilities at Dadri on 10th Feb 2020.
- Siwan- Baitalpur 10.75"x 102 km product pipeline from T-point Siwan to receipt terminal Baitalpur during 14th to 15th Feb 2020.
- Durgapur - Banka 14"x191 km Pipeline during 19th to 20th Mar 2020.
- New LPG Bottling Plant at Gorakhpur, Uttar Pradesh during 20th to 22nd Jan 2020.

➢ **HPCL**

- Newly constructed intermediate pumping station at Bhachau and augmentation by installing new main line pumps at Santalpur, during 8th to 9th Jan 2020.

➢ **BPCL**

- LPG Storage Vessels of LPG Bottling Plant at Gonda, Uttar Pradesh on 23rd Jan 2020.
- New Railway Siding at Jobner, Rajasthan on 29th May 2020.
- New LPG Bottling Plant at Madurai, TamilNadu on 28th May 2020.

➢ **OIL**

- PCSA of newly constructed intermediate pump station for reverse flow at Bongaigaon, 10.75"x 3.5 Km pipeline between PS-05 to Guwahati Refinery and facilities augmentation at PS-05 on 23rd Jun 2020.

Consent To Operate accorded to ONGC

- Offshore Drilling Rig (Jack up) VIRTUE-1 on 10th Jan 2020.
- Offshore Drilling Rig (Jack up) Aban-IV on 27th Feb 2020
- Offshore Well Platform R 9A of N&H Asset, Mumbai on 12th Mar 2020.
- Offshore Drilling Rig (Jack up) VIVEKANAND-1 on 13th Mar 2020.
- Offshore NLM-13 of N&H Asset on 18th Mar 2020.
- Offshore Drilling Rig (Jack up) Trident -2 on 19th Mar 2020.
- Offshore Drilling Rig (Jack up) VIVEKANAND-2 on 30th March 2020.
- Offshore Drilling Rig (Jack Up) G.D.Chaaru on 24th May 2020
- Offshore Well Platform R 13A of NH Asset, Mumbai on 12th Jun 2020.

Oil Spill Response

- Joint Inspection of Oil Spill Response (OSR) facilities of RIL Sikka, Jamnagar done on 17th Jan 2020.

Knowledge sharing by OISD

- Two-day workshop on "Audit of LPG Bottling Plant for Auditors" was conducted at HPCL LPG Bottling Plant, Bhopal during 27th to 28th Jan 2020.
- OISD Workshop on "Fire and Safety in Upstream Oil and Gas Operation" was organized at IPSHEM, ONGC, Goa, jointly by OISD and ONGC during 14th to 15th Feb 2020. Papers were presented on the relevant subjects by Additional Director (Pipeline), Additional Director (E&P) and Joint Director (E&P).
- Presentation by Director (MO-LPG) on "The importance of Safety for the Development of LPG Industry" at The South Asia LPG Conference and Expo in Mumbai on 19th Feb 2020.
- Presentation on "Auditing" and "Art of Report Writing" by Director (MO-LPG) in OISD on 21st Feb 2020.
- Two-day Workshop on "Enhancing Auditors' Skills" for POL auditors of IOCL was conducted at IOCL Irumpanam Terminal during 26th to 27th Feb 2020.
- Two-day workshop on "Audit of LPG Bottling Plant" for Auditors was conducted at BPCL LPG Bottling Plant, Sikrapur, Pune during 6th to 7th Mar 2020.
- Two Joint Directors of PL section attended consultative workshop on Skill Gaps in CGD Sector in India during 06th to 07th Mar 2020 organized in OIDB Bhavan.
- 10 nos officers from OISD attended online CQI/ IRCA approved ISO 45001 LA Course conducted by BSI (British Standard Institute) during 20th to 24th Apr 2020.
- 12 officers from OISD attended 3 days online IMS Integrated Management System of ISO -9001/14001/45001 and ISO 19011 internal auditor programme conducted by BSI (British Standard Institute) during 27th to 30th Apr 2020.
- Addl. Director (IT), OISD attended 05 days online training course on ISO 27701:2019 Privacy Information Management Certified Lead Implementer during 27th Apr to 1st May 2020.

Functional Committee Meetings on OISD Standards

- FC meeting held on revision of OISD-STD-150: - 'Design and Safety Requirements for Liquefied Petroleum Gas Mounded Storage Facility' during 15th to 16th Jan 2020.
- FC meeting held on revision of OISD-STD-155 (Personal Protective Equipment)' on 7th Jan 2020 and 24th Jun 2020 (through VC)
- FC meeting held on revision of OISD-GDN-115 on 'Guidelines on Fire Fighting Equipment and Appliances in Petroleum Industry and also of OISD-GDN-142 on "Inspection of fire fighting equipment and systems" during 6th to 7th Feb 2020
- FC meeting held on new OISD-RP-242, 'Drilling and Testing of HPHT Wells' on 4th May 2020 and 20th Jun 2020.
- FC meeting held on revision of OISD-STD-210 'Storage, Handling & Refuelling of LPG for Automotive Use' through VC on 28th May 2020, 3rd June 2020, 9th Jun 2020 and 17th Jun 2020.
- FC meeting held on revision of OISD-STD-135 'Inspection of Loading and Unloading Hoses for Petroleum Products' on 10th Jun 2020.
- FC meeting on OISD-STD-227 Emergency Response and Preparedness in E&P Industry (Now proposed to be changed to Oil & Gas Industry instead of E&P industry) on 25th Jun 2020.
- OISD-STD-150, 177, 145 and 184 advertised in leading Hindi/ English newspapers and web hosted for seeking comments from public/ professional bodies on 26th Jun 2020.

Meetings

- Periodic review meeting of pending ESA/SSA points of POL (more than 2 years old) and status of sidings was held with BPCL, IOCL and HPCL PPs on 13th Jan 2020 at OISD.
- A meeting was held with Oil India Limited at OISD office on 21st Jan 2020 regarding liquidation of

long pending observations and other issues.

- ED-OISD & Addl. Director (E & P) attended a conference organized by DGMS on "Safety in Mines" at Scope Complex, New Delhi during 28th to 29th Jan 2020.
- Meeting in OISD with OMCs and GMS vendor for modification in existing GMS system at LPG Plants on 14th Feb 2020.
- A two member OISD Committee visited IOCL's pipeline delivery terminal at Ratlam for assessment of equivalent Rim Seal system in 250 KL transmix tank on 20th Feb 2020.
- Director (MO-LPG) addressed the august gathering on 'Industrial Safety & Disaster Risk Reduction - Storage and Handling of Hazardous Chemicals in Industry' in a webinar organized by FICCI on 12th Jun 2020.
- JS(R), MoP&NG took a review meeting of OISD activities along with recent safety audits and incident reports through VC on 15th Jun 2020.
- Director (MO-LPG) attended a VC with officials of Ministry of Shipping on 'Examining the rules and regulations for transportation of LPG Cargo in bulk on National Waterways the infrastructural requirements, SOP and submitting the recommendations for carriage of LPG on NWs' on 16th June 2020,
- AS&FA, MoP&NG took a review meeting of OISD activities and Budget 2020-21 through VC 18th Jun 2020.
- Review (VC) of ESA recommendations pending for more than 2 years, of IOC LPG and BPC LPG was held on 19th Jun and 26th Jun 2020 respectively.
- As a part of knowledge sharing initiative, Additional Director (MO-POL) delivered a presentation on OISD-RP-167 to all OISD officers on 22nd Jun 2020.
- ED-OISD delivered a Key Note Address on Safety Environment and Health issues in E&P industry in a webinar on "DSF Operator's Workshop on Safety Procedures/Guidelines in Petroleum Operations" organized by DGH on 25th Jun 2020. Director (E&P) made a presentation based on OISD Standards and Case Studies.
- Director (MO-LPG), Addl. Director (P&E) & Addl. Director (EDS) attended a stake holder consultation under the chairmanship of Sh. T.S.G. Narayanan, Technical Adviser (Boiler) and Secretary, Central Boiler Board on 'Decriminalization of law- review of penalties under the Boilers Act, 1923' on 29th Jun 2020.

Safety isn't expensive, it's priceless

CASE STUDY
Expelling of Tubing Hanger at Modular Rig in Offshore

Shri Vikas Kumar Sharma
Director (E&P)

Shri Zafar Ali
Addl. Director (E&P)

INTRODUCTION:

Title: Accident at modular rig.

Location: Offshore.

Loss / Outcome: Expelling of tubing hanger along with wireline assembly from Wellhead causing injury to 4 persons.

BRIEF OF INCIDENT:

Well was under workover for servicing and zone transfer. During subduing operations, communication was suspected between A and B sections of wellhead at a shallow depth. It was decided to detect the leakage with the help of ALFA (Acoustic Leak Flow Analyser) tool.

The ALFA tool was made up and lowered inside the slick line lubricator.

Gas injection through A-Section was carried out and the B-Section of wellhead was kept open through burner boom. At this stage there was a sudden surge of pressure in the well due to which the landing joint with wire line lubricator, tubing hanger, rotary table and bushing were flung out. The incident caused injuries to four persons who were present on the rig floor.

OBSERVATIONS:

Logging with ALFA tool was planned with gas injection in section A and return from section B.

- Wire line equipment was rigged up in night shift.
- Landing joint with wire line assembly was rested on tubing hanger flange. There was no tubing below tubing hanger. There was no isolation valve from tubing hanger to wire line assembly.
- Pipe Ram of BOP was not closed.
- Two rounds of ALFA tool logging i.e. dummy round and reference log without gas injection were completed.
- Gas injection was started in pressurized 9 5/8" casing (section A) by well head team with B-Section open to burner boom. Suddenly there was increase in pressure causing huge upward thrust on tubing hanger and lifted it out from the wellhead. This resulted in throwing out of complete wire line assembly along with tubing hanger from the wellhead injuring four persons working on rig floor.

REASONS OF FAILURE / ROOT CAUSES:

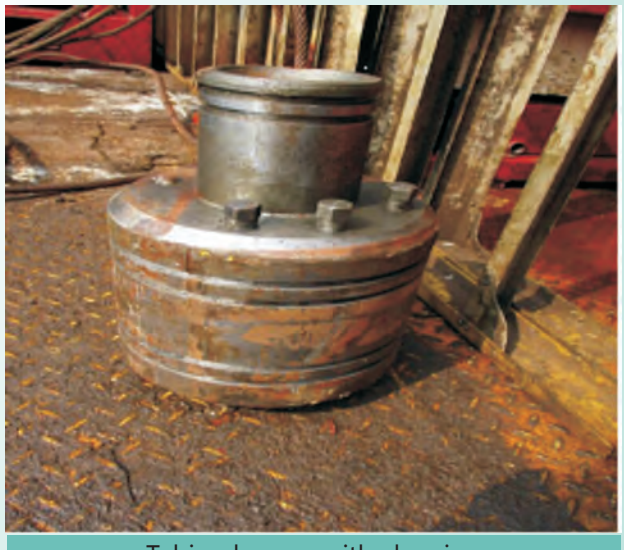
- Anchor bolts of tubing hanger were probably not fully tightened as evident from marks at only 3 places on periphery of tubing hanger.
- There was no detailed plan for the job mentioning maximum permissible injection pressure which can be subjected safely.
- Job of this nature involving lowering of ALFA tool without tubing was being done for the first time on this rig. No risk assessment or job safety analysis was carried out either in base office or at the rig before executing the job.
- Pipe ram of BOP was not kept in closed position.
- Required provision to regulate the gas injection (through adjustable choke) in the annulus was not available /working. Thus at time of starting gas injection in production casing before lowering logging tool there was sudden increase in gas injection pressure

- The risks involved in carrying out logging job in pressurized 9 5/8" casing (Gas injection in section A) without a defined return passage (Through suspected leakage in section B) was not anticipated by any of the persons involved in the operation. The gas injected at a high pressure caused an upward thrust on the tubing hanger and lifted it out from the well head.
- Lack of coordination between various agencies involved in the operation viz the operator, drilling contractor, wireline agency and ALFA tool agency.
- Monitoring of pressure gauge by ALFA tool logging supervisor from rig floor while standing close to pressurized lubricator assembly even though the same could have been monitored through choke manifold gauge at main deck.

RECOMMENDATIONS:

- Detailed plan for workover jobs including mid-course changes should be prepared.
- Commencement of jobs that are not routine in nature should be preceded by a comprehensive risk assessment / job safety analysis along with appropriate risk mitigation measures.
- Work permits for such critical jobs should be linked with JSA document
- Whenever multiple agencies are involved in a job, a document stating the roles and responsibilities of each agency must be prepared prior to commencement of job. Further if such jobs are to be taken in night shift, work permits should be issued only under experienced supervision during execution of job.
- All wireline jobs should be carried out after adequate tightening of anchor bolts on tubing hanger as per OEM recommendation.
- X-mas tree should be preferably on the wellhead for execution of such specific jobs. In case X-mas tree is replaced with BOP, pipe ram should be kept in closed position.
- Persons working on rig floor should be away from pressurized lines or equipment during execution of such jobs.
- Internal safety audit of the rig should be conducted by Operator.

Missing bell nipple & rotary table



Tubing hanger with abrasion

CASE STUDY
Blow out and Fire in well

INTRODUCTION

Title: Blowout of gas well

Location: Onshore Well Site

Loss/ Outcome: Huge Financial Loss, Environment Damage and Loss of Human Lives.

BRIEF OF INCIDENT

An incident of uncontrolled flow of gas and condensate occurred in an onshore well during workover operation. On testing, Tubing Head spool was found leaking. To replace the spool, a cement plug for 100 m was placed. While removing BOP to install new Tubing Head spool, suddenly well started displacing resulting in blowout.

OBSERVATIONS/ SHORTCOMINGS

a) Pre work over conference was carried out. However, there was no system of formal handing over/ taking over by GGS/ EPS to Workover. No record of surface pressures in well heads was provided at the time of handing over/ taking over.

b) BOP was pressure tested on as per BOP test record provided while as per DPR, only function test was carried out.

c) Cement sample collected during cement plugging job at the well was not set at the time of blowout. After 12 hrs. of WOC, Installation Manager instructed Tool Pusher of contractor to pull out the remaining drill pipe string from the depth of 556.24 m.

d) The waiting on cement was included in work over plan, but the verification of position and strength of the cement plug was not included in the plan.

e) After noticing kick, Driller contacted the Tool Pusher over phone, as he was not at site, who waited for instruction from Installation Manager and OGPS crew for next course of action.

f) Assistant driller was not trained in well control, and also not required as per contract. However as per clause 8.0 of OISD-RP-174, Assistant Driller should also be trained in well control.

REASONS OF FAILURE/ ROOT CAUSE

a) 27/8" drill pipe was pulled out and N/down BOP before complete setting of the cement sample kept at surface. The WOC was originally planned for 48 hours, but P/O was started after 12 hrs. only and BOP removed after 16 hours approx.

b) Verification of the position and strength of the cement plug was neither included in the plan nor carried out at the well before nipple down of BOP.

c) There was a gas trapped between 3731.5 to 3574 m (157 m length) as circulation was done through puncture in tubing at 3574 m. Due to reduction in hydrostatic pressure, the trapped gas might have migrated and resulted in blow out.

d) After detecting kick by Driller, the response of crew members of the contractor was neither as per well control procedure nor as per bridging document agreed by operator and contractor.

RECOMMENDATIONS

a) Work over plan in detail should be prepared by a MDT after due deliberation and consideration of all available information (also key points to be recorded in plan along with well history and past work over jobs in brief). It should take into consideration hazards anticipated and should plan accordingly. It should be signed by all MDT members and approved at appropriate level.

b) Any change in Work over plan should be approved by competent authority and communicated through mail/ message in writing.

c) During Waiting on Cement (WOC), there should not be any disturbance in the well. Sufficient

time should be allowed to set the cement as mentioned in plan.

d) Cement plug should be tagged and tested to ensure its strength and position before commencing next operation.

e) Trip sheet should be prepared properly in the format given in OISD-RP-174 with concluding remarks of fluid gain/ loss. Representative of the operator should also verify the trip sheet periodically to monitor that the well is taking correct amount of brine during pulling out of string. Any reported abnormality in trip sheet should be analysed for corrective actions, if any.

f) Well should be kept under observation for the time period equivalent to the anticipated time required till re-installation of BOP plus safety margin as required by clause 7.10.4 of OISD-RP-238, before removing X-mas tree or BOP.

g) All critical operations, which can result in loss of control, should be done in the presence of Key personnel of contractor and operator.

h) BOP or X-Mas tree, as the case may be, should be kept ready for immediate placement in case of any well activity. This scenario should also be practiced during BOP drill. Non-sparking tools should only be used, in case of any well activity.

i) Annulus pressure of all flowing as well as non-flowing wells should be recorded periodically by the concerned officials of Production Installation as per clause 9 of OISD-GDN–239 'Guidelines on Annular Casing Pressure Management for Onshore Wells'. Any abnormal pressure build up in Annulus should be monitored closely and timely action should be taken for corrective action.

j) Handing over and taking over between Work over Services and GGS/ EPS should be as per clause 5.2.4 vii of OISD-GDN-182 in specified format and record maintained.

k) Installation Manager should be responsible for one workover rig so that he can supervise and monitor the day to day operations as per work over plan and all rig operations. IM should inspect rig on daily basis and record his observations in IM diary. All communications from operator side should be communicated to Tool Pusher/ Rig Manager through Installation Manager.

l) BOP function test and pressure test should be done in line with OISD-RP-174. These tests should be recorded in DPR and also witnessed by operator's representative. BOP pressure test should be done by test pump with chart recorder.

m) Other high pressure equipment like choke manifold, kill manifold, FOSV etc. should also be pressure tested as per OISD-RP-174.

n) All down hole equipment should be properly checked before lowering into the well. Any pressure build up in annulus 'A', even though annulus is isolated with packer, should be analysed and corrective measures planned.

o) It should be ensured at all times that two effective barriers are in place in the flow path as per clause 5.1 of OISD-RP-238.

p) Operator should develop a strong Crisis Management Team, who in normal times should work as faculty for well control school, maintain BOP and related equipment, witness BOP pressure test and BOP drill in field.

q) Competency and deployment of rig personnel to be ensured as per contract. Competency of key personnel should be verified through interview (especially competency on well control). No person should be deployed without the approval of operator in writing. Competency of crew should also be assessed on job by IM through BOP drill and day to day monitoring.

r) Detailed internal audit by operator should be conducted within 15 days of deployment of new contract rig as per OISD-GDN-145. Internal audit of all rigs and installations should be carried out by specially constituted MDT once every year as per OISD checklist in line with OISD-GDN-145.

s) Operator should review all formats being used on rigs and installations including format for DPR in line with OISD Standards and good international practices. Formats should be controlled with unique numbers.

t) Assistant Driller should also possess mandatory well control training certificate in line with clause 8.1 of OISD-RP-174.

u) Weekly Safety Meeting should be held on all rigs and installations and record be maintained.

v) All possible scenarios of well control (including situation when there is no BOP on the well) should be documented in well control procedure and practiced.

w) Mines Manager should carry out HSE inspection of all rigs and installations under their jurisdiction as frequent as possible.

x) Competency mapping should be done for all key personnel (including senior management) and necessary trainings should be imparted to bridge the gaps identified.

The safety of the people shall be the highest law

Safety isn't just a slogan, it's a way of life

CASE STUDY
Fire incident on Maintenance Vessel used for SPM maintenance-A

Shri Leela Prasad Konduri
Addl. Director (PL)

Shri Vivek Kumar
Joint Director (PL)

INTRODUCTION

Title: Fire incident on Maintenance Vessel used for SPM maintenance.

Location: During MBC replacement job carried out on the Maintenance Vessel.

Loss/ Outcome: Fire took place on Maintenance Vessel and the incident resulted in four fatalities.

BRIEF OF INCIDENT

A fire incident had occurred on Maintenance Vessel. The fire took place during replacement of leaking Marine Breakaway Coupling (MBC) which parted during the end of cargo discharge operation of crude oil tanker through Single Point Mooring(SPM). The incident resulted in fatalities of four contract workers and severe burn injuries to eight other workers.

OBSERVATIONS

- A Tanker was discharging crude oil through SPM system into shore tanks. Final stripping operation was going on and one hour notice for completion of cargo discharge was given. At this time, a rain squall approached the SPM location. From the telemetry data, it was noted that wind speed increased from around 6 knots (approx.) to 35 knots (approx.) within short time. Wind direction also changed about 400 and danger warning indicated tanker to buoy closest distance as 20 M during this period.
- With the extra pull from the pullback tug and the wind at the location, Tanker started drifting away from the SPM. Suddenly, both the mooring hawsers snapped. The maximum load recorded on DCS of load cell in port side hawser was 114.3 T which then came down to zero. This suggests the time of parting of hawsers. Then floating hoses also got parted after MBCs got activated in both the strings. Tanker drifted away from the SPM. Pumping was still going on based on the trend records available in DCS. Tanker engine was started only after parting of hawsers and hoses. Once the SPM area was clear, support craft were able to inspect the area. It was reported that there was no major oil spill.
- During first daylight hours next day, leak was noticed from actuated MBC portion of parted inner string attached to the buoy. Extent of leakage could not be ascertained as string end was submerged in the water due to weight of parted MBC. On being informed, Port Control instructed owner to contain the oil spill immediately. The Maintenance Vessel - B available at the site had the Oil Spill containment booms and recovery system on board and the same was deployed to contain the oil spill. The other two small supporting boats were also involved in the oil spill containment activity.
- Early in the morning, Coast Guard informed that the spill was increasing and if no immediate action was taken to arrest the leak, the spill could travel to close by beaches and would become a grave disaster with severe environmental repercussions. The situation therefore called for immediate stoppage of the leakage and containment of the oil spill.
- As the alternate Maintenance Vessel - B &

support boats available at the site were involved in the oil spill containment activity, the O&M contractor (hired by owner) decided to mobilise main Maintenance Vessel – A for lifting the parted hose attached to SPM. This main Maintenance Vessel - A had just completed an extensive dry docking (underwater inspection) and was undocked recently and was alongside the fishing harbor for completion and balance certification (including inspection of above water portions). It may be noted that this main Maintenance Vessel - A was the only vessel which was having A-frame which is essentially required to lift the hose and remove the leaking MBC. This main Maintenance Vessel - A was used previously also to carry out the MBC replacement in the past (seven years ago) when the MBC got parted and arrested the leakage successfully.

- The pickup rope was connected to the inner end of the hose and hose was lifted on to deck. Portion of hose near A-frame was kept at an elevation to minimize the spillage. It was observed that one petal on the MBC was not holding and the leakage was larger than anticipated. O&M contractor decided to immediately disconnect the MBC and insert a blind flange with a gasket to permanently shut off the leaking hose. After disconnection of the actuated MBC, maintenance team was in the process of inserting the blind flange at the end. The leakage was being collected into a tank on the port side of the deck. Precautions to contain the oil spillage on main deck were taken by providing absorbent booms but oil spilled through this due to sea roughness and swell. O&M contractor personnel who were working on board felt uneasiness due to excessive vaporization of crude.
- Suddenly, an explosion was heard and a fire broke out resulting in extremely intense heat and thick, acrid smoke on the deck of main Maintenance Vessel - A. Immediately all personnel on board this vessel jumped into the water. Alternate Maintenance Vessel - B, support boats and Coast Guard vessel which were at the location immediately rescued personnel from the water. Firefighting actions by Coast Guard and port tugs were commenced immediately. All the casualties were immediately shifted to the jetty and sent to the hospital by the ambulances waiting at the location.
- Firefighting continued for 4-5 hours. In between, after 2-3 hours, O&M contractor personnel entered the main Maintenance Vessel – A, which was on fire and activated the CO2 suppression system. This helped in extinguishing the fire. Out of the four fatalities, two were dead at site on the day of incident and two later succumbed to burn injuries at Hospital.
- Later on, the main Maintenance Vessel - A was physically inspected. It was ascertained that the entire engine room seemed to have been engulfed in fire. Main area of the flame appeared to be the starboard side near the emergency exit of the engine room. The electrical panels of the main engine and one of the MSB on the starboard side near the emergency exit were fully burnt and deformed. Some amount of fire melt areas were also seen on the starboard side including some parts of the starboard Main Engine.
- The fire appeared to have started from an ignition point in the engine room near the MSB panel or from generator which was in operation at that time. The most probable reason for explosion appears to be presence of highly flammable gases in the engine room due to which fire spread quickly to the entire oil spill (including vapor) on the main deck.

REASONS OF FAILURE/ ROOT CAUSE

- In telemetry system, there were large number of alarms registered for operation during cargo discharge:
  - on combined hawser load danger/ warning/ starboard hawser load warning.
  - on "distance between tanker and buoy as low" when tanker was berthed at SPM.
  - about tanker on red/ orange sector.

The main reason for such huge number of alarms was due to load pin instrument failure in starboard side and ineffective Bow monitoring and pull back operation. This was a serious issue as control room operator was not able to monitor the system properly.

- Inner string MBC did not perform the way it should have performed in ideal condition. It leaked on activation. This created panic situation

and urgency to arrest the leakage. MBC, which was due for refurbishment a year back, was not replaced.

- Deployment of alternate Maintenance Vessel - B in place of main Maintenance Vessel - A which was not having the same facilities e.g. A-frame and enough deck space for carrying out such maintenance. Due to this, there was no choice left for carrying out the removal of leaking MBC other than through main Maintenance Vessel - A (which was still under dry dock activities).
- Main Maintenance Vessel - A was taken to SPM without having valid certificate/ clearances for sailing. As per Port Trust report, hot work was pending and vessel had gaps on the deck. Through these gaps, crude oil seeped into the engine room and caught fire. Although, O&M contractor has taken the vessel in the larger interest of mitigating environmental disaster but had not anticipated the rough weather resulting in overspill of crude oil from floating hoses onto deck of main Maintenance Vessel - A.
- As observed during OISD External Safety Audit, Weather prediction were not being arranged by the owner. This would have facilitated early warning to the Pilot and the Boarding Officer to take preventive measures.
- SOP for tanker operation in bad weather was not available. Bow watch and pull back operations were not well coordinated and effective. This led to hawser failure and subsequently MBC activation.
- Job Safety Analysis (JSA) was not carried out before taking up the non-routine activity like removal of actuated MBC. Learning from similar incident happened in past has not been documented and implemented while attending hose maintenance when it is filled with oil on activation of MBC.
- Many of the trends and details from the system were not downloaded prior to the time of enquiry (after 4 months). Owner personnel's awareness on SPM DCS panel seems inadequate.
- Even though such a fatal incident had occurred, internal enquiry report of owner is not covering the basic principles of enquiry investigation like lapses observed, root causes of failure, recommendations to avoid such incidents in future.
- Owner has adopted a modified spool system for MBC replacement. However, post incident, there is no communication from owner side to O&M contractor highlighting the root cause analysis of the incident and suggesting corrective actions to avoid such incidences in future.
- There is no system of internal audit through multi-disciplinary team for the SPM operations/ maintenance in place. Near miss incident reporting system in case of SPM operations/ maintenance works is not there. Internal audit mechanism and near miss reporting system brings about gaps in the system to take corrective action.
- Risk analysis on direction of oil movement and its impact on environment had not been carried out. Sufficient resource persons, for estimating the quantity of oil in such cases that is exposed to risk of oil spillage, are not available either with O&M contractor or owner.
- There appeared to be over reliance on offshore O&M contractor for day to day activities at the SPM location and hardly any review of their work was being done from owner end.

RECOMMENDATIONS

- Telemetry system and DCS should be made functional in all respects without false alarms by replacement of faulty sensors (e.g. load cells). Panel operators need to be trained to respond promptly on alarms.
- Operator personnel's awareness on SPM DCS panel needs to be enhanced through periodic training.
- Weather prediction is to be arranged by owner.
- Bow watch and pull back operation to be made more coordinated and effective. SOP for the same to be made for possible scenarios (e.g. bad weather) and all the concerned personnel to be adequately made aware through written instructions and wherever possible through effective training.
- MBC to be refurbished within time period as per OEM recommendations.

- A modified spool system (in consultation with OEM) to be put in place for safe replacement of activated MBC at all locations.
- SOP to be developed for replacement of activated MBC.
- Job Safety Analysis (JSA) to be carried out before taking up the critical activity like MBC replacement job.
- Whenever, Maintenance Vessel is taken for periodic survey/ dry dock, it shall be ensured that alternate vessel being deployed is having same facilities (e.g. A-frame, enough deck space) for maintenance activities.
- Maintenance Vessels with statutory certificates/ clearances shall only be deployed for SPM related activities.
- In line with rule-25 of Petroleum and Natural Gas (Safety in Offshore Operations) Rules, 2008, detailed Risk Analysis on direction of oil movement and its impact on environment are to be carried out. Availability of sufficient resource persons either with O&M contractor or owner for estimating the quantity of oil in such cases that is exposed to risk of oil spillage is to be ensured.
- In-house competency for SPM related operations/ maintenance activities is to be enhanced through training for better coordination and supervision with O&M contractor.
- A system for incident investigation by a multi-disciplinary team from another location to be put in place to find the root causes and the same is to be widely shared.
- A system of internal audit for the SPM operations/ maintenance activities through a multi-disciplinary team is to be put in place on yearly basis.
- Near miss incident reporting system in case of SPM operations/ maintenance jobs is to be put in place.

Maintenance Vessel on fire

CASE STUDY
Fire Incident due to leakage of MS from insulating flange joint

Shri LL Sahu
Director (MO-POL)

Shri Navneet Sharma
Joint Director (PL)

Shri SK Tiwari
Addl. Director (MO-POL)

INTRODUCTION

Title: Fire Incident due to leakage of MS from insulating flange joint.

Location: POL Terminal

Loss/ Outcome: Product and production loss / injury to one person

BRIEF OF INCIDENT

A fire incident took place at one of the Terminal during the pipeline receipt of MS from Refinery. At the time of incident, MS pumping was going on from Refinery to Terminal. The length of the pileline is approx. 4 KM and line fill quantity is 1050 KL.

MS pumping from Refinery to Terminal started in the morning. The fire incident took place in the afternoon near the insulation joint provided in 24" MS line when it came out of the ground inside the Terminal. The Pipeline from Refinery is coal tar coated and provided with Cathodic Protection (CP). To isolate this pipeline from station piping, insulating gasket was provided just after raising from underground section inside the Terminal. During the receipt, no job was going on or near the site of incident except the wagon loading of ATF. The CCTV camera provided near the site was not working. The fire was first noticed by the contract worker who was loading ATF rake in the siding. He alerted Control Room on VHF and started to fight the fire. Control Room advised Refinery to stop the pumping and also communicated all the coordinators involved in firefighting response. The firefighting continued for almost 4 hours. Due to continuous leakage, fire reignited twice in the area and was finally brought under control by evening through combined efforts of all members of offsite disaster management group.

As minor product leakage was occurring from insulation flange, flushing of the pipeline was started from Refinery end. Once the line was filled with water, tightening of the flange was done using non-sparking tools and leakage was completely arrested by midnight. During the firefighting operation, one employee of the Refinery was injured due to fall from foam tender.

OBSERVATIONS / SHORTCOMINGS

1. Insulating flange gasket was used in the pipeline instead of monolithic insulating joint. Insulating flange gasket and insulating sleeve on studs are susceptible to weathering and deterioration

2. Refinery is the owner of pipelines supplying products to Terminal and further to Jetty area through the installation. The integrity assessment through hydrotest, CIPL / DCVG surveys and PSP readings measurement & monitoring was being done by Refinery.

   Lack of system was evident in carrying out the monitoring of piping inside the Terminal on regular basis. Confusion was there w.r.t ownership of the pipeline and piping inside the Terminal. Only the major periodic assessments like PSP monitoring, CIPL/DCVG survey, ultrasonic

thickness of above ground piping and pressure testing was being taken care by Refinery. The condition monitoring of above ground portion of pipeline including insulating flange joints to check the possibility of minor leaks, vibrations, possibility of spark across insulating flange gaskets etc. was not done and recorded to rule out these conditions in routine operations and getting prior information before failure of any component involved in the system.

3. No pressure monitoring instrument was installed at pipeline dispatch and receipt location which could indicate possibility of leakage prior to reporting of fire incident.

4. Flow monitoring and reconciliation was based on tank dip at both the ends. There was no online flow monitoring system for giving any alarm on any abnormal flow conditions such as leakages.

5. Hydrocarbon detector was not installed at the incident location within the Terminal which would have given any indication on the leakage and thus allowing any proactive measure before the fire incident.

6. Insulating flange joint was provided without any consideration of upstream isolation valve causing delay in controlling the leakage

7. CCTV camera covering the fire site was non-working for last three months. Further, the location was having PTZ camera which was not focused on the incident site even after the occurrence of incident for its monitoring from the Control Room.

8. The integrity assessment of the pipeline and flange joints in the line is based on hydro test at an interval of 5 years. The hydro test was done in December, 2015 by Refinery. The hydro test report was indicating a test pressure of 12.0 Kg/ cm_2 held for 20 hours. However, hourly record of pressure measuring instrument/ pressure recorder was not in place to confirm integrity of pipeline including the flange joints.

9. The Off PSP readings in some of the test points observed to be in under protection range as per quarterly CP monitoring reports. The unprotected side reading at the insulating joint was observed to be on higher side which is indicating leakage of CP current across flange joint.

10. Surge diverter was not provided across the insulating joint.

11. Earthing was not provided at the insulating flange joint which might have allowed build-up of static charge.

12. The CIPL survey data indicated under protection in most of the pipeline length based on off readings. However, no section was selected for DCVG and coating repair. Further, only the graph of the readings was available without any record of readings in the pipeline section.

13. The automation job of the terminal was not complete. The events log to confirm the closing of tank ROSOVs, start of fire engines etc. were not recorded at the time of incident.

14. The sharing of signals for Pipeline Transfer (PLT) and hotline communication was not working between the Terminal and Refinery. The OFC link provided by Refinery for pipeline transfer between them got damaged almost a year back which has not been restored till date by Refinery. Only P&T and mobile communication was working between Terminal and Refinery.

15. The fire fighting response of Terminal was not satisfactory. They could not contain the fire in initial response as they failed to maintain the continuous foam supply for making foam blanket on fire site resulting in spread of fire. Later on also, they were not able to take the lead in containing the fire and the situation could be brought under control mainly by Refinery team and their resources

16. There were gaps observed in emergency response of the Terminal and Refinery. The Refinery was not part of Mutual Aid Response Group (MARG) though it was under the same organization. The initial information to Refinery about the fire incident was given by Terminal

and also for stopping the dispatch pumps. However, Refinery restricted itself to shutting down the pumping operation. No further proactive effort was made by Refinery to get the details of the incident. They took serious note of the incident only after getting information from state authorities which shows lack of proper coordination. The fire tender of Refinery could reach the site 15 minutes after the first fire tender was reported at the site from State fire services, Then Refinery fire team could take the charge of situation. Further, it was observed that person manning the Control Room activities could not confirm the nature and magnitude of fire which delayed the selection of fire tender for fire fighting exercise.

17. One officer of Refinery got injured during the fire fighting exercise. He slipped and fell from the roof top of fire tender, possibly due to the slippery roof (due to foam and water presence) or may be due to movement of monitor.

18. Audit system of the Terminal as well as of Refinery was not adequately covering various operations, maintenance and inspection aspects of product transfer pipelines and adoption of best engineering practices. Various gaps like non-availability of pressure monitoring system, flow monitoring, non-availability of hydrocarbon detectors, coating issues in pipeline etc. were never pointed out in internal audit system.

19. Management review of Terminal and Refinery was not included pipeline related issues, exchange of pipeline data, pumping / receipt tank data, communication between Terminal and Refinery etc.

REASONS OF FAILURE / ROOT CAUSE

Profuse leakage of MS from insulating flange gasket, most likely due to ageing of sleeves leading to failure of grip at flange joint, and generation of spark due to release of accumulated charge with MS resulted in immediate fire

RECOMMENDATIONS

1. Insulating type flange joint shall be replaced by monolithic insulating joint.
2. Earthing of the pipeline and piping system shall be ensured at insulating type flange joints to avoid charge build up in case of PLT operation. The earthing is really important at all the potential leak points to avoid generation of spark due to static charge dissipation. Further, surge protection device shall be provided across insulating joint.
3. Visual inspection of all above ground portion of pipeline including the flange joints must be strengthened for any signs of leakages, vibrations, dislocation etc. due to the effects of various operating factors like thermal expansion and weathering actions.
4. The online pressure and flow monitoring instruments at the dispatch side and pressure monitoring instrument at receipt side of the pipeline shall be provided for confirming the normal pipeline operation.
5. Hydrotest of the pipeline must be done with utmost care. All the pressure and temperature variations must be recorded. All the possible points of minor leakages like flanges, valves etc. must be checked closely for any signs of deterioration of compressible parts like gaskets, sealing glands etc.
6. The flange joint in any pipeline should be provided only after welded isolation valve to facilitate offline maintenance activities like replacement of gaskets and for effective emergency response in case of any such leak/ fire incident in the Terminal.
7. Hydrocarbon detectors shall be placed in the Terminal in such a way that all the piping and process area is adequately covered for early warning in case of a leakage.
8. Risk assessment of the Terminal shall be done covering various aspects of pipeline operations as lot of underground pipelines are passing through the Terminal. All the hazards shall be identified and proper remedial measures shall be implemented for mitigating these risks.

9. Internal audit system of the Terminal and Refinery shall include the pipeline system also. The internal audit of pipelines by Refinery shall be done by engaging competent persons dealing with various issues in pipeline system for adopting best practices based on latest developments and previous industry experiences. All the gaps like inadequate CP, earthing issues, absence of surge protection measures shall be checked and attended immediately.

10. Management review mechanism shall be made more robust in the Terminal & Refinery for attending important issues like exchange of critical pipeline & tank data between Refinery and Terminal, communication link issue, close coordination between Terminal and Refinery etc. Periodic joint meetings should be conducted between the top management of Terminal and Refinery for resolving any pending issues.

11. Emergency Response and Disaster Management Plan (ERDMP) shall be revised by both the Terminal and Refinery considering the interaction of processes at Refinery and Terminal which can have bearing on the safe operations and emergency response. The role of Refinery is significant for controlling any kind of emergency and joint mock drills should also be conducted for improving the coordination between Refinery and Terminal. The response of Control Room should be improved in emergency handling for ensuring effective external communication.

12. Fire fighting system of Terminal shall be strengthened for developing independent capability in controlling such kind of possible emergent situations with their in house resources.

13. Automation jobs in the terminal shall be completed on priority. All the events must be logged in the PLC server for proper analysis and control of all operations. All the critical events shall be backed by proper voice and visual indications.

14. The availability and CCTV system must be enhanced for better monitoring of all facilities within the Terminal. Further, strategic use of PTZ cameras must be given importance in close monitoring and control of critical activities from Control Room.

Flange, the point of leakage

Flange, the point of leakage

CASE STUDY
Fire incident in a river due to crude oil leakage from feeding pipeline

Shri Leela Prasad Konduri
Addl. Director (PL)

Shri Vivek Singh
Joint Director (Engg.)

Shri Navneet Sharma
Joint Director (PL)

INTRODUCTION

Title: Fire incident in a river due to crude oil leakage from a feeding pipeline.

Location: In a river near crude oil storage location.

Result/ Outcome: Spillage of crude oil and subsequent fire in river.

THE INCIDENT:

At one of the crude oil storage location, accidental activation of Emergency Shutdown Switch (ESD) of tanks resulted in sudden closure of Remote Operated Shutoff Valves (ROSOVs) causing surge pressure, resulting in leakage in feeding pipeline outside the storage location which flowed in to the river through adjoining drain and was later set on fire by some miscreants.

INCIDENT OBSERVATIONS:

- The storage location is meant to receive crude from various production installations. On the day of incident, the receipt of crude oil was going on in two tanks and dispatch was going on from another two tanks.
- Station ESD got activated which generated closure command to all ROSOVs installed in the storage location. The information about the leak incident was given to all pumping locations and the pumping to location was finally stopped after 23 minutes of incident. Subsequently, arrangement was made to divert the crude supply to other storage location.
- Arrangements were made to arrest crude oil spillage outside the location using booms, sorbent pillows, bunds etc. However, substantial quantity of leaked crude oil got mixed in nearby civil water drain and flowed into the river. The leaked crude in the river was set on fire by some miscreants which got media coverage locally and nationally.

LAPSES/ ROOT CAUSE OF FAILURE:

Accidental activation of Emergency Shutdown Switch (ESD) of Tanks, apparently while carrying out instrumentation job in the Main Control Room racks resulted in sudden closure of ROSOVs of the inlet and outlet of all the storage tanks of location, which resulted in surge pressure build up within the location and feeding pipeline and development of leakage thereof inside and outside the location.

OTHER MAJOR SHORTCOMINGS OBSERVED WERE AS UNDER:

- System of Management of Change was not followed in line with OISD-STD-178 while installing the ROSOV to comply with M.B. Lal recommendation.
- Critical jobs like checking of control logic in Control Room etc. were undertaken without adequate internal controls through work permit system with applicable authorization for ensuring proper monitoring and supervision.
- High pressure protection system was not installed neither at the storage location nor at the feeding locations for automatic shutoff of pumps, closing of station inlet valves in case of abnormal pressure rise. Pipeline operations were not conceptualized keeping in mind the

abnormal scenarios like surge creation due to closing of ROSOV/ MOVs or any other reasons.

- The pipeline parameters such as flow and pressure were not monitored at the feeding point. The operator would not have any idea about change in pipeline hydraulics in case of any leakage.
- Pressure control system is not provided in the storage location. The pressure was controlled through manual intervention by controlling the flow which is not a proper and fail proof system.
- Learning from similar type of incident which happened in similar location of the organization was not adopted.
- Supervisory Control and Data Acquisition (SCADA) system was not available for monitoring and control of all pumping and receipt operations.
- Coating and wrapping is not provided on buried piping inside the storage location which resulted into severe pitting/corrosion on the failed pipes.

LEARNINGS/ RECOMMENDATIONS:

- Work permit system should be implemented for any kind of troubleshooting job in Control Room. Authorization should be maintained for different nature of jobs so that only qualified and competent persons carry out specific jobs.
- Surge analysis study to be carried out considering the design parameters and all recommendations to be complied.
- Management of Change (MOC) system to be implemented while carrying out any modification in any process, controls and protection system. All the HAZOP recommendations should be addressed before implementing any modification.
- Pressure control and protection mechanism to be incorporated in the existing system for maintaining pressure within normal operating range.
- Baseline data to be made for all feeding pipeline and station piping to set the various operating range and protection set points and regular integrity assessment to be ensured.
- Monitoring mechanism for all pipeline parameters to be developed for ensuring safe and sustained operations.
- Wrapping & coating shall be done for all underground piping and its inspection to be done in line with OISD-STD-130.
- Learning should be used from past incidents across the industry for taking corrective measures across all locations to avoid reoccurrence of the same.

Photograph of reported fire in river (as published in media)

INDUSTRY SPEAKS
Conquering Cyclone Amphan

Submitted by: Sh. VM Mali, DGM, Corporate HSSE, BPCL

Cyclone Amphan was the first super cyclone over the Bay of Bengal since the 1999 Odisha Cyclone and it turned into a severe super cyclone as it proceeded towards West Bengal. As per the data available, it was formed over the Bay of Bengal on 16th May 2020 and highest speed recorded was 240 km/h. As per official releases, the cyclone has claimed 118 lives and caused unprecedented damages.

All our POL Depots/ Installations, LPG Bottling Plants, Aviation Fuelling stations and Lube Plants in West Bengal and Odisha State were put on high alert from the moment the cyclone advisory was issued by Meteorological Department. The cyclone was monitored for its progress and likely path through satellite images, looking at NDMA & State Government alerts. Corporate HSSE Department of BPCL also supported the locations with its cyclone preparedness and issued circulars on protection measures. A brief write up on the overall approach followed by BPCL and its locations is shared here for larger learning.

The likely landfall dates were taken into consideration and all preparatory activities were undertaken. Normally a Control Room is set up at the Regional Office but due to current COVID-19 situation, it was decided to operate the Control Room from residences of the respective members. Communication lines were kept operational through mobiles, Wi-Fi connectivity etc. Our locations were in constant touch with District Crisis Group, SDO, ADM Disaster Management Cell and Dept. of Factories & Boilers.

Preparedness Measures:

a. All the masts of the high mast towers were brought down and secured to avoid structural damages to the light fixtures.

b. All the security personnel were given instructions and alerted on the process to be followed. List of important telephone numbers were given to them for giving updates and situation report.

c. All the loose and important material were either secured or shifted under covered shed.

d. All the tall structures were inspected before the storm for their rigidity.

e. All temporary display boards/ standees/ loose GI sheets were removed from site and kept inside the store.

f. A team was formed consisting of 3 Officers (Installation Manager, HSSE Officer, Operation officer), 2 Technicians, 2 electricians, 1 tank farm operator, Security supervisor & 4 contract labours to take care of any exigency.

g. Electrician and his team were deployed well in advance to tackle any electrical emergency and for operation of the OWS in case water logging starts inside the plant.

h. The fuel tanks of all DG sets & Fire-Engines were kept full. Adequate stock of lube oils, coolants were positioned.

i. Another team was stationed at designated Control Room with CCTV/ land line/ emergency light/ food facility and their roles were briefed by Installation Manager. Team was interacting regularly over WhatsApp group created for Cyclone Amphan with Regional team and location members on the path of Cyclone.

j. OWS and drain were cleaned and kept free of any debris.

k. All Security Guards and others were instructed to stay inside their civil posts/ buildings during cyclone and follow the instruction of Fire-in-Chief only.

l. Sufficient food/ portable emergency lights etc. were stocked at offices.

m. Stock of non-sparking tools/ gaskets/ nut-bolts/ electrical tools/ SCBA sets were kept in ready condition at Control Room with the Technicians.

n. Small portable electrical pumps for quick removal of water from electrical trenches and other places were kept ready.

o. Trimming of weak and loose branches of trees inside plants was carried out.

p. Availability of basic First Aid and medicines was ensured at all locations.

q. All cylinders in yard and inside shed were

properly fastened by nylon wires in lots.

r. All drinking water tanks (PVC) over Administrative building roof top ware filled and guarded against flying off.

s. Charged SIM cards of all available service providers were provided at the Plant and Control Room.

Monitoring the Cyclone:

a. Continuous monitoring of the situation inside the plant over the landline phone with Security/ Electrician/ OWS staff.

b. Water level/ accumulation inside the plant was continuously monitored.

c. All the electrical fittings, instruments and electrical connections were switched off.

d. To avoid any accident or injury to person, no one was allowed to roam in the open area inside plant during and after the time of storm for any reason.

e. Except emergency power as per OISD-STD-244, all other power was kept off and equipment shut down. One electrician was kept near emergency panel, for cutting power in case of any exigency in critical equipment.

f. Continuous status report by security and other team members to Control Room and further updates on WhatsApp group.

g. Continuous monitoring of CCTV in Control Room.

h. Control Room Officers were in continuous touch with Territory Managers/ Regional In-charges.

Post cyclone recovery measures:

a. All the electrical panels were thoroughly examined to ensure whether there is any risk from resuming the power with DG Set/ electrical mains.

b. Portable pumps were utilised for quick removal of accumulated water around the plant.

c. Housekeeping/ cleaning work was commenced to remove minor debris, pieces of asbestos sheets, tree branches.

d. Electricity and LAN connectivity restored at plant in phases after checking each circuits.

e. A round was taken with all team members throughout the plant immediately after stopping of cyclone/ rain and update was given to Control Room.

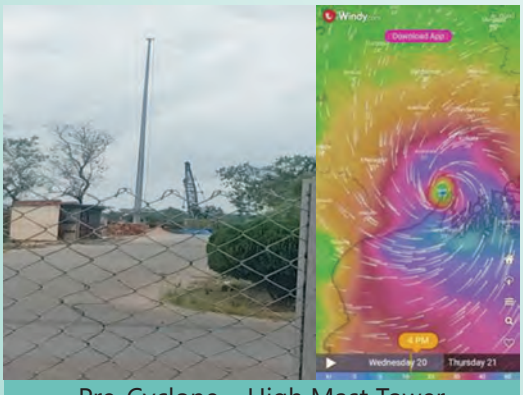
f. Restoration work started from next day morning and assessment of area done.

g. Before starting the electrical motors, which were submerged in water, testing with Merger was carried out.

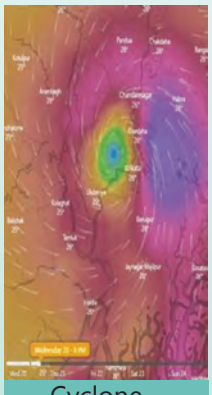
h. Close monitoring of Pipelines/ Pumps/ TLFG during operation resumption done.

Power and communication poles/ cables/ wires etc. were badly damaged all across Kolkata and restoration of the same was major challenge. Power to our locations restored after 24 hrs. and mobile voice connection after almost 36 hrs.

BPCL Corporate HSSE was in constant touch with the locations, Regional set-up and HQ role holders for periodic updates on the situation. The situation report was being submitted to OISD every few hours till Cyclone intensity phased out. It was a major challenge which BPCL as a team faced successfully and ensuring no major damage to our facilities and restoring the Business Operations in short time.



Pre-Cyclone – High Mast Tower Cradle downed


Cyclone – Satellite Images

Post - Cyclone – Flooding and Damages

ARTICLE – LEARNING FROM PAST
Lebanon Incident

Recently, there was an accident in Lebanon (Beirut). Blast equivalent to 1800 T of TNT took place which has not only shattered the life in Lebanon but also raise the question to analyse;

"Do we really need a nuclear bomb, and/ or a third world war to destroy the world or our systems have enough potential to do the same?"

Before discussing further let's have a look at the mishap that happened in Lebanon on August 4, 2020.

The Lebanon Incident

On August 4, 2020 around 6 p.m. local time, at least one initial explosion at a warehouse in the port area of Beirut ignited a fire, apparently triggering a second, farstronger blast, the most powerful non-nuclear explosion in history that sent a shock wave across the city. This explosion resulted in killing at least 190 people, wounding more than 6,500 and leaving approximately 300,000 homeless. Though the exact cause of the disaster is still unknown, many probabilities are put forward by various agencies but prima facie it is believed to have been caused by negligent handling and storing of thousands of tons of Ammonium Nitrate.

A shipment of Ammonium Nitrate confiscated and stored during the last six years that contained approximately 2,750 tons of the material. The effects of the large blast are consistent with the expected effects that would be caused by the accidental detonation of this quantity of Ammonium Nitrate.

Although, this incident is still under investigation but one inference can be made surely that there was 2,750 tons of Ammonium Nitrate stored at the site of explosion for last six years without proper safety precautions.

What should we learn from Beirut Incident: an Indian Perspective

After this incident in India, across all the industries a hunt for searching Ammonium Nitrate began. Every industry was asked about the availability, usage, production of Ammonium Nitrate. The possibility of Beirut like incident was outright negated by many entities as they were not using Ammonium Nitrate. Generally, we neither search for nor bother about the similar possibilities/likelihood of a major incident (happened somewhere else) at our location.

Here in this article, the situations where similar incident had occurred in Indian refineries and since the scale was small; losses/severities were not comparable hence either neglected or closed out without any improvement in the prevailing system, are discussed. These incidents are continuously raising alarm, question on the efficacy of our system, but we are neglecting this ringing alarm just because of low severity. At present, we decide our actions based on the severity of the incident, but ignore the underneath potential of the incident.

Similar Incidents in Indian Industries

Fatal incident due to blast in unidentified container

In one of the refineries while shifting the project leftover scrap, suddenly a blast took place. The contractual labourer involved in shifting died. When analyzed, it was observed that the incident took place in a container of phosphoric acid which was part of this scrap, being shifted. This container was part of project left over material which was brought inside refinery for some job during the project stage nearly 10 years before. Since then, it was earlier lying inside the building and gradually shifted to scrap over the years. The person who has given the permission, who has issued the permit for shifting this scrap and the victim who was involved in the shifting were totally unaware about the container and its content. The phosphoric acid became unstable over the year and on movement, the container might have ruptured and come in contact with metal and corrosion generated hydrogen might have exploded the container.

The radioactive material in scrap

April 7, 2010 (Afternoon)- Message received by the Atomic Energy Regulatory Board (AERB), from a reputed

hospital located in New Delhi, stating that one person, aged 32 years, owner of a metal scrap shop in Mayapuri Industrial Area, New Delhi had been admitted on April 4, 2010. The message also stated that the patient had symptoms indicative of suspected exposure of radiation. Officers from AERB visited the place immediately and recovered one pencil radioactive source (Cobalt-60), one cylindrical source cage of dia. ~25 cm with a source pencil still in intact condition in one of the slots of one drum containing radioactive scrap. After detailed investigation, source of this radioactive material was zeroed down to a University. Unauthorized disposal of radiation source by the University, negligence of the management of the licensee, non-compliance with the National Regulations were found to be some of the under lying causes of this incident.

Fire in scrap yard:

In scrap yard of one of the refineries, huge fire was observed in nearly 50 used chemical drums which were kept there for disposal. The fire was brought under control by company fire crew. On analysis, it was found that these drums were used drums of hydrogen peroxide. Due to ambient heat, the leftover material in drums caught fire (after coming in contact with some flammable material). One similar incident was reported by another refinery in which one empty thinner drum which was used for holding fit-up joint during welding resulted in fatal burn incident.

Dosing of wrong chemical:

In one of the refinery, catalyst worth crores got deactivated due to accidental dosing of wrong chemical instead of the regular dosing chemical. In Hydrogen Generation Unit of Refinery, usually chemical named hydrazine hydrate is dosed continuously for Boiler Feed Water Treatment as oxygen scavenger but on the day of incident, Di-methyl Di-sulphide (DMDS) was dosed in place of Hydrazine Hydrate. Despite the easily identifiable odour of both the chemicals, being routine job and well-experienced operating personnel, the wrong dosing vis-a-vis catalyst deactivation took place.

These were examples of some overlooked incidents, which were considered as normal routine incidents but when read together; they question our extant system of chemical handling and management. Actually we should learn from minor incidents and take necessary safeguards to prevent the major incident/disasters. Remember, learning from other's mistake at right time is the best practice.

What can be done?

All the incident (including Beirut Incident) mentioned above are example of non availability of control to ensure the risk within allowable limit. These incidents are giving us opportunity to question our extant system, our practices before any mishap. No doubt, these incidents are resultant of many hidden gaps in our existing system w.r.t. chemical management (handling, storage, processing and managing Risk etc.). This is general assumption in industry that the MSDS is sufficient to manage all the risk associated with the particular chemical or substance. In most of the risk assessment documents, the chemicals and hazardous substances are the most neglected (taken granted); either only major chemical, products or well-known hazardous gases like H2S, Chlorine get notified in the risk assessment whereas risk associated with other utility chemicals, dosing chemicals (during different stages like operation, storage, disposal etc.) is not addressed properly. MSDS is certainly a helping document but not the substitute to risk assessment. For example, MSDS is silent about many aspects such as quantity which is a major factor in converting any spill incident to disaster. So risk associated with each and every chemical/ substance needs due consideration and controls in place if found inadequate.

Some broader guidelines to start with are described below which will help to strengthen our system of chemical risk management:

Steps needed to manage risk

Risk management is a step-by-step process for controlling health and safety risks caused by hazards in the workplace.

1. **Identify hazards**

Look around your workplace, talk to workers and think about what sort of hazards the chemicals and substance are posing. Consider:

- List out chemicals and substances
- Risk and Hazard posed by these chemicals and substances
- Hazards of work practices involving chemicals and substances
- Hazards of surrounding such as other chemicals in the vicinity
- Previous incident/ ill health records
- Non-routine operations like maintenance, cleaning or changes in routine activities

2. **Assess the risks**

Once hazards have been identified decide how likely it is that someone could be harmed (frequency) and how serious it could be (Severity). This is assessing the level of risk.

Decide:

- Who might be harmed and how
- What you're already doing to control the risks
- What further action you need to take to control the risks
- Who needs to carry out the action
- When the action is needed

3. **Control the risks**

Look at what you're already doing, and the controls you already have in place. Ask yourself:

- Can I get rid of the hazard altogether
- If not, how can I control the risks

If you need further controls, consider:

- Redesigning the job
- Replacing the materials, machinery or process
- Organising your work to reduce exposure to the materials, machinery or process
- Identifying and implementing practical measures needed to work safely
- Providing personal protective equipment and making sure workers wear it

Put the controls you have identified in place. You're not expected to eliminate all risks but you need to do everything 'reasonably practicable' to protect people from harm. This means balancing the level of risk against the measures needed to control the real risk in terms of money, time or trouble.

4. **Review the controls**

You must review the controls you have put in place to make sure they are working. You should also review them if:

- They may no longer be effective
- There are alteration in the workplace that could lead to new risks such as changes to:
    - o personnel

- a process
- the substances or equipment used

Also consider a review if your workers have spotted any problems or there have been any accidents or near misses. Update your risk assessment record with any changes you make.

At the End:

Beirut incident is an eye opener for all of us whether we are regulator, top management, middle management, line supervisor or a shop floor worker. We can prevent such incident at our workplace, only if we learn and implement the learning in our activities.

References:

i. OISD Safety Alert (https://www.oisd.gov.in/Image/GetSafetyAlertAttachmentByID?safetyAlertID=34)

ii. COSHH Regulations

iii. Managing risks and risk assessment at work

https://www.hse.gov.uk/simple-health-safety/risk/index.htm

For safety is not a gadget but a state of mind

Safety..., do it, do it right,
do it right now

News in brief

The Safety Council

To ensure proper implementation of the various aspects of safety in the Oil & Gas Industry in India, Government of India had set up a Safety Council at the apex under the administrative control of Ministry of Petroleum & Natural Gas. The Oil Industry Safety Directorate (OISD) assists the Safety Council, which is headed by Secretary, P&NG as Chairman and members represent the entire spectrum of stakeholders – PSU, Pvt. Sector & JVs – as well as relevant expert bodies. To review the safety performance, the Safety Council meets atleast once a year.

The 37th Meeting of the Council was held on 07th August, 2019.

Shri Tarun Kapoor, Secretary, MoP&NG and Chairman Safety Council at the 37th Safety Council meeting at Shastri Bhavan, New Delhi

Key issues discussed and reviewed during the meeting are as under:

- Major activities undertaken in 2019-20 & Activity Plan for 2020—21.
- Analysis of OISD Safety Audits Compliance status (ESA/SSA).
- Analysis of Major Incidents in the Industry over the last three years.
- Introduction of new processes in extant OISD Standardization procedure
  a. Issuing Errata to up already published OISD Standards
  b. Reaffirmation of OISD Standards
- Introduction of PCSA in E&P for installations like GCS, GCP, GGS, CTF, CPF etc.
- Revision in Pre-commissioning Safety Audit tariff structure

#	Description	New Charges per visit in ₹ plus applicable GST
1	LPG Installations, POL Terminals, Cross country Pipelines etc.	5,00,000
2	Refineries, Petrochemicals, Gas Processing Plants etc.	10,00,000

- Introduction of PCSA in E&P installations

#	Description	Charges per visit in ₹ plus applicable GST
1	New grass root installation (CPF/ CTF)	10,00,000
2	Modification/ augmentation in existing installation (CPF/ CTF)	5,00,000
3	New grass root installation (GGS/ OCS/ GCS)	5,00,000
4	Modification/ augmentation in existing installation (GGS/ OCS/ GCS)	3,00,000

Technical Seminar/ Conference/ Workshops

Technical Seminars / Conferences / Workshops for the Oil and Gas Industry are conducted by OISD to discuss the latest technological developments, sharing of incident experiences etc.

1. Two-day workshop on 'Audit of LPG Bottling Plant' for Auditors at HPCL LPG Bottling Plant, Bhopal during 27th-28th Jan 2020.

2. OISD Workshop on 'Fire and Safety in Upstream Oil and Gas Operation' was organized at IPSHEM, ONGC, Goa, jointly by OISD and ONGC during 14th-15th Feb 2020.

3. Two-day Workshop on 'Enhancing Auditors' Skills' for POL auditors of IOCL was conducted at IOCL Irumpanam Terminal during 26th-27th Feb 2020.

4. Two-day workshop on 'Audit of LPG Bottling Plant' for Auditors was conducted at BPCL LPG Bottling Plant, Sikrapur, Pune during 6th-7th March 2020.

World Environment Day celebration at OISD

Oil Industry Safety Directorate (OISD) celebrated the World Environment Day on 5th Jun, 2020. The World Environment Day 2020's theme was 'Celebrate Biodiversity', and it was hosted in Colombia, in partnership with Germany. The theme is extremely relevant because human beings are part of the ecosystem and cannot continue to survive in isolation. Speaking on the occasion, ED OISD shared his thoughts about Biodiversity which is of utmost importance for the survival of all living things big and small, on land or in water. He emphasized that we all need to understand that while there may be a food chain and ranking of species, every living thing is connected to another living thing, and together it forms a network of diverse life forms on the planet. He also stressed that these efforts should not be limited to just a few days beyond the world environment day; but should be pav of a sustained journey for a healthy environment for mankind as well as flora and fauna.

Several activities were organized to commemorate the occasion. These included quiz competition, slogan completion and poetry recitation.

World Environment Day celebration at OISD, Noida office on 5th Jun, 2020

6th International Yoga day

Oil Industry Safety Directorate (OISD) observed the 6th International Yoga Day 2020 on 21st of June 2020. All officers and staff of OISD practiced yoga on the occasion of International Yoga Day, 2020 with their families at their home by participating in the 45 minute Common Yoga Protocal (CYP) drill.

Photographs shared by the officers and staff of OISD observing International Yoga Day 2020 at home.

6th International Yoga day observed by OISD officers

स्वच्छ भारत अभियान

LPG Bottling plant – Jammu, HPCL
OISD Safety Audit during 14th – 16th Jan 2020

BEFORE

AFTER

BEFORE

AFTER

कोरोना से बचें

सही से मास्क पहनें

हाथ धोएं बार बार

निभाएं दो गज की दूरी

जब तक दवाई नहीं, तब तक ढिलाई नहीं

Protect yourself and others!

Follow these Do's and Don'ts

Do's

Practice frequent hand washing. Wash hands with soap and water or use alcohol based hand rub. Wash hands even if they are visibly clean

Cover your nose and mouth with handkerchief/tissue while sneezing and coughing

Throw used tissues into closed bins immediately after use

See a doctor if you feel unwell (fever, difficult breathing and cough). While visiting doctor wear a mask/cloth to cover your mouth and nose

If you have these signs/symptoms please call State helpline number or Ministry of Health & Family Welfare's 24X7 helpline at 011-23978046

Avoid participating in large gatherings

Don'ts

Have a close contact with anyone, if you're experiencing cough and fever

Touch your eyes, nose and mouth

Spit in public

Together we can fight Coronavirus

तेल उद्योग सुरक्षा निदेशालय
Oil Industry Safety Directorate
ISO 9001:2015 certified

OIL INDUSTRY SAFETY DIRECTORATE
Government of India
Ministry of Petroleum & Natural Gas
8th Floor, OIDB Bhavan, Plot No. 2, Sector – 73, Noida – 201301 (U.P.)
Website: https://www.oisd.gov.in, Tele: 0120-2593833, Fax: 0120-2593802