Awards & Accolades

Indian Oil: In a reaffirmation of Indian Oil refinery division's commitment to operational safety at its two of its refineries at Assam,邦加邦加, and Assam,邦加邦加, the refinery division has been recognized with the coveted Oil Industry Safety Award for the year 2013-14. Dhamanendra Pradhan, Minister of State (IC), Department of Petroleum & Natural Gas, presented the award to A.N. Jha, Executive Director (LPG), Indian Oil, in the presence of K.D. Tripathi, Secretary, PDEO, and S.S. Dixit, Director (Projects), Indian Oil Corporation Limited.

Essar Oil's Vadinar Refinery wins the Prestigious OISD Safety Award

Essar Oil's Vadinar refinery was recently conferred with the prestigious "Best Safety Performance Refinery of the Year 2014-15" award by the Oil Industry Safety Directorate (OISD) for demonstrating superior overall safety performance. The award was presented by Shri Dhamanendra Pradhan, MoP(ICI), in the presence of A.N. Jha, ED(LPG), Indian Oil, in the presence of Sandeep Poudark, Joint Secretary, PDEO.

IndianOil wins OISD Award for LPG Marketing

For its operations in the North Zone in the year 2013-14, Indian Oil Corporation Limited has won the Oil Industry Safety Directorate (OISD) award in the Oil Marketing Company - LPG category. Dhamanendra Pradhan, Minister of State (IC), Department of Petroleum & Natural Gas, presented the award to A.N. Jha, Executive Director (LPG), Indian Oil, in the presence of K.D. Tripathi, Secretary, PDEO, and S.S. Dixit, Director (Projects), Indian Oil Corporation Limited.

HPCL POL terminal bags the OISD safety Award

HPCL's POL terminal bagged the Oil Industry Safety Award 2013-14. Ms. Nishi Vasudeva, CMD, HPCL, and her team received the award from Shri Dhamanendra Pradhan, Hon’ble MOS(ICI). Other present in the award ceremony included Shri KD Tripathi, Secretary, PNG; Sandeep Poudark, Joint Secretary, PDEO. Shri R. Hirdik Dutta, Executive Director, OISD and YK Gwal, Director-M, HPCL.
Esteemed Readers,

In the recently concluded Oil Industry Safety Awards ceremony, two compendiums were released by Hon'ble Union Minister of State (I/C), Petroleum and Natural Gas. The Compendium on Analysis of Major Incidents of Oil and Gas Industry is a compilation of incident data of last eleven years entailing the details of the incidents, root cause analysis along with recommendations. The compendium on Safety Audit Checklist which was also released during the occasion covers the entire gamut of operations comprising audit checklist for refineries and GPP, Exploration and Production, Marketing, Pipelines and Construction Management. I am sure, industry will find both the compendiums useful and it would help industry to minimize losses and enhance safety in this vital sector that energizes the nation.

Friends, while addressing the gathering, Mantri Ji mentioned that there should be a debate on the formation of an umbrella organization that must look after safety of Oil and Gas Industry Organizations. Currently the safety issues in the Oil and Gas Industries are looked after by DGMS, PESO, PNGRB and OISD. Due to the fragmentation, it is quite normal that the issues are not looked after properly. Therefore, Mantri Ji has rightfully desired a debate on this important subject. It is always better to have one single agency/ regulator which must be accountable and responsible for overseeing safety of the entire oil and gas industry. Towards this, OISD/MoP&NG has prepared a Draft Bill, namely, Petroleum and Natural Gas Industry Safety Board Bill which is under consideration of Committee of Secretaries.

The modern day operation of Oil And Gas Industries is highly complex. Thus effectively managing process safety in Oil Sector necessarily calls for persons with adequate knowledge and experience of petroleum business. Thus the requirement of domain expertise is vital. It is also a fact that Expertise, rather than authority, takes precedence in any High Reliable Organization (HRO). When conditions are high-risk and circumstances change rapidly, on-the-ground, subject matter experts are essential for urgent situational assessment and response. HROs do not ignore any failure rather they address any level of technical, human or process failure immediately and completely. In today's context, Regulators must therefore essentially have domain experts who have the ability to not only analyze the technical problems but also understand human behaviour too.

Friends, perhaps OISD is best suited for the purpose. Let there be a debate.

Hirak Dutta
At a simple function held on 4th August 2015 at SCOPE Auditorium, SCOPE Complex, New Delhi, Shri Dharmendra Pradhan, Hon’ble Minister of State (Independent Charge), P&NG, in the presence of Shri K. D. Tripathi, Secretary P&NG, Shri Sandeep Poundrik, Joint Secretary (Refineries), MoP&NG, and Shri Hirak Dutta, Executive Director, OISD, presented the “Oil Industry Safety Awards” for the year 2013-14 to all the award winning entities.

To encourage outstanding safety performance of the industry and to inculcate a positive culture of competitiveness among the industry members, the Ministry of Petroleum and Natural Gas introduced a system of Oil Industry Safety Awards in the year 1987. These awards are presented to those organizations which achieved ‘Exceptional Safety Performance’.

The evaluation criteria for the coveted Oil Industry Safety Awards are quite stringent viz. complexity of operations, accident free man-hours worked, volume of the products handled, direct & indirect loss due to any incident, hazard potential of the complex, no major incident during the period etc.

The award ceremony began by paying homage to Dr. A.P.J. Abdul Kalam, former President of India, who believed in the Freedom of mind and the Expansion of the Intellectual space and whose vision was to make India a knowledge power in the world. During the ceremony, a compendium on Analysis of Incidents in the Industry for the period 2004-15 and another compendium on ‘Check Lists of Safety Audits’ were released by Hon’ble Minister.

Addressing a vast gathering of more than 350 Oil Industry executives comprising Captains of the Industry, Senior Executives, Retired senior executives, Media representatives, Shri Dharmendra Pradhan, congratulated the ‘Award Winners’ and underlined the need for preservation and protection of the vital Oil & Gas Installations in the country.

Shri Pradhan urged the Oil & Gas Organizations to strive towards achieving the ultimate objective of ‘Nil Incidents’ across the Industry. He went on to add that our prime objective must be to create a safe work environment in the Oil and Gas industry with an underlying commitment to creating an incident and injury-free work environment in the entire Oil & Gas Industry in India.

While underlining the importance of proactive measures in preventing any incident in the Industry, Shri Pradhan articulated that Industry must lay more emphasis on self-regulatory measures for strengthening safety in the entire Oil & Gas Industry segments. The companies must strengthen its internal audit mechanisms and promptly liquidate the weaknesses.
On the issue of fragmentation in monitoring & implementation of safety aspects of Hydrocarbon Sector, Hon’ble Minister opined the need for having an umbrella organization looking after the vital Safety aspects of Oil & Gas Industry. He further mentioned that OISD has the necessary wherewithal to effectively monitor the process safety issues in highly hazardous and flammable petroleum industry.

Shri Pradhan, in his address, went on to add that during his tenure he has visited various Oil & Gas Installations in the country and has observed that Industry has taken lot of initiatives for enhancing of safety of their assets. However, the Minister mentioned that we cannot afford to be complacent since safety is a continuous process and we must remain vigilant 24X7. He went on to add that we must aim for establishment of world class Standard Operating Procedures at our Oil & Gas Installations and must strive for making this Industry as a ‘Total Safety, Security and Hazard Free’ Industry.

Hon’ble Minister, made special mention on the two very important compendiums viz. ‘Analysis of Incidents for the Period 2004-15’ and ‘Safety Audit Checklists’ which were released on the occasion. He complimented OISD for taking such an excellent initiative and hoped that the compendiums would be used by Industry members for achieving excellence not only in safety but in other areas of operations. He urged Executive Director OISD to continue to take more such initiatives in the future.

Shri K. D. Tripathi, Secretary, P&NG, articulating the need to achieve excellence in Operations underlined the need for adequate checks and balances in the system which ensures effective safety systems are well implemented in the Oil & Gas Industry establishments. Further, it is also important to track effectiveness of these systems, he added. He went on to add that the Key area which requires constant focus by every organization is developing ‘Safety Competencies’ as a part of core competency.
Complimenting OISD for coming out with the compendium on “Analysis of Major Incidents in Oil & Gas Industry” for the past 10 years enunciating the root cause of failures and learnings thereof, Shri Tripathi mentioned that this booklet would provide a great learning opportunity to the entire industry.

Shri Sandeep Poundrik, Joint Secretary (Refineries) while expressing satisfaction over the compliance of the majority of the M B Lal Committee recommendations by the Industry, urged the Industry to expedite the implementation of the pending recommendations in a time bound manner. He also stressed that for enhancing the safety in our Oil & Gas Installations the key area requiring more focus is the training of our workforce including the training of contract personnel.

Hirak Dutta went on to add that regular reviews of the OISD audit recommendations and the pending points in Board Meetings of the respective Oil & Gas Organizations have sent a strong signal down the line - focus has shifted more towards timely implementation. Such review meetings have helped in liquidation of the pending external safety audit recommendations in a time bound manner.

However, Mr. Dutta mentioned that we should not become complacent and have to remain alert and vigilant 24X7. We must have zero tolerance towards all kinds of unsafe acts and must always respect the SOPs, adhere to work permit system, carry out proper maintenance of equipment and ensure adherence to PPEs.

In all 28 numbers of awards were presented for the year 2013-14 of which 07 awards were given to Individuals and 21 to the Organizations. Individual Safety Awards were given to those employees who made exemplary contribution towards the cause of safety in preventing unsafe situation at their respective work places which otherwise could have resulted in a major incident. In the “Organization Category”, the organizations demonstrating superior Process Safety performances were conferred with the awards.

Earlier, while welcoming the dignitaries, Shri Hirak Dutta, Executive Director, OISD mentioned that the numbers of incidents in the Oil & Gas Industry show a downward trend since 2011 which is a first step towards achieving our ultimate objective of ‘Nil Incident’ across the Industry segments. He went on to add that today there is considerable improvement in process safety awareness level across the Industry. While complementing the Industry leaders for their proactive approach for various PSM implementation measures in the Industry, he wished that the day is not far when we can take pride in making this Industry as one of the best and safest in the world. Continuing on the subject, Shri

Hon’ble MoS (I/C) Presenting Consistent Safety Award in Refinery Category to BGR

Shri D. K. Adhikari, Director (MO), OISD proposed the vote of thanks
We have come a long way since the Jaipur Incident

By Hirak Dutta, Executive Director, Oil Industry Safety Directorate

A chemical engineering graduate from Jadavpur University, Shri Hirak Dutta has over 3.5 decades of rich and varied experience in Operations, Process design and engineering, trouble shooting, Safety management, Project Management, Human Resource Management in various Refineries, Refinery Headquarters and Corporate office.

It was in October, 2009, when the disaster hit the town of Jaipur. A devastating fire at the oil terminal killed 11 people, injured many others and resulted in a whooping property loss of ₹300 crores. The entire terminal was on fire, and it took several days for the valiant fire fighters including company’s in-house employees to extinguish the fire ensuring minimum damage of public property outside the boundary of the terminal, which is located in a thickly populated area.

The Jaipur Incident

The committee setup for investigation identified a number of shortcomings in design, operation & maintenance practices. It was observed that the incident took place due to continuing operations with impaired safety critical instrumentation, not following the standard operating procedure, use of obsolete equipment coupled with improper maintenance, poor safety culture etc. The critical factors of the catastrophic incident were loss of primary & secondary containment, inadequate mitigation measures, shortcomings in design & engineering specifications of equipment etc. The photograph below shows the tanks on fire at Jaipur Installation.

The hammer blind on the product line ex-tank which was then used for the purpose of positive isolation needed to be reversed for transfer of product through pipelines. This operation of reversing hammer blind, which has a large bonnet area, resulted in considerable spillage of high volatile motor spirit. The MS tank body valve which could have been closed from the control room to stop the spillage could not be closed since the instrument cable was cut. The instrumentation cable was found impaired; impaired for substantial period of time.

Investigation Committee Recommendations

The committee made several recommendations (~113) to prevent future catastrophic incidents. Recommendations were broadly divided in two broad areas (a) upgrading the hardware (b) improving the softer issues. As I pen down this article, more than 96% of the recommendations have been implemented and balance are under advance stages of implementation.

A. Improvements in Software Areas:
Focus on knowledge Updation / training

The emphasis to improve the skills of the working personnel was accorded highest priority. It was made mandatory that all employees must undergo refresher training on safety including live fire training. Special training sessions with modified program design and carefully selected faculty were organized at all oil installations to accomplish this task. Further, in oil & gas installations, where large numbers of contract workers are involved unless mandatory training on safety and hands-on firefighting trainings are provided, they were debarred from entering the oil installations. Initially assistance of expert agencies was taken to provide live fire trainings. Subsequently in-house facilities for imparting live fire simulation training were developed.

Special training sessions were conducted at all the Installations to discuss in threadbare the key features of standard operating procedures (SOP) with the operating staff & first line supervisors. The nitty-gritties of operations including key operating parameters were deliberated with the operating crew and all necessary clarifications were provided. The SOPs are prominently displayed at all work stations for the operators’ to carry out safe and smooth operation.

Besides, training sessions were also organized in various O&M areas for updating Knowledge.
Mock drills to enhance preparedness

Conducting mock drills on multiple & diverse scenarios at regular intervals have been put into place. These mock drills are conducted at regular intervals at all sites. Critiquing is done by pre-appointed experienced “Observers” apropos each mock drill and feedback provided to the concerned for improvement. All mock drills are followed up with de-briefing sessions. The on-site and off-site mock drills helped to ensure that the personnel are well-equipped to handle emergency situations.

Documenting near-miss incidents

Capturing near-miss incidents and learning from the near misses also improved the learning process. Documenting the near-miss incidents and sharing the learnings with Operating crew are being regularly practiced. Further, near misses are classified into two categories viz. high potential near misses and normal ones. Special incentive schemes have been designed to encourage reporting of near misses.

Management of Change process

Special importance is laid to the management of change process. No changes either in operating parameters or process changes are allowed unless backed up by the process of MOC. Further, safety interlocks must not be kept in bypass mode; to this effect strict instruction for adherence have been passed at all the installations. In case, it is necessary to undertake maintenance work for some control valves / instruments wherein interlock need to be bypassed, can be done only with the prior approval of the plant manager. Special registrars have been put into use to log these events.

Revisiting the operating manuals at periodic intervals, updating the P&I diagrams have been put into place. Pocket manuals detailing the salient operating parameters & brief steps in start-up and shut down etc. were prepared and distributed to the operating personnel.

Strengthening Safety Function

Initiatives were taken to professionalize the safety cadres. The reporting of Head of Safety has been made directly to the senior most executive (the CEO) of the Company. Further, during every Board Meeting, Head of Safety was allotted specific time to share the safety issues and concerns and action plan to mitigate the same. The outcome of such deliberations resulted in deployment of designated safety officers in marketing terminals and mandatory safety audit of the installations by senior level executives.

Bridging communication gaps

Gaps in communication were noted particularly during shift change overs. Besides Jaipur, at some other locations, incidents took place during shift change overs. To ensure proper handing over and taking over during shift changes, it has been made mandatory to sign the log book by both incoming & outgoing employee, and are monitored regularly by plant managers. Further exchange of ideas and discussions on trouble shooting, reliability aspects of the plant between working level personnel & supervisors were encouraged.

These changes have improved the Operation & Maintenance practices in the terminals of Oil & Gas installations.

B. Hardware Improvements:

While upgrading the software aspects focused on improving the softer skills & procedural issues but it was not sufficient to achieve the desired result. Technological obsolescence in the terminals was a matter of concern. Most of the terminals operated in manual mode of operation like physical dip taking of tanks, manual loading of tank trucks, and manual operation of valves coupled with inadequate fire-fighting infrastructure, etc. At most of terminals, Digital Control System (DCS) or Programmable Logic Control (PLC) based system were not available. A number of recommendations were thus made to modernize the terminals, addition of state-of-the-art equipment & firefighting facilities, incorporate additional layers of protection etc. These changes were aimed at reducing human interventions. Marketing terminals now are all in auto-mode of operation with DCS based control system.

Replacement of obsolete equipment with new technology

The hammer blinds on all the product lines have been dispensed with and replaced with double block and bleeder valves. The risk associated while reversing the hammer blind during every product transfer operation is now nullified. Providing DBBV as replacement of hammer blind ensured no spillage. The large bonnet area of the hammer blind which was a potential source of product spill during its physical reversal is thus done away with.

The motor operated tank body valves were replaced with Remote Operated Shut-Off Valves (ROSOV). The special feature of the fail-safe ROSOV includes quick closing of the valve to avoid loss of containment during receipt of product from ships, pipelines, railway wagons etc.

Fighting of accidental oil spill was another area of concern. To fight the pool fire, medium expansion foam generators have been provided in every Class-A tank farm area. MEFG is an effective tool to prevent vapour formation of accidental oil spills. It also ensures quick blanketing of oil spill fire and

The Marketing Terminal at Jaipur: Ready for commissioning
prevents propagation of pool fire.

Similarly, hydrocarbon detectors have been provided at all Class-A tank dykes, pump houses, OWS drains to detect leakage of hydrocarbons. Early detection is the key to prevent untoward incident in petroleum industry. CCTV cameras were also installed at strategic locations inside the terminal to keep a close watch on performance of equipment and tank farm areas.

Upgrading Fire-fighting equipment

Prior to the Jaipur incident, the terminals had at their disposal 144 m³/hr. fixed water and water-cum foam monitors to fight fire. The fire incident at Jaipur exposed this weakness and firefighters faced serious constraint. At all terminals now, remote operated variable high volume long range water cum foam monitors with capacity of 500-2000 gallons per minute has been installed. In addition, trolley mounted HVLRs have been procured to fight emergency situations.

All terminals with product storage capacity of more than 30,000 kl upgraded its firewater network and firewater pumps to match the requirements of double fire contingency. Additional fire water tanks have been constructed, the FW lines were changed and new higher capacity FW pumps installed. The entire hydrant network has been kept in AUTO-mode i.e. sequential start of fire engines on demand. These changes have enhanced the firefighting capabilities to a large extent.

Rim seal fire protection system

Published literatures on floating roof tank fire indicate majority of the tank fire took place at rim seal area of the external floating roof tanks carrying Class-A petroleum products. To circumvent this, automatic linear heat detection and fire suppression rim seal fire protection system have been incorporated for all class-A tanks. The detection system based on the temperature rise actuates the solenoid valve of the foam tank mounted on the tank roof which automatically sprays AFF foam to the affected area thus extinguishing the fire, if any, at the nascent state itself. Understandably, the inventory of class-A external floating roof tanks in the country being large & working in an operating tank is also risky requiring close supervision, the job in totality is expected to be completed by end-2015. As on date, almost seventy percent of floating roof tanks are equipped with Rim Seal Fire Protection System.

Terminal automation

The loading of products which was earlier done manually have been made automatic through use of PD meters and its integration with SAP. Thus taking physical dip of the tanks or tank trucks have been dispensed with. As a result, not only safety records have improved but product losses have also come down substantially.

To avoid loss of containment, each tank has been provided with two separate radar gauges for level measurement & monitoring. An independent level switch with hi-hi level alarm upon its activation will close the tank body valve - the ROsov. This was made to ensure no spillage of products from the tanks. It is an over-fill protection device for the tank. However, this job in totality (since the quanta of tanks are too large) is expected to be completed by end-2015.

One more significant safety feature which has been integrated to the installations for managing any emergency situation is the Emergency Shutdown (ESD) System. The philosophy of ESD is to completely bottle up the operation in case of fire or exigent situation. Pressing the ESD button will automatically actuate the ROsov and close the tank body valve to avoid tank overflow; stop the loading operation in TT or TW loading bays in the event of fire by stopping the product pumps. It would also activate power shutdown after process shutdown except emergency requirements, and other critical lightnings of the installation.

To acquaint the operating personnel with the operation of DCS/PLC and updated equipment special training sessions were arranged by the oil & gas companies. The logic of instrumentation and working of PLC were explained to the satisfaction of the crew.

Focus on Process Safety Management:

The other important change which I have noticed is focus on Process Safety Management. I have been constantly emphasizing this at several fora. PSM must globally get the same attention as accorded to HSE. It is easy to spot defects on site walk-outs but understanding process safety issues require in-depth technical knowledge, analytical skills and even understanding of human behaviour. It is like an ice-berg where only the tip is visible while ninety percent is underneath. Similar is the case with process safety management.

Leadership Challenges:

Leaders are the key drivers for bringing in change in the organization. Thus leadership commitment and its visibility are extremely vital. Leaders must have adequate knowledge & experience of process; understand the associated risks of handling hazardous petroleum products and the behavioral issues. They must be willing to sit with the peers and subordinates to improve their understanding, if called for. Such open discussions help in improving the work culture and thereby safety. However, this is a difficult task but slowly but surely this metaphor is becoming visible.
## Comparison of facilities: Post Jaipur Fire Incident

<table>
<thead>
<tr>
<th>Features</th>
<th>Pre-Jaipur</th>
<th>Post-Jaipur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year of Construction.</td>
<td>1996-97 (Pipeline feed terminal)</td>
<td>2015 (Pipeline feed terminal).</td>
</tr>
<tr>
<td>Positive isolation facility.</td>
<td>Hammer blind valve used for positive isolation.</td>
<td>Replaced with Double block and bleed valve for positive isolation eliminatng the chances of product spill.</td>
</tr>
<tr>
<td>First Tank body valve,</td>
<td>Motor operated valve (MOV) with local /remote operation – was impaired.</td>
<td>Replaced with Remote operated shutof valve (ROSOV). Remote operation both from Control room &amp; outside of dyke area.</td>
</tr>
<tr>
<td>Tank overfill protection system,</td>
<td>Mechanical gauge with local display.</td>
<td>Two radar gauges and one limit switch for each tank.</td>
</tr>
<tr>
<td>Features of ROSOV operation.</td>
<td>Nil</td>
<td>With activation of limit switch, tank receipt ROSOV closes automatically with alarm at Control room. Fail safe operation.</td>
</tr>
<tr>
<td>Rim Seal Fire protection system for EFR tanks</td>
<td>Nil</td>
<td>All Class - A tanks are IFR type, thus Rim seal fire protection system are not required.</td>
</tr>
<tr>
<td>Firefighting facility.</td>
<td>4 Hrs. firefighting for single major scenario.</td>
<td>Upgraded to 4 Hrs. simultaneous firefighting for two major scenarios.</td>
</tr>
<tr>
<td>Centralized foam system.</td>
<td>Mainly foam drums deployed at site.</td>
<td>Foam tanks and replenishment from centralized system.</td>
</tr>
<tr>
<td>Spill protection in dyke area.</td>
<td>Handheld foam monitors</td>
<td>Fixed type Medium Expansion Foam Generator (MEFG) for Class-A dyke.</td>
</tr>
<tr>
<td>Spill Detection device.</td>
<td>Nil</td>
<td>Hydrocarbon detectors at Class A tank manifold, pump house etc. with audio / visual alarm indicaton in control room.</td>
</tr>
<tr>
<td>Shutdown system.</td>
<td>Manual and equipment specific.</td>
<td>PLC based total shutdown with feature of process shutdown and power shutdown.</td>
</tr>
</tbody>
</table>

**Conclusion:**

The concerted efforts of the Oil & Gas companies for the last 5 years fructified in some notable positive outcomes viz. improved awareness on process safety, focus on implementation, less violation of standard operating procedures, maintaining both system & self-discipline. Automation of terminals has reduced human intervention thus less chances of errors & better records. Since last 03 years numbers of incidents have also come down. The challenges now for the oil companies are to maintain the assets properly and ensuring they are in working condition all the time. There is no room of complacency to ensure smooth & reliable operations in vital petroleum sector. Leaders have to constantly watch out for signals whether complacency is creeping in the organization and take immediate corrective measures through a process of employee engagement. Safety is 24X7 job for everyone.
**Major OISD activities April-June, 2015**

**External Safety Audits (ESA)**

- **IOCL**
  - POL Terminal, Siliguri during May 14-16, 2015.
  - POL Terminal, Paradip during June 4-6, 2015.

- **HPCL**

- **BPCL**

- **ONGC**
  - Armada Sterling-II Mumbai High Offshore on April 10, 2015.
  - 09 installations at Ankleshwar during April 27-May 01, 2015.
  - Two Offshore Drilling Rigs (Vitru-1 and Valiant Driller) during June 6-7, 2015.

- **HMEL- Guru Govind Refinery**

- **Reliance – Jamnagar Refinery**
  - DTA Refinery, Jamnagar during June 8-12, 2015.

**Cross Country Pipelines**

- **IOCL**
  - 12 Km. long, 24"OD x 0.281"Wall Thickness Crude Oil pipeline section, at Rewari under SMPL debottle necking project on May 23, 2015.

- **BPCL**

- **HPCL**
  - Mundra-Awa Section (541Km) of Mundra-Delhi Product Pipeline during May 25-28, 2015.

- **GAIL**

**Pre-commissioning Audit (PCS A)**

- **IOCL**
  - LPG Bottling Plant, Dimapur, Nagaland on April 10, 2015.
  - Additional Storage Tank, POL Terminal at Chittorgarh, Rajasthan on April 18, 2015.
  - POL Terminal-B, Hazira on May 9, 2015.
  - POL Terminal, Jaipur, Rajasthan during May 29-30, 2015.
  - POL Depot at Sankari, Tamilnadu on June 12, 2015.
  - POL Depot, Mysore on June 22, 2015.

- **BPCL**
  - Mounded storage vessel of LPG Bottling Plant at Rajkot, Gujarat on April 15, 2015.

- **HPCL**
  - LPG Bottling Plant at Mangalore Loading Import Facilities on April 6, 2015.
  - PSA of CCCR at Visakh Refinery on April 23, 2015.
  - DHDS revamped unit, Mumbai during June 11-12, 2015.
  - POL Terminal, Palanpur, Gujarat for additional tankage on June 27, 2015.

- **GAIL**
  - Condensate Handling Facilities at Gandhar plant on May 22, 2015.

**Surprise Safety Checks**

- **ONGC**
  - FGM Drilling Rig at Mumbai High Offshore on April 10, 2015.
  - Four work over Rigs and one Drilling Rig in Mehsana Asset during May 14-15, 2015.

- **HPCL**
  - LPG Bottling Plant, Bahadurgarh during May 01-02, 2015.

**Special Safety Audits**

- Jetty lines of IOCL, BPCL, HPCL & Friends Terminal - 05 jetties at Kandla Port during May 7-8, 2015.
- ATF facilities of ONGC Hazira Plant on May 15, 2015.
Inspection of Oil Spill Response facilities

- Special audit of Oil Spill Response and Fire Fighting capabilities of major Ports undertaken as per request of Ministry of Shipping as under:
  - Mumbai Port Trust
  - J.N Port Trust
  - Visakhapatnam Port Trust

Consents accorded to Operate

- **ONGC**
  - Offshore Jack up Drilling Rig “Paragon M 1161” on April 1, 2015.
  - Offshore Jack up Drilling Rig “ABAN-III” on April 7, 2015.
  - Offshore Jack up Drilling Rig “D S FOSSIL” on April 10, 2015.
  - Operation of WI-3, WI-4 & WI-5 wellhead platform (Total 3 nos.) associated with WIN process complex of MH Asset issued on June 9, 2015.
  - Wellhead platforms IE, IK, IL, IM, IT, IW, ED, RS-7, S1-4, S1-5, S1-6, SW (Total 12 Nos.) associated with SH process complex of MH Asset on June 20, 2015.
  - Operation of wellhead platforms N1, N5, N9, N11, RSS, NM & W16 (Total 07 Nos.) associated with MHN process complex of MH Asset issued on June 25, 2015.

- **BGEIPL**

Meetings

- OISD representative participated in the 20th National Oil Spill Disaster Contingency Plan & preparedness (NOSDCP) meeting at Goa on April 9, 2015.
- Meeting on review of implementation status on OISD-116 and MB Lal Committee recommendation at Uran, ONGC on April 11, 2015.
- Review meeting on pending ESA recommendations with Oil Industries and Gas Processing Companies on April 20-23, 2015.
- Meeting on Preparedness, Response & Co-operation to Pollution Incidents on May 1, 2015 at Ministry of Shipping, New Delhi.
- Meeting on “Site Restoration after Cessation of Operation” held at DGH, NOIDA on May 8, 2015.
- Meeting with CCoE, PESO & other stakeholders on inclusion of OISD standards in Petroleum Rules on May 20, 2015 at Nagpur.
- Review meeting on status of ERDMP for Private Oil Companies (RIL, ESSAR, and NOCL) on May 29, 2015 at OISD office, NOIDA.
- Meeting to review progress on implementation of OISD 116 & 117 and MB Lal recommendations on June 16, 2015 at MoPNG chaired by JS-R.
- Meeting between OISD, DGH and Niko Resources Ltd. on “Site restoration & abandonment of off-shore & on-shore well” of Niko, Hazira field at DGH, Noida on June 18, 2015.
- Meeting with Private, JV & Upstream Oil Companies on Disaster Management Plan on June 30, 2015 at OISD office, NOIDA.

Knowledge sharing by OISD officials

- ED-OISD, AD (PPL-RU & BKG)-OISD spoke on Process Safety & Asset Integrity at ASME Conference held at New Delhi on April 18, 2015.
- ED-OISD, AD (PPL-RU) & AD (AI-SKB) took sessions on Process Safety & Asset Integrity issues at a conference on HSE organized by Petrofed during April 17-19, 2015.
- ED-OISD took a session on role of “OISD in enhancing safety” in a workshop organized by TERI for Ethiopian delegates at India Habitat Centre, New Delhi on April 23, 2015.

Functional Committee Meetings

- 6th Functional Committee Meeting of OISD GDN-192 on Guidelines for Safety Practices during construction held on April 6, 2015 at OISD Noida office.
- 6th Functional Committee Meeting of OISD GDN-207 on Guidelines for Contractor Safety held on April 7, 2015 at OISD Noida office.
- 3rd Functional Committee meeting of OISD RP-174 on Well Control held on April 8, 2015 at OISD Noida office.
- 3rd Functional Committee meeting on OISD-STD-173 “Fire Protection System for Electrical Installations” held at OISD office, NOIDA on May 12, 2015.
WED Celebrations at OISD

- World Environment Day (WED) was celebrated on June 5, 2015 at OISD office, Noida. The programme commenced with environment pledge in Hindi and English, special lecture on “Conservation of Environment” by Dr. Banwari Lal, Director (TERI) followed by release of a Booklet on World Environment Day.
- Quiz, Essay and Slogan competition in English and Hindi was organized to commemorate the WED. OISDians pledged to rededicate themselves for protection of environment.

Steering Committee Meeting at OISD

- 51st Steering Committee Meeting was held at OISD office, NOIDA on June 26, 2015. The meeting was attended by 55 senior executives from both PSU & Private oil & gas companies. Besides adoption of 2 new Standards and revision of 7 other Standards, the long pending ESA points, status of MB Lal Committee recommendations, status of Oil Spill Response facilities, Audit schedule for the FY 2015-16 and inclusion of some OISD Standards in Petroleum Rules were deliberated.

Safety Award Evaluation Committee Meeting

- Safety Award Evaluation Committee, set up by MoP&NG, met on June 22 & 23, 2015 to evaluate and recommend the winners of Oil Industry Safety Awards for FY 2013-14. Hon’ble MoS (I/C) gave away the Safety Awards on 4th August, 2015 at SCOPE Convention Centre in the presence of Secretary, PNG; JS-R, FNG and ED-OISD.

OISD Releases Compendium on ‘Analysis of Major Incidents in Oil & Gas Industry 2004-2015’

A Compendium on ‘Analysis of Major Incidents in Oil & Gas Industry 2004-2015’ for the oil & gas industry of India was released by the Hon’ble Union Minister of Petroleum and Natural Gas, Government of India during the recent ‘Oil Industry Safety Awards Ceremony’ held at New Delhi.

This compendium on analysis of major incidents in the oil & gas industry covers the major incidents data of the last eleven years of the entire oil & gas industry entailing the root cause of the incidents and lessons learnt thereof. It also depicts the detailed analysis of incidents of Exploration & Production, Refineries & Gas Processing Plants, Marketing, Pipelines etc. covering the entire array of hydrocarbon business of the country.

It is expected that this small step of OISD with release of this Compendium would enrich the knowledge of the personnel and enable the industry to achieve the ultimate objective of ‘NIL’ incidents in this vital sector of the country.
CASE STUDY
MAJOR FIRE IN A MS PIPELINE AT A PORT LOCATION
By S/Shri Rajesh Uprety & Hirak Dutta

A mechanical engineer from G.B.Pant University of Agriculture & Technology with Post Graduate Diploma in Business Management from IMT, Ghaziabad having about 32 years' experience in Oil & Gas industry. Special area of interests are Coating (CTE/ 3 LPE/ FBE/ Dual FBE) all types of pipes (API 5L/ ASTM Grade/ IS Grade), valves and pipe-fittings. Instrumental in introducing DFE Coating in India in the year 2004. Presented six papers in NACE conference and one paper in ASME conference on various topics related to pipe and coating. In addition to this also presented other technical papers in various national & international seminars organized by IOCL, Petrofed etc.,

INTRODUCTION:
It was late afternoon on a weekend when the news of a big fire from a jetty pipeline area made people rush to the site. The leak in the pipeline at the jetty area was noted during the morning while MS was being transferred from one of the refinery to its marketing terminal. The pumping was stopped in the morning and preparatory work for repairing the line i.e. flushing of the line was in progress. The fire-fighters put the fire under control & finally extinguished the same, though it took time to do so, since the spilled MS got mixed with the water in the creek & was carried away to nearby areas during the tide.

OBSERVATIONS:
• The leak in the 14” OD line caused substantial spillage of MS; the spilled oil got mixed with the water in the adjacent creek & spread to nearby areas due to tidal effect.
• Gully sucker & other firefighting accessories etc. were mobilized to recover the oil from the creek,
• Flushing of the associated lines was started to undertake the repair of the line. After sometime when it was observed that the leakage of product increased substantially the flushing operation was stopped,
• A major fire took place at about 100 M away from the leak spot; fire tenders were put into service to fight the fire,
• Fire was put under control but kept on re-occurring intermittently,
• Finally the fire was extinguished after eight hours.

ANALYSIS:
• Health check-up such as thickness survey of the subject pipeline or hydro test of the pipeline was not reported to have been carried out since commissioning of the line.
• Proper maintenance of the pipeline was not undertaken; no evidence of preventive maintenance of the pipeline was found.
• Cathodic protection which is a usual practice to prevent external corrosion was not provided in the subject pipeline for the underground sections.
• The thinning of the pipeline, as may be seen from the picture, indicates uniform external & internal corrosion, across the longitudinal section of the pipeline, was taking place for prolonged period of time.
• Further, external coating was not provided in the underground pipeline which aggravated the external corrosion.
• The practice of flushing the lines with sea water is detrimental to the health of the pipeline.
• During earlier incidences of leakages, the leak was rectified by clamps and S-wraps, which are temporary measures & not a good engineering practice.
• Normally road crossings are provided with casing pipes/ sleeves to take the additional load; in the instant case the same was not provided.
• The philosophy of replacement of pipe segment, as & when required, without proper Maintenance & Inspection cannot ensure integrity of the pipeline.

ROOT CAUSE:
• The uniform paper like thinning of the pipe indicates corrosion for a prolonged period of time. The corrosion in the pipeline is attributed to both internal & external corrosion not providing cathodic protection system coupled with no external coating on the line made it:
vulnerable against external environment. It may be pertinent to note that nearer to the sea location indicate that the soil resistivity is low which enhances the rate of corrosion. The internal corrosion in the line is attributed to use of saline (sea) water as flushing media. Further in absence of periodic planned M&I activity such as direct corrosion assessment tests (hydro test, thickness measurement etc.) the extent of damage in the line could not be assessed till the same failed.

- Since there was no external coating in the underground pipeline, it caused severe external corrosion of the pipe.

**SOURCE OF IGNITION:**
After the failure of the pipeline, the leaked product, MS got mixed with the water in the adjacent creek. It was raining heavily and due to the tidal effect MS got spread up and flowed to nearby mangroves field, which was already flooded with water. It was reported that a passer-by lighted a bidi, which provided the ignition.

**LEARNINGS:**
- Regular health & integrity assessment of the pipeline shall be carried out by carrying out thickness measurement of the pipes, hydro testing etc.,
- Maintenance schedule must be prepared for carrying out regular maintenance of all the associated accessories like valves including the maintenance activities like partial stroking, stem greasing, drain flushing, seat sealant injection etc.,
- Proper painting of above ground pipes shall be carried out at regular intervals; the saline environment hastens up the external corrosion & application of suitable paint would reduce external corrosion.
- Underground pipes shall be provided with suitable external coating such as 2-ply/ 3-ply cold tape, PU coating, High Build Liquid Epoxy etc.,
- Sleeves shall be provided in all the road crossings after putting a corrosion resistant paint for strengthening the pipe. This would prevent cyclic load on the pipe segment while vehicles pass over the crossings.
- Corrosion probes/ corrosion coupons shall be provided for monitoring the rate of internal corrosion. Corrosion inhibitors may be used in the pipeline, if the internal corrosion rate exceeds 1 mpy.
- Flushing of pipeline with sea water must be dispensed with. In the event line flushing is absolutely necessary, must be done with fresh water or ideally kept with product fill; in the later case, necessary accounting must be done.
- Considering, the fact that there was cluster of product tanks near this pipeline, risk analysis shall be carried out for product transfer/receipt lines and necessary remedial measures may be taken.
- Periodic mock drills must be conducted for effective handling & preparedness of emergency situations.

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**Compendium on ‘Safety Audit Checklist’ released by OISD**

A Compilation of ‘Safety Audit Checklist’ for the oil & gas industry of India was released by the Hon’ble Union Minister of Petroleum and Natural Gas, Government of India during the recently concluded ‘Oil Industry Safety Awards Ceremony’ held at New Delhi.

‘Safety Audit Checklist’ is one of the important tools in conducting external safety audits effectively and ensures the consistency and completeness in carrying out the tasks. The compilation of Safety Audit Checklist covers the whole gamut of operation comprising external safety audit checklists for Refineries & Gas Processing Plants, Exploration & Production, Marketing, Pipelines and Construction Management also. It is expected that this small step by OISD with release of this Compendium will address the gaps between the health of the assets and potential hazards and serve as a buffer for averting the technical and human failures in this vital sector of the country.
A case study on ‘Uncontrolled flow of gas from a well during pulling out fishing string in work over operation

By S/Shri Tarsem Singh & A. K. Jain

A mechanical engineer by profession Shri Arvind Kumar Jain brings with him nearly two decades of rich and varied experience in drilling operations of both Offshore as well as Onshore. Currently working as Joint Director (E&P) in OISD, Arvind Kumar Jain looks after the safety of E&P.

Brief Description:
Lower tested intervals of a well were isolated by placing a barrier i.e. Bridge plug at a depth of 1227 meters MD. Three upper perforated zones (1047 – 46, 1012 – 07, 1005 – 01 meters) were in open condition. The zone (1047 – 46 meters) was having the potential for gas with BHP 1650 psi, gas flow rate 980 cubic meter per hour with 4 mm bean size an SITHP 109-111 Kg / Square cm.
A retrievable mechanical packer was set at 971 meters to isolate the upper open intervals for testing. The mechanical packer could not be released after testing of the intervals. The work over was being carried with an objective to retrieve / fish out the stuck mechanical packer from the well.

Second attempt was made with long Taper tap (Internal catch fishing tool) to engage and fish out the stuck packer, but failed.
The well was subdued with 1.30 gram / cc brine and kick was observed two times during the fishing operation.
As the attempt to release the stuck packer was unsuccessful, the taper tap was disengaged, well circulated with 1.30 specific gravity brine and started pulling out the fishing string.
The complete fishing string was pulled out except two singles of 4 ¼” round drill collars along with the taper tap in the well. Flow of gas and brine started from the well.
The crew made up a 2-7/8” drill pipe to the drill collar singles which were still in the well against the BOPs and run in in the well. Installed FOSV & circulating head and closed the 2-7/8”ram BOP.
After observing the well activity for some time, BOP was opened. The well became active and well fluid pushed one single of drill collar out of the hole. Both the 2-7/8” pipe ram and blind ram were closed against the drill collar which was still in the hole against the BOPs. The gas flow from the well became uncontrolled as the secondary well control system failed.

Analysis:
1. The gas well was subdued with 1.30 specific gravity brine, which could not stabilize the well as it is very difficult to maintain the specific gravity of brine. Furthermore, gas migrates and expands with faster rate in the brine due to its low viscosity, low yield
point and practically nil gelation. The fast migration coupled with exponential expansion of gas unloads the well at a faster rate, thus reducing the hydrostatic head drastically. The gas wells should be subdued with mud for prolonged work over operations.

2. When start of the gas & brine flow was observed from the well, the shift crew made up a 2-7/8” drill pipe to the drill collar singles which were still in the well, ran in it in the well, installed FOSV & circulating head and closed the 2-7/8” ram BOP. This was a wrong operation and wasted considerable time. During the makeup of drill pipe single, running in the well and installation of FOSV and circulating head, the well was unloaded and gas flow became significantly high. Instead of adding single of drill pipe, R/I, installing FCSV & circulating head, the string of two drill collars should have been pulled out of the hole and blind ram closed.

3. ‘Shut in well’ was not observed as per the laid down procedures. Shut in Drill pipe pressure (SIDPP) and casing pressure (SICP) were not recorded to monitor the well. This was a serious violation of standard procedures.

4. The BOP was opened without checking the well condition through the annulus valves.

5. Both the BOPs i.e. 2-7/8” pipe ram and Blind ram were closed against the 4¾” drill collar, thus damaging both the pipe as well as blind ram.

6. There was no trip tank provided with the rig to monitor the well behavior during pulling out operations. The well was not properly monitored during its behavior during pulling out operation.

**Well Capping:**

1. Initial attempt was made to kill the well by ‘Dynamic killing method’. Four cementing units were mobilized and connected to the annulus with the high pressure 2” chickson lines. Mud of 1.30 specific gravity (five times of well volume) was prepared. This attempt was unsuccessful because mud could not be supplied to cementing units with the required flow rate to suction of cementing units.

2. A 2-7/8’ ram packer block was converted to 4¾” ram packer block by machining the cavity of front packer of 2-7/8” pipe ram block in a local workshop. 1.90 mud of volume equivalent to 5 times of well volume was prepared. After mud preparation of sufficient quantity, the stuck drill collars were secured firmly with wire ropes, working under the water umbrella. Bonnet of the upper Blind ram BOP was opened and the blind ram packer was replaced with the fabricated 4¾” pipe ram packer, bonnets of the BOP closed and bonnet bolts tightened. The 4¾” pipe rams were closed and observed that it worked. It stopped the gas flow from the well. The well was then bulldozed with 1.90 specific gravity mud and finally subdued with 130 specific gravity mud.

**Recommendations:**

1. Gas wells should be subdued with mud instead of brine for work over operations.

2. Frequent mock trip drills to be conducted for scenario ‘drill collars against rams’ witnessed by senior drilling engineers to improve competency of the drilling or work-over crew.

3. BOP stack should be provided in line with the requirements of API–Standard-53. Annular BOP should preferably be provided in the BOP stack of work-over operations in gas wells.

4. Rigs deployed for Work over operations of gas wells should be provided with ‘Trip tank system’ to monitor the well during pulling out operations.

5. Before pulling out the BHA, observe the well for the time period equivalent to anticipated time required to completely pull out the BHA plus safety margin.
संसदीय राजभाषा समिति की यह उप-समिति नवंबर 18 अप्रैल, 2015 को तेल उठाए गए सुखद निदेशालय का निरीक्षण करते थे। माननीय संसदीय राजभाषा समिति के पहली उप-समिति के संयोजक श्री सत्यजीत चंद्रोपाध्याय ने सभी और सूचना का आवश्यक समझाता रहे। प्रासंगिक गैस मंत्री अर्जुन कुमार द्वारा सभी विषयों पर समानता वाले व्यक्तियों के लिए उपलब्धियाँ उद्घोषित किए गए।

राजभाषा नवंबर द्वारा निरोधित लक्षण की प्रतीति के लिए और अधिक समय प्राप्त करने की आवश्यकता है। तेल उठाए गया सुखद निदेशालय का समूहित विषय

माननीय संसदीय राजभाषा समिति की पहली उप-समिति तेल उठाए गया सुखद निदेशालय का निरीक्षण करते हुए।

श्री सूरज भाद, सचिव (समिति), ने संसदीय राजभाषा समिति से बैठक का आयोजन करने का अनुरोध किया। श्री हीरेश दत्त, कार्यालयी निदेशक, तेल उठाए गया सुखद निदेशालय के अध्यक्ष के अनुरोध से संसदीय समिति के सदस्यों को शाल अधिक समझने का कोटा है।

इस दिन श्री यू.वी. के हिंदी बोलने के हेतु आयोजन का उद्घोष किया गया। तोडीपति श्री दत्त ने अपने उपचारक बोधन के संबंध में तेल उठाए गए सुखद निदेशालय का परिःसत्वी देखते हुए निदेशालय की कार्य-प्रणाली से माननीय समिति को आपत्ति पूरा कर सब काम कार्यान्वयन के संबंध में उठाए गए क्षेत्र विशेष भी कार्य कर दिया।

माननीय संसदीय राजभाषा समिति की पहली उप-समिति नवंबर 18 अप्रैल, 2015 को तेल उठाए गए सुखद निदेशालय का निरीक्षण करते हुए।

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इस अवसर पर तेल उठाए गए सुखद निदेशालय का आयोजन के हेतु आयोजन का उद्घोष किया गया। तेल उठाए गए सुखद निदेशालय का साक्षात्कार तथा व्याख्यान देने वाली कार्यकर्ता की प्रतीक्षा से संबंधित है।
The 51st Steering Committee Meeting was held at OIDB Conference Hall on 26th June, 2015. The meeting was attended by 54 senior level representatives of both the Public and Private Sectors of Oil and Gas Companies.

Welcoming the Steering Committee members Shri Hirak Dutta, ED, OISD observed that while the numbers of incidents in the Oil and Gas industries for the past 3 years indicate a declining trend, but the high percentage of fatality of contractor workers is an area of concern. It calls for taking appropriate steps to strengthen the safety management system including improving the safety competency of the contract workers to arrest this disturbing trend. ED, OISD expressed satisfaction over the progress of implementation of M.B. Lal Committee recommendations and OISD Standards 116 & 117 recommendations - 98% of the recommendations have been complied with and balance 2% are under advance stage of execution which is expected to be completed by December, 2015. It was shared that two-wired based rim seal fire detection and suppression system has undergone successful field trial at HPCL and BPCL Terminals and can now be considered as Equivalent to the extant Hollow Metallic Rim Seal Fire Protection System.

Analysis of major incidents in Oil and Gas Sector for the last 3 years was shared with the group. Violation of Standard Operating Procedures, equipment failure, and improper maintenance and inspection including poor supervision contributed to the incidents. ED, OISD urged that violation of SOPs need to be stopped forthwith so as to further improve safety in the Oil and Gas Sector.

During the meeting, the audit schedule of OISD for FY 2105-16 was shared with the industry members. The Steering Committee reviewed the status of long pending ESA recommendations; industry members vowed to make all out efforts to liquidate the same expeditiously. During the meeting, two new OISD Standards viz. OISD-238 & 239 were adopted by the Steering Committee. Besides revision & amendment of eight OISD standards were also adopted by the Steering Committee. These standards would be placed to Safety Council for its approval.

Steering Committee members also reviewed the status of Oil Spill Response facilities. It was observed that at many locations adequate OSR facilities are not available. ED, OISD emphasized that adequate quantity of OSR equipment along with trained manpower must be made available to combat Tier-I Oil Spill in the ports. The Disaster Management Plan of Private Sector companies were also reviewed during the meeting. It was informed that as per DMP–2014 of MOP&NG, OISD has been designated as Nodal point for private sector companies. On a query, regarding statutory powers to OISD, it was shared that for establishment of an umbrella body a bill namely Petroleum and Natural Gas Safety Board has been prepared and currently the proposal is under consideration before Committee of Secretaries.

On behalf of team OISD, ED-OISD thanked the member companies for the constant endeavor to improve safety management system and unstinted cooperation.
World Environment Day Celebration at OISD

Every year 5th June is celebrated as World Environment Day (WED) to stimulate awareness on environment and to commit to protect the nature and the Mother earth. Theme for this year’s WED was “Sustainable Consumption and Production” and the slogan for 2015 was “Seven Billion Dreams. One Planet - Consume with Care”. Italy is the official country to host WED 2015. Expo Milano 2015 is being celebrated in Milano, Italy from 1st May, 2015 to 31st October, 2015 with the theme “Feeding the Planet-Energy for Life” in line with the WED theme.

Oil Industry Safety Directorate like all previous years celebrated the World Environment Day at its office at NOIDA. Several activities were planned to commemorate the occasion. These included quiz competition, slogan and essay writing, special lecture session by eminent faculty etc.

The programme commenced with pledge taking by OISDians which was administered by ED, OISD & Dir, MO, OISD in English & Hindi respective y.

ED-OISD addressing the gathering on WED

more pronounced today and unless drastic actions are taken to reduce consumption of fuels, 2 deg C rise in global temperature in near future is inevitable. Therefore, conservation measures in oil & gas industry organizations are paramount, he added. Later a booklet on World Environment Day was released by ED (OISD) and Dr. Banwari Lal.

The quiz competition on environment generated immense interest amongst the participants’. Quiz master in his immaculate style conducted the competition and appreciated the knowledge of OISDians in various spheres of environment management.

In slogan and essay writing event, 54 slogans and 11 essays were submitted by OISDians. Prize winners in each of the categories were awarded mementos on the conclusion of the programme. The programme concluded with vote of thanks proposed by Shri Mrityunjay Gupta, Additional Director- Environment.

Special lecture on “Preservation and Conservation of Environment in Oil Field” was delivered by eminent scientist Dr. Banwari Lal, Director (TERI). Dr. Lal spoke at length on solid waste management with particular reference to management of oily sludge in refineries. Some of the latest developments in bio-remediation of oily sludge were shared by Dr. Lal.

Speaking on the occasion, Mr. Hirak Dutta, ED (OISD) shared the measures undertaken by oil industry to reduce the carbon footprint. Global warming and its adverse impact is
We will be remembered only if we give to our younger generation a prosperous and safe India, resulting out of economic prosperity coupled with civilizational heritage

- Dr. APJ Abdul Kalam