PETROLEUM AND NATURAL GAS (SAFETY IN OFFSHORE OPERATIONS) RULES, 2008

Petroleum and Natural Gas (Safety in Offshore Operations) Rules, 2008 has been notified vide Gazette Notification-S.O-1502(E) in June’2008 and Central Government designated “OIL INDUSTRY SAFETY DIRECTORATE (OISD)” as the competent authority to exercise powers and functions as stipulated in Petroleum and Natural Gas (Safety in Offshore Operations) Rules 2008, with effect from 18th June’2008, the date of publication of this notification in the official gazette.

Petroleum and Natural Gas (Safety in Offshore Operations) Rules, 2008 have been framed under the Oilfields (Regulation & development) Act, 1948 for regulation of safety in offshore exploration, exploitation, conservation, management of petroleum & natural gas and matters connected therewith. Existing “Petroleum and Natural Gas Rules, 1959” deal with resource management and regulate grant of licences and mining leases in respect of petroleum & natural gas.

Off-Shore Installation HEERA

These rules follow goal setting approach i.e. what is to be achieved rather than provide concrete solutions. Functional requirements have been given in the rules which among other things, refer to safety related issues without specifying any particular solution to be adopted. The rules will be supplemented by guidance notes, wherever required. The guidance notes indicate possible solutions for complying with the requirements arising out of the rules. The operator can choose a solution other than those mentioned in the guidelines as long as it meets the functional requirement. Solution chosen by the operator shall be based on customary practice in the industry, requirements & specifications emerging in other documents such as nationally and internationally recognised industrial standards (e.g standards like API, ISO, OISD), codes and conventions (e.g. MARPOL, SOLAS etc). However, documentation demonstrating that solutions selected by operator fulfill the functional requirements of the rules shall exist at all times.

In certain cases the rules require that the operator himself shall define requirements and specification for his own activities in order to comply with functional requirements of the rules. The operator’s own requirements shall be binding and will constitute the basis of the supervision carried out by the competent authority.

OISD has been notified as competent authority to supervise the implementation of these rules. Competent authority will carry out supervision by means of consents, investigations, verification and system audits. Other statutory requirements that are applicable to the petroleum activities in offshore areas, for example stipulations laid down by the MMD, MOEF, Indian Navy, Coast Guard, FODAG etc. have not been indicated in these rules. However competent authority may ask for compliance to other’s stipulations also.

In most of the rules, responsibility is placed on “The licensee, the lessee, or as the case may be, the operator” whereas in some of the rules it is on “The operator only” depending upon the requirement of the rule. In the rules / sub rules where no party is mentioned, the licensee, the lessee, or as the case may be, the operator shall be responsible.

NEW PETROLEUM SECRETARY

Shri Raghaw Sharan Pandey, an IAS of 1972 batch (Nagaland Cadre), has taken over as the Secretary, Ministry of Petroleum & Natural Gas, Govt. of India, in August’2008 from Shri M.S. Srinivasan who superannuated on 31.07.2008. Prior to this assignment, Shri Pandey was Secretary in the Ministry of Steel. Shri Pandey is recipient of the Prime Minister’s award for excellence in public administration in 2007 and UN Public Service award in New York in 2008.

OISD team wishes Shri Pandey all success in his new assignment.
In the 26th Safety Council Meeting held on 25th July’2008, amendments in some OISD standards has been approved, which are produced below.

A. OISD-STD-116 : Fire Protection facilities for Petroleum Refineries and Oil/Gas Processing Plants

1. Delete from clause 4.2.3 - “However, in lightning prone area, for floating roof tank of diameter 60 meter and above, Automatic rim seal fire extinguishing system shall be provided”

B. OISD-STD-117: Fire Protection Facilities for Petroleum Depots and Terminals

1. Add at 2.4 under “Scope”
   The fire protection and fire fighting requirement for the combined POL and LPG facilities in the same premises shall be based on following:
   - Each POL / LPG facility shall independently meet the design, layout & fire protection system requirements of corresponding OISD standards.
   - The fire water storage and pumping requirement can be considered based on single largest risk of the combined facility.
   - The fire water system shall ensure availability of pressure of 7 kg/cm² at the farthest point.
   - The entire fire water system shall remain pressurized and kept in auto mode as recommended for LPG installations
   - The control of such facility shall remain with dedicated or LPG group.

2. Delete from clause 4.2.13 - “located in lightning prone areas and/or”

C. OISD-STD-118: Layouts for Oil and Gas Installations

1. Clause 8.1.3 (b) : “LPG rail loading/unloading gantry shall be located on a separate rail spur and shall not be grouped with other petroleum products” shall be replaced with the following clause.
   “The loading facilities for LPG and other petroleum products shall be kept dedicated keeping in view the possibility of mis-charging and large scale operations at refineries”.

2. Add new Clause 8.1.3 (c) as
   “The unloading facilities of LPG & other petroleum products of marketing locations may be combined after complying with conditions as given in Annexure - I”

3. Existing Clause 8.1.3 (c) renamed as Clause 8.1.3 (d)

   Annexure - I of Clause 8.1.3(c)

   a. Risk Assessment
      - Risk analysis & Hazop studies shall be carried out for the combined facilities at the planning stage itself and all recommendation thereof complied with.

   b. Facilities related
      - Dedicated unloading arms / hoses shall be used for LPG and POL products to avoid any chance of wrong connections or mixing of POL and LPG.
      - The unloading of POL products shall be done from bottom with POL headers running on ground / trenches.
      - The LPG unloading shall be done from the top.

   c. Operations Related
      - There is no simultaneous unloading operation of LPG and other petroleum products.
      - The operation shall be carried out only by skilled and trained personnel under close supervision of officer.
      - All operating personnel shall be trained for both POL & LPG operation and emergency handling.
      - The unloading shall be carried out by following best operating practices as given in OISD standards.
      - In case of any leakage, the complete operation shall be stopped.
      - All safety and emergency inter-locks shall be in place and checked before commencing unloading operation.
      - Gantry shall be kept free of spillage. There shall be a check of spillage / leakage before the start of the operations and during the operation. Spillage, if any, shall be flushed.
      - Passing of valves in LPG unloading lines shall be checked and rectified, if any.
      - Railway track shall be isolated and checked before commencing the operation.
The mock drills shall be practiced jointly periodically keeping in view the presence of both products in gantry i.e. LPG headers and POL product lines in trenches or at ground level.

The pressure in LPG headers should be brought to minimum after completion of unloading.

All unloading arms/ hoses to be secured properly after use and ends capped.

Before commencing any unloading operations, an inspection of facilities by joint team of LPG & POL officers shall be carried out ensuring compliance to all the above recommendations and to identify any hazardous situation and also ensure safe condition for unloading operation. A common checklist shall be developed for compliance to be signed by POL & LPG officers.

**DIFFERENCE BETWEEN "DESIGN PRESSURE" AND "MAXIMUM ALLOWABLE WORKING PRESSURE / MAXIMUM OPERATING PRESSURE"**

As per ASME following definitions are given:

**Design Pressure**: Is the maximum pressure determined by the design procedures applicable to the materials and location involved.

**Maximum Allowable Operating Pressure (MAOP)**: Is the maximum pressure at any point in a system that may be operated.

**Maximum Operating Pressure (MOP)**: Is the highest pressure at which a system is operated during normal operating cycle.

Normally people get confused with the terms "design pressure" and "Maximum Allowable Operating Pressure" (MAWP) or Maximum Allowable Operating Pressure" (MAOP). The two terms are not related mathematically; rather, they are related in a practical procedure that takes place during the actual fabrication of a pressured vessel/piping system.

Those who are in process industry or petroleum storage and transportation business, concerned engineers have to deal with a pressure vessel fabrication or pipeline design & operation, engineering terms employed and the logic of their application. In dealing with or specifying a pressure vessel, an engineer must be using a Vessel Specification Sheet that one should be familiar with and employ in the course of their work.

The "Design" pressure is that pressure which the engineer decides (considering certain factor of safety) is the value of the pressure at which the vessel will normally operate (or which it must withstand under operating conditions). This value must include any normal excess pressure that can occur during the vessel's operation. This is a discretionary value that depends on the background and experience of the design engineer. Sometimes the design value can be 10% over the pressure calculated (as in a simulation) or as much as 25% more. Good engineering judgment is employed in arriving at this design figure.

Once the Specification Sheet is received by the vessel fabricator, mechanical fabrication design takes place in which alloys, fabrication techniques, available materials, and other factors are taken into consideration to generate a fabrication drawing. Although the design pressure given is employed to generate the required vessel physical characteristics, some practical factors - such as available materials, fabrication efficiency factors, and alloys employed - will result in a vessel, that not only meets the required design pressure, but often **EXCEEDS** it. This is a conservative procedure, because it ensures that the vessel will meet pressure safety expectations.

The Maximum Allowable Working Pressure (MAWP) is a result of back-calculating the ultimate resulting fabricated vessel and is the prime factor in setting the pressure at which the corresponding vessel Safety Relief Devices should be activated and in no case it should be more than the design pressure. One should consider the MAWP, the most important pressure value attached to a vessel or pipe and it should be clearly understood and stamped on the vessel or pipe for all to clearly read. The MAWP will change with time (as will the related design value) due to wear, corrosion, and vessel fatigue. This is why it is so important to keep and maintain current and accurate data sheets and calculations on all pressure vessels or pipe as they are inspected and repaired through the years of service.

When it is required to set a PSV on a vessel and one do not have its MAWP figure, one can employ the "design" pressure value - as long as it can be proven that the vessel is in as good a physical condition as the day it was fabricated. It is important to note the condition that defines the physical condition of the vessel at the time of its use or operation. People often neglect to mention that they are **ASSUMING** that the physical condition of the vessel doesn't change from the day it was fabricated. This can be dangerous assumption that don't necessarily apply. A vessel or pipe can undergo corrosion and wear as well as other chemical attacks through its use during lifetime. Physical and meticulous inspections reports are essential to ensure that the vessel can be safely applied to a process - especially to a high-pressure application. One should consider any pressure over 50 psig (3.5 Kg/cm²) as HIGH PRESSURE. When a vessel explodes, it isn't the pressure that kills a person; it's the amount of shrapnel and steel pieces that are blown about that do the damage. A 50 psig pressure can cause a considerable amount of serious damage if allowed to trigger a vessel failure.

The term "Maximum Operating Working Pressure" means the same thing as MAWP.
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Money won't buy happiness, but it will pay the salaries of a large research staff to study the problem..... Bill Vaughan.
CONSENT GIVEN BY OISD FOR OFF-SHORE INSTALLATION

Floating, Production, Storage & Offloading unit (FPSO) DHIRUBHAI-1 operated by Reliance industries limited in D-26 (MA) field of KG–DWN-98/3 block has been given consent for operation in East Coast of India under Rule 16 of Petroleum and Natural Gas (Safety in Offshore Operations) Rules, 2008. The FPSO has been hired by RIL from 'Aker Contracting FP ASA' for 10 years.

INCIDENT ALERT

FIRE AT LPG BOTTLING PLANT (OLD INCIDENT)

BRIEF
A fire incident took place at one of the Oil Industry’s LPG Bottling Plant. The fire occurred due to leakage of LPG from elbow of filling gun of carousel causing burn injury to three persons, damage to a few filling hoses, control cables and some pneumatic circuit accessories. The fire was immediately controlled by operating emergency push button as well as closing of ROV (Remote Operated Valve) followed by actuation of deluge valve. The injured persons were immediately rushed to the hospital for treatment.

DESCRIPTION OF FACILITY
The bottling plant is having Bulk Storage - 6 Spheres of 1200MT each (total 7200MT) and bottling capacity of -1,44,000 MTPA.

At the time of incident, one helper was at introduction unit and one filler was adjusting tare weight sitting on iron stool next to the helper. The helper was deployed to prevent toppling of empty cylinder on carousel platform and ensure their smooth feeding so as to facilitate filler to set tare weight. Another contract labor was also engaged for shifting cylinders from ejection unit to other operating area.

DETAILS OF THE INCIDENT
The fire occurred on cylinder filling gun no: 20 of 24 station carousel during normal bottling operation. During the process of latching the filling gun with the cylinder valve, the LPG filling rubber hose snapped off with metallic elbow from the filling gun. As a result, liquid LPG started coming out forming vapor cloud which subsequently got ignited. The snapping of rubber hose from the gun caused breaking of bonding wire of filling gun. On noticing the LPG leak, the filler in an attempt to get down in haste from the iron stool fell down and the stool hit the carousel structure. After snapping off LPG hose, the hose started vibrating and hit the filling gun structure several times and within no time leaked LPG got ignited into a flash fire of about 12-15 feet high with the cylinder valve, the LPG filling rubber hose snapped off with lower as well as upper limbs, the other contract labor suffered burn injuries on his face, chest and cheeks, hands and lower legs. The filler received burn injuries on his face, hands and lower legs.

OBSERVATIONS
1. The filling guns and their fittings were found to be of local make i.e. original guns of OEM make were replaced with substandard fittings/spares of local make.
2. The threads of metallic elbow of filling gun no: 20 & filling gun were found to be worn out/cross threaded and it’s copper bonding wire was found broken.
3. The washer at the worn out threaded joint between elbow of LPG hose and filling gun was found to be intact.
4. History sheets of filling guns/carousel & hydro-test record of LPG filling hoses was not available.
5. Paint was damaged and bare metal was seen exposed on the carousel structure indicating the striking/hitting mark of metallic elbow of LPG hose of filling gun no: 20 at high pressure.
6. The gun and cylinder placed on filling gun no: 20 were unaffected by the fire.
7. Rubber ring of jaw holder on filling gun no: 21, 22, 23 & 24 and their pneumatic tubing were found partially burnt.
8. Front fiber covers of filling gun no: 21, 22, 23 & 24 were melted partly and LPG hoses of filling gun no: 21, 22, 23 & 24 had burn marks on them.
9. Control cables of vapor extraction unit and it’s interlocking with carousel were affected by the fire.
10. Burnt marks were observed on overhead duct of vapor extraction blower, sprinkler lines & lighting cables.
11. Continuity of filling guns, carousel stations and conveyor structure was checked and found to be OK, except at filling gun no: 20.
12. Functioning of vapor extraction unit and it’s interlocking with carousel found not working due to damage in the control cable on account of fire. However, it was found working with other carousel.
13. GMS was functional but did not show any leakage logging at the time of incident. However, GMS logging was wrongly appearing on one day in advance of the incident which could be due to erroneous clock setting in it’s software program.
14. Safety, Security & Automatic Fire Protection System was not in line with clause no: 4.4 of OISD-STD-144 (Vol-4). Though the fire emergency was handled immediately with manual intervention, it could have been handled automatically without any loss of time, had the above interlocking been in place.
15. Operations officer, was not properly trained to supervise cylinder bottling operations.
16. The leakage could not be stopped by the filler immediately either by closing five port switch or ball valve or main air line valve to actuate gas stop valve of leaking filling station.

The best political community is formed by citizens of the middle class...... Aristotle (384 – 322 B.C.)

5 OISD Newsletter Aug. '08 - Sept. '08 Year 10, Issue No. 94
ANALYSIS OF INCIDENT

A) CAUSE OF LEAKAGE:
1. Due to improper / poor maintenance, worn out / damaged threads on the gun, elbow resulted in snapping of LPG hose causing LPG leakage.
2. Use of sub-standard/locally made filling guns and their fittings/accessories/spares parts.

B) SOURCE OF IGNITION:
1. Hitting of vibrating metallic elbow of LPG hose with carousel structure at high pressure several times leading to generation of spark.
2. Static charge accumulation leading to generation of spark due to breaking of bonding wire of LPG hose & release of LPG at high pressure into atmosphere from the snapped off LPG hose elbow.
3. Due to the hitting of falling iron stool (used by filler for sitting) on carousel structure, spark could have generated.

RECOMMENDATIONS:
1. The vital spares of guns/carousel to be used after ascertaining their quality and be preferably of OEM/standard design/make.

BRIEF DESCRIPTION
Emergency Shut Down Valve (ESDV) on an off-shore platform abroad failed when a command was given to close the ESDV following a minor gas release from the inlet flange of an equipment. Production was shutdown, worksite of platform and drilling rig were properly secured. All topside process piping and pipeline to other equipment/facilities as laid down in OISD-STD-144 were removed from the platform and sent for inspection.

OBSERVATION
On dismantling and inspection of the valves, it was observed that the "O" rings in the ESDV and accompanying manual valve were not fit for the purpose and that back up "O" rings were missing from these valves altogether. This is a serious failure in the manufacturing process. Due to non-provision of back up "O" rings, several of the "O" rings had failed as a result of swelling due to poor manufacture.

RECOMMENDATIONS
Competency level of Design Consultant must be assessed and design specification of ESDV should be taken into account in worst case scenario for potential production fluid composition.

DID YOU KNOW...........THAT........

- Entry on floating roof tank’s deck when the roof is more than 3 meter down from the top, requires Confined Space Entry Permit (OISD-STD-105).
- For LPG Mounded bullets, monitor the settlement of the mound / vessel throughout the lifetime of the vessel by providing permanent reference (minimum three) points to ascertain uniform / differential settlement and also identify possible vessel bending (OISD-STD-150).
- Overhead power transmission lines shall not pass over the installation including the parking areas. Horizontal clearance shall be in line with the Indian Electricity Rules(OISD-STD-118).
- The process hazard analysis should be updated and revalidated by a team, having requisite background, at least every 5 years after the completion of initial process hazard analysis as per OISD-GDN-206.
- All Fire water pumps should be identical with respect to capacity and head characteristics (OISD-STD-116 & 117).
- The Piping connected between Blow Out Preventer (BOP) and Choke Manifold shall be as straight as practicable and firmly anchored to prevent excessive whip or vibration as per OISD-STD-174.
- Well control drills should be conducted once a week with each crew as per OISD-STD-174.
- Under the Furnace, there should not be any trenches or pits which might hold flammables. Also the connections with underground drain system should be sealed over an area of 15 meters from the furnace walls(OISD-STD-118).
- Air intake to the FD fan, should be from a safe location so that no hydrocarbon can be sucked into them (OISD-STD-112).
- Systems working under vacuum conditions can pull in air through leaky flanges, pump glands/seals, left open vents and drains, etc. Vacuum system shall be tested and checked thoroughly, for leaks and tightness, before start-up and periodically during operation. Also a sample point of the exhaust gases from the ejector system shall be analyzed periodically for oxygen content (OISD-STD-112).
- The flare header shall always be maintained at minimum positive pressure to prevent entry of air into flare system. Gases entering the flare header, shall not contain oxygen (OISD-STD-112).

A good storyteller is a person who has a good memory and hopes other people haven't...... Irvin S. Cobb.
EXTERIOR SAFETY AUDIT

EXPLORATION & PRODUCTION-ON-SHORE

25th to 28th August' 2008: Mehsana Asset of ONGC has average oil production of 2.101 MMT and gas production of 162.8 MMSCM during 2007-08. The following installations were audited.

i. Production Installation - GGS-Nandasan
ii. Production Installation - EPS-North Lanwa
iii. Production Installation - GGS-03-North Kadi
iv. Drilling Rig - CW-700-06
v. Work over Rig - UPET-50-05

22nd to 25th September' 2008: Rajahmundry Asset of ONGC has oil production of 0.279 MMT and gas production of 1566.9 MMSCM during 2007-08. The following installations were audited.

i. Production Installation - GCS-Endamuru
ii. Production Installation - GGS-Mori
iii. Production Installation - ETP-Kesanapalli
iv. Production installation - EPS-Nandigama
v. Drilling Rig - BI-2000-02
vi. Work over Rig - DEEP-100-01 (Cardwell KB-500)

25th September' 2008: Raava Onshore Terminal of Cairn Energy India Ltd

EXPLORATION & PRODUCTION-OFF SHORE

15th to 19th September' 2008: Ed Holt (charted rig hired by ONGC) Ed Holt rig is owned by Noble Drilling Corporation and hired by Jindal Drilling & Industries Limited to drill for ONGC. Built in 1981 having Liberian state flag, it is a Cantilever Jack Up rig capable of operating in water depths up to 300ft. The rig had a major lay up repair in 2006 at Sharjah. At the time of audit, the rig was drilling at N11-8 H well in Mumbai High North field.

PROCESS & ENVIRONMENT

18th to 23rd September' 2008: 3rd round of ESA of IOCL-Panipat Refinery. Panipat Refinery is the 7th Refinery of IOCL having the processing capacity of 12 MMTPA with the commissioning of PREP expansion project. In addition to this petrochemical complex comprising of PX-PTA has been commissioned. At present three major projects are in process at Panipat and Naphtha cracker project, MS quality up gradation project and Refinery capacity augmentation to 15 MMTPA.

25th September' 2008: Inspection of OSR tier -1 facility set up by M/s Hardy explorations at Chennai offshore location was carried out by OISD and coast guard.

MARKETING

29th August' 2008: IOCL's LPG Bottling Plant, Rangpo

ENGINEERING

31st July 2008 to 1st August 2008: For the first time Safety Inspection of LPG & Oil facilities of Vizag Port Trust (VPT) was carried out by OISD at the request VPT of Vizag Port was commissioned in 1993 with a cargo handling capacity of 1.1 Million tonne. Subsequently, the cargo throughput increased to 55.8 MMT in 1951-52. Presently the port handles hazardous substances like LPG, Crude Oil, Naphtha, MS/ATF, SKO, HSD, FO etc. VPT requisitioned OISD's services to identify loopholes in safety and DMP.

PRE-COMMISSIONING SAFETY AUDIT

MARKETING

1. 3rd April' 2008: BPCL's POL Terminal, Kota
3. 14th to 16th May' 2008 & 26th August' 2008: IOCL's LPG Bottling plant at Mathura.
4. 18th July' 2008: NRL's POL Terminal, Siliguri.
5. 21st July' 2008: HPCL's POL Terminal at Jaipur.
6. 29th to 30th September' 2008: BPCL's LPG Bottling Plant at Patna.

CROSS COUNTRY PIPELINES

18th to 20th August' 2008: LPG and Propylene transfer pipeline system from Mathura Refinery to New Marketing Installation at Mathura. LPG Transfer line is of 12.75” OD, 9.53mm wall thickness, ASTM A106 Grade B pipe having length of 3.428 km and design flow of 225 kl/hr. Propylene transfer pipeline is of 6” NB, 7.11 mm wall thickness, 3.410 km long with design capacity of 42 kl/hr.

28th to 30th August' 2008: GAIL(I) Ltd's Natural Gas pipeline from Oduru to K. Cheruvu and Oduru to Kakinada. This pipelines consists of 10.541 Km long, 18” OD, 0.25” / 0.344” wall thickness, API 5LX 70 grade, 3 LPE pipe and 19.784 Km long, 18” OD, 0.25”WT/0.344” WT, API 5LX 70 grade, 3 LPE pipe with design capacity of 6 MMSCMD (each pipeline)

SURPRISE SAFETY AUDITS

EXPLORATION & PRODUCTION-ON-SHORE

27th August, 2008: Mehsana Asset of ONGC - GGS-CTF-North Santhal

MARKETING

6th August' 2008: IOCL’s POL Terminal, Vasco.

The advantage of a bad memory is that one enjoys several times the same good things for the first time......Friedrich Nietzsche (1844 – 1900)

7 OISD Newsletter Aug. '08 - Sept. '08
OISD STANDARDS - JULY '2008

OISD Standards updated up to JULY '2008 are now released. These standards are available on payment of Rs. 10,000.00 (Rupees Ten thousand) only for a single CD containing all standards or Rs. 500.00 (Rupees five hundred) per standard / volume in printed form. The payment can be made to OISD in cash or by way of demand draft in favour of "Oil Industry Safety Directorate" payable at New Delhi. For further information please contact:

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8 OISD Newsletter Aug. '08 - Sept. '08 Year 10, Issue No. 94