“SAFETY IN DERRICK FLOOR OPERATIONS
(ONSHORE & OFFSHORE DRILLING RIGS)”

Prepared by
Committee on “Derrick floor Operation onshore & offshore”

Oil Industry Safety Directorate

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Preamble

Indian petroleum industry is the energy lifeline of the nation and its continuous performance is essential for sovereignty and prosperity of the country. As the industry essentially deals with inherently inflammable substances throughout its value chain – upstream, midstream and downstream – Safety is of paramount importance to this industry as only safe performance at all times can ensure optimum ROI of these national assets and resources including sustainability.

While statutory organizations were in place all along to oversee safety aspects of Indian petroleum industry, Oil Industry Safety Directorate (OISD) was set up in 1986 Ministry of Petroleum and Natural Gas, Government of India as a knowledge center for formulation of constantly updated world-scale standards for design, layout and operation of various equipment, facility and activities involved in this industry. Moreover, OISD was also given responsibility of monitoring implementation status of these standards through safety audits.

In more than 25 years of its existence, OISD has developed a rigorous, multi-layer, iterative and participative process of development of standards – starting with research by in-house experts and iterating through seeking & validating inputs from all stake-holders – operators, designers, national level knowledge authorities and public at large – with a feedback loop of constant updation based on ground level experience obtained through audits, incident analysis and environment scanning.

The participative process followed in standard formulation has resulted in excellent level of compliance by the industry culminating in a safer environment in the industry. OISD – except in the Upstream Petroleum Sector – is still a regulatory (and not a statutory) body but that has not affected implementation of the OISD standards. It also goes to prove the old adage that self-regulation is the best regulation. The quality and relevance of OISD standards had been further endorsed by their adoption in various statutory rules of the land.

Petroleum industry in India is significantly globalized at present in terms of technology content requiring its operation to keep pace with the relevant world scale standards & practices. This matches the OISD philosophy of continuous improvement keeping pace with the global developments in its target environment. To this end, OISD keeps track of changes through participation as member in large number of International and national level Knowledge Organizations – both in the field of standard development and implementation & monitoring in addition to updation of internal knowledge base through continuous research and application surveillance, thereby ensuring that this OISD Standard, along with all other extant ones, remains relevant, updated and effective on a real time basis in the applicable areas.

Together we strive to achieve NIL incidents in the entire Hydrocarbon Value Chain. This, besides other issues, calls for total engagement from all levels of the stake holder organizations, which we, at OISD, fervently look forward to.

Jai Hind!!!

Executive Director

Oil Industry Safety Directorate
FOREWORD

The Oil Industry in India is more than 100 years old. Because of various collaboration agreements, a variety of international codes, standards and practices have been in vogue. Standardisation in design philosophies and operation and maintenance practices at a national level was hardly in existence. This coupled with feedback from some serious accidents that occurred in the past in India and abroad, emphasised the need for the industry to review the existing state of the art in designing, operating and maintaining oil and gas installations.

With this in view, the Ministry of Petroleum and Natural Gas in 1986 constituted a Safety Council assisted by the Oil Industry Safety Directorate (OISD) staffed from within the industry for formulating and implementing a series of self regulatory measures aimed at removing obsolescence, standardising and upgrading the existing standards to ensure safe operations. Accordingly, OISD constituted a number of functional committees of experts nominated from the industry to draw up standards and guidelines on various subjects.

The present guidelines, earlier titled Standard on “Derrick Floor Operations (Onshore Drilling / workover rigs)”, were published as a standard in August, 2000. It was taken up for review by the functional committee, constituted for the purpose, in the year 2007. The standard has been changed to recommended practices and renamed as “Safety in Derrick floor operations onshore & Offshore”. Operations related to work-over rig have been excluded from revised edition as these are covered in detail in OISD GDN 182 on “Recommended Safe procedures & Guidelines for Work-over and Well Stimulation Operations” The document is based on the accumulated knowledge and experience and the various national and international codes and practices.

The recommended practices are meant to be used as supplement and not as a replacement for existing codes and practices.

It is hoped that provisions of these recommended practices, if implemented objectively, may go a long way to improve the safety and reduce accidents on onshore and offshore drilling rigs. Users are cautioned that no guidelines can be a substitute for the judgement of responsible and experienced personnel involved in drilling operations.

These recommended practices in no way, supersedes the statutory requirements of bodies like DGMS, PESO or any other Government Body which must be followed as applicable.

Suggestions are invited from the users after it is put into practice to improve the document further. Suggestions for amendments to this document should be addressed

To

The Coordinator,
Functional Committee on “Derrick floor Operations onshore & offshore”,

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These documents are intended only to supplement rather than replace the prevailing statutory requirements.
FIRST EDITION – AUGUST 2000

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ON
"DERRICK FLOOR OPERATIONS
(ONSHORE DRILLING / WORKOVER RIGS)"

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FUNCTIONAL COMMITTEE  
FOR COMPLETE REVISION, JAN 2015  
ON  
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SAFETY IN ONSHORE RIG OPERATIONS

1.0 INTRODUCTION

Operational safety is of foremost concern while working on onshore and offshore rig. The two types of rigs are generally used in onshore E&P industry, namely drilling rigs and work-over rigs. Operations related to work-over rigs are covered in OISD GDN 182 on "Recommended Safe procedures & Guidelines for Work-over and Well Stimulation Operations". In offshore E&P, self-elevating jack-up rigs, floater and semi-submersible rigs are being used for drilling operations.

The recommended practices coverage including safety precautions required during derrick floor operations, safety aspects related to rig equipment, maintenance procedure for critical items / equipment.

These recommended practices are prepared recognizing that owners, operators, contractors, and their personnel have separate responsibilities that may be contractual in nature. The specific work activity being performed should be under the immediate supervision of an authorized person who has the authority to commence, modify, or cease the work methods or operations, as necessary, to ensure the safety of affected personnel and environmental damage.

Pre spud / Pre-operations conference is required to be conducted before taking up operation for all the onshore and offshore drilling rigs. The various points to be checked during Pre spud / Pre-operation conference have been compiled as a checklist for the convenience of field personnel.

2.0 SCOPE

This document provides recommended practices and guidelines for safe onshore as well as offshore drilling rig operations. It also covers the guidelines and established requirements for safety related to personnel, operations and maintenance of equipment to ensure integrity of onshore and offshore drilling rigs.

3.0 PRE-SPUD / PRE-OPERATION CONFERENCE

Pre-spud / Pre-operation conference should be held before spudding / commencing operation at each drilling location with the supervision / participation of all key personnel like Rig In-charge, Barge engineer, Sub-sea engineer, Ship / Barge captain, Mechanical Engineer, Electrical Engineer, Civil Engineer, Rig building In-charge, geology, mud services, logging services, logistics, fire services, Security and HSE Officer as applicable at well site and they should confirm the compliance of safety norms as per checklist placed as a Annexure I.

Before spudding the well i.e. before commencing operation, it should be ensured that all the observations / recommendations of pre-spud conference / pre-operation conference have been implemented. It should also to be ensured that earlier recommendations of ISA / ESA should be implemented before spudding in. Minutes of the pre-spud meeting should be signed by all the participants. It should be ensured that ECD (Expected Completion Date) of
pending observations / recommendations are indicated in the minutes and compliance be monitored.

4.0 EQUIPMENT TOOLS / ACCESSORIES FOR OPERATIONS AT DERRICK FLOOR ON DRILLING RIG

For safe operations related to onshore rig activities, the suggested items, are listed in Annexure-II

5.0 SAFETY ASPECTS RELATED TO DRILLING EQUIPMENT:

Rig and equipment can cause safety hazards due to dynamic, instantaneous, and fatigue loading, wear and tear due to continuous operation at drill site. The safety hazard may also be due to hazardous environment and corrosive fluids.

It is recommended that every drilling rig should have Safe Operating Procedure Manual covering all the operations, repair and preventive maintenance including safety checks as per OEM recommendations.

The SOPs (Safe operating procedures) for all the operations to be carried at the rig should be made available at the rig before commencement of the operations.

The following safety precautions should be taken by operator to ensure integrity of equipment:

5.1 RIG MASTS

(a) Each derrick or mast should have a valid API 4G monogram plate showing name of manufacturer, year of manufacture and safe working load capacity.

(b) No derrick or mast should be subjected to a compressive load greater than the safe working load limit shown on the manufacturer's plate.

(c) Derricks, mast guying and foundations should comply with the standards for guy lines, bull lines, anchors and foundation bases for rigs, as per manufacturer's recommendations.

(d) Carrier-mounted masts should not be moved while in a raised position. This does not apply to skidding of a drilling rig on extended existing foundation.

(e) Major inspection of mast, substructure should be carried out after every five years in accordance with API RP 4G.

(f) Before placing the Bottom boxes, it should be ensured that both the Bottom box foundations are at the same level.

(g) A person qualified and experienced in procedures for raising and lowering the rig mast shall be in charge of raising or lowering operations. During raising or lowering operations, safety checks shall be made as per OISD GDN-218.

(h) Visual inspection of Mast and sub-structure should invariably be carried out after each rig dismantling. A visual inspection of the raising and lowering mechanism shall

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be made by the person in charge prior to raising or lowering the mast. Check and service mast lifting sheaves and equalizer pulley, mast bull lines for broken wires, corrosion, incidental damage, auxiliary pulleys for air winches & power tong lines etc. prior to lowering / raising of rig mast. (For offshore drilling rigs, weekly and monthly visual inspection of Mast and substructure should be carried out by Shift driller and tool pusher)

(i) For onshore rigs, the lowering and raising of Mast / draw-works shall be done during daylight hours only.

(j) Bolts, nuts, and pins of mast & substructure, wire rope, and cat-lines, as well as sheave and other anchor bolts in the derrick or mast, should be secured with appropriate strength.

(k) For onshore rigs, prior to raising or lowering any mast and for offshore rigs prior to sailing for next location, all unwanted tools and materials shall be removed from the mast.

(l) Prior to lowering / raising the mast, it shall be ensured that spreaders and diagonals, front & rear extensions of the bottom boxes are fitted and locked with original pins / bolts.

5.2 RIG MASTS

(m) Each derrick or mast should have a valid API 4G monogram plate showing name of manufacturer, year of manufacture and safe working load capacity.

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(w) For onshore rigs, prior to raising or lowering any mast and for offshore rigs prior to sailing for next location, all unwanted tools and materials shall be removed from the mast.

(x) Prior to lowering / raising the mast, it shall be ensured that spreaders and diagonals, front & rear extensions of the bottom boxes are fitted and locked with original pins / bolts.

(y) Prior to applying recommended pull (after engaging power tongs), it should be ensured that no any person is near the power tongs / pull lines.

5.3 LADDERS, STAIRWAYS, AND PLATFORMS

(a) Each derrick and mast shall be equipped with a fixed ladder(s) providing access from the rig floor to the crown block platform and to each intermediate platform.

(b) Permanent ladders fastened to a derrick or mast shall be securely held in place at the top, bottom, and other points in between in accordance with manufacturer’s specifications. Permanently mounted ladders shall not lean back from the vertical.

(c) The distance from the centerline of fixed ladder rungs, cleats, or steps to the nearest object behind the ladder should not be less than 7 in. The distance between ladder rungs should be uniform throughout the length of the ladder including the landing(s) and no more than 12 in. The minimum rung clear length should be 16 inches. When unavoidable obstructions are encountered, minimum clearances for the two rungs on either side of the obstruction should be measured vertically from the obstruction no less than 1.5 in. (3.8 cm) to the upper rung, and 4.5 in. (11.4 cm) to the lower rung.

(d) Side rails of all fixed ladders should extend a minimum of 42 in. (106.7 cm) above any platform or landing. The ladder opening should be provided with a swinging gate or similar restraining device or offset so that a person can not walk directly into the opening.

(e) Platforms shall be provided wherever fixed ladders are offset laterally. If not possible, a personal fall arrest device should be provided to minimize the risk of falling.

(f) The width of tread and height of rise should be uniform throughout the length of a stairway and the treads should be level.

(g) All personnel stairways, ladders, ramps, runways, and platforms should be kept free of objects and substances that may create a slipping or tripping hazard and hinder or prevent emergency egress of personnel. The rig floor should be kept in an orderly manner and free of such objects.

(h) All derrick or mast platforms above the rig floor shall be secured, inset, or otherwise adequately protected against accidental dislodging during operations.

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(l) Each finger of a finger board, monkey boards and sliding door shall be bolted, welded, hinged-and-pinned, or attached by other equivalent means to its support beam.

(j) Guardrails, consisting of 42 in. (106.7 cm) high (nominal) top rail, intermediate rail, and posts, should be installed at the outer edge of any floor, platform, or walkway, that is 4 ft (1.2 m) or more above ground level or another floor or working level. A runway of 4 ft (1.2 m) or more above ground level shall be equipped with a guardrail. Exceptions are as follows:
   i. Personnel egress (exit and entrance) openings.
   ii. Catwalk and V-door opening when being used.
   iii. Work station being used to rack tubular.
   iv. Alternate arrangements providing equivalent safety are acceptable.

(k) Toe boards shall be provided in addition to handrails on open-sided floors, platforms, walkways, and runways under which persons can pass, or there is machinery or equipment into which falling materials can cause damage or create a hazard.

(l) Standard toe boards should be a minimum of 6 in. (15.24 cm) in vertical height from the top edge to the level of the floor, platform, walkway, or runway. Toe boards should be securely fastened in place and have not more than 1 /4 in. (0.64 cm) vertical clearance between the bottom of the toe-board and the floor level.

(m) Every floor hole into which persons might accidentally walk (on account of fixed machinery, equipment, or walls) should be protected by a cover that leaves no openings more than 1 in. wide. The cover should be securely held in place.

(n) Every scaffold, stage, walkway, working platform, stairway and ladder, whether temporary or permanent, should be constructed and maintained in safe condition and should not be altered or moved while in use.

(o) A guardrail used and/or needed for the purpose of actual or potential containment of equipment or material should be of such construction and strength as to effectively contain the full load or stress which may be anticipated to be applied upon it.

5.4 DRAWWORKS

(a) A competent person shall examine brakes and linkage of draw works once at least in every shift. If any defect is noticed during such examination, the draw works shall not be used until such defect is rectified.

(b) Preventive maintenance like greasing, changing of lube oil and inspections should be carried in line with OEM recommendations.

(c) The draw-works guard shall remain in place and in good condition when in operation.

(d) Moving draw-works machinery shall not be lubricated while it is in operation.

(e) The equipment operator shall not leave the draw-works brake without tying down the brake or securing it with a catch lock, unless the draw-works is equipped with an automatic driller.

(f) Travelling block safety device crown-o-matic / floor-o-matics shall be installed in order to prevent the block hitting the crown block and derrick floor accidentally. The Crown-o-matic /
floor-o-matic should be tested before each trip and after each casing line slip / cutting operation and recorded in the IADC report.

(g) Shut-down switches for engines / power supply should be installed at the draw-works control console.

(h) Draw-works should be fitted with an auxiliary brake to assist the primary braking system. Inspection & preventive maintenance shall be carried as per OEM recommendations in operation and maintenance manual.

(i) Adequate air pressure (110 – 125) psi should be ensured prior (all times) to carry out any operation.

(j) The lifting capacity of Draw-works with different combinations of Transmission clutch & Drum clutch should be displayed on control panel of draw-works.

(k) Foundation bolts of Draw-works, oil lubricating pump/motors should be checked regularly.

(l) Driller console at the derrick floor should always be air purged.

(m) All valves kill switches and other working devices should be kept in proper working order.

(n) Inspection, maintenance and repair schedule should be developed for Draw works (SCR / VFD) in line with API RP 7L and OEM recommendations / guidelines and followed.

5.5 CATHEADS AND LINES POWERED BY THE CATHEAD

(a) Lines powered by the cathead for make-up and break-out should be of proper length, capacity/strength and maintained in safe working condition.

(b) Use of manila rope for screwing or spinning out tubular with cathead operation should be avoided.

(c) Automatic/hydraulically operated catheads and their mechanism should be maintained in safe working condition.

(d) When tubular are being lifted using a pickup line or sling attached (only in extraordinary circumstances) to hoisting lines or the traveling block (hook), care should be exercised that appropriate elevators, wire rope line(s), or sling(s) are used that will not slip off of the tubular.

5.6 HOISTING LINES AND OTHER WIRE ROPES

(a) Casing line cut off and shifting should be carried out as per the OISD STD 183 “Care and Use of Wire Rope”.

(b) When the hoisting line is wrapped on the hoisting drum, the end shall be securely fastened and there should be a sufficient number of lines wrap remaining on the drum to eliminate strain on the fastening devices.

(c) Deadline anchors for hoisting lines should be so constructed, installed and maintained that their strength equals or exceeds the working strength of the hoisting line.

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(d) A moving hoisting line under load shall not be allowed to come in contact with any part of the derrick or mast or other stationary equipment except at the crown block sheaves and traveling block sheaves.

(e) The hoisting line should not be removed from the hoisting drum until the traveling block is rested on the rig floor or held suspended by a separate wire rope or chain.

(f) All casing lines shall be visually examined by a competent person once at least in seven days and the condition of the wire as to wear, corrosion, brittleness and fracture shall be noted. A report of every such examination shall be recorded in a bound-paged book kept for the purpose and shall be signed and dated by the person who made the examination.

(g) If on any examination made as aforesaid there is discovered any weakness or defect by which the safety of persons may be endangered, such weakness or defect shall be promptly reported in writing to the person responsible for operation and until such weakness or defect is remedied, the casing line shall not be used.

(h) Slings should have permanently affixed durable identification stating size, grade, rated capacity and reach.

(i) Casing line guide rollers (turn back rollers) should be in good condition and worn out rollers should be replaced.

(j) Winch line should be visually inspected for corrosion, breaking of wires/strands etc. at least once a day.

5.7 HOISTING TOOLS, HOOKS, BAILS, ELEVATORS, AND OTHER RELATED EQUIPMENT

(a) No element in the hoisting tool system should be subject to any load in excess of its design limitations.

(b) The hoisting hook shall be equipped with a safety latch or other equivalent device to prevent accidental release of the load being hoisted or lowered.

(c) Traveling blocks shall be properly guarded and shall not be operated unless guards are in place.

(d) Crown block assemblies shall be adequately secured to prevent the casing line jumping out of sheaves.

(e) On every derrick or portable mast, a platform at least 0.6 meter wide shall be provided at least one side of the crown block. The platform shall be equipped on its outer edges with a two rail railings on its outer edges with two rail railings at least one meter high and toe board of 0.15 meter high.

(f) Traveling blocks should not be moved while the crown block is being lubricated.

(g) The pump end of the rotary hose should be securely fastened to the derrick or mast by a cable or by a chain clamped to the hose and to the derrick or mast leg. The swivel end of the hose should be secured by a similar cable or chain, with the other end of the cable or chain affixed to the swivel.

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(h) Elevators, latches, latch locks, pins, and springs should be carefully inspected by rig crews and worn or damaged parts replaced so as to reduce the possibility of elevator malfunction and inadvertent release of the load.

(i) While operating cranes in the vicinity of overhead electric transmission line adequate precaution shall be taken against accidental contact with the electric transmission line unless the same is kept de-energized during movement of the same.

(j) Inspection and maintenance of Hoisting system should be carried out as per API RP 8B and OEM recommendations.

5.8 ROTARY & TOP DRIVE SYSTEM

5.8.1 ROTARY

(a) The operator shall not engage the power to begin rotation until the rotary table is clear of all personnel and materials.

(b) The Kelly bushing shall be of smooth design to prevent catching or snagging of personnel, clothing, or material.

(c) Before drilling, tripping, fishing operation, it shall be ensured that Rotary brake and Rotary mechanical lock are in good condition.

(d) Do not attempt to engage rotary table lock while in motion.

(e) Rotary table / top drive should not be used for final making up or initial cracking of drill pipe joints during running in / pulling out.

(f) Rotary table should be centered with respect to the well first and then mast should be centered with respect to rotary table.

(g) The Dead load capacity should be more than the air weight of the largest and deepest intermediate casing string to be lowered in the well.

(h) Inspection, maintenance & repair of Rotary should be carried in accordance with API RP 7L and OEM recommendations.

(i) It should be ensured that Rotary brake & mechanical lock of rotary table are in operating condition.

5.8.2 TOP DRIVE SYSTEM

a) Top drive shall be electrically isolated when using perforating guns. Top drive inactive, but not electrically isolated, may be capable of sufficient voltage to induce premature detonation of explosive devices.

b) Always ensure that the lock pin of the handler assembly is engaged before
using the backup wrench for makeup or breakup functions. Improper engagement could result in rapid rotation of the handler assembly.

c) The handler should be kept locked while drilling and when using backup wrench.

d) Use of surface jar with top drive should be avoided.

e) After any jarring operation, top drive system should be thoroughly inspected.

f) Welding on the top drive unit should be avoided.

g) Top drive should never be rotated with electrical motor or torque boost when there is weight suspended in the elevators.

h) Inspection and maintenance of top drive should be carried in accordance with the OEM guidelines.

i) Well control valves of the top drive should be pressure tested along with the BOP stack.

5.8.3 DRILL STRING HANDLING EQUIPMENT

(a) Manual drill pipe slip handles and drill collar slip handles should be the original manufacturer's handles or equivalent. They should be short enough so they will not project beyond the master bushing when the slips are in position to hold pipe in the rotary table.

(b) The tapered side of drill pipe slips should be lubricated to facilitate slip setting and removal. Slip dies should be clean and sharp.

(c) Rotary slips shall be set using handles with hand palms up. It is forbidden to kick the slips into the rotary table bowl.

(d) All power tongs should be securely attached to a suitable fixed structure using wire rope or a stiff arm.

(e) Fittings used to attach a back-up line to the back-up post or other fixed structure shall have a minimum breaking strength at least equal to the breaking strength of the cable attached to the fitting.

(f) Tong safety lines should be of sufficient length to obtain full benefit of the pull from the breakout cathead, but short enough to prevent complete rotation of the tongs. Tong snub lines should be of such length that when securing pipe in the rotary table, a 90-degree angle is formed between the tong body and the snub line.

(g) Tongs should be properly maintained. All tongs and tong heads including dies should be inspected for size and condition. Parts to be lubricated should be greased prior to every trip. Tong dies should be properly pinned in die slots. All replaceable parts & pins should be in line with the respective OEM specifications.

(h) Power tongs with front openings for putting the tongs on and off the pipe shall have front doors in proper working order.

(i) Power tong pressure systems (hydraulic or air) should be equipped with a safety relief valve and operating pressure shall never be set higher than the manufacturer's
specifications for any component of the system. The pressure should be set to apply the correct make-up to the pipe being run.

(j) Uncontrolled rotation of pipes shall be effectively prevented while making or breaking pipe connections and a back-up tong shall be used for this purpose whenever required.

(k) The ends of tong safety lines shall be secured with not less than three wire-line clamps.

(l) Tongs, ends of rotary hose and suspension sheaves shall be fitted with safety chains or wire lines.

(m) When usual strain is taken on the tongs, all crew members except the person required to operate the draw-works, shall stand in the clear.

(n) For handling small diameter drill collars (4 ½” and below), pup joints should be preferred in place of Drill collar elevators.

(o) Lifting of drill string singles from catwalk to rig floor should be done using lifters.

5.9 BOP AND ACCUMULATOR UNIT

(a) It should be ensured that BOP control unit is charged and sufficient oil is filled in oil sump.

(b) Manifold relief valve and Accumulator relief valve, air pressure switch, hydro-electrical pressure switch and pressure gauges of BOP control unit should be calibrated once in six months.

(c) After the surface casing is set in a well, no drilling shall be carried out unless BOP stack is securely installed and tested. Each line shall consist of components having a working pressure equal to that of the blowout preventers.

(d) All controls of power operated blowout preventers shall be located within easy reach of the driller on the derrick floor.

(e) A remote control panel for the blowout preventers shall also be installed at the derrick floor.

(f) Blind/Shear Ram operating valve should be secured with locking arrangement to avoid its accidental activation.

(g) Hi-Low bye-pass valve should be kept on Low side during normal operations.

(h) The choke line and lines downstream of the choke should be as straight as possible and be firmly anchored to prevent excessive whip or vibration.

(i) The accumulator capacity should be adequate for closing all the preventers with safety margin without recharging accumulators.

(j) All closing unit control valves be clearly marked to indicate which type of BOP or gate valve is to be operated from a particular control valve.

(k) If one of the two PODs of Subsea stack goes out of operation, Operations should be stopped.

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well secured, defect of POD should be rectified and tested prior to resuming further operations.

(l) BOP stack of floaters should have ROV compatible hot stabs for Blind cum shear ram and one pipe ram operation in emergency.

(m) It should be ensured that BOP stack and its control equipment are operational prior to resuming operations. If any component or part of well control system is found defective during operations, operations should be stopped, well secured and defective component rectified prior to resuming further operations.

(n) If the choke and kill lines are filled with drilling mud, these should be flushed at regular intervals to prevent barite settling and plugging of lines. The flushing interval to be decided depending on the drilling mud composition and density.

5.10 WEIGHT INDICATORS

(a) A weight indicator should be installed and used on all operating drilling rigs intended to manipulate tubular. The indicator should be so constructed, installed, and maintained that it will register a close indication of the hook load suspended (within 5% of the maximum hook loading).

(b) The weight indicator system should be checked periodically for calibration by comparing its reading with the calculated drill string or tubing string weight, with adjustments made as necessary as per OEM requirements / regulatory requirements.

(c) The weight indicator should be mounted so that the gauge and rotary table is easily visible to the operator standing at the brake position.

(d) When the weight indicator is installed above the rig floor, it should be securely fastened to prevent it from falling. The load cell should be secured by a separate safety line.

(e) Weight Indicator’s reading should be adjusted equal to the hanging wt. of travelling block or (wt. of T.B. + wt. of Top Drive System).

5.11 DRILLING FLUID (MUD) TANKS

(a) On land locations, pits and tanks used to circulate flammable materials should be located a minimum distance of 30 meter from the well. Equivalent safety measures should be taken where terrain and location conditions do not permit maintaining such distance.

(b) All fixed drilling fluid guns used for jetting shall be pinned or hobbled when in use and unattended.

(c) When necessary for personnel to enter a drilling fluid tank that may contain hazardous or toxic substances, applicable provisions for entering confined space shall be followed as per OISD STD 105.

(d) All mud tank runways standard railing shall be provided unless other means are available to prevent a person from falling into the mud tanks.

(e) Mud tanks shall be so designed and installed as to provide positive suction to mud pumps.
(f) Mud Tank system of all the drilling rigs should have a calibrated trip tank of 80 bbl capacity. The trip tank should be provided with at least one electrical motor driven centrifugal pump of 10 H.P. and 3" suction / 2" delivery line.

(g) Only one mud tank should be used as suction tank to ensure adequate mud volume monitoring.

(h) Couplings of all agitators fitted on mud tanks should be covered with guards and electrical motors double earthed.

(i) Slug Pit of min. 8 cu.m should be provided.

(j) Eye wash unit should be provided at mud tanks near chemical loading / unloading area.

5.12 PIPE RACKS AND DRILL PIPES

(a) Drill pipes should be handled at the ends during manual pipe loading and unloading operations and transfer between pipe racks.

(b) Personnel should not pass between the pipe rack or drill pipes and a pipe truck or trailer during loading, unloading, or transfer operations.

(c) Provision for stoppers (retrievable) should be made to prevent pipe from accidentally rolling off cat walk or pipe racks.

(d) During transfer operations between the trailer / truck and pipe racks, temporary supports for skidding or rolling pipe should be constructed, placed, and anchored to support the load to be placed on them.

5.12.1 PRESSURE EQUIPMENT

(a) Air receiver tanks shall be fitted with a safety valve and air pressure gauge which shows pressure in excess of the atmospheric pressure. The pressure safety valve should be calibrated every six month.

(b) The air receiver tanks should be subjected to a hydraulic test at a pressure at least one and half times of the maximum permissible working pressure; similar test shall be made after every renewal or repair and in any case at intervals of not more than three years or at such shorter intervals as may be required.

5.12.2 MUD PUMPS

(a) Pressure relief valve discharges should be located and anchored so as to prevent a hazardous condition due to sudden discharge or piping movement.

(b) There shall be no valve between a pump and its safety pressure relief valve.

(c) Each section of a high pressure rigid line should be secured using appropriate means to prevent movement/vibration that may lead to line failure.

(d) Flexible high pressure hoses should be properly secured to prevent unsafe movement. Other suspended hydraulic, air, or electrical lines should be appropriately secured.

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(e) In normal operations, pumps, piping, hoses, valves, and other fittings shall not be operated at pressures greater than their rated working pressure and shall be maintained in good operating condition. Test pressures shall not exceed the design test pressure. Pumps, piping, hoses, and pressure relief devices shall be designed to meet the requirements of the operating conditions to be encountered.

(f) Hammer unions shall be made up of like halves with the same pressure ratings and thread type.

(g) Pressure relief devices shall be set to discharge at a pressure equal to or less than the 'maximum allowable working pressure' or 'maximum operating pressure' of any pump, piping, hose, or fitting that the devices protect.

(h) The inside diameter (ID) of piping on the pressure and discharge side of pressure relief devices shall at least equal the ID of the pressure relief devices. The piping shall be such as to prevent obstructions and minimize restrictions to flow.

(i) Positive displacement pumps shall be equipped with pressure relief devices that discharge to the circulation system or other acceptable location.

(j) Shear-pin pressure relief valves shall have the valve stem and shear pin enclosed to prevent accidental contact and to prevent the shear pin from flying when sheared. The enclosure shall be so designed and attached that it cannot fly off. Only the correct shear pin shall be used when replacement.

5.13 LIGHTING

(a) Adequate general lighting arrangements shall be provided during working hours at the following places -
   i. Where the natural lighting is insufficient;
   ii. derrick floor;
   iii. driller's stand and control panel;
   iv. monkey board;
   v. every engine and pump house;
   vi. derrick sub-structure near blowout preventer controls;
   vii. every place where persons are to work;
   viii. every means of escape, access or egress;

(b) Adequate illumination should be provided in positions so as not to impair vision of persons in the work area.

(c) All electrical extension cords shall be properly insulated and plugs shall be in good condition.

(d) Rig lighting and fixtures shall be of appropriate electrical classification for the area in which they are located in accordance with OMR 1984.

(e) Approved type spark arrestors shall be provided on all internal combustion engine exhausts located within 30 meter of the wellbore.

(f) Hazardous area classification in order to determine the type of electrical equipment suitable to use in different condition of hazardous atmosphere to be done as per latest guidelines of OMR, 1984.

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(g) The shale shaker motor and area within 5 ft (1.5 m) shall have Zone-1 safeguards as described in OMR 1984. The shale shaker motor shall be a type approved for Zone-1 in accordance with OMR, 1984 and maintained in accordance with the requirements of this classification.

(h) Repairs to electrical equipment shall not be performed unless the power source has been isolated and the control has been locked out/tagged out, and the person making the repairs is authorized to do so.

(i) Rig lighting equipment in the derrick or mast, tanks, and on the rig floor, should be enclosed and gasketed.

(j) Guylines, cat lines, sub lines and such other lines shall not be installed within six metres of any electric overhead transmission lines.

(k) Electrical motors, generators, and control panels should be grounded as per Indian Electricity rules, 1956 & OISD GDN 216.

(l) Adequate number of approved type safety torch / emergency light in electrical control room, drillers stand generator house etc. shall be made and kept available for immediate use in emergency.

For further details, refer OISD GDN 216.

5.14 EMERGENCY ESCAPE DEVICE & FALL PREVENTION DEVICE.

(a) On every derrick there shall be installed and maintained an escape line with a slide of adequate strength in such a manner that persons can come down safely from the monkey board to ground level in an emergency. The landing area should be maintained properly for smooth/safe operation.

(b) A competent person shall inspect every part of Emergency escape device / Fall prevention device Braking system as per OEM inspection & maintenance guidelines. Record of such inspection to be maintained.

(c) The track rope of the Top man escape line should have sufficient sag to avoid straining due to pre-tensioning.

(d) The track rope should have no damage or kink on any portion of it.

(e) The braking unit pulleys of the top man escape line device should be checked for free rotation prior to each installation. These should be checked for any wear and cleaned to make it free from dust.

(f) Every derrick should be fitted with a fall prevention device.

6.0 INSPECTION OF CRITICAL EQUIPMENT

(a) Critical equipment should be periodically inspected as recommended by the manufacturer or in accordance with recognized engineering practices.

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(b) When using nondestructive testing (NDT) methods, certified inspectors should conduct the tests in accordance with recognized methodology and acceptance criteria.

(c) NDT inspection of structure, substructure and handling tools should be conducted as per OISD GDN 202.

7.0 SAFETY PRECAUTIONS IN DRILLING OPERATIONS:

Ensure the following before commencing drilling operations:

7.1 Ensure availability and provision before spudding in of the well

(a) Well plan / well program.
(b) PPE for crew.
(c) First aid box.
(d) Lower & upper Kelly cock, FOSV, inside BOP (Its operating lever should be kept at designated place at derrick floor).
(e) Kelly saver sub.
(f) BOP control panel on derrick floor.
(g) All the instruments such as weight indicator, pressure gauges, rotary torque, SPM counter, RPM counter mud volume totaliser, flow meter & trip tank operational.
(h) Required quantity of drill pipes, drill collars and heavy weight D/Ps.
(i) Availability of at least two mud pumps in good working condition.
(j) Sketch of BHA for each phase at derrick floor.
(k) Rat hole and mouse hole should have already been drilled
(l) Crown-o-matic device / Twin stop safety device are in working order.
(m) SOP for all the operations to be carried at the rig.

For other points, checklist placed at Annexure 1 may also be referred.

7.2 Checking of critical equipment prior to Drilling Operation

(a) At the beginning of every shift, the instruments and controls at Driller's stand, draw works, mud pump, casing line, cat-line, and blowout preventer assembly etc. shall be examined by the Shift in charge and he shall satisfy himself that these are in good condition. In case of non operational of any instrument be recorded and corrective action should be taken immediately.

(b) It shall be ensured that no person remains in a position of danger at or near the rotary table when set in motion.

(c) Tools or other materials shall not be carried up or down a ladder unless properly secured to the body leaving both hands free for climbing.

(d) The casing line shall not be in direct contact with any derrick member.

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(e) When cementing, no person shall be allowed on the rig floor near the wellhead or near the cementing equipment except those actually engaged on the operation.

(f) All high-pressure pipes fitted with flexible joints shall be suitably anchored and pressure tested at ‘maximum operating pressure’ before commencement of any operation.

(g) For further details on Cementing operation, OISD STD 175 respectively may be referred.

7.3 Stock Of Barytes, Chemical And Water

(a) Sufficient quantity of barytes, mud chemical and water including proper, infrastructure facilities for loading mud in case of emergency well kick situation should be available all the time during drilling operation of the rig.

(b) For Floaters, drilling operations should be suspended if on-board stock of barite or any other weighing material becomes less than the quantity required to raise the drilling fluid density of the active mud system by at least 1 ppg.

(c) For floaters, drilling operations should be suspended if on-board stock of bulk cement and additives is less than the required quantity to set at least two cement plugs in the hole section being drilled.

(d) Relevant portions of MSDS (PPE requirement and first aid procedures) of all chemicals to be used for drilling and testing of well in local language and eye wash system should be made available near the loading / unloading area.

(e) One high-pressure well killing pump / cementing unit, while drilling wild cat / high-pressure gas wells be placed at suitable distance and hooked up for killing well in emergency situation.

7.4 Safe Practices during Drilling

(a) Rate of penetration shall be monitored. In case of any drilling break, stop rotary table, pull out the Kelly up to first tool joint, stop mud pump and check for self flow.

(b) Different type of drill pipes should not be mixed up during making up of the drill string.

(c) Thread protectors should be used on drill pipes while lifting and laying down the pipes on catwalk.

(d) Before starting drilling, it should be ensured that rotary is centred w.r.t. well and mast is centred w.r.t. rotary. This is to avoid damage due to touching of Kelly with upper portion of casing, well head and BOP.

(e) Continuous monitoring of the mud loss / gain during drilling.

(f) BOP mock drill should be carried out during drilling and tripping. Trip drill should be carried out for all the three scenarios i.e. drill string in the hole, drill string out of the hole and BHA against the rams.

(g) Wiper trip / short trips should be carried after drilling every 250 meters drilled or based on well bore condition to check well bore stability.

(h) For subsea drilling operations:
   - Drilling operations should be suspended if any of the following equipment is defective and preventing accurate monitoring of well behaviour.

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i. Return Flow Meter  
ii. ‘Active Pit’ level sensor  
iii. ‘Trip tank’ level sensor  
iv. LEL Gas detection system  
v. H2S Gas detection system

### 7.5 Mud Volume Totaliser (Pit volume monitoring system)

Mud volume totaliser should be operational during drilling operation.

### 7.6 Before Round Trip

Before commencing round trip the following precautions should be taken:

(a) Circulate for minimum one cycle to flush the hole & condition the mud. During circulation, drill string should be in continuous rotation and reciprocation.

(b) Pump high viscous pills to remove drilled cuttings from the hole. The pumping interval between two high viscous pills should be equal to the annulus volume.

(c) During pulling out in top hole, hole shall be filled continuously as any drop in fluid level may cause hole collapse or swelling of clay resulting in reduction in well bore ID.

(d) Pump slug to enable the pipes to be pulled dry and the hole to be accurately monitored during the trip.

(e) Prior to tripping in subsea wells, swab / surge and trip margin should be calculated. It should be ensured that drill string is not being moved faster than the calculated tripping speed.

(f) If the hole does not take mud in accordance with the calculated steel volume being pulled out, a flow check should be performed. The bit should be than run to bottom, regardless to the outcome of the flow check, for circulating for at least bottoms up.

(g) Check/service and made ready all tubular handling gears like rig tongs, jerk line, elevators, rotary slips etc.

(h) Less diameter drill collars like 6 ½”, 3 ½” should preferably be handled with pup joints instead of drill collar elevator.

(i) Install mud bucket.

(j) Full opening safety valve to be checked and keep these in hanging position so that it can be installed in a minimum possible time.

(k) Topman should inspect safety harness and safety line, diving board and step-in board pins / bolts.

(l) Trip tank should be functional and ensure that hole is filled at regular interval and trip sheet is being maintained as per OISD RP 174.

(m) Check functioning of all gauges prior to pullout.

(n) Safetyclamp for drill collars to be inspected.

(o) Arrange thread dope. (Graphite grease for drill pipes and 60% Zn or Pb grease for drill collars)

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(p) Personnel protective equipment like hand gloves, helmets, shoe etc to be made available.
(q) Drill pipe wiper to be made available.
(r) Ensure availability of recommended air pressure (100 – 125 psi) for pneumatic clutches.
(s) Check and adjust brake lever.
(t) Visually inspect casing line, dead end anchor and fast end.
(u) Visually inspect casing line, dead end anchor and fast end.
(v) Ensure proper functioning of crown-o-matic / twin stop safety device.
(w) Check auxiliary brake.
(x) Ensure availability of trip sheet and actual / theoretical steel volume data of tubular to be pulled out.
(y) Record-o-graph to be checked.
(z) Ensure availability of water for cleaning the derrick floor.
(aa) Availability of flame proof hand lamp and safety torch during night.
(bb) Check and fill hydraulic oil as per recommendation in tank.
(cc) Availability of lifting sub.
(dd) Ensure proper functioning of auxiliary brakes before tripping in.
(ee) Condition of planks of pipe raft to be checked and broken planks to be replaced.
(ff) Bit breaker, Master bushing lifter availability to be checked.
(gg) Back up lines of rotary tongs should not be anchored around sharp edges to avoid damage of wire.

7.7 During pulling out & running in

(a) Working joints of drill string to be changed in each trip.
(b) Pulling out should be carried out in control speed to avoid swabbing.
(c) For the first 5 – 10 stands off bottom, the hole should be monitored through the rotary for checking swabbing effect.
(d) Compare actual hole fill up volume with theoretical volume for any corrective action, if required.
(e) Flow check before pulling out with pumps off should be made to ensure that well is stable with the ECD effect removed. Also, recheck for self-flow at previous casing shoe and before pulling out BHA.
(f) String should not be kept stationary in open hole for prolong period to avoid sticking of drill string.
(g) During running in break circulation inside casing shoe in case of deep wells particularly when high-density mud is used.
(h) While recovering / retrieving fish it must be ensured that Rotary table is not used for spinning out the drill pipes.
(i) ‘Self-flow’ shall be continuously monitored during pulling out operations.

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(j) Extra pull on drill string while working in tight hole should be maintained as advised by the rig manager, keeping in view the safe limit of the drill string and rig.

(k) During round trip, tool joint shall be kept at minimum height above the rotary table to avoid bending while cracking the joint.

(l) Use both the rotary tongs for cracking joints.

(m) Key operational personnel should be aware of the grade, class of the drill pipe being used & its strength.

(n) Hook lock should be disengaged during round tripping in open hole.

(o) Safety clamp should be used while making and breaking of drill collars.

(p) Crew should be away from the vicinity of backup and jerk line while using power tongs.

(q) Trip sheet should be filled up during pulling out to monitor the well behaviour.

(r) Drill pipe stands should be run in the same sequence in which these were pulled out.

(s) BHA should be serviced during every alternate round trip i.e. open non working joints, clean threads, inspect for any wear / damage / cracks, apply grease properly, re-tighten with applying API recommended torque.

(t) Tight spots, if any, should be cleared by reciprocation, circulation & reciprocation or circulation, rotation & reciprocation.

(u) During pulling out, if tight spots are encountered, over pull should not be applied exceeding 50% of BHA air weight for reciprocation to clear the tight spots.

(v) Whenever a trip is interrupted, a FOSV should be installed on the top of the pipe above the rotary table and the well monitored in the trip tank with the trip tank pump running. FOSV is to be remain open.

7.8 Precautions during Lowering of Casing

(a) Ensure that capacity, condition of rig and tackle system is sufficient to handle the casing load.

(b) Casing pipes/connections should be thoroughly serviced, cleaned & gauged and tally sheet to be prepared.

(c) Inspect braking system (Primary as well as secondary).

(d) Check all handling tools required for lowering of casing.

(e) Close blind Ram and replace pipe Ram corresponding to the casing pipe being lowered

(f) Functioning of NRV of float shoe and float collar should be checked prior to lowering the casing.

(g) Due care should be taken while lifting casing pipes from pipe racks to derrick floor.

(h) Casing should be filled regularly in case conventional type floating equipment are being used

(i) All the casing joints should be tightened applying API / OEM recommended make up torque.

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7.9 Well Head Fitting

(a) Casing should be cut at an appropriate height to accommodate the well head, and BOP assembly, facilitating the connection to choke & kill manifold.

(b) Casing head housing, the first well head component to be installed on a conventional well should be checked by spirit level for proper levelling prior to welding, in case weld on type casing head is being used.

(c) While fitting of section of well head and BOP component, new ring gasket of proper size & rating should be used. Studs/ Bolts should be tightened at a proper torque.

(d) Gas percentage should be checked prior to and during well head installation.

(e) During well head installation, only non-sparking tools should be used where there is any chance of presence of hydrocarbon.

(f) Subsea well head assembly should be thoroughly checked in line with OEM checklist prior to lowering it.

7.10 Fishing

Before taking up any fishing job, hoisting equipment, casing line, strength of tubular, rotary chain drives, components of drill string, braking system, functioning of control panel etc. be checked for its normal functioning.

7.11 Hazardous chemicals and their handling

Many hazardous chemicals are used in drilling operations. Inadequate awareness about the hazardous properties of these chemicals may lead to serious accidents which will affect the operating staff at work and the environment.

Company should define the hazardous chemicals used at site as per MOEF guidelines. Material safety data sheet (MSDS) of these hazardous chemicals should be collected from the manufacturer and displayed at location(s) where these chemicals are handled.

Safety at storage and handling of hazardous chemicals depends on a considerable extent on effective safety education / training following safety procedures and efficient supervision. The operating staff should be aware of the hazards involved, the location and operation with necessary PPE, safety equipments.

7.12 Logging

OISD GDN 182 and OISD STD 183 may be referred.

7.13 Drill Stem Testing

(a) Detailed program should be made / chalked out and responsibilities be assigned to concerned persons prior to carrying out DST.

(b) Function and pressure test of BOP must be conducted before carrying out DST.

(c) Engines without the provision of approved spark arresters and not having the provision of asbestos rope insulation on the engine exhaust should not be operated with in 30 meters of the well.

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(d) Keep available all necessary fire fighting items/equipment in accordance with OISD-STD-189 (revised).

(e) Entry of unauthorised person at the well site should be restricted.

(f) Drilling fluid density and viscosity should be checked and maintained within specified limits before running in DST tools.

(g) Trip tank should be made operational.

(h) DST manifold on the rig floor should be anchored properly with chains.

(i) One or more reversing valves shall be incorporated in the test tool assembly.

(j) Ensure that the separator safety valve is periodically calibrated and in good working conditions.

(k) The Rotary hose should not be used as a part of test lines.

(l) A Full opening safety valve of proper rating should be available in hanging position for emergency use.

(m) Test line laid down to the reserve pit should be properly anchored at every 9-meter interval.

(n) Precautions should be taken as per API 49 standard in case of H2S is encountered.

(o) Test string should be designed as per anticipated bottom hole pressure.

(p) Prior to DST, the test line and valves shall be examined by a competent persons and no test shall be taken if any defect is discovered until such defect is rectified.

(q) Gas produced to the atmosphere during a drill stem test shall be burnt through a flare line / burners at safe distance from the wellhead.

7.14 DST Operation

(a) High-density mud should be stored in reserve tank for killing the well in case of emergency.

(b) Fluid volume in the casing should be monitored while going in and coming out of the hole to ensure the well to be under hydrostatic control.

(c) The derrick floor should not be left unattended during the drill stem testing.

(d) The mud box should be hooked up and ready for use before the drill stem tool is pulled out of the hole.

(e) DST packer should be set during daytime. The DST tool should not be pulled out of the hole after dark unless all test fluids have been pumped out of the test string.

(f) The fluid level in the annulus should be checked regularly throughout the test and ensure that packer is holding and gas is not leaking into the annulus from test string.

(g) Test string should not be rotated during running in or pulling out. String to be made up or opened with the help of pipe spinner to avoid rotation of Rotary table.

(h) Reverse circulation should be established in all DST operation after completion of the test. In case reverse circulation is not established, annulus should be watched frequently and fire tender should be made available as standby.

(i) Drill string should not be pulled out after DST, unless the well is properly killed.

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7.15 Cementing

1. Pipe OD should be optimized to ensure sufficient clearance to avoid swabbing when pulling out of hole after placement of cement plug.

2. Cementing head, cementing lines and connections from cementing unit to rotary table should be pressure tested at anticipated / calculated pumping pressure + 50%. Seals of leaking joints, if any, should be replaced be original ones and retested.

3. Cementing lines should be secured properly prior to pumping operations.

7.16 Testing

1. Associated gas should be separated from oil with oil gas separator and its discharge at a minimum safe distance of 40 meters from the rig should be ensured.

2. Only non-sparking tools should be used for tightening joints, nut/bolts of flanges etc.

3. Production crude oil tanks should be earthed.

4. All the lines are to be anchored and secured firmly.

8.0 GENERAL SAFE PRACTICES ON DRILLING RIGS

8.1 THE JOB SAFETY ANALYSIS (JSA) PROCESS

The JSA is a very effective means of helping reduce incidents, accidents, and injuries in the workplace. It is an excellent tool to use during new employee orientations and training and can also be used to investigate "near misses", minor and major incidents.

Any job that has hazards or potential hazards is a candidate for a JSA.

Forms or worksheets (see sample worksheet is illustrated in Annexure-3 may vary from company to company but the idea remains the same.

The JSA indicating potential, hazards, necessary actions to eliminate or minimize hazard that could lead to incident, injuries to person, damage to environment or possible occupational illness should be developed for each operation. The JSA should be performed by crew members so that they understand the hazards associated with each operation, and their role and responsibility.

The JSA should be reviewed approved and signed by the supervisor before the commencement of operation. The JSA document should be available at site. Based on JSA, Safe operating procedure should be developed and available at site.

8.2 Tool Box Talks (TBT)

Toolbox talks are an ideal method of capturing and communication of safety issues at the worksite. During the Toolbox Talk (TBT), the risks to each individual involved in the job should be considered and discussed (Risk assessment). Safe operating procedure (SOP)

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and JSA should be used as basis for discussion during TBT so that the crew understands the hazard involved in each operation. All crew members should encourage to get involved during TBT so they know their roles and responsibilities to accomplish the assigned task.

TBT should be repeated if there is any change in the job namely equipment, GTO, personnel, environment etc.

Record of Tool Box Talks should be maintained. This should include topics discussed, participation and signed by shift in-charge.

8.3 Emergency Response Plan (ERP)

The objective of emergency response planning is to have clear written procedure for expected action during anticipated emergency. The emergency response plan includes operational and procedural requirements of various emergency scenarios.

The ERP should be developed as per OISD GDN 206 and 227 by the company indicating anticipated scenarios, action to be taken, role and responsibility of each person, important telephone numbers of persons to be contacted, nearby hospital and fire station.

The ERP document should be reviewed periodically and available at site.

The BOP drills, fire drills, first aid and medical evacuation drills should be conducted regularly for each anticipated scenarios as per ERP.

8.4 General Safety Awareness

I. General HSE education should be imparted through trainings, periodical safety meetings, company publications and other educational media like video, safety quiz etc. (if possible).

II. Unsafe and potentially dangerous conditions should be rectified and reported immediately to the in-charge/HSE officer for further suitable action.

III. The off-going shift in-charge shall inform the oncoming in-charge for any known special hazards on ongoing work that may affect safety of the crew and rig. Accordingly brief note should also be recorded.

IV. Hazardous substances shall be stored at proper place, in proper containers and properly labelled. Employees required to handle or use hazardous substances shall be trained regarding their safe handling and use and are made aware of the potential hazards and personnel protection requirements.

V. Smoking and naked light shall be prohibited inside the operational area. No person shall smoke or carry naked light within the operational area. In cluster locations prohibition should be enforced for all operations. For details, refer OISD GDN 186. Locations should be conspicuously posted with a sign, “NO SMOKING OR NAKED LIGHT” or equivalent.

VI. Field welding shall not be permitted on rig mast/ derrick, structure, substructure, handling tools namely tongs; elevators, bails or heat-treated rig equipment. Repair
should be carried out as per OEM recommendations and integrity of mast/derrick, structure, substructure and handling tools should be ensured as per OISD STD 202.

VII. Safe operating procedures (SOP) for the work to be carried out during drilling operation, maintenance & inspection should be developed and made available at site indicating an assessment of risk, wherever possible and safe method to deal with it/them.

VIII. At least one trained person should always be present on derrick floor even during shutdown period to observe the well particularly when BOP is not closed and well is waiting for some job.

IX. PPE should always be used for working on rig floor, while handling of wire ropes and tubular (inside drill site area).

X. All work personnel should undergo periodical medical check up/fitness test for attending hard/hazardous job in oil mine area as per OMR.

8.5 House Keeping

(a) Work places and stairs with handrails should be maintained reasonably clean and free of debris, mud, oil or stumbling hazards.

(b) Scrap, waste and rubbish shall not be allowed to accumulate in work places of access or egress.

(c) Hazardous leaks should be immediately stopped or spills should be promptly cleaned up to eliminate personnel slipping and fire & environmental hazard.

(d) If employees are required to work in a cellar pit, it should be kept reasonably clean of water, oil or drilling fluid accumulation.

(e) Loose materials that are not required for use should not be placed or left at derrick floor, escape routes, ladders etc so as to dangerously obstruct work places and passage way.

(f) All projecting sharp edges and railing ends shall be properly bend over to prevent possible injury.

(g) When placing equipment and tools on or around the rig floor and location, care should be taken to leave egress routes open. Tools and equipment should be securely placed and stored in a manner so that they may not fall.

(h) Openings in the rotary table should be kept properly covered when not occupied by Kelly drive bushing, pipe, or other equipment. The rat hole and mouse hole openings should be covered when the Kelly or other equipment is not in the respective hole(s). -Ref API- RP 54.

8.6 Drilling Programme

Well plan / well program indicating comprehensive drilling policy, casing policy, formations to be encountered, expected bottom hole pressure, temperature mud weight to be used and anticipated hole problems as per history of reference wells, contingency plan to deal such emergencies should be made available at well site.

Rig manager / all the shift in-charge shall be aware of the content of such drilling plan.

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8.7 COMMUNICATION SYSTEM:

(a) Efficient means of communication shall be provided and maintained in good working order between topman, driller and rigmanager.

(b) For DP rigs, Drill floor should have good, clear and continuous communication with DP control room and ROV supervisor during open hole re-entry, BOP & well head installation, Surface casing RI etc.,

(c) The communication system installed on the drilling rig shall comply with the provisions of the Indian Electricity Rules, 1956.

(d) Minimum two modes of independent communication system should be provided at site.

(e) Mobile phone shall be prohibited in the operational area on rigs as it is considered to be a potential source of ignition.

9.0 Fire fighting system:

For the protection of the personnel involved in drilling, equipment and the environment, necessary fire fighting arrangements as per OISD- STD- 189 shall be provided on on-land rigs. Offshore drilling rigs should meet the ‘CLASS and ‘MODU’ code requirements.

10.0 Personal Protective Equipment (PPE) & TRAINING

Personnel should wear personal protective clothing and should use personal protective equipment (PPE) when working at drill site.

Every person who works above the first girt of the derrick shall be provided with approved type of safety harness and lifeline and shall use the same unless he is otherwise protected against the danger of falling from height.

For further details, refer OISD STD 155 & OISD GDN 182.

All the key operational personnel should have valid well control training certificates of appropriate level from IWCF / IADC accredited well control training centers.

Each member of drilling crew should be trained in ‘Firefighting & first aid’ to enhance their capabilities.

11.0 Injuries and Incidents

11.1 Injuries

Every occupational injury/accident or illness shall be immediately reported to the supervisor and competent/statutory authority where ever necessary. The supervisor shall arrange for any necessary medical or first aid treatment.

The cause of the injury or illness should be investigated and steps taken to prevent a recurrence.

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11.1.1 First Aid

At least two trained personnel in each shift should be available at site to give the first aid treatment to the victim before shifted to medical services for further treatment.

A first aid kit shall be maintained at the worksite. The kit should contain appropriate materials for the potential injuries and should be inspected at frequent intervals, replenished as necessary, and be immediately available at all times.

11.2 Medical services

Telephone numbers, location, and other relative information pertaining to availability of medical personnel, and medical facilities shall be available at all drilling sites.

Prior to commencement of work in an area, arrangement should be made for ambulance/standby vehicle for prompt medical attention in case of serious injury at drill site.

11.3 Incidents:

Every major incident shall be reported to regulatory bodies like DGMS, OISD etc within twenty four hours of every such occurrence indicating brief about incidents by telephone followed by fax.

A report should be prepared as soon as practical, to record information (or the circumstances) surrounding the injury or illness. Additional reports to regulatory agencies and others may be required.

12.0 Simultaneous operations:

Simultaneous operations involving drilling rig at cluster locations include:

I. Movement of drilling rig around the producing oil / gas wells,
II. Skidding of drilling rig and shifting of drilling rig in cluster location,
III. Drilling on one well and activation of / wireline job on another well in the cluster,
IV. Drilling on one well and CTU / Stimulation job on another well in the cluster,
V. Drilling rig inside the installation.

For further details, refer OISD GDN 186.

13.0 Management of Change

Management of change includes:

I. Installation of new equipment like top drive, Mud volume totalizer etc;
II. Introduction of new drilling technology;

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III. Change of personnel
IV. Change of procedures.
V. Change in operational plan / design.

For further details, refer OISD-GDN-178 "Guidelines for Management of Change" for details.

14.0 Contractor employee's safety

Safety levels of the contractor employee's safety deployed at drill site should be enhanced by imparting training, safety briefing before start up of job and use of PPE during job.

For further details, refer OISD GDN 207.

15.0 Work Permit System:

All the hot jobs, cold jobs, electrical jobs working at height for non-routine jobs should be carried out at drilling rig / at drill site through work permit system.

For further details, refer OISD STD 105.

16.0 Environment Protection And Waste Management

(a) The size and capacity of waste / effluent pit should be designed as per the type of the rig, depth of the well, climatic condition of the area and quantity of waste discharged during the operation of the rig. Cutting pit should also be made to collect well cuttings generated and pit to be cleaned regularly.

(b) Provisions should be made to recycle and reuse treated waste water at drilling site.

(c) Waste pits should be lined with impervious lining.

For further details, refer OISD RP 211

17.0 GLOSSARY

Crown Block Assembly

The stationary sheave or block assembly installed at the top of a derrick or mast.

Derrick

Semi-permanent structures of square or rectangular cross section having members that are latticed or trussed on all four sides.

Mast

A structural tower comprised of one or more sections assembled in a horizontal position near the ground and then raised to the operating position. If the unit contains two or more sections, it may be telescoped or unfolded during the erection procedure.

Derrick Inspection

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Derricks should be thoroughly inspected after erection to see that all members and bolts are in place and that the latter are tight and equipped with suitable lock washers. This inspection should ensure that no member has been installed in a manner that will impair the safety of the derricks.

**Brake**
A device used for retarding or stopping monitor or holding.

**Brake Shoe**
That part of a shoe type brake or clutch which makes contact with brake drum.

**Clutch**
A means for engagement or disengagement of power.

**Counter Weight**
Weight used to supplement the weight of the working tools / equipment in providing stability for the working tool.

**Drilling operation**
A hole in the earth’s crust by mechanical means (by drilling rig) including well testing, cementation, perforation etc.

**Hoisting**
The process of lifting.

**Hoist Mechanism**
A hoist drum and rope reaving system used for lifting and lowering loads.

**Hoist Rope**
Wire rope involved in the process of lifting.

**Casing Line**
Wire rope used for hoisting and constructed between drawworks and travelling block.

**Hook Block**
Block with hook attached used in lifting service.

**Sling**
An assembly which connects the load to the material handling equipment.

**Swivel**
A load-carrying member with thrust bearing to permit rotation under load in a place perpendicular to the direction of the load.

**Wire Rope**
A flexible, multi-worked member usually consisting of a core member around while a number of multi-wired strands are laid or basically wound.

**Power subs**
A power sub is a device that moves with the travelling block and is designed to provide rotary power to the top of the drill string for drilling operations. It attaches to the bottom of the rotary swivel but does not include a rotary seal or bearing for supporting the drill string weight.

**Master Bushing**
It is a solid / split type bushing that is used with Rotary table opening to accommodate slips / kelly bushing.

**Rotary Slip**
Rotary slips are assembly of various segments to grip different sizes of tubular and to match the dimension to permit operation in standard master bushings.

**Kelly**
It is a hollow tubular having hexagonal / square edge to transmit rotation from rotary table / kelly bushing to the drill string.

**Kelly Bushing**
Kelly bushings are used to transmit Rotary table rotation to kelly.

**Rotary Hose**
It is a flexible connection between stand pipe and swivel facilitating the high pressure flow of mud while drilling the kelly length.

**Elevators**

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It is a handling tool to be used for lifting of drill pipes, drill collars, casing pipes and tubing.

**Rotary Tong**
It is a handling tool used for making up or breaking up of tool joint connection at a desired torque.

**Spinner**
It is a device used for making up of tubular connection by spinning action.

### 18.0 REFERENCES

1. API RP 54 Occupational safety For Oil and Gas Well Drilling And Servicing operation
2. Drilling Operation manual of drilling companies
3. IADC Journals
4. Oil Mines Regulation
5. API standard 8A
6. API standard 7
7. API standard 7 K
8. API standard 8C
**Toolbox Talk Form**

**COMPANY________ INSTALLATION**

**NAME________________________________________**

**DATE________________**

**LOCATION________________ SUPERVISOR________________**

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**Toolbox Talk – Topics to discuss**

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**OTHER POINTS OR ISSUES RAISED**

(include names of persons raising the points)

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**PROBLEM AREAS OR CONCERNS**

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