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

Rules and Guidelines for Safety in E&P Operations & Contingency Planning

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OISD: Functions and Responsibilities

- Development of Safety Standards for Oil & Gas Industry
- 121 standards developed so far for implementation by the Oil & Gas Industry.
- 21 of these standards have been included in statutory provisions of :
  - the Petroleum Rules, 2002 (06),
  - the Gas Cylinder Rules, 2016 (02),
  - the Static & Mobile Pressure Vessels (Unfired) Rules, 2016 (01), and,
  - the Oil Mines Regulations, 2017 (16)
- 36 of these standards are related with E&P operation.
- As per P&NG rules 2008,OISD is competent authority for according field decommissioning approval for offshore.
- Investigation of major onsite accidents - Root cause analysis, corrective actions and sharing of learning's with industry.

OISD: Functions and Responsibilities

- Conducting External Safety Audits (ESA)/ Surprise Safety Audits (SSA) of existing locations to assess in-depth conformance status vis-a-vis relevant OISD standards and identifying gaps where further corrective actions are required.
- Approx. 99% compliance of Safety Audit recommendations (Audits more than two years old) of all OISD audits – resulting in enhanced Safety at locations.
- OISD carries out Pre-commissioning Safety Audits of newly built-up locations and addition/ modifications of facilities in existing locations to ensure ab-initio compliance of such facilities to OISD standards.
- Accord Consent to Operate for E&P Offshore Operations under the Petroleum & Natural Gas (Safety in Offshore Operations) Rules, 2008.
- Evaluation of Safety Performance for Oil Industry Safety Awards
- Capability building of internal auditors
- Dissemination of sector specific knowledge through Case Studies, Safety Alerts, Seminar, Workshop and in-house Newsletters.

OISD-STD-190(Derrick floor operations)

- Pre-spud/pre-operation conference
- Equipment tools / accessories for operations at derrick floor on drilling rig
- Safety aspects related to drilling equipment:
- Inspection of critical equipment
- Safety in drilling operations
- Safe practices on drilling rigs
- Job safety analysis (jsa) process
- Tool box talks (tbt)
- Emergency response plan (erp)
- General safety awareness
- House keeping
- Drilling programme

OISD-GDN-182(Workover and well stimulation operations)

WORKOVER SAFE PRACTICES

- Safety of personnel.
  - ➢ Personnel protective equipment
  - ➢ Personnel safety equipment
- Offshore related
- Medical
- Chemical hazards
- Communication
- Emergency response planning
- Job Safety Analysis (JSA)
- Pre-operation & safety meetings
- Hydrogen sulphide (H2S)
- Safety of operations.
- Well integrity.
- Modular workover rig

WELL STIMULATION

- Equipment used in stimulation jobs General safety precautions
- Environment protection
- Annexure- i - pre-workover check list (for on land workover rigs)
- Annexure ii - checklist for stimulation jobs.

OISD-STD-175(Cementing operations and Well P&A)

Well Plug & Abondonment

Open Hole:

- 30M below the bottom to 30M above the top of any oil, gas, or freshwater zones.
- Minimum 30M above and below the previous Shoe.
- Multiple Zones 2 or more plugs with lower to extend 30M below the bottom zone & upper to extend 30M above the upper.
- Plug(s) in open hole be tagged after WOC with 8 MT.
- If no oil, gas, or water, cement plug of min. 60M (30M below and 30M inside deepest shoe).
- loss condition mechanical barrier BP/Retainer be set 15-30M above the shoe with 15M cement top.
- Surface plug of 60M with top within 60M below the mean ground level.

Cased Hole:

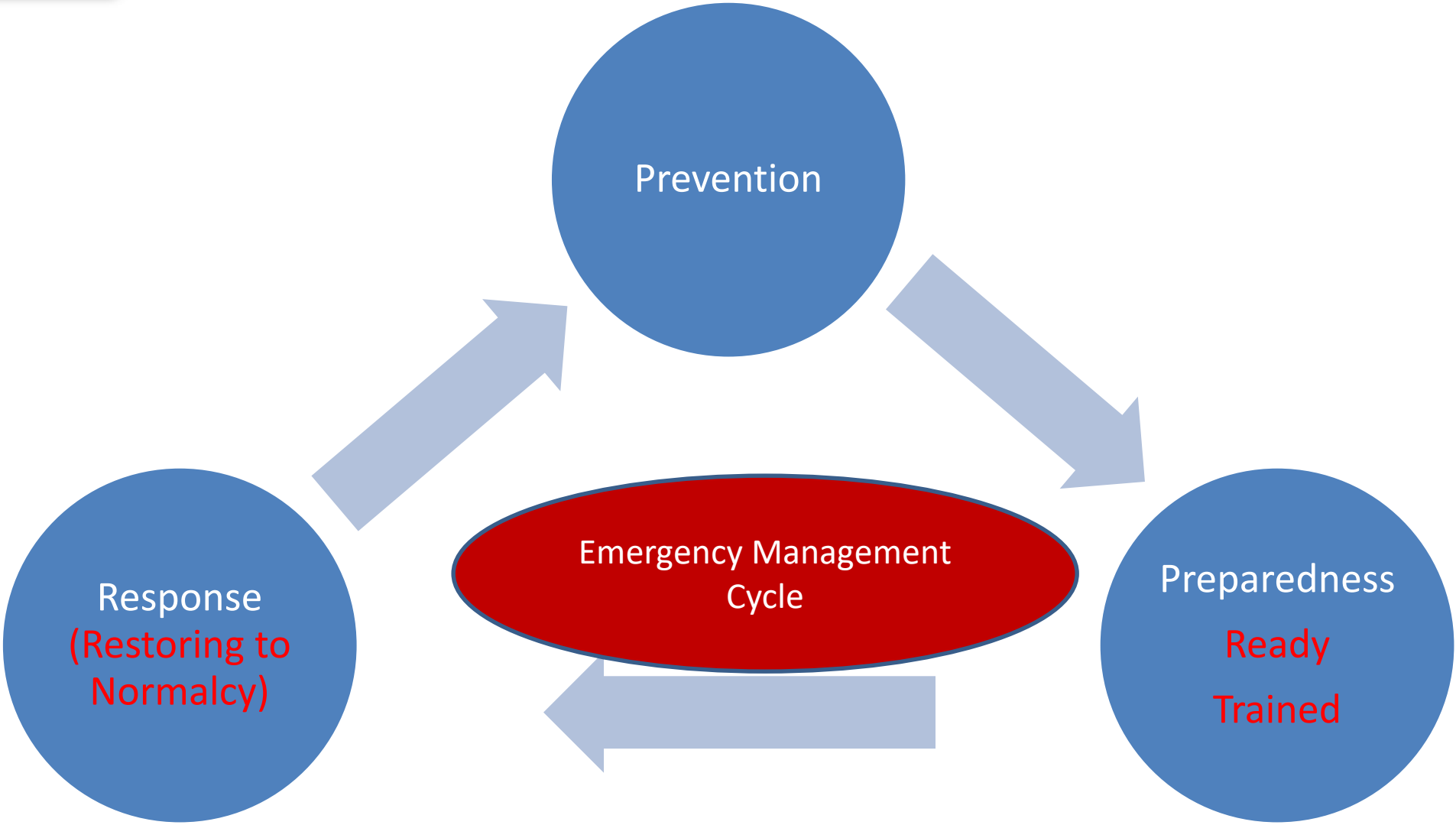
- 30M above to 30M below the perforated interval. To ensure good plug, it would be preferable on a platform (BP/ retainer).
- Second 30M plug, if zone is HC or high pressured water bearing.
- In liner plug to extend at least 30M into the liner.
- In offshore exp. plug of min. 60M be placed in prod casing at 1000-1500M.
- If casing(s) are retrieved abandonment plug of minimum 30M inside deepest stub and 30M above largest stub covering all the annuli.
- Surface plug of 60M with top within 60M below the mean ground level.

Complete list of OISD standards related with E&P are

Hazard identification methods

- At every installation/plant appropriate hazard identification and analysis techniques shall be used for identification of the emergency scenarios associated with the installation.
- Some commonly used hazard identification methods are:
- **Hazard and operability study (HAZOP):**it is used to identify all causes of deviation from normal safe operation, which could lead to any safety hazards or operability problems, and to define any action required to deal with it.
- **Quantitative risk assessment (QRA):**
- QRA is a means of objectively measuring the risks from hazardous activities of a facility or operation. The risks are quantified in terms of their probability and consequences.
- **Escape, evacuation and rescue analysis (EERA)**
- EERA a technique to evaluate the performance of the emergency response facilities and procedures.
- **Environmental impact assessment(EIA):**
- EIA is an evaluation of the possible effects on the environment of acute accidental discharges or releases

Emergency response planning in E&P



Goals of emergency response preparedness

- Securing effective response to emergencies
- Protecting human lives
- Protecting Installations/properties
- Protecting environment

These goals can be achieve by :

- Proper Risk assessment and Hazard identification preventing hazardous event occurrence
- Controlling escalation of emergency
- minimizing the consequences of hazardous event

Steps of emergency response preparedness

- **Identifying possible emergency scenarios**
- **Preparing emergency plan**

Clear written procedures for expected actions during anticipated emergencies and shall cover:

- Organization set up
- Procedures for emergency response
- Role of Government authorities / other agencies

- **Building competence**

- Maintains and develops individual competencies in emergency response.
- Monitors the performance of individuals to identify areas of improvement.

- **Providing necessary training**

Steps of emergency response preparedness

- **Conducting drill for all possible emergency scenarios**

➢ Tests and develops the command structure and communication arrangements.

➢ Verifies data and assumptions used in the emergency response assessment.

- **Identifying emergency response equipment**

➢ Tests emergency equipment under realistic conditions

- **Maintaining emergency response equipment in ready to use condition**

Case Study-1

INTRODUCTION

- Title: Uncontrolled flow of gas from a well.
- Location: On-land
- Loss/ Outcome: Snapping of flow line, injury to 1 person.

Case Study-1

BRIEF OF INCIDENT

- An incident of uncontrolled flow of gas and condensate occurred in well during activation of old drilled well that was subdued with 11.2 ppg mud with the arrangement of one high pressure cementing unit and one water tanker to supply water to pumping unit. Several attempts were made to activate the well by pumping through the annulus and return from tubing and vice versa. Flow line was connected to waste pit. Finally, when the pumping of water was done through tubing and return was taken from annulus, viscous mud observed in flow line along with slight gas. Suddenly gas flow increased. One person attempted to close the annulus valve but flow line parted near annulus valve and could not be closed due to which gas flow from flow line became uncontrolled. Around 1,600 persons from the nearby area over a 2 km radius were evacuated to a safe distance. One person was injured during this operation.

Case Study-1

OBSERVATIONS/ SHORTCOMINGS

- As per well activation plan, flow back line was to be made up of steel tubular. But in actual, flow back line was made up of MS pipe and local welding was done to connect MS pipe (threaded joint) with the annulus valve.
- Flow back line was not anchored.
- No choke manifold and flare stack was available.
- Separator was not used during well activation job.
- Potentially high well pressure after well activation was not considered and accordingly suitable arrangements were not made.
- Breathing apparatus was not made available at the well site during activation job.

Case Study-2

INTRODUCTION

- Title: Accident at modular rig.
- Location: Offshore.
- Loss/ Outcome: Expelling of tubing hanger along with wire line assembly from Wellhead causing injury to 4 persons.

Case Study-2

BRIEF OF INCIDENT

- ✓ Well was under workover for servicing and zone transfer. During subduing operations, communication was suspected between A and B sections of wellhead at a shallow depth. It was decided to detect the leakage with the help of ALFA (Acoustic Leak Flow Analyser) tool.
- ✓ The ALFA tool was made up and lowered inside the slick line lubricator. Gas injection through A-Section was carried out and the B-Section of wellhead was kept open through burner boom. At this stage there was a sudden surge of pressure in the well due to which the landing joint with wire line lubricator, tubing hanger, rotary table and bushing were flung out. The incident caused injuries to four persons who were present on the rig floor.

Case Study-2

REASONS OF FAILURE/ ROOT CAUSE

- ✓ Anchor bolts of tubing hanger were probably not fully tightened as evident from marks at only 3 places on periphery of tubing hanger.
- ✓ Job of this nature involving lowering of ALFA tool without tubing was being done for the first time on this rig. No risk assessment or **job safety analysis** was carried out either in base office or at the rig before executing the job.
- ✓ Pipe ram of BOP was not kept in closed position.
- ✓ The risks involved in carrying out logging job in pressurized 9 5/8" casing (Gas injection in section A) without a defined return passage (Through suspected leakage in section B) was not anticipated by any of the persons involved in the operation. The gas injected at a high pressure caused an upward thrust on the tubing hanger and lifted it out from the well head.
- ✓ Monitoring of pressure gauge by ALFA tool logging supervisor from rig floor while standing close to pressurized lubricator assembly even though the same could have been monitored through choke manifold gauge at main deck
- ✓ Lack of coordination between various agencies involved in the operation viz the operator, drilling contractor, wireline agency and ALFA tool agency.

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Thank you