Well Operations Integrity Handbook

DOC-NO-XXX-XXXX

NOTE: If you have questions about this Handbook, please contact the Health and Safety Manager.

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1 Introduction

Purpose

The Well Operations Integrity Handbook (“Handbook”) includes Company guidance for carrying out all well operations with the least amount of risk to people, equipment, and the environment. The Handbook includes the best available and safest technology (BAST) and procedures to meet the Company commitment to health and safety.

The Handbook complies with Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) requirements for operations the Gulf of Mexico and Sonangol requirements for operations in Angola.

Scope

The Handbook applies to Company operations worldwide, including drilling, completion, and well servicing operations. For information about well design and planning, refer to the Well Design Integrity Handbook (DOC-NO-XXX-XXXX).

Responsibilities

Executive Vice President, Operations and Development

Responsible for:

- Ensuring that all employees and contractors follow the Handbook.
- Providing the resources that employees need to follow the Handbook.

Drilling Manager

Responsible for:

- Reviewing, updating, and improving the Handbook.
- Communicating Handbook content changes to managers and supervisors.

Health and Safety Manager

Responsible for:

- Helping the Drilling Manager review, update, and improve the Handbook.
- Helping the Drilling Manager communicate Handbook content changes to managers and supervisors.
- Collecting feedback from managers and supervisors.
- Sharing feedback with the Drilling Manager.

Team Managers and Supervisors

Responsible for:

- Making sure that employees and contractors know where to find a current copy of the Handbook.
- Communicating Company and personal commitment to following the Handbook.
- Communicating Handbook content changes to employees and contractors.
- Answering employee and contractor questions about Handbook content.
- Making sure that contractor equipment and services comply with the Handbook.
- Sharing feedback with the Health and Safety Manager.

Employees

Responsible for:

- Following the Handbook.
- Asking any questions they have about Handbook content.
- Communicating feedback to managers and supervisors.

Contractors

Responsible for:

- Following the Handbook.
- Asking any questions they have about Handbook content.
- Making sure that their equipment and services comply with the Handbook.

2 Pre-Campaign

Well Control Training

Classroom-Based Training (Well Control Certificate)

All drilling, completions, and well servicing employees and contractors must complete classroom-based well control training and maintain a valid Well Control Certificate. Classroom-based training must be delivered by companies that are accredited by the International Well Control Federation (IWCF) or International Association of Drilling Contractors (IADC).

Employees and contractors with any of these job titles must maintain a valid Well Control Certificate:

- Drilling and Completion Director.
- Drilling Operations Manager.
- Drilling Supervisor.
- Completion Supervisor.
- Drilling and Completion Engineering Supervisor.
- Senior Drilling and Completion Engineer.
- Drilling and Completion Engineer.
- Drilling Engineer.
- Operations Engineer.
- Offshore Installation Manager (OIM).
- Driller.
- Assistant Driller (AD).
- Toolpusher.
- Subsea Engineer.

To maintain a valid Well Control Certificate, renew your certificate at least every 2 years.

Rig-Based Training

Rig-based training includes pit and trip drills. Drillers must hold pit and trip drills once every week. The drills should include bringing pumps online and offline during kill operations, choke manipulation, and monitoring pressure response.

Employees and contractors with any of these job titles must participate in pit and trip drills:

- Offshore Installation Manager (OIM).
- Driller.
- Assistant Driller (AD).
- Derrickhand.

Drillers must record pit and trip drills on the IADC report.

Bridging Document

Before starting a campaign, the Drilling Operations Manager must confirm that the drilling contractor's well control policy complies with this Handbook.

The Company and contractor will develop a bridging document that identifies any differences between the contractor's well control policy and this Handbook. For each difference, the bridging document must describe whether to follow the well control policy or this Handbook.

All drilling, completions, and well servicing employees and contractors must understand the contractor's well control policy and the agreements listed in the bridging document.

Well Control Audit

Before starting a campaign, the Drilling Operations Manager must complete a well control audit that covers plans, equipment, standard operating procedures (SOPs), training, and contingencies. The well control audit should also describe the condition of the drilling contractor's pressure control equipment.

The Drilling Operations Manager must complete any critical actions from the audit before starting operations.

3 Pressure Control Equipment

CAUTION: In case of any problem that could affect the integrity of pressure control equipment, STOP all operations and make the well safe. Do not resume operations until the problem is resolved or the Drilling and Completions Manager approves an appropriate hazard mitigation plan.

Blowout Preventers

Blowout preventers (BOPs) and associated equipment must be rated to exceed the maximum anticipated wellhead pressure.

BOPs must consist of at least the following components:

- One annular.
- Two sets of blind/shear rams or one blind/shear ram and one casing shear ram.
- Three pipe rams.

BOP stack configuration and accumulator volume must meet the requirements in American Petroleum Institute (API) Standard 53.

Upper annulars on BOP stacks must have a bleed line/valve (or choke line/valve) to bleed off any accumulated gas when flushing the stack after a well control event.

Remote BOP control panels must have backup uninterrupted power supply and air supply.

Ram Blowout Preventers

Shear rams must be able to shear all drill pipe or work string in use, not including landing strings. Adjust published shear values for the anticipated water depth and mud weight in use, plus shut-in pressure.

Configure ram BOPs so that at least two sets of pipe rams can close on any drill pipe or work string in use.

On dynamically positioned (DP) operations, shear rams should be able to shear all casing run through the BOP stack where hydrocarbons may be exposed.

Do not routinely close the blind/shear or shear rams when out of the hole on trips.

Do not tag the blind/shear or shear rams with the drill string at any time.

Blowout Preventers on Floating Operations

BOPs on floating operations must have a remotely operated vehicle (ROV) override for at least the following functions:

- Close blind/shear rams.
- Close casing shear rams.
- Close one set of pipe rams.
- Release lower marine riser package (LMRP) connector.
- Release BOP/wellhead connector.

Full-Opening Safety Valves

A full-opening safety valve (FOSV) must be on the rig floor at all times, with appropriate cross-overs to the drill pipe in use (through the rotary).

Install an FOSV any time a trip is interrupted.

Dart Subs

NOTE: Dart subs are also called check valve subs or circulating valve subs.

After installing the BOP, install and test a dart sub with a check valve. The dart sub must be on the rig floor at all times.

If you need to strip in the hole during a well control event, install a dart sub.

Keep a flapper-type check valve on the rig as a backup for the dart sub.

NOTE: Flapper-type check valves are also called Gray valves.

CAUTION: Install the flapper-type check valve only if the dart sub fails to seal.

Float Subs

Install a float sub in all bottom hole assemblies (BHAs).

When a float sub is not practical for a BHA (for example, when setting balanced cement plugs), use a dart sub instead. The dart sub will allow you to deploy a check valve in case of a well control event.

Diverter Elements

When drilling and tripping, install a diverter element on all floating rig operations after the BOP is installed.

NOTE: Do not install a diverter element when running or pulling the BHA or casing.

Choke and Kill Lines

Circulate choke and kill lines at least once every 12 hours when using weighted drilling mud or changing the mud weight.

Temporary Pressure Control Equipment

Label all temporary pressure control equipment at the well site with the following information:

- A unique identification number.
- Equipment design basis.
- Construction details.
- Testing dates.
- Intended operating envelope.
- Certificate number for maintenance and inspection.

4 Pressure Testing

NOTE: Test all pressure control equipment in the direction of well pressure during use.

Test Frequency

Pressure-test all blowout preventer (BOP) equipment at least once every 21 days, unless local regulations require more frequent tests.

At the start of operations, pressure testing for BOPs must include an accumulator drawdown test and ROV intervention system test.

NOTE: “Start of operations” includes any time the BOP is deployed on a new well, whether for drilling, completion, or well servicing.

Pressure-test blind/shear rams after setting each casing string or liner and deploying the BOP.

Before any well intervention, pressure-test all test trees, lubricators, accessories, kill lines, and valves (except the lower master valve) before any well intervention.

Test Pressure

Test BOPs, choke manifolds, kill and choke lines, inside BOPs, and surface equipment to the pressure specified in the Company Drilling and Completion Program.

Test blind/shear rams to the casing test pressure specified in the Company Drilling and Completion Program.

Test Acceptance Criteria

Pressure test acceptance criteria for BOPs is 5 minutes low pressure (200-300 psi) and 5 minutes high pressure according to the Company Drilling and Completion Program. Both low and high pressure tests require a flat line of the required test pressure.

Pressure test acceptance criteria for surface, intermediate, and production casing is 30 minutes with a drop of no more than 5% and a flat-line of the maximum required test pressure.

5 Rig Equipment

All active mud tanks must have independent level indicators and produce a mud volume totalizer readout on the Driller's console on the rig floor and the mud logging unit. On offshore rigs, this requirement also applies to all reserve mud tanks.

An employee must be assigned to the mud logging unit 24 hours a day when the blowout preventer (BOP) stack is deployed. The ROV crew must be on the rig when the BOP stack is deployed.

Use a circulating trip tank with the readout easily visible to the Driller during:

- Tripping in or out of the hole when the BOP is installed.
- Logging.

Keep all internal combustion engines, exhausts, air-intakes, fuel lines, and electrical equipment and controls away from the well centerline in a nonhazardous designated area.

6 Wireline and Coiled Tubing Equipment

Conduct all wireline, coiled tubing, and snubbing work inside the drill pipe (or work string or tubing) with pressure control equipment installed. The wireline, coiled tubing, and snubbing work must maintain a double barrier and allow:

- Pack-off on the wire (or coil).
- Shut-in and removal of the wireline (or coil) tools.
- Circulation of the drill pipe (or work string or tubing).
- Cutting of the wire (or coil).

Wire line and coiled tubing blowout preventers (BOPs) must meet all of the following requirements:

- Fully rated to the pressure specified in the Company Drilling and Completion Program.
- Hydraulically operated (with manual backup).
- Capable of emergency shutdown.

For wells with a surface test tree, install a device that can cut wire or coiled tubing and subsequently seal off the wellbore directly below the wireline lubricator or coiled tubing injector.

During wireline and coiled tubing activities, position at least two BOP rams above the uppermost kill inlet.

Regardless of pressure rating, all kill line isolation valves must be flanged with metal ring-type joints or gaskets or solid-welded.

CAUTION: Do not use valves with flanged outlets and spiral-wound metal or fiber-type gaskets or valves with threaded outlets on the kill line between the isolation valves and the inlet point below the BOPs.

Do not use connections that rely on O-rings for pressure integrity between the swab valve (or tubing hanger) and the intervention BOPs during wireline or coiled tubing operations.

Use flexible steel hoses that rely on a resilient seal for pressure integrity only on the kill pump side of the kill line isolation valves.

Protect all threaded pressure and instrument tappings with double block-and-bleed stainless steel high-pressure valves. This includes tappings for pressure sensors fitted to lubricators.

CAUTION: Do not use back-welded threaded connections on any pipe work.

Equipment Certification and Verification

Verify well control equipment condition at the start of operations and any time the BOP is brought to the surface between wells.

Certify BOP equipment every 3 to 5 years according to API Standard 53.

NOTE: Only a qualified third-party service provider may verify or certify well control equipment.

7 Well Control

Standard Operating Procedures

Every rig, facility, and installation must have standard operating procedures (SOPs) that include instructions for the following well control operations:

- Well shut-in.
- Gas in riser.
- Surface diverter.
- Kill methods.
- Tripping.
- Pit and trip drills.
- Blowout preventer (BOP) stack flushing and clean-out.
- Riser de-gassing.
- Pressure control with wireline through drill pipe.
- Drill string shearing.
- Bullheading.

Well Kill Operations

Take slow circulating rates (SCRs) at least once every tour, every 1000 ft, or after bottom hole assembly (BHA) or mud weight changes.

Measure choke line friction on floating rigs before drill-out. Update the friction measurements when mud weight changes.

NOTE: You may measure choke line friction pressure offline.

Update the pre-recorded data for well kick calculations every tour after BOPs are deployed. Store the pre-recorded data on the rig floor, in the Company drilling office, and in the drilling contractor's office.

Flow Checks

Complete a flow check at the following times:

- After a drilling break.
- Before tripping.
- After pulling the bit into the casing shoe.
- Before pulling the BHA into the BOP stack.
- After pumping out.
- Any other time you observe abnormal pit volume readings.

Required flow check duration is at least 15 minutes with the well lined up on the trip tank.

If you have any doubts about flow check results, extend the flow check period as needed to determine if the well is stable.

Shut-In Procedures

Shut-in procedures must address the following scenarios:

- Normal drilling operations.
- Tripping operations.
- Non-shearable pipe across the BOP (such as casing and BHA).
- Shut-in scenarios with special components, including slotted liners, screens, spent guns, and completion assemblies.

Post the shut-in procedures on the drill floor.

Use hard shut-in procedures on all well kicks after the surface casing is set.

NOTE: You must shut in any well on a ram preventer if the pressure exceeds 2000 psi.

Well Kill Operations

Do not reciprocate or rotate drill pipe or work string through the BOP stack during well kill operations unless this is approved by the Drilling Manager.

Diverter and Gas in Riser

Line up the diverter system to initially divert overboard rather than diverting through the mud/gas separator.

After initial diversion overboard, you may divert subsequent flow through the mud/gas separator at the discretion of the Drilling Manager and the Offshore Installation Manager (OIM).

Well Control Emergency Response

Refer to the Well Control Emergency Response Handbook (DOC-NO-XXX-XXXX) for information about how to respond when a well control event escalates to an emergency.

8 Drilling Operations

Regulatory Requirements

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Hazard Assessment and Barrier Analysis

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Blowout Preventer Space-Out Diagram

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Bottom Hole Assemblies

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Driller's Instructions

Drilling Operations

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Completion Operations

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Conductor/Surface Hole Drilling

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Hydrogen Sulfide

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9 Drill String Equipment

Quality Assurance and Quality Control (QA/QC)

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Drill String Inspector Certification

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10 Directional Drilling and Surveying

Directional Planning

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Directional Surveying

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Avoiding Collisions

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11 Wireline Operations

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12 Completion Operations

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13 Perforating and Pipe Recovery

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Tests Required for Perforating

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14 Well Stimulation Operations

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15 Simultaneous Operations

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16 Well Handover

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Well Handover Documentation

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Well History Documentation

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17 Well Suspension

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18 Well Abandonment

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Permanent Barrier Requirements

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Subsea Wellhead Clearance

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19 Shorebase Operations

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20 Marine Operations

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Jack-Up Rigs

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Moored Rigs

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Dynamically Positioned Rigs

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Emergency Disconnect Sequence Requirements

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Emergency System of Subsea BOPs

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Heading Changes

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Supply Vessel Cargo Operations

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Crew Boats

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Standby Vessels

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Vessel and Rig Collision Avoidance

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Hazardous Fluid Transfer

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Fluid Transfer Hoses

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Lifeboat Drills

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21 Work Requirements

Medical and Fitness Assessments

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Travel

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Hours of Work

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Chain of Command

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Serious Injury, Illness, or Fatality

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Management of Change

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Confined Space Entry

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Fire Watch

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Personal Protective Equipment (PPE)

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22 Compliance

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Reporting Noncompliance

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Compliance Exemptions

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23 Reviewing and Changing this Document

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24 References

Regulations

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Technical Specifications and Standards

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Related Procedures

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25 Definitions

Term	Definition
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Lacinia	Ut nonummy. Fusce aliquet pede non pede. Suspendisse dapibus lorem pellentesque magna. Integer nulla. Donec blandit feugiat ligula.
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Maecenas porttitor	Fusce posuere, magna sed pulvinar ultricies, purus lectus malesuada libero, sit amet commodo magna eros quis urna. Nunc viverra imperdiet enim.
Nunc viverra	Maecenas porttitor congue massa.
Pellentesque	Ut nonummy. Fusce aliquet pede non pede. Suspendisse dapibus lorem pellentesque magna.
Quat consequat	Donec blandit feugiat ligula. Donec hendrerit, felis et imperdiet euismod, purus ipsum pretium metus, in lacinia nulla nisl eget sapien.
Suspendisse	Fusce posuere, magna sed pulvinar ultricies, purus lectus malesuada libero, sit amet commodo magna eros quis urna.
Ut nonmummy	Suspendisse dapibus lorem pellentesque magna. Integer nulla.