



Smith Mason & Co



WELL CONTROL AND
TECHNICAL TRAINING

CATALOG

2023

OFFERINGS

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ABOUT **SMITH MASON & CO**

For more than 40 years, Randy Smith has been respected around the world for delivering state-of-the-art well control training and safety leadership courses to the oil and gas industry.

In 2014, Randy joined Marcus Mason and Larry Schmermund to form Smith Mason & Co. Marcus, CEO, and Larry, COO, bring more than 40 years of training industry knowledge and experience to the company's front office.

While Smith Mason & Co's tradition of excellence in serving the oil and gas industry continues, we are dedicated to sustainable learning and development solutions for a wide variety of industries, including oil and gas, construction, logistics, pipeline, LNG, etc.

From risk management to leadership training, we are well-positioned to support your organization's ongoing workforce development with customized programs to address your unique challenges.



OUR **OFFERINGS**

Smith Mason & Co provides a full range of premium-quality well control training courses and specialty programs for industry-leading oil and gas operators and drilling contractors worldwide.

We integrate decades of experience with state-of-the-art well control technology to deliver fundamental principles that bridge old-school learning with cutting-edge techniques to help minimize risk and maximize safety for workers and well sites alike.

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IADC WELL CONTROL

WELLSHARP, AWARENESS

This training is designed for new hires or inexperienced rig crew members.

Well kicks can cause serious damage to rig equipment and the environment, as well as potentially cause the loss of lives. This course will teach inexperienced/new employees basic well control principles, and practices, and procedures for surface and subsea stacks.

Our instructors are fully certified by the IADC, and the course complies with IADC requirements. All course records and student certificates are properly maintained to meet IADC regulations.

Introduction

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- Wait and Weight
- Driller's Method

Simulation Session

Written Knowledge Assessment

IADC WELL CONTROL

WELLSHARP, LEVEL 2 - INTRO

This training is designed for new hires or inexperienced rig crew members.

Well kicks can cause serious damage to rig equipment and the environment, as well as potentially cause the loss of lives. This course will teach inexperienced/new employees basic well control principles, and practices, and procedures for surface and subsea stacks.

Our instructors are fully certified by the IADC, and the course complies with IADC requirements. All course records and student certificates are properly maintained to meet IADC regulations.

Introduction

Well Control Calculations

Formation Characteristics and Pressure

Bottom Hole Pressure

- Hydrostatic Pressure
- Friction Pressure and ECD
- MAASP
- Drilling Fluids

Advanced Topics

- LWD and PWD
- Kick Tolerance

Causes of Kicks

- Shallow Flow
- Loss of Circulation
- Inadequate Mud Weight
- Abnormal Pressure
- Inadequate Hole Fill
- Tripping — Swab and Surge
- Gas Channeling Through Cement
- Drill Stem Tests

Warning Signs of Kicks

- Primary Indicators
- Secondary Indicators
- While Tripping

Killing the Well

- The Well as a U-Tube
- Effects of a Gas Kick
- Bridging Documents
- Wait and Weight Method
- Driller's Method

Simulation Session 1

- Wait and Weight Method Well Kill Simulation

Simulation Session 2

- Driller's Method Well Kill Simulation

Non-Circulating Well Control Methods

- Volumetric Method
- Lubricate and Bleed

Problems While Circulating Out a Kick

- Plugged/Washed Out Choke
- Plugged Bit/Bit Nozzle
- Plugged/Washed Out Drillstring
- Equipment Failure

Well Control Equipment

- Strippers
- Rotating Head
- Annular Preventer
- Diverters
- Ram Preventers
- BOP Stack Configuration
- Manual and Hydraulic Valves
- Flanges and Ring Gaskets
- BOP Testing
- Accumulators
- Manifolds and Chokes
- Auxiliary Equipment
- Gas Separation
- Flow Sensors
- Pit Level Indicators

Simulation Session 3

- Wait and Weight Method Well Kill Simulation

Simulation Session 4

- Driller's Method Well Kill Simulation

Simulator Assessment

Written Knowledge Assessment

IADC WELL CONTROL

WELLSHARP, LEVEL 3 – DRILLER

This training is designed for rig crew members, including: derrickmen, ADs, drillers, and service hands.

IADC WellSHARP (Level 3) is a fundamental technical overview of drilling operations.

The course incorporates both instructional theory and practical application and allows ample hands-on simulator training time. Students are presented with real-world "what if" situations to prepare them for potential well-control problems.

This level focuses on identifying pre-kick detection and first actions.

Drilling simulators are utilized in all learning centers, and courses can be delivered to your location and customized to meet the location's specific needs.

Introduction**Well Control Calculations****Formation Characteristics and Pressure****Bottom Hole Pressure**

- Hydrostatic Pressure
- Friction Pressure and ECD
- MAASP
- Drilling Fluids

Advanced Topics

- LWD and PWD
- Kick Tolerance

Causes of Kicks

- Shallow Flow
- Loss of Circulation
- Inadequate Mud Weight
- Abnormal Pressure
- Inadequate Hole Fill
- Tripping — Swab and Surge
- Gas Channeling Through Cement
- Drill Stem Tests

Warning Signs of Kicks

- Primary Indicators
- Secondary Indicators
- While Tripping

Killing the Well

- The Well as a U-Tube
- Effects of a Gas Kick
- Bridging Documents
- Wait and Weight Method
- Driller's Method

Simulation Session 1

- Wait and Weight Method Well Kill Simulation

Simulation Session 2

- Driller's Method Well Kill Simulation

Non-Circulating Well Control Methods

- Volumetric Method
- Lubricate and Bleed

Problems While Circulating Out a Kick

- Plugged/Washed Out Choke
- Plugged Bit/Bit Nozzle
- Plugged/Washed Out Drillstring
- Equipment Failure

Well Control Equipment

- Strippers
- Rotating Head
- Annular Preventer
- Diverters
- Ram Preventers
- BOP Stack Configuration
- Manual and Hydraulic Valves
- Flanges and Ring Gaskets
- BOP Testing
- Accumulators
- Manifolds and Chokes
- Auxiliary Equipment
- Gas Separation
- Flow Sensors
- Pit Level Indicators

Simulation Session 3

- Wait and Weight Method Well Kill Simulation

Simulation Session 4

- Driller's Method Well Kill Simulation

Subsea Issues

- Kick Detection Issues
- Deepwater Riser Considerations
- Hydrates
- Choke Line Friction
- Subsea Equipment
- Shut-In Procedures
- Trapped Gas Stack

Simulation Session 5

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Simulator Assessment**Written Knowledge Assessment**

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Well Control Calculations

Formation Characteristics and Pressure

Bottom Hole Pressure

- Hydrostatic Pressure
- Friction Pressure and ECD
- MAASP
- Drilling Fluids

Advanced Topics

- LWD and PWD
- Kick Tolerance

Causes of Kicks

- Shallow Flow
- Loss of Circulation
- Inadequate Mud Weight
- Abnormal Pressure
- Inadequate Hole Fill
- Tripping — Swab and Surge
- Gas Channeling Through Cement
- Drill Stem Tests

Warning Signs of Kicks

- Primary Indicators
- Secondary Indicators
- While Tripping

Killing the Well

- The Well as a U-Tube
- Effects of a Gas Kick
- Bridging Documents
- Wait and Weight Method
- Driller's Method

Simulation Session 1

- Wait and Weight Method Well Kill Simulation

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- Driller's Method Well Kill Simulation

Non-Circulating Well Control Methods

- Volumetric Method
- Lubricate and Bleed

Problems While Circulating Out a Kick

- Plugged/Washed Out Choke
- Plugged Bit/Bit Nozzle
- Plugged/Washed Out Drillstring
- Equipment Failure

Well Control Equipment

- Strippers
- Rotating Head
- Annular Preventer
- Diverters
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- BOP Stack Configuration
- Manual and Hydraulic Valves
- Flanges and Ring Gaskets
- BOP Testing
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- Manifolds and Chokes
- Auxiliary Equipment
- Gas Separation
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- Pit Level Indicators

Simulation Session 3

- Wait and Weight Method Well Kill Simulation

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- Driller's Method Well Kill Simulation

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- Reasons for Workover
- Completion Types
- Difference Between Workover and Drilling
- Hydrostatics
- Estimating Formation Pressure
- Brine Fluids
- Friction Pressure

Killing a Producing Well – Non-Circulating Techniques

- Lubrication and Bleeding
- Bullheading

Simulation Session 5

- Bullheading

Killing a Producing Well – Circulating Techniques

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Simulator Assessment

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Well Control Calculations

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- Friction Pressure and ECD
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Advanced Topics

- LWD and PWD
- Kick Tolerance

Causes of Kicks

- Shallow Flow
- Loss of Circulation
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- Inadequate Hole Fill
- Tripping — Swab and Surge
- Gas Channeling Through Cement
- Drill Stem Tests

Warning Signs of Kicks

- Primary Indicators
- Secondary Indicators
- While Tripping

Killing the Well

- The Well as a U-Tube
- Effects of a Gas Kick
- Bridging Documents
- Wait and Weight Method
- Driller's Method

Simulation Session 1

- Wait and Weight Method Well Kill Simulation

Simulation Session 2

- Driller's Method Well Kill Simulation

Non-Circulating Well Control Methods

- Volumetric Method
- Lubricate and Bleed

Problems While Circulating Out a Kick

- Plugged/Washed Out Choke
- Plugged Bit/Bit Nozzle
- Plugged/Washed Out Drillstring
- Equipment Failure

Well Control Equipment

- Strippers
- Rotating Head
- Annular Preventer
- Diverters
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- BOP Stack Configuration
- Manual and Hydraulic Valves
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Simulation Session 3

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Simulation Session 4

- Driller's Method Well Kill Simulation

Subsea Issues

- Kick Detection Issues
- Deepwater Riser Considerations
- Hydrates
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- Trapped Stack Gas

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- Subsea Well Kill Simulation

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- Subsea Well Kill Simulation

Completion and Workover Fundamentals

- Reasons for Workover
- Completion Types
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- Brine Fluids
- Friction Pressure

Killing a Producing Well – Non-Circulating Techniques

- Lubrication and Bleeding
- Bullheading

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- Completion and Workover Simulation

Killing a Producing Well – Circulating Techniques

- Causes of Kicks
- Warning Signs of Kicks
- Shut-In Procedures
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- Circulating Kill Methods
- Wait and Weight Method
- Reverse Circulation

Completion and Workover Equipment

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- Kick Tolerance

Causes of Kicks

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- Gas Channeling Through Cement
- Drill Stem Tests

Warning Signs of Kicks

- Primary Indicators
- Secondary Indicators
- While Tripping

Killing the Well

- The Well as a U-Tube
- Effects of a Gas Kick
- Bridging Documents
- Wait and Weight Method
- Driller's Method

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- Wait and Weight Method Well Kill Simulation

Simulation Session 2

- Driller's Method Well Kill Simulation

Non-Circulating Well Control Methods

- Volumetric Method
- Lubricate and Bleed

Problems While Circulating Out a Kick

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Well Control Equipment

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- Wait and Weight Method Well Kill Simulation

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- Driller's Method Well Kill Simulation

Simulator Assessment

Written Knowledge Assessment

IADC WELL CONTROL

WELLSHARP, LEVEL 4 – SUPERVISOR

This training is designed for supervisors.

IADC WellSHARP (Level 4) is a fundamental technical overview of drilling operations.

The course incorporates both instructional theory and practical application and allows ample hands-on simulator training time. Students are presented with real-world "what if" situations to prepare them for potential well-control problems.

Our instructors are fully certified by the IADC, and the course complies with IADC requirements. Drilling simulators are utilized in all learning centers, and courses can be delivered to your location and customized to meet the location's specific needs.

Introduction**Well Control Calculations****Formation Characteristics and Pressure****Bottom Hole Pressure**

- Hydrostatic Pressure
- Friction Pressure and ECD
- MAASP
- Drilling Fluids

Advanced Topics

- LWD and PWD
- Kick Tolerance

Causes of Kicks Shallow Flow

- Shallow Flow
- Loss of Circulation
- Inadequate Mud Weight
- Abnormal Pressure
- Inadequate Hole Fill
- Tripping — Swab and Surge
- Gas Channeling Through Cement
- Drill Stem Tests

Warning Signs of Kicks

- Primary Indicators
- Secondary Indicators
- While Tripping

Killing the Well

- The Well as a U-Tube
- Effects of a Gas Kick
- Bridging Documents
- Wait and Weight Method
- Driller's Method

Simulation Session 1

- Wait and Weight Method Well Kill Simulation

Simulation Session 2

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Non-Circulating Well Control Methods

- Volumetric Method
- Lubricate and Bleed

Problems While Circulating Out a Kick

- Plugged/Washed Out Choke
- Plugged Bit/Bit Nozzle
- Plugged/Washed Out Drillstring
- Equipment Failure

Well Control Equipment

- Strippers
- Rotating Head
- Annular Preventer
- Diverters
- Ram Preventers
- BOP Stack Configuration
- Manual and Hydraulic Valves
- Flanges and Ring Gaskets
- BOP Testing
- Accumulators
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- Auxiliary Equipment
- Gas Separation
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Simulation Session 3

- Wait and Weight Method Well Kill Simulation

Simulation Session 4

- Driller's Method Well Kill Simulation

Subsea Issues

- Kick Detection Issues
- Deepwater Riser Considerations
- Hydrates
- Choke Line Friction
- Subsea Equipment
- Shut-In Procedures
- Trapped Gas Stack

Simulation Session 5

- Subsea Well Kill Simulation

Simulator Assessment**Written Knowledge Assessment**

IADC WELL CONTROL

WELLSHARP, LEVEL 4 – SUPERVISOR

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Problems While Circulating Out a Kick

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- Plugged/Washed Out Drillstring
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Simulation Session 3

- Wait and Weight Method Well Kill Simulation

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- Driller's Method Well Kill Simulation

Completion and Workover Fundamentals

- Reasons for Workover
- Completion Types
- Difference Between Workover and Drilling
- Hydrostatics
- Estimating Formation Pressure
- Brine Fluids
- Friction Pressure

Killing a Producing Well – Non-Circulating Techniques

- Lubrication and Bleeding
- Bullheading

Simulation Session 5

- Bullheading

Killing a Producing Well – Circulating Techniques

- Causes of Kicks
- Warning Signs of Kicks
- Shut-In Procedures
- Vital Information
- Circulating Kill Methods
- Wait and Weight Method
- Reverse Circulation

Completion and Workover Equipment

- Surface Equipment
- Subsurface Equipment
- Equipment Testing

Simulation Session 6

- Completion and Workover Simulation

Written Knowledge Assessment

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IADC WELL CONTROL

WELLSHARP, LEVEL 4 – SUPERVISOR

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Well Control Calculations

Formation Characteristics and Pressure

Bottom Hole Pressure

- Hydrostatic Pressure
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- MAASP
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Advanced Topics

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- Kick Tolerance

Causes of Kicks

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- While Tripping

Killing the Well

- The Well as a U-Tube
- Effects of a Gas Kick
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- Wait and Weight Method
- Driller's Method

Simulation Session 1

- Wait and Weight Method Well Kill Simulation

Simulation Session 2

- Driller's Method Well Kill Simulation

Non-Circulating Well Control Methods

- Volumetric Method
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Problems While Circulating Out a Kick

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- Plugged/Washed Out Drillstring
- Equipment Failure

Well Control Equipment

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Simulation Session 3

- Wait and Weight Method Well Kill Simulation

Simulation Session 4

- Driller's Method Well Kill Simulation

Subsea Issues

- Kick Detection Issues
- Deepwater Riser Considerations
- Hydrates
- Choke Line Friction
- Subsea Equipment
- Shut in Procedures
- Trapped Stack Gas

Simulation Session 5

- Subsea Well Kill Simulation

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- Subsea Well Kill Simulation

Completion and Workover Fundamentals

- Reasons for Workover
- Completion Types
- Difference Between Workover and Drilling
- Hydrostatics
- Estimating Formation Pressure
- Brine Fluids
- Friction Pressure

Killing a Producing Well – Non-Circulating Techniques

- Lubrication and Bleeding
- Bullheading

Simulation Session 7

- Completion and Workover Simulation

Killing a Producing Well – Circulating Techniques

- Causes of Kicks
- Warning Signs of Kicks
- Shut-In Procedures
- Vital Information
- Circulating Kill Methods
- Wait and Weight Method
- Reverse Circulation

Completion and Workover Equipment

- Surface Equipment
- Subsurface Equipment
- Equipment Testing

Simulation Session 8

- Completion and Workover Simulation

Written Knowledge Assessment

Simulator Assessment

IADC WELL CONTROL

WELLSHARP, LEVEL 4 – SUPERVISOR

Day 1

Introductions and Overview

Bottom Hole Pressure

- Potential Impacts of a Well Control Event
- Well Integrity
- Pre-Job Communication
- Safety Margin Selection
- Bridging Documents
- Pressure Control Envelop Barrier Envelope Considerations

Organizing a Well Control Operation

- Personal Assignments
- Pre-recorded Information
- Subnormal Formation Pressure
- Plan Responses to Anticipated Well Control Scenarios

Well Control Principles & Calculations

- Pressure Fundamentals
- Maximum Anticipated Surface Pressure (MASP)
- Forces from Applied Pressure
- Equivalent Circulating Density
- Kill Mud Weight
- U-Tube Principles
- Buoyancy
- Pre-Job Calculations
- Pressure Calculation Exceeding MASP
- Tubing Collapse and Casing Burst
- Overcoming Frictional Forces

Well Control Principles & Calculations

(continued)

- Conditions Causing Collapse or Parting of Pipe
- Conditions Causing Twist-Off Pipe
- Pre-recorded Well Information
- Maximum Safe Pressures

Barriers

- Barriers and Barrier Envelop
- Purposes of Barriers During Completions and Well Interventions
- Barrier Hierarchy
- Primary & Secondary Barriers (Workover/Completion)
- Primary & Secondary Barriers (Well Servicing)
- Minimum Number of Barriers Required for Safe Operations
- Mechanical Barriers, Testing Mechanical Barriers
- Fluid Barriers
- Validating Fluid Barriers
- Detecting a Failed Barrier

Coiled Tubing Pressure Control Equipment

- Stripper
- Flow Check Assembly in Bottom Hole Assembly (BHA)
- Lubricator/Spool
- Quad Well Control Stack
- Fluid Inlet/Outlet
- Additional Blind Shear Ram
- Christmas Tree

Wireline Pressure Control Equipment

- Line Wiper
- Stuffing Box/Pack Off
- Grease Injection
- Lubricator, Quick Test Sub
- Wireline Valves, Conductor/Braided Line Rams
- Wireline Valves, Slick Line
- Pump-In Sub
- Lubricator Extension
- Wireline Shear Seal

Simulation Practice

IADC WELL CONTROL WELLSHARP, OIL & GAS OPERATOR REPRESENTATIVE

The well-servicing course covers fundamental and supervisory concepts of workover, completions, wireline, coiled tubing, and snubbing.

The course incorporates both instructional theory and practical application and allows ample hands-on simulator training time. Students are presented with real-world "what if" situations to prepare them for potential well-control problems.

Our instructors are fully certified by the IADC, and the course complies with IADC requirements. Drilling simulators are utilized in all learning centers, and courses can be delivered to your location and customized to meet the location's specific needs.

Day 2

Homework Review

Snubbing Pressure Control Equipment

- Barriers
- Sealing Elements
- Additional Rams
- Stripping Rams
- Equalizing Loop and Bleed-Off Line

Influx Fundamentals

- Possible/Positive Indicators of an Unplanned Influx

Gas Characteristics and Behavior

- Relationship Between Pressure and Volume of a Gas in the Wellbore (Boyle's Law)

Completion and Workover Fluids

- Fluid Loss
- Brine Requirements
- Applied Simulation and Treatment Fluids
- Fluid Properties
- Frictional Pressure Losses
- Fluid Flow Path Geometry

General Overview of Surface and Subsurface Wellbore Equipment

- Preventer Equipment, OEM Replacement Parts
- Shear or Cutter Rams
- Blind/Shear Rams
- Barrier Elements
- Operating Environment
- Usable Fluid Volume/Drawdown Test
- Adjustment of Operating Pressure
- Operating Functions of Main and Remote Well Control Panels
- Power Packs, Tubing Failures
- Polished Bore Receptacle
- Surface Controlled Sub-Surface Safety Valve

General Overview of Surface and Subsurface Wellbore Equipment (continued)

- Sliding Sleeve
- Gas Lift Mandrels and Valves
- Floats/Downhole Check Valves
- Type of Plug, Service Ratings
- Differential Pressure
- Equalizing Sub, Types of Packers

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- Procedures for Shut-In and Securing the Well
- Non-Shearable or Non-Sealable
- Verification of Shut-In, Recordkeeping
- BOP Stack/Wellhead
- Accumulator
- Stripping Operations
- Preparing for Well Entry
- Conditioning the Wellbore
- Drift/Gauge Runs
- Pressure Control Equipment
- Procedures for Well Control Drills
- Open Hole logging, Cased Hole Logging
- Slick Line
- Contingency Procedures
- Common Well Kill Problems
- Actions to Take if Casing Pressure Exceeds MAASP
- Communication Between Casing Strings

Coiled Tubing Operational Considerations

- Pressures
- Forces
- Surface Force
- Coiled Tubing Material Strengths
- Coiled Tubing Pressure Bend-Cycle Fatigue
- Collapsed Coiled Tubing

Simulation Practice

IADC WELL CONTROL

WELLSHARP, OIL & GAS OPERATOR REPRESENTATIVE

Day 3

Homework Review

Well Kill In Preparation of Well Intervention

- Live Well Intervention
- Dead Well Intervention
- Definition, Application, and Calculation – Bullheading
- Volumetric Method
- Definition, Application, and Calculation – Lube and Bleed
- Definition, Application, and Calculation – Forward Circulation
- Applying Reverse Circulation Method
- Startup/Shutdown Procedures
- Slow Circulating Rate
- Initial Circulating Pressure
- Lag Time
- Verifying the Well is Dead Following the Kill Procedure

Special Situations

- Effects of Blockages in Retaining Trapped Pressure
- Effects of Blockages in Impeding the Ability to Run Tool String In or Out of the Wellbore
- Effect of Hydrates While Circulating
- Effect of H₂S on Well Control Methodology
- How to Respond to Problems that Can Happen During the Well Kill
- Organizing Abnormal Operations During Well Control Events
- Handover/Changes to Personnel During a Well Kill Operation
- Kill Log as a Tool for Troubleshooting Unplanned Events
- Problems With the Kill, “Stopping Points”

Special Situations (continued)

- Management of Change
- Pressure Limits Created by Hydraulic Fracturing Operations
- Rig-Up Complications
- Cutting Wireline with Shear Seal
- Retrieving Wireline, Special BOP Equipment
- Encountering Unexpected Pressure
- Slip Bowl Failure
- Power Unit or Hydraulic Circuit Failure While in the Hole
- Stripping Annular Element Failure
- Leak Below BOP Stack and/or PCE
- Pressure at Surface Inside the Work String
- Leak in the Stripper PCE
- Buckling Tubulars
- Parting of String

Testing

- Packers and Plugs
- Testing of Connections

Simulation Driller's Method

IADC WELL CONTROL

WELLSHARP, OIL & GAS OPERATOR REPRESENTATIVE

Day 4

Homework Review

Well Control Drills

- Pit Drills
- Trip Drills

Well Control Drills (continued)

- Choke Drills
- Various Action Drills

Government, Industry, and Company Rules, Orders, and Policies

- API and ISO Recommended Practices, Standards, and Bulletins Pertaining to Well Control
- Regional and/or Local Regulations Where Required
- Company/Operator Specific Requirements Where Required

Simulation

- Circulating

Day 5

Homework Review

Ancillary Considerations

- Fluid-Gas Separators
- Operating Parameters
- Hazardous Area Zone Classification

IADC Testing (allocated time 3.5 hours, not including any retesting)

Day 1**Introduction****Understanding the Basics & Formation****Pressure**

- Well Control Incidents
- Well Control Training and Assessment
- The Origins of Hydrocarbons
- Sedimentation
- Porosity and Permeability
- Reservoir Rocks and Hydrocarbon Traps
- Formation Pressure
- Hydrostatic Pressure
- Equivalent Mud Weight - EMW
- Hydrostatic Pressure – Different Fluid Densities
- Friction Pressure
- Formation Pressure and Bottom Hole Pressure
- Formation Fluids - Influx
- Friction Pressure – Slow Pump Rates
- Friction Pressure – Pump Rate Change
- Friction Pressure – MW Change

Fracture Pressure, LOT/FIT/Drilling Fluid

- Fracture Pressure
- Fracture Pressure – Leak-Off Test Procedure
- Fracture Pressure – Formation Integrity Test
- MAASP – Max Allowable Annular Surface Pressure
- Drilling Fluid
- Mud Cleaning Equipment

Control of Formation Pressure & Causes of**Kicks**

- Control of Formation Pressure
- Systematic Risk Management
- Management of Change
- Causes of Kicks

Warning Signs of Kicks & Shut-In Procedure

- Warning Signs of Kicks – Kick Indicators
- Well Control Situation
- Shut-In Procedures
- Well Control Drills

Shut-In Pressure/KWM/Wellbore**Calculations/Kill Sheet**

- Shut-In Pressures
- Kick (influx) in Drillpipe
- Trapped Pressure
- Kill Weight Mud
- Wellbore Volume Calculations
- Determining Pump Output
- Required Pump Strokes
- Circulating Time
- Circulating Strokes
- Determining Mud Tank Volumes
- Vertical Kill Sheet

IWCF DRILLING WELL CONTROL

LEVEL 2 – INTRODUCTORY

This course is designed for personnel involved in drilling and well control operations on offshore drilling installations and onshore rigs.

Level 2 (Introductory) well control training is provided for surface and/or subsea stack. This course has 2, timed, written test, for either Surface or Surface & Subsea stack certification. The course incorporates both instructional theory and practical application and allows ample hands-on simulator training time.

Our instructors are fully certified by the IWCF, and the course complies with IWCF requirements. Drilling simulators are utilized in all learning centers, and courses can be delivered to your location and customized to meet the location's specific needs.

Day 2

Killing the Kick/BHP Management/Wait and Weight Method/Driller's Method

- Kill Method
- The Well as a U-Tube
- BHP Management
- Influx Characteristics
- Gas Solubility
- Gas Migration
- Kill Method Selection
- Wait & Weight Method
- Driller's Method
- Comparison – Wait & Weight and Driller's

Gas Expansion/Kicks While Running Casing, Cementing and Wireline Operation, Volumetric Well Control/Lube & Bleed

- Theoretical Gas Expansion
- Bringing the Well on Choke
- Choke Manipulation
- Kill Method Selection – Other Methods
- Kicks Taken While Running Casing
- Risks of Casing Operations
- Casing Operation Self-filling Float System
- Lost Circulation When Running Casing
- Cementing Operations
- Wireline - Tool Movement & BOP Limitations
- Volumetric Well Control
- Lubrication & Bleeding

Well Control Equipment

- Drill String Stripper
- Rotating Head
- Diverter/ Annular Preventer
- Ram Preventer
- Cameron Shear Ram Boosters
- BOP Failure
- BOP Stack Configuration
- Manual and Hydraulic Valves (Side Outlet Valves)
- BOP Test Plug
- Selecting The BOP Pressure Rating
- Criteria for BOP Equipment Testing
- Documentation for Barrier Test
- BOP Test Procedure
- Inverted Test Rams
- BOP Closing Pressures and Closing Times
- Function Test
- Accumulator
- Standpipe Manifold
- Choke Manifold
- Drilling Choke
- Drill String Safety Valve
- Inside BOP
- Mud Gas Separator
- Gas Separation
- Flow Sensor
- Pit Level Indicators
- Inflow Test - Negative Pressure Test

Day 3

Subsea Well Control

- Kick Detection
- Fracture Gradients
- Loss of Riser Hydrostatic Pressure
- Riser Margin
- Riser Disconnection
- Riser Reconnection
- Shallow Hole Kicks
- Shallow Hole Kicks – Drilling Riserless
- Gas Expansion in Riser
- Swab and Surge Effect Due to Vessel Heave
- Seawater/Riser Hydrostatic Effect on Annular Preventers
- Hydrates
- Choke Line Friction
- Typical Subsea Drilling Installation
- Lower Marine Riser Package
- BOP Stack
- BOP Stack Configuration
- Ram Preventers
- Ram Preventers – BOP Testing Rams
- Subsea BOP Stack/Wellhead Test Tool
- Fail-Safe Valve
- Subsea Control Systems
- Subsea BOP Controls
- Components of a Hydraulic System
- BOP Functioning
- MUX BOP Controls
- Shut-in Procedures
- Bubble Chopping
- Kill Sheet Preparation
- Vertical Well Kill Sheet
- Bringing the Well on Choke
- Circulating Pressures
- Gas in the Choke Line
- Trapped Stack Gas

Testing (Final Exam)

Day 1

Introduction

Overview & Fundamentals

- Well Control Events
- Well Control Training and Assessment
- Hydrostatic Pressure
- Formation Pressure
- Primary Well Control
- Secondary Well Control
- Secondary Well Control Equipment
- Barrier Concept
- Barrier Management
- Risk Management
- Well Control and Emergency Drills

Causes of Kicks

- Loss of Hydrostatic Pressure
- Gas Cutting
- Lost Circulation
- Surge and Swab Effects
- Tripping

Kick Warning Signs & Indicators

- Kick Warning Signs and First Actions
- Kick Indicators While Tripping
- Primary Indicators While Drilling
- Secondary Indicators While Drilling
- Oil Base Muds Considerations
- False Indicators
- Shallow Gas Kicks
- Shallow Water Flow
- Diverter - Requirements and Recommendations

Circulating System

- The Use of Barite
- Definition and Principles
- Slow Circulation Rates
- Fracture Pressure and MAASP

Influx Characteristics & Behaviors

- Principles
- Influx Behavior

Shut-In Procedures

- General Principles
- Procedure
- Wireline Operations
- Interpretations
- Observations

Day 2

Homework Review

Well Control Methods

- Principles
- Influx Migration
- Kill Method Principles
- Driller's Method
- Wait and Weight Method
- Kill Sheet Calculations (Pre-tour)
- Kill Sheet Calculations (Post kick)
- Volumetric Methods
- Lubricate and Bleed Method
- Stripping

Well Control During Casing and Cementing

- Volumetric Methods
- Lubricate and Bleed Method
- Stripping

Well Control Management and

Contingency Planning

- Well Control Drills
- Recognition of Problems and First Actions
- Pressure Gauge Failure
- Mud Gas Separators
- BOP Failure
- Hydrate Formation
- Lost Circulation During a Well Control Event

Simulation Practice I

IWCF DRILLING WELL CONTROL

LEVELS 3&4 – DRILLER & SUPERVISOR

This course is designed for personnel involved in drilling and well control operations on offshore drilling installations and onshore rigs.

Level 3 (Driller) and Level 4 (Supervisor) well control training is provided for surface and/or subsea stack. This course has 2, timed, written test, for either Surface or Surface & Subsea stack certification. The course incorporates both instructional theory and practical application and allows ample hands-on simulator training time.

Our instructors are fully certified by the IWCF, and the course complies with IWCF requirements. Drilling simulators are utilized in all learning centers, and courses can be delivered to your location and customized to meet the location's specific needs.

Day 3

Homework Review

Well Control Equipment

- Strippers
- Rotating Head
- Annular Preventer
- Diverters
- Ram Preventers
- BOP Failure and Stack Configuration
- Manual and Hydraulic Valves
- Flanges and Ring Gaskets
- Accumulators
- Manifolds and Chokes
- Auxiliary equipment
- Gas Separation
- Gas Detectors
- Flow Sensors
- Pit Level Indicators
- Inflow Test - Negative Pressure Test BOP Testing
- Kick Detection
- Fracture Gradients
- Loss of Riser Hydrostatic Pressure
- BHP Management
- Riser Margin
- Shallow Hole Kicks
- Gas Expansion in Riser
- Seawater/Riser Hydrostatic Effect on Annular Preventers
- Swab and Surge Effect due to Vessel Heave
- Hydrates
- Choke Line Friction
- Dynamic MAASP
- Typical Subsea Drilling Installation
- Riser System
- Lower Marine Riser Package
- BOP Stack Configuration
- BOP Equipment
- Subsea BOP Control Systems
- BOP Functioning

Well Control Equipment (continued)

- Components of a Hydraulic System
- MUX BOP Controls
- Back-Up & Emergency Systems
- ROV Intervention
- Subsea Accumulator
- Shut-in Procedures
- Subsea Vertical Well Kill Sheet
- Subsea Deviated Well Kill Sheet
- Bringing the Well on Choke
- Gas in the Choke Line
- Circulating Out the Gas
- Trapped Stack Gas
- Choke or Kill Line Problems
- Alternative Kill Methods

Simulation Practice II

Day 4

Practical Assessment Simulation

- Checking the Correct Line-up
- Recording the Required Data
- Setting the Alarms
- Starting the Drilling
- Drilling into a Kick
- Shutting the Well in
- Recording Shut-in Pressures
- Filling out a Kill Sheet
- Bringing the Well on Choke
- Continuing the Circulation
- Encountering the Mechanical Problem
- Taking the Correct Action
- Getting Back to Drilling
- Circulating the Kick out
- Finishing Killing the Well

Day 5

P&P Equipment Test (Comprehensive) Equipment Assessment



WELL CONTROL ***E-LEARNING***

Our well control E-Learning courses are designed to enhance your knowledge and skills in the field of well control.

These programs are the perfect complement to traditional instructor-led courses, offering flexibility, accessibility, and engaging content that can be accessed anytime, anywhere.

We can customize courses these topics or create a variety of others to meet the needs of your organization.

- Basic Well Control Equipment
- Causes of Kicks
- Warning Signs of Kicks
- Geology and Faults
- Gas Mud and Migration
- Tripping and Trip Sheet Practices
- Kill Methods - Wait & Weight and Driller's Method
- Unconventional Drilling

- **Introductions**
- **Pre-test**
- **Basic Well Control**
- **Trip Sheet**
- **Stripping**
- **Communications Skills**
- **BOP Stack**
- **Characteristics of UBD**
- **Rotating Control Head/Orbit Valve**
- **UBD Drilling Operations**
- **UBD Tripping Operations**
- **Communications Skills**
- **Case History project**
- **Final Test**

UNDERBALANCED WELL CONTROL FUNDAMENTALS

Underbalanced Well Control Fundamentals is an introduction to underbalanced drilling.

Interactive exercises provide the tools for safe and efficient operation at the wellsite. Through our team activities and group discussions, participants will outline the various procedures associated with UBD and collaboratively use contingency planning tools to assist in hazard identification and dynamic risk assessment.



RIG COACHING *AUDITS*

Gain unparalleled insights and empower your team for optimal productivity and streamlined performance with our rig coaching audits.

Our seasoned experts analyze various aspects of your rig operations, from equipment functionality and maintenance protocols to safety measures and compliance standards.

Recognizing that knowledgeable, skilled, and motivated teams are the backbone of successful rig operations, we use the audit findings to design specialized coaching to empower your crew with the knowledge and awareness they need to excel at safe and productive operations.

Geology

- Depositional Theory
- Sedimentary Formations
- Tectonics
- Formation of Hydrocarbons
- Hydrocarbon Traps
- Geologic Ages

Drill Bits

- Bit Types
 - Mill Toothed Bits
 - Tungsten Carbide Insert Bits (button bits)
 - PDC Bits
 - Diamond Bits
- Bit Selection
 - Formation Section/s
 - Formation Hardness
- Bit Failure
- Bit Grading

The Drill String

- Basic Components
- Drill String Design – Vertical and Deviated Wells
- Tripping The Drill String – Comprehensive (displacement wet and dry and estimation of swab and surge pressures)
- Drill String Failure Prevention
- Care of and Best Practices

Hydraulics Optimization

- Complete Hydraulics Design (pump to flow line)
- Hole Cleaning
- Cutting Slip Velocity

Solids Control Equipment

- Flow line
- Shale Shaker
- Degasser
- Desanders & Desilters
- Mud Cleaner
- Centrifuge
- Solids-Related Trends

Drilling Fluids

- Types of Drilling Fluids Used
- Most Common Types
- Functions of Drilling Fluid
- Properties - Density, Viscosity, Yield Point, Gel Strength, Fluid Loss
- How Drilling Fluids Are Affected By Formation Fluids
- Mud Building and Mixing
- Mud Weight Adjustments

Drilling Abnormal Pressures

- Sources of Abnormal Pressure
- Prediction Prior to Drilling
- Offset Well Data
- Logs - Log Interpretation
- Prediction While Drilling
- Drilling Parameters and Equations

Casing & Cementing

- Casing Strings
 - Conductor
 - Surface Casing
 - Intermediate Casing
 - Drilling Liner
 - Production Casing & Tubing
- Cementing Casing
 - Determining Accurate Cement Volume
 - Cementing Calculations
- Testing The Shoe
 - Leak-off Test
 - Formation Integrity Test
 - Manufactured Shoe Test (a bad idea)
 - Negative Pressure Liner Testing

Well Control (Beyond IADC and IWCF)

- Identification and Containment
- Interpretation of Surface Pressures
- Vertical, Extended Reach and Horizontal Wells
- Kill Method Selection and Implementation
- When Not to Use Recorded Slow Pump Rates and Pressures
- Kill Sheet Preparation
- Vertical and Deviated Wells
- Proper Manipulation of the U-Tube
- When Things Don't Go Quite Right
- Identifying Problems and Selecting Solutions

DRILLING PRACTICES

This course is developed and scheduled based upon customer request.

The Smith Mason & Co. Drilling Practices provides an understanding of the “big drilling picture” by providing practical and proven field drilling practices to recognize and interpret drilling trends.

The course is based on answering the many “whys” that usually do not get answered on a daily, weekly, or monthly basis and is a “how-to” course for many drilling operations crews will encounter.

The course is heavily math laden and to that end, the students are given a scientific calculator and are taught to use it effectively.

Stuck Pipe

- Mechanics of Stuck Pipe
 - The 14 Identifiable Causes of Stuck Pipe
 - What A Stuck Pipe Incident Can Cost
 - Problem Formations
 - Unconsolidated
 - Salts and Shales
 - Geopressured
- Formation Pressures and Permeabilities
- Hole Geometry and Open Hole Failure
 - Doglegs, Ledges, Time-Related Mechanical Failure
- Hole Cleaning
 - Vertical, Build, and Horizontal Sections
 - Sweeps
 - Over-circulation
- Differential
 - Mechanics
 - Trends To Watch
 - Nipping The Problem in the Bud
- Pack-Offs/Bridging
 - Trends To Watch
- Identifying The Probable Cause of Sticking
- Appropriate First Actions to Take
- Freeing Techniques
- Proper Use of Jars
 - Mechanical
 - Hydraulic

Stuck Pipe History and Statistics**Fundamentals of Geology - troublesome formations****Causes of stuck pipe (13 in all) – major categories are:**

- Pack-off and Bridging
- Differential Sticking
- Wellbore Geometry

Hole cleaning – large and small bore annuli**Vertical, deviated and horizontal hole sections****Effective solids control****Trends to watch and how to interpret them – drilling & tripping****Crew members' roles and responsibilities**

- Driller
- Derrickhand
- Shakerhand
- Mud Logger
- Mud Engineer

Accurate identification of the cause of the incident

- Stuck Pipe Worksheet
- Appropriate First Actions

Estimating Freepoint – vertical and deviated well

- What “freepoint” really means

Possible freeing techniques**Jars and Jarring**

- Jar Placement in the Drill String
- How They Operate
 - Mechanical and Hydraulic
 - Hydraulic Jars...friend, or “not so much?”
 - Proper Jarring Direction
 - Jarring While Circulating

STUCK PIPE PREVENTION

This course is for drill crews and supervisors

Smith Mason & Co customized Stuck Pipe Prevention training focuses on preventing one of the costliest drilling problems the oil industry faces. This course helps to identify early warning signs and the early steps necessary to reduce stuck pipe incidents.

This course provides drill crews and supervisors with practical techniques for eliminating or significantly reducing stuck pipe incidents as well as steps to minimize the event and get free quickly.

This course is highly customizable to meet the area-specific needs of your company.

DWOP TOPICS

- Operator's Expectations & Philosophy
- SEMS or Safety Management System
- Geology Review
- Well Plan Drilling Overview
- DWOP Process
 - "Solicit and document the rig team's input into improving the safety and efficiency of selected critical path and offline operational steps."
- Organize into Logical Workgroups
- Breakout Session (Target Setting and Risk Avoidance)
- Teams Report Breakout Results - Get Consensus
- Team Breakouts for Drilling Surface Hole / Run & Cement Surface Casing, Drill Intermediate Hole Section Hole/ Run & Cement Intermediate Casing
- Teams Report Breakout Results - Get Consensus
- Team Breakouts for Drill Next Hole Section / Run & Cement Next Hole Casing
- Team Breakouts for Drill Bottom Hole Section to TD, Condition for Logs, POOH"
- Teams Report Breakout Results - Get Consensus
- Report Results of DWOP vs AFE
- Closing Comments

CWOP TOPICS

- Welcoming Remarks
- Safety Expectations
- Completion Overview
- Workstring Handling - Best Practices
- Run BOP and Riser Install Fairings
- Displace WBM to Completion Fluid
- TCP Perforate
- Run BJ MSTZ System
- Rig up and Frac Well
- Run Isolation Assembly and Production Tubing
- Run Tubing Hanger
- Run Tubing Hanger
- Run Tubing Hanger, Tension Lift Frame
- Team Breakout Sessions & Break
- Teams Report
- CWOP Wrap-up

DWOP/CWOP

Unscheduled events are costly. Holding DWOP/ CWOP meetings has saved hundreds of thousands of dollars for many companies around the world. The team, comprised of all office, field, and service company personnel, is assembled to review the well plans. The overall goal is enhanced efficiency and reduced planned target times.

During this meeting, various well control and drilling scenarios are discussed. The team constructs a theoretical well and works through each hole section. They then develop a plan to improve performance based on the lessons learned. This plan addresses the need to control costs while working safely and efficiently. As a result of the plan, the drilling team has a road map for performing the job properly and meeting operator expectations.

By assembling the drilling team for a pre-spud presentation of the specific well program, you improve planning for avoiding unscheduled events or incidents by improving the channels of communication.

- Individual Pre-Test
- Characteristics of UBD
- Well Control Basics
- HPHT Characteristics
- Behavior of OBM
- Causes of Kicks While Drilling
- Causes of Kicks While Tripping
- Tripping in HPHT
- Kick Indicators, Ballooning
- Practice Test Review
- BOP Stack Exercise
- Well Control Equipment
- Rotating Control Head / Orbit Valve Operations
- UBD Drilling Techniques
- UBD Tripping Techniques
- ECD Pill Exercises
- Pre-job planning exercise
- Well Control Event
- Debrief kill process and results
- Final Test

HIGH PRESSURE, HIGH TEMPERATURE (HPHT)

This course is designed to reach multiple levels at both the rig site and office

Introducing high-pressure and high-temperature scenarios to the crews allows your team to identify the challenges created in an HPHT well, in both the drilling and well control environment. This course takes a very practical approach to the communication challenges involved in a situation with HPHT.

The course focuses on recognizing and understanding indicators of critical well conditions and developing response plans which often require complex solutions. The HPHT course is generally customized for a particular operator, drilling rig, and well-specific personnel. It provides an excellent form for discussion and planning by the office and rig-based team.

A photograph of a male worker with a beard, wearing a red hard hat, safety glasses, and a red jacket, working on industrial machinery. The image is framed by a large blue arrow pointing to the right, which is set against a white background with blue and green geometric shapes.

OTHER COURSES

At Smith Mason & Co., our course offerings are designed to address the specific challenges encountered in this dynamic industry. We embrace a culture of continuous improvement and innovation, ensuring our offerings remain at the forefront of the ever-evolving energy landscape.

If your organization is struggling with a unique challenge or has a specific training requirement not covered in our catalog, we encourage you to reach out to us. Our team is committed to tailoring solutions to cater to your specific needs.