

WellCAP[®]

IADC ACCREDITATION PROGRAM

MANAGED PRESSURE DRILLING OPERATIONS CORE CURRICULUM AND RELATED JOB SKILLS

FORM WCT-2MPD
FUNDAMENTAL LEVEL

NOTE: It is suggested that the course be taught in the order presented here.

The purpose of the core curriculum is to identify a body of knowledge and a set of job skills, which can be used to provide skills for Managed Pressure Drilling operations.

The suggested target students for each core curriculum level are as follows:

Fundamental: Rig crew up to and including the Driller,

Upon completion of a Managed Pressure Drilling training course based on curriculum guidelines, the student should be able to perform the job skills in italics identified by a "■" mark (e.g., ■ Perform bottom hole pressure calculations).

Instructions:

- The curriculum contained in this form is designed for Fundamental level of Managed Pressure Drilling personnel.
- Whenever you see the word "demonstrate" in the learning objective, consider utilizing simulation as a means of demonstrating or have the student demonstrate that objective.

Managed Pressure Drilling Operations Core Curriculum and Related Job Skills-Fundamental Level

- Whenever you see the word “Identify” or “Explain” in the learning objective, consider utilizing pictures and videos and actual equipment as a way for the students to achieve the objective.
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i. Table of Contents

I. MANAGED PRESSURE DRILLING OVERVIEW.....	5
A. Definitions of conventional, underbalanced drilling and managed pressure drilling.....	5
B. Drivers.....	5
C. IADC classifications.....	5
II. SIMILARITIES AND CONTRASTS BETWEEN CONVENTIONAL DRILLING AND MANAGED PRESSURE DRILLING	6
A. Similarities.....	6
1. BOP stack.....	6
2. Control of well at all times	6
3. Health, Safety & Environmental Issues	6
4. Overbalanced at all times	6
5. Barrier verification.....	6
6. Secondary Barrier is the same.....	6
B. Differences.....	6
1. Primary barrier changed	6
2. Additional equipment, personnel and procedures	6
III. VARIANTS OF MANAGED PRESSURE DRILLING	7
A. Examples of MPD Variations	7
IV. PRESSURE RELATIONSHIPS FOR MANAGED PRESSURE DRILLING TECHNIQUES.....	8
A. Dynamic (equivalent circulating density) vs. static in MPD.....	8
B. Choke Control and Surface Pressure	8
C. Bottom hole Pressure	8
D. Pressure Window	8
V. MANAGED PRESSURE DRILLING EQUIPMENT AND RIG UP.....	9
A. Rotating Control Device (RCD).....	9
B. Rig Interfaces	9
C. Separation equipment	9
D. Choke manifold	9
E. Returns Flow Meter	9
F. Automation and Computer Control	9

Managed Pressure Drilling Operations Core Curriculum and Related Job Skills-Fundamental Level

G. Drillstring floats.....	9
H. Continuous Circulation Equipment.....	10
I. Pressure Sensors, Gauges, and data acquisition	10
J. Auxiliary Pump	10
K. Gas Injection Equipment	10
VI. BOTTOMHOLE PRESSURE CONTROL	11
A. MPD Operational Matrix	11
B. Anchor Point (Point of Constant Pressure)	11
C. Influxes.....	11
D. Losses.....	11
VII. MANAGED PRESSURE DRILLING PROCEDURES	12
A. Tripping in hole.....	12
B. Tripping out of hole.....	12
C. Making a connection.....	12
D. Drilling	12
E. RCD Element Replacement.....	12
F. Casing/Liner Running and Cementing	12
G. Commissioning and Fingerprinting	12
H. Contingency Procedures	12
VIII. HEALTH, SAFETY AND ENVIRONMENT AND REGULATION	13
A. Trapped pressure issues	13
B. Corrosion and erosion	13
C. Pressure Testing	13
D. HAZID/HAZOP/MOC	13
E. Bridging Documents	13
F. Communication	13
G. QHSE Planning	13

I. MANAGED PRESSURE DRILLING OVERVIEW

TRAINING TOPICS	LEARNING OBJECTIVE	KEY POINTS/COMMENTS
<p>A. Definitions of conventional, underbalanced drilling and managed pressure drilling</p>	<ul style="list-style-type: none"> ▪ Define conventional drilling, Underbalanced Drilling and Managed Pressure Drilling 	<p><i>Emphasize the difference in Managed Pressure Drilling compared to Underbalanced Drilling and Conventional Drilling</i></p>
<p>B. Drivers</p>	<ul style="list-style-type: none"> ▪ Describe key drivers for using MPD 	
<p>C. IADC classifications</p>	<ul style="list-style-type: none"> ▪ Show IADC classifications and significance 	<p>Use the <u>IADC Classification System</u></p>

II. SIMILARITIES AND CONTRASTS BETWEEN CONVENTIONAL DRILLING AND MANAGED PRESSURE DRILLING

TRAINING TOPICS	LEARNING OBJECTIVE	KEY POINTS/COMMENTS
<p>A. Similarities</p> <ol style="list-style-type: none"> 1. BOP stack 2. Control of well at all times 3. Health, Safety & Environmental Issues 4. Overbalanced at all times 5. Barrier verification 6. Secondary Barrier is the same 	<ul style="list-style-type: none"> ▪ Identify similarities between conventional drilling and Managed Pressure Drilling 	
<p>B. Differences</p> <ol style="list-style-type: none"> 1. Primary barrier changed 2. Additional equipment, personnel and procedures 	<ul style="list-style-type: none"> ▪ Identify differences between conventional drilling and Managed Pressure Drilling 	

III. VARIANTS OF MANAGED PRESSURE DRILLING

TRAINING TOPICS	LEARNING OBJECTIVE	KEY POINTS/COMMENTS
A. Examples of MPD Variations	<ul style="list-style-type: none">▪ Explain what conditions influence the type of Managed Pressure Drilling technique selected for a specific well	<i>Possible examples: CBHP, Low Head, MCD, DG, Continuous Flow, Multi-Phase, etc.</i>

IV. PRESSURE RELATIONSHIPS FOR MANAGED PRESSURE DRILLING TECHNIQUES

TRAINING TOPICS	LEARNING OBJECTIVE	KEY POINTS/COMMENTS
A. Dynamic (equivalent circulating density) vs. static in MPD	<ul style="list-style-type: none"> ▪ Explain ESD, ECD Dynamic vs. Static conditions ▪ Compare the effect of circulation for conventional and Managed Pressure Drilling 	<i>MW may be underbalanced or overbalanced, but the well is never underbalanced.</i>
B. Choke Control and Surface Pressure	<ul style="list-style-type: none"> ▪ Explain the effects on bottom hole pressure from surface pressure 	<i>If we lose choke pressure we may become underbalanced</i>
C. Bottom hole Pressure	<ul style="list-style-type: none"> ▪ Explain the components of bottom hole pressure and their relationship 	<i>Hydrostatic Head, Friction, Backpressure; $P = HH + Friction + Surface Pressure$</i>
D. Pressure Window	<ul style="list-style-type: none"> ▪ Describe the limits of the operating pressure window. 	<i>Include discussion of margins</i>

V. MANAGED PRESSURE DRILLING EQUIPMENT AND RIG UP

TRAINING TOPICS	LEARNING OBJECTIVE	KEY POINTS/COMMENTS
A. Rotating Control Device (RCD)	<ul style="list-style-type: none"> ▪ Explain the purpose of a RCD and main components, and placement ▪ Explain differences between static and dynamic pressure rating ▪ Identify factors affecting seal life 	<i>Include application with subsea stack</i>
B. Rig Interfaces	<ul style="list-style-type: none"> ▪ Identify the pipework, flow path, electricity, cabling, air requirements ▪ Describe the placement of all equipment associated with the MPD operation 	<i>Use simplified or example PID, Flowpath schematics, etc.</i>
C. Separation equipment	<ul style="list-style-type: none"> ▪ Identify main components of a separator <ul style="list-style-type: none"> ▪ Flare line ▪ U-tube/Mud Seal/level control ▪ Identify the criteria for using a separator 	<i>When using multi-phase fluid and when using single phase fluid</i>
D. Choke manifold	<ul style="list-style-type: none"> ▪ Describe use of a choke manifold ▪ Identify the components of the choke manifold 	
E. Returns Flow Meter	<ul style="list-style-type: none"> ▪ Describe the purpose and limitations of a returns flow meter 	
F. Automation and Computer Control	<ul style="list-style-type: none"> ▪ Explain where automation and computers are used in MPD 	<i>Discuss use of hydraulic model to provide set points</i>
G. Drillstring floats	<ul style="list-style-type: none"> ▪ Identify different types and placement of drillstring floats ▪ Explain importance of using drillstring 	

Managed Pressure Drilling Operations Core Curriculum and Related Job Skills-Fundamental Level

	floats	
H. Continuous Circulation Equipment	<ul style="list-style-type: none"> ▪ Identify equipment used for continuous circulation systems 	
I. Pressure Sensors, Gauges, and data acquisition	<ul style="list-style-type: none"> ▪ Identify pressure sensors and gauges used in managed pressure drilling 	
J. Auxiliary Pump	<ul style="list-style-type: none"> ▪ Explain the purpose of using an auxiliary pump 	<i>Include mention of riser boost line for offshore applications</i>
K. Gas Injection Equipment	<ul style="list-style-type: none"> ▪ Identify equipment and lines used in gas injection ▪ Identify gas injection points ▪ Explain differences between gas and liquid injection 	<i>Pressure bleed off process</i>

VI. BOTTOMHOLE PRESSURE CONTROL

TRAINING TOPICS	LEARNING OBJECTIVE	KEY POINTS/COMMENTS
A. MPD Operational Matrix	<ul style="list-style-type: none"> ▪ Identify the operations matrix ▪ Identify limits of the matrix ▪ Identify transition point between MPD and Well Control 	
B. Anchor Point (Point of Constant Pressure)	<ul style="list-style-type: none"> ▪ Identify potential points where pressure may be held constant 	
C. Influxes	<ul style="list-style-type: none"> ▪ Explain how MPD detects influxes compared to conventional methods 	
D. Losses	<ul style="list-style-type: none"> ▪ Explain how MPD detects losses compared to conventional methods 	

VII. MANAGED PRESSURE DRILLING PROCEDURES

TRAINING TOPICS	LEARNING OBJECTIVE	KEY POINTS/COMMENTS
A. Tripping in hole	<ul style="list-style-type: none"> ▪ Explain general procedures & practices 	<i>Include mud roll over</i>
B. Tripping out of hole	<ul style="list-style-type: none"> ▪ Explain general procedures & practices 	
C. Making a connection	<ul style="list-style-type: none"> ▪ Explain general procedures & practices 	
D. Drilling	<ul style="list-style-type: none"> ▪ Explain how MPD drilling may be different than conventional 	
E. RCD Element Replacement	<ul style="list-style-type: none"> ▪ Explain general procedure for replacing RCD element 	<i>Include HSE issues</i>
F. Casing/Liner Running and Cementing	<ul style="list-style-type: none"> ▪ Explain why running casing or liner is different compared to conventional 	<i>Surge and swab mitigation</i>
G. Commissioning and Fingerprinting	<ul style="list-style-type: none"> ▪ Explain why fingerprinting, pore-pressure verification tests, and formation Integrity tests are used 	<i>Include discussion of general steps for these procedures</i>
H. Contingency Procedures	<ul style="list-style-type: none"> ▪ Explain why contingency procedures are necessary ▪ Identify main contingency procedures 	<i>Examples may include plugged choke, loss or power, RCD seal leak, etc.</i>

VIII. HEALTH, SAFETY AND ENVIRONMENT AND REGULATION

TRAINING TOPICS	LEARNING OBJECTIVE	KEY POINTS/COMMENTS
A. Trapped pressure issues	<ul style="list-style-type: none"> ▪ Explain need for opening and closing sequences/procedure ▪ Identify pressurized equipment (lines, etc) 	
B. Corrosion and erosion	<ul style="list-style-type: none"> ▪ Identify when corrosion and erosion may be increased in MPD 	<i>Note sources: drilling fluids,</i>
C. Pressure Testing	<ul style="list-style-type: none"> ▪ Explain importance of Pressure Testing MPD equipment 	92M Requirements
D. HAZID/HAZOP/MOC	<ul style="list-style-type: none"> ▪ Explain why a HazOP is necessary ▪ Explain what a HazID is for ▪ Explain why it is important to manage any changes to equipment and procedures 	
E. Bridging Documents	<ul style="list-style-type: none"> ▪ Explain the use of bridging documents 	<i>Integration of different policies and changes brought about by implementation of MPD</i>
F. Communication	<ul style="list-style-type: none"> ▪ Describe the importance of good communication between all involved personnel 	<i>Emphasize following established protocols or any operation</i> <i>Discuss language barriers and continuity of signals</i> <i>Define roles and concept of chain of command</i>
G. QHSE Planning	<ul style="list-style-type: none"> ▪ Describe the importance of Quality, Health, Safety and Environment Planning 	<i>General HSE awareness</i> <i>Evacuation Plan, etc.</i>

Managed Pressure Drilling Operations Core Curriculum and Related Job Skills-Fundamental Level