

IADC WORKOVER COURSE OUTLINE

| <u>IADC WELLSHARP WELLSERVICE WORKOVER</u> | | |
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| <u>COURSE OUTLINE</u> | | |
| <u>DAY1</u> | | |
| <i>TIME</i> | <i>Subject</i> | <i>Lesson plan</i> |
| 8:00 - 9:00 | Risk Awareness and Management :Potential Impacts of a Well Control Event Live/Dead Well , Risk Management Systematic risk ,Pre-job Communication , Handover for Tour and Hitch Change ,Safety Margin Selection , Bridging Documents , Emergency Equipment , Requirements procedures (MAASP) | Lesson plan -1 |
| 9:00 - 10:30 | Installation of rings, flanges and connections , Load Bearing Considerations(requires lifting certifications , environmental factors) Well Control Principles & Calculations (Types of pressure a. Hydrostatic pressure , b. Applied Pressures 1. Surface pressure a. SITP b. Annulus Pressure | Lesson plan -2 |
| 10:30 - 10:45 | BREAK | |
| 10:45 - 11:00 | 2. Pump Pressure 3. ECDs (Equivalent Circulating Densities) 4. Trapped Pressure 5. Swab/surge c. Formation pressure d. Differential pressure e. Fracture pressure | Lesson plan -3 |
| 11:00-12:00 | f. Bottom hole pressure 1. Balanced 2. Underbalanced 3. Overbalanced, (MASP) , Kill Mud Weight , <u>ECD and calculation</u> , <u>U-tubing</u> , <u>Buoyancy and calculation</u> , <u>Volume , strokes and rates /Displacement calculations</u> , Principles(Tubing Collapse and Casing Burst , <u>von Mises equivalent (VME) form.</u>) , Given well data, complete a well data question form (wellbore profile , deviation) | Lesson plan -4 |
| 12:00-12:30 | Launch Time | |
| 12:30-02:00 | pre-recorded information (Well configuration " Top and bottom of perforations , Packer/tool locations) , <u>Maximum allowable working pressure(well head , casing)</u> , the well (Wellhead / Well Control Stack / Christmas tree valves – function test) Barriers : Philosophy and Operation of Barrier Systems(Barriers and barrier envelope ,Purpose of barriers) Types of Barriers (fluid , mechanical) | Lesson plan -5 |

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| 02:00-02:45 | <p>Levels of Barriers (Hierarchy , primary ,secondary and tertiary) Barrier Management (test criteria , monitoring and detecting failure) Validating fluid barriers (monitoring , fluid weight , crystallization , if barrier fail), Hoses , fittings and Connections Influx Fundamentals Influx : Detention , Causes , Influx detection (signs and indicators)</p> | Lesson plan -6 |
| 02:45: 03:00 | BREAK | |
| 03:00-04:00 | <p>Importance of Influx Management in Open Hole Operations (Managing Risk , Consequences of not Managing influx "pollution" Pressure and Volume Relationship (Boyles Law) " Gas Volume/Pressure . Completion and Workover Fluids Completion and Workover Fluids (purpose, corrosion) Brine requirements . Fluid properties (Density , viscosity ,PH, saturation ,Crystallization</p> | Lesson plan -7 |
| 04:00: 06:00 | <p>Cont. Completion and Workover Fluids Fluid Flow Behavior (friction pressure loss , geometry) Fluid Types (Gas , oil , water) <u>Measuring Techniques (density and viscosity)</u> Surface and Subsurface Wellbore Equipment Christmas Tree , BOP component stack (function, component , flow path , HCR & manual valve , Annular , Blind/shear , shear or cutter ram</p> | Lesson plan -8 |
| 06:05 | END OF TRAINING DAY | |
| <u>DAY 2</u> | | |
| 08:00-09:45 | <p>Cont. BOP component: OEM Replacement Parts, Stripping rams (HWO) Multiple completions) Auxiliary Well Control Equipment (Kelly valve , F.O.S.V) Accumulator(function ,min. system pressure , Drawdown test . <u>closing time , regulators , panels)</u> <u>Chokes and Choke Manifolds , Fluid Measuring (strokes, rates)</u></p> | Lesson plan -9 |
| 09:45-10:00 | BREAK | |
| 10:00-11:00 | <p>Workstring and Production Tubing (Integrity , hazards , IBOP , Tubular failure , Polished Bore Receptacle (PBR) , how to reduce tubing movement) Completion Equipment: (Tubing HGR , Surface & sub-surface Controlled Sub-Surface Safety Valve (SCSSV) , Landing nipple , Packers , SSD , Gas lift mandrill</p> | Lesson plan -10 |

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| 11:00-12:00 | <p>Procedures: <u>Set/Check Alarm Limits(PIT LEVEL &FLOW RETURN) , Shut-in (procedures , Non-sharable) , Verification of Shut-in (Annular , manifold) , Monitoring and Recording During Shut-in (visual check , accumulator) , Stripping operations (importance of strip in/out , calculation , stripping procedures)</u></p> | Lesson plan -11 |
| 12:00-12:30 | LAUNCH TIME | |
| 12:30-02:45 | <p>Use of valve removal plug (VR plug) , <u>calculations</u> (Pulling a gas lift valve or Opening sliding sleeve Well Kill in Preparation of Well Interventions : Live vs. Dead Well intervention (without killing the well) Bull heading: principles advantages/disadvantages limitation calculation and kill sheet friction pressure minimum theoretical volume verify if well has been killed</p> | Lesson plan -12 |
| 02:45 : 03:00 | BREAK | |
| 03:00-04:30 | <p>Lube and Bleed principles advantages/disadvantages Calculate pressure per unit of volume in lube and bleed . limitation Pump schedule for lube and bleed operations. verify if well has been killed Forward Circulation (Driller's) Method principles advantages/disadvantages Calculate limitation Explain how kill procedures can impact BHP (i.e., changing SPM)</p> | Lesson plan -13 |
| 04:30-06:00 | <p>Reverse Circulation principles advantages/disadvantages Calculate Explain the main differences between a normal forward circulation kill technique and a reverse circulating</p> | Lesson plan -14 |
| 06:05 | END OF TRAINING DAY | |

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| <u>DAY 3</u> | | |
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| 08:00-09:30 | <u>Pump Startup and Shutdown Procedure</u> Startup/Shutdown procedures Action to take if SCR has not been recorded ICP , Lag time , Determine the action(s) required to verify a well is dead <u>before opening up the BOP</u> | Lesson plan -15 |
| 09:30-09:45 | BREAK | |
| 09:45-10:30 | Special Situations: Blockages and Trapped Pressure in Tubing / Wellbore , Hydrates , H2S consideration (detention , necessary equipment , safety consideration) | Lesson plan -16 |
| 10:30-12:00 | Demonstrate a detailed bull-heading example on a simulator. Demonstrate a detailed forward circulating (driller's) method | Lesson plan -17 SIMULATOR |
| 12:00-12:30 | LAUNCH TIME | |
| 12:30-02:00 | Demonstrate a startup and shutdown procedure Demonstrate how to maintain constant BHP when an influx is being circulated | Lesson plan -18 SIMULATOR |
| 02:00-02:15 | BREAK | |
| 02:15-04:00 | 2nd group Demonstrate a detailed bull-heading example on a simulator. Demonstrate a detailed forward circulating (driller's) method | Lesson plan -19 SIMULATOR |
| 04:00-06:00 | Demonstrate a startup and shutdown procedure Demonstrate how to maintain constant BHP when an influx is being circulated | Lesson plan -20 SIMULATOR |
| 06:05 | END OF TRAINING DAY | |
| <u>DAY 4</u> | | |
| 08:00-09:30 | <u>Managing Change During a Well Kill</u> How to react to problems that can happen during the well Kill importance of handover procedures during a well kill Problems with the kill | Lesson plan -21 |
| 09:30-09:45 | BREAK | |

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| 09:45 :11:00 | <p><u>Cont. Managing Change During a Well Kill</u> Identify the importance of reassessment of the current plan and techniques used (i.e., MOC). <u>Handling Kill Problems</u> Pressure Calculation Exceeding MASP How MASP can be exceeded during well intervention operations being influenced by nearby hydraulic fracturing operations .</p> | Lesson plan -22 |
| 11:00-12:00 | <p>Organizing a Well Control Operation : personnel -Roles and Responsibilities , Plan Responses to Anticipated Well Control Scenarios</p> | Lesson plan -23 |
| 12:00-12:30 | LAUNCH TIME | |
| 12:30-03:00 | <p>Testing : Pressure and Function Tests (purpose , Maximum safe working pressures of well control equipment , low & high pressure test) , BOP Testing (specific equipment , pressure test value) Testing of Completion Equipment (Packers , deep set plug , documentation</p> <p>Well Control Drills Pit Drills Trip drills Choke drills</p> | Lesson plan -24 |
| 03:15-03:30 | BREAK | |
| 03:30-05:00 | <p>Government, Industry and Company Rules, Order and Policies : API and ISO recommended practices, standards and bulletins pertaining to well control , Company/operator specific requirements Ancillary Considerations: Gas detector , fluid gas separator , Wellhead Control Panel</p> | Lesson plan -25 |
| 05:05 | END OF LAST TRAINING DAY | |