

WellCAP®
IADC WELL CONTROL ACCREDITATION PROGRAM

WELL SERVICING OPERATIONS (WIRELINER, COILED TUBING & SNUBBING)
CORE CURRICULUM AND RELATED JOB SKILLS

FORM WCT-2WSI

INTRODUCTORY LEVEL

For information on how an Introductory Level course should be delivered and documented, refer to Form WCT-21.

The purpose of WellCAP core curriculum is to identify a body of knowledge and a set of job skills, which can be used to provide well control skills for wireline operations. The curriculum is divided into three course levels: Introductory, Fundamental, and Supervisory.

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

INTRODUCTORY: New Hires
(May also be appropriate for non-technical personnel)

FUNDAMENTAL: Helpers, Assistants, "Hands" and personnel involved with the operational aspects of the unit

SUPERVISORY: Supervisors, Superintendents, and Project Foreman

Upon completion of a well control training course based on curriculum guidelines, the student should be able to perform the job skills in italics identified by a "■" mark (e.g., ■ *Identify causes of kicks*).

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I. REASONS FOR WELL SERVICING OPERATIONS

TRAINING TOPICS	JOB SKILLS
A. Definitions of well-servicing operations	<ul style="list-style-type: none"> ■ <i>Describe well-servicing operations.</i>
B. Definition of well-servicing unit types	<ul style="list-style-type: none"> ■ <i>Describe types of well-servicing units.</i>
<p>C. Reasons for well servicing operations which may include wireline:</p> <ol style="list-style-type: none"> 1. Completing for production from a new reservoir. 2. Completing a well in more than one reservoir. 3. Stimulating a completion in a producing reservoir. 4. Reworking a producing reservoir to control water and/or gas production. 5. Rework to reduce or eliminate water coning. 6. Repair mechanical failure. 7. Cement repair. 	<ul style="list-style-type: none"> ■ <i>Identify reasons for performing well servicing activities or working over a well.</i> ■ <i>List potential well control problems that could occur during well servicing and workover operations.</i>

II. DEFINITIONS AND CALCULATIONS

TRAINING TOPICS	JOB SKILLS
<p>A. Pressure fundamentals</p> <ol style="list-style-type: none"> 1. Definition of pressure <ol style="list-style-type: none"> a. Force b. Area 2. Types of pressure <ol style="list-style-type: none"> a. Pressure gradient <ol style="list-style-type: none"> 1) Liquid 2) Gas b. Hydrostatic pressure <ol style="list-style-type: none"> 1) General 2) Effect of fluid level change c. Total downhole pressure <ol style="list-style-type: none"> 1) Considering multiple fluid columns with varying densities 2) Considering shut-in surface pressures d. Bottomhole pressure e. Formation pressure <ol style="list-style-type: none"> 1) Balanced 2) Underbalanced 3) Overbalanced f. Differential pressure g. Trapped pressure h. Swab pressure i. Surge pressure j. Fracture pressure 	<ul style="list-style-type: none"> ■ <i>Define the following items:</i> <ul style="list-style-type: none"> • Force • Pressure gradient • Hydrostatic pressure • Bottomhole pressure • Differential pressure • Total downhole pressure • Formation pressure ■ <i>Explain causes and effects of swab and surge pressures in the wellbore.</i>

Definitions and Calculations continued on next page.

TRAINING TOPICS	JOB SKILLS
<p>B. Live Wells and Kicking Wells</p> <ol style="list-style-type: none"> 1. Routine and non-routine operations <ol style="list-style-type: none"> a. Operations with wellhead pressure b. Operations without wellhead pressure 2. Definition of Live Well <ol style="list-style-type: none"> a. Producing b. Shut in 3. Definition of Kicking Well <ol style="list-style-type: none"> a. Undesired production b. Formation flow c. Pressure below bridge/blockage d. Unwanted swabbing 	<ul style="list-style-type: none"> ■ <i>Describe routine and non-routine operations.</i> ■ <i>Describe difference between routine and non-routine operations for pressured and non-pressure scenarios.</i> ■ <i>Define</i> <ul style="list-style-type: none"> • Production • Shut in • Unwanted flow/production • Possible scenarios for well kick
<p>C. Force</p> <ol style="list-style-type: none"> 1. Definition 2. Necessary tool string weight to overcome force. 3. Stripping (considering buoyed wireline/tool weight) 4. Packer, plug, etc. (considering differential pressure across packer, plug, etc.) 	<ul style="list-style-type: none"> ■ <i>Define force and buoyancy</i>

III. KICK FUNDAMENTALS

TRAINING TOPICS	JOB SKILLS
A. Definition of a kick	<ul style="list-style-type: none"> ■ <i>Define a kick.</i>
B. Causes of kicks (open hole, cased hole and tubing) <ol style="list-style-type: none"> 1. Swabbing the well 2. Insufficient fluid density 3. Failure to keep hole full 4. Loss of circulation 	<ul style="list-style-type: none"> ■ <i>Identify causes of a kick and how it can impact wireline operations.</i>
C. Kick detection (open hole, cased hole and tubing) <ol style="list-style-type: none"> 1. Kick indicators and warning signs including, but not limited to: <ol style="list-style-type: none"> a. Increase in surface pressures b. Unwanted flow c. Increase in fluid flow rate d. Gain in pit volume e. Hole not taking proper amount of fluid when pulling pipe or wireline f. Volume displacement change during trip in g. Change in string weight h. Oil or gas shows 	<ul style="list-style-type: none"> ■ <i>Identify indicators and warning signs of a kick</i> ■ <i>Rank indicators from most reliable to least reliable.</i>

Kick Fundamentals continued on next page.

TRAINING TOPICS	JOB SKILLS
<p>D. Importance of responding to kick indicators in a timely manner</p> <ol style="list-style-type: none"> 1. Minimize kick volume 2. Consequences of not responding <ol style="list-style-type: none"> a. Kick becomes blowout b. Possible release of poisonous gases c. Pollution d. Potential for fire e. Loss of life, equipment resources f. Larger kick and higher shut-in surface pressure 	<ul style="list-style-type: none"> ■ <i>Identify the benefit of timely response to kick indicators.</i> ■ <i>Identify or describe potential consequences of improper or untimely response to kick indicators.</i>

IV. GAS CHARACTERISTICS AND BEHAVIOR

TRAINING TOPICS	JOB SKILLS
A. Pressure, volume, relationship (Boyles Law)	<ul style="list-style-type: none"> ■ <i>Describe that gas expands as pressure on it is reduced.</i>
B. Gas expansion and migration relationships <ol style="list-style-type: none"> 1. In the wellbore <ol style="list-style-type: none"> a. Gas density based on pressure b. Effect on bottomhole pressure c. Effect on surface pressure d. Effect on uncontrolled pressure 	<ul style="list-style-type: none"> ■ <i>Describe that gas migrates</i>

V. FLUIDS

TRAINING TOPICS	JOB SKILLS
<p>A. Characteristics</p> <ol style="list-style-type: none"> 1. Density 2. Viscosity 	<ul style="list-style-type: none"> ■ Describe desirable properties of fluids. ■ Describe undesirable properties and how it may effect running/pulling activities
<p>B. Fluid types</p> <ol style="list-style-type: none"> 1. Oil and oil based fluids 2. Water and water based fluids <ol style="list-style-type: none"> a. Brines b. Muds 3. Gases 4. Packer fluids 5. Other types 	<ul style="list-style-type: none"> ■ Describe that different types of fluids are used for specific purposes

VI. SURFACE EQUIPMENT

TRAINING TOPICS	JOB SKILLS
<p>A. Types of wireline</p> <ol style="list-style-type: none"> 1. Slickline 2. Braided line 3. Electric line 	<ul style="list-style-type: none"> ■ <i>Identify types and describe uses of different types of wireline</i> ■ <i>Describe limitations</i> ■ <i>Describe differences in handling procedures</i>
<p>B. Components of wireline units</p> <ol style="list-style-type: none"> 1. Reel/drum 2. Brakes 3. Wire measuring devices 4. Power pack 5. Sheaves/pulleys 6. Tools 7. Accessories 	<ul style="list-style-type: none"> ■ <i>Identify and describe components, function and configuration of wireline units</i>
<p>C. Production (Christmas or Xmas) tree</p> <ol style="list-style-type: none"> 1. Equipment <ol style="list-style-type: none"> a. Pressure gauges a. Gauge flange or cap b. Swab valve c. Flow or cross tee d. Wing valves e. Master valves f. Surface safety valves 2. Configuration 	<ul style="list-style-type: none"> ■ <i>Identify the key Xmas tree components.</i> <ul style="list-style-type: none"> • Master, swab and flow line valves, etc. <p style="text-align: right;"><i>Surface Equipment continued on next page.</i></p>
TRAINING TOPICS	JOB SKILLS

<p>D. General rig and coiled tubing and snubbing units blowout preventer equipment</p> <ol style="list-style-type: none"> 1. Rig/unit Equipment that may be encountered <ol style="list-style-type: none"> a. Annular preventers and strippers b. Rams <ol style="list-style-type: none"> 1) Blind 2) Pipe/Multiple string 3) Shear 4) Blind/Shear 5) Variable bore and slip c. Ram locking mechanisms d. Sealing elements e. Safety valves f. Chokes and manifolds 	<ul style="list-style-type: none"> ■ <i>Identify function and configuration of key rig BOP stack components.</i> ■ <i>Identify flow path(s) used in well control operations.</i>
<p>E. Auxiliary well control equipment</p> <ol style="list-style-type: none"> 1. Kelly valves (kelly cock) 2. Full open safety valve <ol style="list-style-type: none"> a. Top drive valves b. Floor stabbing valves 3. Inside BOP 4. Floats/back pressure valves 	<ul style="list-style-type: none"> ■ <i>Describe function and use of the following rig/unit equipment that may be used during wireline activities:</i> <ul style="list-style-type: none"> • Kelly/top drive system valve • Full open safety valve • Inside blowout preventer • Floats/back pressure valves

Surface Equipment continued on next page.

TRAINING TOPICS	JOB SKILLS
<p>F. Wireline BOP/valve and pressure control equipment</p> <ol style="list-style-type: none"> 1. Manual and hydraulic slickline BOPs 2. Braided line BOPs 3. Pressure ratings 4. Stuffing boxes 5. Control heads/grease injectors 6. Risers 7. Lubricators 8. Tool traps 9. Back pressure (inside blowout preventer) valve 	<ul style="list-style-type: none"> ■ <i>Identify components, function and configuration of key BOP stack components.</i> ■ <i>Distinguish between types of rams for various operations (i.e., blind, shear/cutter, slick line and braided, etc.)</i> ■ <i>Recognize the different types of sealing elements on schematic drawings and answer questions about proper installation (e.g.; including any lubrication that may be required).</i>
<p>G. Lubricator/Stripper/stuffing box assemblies</p> <ol style="list-style-type: none"> 1. Lubricators 2. Strippers 3. Stuffing boxes 	<ul style="list-style-type: none"> ■ <i>Describe general functions of lubricators, strippers and stuffing boxes and their use</i> ■ <i>Recognize the different types of sealing elements and describe proper installation and use.</i>
<p>H. Gas detection and gas handling systems</p> <ol style="list-style-type: none"> 1. Gas detectors 	<ul style="list-style-type: none"> ■ <i>Describe locations and principles of gas detection equipment.</i>
<p>I. Safety systems and Emergency Shutdown Devices (ESDs)</p> <ol style="list-style-type: none"> 1. Alarm systems 2. ESD 	<ul style="list-style-type: none"> ■ <i>Describe general functions of safety systems applicable to wireline operations.</i> ■ <i>Describe the functions of platform shut down devices and general areas where they are located.</i>

VII. SUBSURFACE EQUIPMENT

TRAINING TOPICS	JOB SKILLS
<p>A. Workstring and production tubing, and drillstring components</p> <ol style="list-style-type: none"> 1. Ratings <ol style="list-style-type: none"> a. Burst b. Collapse 2. Washouts 	<ul style="list-style-type: none"> ■ <i>Identify tubing ratings (burst and collapse).</i> ■ <i>Identify or troubleshoot possible tubing failure (washouts, etc.).</i>
<p>B. Completion equipment</p> <ol style="list-style-type: none"> 1. Tubing hanger 2. Surface controlled subsurface safety valves 3. Packers and bridge plugs 4. Landing nipples and plugs 5. Sliding sleeve 6. Multiple completions 	<ul style="list-style-type: none"> ■ <i>Identify potential well control complications and solutions when running completion equipment.</i> ■ <i>Describe the function of equipment at left.</i>

VIII. PROCEDURES

TRAINING TOPICS	JOB SKILLS
<p>A. Pre-recorded well information</p> <ol style="list-style-type: none"> 1. Well configuration <ol style="list-style-type: none"> a. Well measured and true vertical depth b. Hole angle c. Top and bottom of perforations d. Packer/Tool locations e. Tubing dimensions, lengths and strengths f. Problem locations (e.g., junk, collapsed or narrow sections, etc.) 2. Maximum safe casing pressures <ol style="list-style-type: none"> a. Wellhead rating b. Casing burst rating c. Tubing collapse and burst ratings d. Production zone/perforations 3. Fluid density (ies) in well 4. Reservoir data <ol style="list-style-type: none"> a. Pore pressure b. Fracture pressure 5. Line limits 6. Others (H₂S and flammable/explosive gas sensors) 	<ul style="list-style-type: none"> ■ <i>Demonstrate an ability to document data as instructed</i> ■ <i>Describe the purpose for and locations for H₂S and explosive mixture gas sensors.</i>

Procedures continued on next page.

TRAINING TOPICS	JOB SKILLS
<p>B. Rigging up and deployment into well</p> <ol style="list-style-type: none"> 1. Rig up/down 2. Tool string deployment 	<ul style="list-style-type: none"> ■ <i>Describe or demonstrate rig up/down procedures for pressure related components.</i>
<p>C. Running, shifting and pulling tools</p>	<ul style="list-style-type: none"> ■ <i>Describe uses of running, shifting and pulling tools.</i>
<p>D. Shut-in</p> <ol style="list-style-type: none"> 1. Procedure (steps not necessarily in order) <ol style="list-style-type: none"> a. While on bottom <ol style="list-style-type: none"> 1) Individual responsibilities 2) Shut-in well 3) Notify supervisor b. While tripping <ol style="list-style-type: none"> 1) Individual responsibilities 2) Space out and tool string considerations 3) Shut-in well 4) Notify supervisor c. Other operations 	<ul style="list-style-type: none"> ■ <i>Define or describe why a shut-in technique would be necessary during trips, on bottom or during other operations.</i> ■ <i>List the precautions to be taken when opening a valve under pressure.</i>

Procedures continued on next page.

TRAINING TOPICS	JOB SKILLS
<p>E. Verification of shut-in</p> <ol style="list-style-type: none"> 1. Annulus <ol style="list-style-type: none"> a. Through BOP b. At the flow line 2. Workstring <ol style="list-style-type: none"> a. Pump pressure relief valves b. Standpipe manifold c. Lubricator/wireline BOPs/valves 3. Wellhead/BOP/Xmas tree <ol style="list-style-type: none"> a. Casing valve b. Crown, wing, master valves, etc. 4. Manifold <ol style="list-style-type: none"> a. Manifold valves b. Choke(s) (manual and remote) 	<ul style="list-style-type: none"> ■ <i>Identify appropriate valves/BOP equipment that will be closed to effect a proper shut-in.</i> ■ <i>Identify how to verify the well has been shut-in.</i>
<p>F. Well monitoring during shut-in</p> <ol style="list-style-type: none"> 1. Record keeping <ol style="list-style-type: none"> a. Time of shut-in b. Tubing and casing pressures <ol style="list-style-type: none"> 1) At initial shut-in 2) At regular intervals c. Estimate pit gain d. Pressure increase at surface and downhole due to: <ol style="list-style-type: none"> 1) Gas migration 2) Gas expansion e. Pressure between casing strings 	<ul style="list-style-type: none"> ■ <i>Describe procedures to use for well monitoring during well shut-in.</i> ■ <i>Read, record and report well shut-in record keeping parameters.</i> ■ <i>Identify two causes for pressure between strings.</i>

Procedures continued on next page.

TRAINING TOPICS	JOB SKILLS
<p>G. Tripping</p> <ol style="list-style-type: none"> 1. Procedure for keeping hole full <ol style="list-style-type: none"> a. Using rig pump b. Using trip tank (gravity fill) c. Using recirculating trip tank (continuous fill) 2. Methods of measuring and recording hole fill volumes (trip sheet) 	<ul style="list-style-type: none"> ■ <i>Describe methods for filling hole during trips.</i>
<p>H. Stripping operations</p> <ol style="list-style-type: none"> 1. Line up for bleeding volume to stripping tank 2. Stripping procedure for BOP 3. Measurement of volumes bled from the well 	<ul style="list-style-type: none"> ■ <i>Describe stripping operations.</i> ■ <i>Demonstrate ability to line up to stripping tank.</i>
<p>I. Shearing wireline</p>	<ul style="list-style-type: none"> ■ <i>Identify complications that require shearing and cutting the wireline</i>
<p>J. Fishing wireline</p>	<ul style="list-style-type: none"> ■ <i>Identify tools that may be necessary for fishing operations</i>
<p>K. Well control drills</p> <ol style="list-style-type: none"> 1. Pit drill 2. Trip drill 	<ul style="list-style-type: none"> ■ <i>Describe wireline crew responsibilities during pit and trip drills, etc.</i>

IX. COMPLICATIONS AND SOLUTIONS

TRAINING TOPICS	JOB SKILLS
<p>A. Trapped pressure</p> <ol style="list-style-type: none"> 1. Wireline plugs (e.g., nipple plug, plug set in tubing, etc.) 2. Subsurface safety valves (storm chokes) 3. Surface controlled subsurface safety valve 4. Bridge plugs 5. Sand bridges 6. Paraffin 7. Hydrates 8. Beneath packer 	<ul style="list-style-type: none"> ■ <i>Recognize that many problems may occur during a well control event.</i>
<p>B. Pressure on casing</p> <ol style="list-style-type: none"> 1. Hole in tubing 2. Hole in casing 3. Seal or packer leak. 4. Pressure or temperature pulled seals out of seal bore 5. Failed squeeze job or patch 	<ul style="list-style-type: none"> ■ <i>Identify sources of pressure on casing and explain the well control implications.</i>
<p>C. Lost circulation</p>	<ul style="list-style-type: none"> ■ <i>Identify sources of pressure on casing and explain the well control implications.</i>
<p>D. Underground flow</p>	<ul style="list-style-type: none"> ■ <i>Identify sources of pressure on casing and explain the well control implications.</i>

Complications and Solutions continued on next page.

TRAINING TOPICS	JOB SKILLS
E. Collapsed tubing	<ul style="list-style-type: none"> ■ <i>Identify sources of pressure on casing and explain the well control implications.</i>
F. Junk in hole	<ul style="list-style-type: none"> ■ <i>Identify sources of pressure on casing and explain the well control implications.</i>
G. Hole in tubing	<ul style="list-style-type: none"> ■ <i>Identify sources of pressure on casing and explain the well control implications.</i>
H. Stuck tool string	<ul style="list-style-type: none"> ■ <i>Identify sources of pressure on casing and explain the well control implications.</i>
I. Fishing under pressure	<ul style="list-style-type: none"> ■ <i>Identify sources of pressure on casing and explain the well control implications.</i>
J. Hole angle	<ul style="list-style-type: none"> ■ <i>Describe how hole angle affects deployment of wireline tools</i> ■ <i>Identify factors allowing or preventing continuation of wireline as hole angle increases</i>

X. ORGANIZING OPERATIONS

TRAINING TOPICS	JOB SKILLS
A. Personnel assignments	<ul style="list-style-type: none"> ■ <i>Describe personnel assignments and indicate those personnel (if any) not required during a well control operation.</i> ■ <i>Identify personnel who must coordinate effectively to affect a well kill and name their main responsibilities.</i>
B. Pre-recorded information	<ul style="list-style-type: none"> ■ <i>Describe locations of pre-recorded information, collection process, and where supervisor will keep well documentation.</i>
C. Plan responses to anticipated well control scenarios	<ul style="list-style-type: none"> ■ <i>Describe procedures for implementing responses to well control scenarios.</i>
D. Communications responsibilities	<ul style="list-style-type: none"> ■ <i>Describe chain of command and each individual's responsibility to timely and properly convey pertinent information.</i>

XI. TESTING

TRAINING TOPICS	JOB SKILLS
<p>A. Testing of pressure control equipment</p> <ol style="list-style-type: none"> 1. BOPs/wireline valves 2. Surface pressure control accessory equipment 3. Packers 4. Lubricators 5. Xmas trees 6. Test trees 	<ul style="list-style-type: none"> ■ <i>Demonstrate the ability to line up piping and valving to perform test.</i>

XII. GOVERNMENT, INDUSTRY AND COMPANY RULES, ORDERS AND POLICIES

TRAINING TOPICS	JOB SKILLS
<p>A. Incorporate by reference</p> <ol style="list-style-type: none"> 1. API and ISO recommended practices, standards and bulletins pertaining to well control 2. Regional and/or local regulations where required 3. Company/operator specific requirements where required 	<ul style="list-style-type: none"> ■ <i>Describe or identify appropriate regional government or company specific regulations pertaining to job being completed.</i>

XIII. SPECIAL SITUATIONS (OPTIONAL)

TRAINING TOPICS	JOB SKILLS
A. H2S considerations	<ul style="list-style-type: none"> ■ <i>Describe additional procedures, precautions and supplemental safety equipment necessary while operating in an H2S environment.</i> ■ <i>Describe equipment addition, limitations, modification or replacement necessary to work in an H2S environment.</i> ■ <i>Provide documentation of successful completion of a H2S training course.</i>
B. Subsea considerations	<ul style="list-style-type: none"> ■ <i>Identify components of a subsea wellhead/production tree.</i>
C. Coiled tubing operations	<ul style="list-style-type: none"> ■ <i>Identify and describe basic coiled tubing unit components and functions.</i>
D. Snubbing and HWO operations	<ul style="list-style-type: none"> ■ <i>Identify and describe basic snubbing unit components and functions.</i>
E. Small tubing unit	<ul style="list-style-type: none"> ■ <i>Identify and describe basic small tubing unit components and functions.</i>
F. Drilling operations	<ul style="list-style-type: none"> ■ <i>Identify and describe basic drilling rig components and functions.</i>
G. Workover operations	<ul style="list-style-type: none"> ■ <i>Identify and describe basic workover rig components and functions</i>

Optional Topics continued on next page.

TRAINING TOPICS	JOB SKILLS
<p>H. If pump unit is utilized by wireline crew: Techniques for controlling or killing a producing well</p> <ol style="list-style-type: none"> 1. Bullheading 2. Lubricate and bleed 3. Constant bottomhole pressure (BHP) techniques <ol style="list-style-type: none"> a. Wait and weight b. Drillers's method 4. Reverse circulate 	<ul style="list-style-type: none"> ■ <i>Recognize chain of command and that you will work as directed</i>

Optional Topics continued on next page.

TRAINING TOPICS	JOB SKILLS
<p>I. If pump unit is utilized by wireline crew: No returns pumping technique (e.g., bullheading)</p> <ol style="list-style-type: none"> 1. Well shut-in will stop influx when BHP equals formation pressure 2. Determine status of shut-in tubing pressure (SITP), shut-in casing pressure (SICP) 3. Pump rates and pressure limitations <ol style="list-style-type: none"> a. Maximum pump pressure b. Friction of fluids vs. rate c. Gain in hydrostatic pressure vs. volume pumped d. Burst pressure of tubulars e. Collapse pressure of tubulars f. Formation fracture pressure 4. Determine volume to be pumped <ol style="list-style-type: none"> a. Theoretical volume to formation b. Overdisplacement (if any) c. Volume to pump to load surface lines 5. Pump rate vs. volume pumped 6. Gas migration vs. pumped fluid viscosity 7. Determine if well has been successfully killed 8. Barrier concept 	<ul style="list-style-type: none"> ■ <i>Recognize chain of command and that you will work as directed</i>