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ENGINEERING THE FUTURE OF WELL CONTROL

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Cudd Well Control (CWC) is a recognized leader in well control engineering and critical well intervention services for onshore and offshore environments. CWC has provided well control and well recovery services for drilling, workover, and production emergencies around the world since 1977. CWC, a registered professional engineering firm (registration number F-11840), provides first-class engineering and critical well intervention services to identify risks and design solutions that increase production efficiency. CWC is an ISO 9001:2008 certified company.

PREPARE FOR THE WORST.

PLAN WITH THE BEST.

CWC is strategically positioned to respond to operations around the world, working to help mitigate risks for oil and gas producers, drilling contractors, well servicing companies, regulatory agencies, insurance providers, academic institutions, and underground storage operators. to help mitigate risks. We help you prepare for emergency situations through advanced planning and training programs to uncover vulnerabilities and establish procedures for a safer, more productive working environment.

Our personnel are our most important assets. We make safety a priority in every situation. CWC's highly experienced, certified engineers and well control specialists are accustomed to working under different well control conditions, using various specialized tools at a mastery level. By maintaining current training and up-to-date knowledge on the latest technology and proven techniques, we're poised to give our best at a moment's notice. Our team stands ready to put their experience and training to work anywhere in the world. From establishing safe work zones to ensuring the safety of the equipment, you can count on CWC to do it the right way.

WELL CONTROL SERVICES

When faced with a critical well event, trust an experienced, reliable resource to resolve your situation quickly and safely. CWC responds promptly to assess the situation and develop a plan of action to resume your operations.

Applications

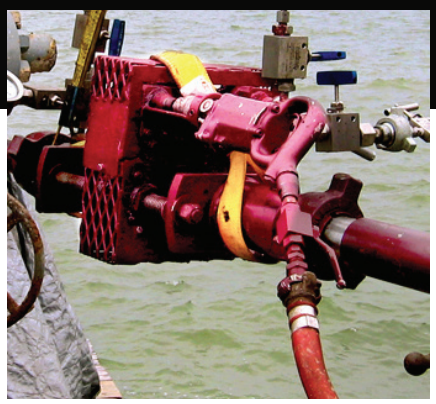
- Well control and kick resolution
- Subsea well control
- Oil and gas well firefighting
- Blowout response
- Well recovery operations
- Surface intervention
- Pressure control

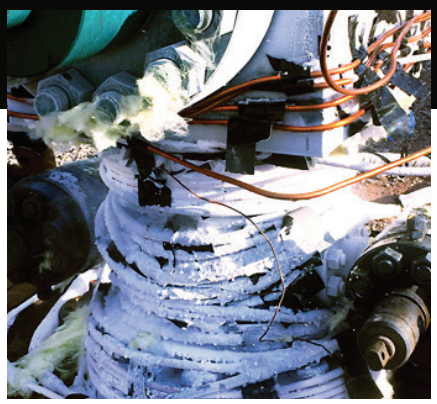
SPECIAL SERVICES

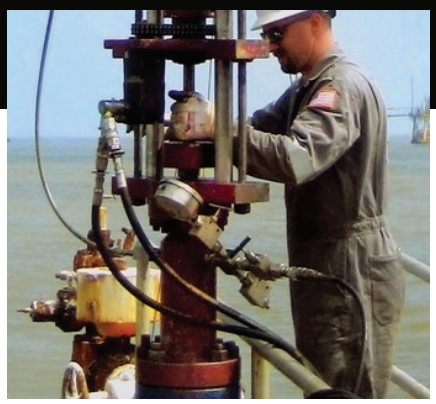
We deliver custom-engineered, cost-effective solutions for critical well intervention services in a range of applications, tackling events in even the most demanding environments. Combining our extensive expertise and experience with pioneering technology, we're able to overcome unique challenges safely, efficiently, and reliably while minimizing non-productive time.

Applications

- Surface and subsea hot tap operations
- Dry ice and cryogenic freeze operations
- Gate valve drilling







ENGINEERING SERVICES

Our experienced engineers and specialists are dedicated to ensuring the safety and functionality of your investment. We partner with you to identify operational vulnerabilities and develop plans that reduce your risks.

Applications

- Rig inspections/well control equipment inspections
- Relief well planning and execution
- Kick modeling
- Drilling plan reviews
- Blowout contingency and action plans
- Regulatory compliance verification
- Shear test verification/witnessing
- Dynamic kill planning and modeling
- Gas dispersion modeling
- Gas storage facility audits
- Well control drills
- Workover/completion audits
- Basic/advanced well control crew training
- High-pressure/high-temperature contingency planning

WE WORK UNDER PRESSURE SO YOU DON'T HAVE TO.

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CUDD ASSURED FULLY AUTOMATED WELLHEAD AUDITS SAVE TIME, MONEY

CUDDASSURED™

Rapid Access to the Data You Need

Cudd Well Control's next-generation wellhead inspection automation software, powered by CuddAssured, leads the industry with a combination of software development expertise and unparalleled asset protection. Starting from a client-centered approach, our research and development team engineered a remarkable program that revolutionizes wellhead audits, saving operators significant time and money.

Software Features:

- Low-cost audits performed quickly, efficiently on convenient mobile device
- Use of handheld device allows for quick delivery of audit information on the spot, in the field
- Access the info you need—when you need it—with real-time data uploads to the cloud
- Every bit of information remains protected with our triple-encrypted online security measures

Experience that Works for You

The CuddAssured wellhead audit from Cudd Well Control covers all the traditional aspects of a thorough investigation, including pressures, valve functionality, and potential corrosion. We go a step further to ensure that all findings are tied into API Specifications 6A, guaranteeing your equipment is operating at its best. And if it's not, you have decades of well control experience at your service.

Additional benefits of a CuddAssured wellhead audit:

- Upon inspection and finding of minor or even critical issues, we will develop a solution to fix or repair the well
- With permission, our team will fix or replace pressure gauges, needle valves, and other easily accessible equipment
- Through wholly in-house services and the CuddAssured automated audit program, your operation will experience results in minutes, not days

Click here to watch demo

By harnessing the power of CuddAssured's Wellhead Audit automation, you will gain unprecedented access to wellhead data in a matter of minutes rather than days.

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WELL CONTROL SYSTEM SURVEY

Overview

The Well Control System Survey is specifically designed for each site (drilling, workover, snubbing, coiled tubing, frac) to encompass the various systems on location in all environments (land, offshore, inland waters).

We conduct the well control system survey (WCSS) to cover all well control components and subsystems rigged up in their operational mode typically after surface or intermediate casing has been set and prior to or at drillout. This allows for the WCSS specialist to assess and inspect the system as it would function in the event of a well control situation, such as a kick or diverting operation.

The purpose and goal of the survey is to identify the system(s) or the system components that may not comply with standards set forth by the American Petroleum Institute (API), International Association of Drilling Contractors (IADC), sound engineering and operational reasoning, as well as the decades of experience established by Cudd Well Control.

The WCSS specialist documents, lists, and categorizes observations from tiers 1, 2, and 3 along with action-based remedies based on Industry Standards (API and IADC) and Recommended Safe Practices along with the well control experience of Cudd Well Control.

While WCSS may identify certain observations based on tiers 1, 2, and 3, compliance with such recommended or suggested actions shall not imply any additional guaranty or warranty of any kind.

Components and Subsystems Evaluated

- Accumulator system
- BOP equipment system
- Kill line valves & kill line system
- Choke line valves & choke line
- Choke manifold system
- Mud-gas system
- Active pits system
- PVT system
- Degasser
- Trip tank
- Standpipe system
- Rig floor equipment
- Preparedness
- Condition and readiness
- Drills, testing & rig up
- Target well monitored

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WELL CONTROL ASSESSMENT TRAINING

Overview

Rig crews and their use of the associated well control equipment are the first line of defense for recognition and containment.

The goal is prevention of oil and gas well control events or minimization of the event. Cudd Well Control believes properly trained rig crews should have a full understanding of their well control equipment systems, responsibilities and how to respond to an event. This will greatly enhance their collective ability to prevent and/or control any escalation of a potential well control event. Prevention of an escalation of an event is paramount to your company's success.Cudd Well Control's goal is to provide a professional and consistent approach to ensure competency of everyone involved in all aspect of well control.

The Cudd WCAT module was developed to provide well site personnel with the necessary information to recognize indicators and properly respond. The module will accomplish the following:

- Assess all personnel / teams on site for their assigned responsibilities prior to a kick, during and after
- Training tools to further enhance the crews understanding of their assignments and their equipment knowledge

The methodology will comprise:

- Interactive questioning by the Assessors/Trainers of the crew concerning their job responsibilities.
- Immediate clarification to crew if found deficient or weak in their understanding.
- Review their understanding of the equipment they will use, and the importance of its use.
- Immediate response of equipment information/use to crew if found deficient or weak in their understanding.
- Involvement of ALL personnel on site (including but not limited to Company Man, Toolpusher/Rig Manager, Driller, Derrick Hand, Floor Hand, Motorman, etc.)

Each crew/tour concludes their WCAT with a comprehensive re-cap of the training, key point(s) and an open question and answer interaction.

Typical Items Assessed

- Competency
- Job Responsibilities
- Knowledge of Operations / Procedures and Equipment
- Response Skills during a
- Well Control Situation
- Training Tool
- Understanding of Well
- Control Equipment Systems
- First Line of Defense
- Proper Shut–In Procedures
- Differences of Water
- Based & Oil Based Kicks
- Driller Method or Wait & Weight Kill Method
- Understands the BOP Stack
- Site Emergency Response Checklist
- Daily inspection of TIW & IBOP
- Knows Purpose of SIDPP
- Understands Manual
- Choke, Hydraulic Choke and Panic Line Alignment

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WELL CONTROL EMERGENCY PLAN/ WELL CONTROL ACTION PLAN

Overview

The well control emergency plan (WCEP) establishes a protocol for designated team members to safely respond and manage a well control emergency under the ICS system. The WCEP will include drilling, completion, and production provisions as well as multi-well pad considerations, such as prevention of collateral damage, how to deal with emergency well control operations with other wells in close proximity, and capping and control considerations and mitigations/options.

This plan covers the following topics:

- Securing wellsite, all personnel accounted for
- Attend to all Injured personnel
- Notification procedures (corporate, state, and local)
- Well control event levels defined
- ICS roles and responsibilities for response team at wellsite and office
- Data forms for documentation of essential information
- Approved vendor contact list for specialized equipment, materials, and services often required during a well control event

The well control action plan (WCAP) includes sections, with each designed for a specific purpose covering the plan of action. The WCAP provides anyone involved in an emergency well control event, regardless of magnitude, to refer to a plan and initiate a response. This is not a full or comprehensive document. However, the document can be bridged to any existing comprehensive plan and will cover all aspects of a well control emergency.

Following the development of either the WCEP or WCAP, drills can be scheduled and revisions can be made based upon any items identified during the drills or substantial changes to scope or type of operations.

Typical Outlines for WCEP / WCAP

- Incident Class / Type Definitions
- Well Control Emergency Contacts
- Incident Command Contacts
- Field / Asset Map
- Regulatory Agency Contacts
- Local Agency Contacts
- Blowout / Fire Service Contacts
- Emergency Service Vendors
- 3rd Party Services
- Incident Command Structure
- Great White Well Control Response Team
- Emergency Response Checklist
- Site Emergency Response Checklist
- On-Scene Commander Incident Report
- Well Control Data Sheet
- Drilling Operations
- Completion Operations
- Workover Operations
- Producing Operations
- Coil Tubing Operations

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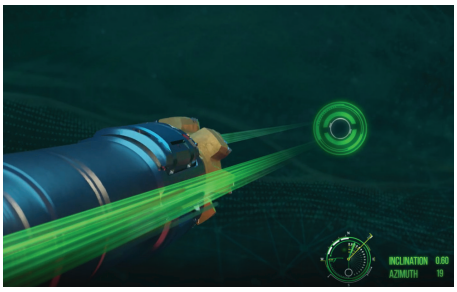
RELIEF WELL PLANS & RELIEF WELL EXECUTION

Overview

Cudd Well Control offers a full range of relief well planning and execution services designed to deliver timely solutions during critical well control events. Relief well pre-planning for permitting and equipment selection has proven instrumental in mitigating, or even eliminating, the risks of a nonresolution after employing conventional methods to control the well. Due diligence reduces stress.

A relief well serves as a method to intercept and kill a blowout well when surface or direct intervention may require an extended period of time or when unacceptable risks are present for capping or direct intervention. When planned and executed properly, relief wells are highly successful.

It's common to spud a relief well before or during a capping operation as a contingent method of resolution, known as a dual strategy. A relief well is designed based on the best kill strategy(s) for success. The well kill design requirements will drive the detailed design of the relief well.



Once the target well is intercepted and killed, the relief well can be plugged or possibly converted to a replacement well; this, however, is not the typical case. Whether it is relief well pre-planning for regulatory or due diligence purposes or in an emergency, we are here to assist.

Why a Relief Well

- Surface equipment damaged beyond use or inaccessible
- Surface intervention options present unacceptable risks
- Dual strategy when combined with direct intervention
- Relief well may provide faster remedy than direct intervention

Basic Steps of a Relief Well

- Determine relief well location
- Relief well rig position surveyed
- Drilling begins
- Set casing(s)
- Continue directional drilling
- Target well pass by (option)
- Run initial proximity ranging runs
- Confirm target well location
- Track target well
- Alignment confirmed with ranging runs
- Drill to point of interception
- Alignment and angle confirmed
- Intercept target well
- Kill target well
- Target well monitored

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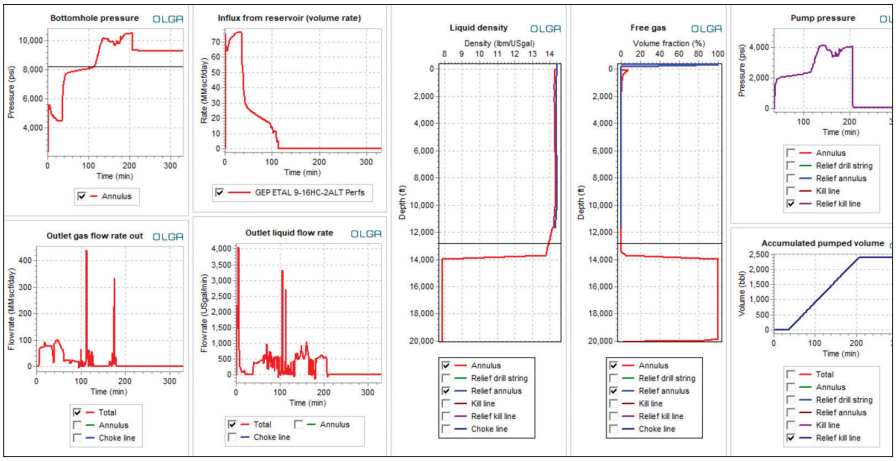
WELL KILL MODELING & REAL-TIME KILL ANALYSIS



Simulations Analysis

- Underbalanced Operations
- Blowout Control
- Well Control
- Pressure Control

Information for Dynamic Kill

- Kill Mud Density
- Kill Mud Volume
- Dynamic Kill Pump Rate
- Dynamic Kill Pump Pressure

Benefits

- Various Scenarios
- Multi-phase Flow Simulations
- Graphics
- Skilled Users
- Real Time Support

Overview

Active well kill modeling and real-time kill analysis has been proven to be a valuable risk management tool for operators in support of pre-planned and ongoing drilling operations. Modeling software has the ability to simulate kick behavior of a well, allowing for the determination of kill methods with the ability to change mud weights, pump rates, and equivalent circulating density as required. With additional well data incorporated into the modeling program, further information can be developed to assist operators with DS design, FIT/LOT/EMW, casing shoe placement, and the identification of potential lost circulation possibilities.

Dynamic kill modeling is a valuable tool that has been successfully used to control and kill blowouts. The technique pumps weighted drilling fluids calculated by the model down the wellbore at higher pump rates. The specific fluid dynamics created by this pumping method greatly enhances the friction within the wellbore, thereby controlling the flow successfully killing the well.

Cudd Well Control uses Drillbench Dynamic Well Control and Blowout Control program to conduct well kill modeling and real time kill analysis for our clients.

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RISK & PROJECT MANAGEMENT

Overview

Cudd Well Control offers a broad range of professional risk and project management services based on sound engineering principles that are founded in decades of well control experience. Specifically designed to address the requirements of the global energy and marine industries, our risk and project management services incorporate a safety-first maxim that anticipates change and delivers proven solutions *before* problems arise.

Our overall approach to these services is unique to each and every need to meet the exact requirements of your specific projects. From pre-risk condition surveys to the most complex claim management project, our team of seasoned industry professionals is prepared to help optimize your operations.

Risk Management Services

- Drilling and workover equipment condition and evaluation surveys/audits
- General oil and gas equipment condition and evaluation surveys/audits
- Equipment stacking verifications surveys
- Onshore drilling and production wellsite condition and evaluation surveys/audits
- Due diligence surveys/audits
- Site-specific and general claim management response plans

Post Incident Claim & Project Management

- Wreck removal, clean up, and restoration
- Repair and reconstruction of equipment and facility
- Well control/re-drill and wellsite restoration
- Services procurement, cost monitoring, and scheduling
- Claim documentation and cost management

General Project Management

- General repair and upgrade construction
- General and critical equipment mobilization and demobilization
- Services procurement, cost monitoring, and scheduling