Consulting and Project Management
Delivering value from insight to execution.

Halliburton Consulting and Project Management is one of the few organizations in the world with enough breadth and depth to help you assess, plan, build, and manage entire oil and gas assets.

HALLIBURTON CONSULTS IN FIVE MAIN AREAS:

- Mature Fields
- Unconventional Reservoirs
- Field Development Planning
- Well Planning and Design
- Business Performance Improvement

HALLIBURTON ALSO MANAGES PROJECTS, SUCH AS:

- Well Construction and Completions
- Workovers
- Plugging and Abandonment
- Gas Storage and Geothermal

Extensive education and experience

Halliburton employs more than 1,000 consultants and project managers with extensive oilfield experience in geology, geophysics, petrophysics, geomechanics, chemistry, evaluation, modeling, drilling, monitoring, logistics, change management and more. More than a third of our consultants have PhDs. Virtually all of our project managers have decades of field experience. Clients choose Halliburton for our collaborative style, integrity, and thoroughness. They appreciate the sense of certainty Halliburton brings to projects as well as the results Halliburton produces.

LET US HELP YOU:

- Design the optimal development plan for new assets
- Optimize production from existing assets
- Extend the producing life of a field
- Exploit unconventional assets
- Design and deliver wells on a turnkey basis
- Diagnose and resolve production issues
- Improve processes that affect asset performance
- Take advantage of real-time and new technologies
- Coordinate and manage oilfield projects
- Expand your capabilities and train your staff
- Accelerate the development of an asset

Increasing production, adding reserves and reducing costs

As a field’s lifecycle plays out and production declines, the question becomes, “How can we keep this field profitable?” Our Mature Field consultants address this question by rapidly applying global best practices and new technologies that will work best in your specific field.

Immediate P&L impact

Most of Halliburton’s mature-field engagements are designed to have immediate impact through some type of intervention. After reviewing well data and prioritizing needs, Halliburton recommends and implements solutions that fix underperforming wells, address artificial lift challenges or address operational issues.

Reservoir rediscovery

Halliburton also reevaluates well logs and seismic data using new tools and techniques designed to pinpoint pockets of bypassed pay. The goals: Identify remaining reserves, develop infill-drilling programs, and pinpoint opportunities for enhanced recovery.

Cost-effective well abandonment

When economics finally turn against operators, the best way to make money is to stop losing it. When a well or field is no longer covering its operating costs and there is no hope of turning it around, prudence calls for devising the most cost-effective, yet environmentally responsible, well abandonment strategies possible. This represents another one of Halliburton’s areas of expertise.

SUCCESS STORY

Reducing P&A Costs

A U.K. client had 201 subsea wells in 15 fields that were expected to cease producing in less than 10 years. They commissioned Halliburton to review 89 of the wells, develop a P&A strategy, and provide cost estimates for each well. Halliburton ranked each well based on type, expected duration of production, and plugging and abandonment costs. Halliburton also developed proposed wellbore schematics and identified new technologies for each well type.

This approach achieved all client objectives. Additionally, categorizing wells by type allowed the client to extrapolate costs beyond the wells studied. Halliburton also showed them how they could reduce costs by “campaigned mobilization” – addressing groups of wells at one time to eliminate redundant mobilization costs.

SUCCESS STORY

Increasing ROI by More Than 15% in Three Fields

A client with an underperforming asset asked us to reinterpret existing data and prioritize wells for intervention based on risk level and potential production increase. Collaborating closely with the client, Halliburton integrated surface and subsurface studies of three fields. After screening all data, Halliburton then recommended detailed workflows, plans and specific technologies for addressing each well.

Overall, the plan increased ROI more than 15%. Compared to original expectations, one well exceeded its production target by 667%, thanks in part to the integration of insight from Halliburton Consulting and execution from other parts of Halliburton. Another well exceeded its original target by 420%.

The bottom line improved

Through rigorous analysis and the application of new technologies our clients have experienced:

- Increased production and reserves recovery
- Reduced operating expenditures
- Reduced downtime and lost production
- Cost-saving abandonment procedures

Halliburton specializes in applying secondary, improved and enhanced oil recovery techniques to extend and, for a period of time, reverse the decline curve.

In one field, a client had 80 percent of the hydrocarbon resource still in place, but pressure had dropped to one-third of its original level. The client asked Halliburton to evaluate waterflooding to increase production and extend reservoir life. The customer was prepared to spend approximately $100 million USD on the project. Using numerical algorithms and stochastic analysis, Halliburton determined that the original waterflooding plan was not the optimal solution. An alternative chemical enhanced-oil-recovery plan could increase NPV approximately 300% compared to the base case.

Increasing NPV 300%

Halliburton has five stages of recovery techniques to extend and, for a period of time, reverse the decline curve. The bottom line improved.
Halliburton Consulting has been instrumental in the early development of most North American shale plays – including the Bakken, Eagle Ford, Monterey and Marcellus – and is bringing this knowledge to new developments around the world.

All of these plays have resulted in sustainable successes due to a combination of factors: Halliburton’s application of the “right” technology; our understanding of the differences between shales and what makes them productive; and clients with the ability to profitably manage lower margin projects.

No two shales are alike
Halliburton Consulting has developed evaluation tools, processes and modeling workflows that have enabled us to better understand shale disparities. Shale lithology, processes and modeling workflows that have enabled us to profitably manage lower margin projects.

Optimizing for variations in rock mechanics
Shale can differ in many ways. Perhaps the most important is brittleness. Brittle shale fractures easily. Ductile shale may not fracture at all; if it does, the fractures may close as soon as pressure is released. Attempting to fracture ductile rock with the same program as brittle rock wastes time and money without returning profit.

At every point between those two extremes, optimal fracturing may require different combinations of pressure, fluid and proppant size.

Halliburton uses a fast-loop, fully integrated, continuously refined Asset Model to help you assess and develop unconventional resources including shale and tight gas. The model integrates all reservoir properties to improve well placement, completion design, and well and field performance. Locating all this information in a single environment, accessible by all engineers and geoscientists, facilitates quick collaboration and continuous learning.

Benefits of working with Halliburton for your unconventional field
Clients report that Halliburton consultants have helped them:
• Identify technologies and techniques that make fields profitable
• Increase total reserves
• Enhance production rates
• Reduce the total cost of operations
• Make marginal fields profitable
• Increase ROI and NPV
• Rapidly identify optimal well placement, well design, stimulation and development scenarios
• Predict economics of fields under consideration for leasing
• Reduce development risk

Enhancing well design, placement, and completions with unique tools
Halliburton offers many proprietary tools that help our consultants better understand unconventional reservoirs and how to optimize production. For instance:
• LaserStrat® service provides a portable laser spectrometer to rapidly measure the chemistry of cuttings at the wellsite in near real time, improving stratigraphic knowledge and wellbore placement.
• Real-time updates to earth models while drilling provide better understanding of complex facies and rock property relationships.
• The Halliburton unconventional reservoir modeling tool kit includes applications that help optimize frac design, completions and lateral lengths. The software suite can:
  • Convert microseismic signals into statistically valid fracture planes in real time. This helps avoid overtreatment that wastes materials and under-treatment that bypasses pay.
  • Mine technical data for historical information.
  • Effectively model unstructured, multi-directional fracture network growth as rock stresses change.
  • Stimulate and visualize the effects of stimulation on entire reservoirs.
  • Aid in precise geosteering to maximize contact with reservoir rock.
• Halliburton can identify the best solutions for well placement, completion, and stimulation using new shale or tight-gas-specific modeling tools to enhance asset development.

Get to full production faster
Shale often involves marginal economics. The faster you can find optimal well and stimulation plans for a reservoir, the more profitable you become. Halliburton Consulting fully understands shale complexity and the cutting-edge technologies that can quickly exploit it.

The Bakken Shale: From zero to 1,000,000 barrels of oil per day in 15 years
Since the 1950s, many companies tried and failed to unlock the vast resources of the Bakken Shale. The problem: oil exists in a very thin layer ranging from six to 15 ft thick. Since then, Halliburton has drilled more than 2.7 million ft in the Bakken.

Today, many laterals reach 12,000 ft. To optimize completions, Halliburton uses non-cemented liners with open hole isolation packers and sliding sleeves to efficiently treat multiple frac stages. Laterals are fractured in smaller stages to limit the amount of fracturing equipment and personnel required on-site. Frac engineers use a mixture of polymer and sand. As a result, production has continued to improve. Analysts predict that the Bakken could produce as much as a million barrels of oil per day by 2015.

Success story
40% production increase in tight-gas field
A Latin American national oil company requested the development of an integrated exploitation plan for a tight-gas asset. Our Front-End-Loading (FEL) methodology pointed to a new subsurface strategy and recommended an integrated exploitation plan for a tight-gas asset. Our Front-End-Loading (FEL) methodology pointed to a new subsurface strategy and recommended an integrated exploitation plan for a tight-gas asset.

A multi-disciplinary consulting team identified exploration opportunities; evaluated uncertainties; delivered design recommendations for lateral and wellbore architectures and new stimulation technology. The exploitation plan was fully adopted and funded. Result: a 40% increase in production.

40% increase in production

90% success rate

40% increase in production
Rapidly identifying the optimal plan for any size or type of field

Halliburton is recognized for pioneering the use of Front-End-Loading (FEL) principles in field development planning. Widely used in many types of engineering, FEL has rapidly proven its worth in upstream oil and gas.

Compared to traditional sequential field development planning, the FEL approach evaluates a wider range of development scenarios in much less time. By utilizing Landmark Decision Management System™ (DMS™) software, Halliburton can efficiently analyze hundreds of field development scenarios in days or weeks instead of a small number of scenarios in months or years.

Multi-domain scenario analysis and optimization

Traditionally, companies plan field development sequentially. One group of experts completes its work and hands it off to the next. In Halliburton’s process, all specialists work together up front to define a wide range of high-level development scenarios. Simulators then estimate costs, impacts and returns of each scenario. Identifying and ranking the most promising scenarios early in a project enables planners to thoroughly evaluate their risks and rewards, and rapidly identify the optimal plan with a high degree of confidence.

This technique often identifies scenarios that may be counter-intuitive but which have higher-than-expected rates of return. It also helps avoid investing years of effort in development scenarios that may be less optimal or even damaging.

For any size or type of field

This unique approach works for any field:

- Large or small
- Gas or oil
- Conventional or unconventional
- Green or mature
- Onshore or off

For any type of company

Our FEL/DMS process also works for any type of company. Whether you are a giant national oil company or a small independent, Halliburton can rank scenarios based on your objectives. The result: plans customized for your capital process.

The complete tool set

Of course, the value of any plan depends on the competence of the team compiling recommendations. The Halliburton field development planning team has hundreds of consultants, most with post-graduate degrees and decades of field experience. Halliburton has the entire spectrum of specialists needed for effective field planning – from geology and geophysics to reservoir engineering and production modeling. Halliburton professionals also understand field development costs better than most other consulting organizations. They bring an understanding of new game-changing technologies to every engagement.
Global design-to-delivery capability

Halliburton Consulting offers Well Planning and Design services worldwide. Halliburton can take responsibility for the total well design consult on specific issues. Three main objectives:

- Optimizing the number of wellsbores for best reservoir drainage
- Optimizing wellbore designs for safety, speed and cost
- Designing wells to help eliminate incidents and lost time

To achieve these objectives, Halliburton integrates world-class capabilities in well planning, tubular design, geomechanics and real-time.

Maximizing drainage with fewest wells

The least expensive well is the one you don’t have to drill. Our Collaborative Well Planning service enables engineers and geoscientists to maximize reservoir drainage with the fewest wells possible by understanding each other’s constraints. As a result, our recommended targets and well paths also avoid collisions and subsurface hazards that cause NPT or HSE issues.

Reducing drilling costs by almost two-thirds

A large fault, depleted sand, and weak rock zones concerned a client drilling a high-inclination (>65º), high-stress, deepwater appraisal well in the Gulf of Mexico. The well’s objective: to understand the volume of oil and gas in the reservoir by finding the point of oil/water contact.

Through meticulous geomechanical analysis and planning, the well was drilled without wellbore instability or fluid loss despite encountering the predicted hazards. While drilling, real-time pore-pressure readings indicated an opportunity to omit the intermediate casing string. Drilling the 15,000-foot well took only 14 days. As a result of this and other efficiencies, the client reduced costs by almost two-thirds and saved $15.9 million USD in reduced rig time, mud additives and casing costs.

Optimizing wellbore stability for safety, speed, cost

If not understood, pore-pressure and wellbore-stability issues can lead to costly equipment failures and nonproductive time. Risks include stuck pipe, lost circulation, wellbore collapse, blowouts, safety, environmental consequences and production loss.

To help avoid such problems, Halliburton geomechanics specialists predict how your target will respond to drilling with Landmark Drillworks® software. It provides an integrated pore pressure and geomechanical solution that helps achieve higher levels of risk reduction, cost savings and improved drilling performance.

Safe, reliable design for extreme environments

Halliburton Consulting routinely designs systems that keep oil and gas flowing even in extreme environments using Landmark WELLCAT™ Casing and Tubing Design Analysis software. Its advanced capabilities help Halliburton:

- Simulate fluid and heat transfer during completion, production, stimulation, testing, and well-servicing operations
- Analyze tubing loads and movements, buckling behavior, and design integrity
- Predict pressure and volume changes due to annular pressure buildup.

Next-generation real-time capabilities

Halliburton also takes well design into execution with real-time operating centers. Our integrated workflows help optimize drilling operations by connecting multiple capabilities. From bit and bottom-hole-assembly design to fluids, geomechanics and directional drilling, Halliburton can help you monitor and optimize operations more efficiently and reliably than ever. As always, Halliburton strives to help ensure safe, efficient drilling and well construction operations.
Managing change

When improving productivity involves people, processes and technology, getting to the next level can be challenging. A Middle East oil company wanted to improve field productivity and reservoir management efficiency. To do that, the company knew it would have to adopt new workflows and roles enabled by new technology. (See Digital Oilfield on page 20.)

Halliburton Consulting designed a pilot program around 50 wells in an existing field. Halliburton re-engineered workflows, built a real-time center, installed Landmark DecisionSpace® Production software, and deployed Pinnacle instrumentation for well monitoring and WellDynamics® technology for well control.

Instead of managing change via an external communication program, Halliburton used an internal “Do and Change” approach based on collaboration and technical coaching. This accelerated buy-ins and hand-overs of the new workflows. Among other things, the ability to monitor and optimize production in real time helped the company increase production by 7%. Its recovery factor also increased 4X. Well downtime was cut by 30% and the water cut dropped from 56% to 20%.

SUCCESS STORY

Cutting the time from discovery to production in half

A large European oil company with assets in the North Sea had more drilling opportunities than it had staff to take advantage of them. They needed to find a way to work more efficiently. Their goals: reduce the time from discovery to production from five years to 2.5, and increase the number of wells drilled per rig per year from three to five.

The company approached Halliburton for help in identifying and implementing performance improvements. After thorough analysis, development of key performance indicators, and process changes, the company is on track to achieve both objectives. Improvements have come from the ability to track job performance better, a reduction in hand-off time between groups through better project management, and planning wells and fields simultaneously. The company has hired Halliburton to help deploy their new practices to operations in nine other countries.

Developing skills needed to grow in new areas

A large South American national oil company wanted to double production in 10 years. It acquired deepwater assets even though it had no experience offshore. The company hired Halliburton to develop workforce competencies and deepwater processes.

After creating a process model for deepwater exploration, development and production that included real-time capabilities, Halliburton developed a deepwater curriculum. Students spent four months receiving intensive instruction from Halliburton’s deepwater experts. At the end of the course, they created a deepwater field development plan used in the real world. Today, the company is successfully developing several offshore assets, continues to consult with Halliburton, and uses many other Halliburton services.
Project management services that maximize your efficiency – any way you want them

Whether you just want help coordinating projects, a full turnkey solution, or something between the two, Halliburton can help.

Professional coordination
Some clients want to make all financial and operational decisions themselves, but want the efficiencies that expert project management provides. For these clients, Halliburton offers Integrated Services (IS) on a time-and-expense basis.

Turnkey accountability
Other clients want a turnkey solution. They want to outsource construction of entire wells from drilling to completions. For these clients, Halliburton offers Integrated Project Management (IPM). In IPM projects, Halliburton assumes all financial and operational responsibility to deliver a finished well at an agreed-upon price. From start to finish, Halliburton collaborates with you to ensure that wells meet your specifications.

Fast-track solutions
Sometimes clients want to retain control over financial and operational decisions, but need help designing and constructing the well. For them, Halliburton offers Fast-Track services in which our consulting and project management groups work together under the supervision of the client to deliver the well.

A single point of contact
Regardless of how you want to work together, Halliburton Project Managers provide a single point of contact responsible for coordinating logistics, scheduling and daily reporting. Halliburton can also provide more advanced services, such as drilling and completions planning, contingency planning, financial tracking, performance optimization and HSE management. Halliburton can even catalog lessons learned to help ensure that your next well costs less than your last.

Additionally, as part of IPM services, Halliburton can manage third-party services, such as wellbore and civil engineering; regulatory approvals and compliance; procurement; rig contracting; and wellsite services such as security and living quarters.

Improving service quality and operational efficiency
Our professionals have experience in offshore and land-based drilling and completions. The cost of project management professionals is usually returned many times over in project savings. They communicate with all vendors 24/7 to ensure smooth handoffs and safe operations. Their goal: ensure the right people with the right knowledge are in the right place at the right time with the right equipment – ready to do their jobs.

Leaders and catalysts
Halliburton project management professionals all have many years of client-side, well-engineering and/or management experience. Halliburton does not hire project managers and teach them about oil and gas. Halliburton hires professionals with decades of oilfield experience and teaches them about project management. All receive Project Management Institute training and many go on to become Certified Project Managers. They are catalysts who can build and lead oilfield teams to achieve results, whether those teams consist of other Halliburton people or third-parties.

SUCCESS STORY
Fast-track development makes more fields economical
A large national oil company that traditionally hired multiple vendors to provide a series of discrete services was frustrated by the time it was taking to plan, drill and complete wells. They awarded Halliburton a contract to provide directional drilling and logging-while-drilling services, surface data logging, drill bits, hole enlargement and coring services, cementing and pumping services, drilling and completion fluids, completion services, multilateral junctions, SmartWell® completion systems and VersaFlex® expandable liner hangers.

The operator also hired Halliburton Project Management IS to coordinate all these services. Through increased efficiency, IS reduced the time from sanction to production. The company also found that lower overall project costs allowed it to develop marginal oil discoveries that would have been uneconomical using traditional contracting models.

SUCCESS STORY
Unlocking one of the world’s largest gas fields in remote deep water
When our client discovered an estimated 17-30 trillion ft³ of natural gas offshore Mozambique, the country had no oilfield infrastructure. Validating the discovery proved to be a logistical challenge. There is only one deepwater port capable of supply operations in the entire country and it is eight hours from the discovery. The available staging area was crosstown and the roads were not built to handle heavy oilfield equipment. After extensive planning, Halliburton IS brought in crews, bulk and portable repair facilities, drilling fluids, completion fluids, cement, plugs, lab facilities, cleanout tools and more to support the drilling of eight wells. All the planning paid off; there were no significant delays for equipment or supplies during the program and the client proved it had one of the world’s largest natural gas fields.
Halliburton Project Management delivers hundreds of wells each year throughout the world by solving complex challenges with step-and-repeat processes.

Good project management requires far more than managing logistics. To produce exceptional results, it also requires a thorough understanding of geology, well engineering, industry best practices and oilfield technologies.

Efficiently integrating resources

Our project managers work closely with every part of Halliburton. As leaders of a highly qualified team with global experience, our project managers understand how the many pieces of your project are connected. They also understand which resources to marshal for any given challenge and how to coordinate them for your maximum benefit.

Applying breakthrough technologies

Halliburton consistently ranks as an industry leader in industry best practices and oilfield technologies. Applying breakthrough technologies could benefit your project.

Drilling and completing wells faster

By maintaining a core group on your project, Halliburton can apply lessons learned on one well to the next well. In a south Mexico HP/HT reservoir with severely depleted zones, Halliburton cataloged 50% such lessons. They reduced average drilling time from 165 days per well to 68, and average completion time from 35 days to seven. (See SPE 102228.)

Accelerating development of one of world’s largest oil fields

In the Middle East, the operator of one of the world’s largest oil fields hired Halliburton to drill and complete up to 185 oil production, water injection and evaluation wells on a lump-sum, turnkey basis. Halliburton started the project with three rigs and delivered more wells each year than the contract stipulated. As a result, the operator expanded the scope before the first phase of the contract had been completed. Halliburton provides drilling rigs, directional and horizontal drilling, logging while drilling, cementing, mud engineering, wireline logging, completion, perforating, and other well construction activities, including engineering and management of all drilling operations. Halliburton has provided services to the operator for nearly 70 years.

SUCCESS STORY

Reversing declining production by accelerating drilling with IPM

Since 2008, Halliburton has collaborated with a large Latin American national oil company on a 58-well, $683 million USD project. The contract calls for Halliburton to drill and complete each well for a lump sum using rigs supplied by the operator.

The well conditions are challenging. They include depressurized and HP/HT formations, complex geologies and tremendous depths. The wells range from 5,000 to 7,000 meters and require unbalanced or managed pressure drilling. Despite the challenges, Halliburton IPM has delivered the targeted number of wells each year on time, on budget. As a result, the operator has expanded the contract’s scope by increasing the number of rigs allocated to us from 7 to 12. Contributing to the success: excellent collaboration with the client, integrated project management and a Halliburton-managed real-time operations center that optimizes work on all rigs simultaneously.

SUCCESS STORY

Accelerating development of of one of world’s largest oil fields

A European national oil company (NOC) wanted to reverse declining production by shortening the time from discovery to production. They contracted with Halliburton to provide integrated project management, consulting, drilling, completions, cementing, and fluid services.

Working closely together, the client and Halliburton Project Management have reduced costs by standardizing equipment and work processes, and focusing on reservoirs that are easy to tie in to existing host platforms.

Under this fast-track contract, Halliburton is now helping the client deliver wells ahead of schedule and on or below budget. So far, this approach has been responsible for the discovery of hundreds of millions of barrels of oil at remarkably low recovery costs. “The focus on fast-track development has been a complete success,” says the client. “Normally, these fields would not have been profitable. Yet, now we have incredibly profitable production. Some of the fields will break even at only $30 a barrel!” The client now aims to deliver five new fast-track projects per year.

SUCCESS STORY

Preparing for fast-track projects

A Middle East NOC hired Halliburton to drill and complete 145 wells in five years on a lump-sum turnkey basis. The NOC previously used a variety of vendors on each well. By providing integrated services, Halliburton was able to keep crews together, enhance communication, and follow established processes.

Halliburton cut NPT by approximately 50% and has not had one recordable safety incident during the first four years of the contract (from day one to the date of this writing) – while honoring a mandate to use 45% local content.

The client is saving 20% on drilling costs. Even more impressive: the average well pays for itself in only four to five days due to high production rates.

Several hundred MBOE at recovery costs between $30 and $50/barrel

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Reducing NPT and drilling costs leads to 5 day payback on new wells

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Trinidad Drilling and Halliburton have established a joint venture, Trinidad Drilling International, to take high-performance drilling to the next level on Halliburton-managed projects.

New level of integration between rig and service providers

Trinidad Drilling is a major, vertically-integrated, drilling company headquartered in Calgary. Trinidad’s advanced manufacturing facilities and high-performance drilling services combined with Halliburton’s leading-edge technology and project management capabilities will provide a new level of integration and performance rarely seen on land rigs.

Exclusively top-tier rigs

Thirty to 35% of drilling costs are related to rigs. Improving rig capabilities can substantially reduce drilling costs and reduce risks, resulting in more predictable well costs. Drilling operations in North America have proven that new-generation drilling equipment can drill faster and with better results. Halliburton Project Management will utilize top-tier rigs from the Trinidad Drilling International joint venture to deliver performance gains for our customers. Unlike other companies, the joint-venture’s fleet will consist primarily of top-tier rigs that feature service-provider integration typically found only offshore.

Halliburton and Trinidad, through the joint venture, will further integrate Halliburton services into the rig design. It will enhance crew collaboration, expedite rig transport, improve drilling performance and increase rig reliability.

High-end features deliver wells faster

These rigs will deliver wells faster and enhance crew safety. All rigs feature high-horsepower mud pumps, AC electric variable frequency drive power, high-torque top drives, and fast moving capabilities. Additionally, they will be outfitted with ancillary equipment like iron roughnecks, hydraulic catwalks, BOP handling systems and pipe-handling machines.

Unconventional and mature fields

Trinidad Drilling International rigs will be rated principally from 1500 to 2000 horsepower. They have been designed specifically for horizontal drilling generally found in mature and unconventional plays. Halliburton and Trinidad’s initial focus will be on Middle Eastern and Latin American markets.

Efficiently managing entire portfolios of workovers by preparing for the unexpected

Halliburton Project Management mitigates risk with thorough analysis, contingency planning, and access to one of the industry’s deepest pools of expertise and resources.

Workovers can be highly unpredictable. Efficiency depends on being able to react quickly to unpredictable events.

Resources for any contingency

Through access to a wide range of in-house services, equipment and expertise, our project managers can help you prepare for and efficiently manage any contingency. As one of the world’s largest oilfield service companies, Halliburton can handle the vast majority of potential issues you might encounter. However, when outside expertise is needed, Halliburton project managers do not hesitate to hire third parties.

Outsourcing a business process

Mitigating risk requires thorough analysis and contingency planning. Halliburton manages large workover portfolios on a multi-year basis – from field operations to the entire business process. Halliburton Project Management, as an example, has earned a reputation for workover efficiency in the Middle East, where clients have some of the world’s largest workover needs.

With or without rigs

In new wells and old, Halliburton can help you stimulate and complete wells, manage interventions and wellhead maintenance, install electric submersible pumps, reduce water cut, ensure well integrity, deepen wells, develop sidetracks and much more.

Benefits

- Enhanced crew collaboration
- Improved well-delivery performance
- Reduced well-construction costs
- More predictable results
- Improved crew safety
- Expedited rig transportation and mobility

SUCCESS STORY

IPM improves efficiencies, saves $500,000 USD per well

To improve its drilling efficiency, reduce its nonproductive time and improve cost controls, a large Latin American NOC outsourced construction and completion of several wells. Halliburton used real-time operations to improve teamwork, new bits to increase meters drilled per hour, managed-pressure drilling to penetrate highly depleted formations, ultra-light cements to eliminate squeeze jobs, and specialized BHA systems to eliminate extra wiper trips. Halliburton also established benchmarks for efficiency, introduced new cost-tracking programs, thoroughly integrated all suppliers, and retained the same team throughout the campaign. Compared to wells that Halliburton previously drilled in the same area, Halliburton project management further reduced drilling and nonproductive time 10 to 15% and total costs per well 5 to 10%. That saved the client an average of $500,000 USD per well.

SUCCESS STORY

Ready resources save IOC $10-$15 million on P&A project

A large IOC was pulling out of a North African country, and needed to plug and abandon several wells. However, they didn’t have the expertise in-country to do the job themselves. Because Halliburton had all the necessary resources nearby, they hired us to do the job.

Through thorough risk analysis, flawless execution, and ready access to a vast array of resources, Halliburton saved the client an estimated $10 to $15 million USD compared to what it would have cost them to mobilize resources and do the job themselves.

SAVED $500K PER WELL

SAVED $10-$15 MILLION
Simultaneously minimizing cost and risk in an uncertain environment

Experienced Halliburton P&A specialists can minimize potential liabilities and costs – even when there are many unknowns.

By the time most wells are ready to abandon, they could be 30 to 50 years old – or more. Often, clients lack information about how wells were constructed, i.e., what steel was used, where the cement is, or what fluids are in the annuli. Current conditions inside the well may also be unknown.

Cost and risk without reward: The P&A dilemma

These uncertainties increase financial and technical risk. They also make cost control difficult at a time when operations have no current economic value. Complicating matters: Plugging and Abandonment (P&A) regulations can vary dramatically from country to country. Poorly plugged wells create potential conduits for fluids to migrate between formations, into fresh water aquifers or the wellbore. Left that way, they could provide pathways for hydrocarbons to seep to the surface and escape to the environment. Plugging wells correctly avoids the potential future liabilities caused by environmental damage and non-compliance with legislation.

A complete and innovative tool-box

A group within Halliburton Project Management specializes in P&A and has developed a disciplined three-pronged strategy for mitigating uncertainty, risk and unexpected costs. Halliburton develops an inventory of all possible risks, identifies actions to mitigate each, and thoroughly rehearses teams on each contingency before a P&A project commences.

Having ready access to Halliburton’s entire toolbox prepares us for any eventuality. Plus, innovative new Halliburton materials and tools help increase plugging quality while mitigating risk. For instance, the Xaminer® Electromagnetic Casing Tool can quantify corrosion (both radially and longitudinally) through two concentric rings of tubulars and characterize it qualitatively through a third – without pulling the inner strings.

More experience than any other P&A team in the world

Halliburton Project Management has successfully managed P&A projects around the world. As P&A activity increases, it’s important to make sure experienced people who can handle any contingency are handling your job in a way that meets or exceeds local regulations.

Geothermal challenges

Compared to oil and gas formations, geothermal formations are hot, hard, abrasive, highly fractured, under pressured and boiling with corrosive fluids. These conditions make drilling and completing wells difficult. Stuck pipe is common. Lost circulation is frequent and severe. Bit life is short. Cementing is difficult. Gases such as carbon dioxide and hydrogen sulfide limit casing choices and increase safety risks. Casing corrosion and scaling create the need for frequent workovers. All of these factors increase costs and make expert project management paramount.

Biggest geothermal provider in world’s biggest geothermal market

Halliburton has developed special techniques for drilling and completing wells in such formations. In Indonesia, which has 40% of the world’s geothermal reserves, Halliburton drills and completes more geothermal wells than any other service provider, and has more than 60% market share.

Gas storage challenges

Gas can be withdrawn from salt caverns faster than other types of storage. This makes them useful for unexpected demand surges. However, unlike depleted reservoirs (also used for gas storage), salt caverns must be constructed, completed and tested.

Efficient, new market alternative

To create cavities of the right size and shape, directional drilling may be required – a Halliburton specialty. Following creation, the caverns must be converted and re-completed for gas storage and extraction. Finally, an even bigger challenge: testing, certifying and monitoring the cavern’s integrity. Until recently, only specialty engineering companies created these facilities, using a variety of subcontractors. As the only integrated service provider in this business, Halliburton can create exceptional efficiencies across all services, phases of construction, and preparation. On a recent 10-cavern job in the UK, local regulators lauded Halliburton’s work and used it as an example of how to do things right.

Sixteen well P&A project comes in 30% under budget

A large IOC operating in the North Sea hired Halliburton to plug and abandon 16 wells. Many technical challenges were evident, including an instance of tubing collapse, making it impossible to pass a mechanical plug through the restricted zone. Working in close collaboration, Halliburton and the client decided to use innovative, new Halliburton plugging materials that could be pumped and spotted using coiled tubing. Innovative Halliburton logging tools were also able to show that the shale formation behind the casing had completely sealed off the annulus, saving the client a costly and technically challenging remedial cement job. As a result of innovation, preparation and close collaboration, the project came in 30% under budget.

Geothermal drilling performance advantage

To power its economy with clean, sustainable energy, Indonesia has stepped up production of geothermal power. Today, the country could not meet its electricity needs without geothermal. Special drilling, cementing, completion and project management techniques that Halliburton developed enable us to drill more than 20 geothermal wells in Indonesia each year. Because Halliburton has learned how to radically reduce borehole instability issues such as stuck pipe incidents, Halliburton drills geothermal wells 20-40% faster than competitors. As a result of superior performance, Halliburton recently won a 34 geothermal well project – the largest in Indonesia, which is the largest geothermal market in the world.
Halliburton can help you improve production in the short term and ultimate recovery in the long term with new completion technologies and workflows.

Optimize field development and production in real time

Real-time production surveillance systems, SmartWell® technologies, remotely operated chokes and valves, and intelligent workflows. These are the tools of the Digital Oilfield (DOF). They enable you to process the steady streams of information flowing into control centers and act on what you see before production suffers.

Visualize, analyze, monetize

A good example of how all these technologies can work together is in a large Middle Eastern oil field. To help visualize the flow of data, Halliburton designed and built a state-of-the-art real-time center and installed automated workflows that:

- Multi-phase flow metering
- Water cut metering
- Liquid rate metering
- Surface choke settings, control, pressure
- ESP monitoring and Variable Speed Drives
- Gas-lift measurement and manifold control
- Water injection flow rate monitoring
- Smart wells
- Distributed temperature sensing
- Remote terminal units
- SCADA systems

State-of-the-art

To analyze the flow of data, Halliburton designed and built a state-of-the-art real-time center and installed automated workflows that:

- Monitor key production parameters
- Allocate production
- Provide production surveillance
- Analyze production losses
- Distribute reports
- Visualize and analyze the reservoir
- Optimize gas lift
- Optimize water sweeps
- Evaluate well and reservoir performance
- Monitor and diagnose pumps

DOF Benefits:

- Enhanced ultimate recovery
- Improved field economics
- Faster reaction time when production issues arise
- Improved staff productivity
- Real-time optimization
- Flexibility and scalability for future
- Better field development plan execution

Getting the most from your field development plan

The ability to visualize and analyze issues, coupled with real-time controls, gives your production and reservoir engineers the ability to alter pump rates, gas injection, water flooding and more to optimize production and increase ultimate recovery. In addition to providing raw production data in real time, the systems also help diagnose problems and suggest the most profitable courses of action. Increased production from the field paid for the state-of-the-art real-time center in less than two years. The field is expected to produce for another 50 years.

Future-proofing the oilfield

When designing digital oil fields, Halliburton simulates different scenarios to predict what the most likely needs will be in the future. For instance, will surface systems suffice if you get better-than-expected production? Halliburton can then build flexibility and scalability into the field development plan to support likely scenarios.

Field development planning should also encompass the life-cycle of an asset. As an industry leader in SmartWell®, real-time and other oilfield technologies, Halliburton knows where technology is heading. Halliburton can help you develop field plans aligned with technologies which may not even be commercialized yet.

Success story

New production workflows lead to 7% daily production increase

A typical day in the life of a production engineer working in the digital oilfield above begins with a review of each well’s production in the last 24 hours. Automated alarms in the real-time center alert the engineer to developing issues. Automated workflows help monitor key production parameters, analyze production losses, evaluate impacts of potential solutions, determine how to implement decisions quickly, and distribute reports. The system even includes artificial intelligence techniques like neural networks and fuzzy logic to learn from the field’s operating history. The real-time center gives all specialists a unified environment in which to collaborate and make better, faster cross-functional decisions. Experience to date indicates that automated workflows and the real-time center have improved daily production in this field by more than 7% on a sustainable basis. A happy client calls this “the future of oil production.”

Reservoir workflows add another 6% to recoverable reserves

In the same digital oilfield (see story on left), reservoir engineers begin their days much like production engineers. However, reservoir engineers use other workflows that optimize the entire reservoir, not just individual wells. These workflows help them closely monitor water injection, and changes in the field’s production and reservoir pressure. They enable engineers to quickly recommend changes in reservoir management to help improve sweep efficiency and overcome problems related to water channeling. The goal: identify “stranded” pockets of oil and develop strategies to mobilize this oil toward producing wells. Evidence to date indicates that automated reservoir management will add at least 6% to recoverable reserves. Higher production has already paid for the real-time center and workflow development in less than two years.
Halliburton real-time technology does more than let people see what’s happening at a rig site; it’s an essential tool that enables performance improvement in virtually every aspect of oilfield operations.

The right information at the right time

Halliburton makes sure that the right people get the right information at the right time in the right place and in the right format to make the best decisions possible. For instance, when drilling, Halliburton can create a high-resolution picture of the area around the bit and update earth models in real time to help you stay in the sweet spot. When fracturing, Halliburton enables clients to monitor variables, such as pumping rates, pressure readings, and proppant volumes, in real time. Clients can also see frac planes propagate as each job progresses. This helps ensure that fracturing stays in the reservoir and away from water-producing zones. Clients can see the extent, direction and density of frac networks in 4D. Halliburton’s digital oilfield technologies (see page 20) enhance customers’ abilities to increase production and reduce operating expenses.

Real-time optimization of oilfield operations

Halliburton real-time technology enhances data collection, communication, collaboration and control. As data flows in, our technology enables companies to simultaneously monitor, visualize, analyze and optimize most oilfield operations. This real-time capability can reduce the cost and improve the quality of field development planning, drilling, logging, sampling, cementing, completions, interventions, fracturing, production and more. By integrating information in ways that would be difficult on site, you can make better decisions faster in every step of well construction or production supervision.

Customized for your needs

Halliburton can tailor your real-time experience to meet your exact needs and budget. Halliburton offers far more than simple remote connectivity. Halliburton offers:

- The ability to integrate and analyze wellsite data using software from Landmark, Sperre, Pinnacle and others
- Complete integrated workflows that help drill wells faster and more safely
- Knowledgeable consultants who can help you operate systems and interpret information on the fly

Tight integration with other Halliburton services

Compared to other companies that offer simple connectivity, Halliburton offers a wealth of oilfield experience with our real-time technology. In deep water, that expertise can help prevent simple problems from turning into very costly problems. In high pressure and high temperature situations, Halliburton can help you stay safely in control. In unconventional, Halliburton can drive down supervisory costs for factory-drilling operations.
Halliburton Integrated Field Labs begin with detailed subsurface analysis and modeling. Field trials follow in a small, representative area to help identify the optimum combination of technologies, processes and strategies before full-scale development.

**Ideal for low-producing and complex reservoirs**
Integrated Field Labs reduce field development costs and risks by optimizing field strategy in a small area before rolling it out field wide. This approach to learning is ideal for:
- Low-producing conventional reservoirs
- Unconventional reservoirs
- Wherever production has not met expectations
- Fields with low recovery
- Fields that are candidates for secondary and tertiary recovery

**Rapidly identify best approach and technology to optimize production**
Integrated teams facilitate quick collaboration across disciplines. These teams use an iterative, scientific approach. They thoroughly review all existing data. Then they acquire new information, if needed, to fill gaps. After developing a hypothesis, they experiment, refine their plans, experiment more, compare results, and make final recommendations.

This approach rapidly identifies the optimum combination of technologies, processes and field management strategies for any given area – before spending hundreds of millions of dollars.

Typical applications include complex, mature and unconventional reservoirs, as well as secondary or tertiary developments. This methodology works almost anywhere except deep water. There, the economics of testing iterations simply become too expensive.

**SUCCESS STORY**

**100X production increase in complex reservoir**
An Integrated Field Lab helped a North American operator increase production from a complex reservoir plagued by low recovery since its discovery. Issues included low permeability, poor porosity, poor continuity, and high temperatures and pressures. The average well produced only 40 BOPD and had a life span of just one year.

Halliburton’s Integrated Field Lab led to a new conceptual design for development wells. In a field test, the first well initially produced 4,300 barrels of oil per day (BOPD) – 100X more than previous wells. Sustained production was 25X greater. The well produced 270,000 barrels in just seven months, paying for itself in that time. The operator extended Halliburton’s drilling contract and gave Halliburton six more rigs in less than a year.

**SUCCESS STORY**

**More than 4X increase in heavy oil production**
A developing, extra-heavy oil field of a North American client was producing 30,000 BOPD. Individual wells averaged a baseline of 240 BOPD. The company asked Halliburton Consulting to evaluate different ways to improve production.

After thorough examination, Halliburton recommended a pilot project that alternated steam injection (three to five cycles). Average production per well increased from 240 to 1,170 BOPD – a 387% increase. Thirty to 40 barrels of oil were recovered for each ton of steam injected. After obtaining these results, Halliburton created a field development plan that the client is now implementing.

**SUCCESS STORY**

**Beneficial before large capital expenditures**
An integrated field lab is not a first step; it is best used after collecting basic data. It can be especially beneficial prior to a large capital expenditure. It helps ensure that the least number of iterations are required to achieve the desired results. It also helps ensure that the best suite of tools for any given job is deployed.

**Unique combination of expertise**
As part of Halliburton, our consultants have deep experience with a uniquely broad range of tools and technologies. In a field lab, these consultants also work side by side with our project managers who have extensive client-side experience and the ability to ensure plans are implemented properly.

Together our consulting and project management groups comprise one of the few teams in the industry with the expertise to manage entire fields.
Providing the insights needed to optimize drilling, completions and reservoirs

Accurately predicting how formations will react to drilling, completions and stimulation is necessary to maximize safety and recovery while minimizing NPT. Halliburton Consulting provides experts with hundreds of years of combined experience in geomechanics.

Halliburton consultants build reliable geomechanical models that help you improve the drilling and completion of wells, the management of reservoirs, and ultimate recovery.

Reducing Drilling Hazards and Costs

The more challenging the environment, the more important accurate predictions become. Bad geomechanical assumptions cause almost half of the drilling-related nonproductive time in HP/HT and deepwater environments. Stress, rock strength and fault analyses influence well location, trajectories, stimulation design, and safety mitigation. Wellbore stability and pore pressure analysis determine the mud weights and fluid types needed to safely drill without kicks, stuck pipe, other costly delays and safety incidents.

Completions that maximize recovery

Geomechanics also affect completions. Understanding pore pressures, flow rates, rock strengths and weak zones helps planners manage sand production and place perforations to maximize oil or gas production. Knowing stresses, stress directions and mineralogy helps them understand how fractures will propagate so they can maximize reservoir drainage.

Optimizing reservoirs

Porosities and fractures affect well spacing and layout during field development planning. Later in the life of an oil or gas field, fluid depletion can induce compaction, cause subsidence, change permeability, and reactivate faults. Without proper planning and mitigation, these changes could cause casing collapse, choke off production, fracture cap rocks, affect the operation of surface facilities and strand large deposits of hydrocarbons.

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What makes us different?

On the preceding pages, you have seen examples of what Halliburton does, how Halliburton does it and the results Halliburton achieves. But there are many good consulting and project management organizations in the world. They all have success stories.

What makes Halliburton better?

- Global support, global insights and global best practices
- Broader, deeper experience than smaller competitors
- A refreshingly collaborative experience compared to large competitors

Halliburton Consulting and Project Management listens, learns and delivers results that meet your needs. We also offer the resources of one of the world’s greatest oilfield service companies. Halliburton professionals can help you:

- Understand new technologies that alter production possibilities
- Understand development costs for reliable economic projections
- Deliver what we recommend
Sales of Halliburton products and services will be in accord solely with the terms and conditions contained in the contract between Halliburton and the customer that is applicable to the sale.