

Enlightening energy

Photo: Oleg V. Vystanov / Shutterstock.com

CONSULTING

140 MNOK saved for the customer

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Introducing

This is the first edition of add value and our aim is that you will feel enlightened and energized after reading it. We in add energy are very happy to finally be able to communicate with our clients and partners through this magazine which will be distributed bi-annually. It is our hope that it will serve to add value to our business relationships going forward.

Text: Stig H. Christiansen, CEO
Photo: Ørjan Gjedrem

PRESENTING ADD ENERGY GROUP

add energy was established through 2008 and formally launched in late November 2008 – only about 10 months ago. Since then we have worked hard and with focus and commitment to integrate the group, market the group and position ourselves strategically. The financial turmoil has added challenges to the execution of these activities, but it has also reinforced the rationale for having to do them. **Our vision is to be a preferred supplier of competence and innovative solutions in niches of the energy market.** add energy is accordingly organized in three business areas – respectively *Consulting*, *Drilling & Production* and *Energy & Environment*.

The core competence, experience and deliverables in these three business areas will be presented later in add value. Being established with the ambition of being a *competence house* as a key driver, we have in addition to the operating business areas even established add academy as a separate training, learning & documentation unit within add energy. A more in-depth coverage is found later in add value.

In the years ahead, it is our goal to grow the size and quality of add energy further. This will be done in a focused and stepwise manner, by combining organic development with business development, mergers & acquisitions and selective internationalization. Looking for and tying up with strategic partners may also be a key building block in this effort.

PERSPECTIVES FOR THE FUTURE

There is little doubt that the financial crisis that was unleashed with the collapse of *Lehman Brothers* exactly one year ago – in September 2008 – took the world by surprise. Not that it is surprising that the world moves in cycles, but the timing and the triggering events always come as surprises. Since then the world has moved into the worst recession in decades with a subsequent drop in the oil demand and thus oil price, which consequently resulted in a hefty effort to adjust the speed to the changing surroundings. In this case falling cash flows, and thus postponement of projects, cancellation of projects and cost cutting exercises.

After a rocky ride for many industry players during Q4 2008 and the first half of 2009, it now seems as though things are starting to stabilize and look more optimistic. The lagging effects in our industry should not be underestimated though, and that may mean that we still have a period ahead of us still with moderate and volatile activity and margin levels.

However in a longer perspective, it is clear that we have decades left with high industrial activity in the oil and gas business. We are looking forward to continue to position and steer add energy group ahead to the future. æ

“... combining organic development with business development, mergers & acquisitions and selective internationalization. Looking for and tying up with strategic partners may also be a key building block ...”

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NEWS IN BRIEF

Corporate Marketing & Innovation

AS PART OF ADD ENERGY'S NEW BUSINESS ORGANIZATION EFFECTIVE as from September 1st 2009, we have created a new function – *Corporate Marketing & Innovation* – that will be headed up by Kjell Terje Roverud. *Corporate Marketing & Innovation* will have two central goals in focus. The first being to assure that add energy becomes proactively more visible and active in the market place in order to both grown and develop our business and to attract and retain the best competence. The second being to assure the continued development of add academy. The business unit add academy will build on the strong basis that was developed over years in add upstream and add safety within Documentation for Operation, Simulator operations and training and specialized safety advisory and support. Ted M. Pettersen will become Manager of add academy and he will report to Vice President *Corporate Marketing & Innovation* Kjell Terje Roverud.

add energy is searching for Sales Manager – Consulting

IN ORDER TO STEP UP OUR SALES ACTIVITIES AND MARKET VISIBILITY, we need to strengthen our team with a: *Sales Manager – Consulting*. Your main responsibility will be to actively contact and visit our customers and potential new customers in Norway and abroad to map and understand their needs for competence and consulting. You will follow-up inquires and leads, submit proposals, negotiate contracts and close out deals. You will participate in marketing events, conventions and seminars and promote additional services and solutions that the group provides. You will work in close relationship with our recruitment and resource persons, liaise with our consultants and report to the Vice President - Consulting. Think you can handle this? Then see: www.addenergy.no for further details

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Concept and design: F A S E T T

Steen Tino Svenningsen,
Senior Completion Engineer
Consulting



Consulting

140 MNOK saved for the customer

I am a normal indian who helps the chief, says Completion Engineer Steen Tino Svenningsen. He is not after a feather in his hat – he is just doing his job.

Text: Ingveig Tveranger

Side Pocket Mandrel – SPM

A small side pocket mandrel/SPM is put in the well's production tubing, and a valve is placed in it. By using this equipment nitrogen can be pumped in the well through the production tubing and force the fluid in the well up on the outside of the production tubing. Surge pressure is created to get the well flowing. This is a creative solution to a difficult problem. The normal solution involves use of coiled tubing for displacement of well fluids. Time and money saves millions, and the new concept is much more effective, says Svenningsen.

Steen Tino Svenningsen has delivered beyond expectations. He had an idea which has saved the customer for at least 140 MNOK. The Dane is Senior Completion Engineer with responsibility for planning how a well is prepared for production.

CREATIVE INNOVATION It is a well known challenge when the pressure in the reservoir is not high enough for the well to start the production on its own. Good advice is often very costly. Svenningsen suggested a solution which required less equipment and which could be implemented in a shorter time, the Side Pocket Mandrel (SPM).

I do my job but I hope that this will strengthen add energy's reputation in the marketplace, says Svenningsen.

DROPPED OUT The experienced consultant has a mixed background: *As a 13 year old I was so sick of school that I dropped out and started as a butcher's assistant, says Svenningsen. Then*

he completed his education as blacksmith. A while later he attended marine engineer school at home in Denmark – an education which has many common features with engineering education.

LOVE OF ADVENTURE AND UNDERSTANDING OF CULTURE The Dane who commutes weekly from Jylland to Stavanger has visited so many countries that he has lost count. The machine engineering career took him out in the world, and he has driven his motorcycle from Denmark to Australia. The most dramatic was actually as a young seaman on Jersey outside New York. *A friend and I ended up in a black neighborhood with threatening gangs. The police had to escort us out with a taxi, Svenningsen remembers.*

TALKS WITH EVERYONE *I have travelled for half my salary for many years, talked with everyone and adjusted to different environments and cultures. Together with diverse experiences this makes me creative and innovative, Svenningsen concludes. æ*

Consulting – Focus on Safety & Operations

Specialized competence in clients organization

OUR INSTRUMENT TECHNICIANS, process technicians and control room operators are dressed in customers' coverall performing their work carefully and diligently by adjusting production flow, collecting fluid samples from the oil stream, bleeding off pressures or responding to alarms, or merely being there to provide advice and tutoring.

THEY ARE THE CORE of production operations – a service that is appreciated amongst our customers who see the value of having competent people operating their revenue stream. We have been told that repeated production increases were noted when our people were on shift!

IN ORDER to be able to develop a safety culture in an organization or project, it is important that safety measures are not left lying on a desk or in a drawer. The measures must be incorporated in routines and systemized in the whole organization. Our offshore Safety Coaches are there to influence the behavior of the rig crew and work practices in order to achieve better safety results. They spend time with the crew and lead by example, rather than spending time behind a desk with administrative work.

OUR ONSHORE HSE ADVISORS perform safety and risk analysis with active follow-up of actions to make everyday life safer. Unfortunately, it happens that they have to participate in accident investigation teams to map the facts and use their experience and knowledge to find the root causes. æ

Text: Terje Løkke-Sørensen
Vice President
Consulting



Drilling & Production

Designing safe wells and Know-how to drill them – plus the way of efficient and safe production

THE BUSINESS SEGMENT DRILLING & PRODUCTION within the add energy group comprise key elements in the oil industry; designing safe wells and how to drill them, and the way of efficient and safe production. add energy group will focus on niches within these areas of our industry giving valuable solutions to the operators and the industry in general.

AS ONE OF THE EXPERTISE NICHES in Drilling and Production, add energy offers petroleum services focusing on transient multiphase flow analysis for production, drilling and well control applications. We add value to our customers through our technology, expertise and experience.

ADD ENERGY IS A LEADING GLOBAL PROVIDER of transient flow calculations for well control incidents and for contingency planning. Our company has been involved in several blow-out control projects, including offshore and onshore operations, relief well kill, deepwater operations, shallow gas and water flows, cratered or broached blowouts.

ADD ENERGY'S POSITION IN THE INDUSTRY is unique due to the combination of highly competent personnel with onsite experience together with use of a state of the art transient flow simulator. The experienced personnel has background within multiphase, transient flow simulations, fluid mechanics engineering and research, computer programming, mechanical engineering, drilling, completions and work-over engineering and reservoir engineering. æ

add energy is providing:

- Transient multiphase flow analyses
- Blowout contingency planning
- Flow assurance and production optimization
- Well kill analyses and onsite support

Text: Dr. Ole B. Rygg
Vice President
Drilling and Production



▼ Relief-well rig in foreground and problem-well rig in background (see page 14–15). Photo: add wellflow as



Well control evaluation as an integral part of well design

DRILLING ENGINEERS face a series of challenges when planning for today's drilling operations. The challenges include deepwater drilling, shallow water or gas flow problems, high pressure and high temperature, tight drilling pressure margin or under-balanced/managed pressure requirements.

In addition to the technical challenges, economical constraints force the engineers to constantly seek solutions aiming at reducing overall cost. In doing so, the casing design may also be questioned and altered. Examples of well design changes influenced by economical demands are: altering the setting depths or totally removing intermediate casing strings, penetrating the reservoir top prior to setting reservoir casing and landing horizontal wellbores with minimal casing protection.

THESE TYPES OF CHANGES in well design will influence the well control and potentially increase the general risk significantly, not only the risk of an incident occurring, but also changing the consequences of an incident with respect to damage to the environment and/or opportunity to regain control in a safe and timely manner. The variations in risk and consequence are not always obvious to the engineer and detailed processes therefore needs to be in place to reveal the exposure.

Processes in well control evaluation should be an integral part of well design and include detailed dynamic kick tolerance calculations as well as blowout and well control evaluations.

REQUIRED STEPS in evaluating well control will typically include:

- Kick tolerance
- Steady state evaluation
- Dynamic kick simulations
- Cross flow evaluation
- Steady state evaluation of maximum rates
- Dynamic kill down existing string
- Blowout rates
- Maximum oil release to the environment
- Regain control of a blowout
- Evaluate intervention options
- Relief well – Dynamic kill evaluation

A comprehensive integral evaluation will make it possible to take the necessary risk reduction measures throughout the well planning process and hence, manage the risk in an improved manner. æ

Text: Dr. Ole B. Rygg
Vice President
Drilling and Production



A worst case result of lack of well control planning
Photo: add wellflow as

Energy & Environment

Capability statements

Text: Geir Husdal
Vice President
Energy & Environment

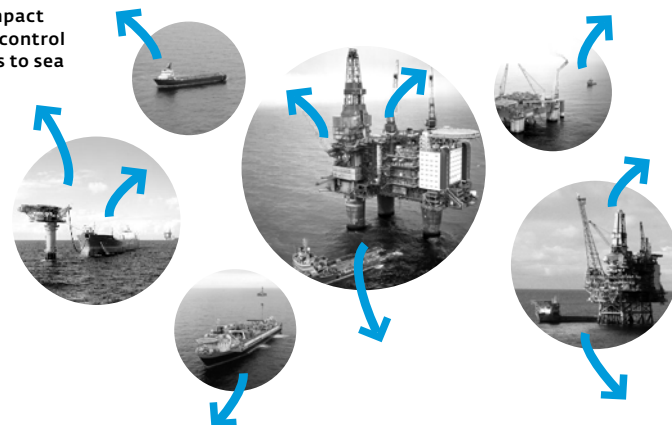


ADD ENERGY has a leading position in Norway in energy and environmental related services for the oil and gas industry. Strategic search for key qualifications in our personnel and a broad range of experience over the past 20 years has taken us to where we are today. add energy seeks the solutions that contribute to improved emissions control, regulatory and cost efficiency for our clients.

Some specialties within this business segment are:

- **Powerful analysis of environmental data (trends, direct and underlying causes, strategies)**
- **Confident quantification methods for emissions and discharges**
- **Identification of emission and discharge reduction potentials**
- **Technical and operational feasibilities for improved energy efficiency**
- **Reliable stipulation of future emissions and energy requirements (forecasting services)**
- **Environmental properties for offshore chemicals (documentation of eco-toxicity)**
- **Management services for chemicals, emissions, discharges and wastes**
- **Environmental impact assessments, determination of environmental impact factors and discharge permit applications.**

To control the environmental impact of your operations, you need to control your emissions to air, discharges to sea and your waste handling
Photo: StatoilHydro



ADD ENERGY also supports its customers' operational units through operation of joint databases and preparation of discharge, production license and consent applications, discharge accounts, energy management studies etc.

ADD ENERGY has developed several recognized IT systems for the purpose of more efficient environmental management and control:

CHEMS® is a database system containing environmental properties for offshore chemicals. Via the add energy operated KPD Centre, this system plays a key role in environmental management for a strong majority of the fields and wells drilled on the Norwegian Continental Shelf.

NEMS ACCOUNTER® is a market leading environmental accounting and management system. The system was originally tailor-made for the oil and gas industry on the Norwegian Continental Shelf, but is now also in international use. The system is web-based, easy-to-learn and meets all requirements for a modern environmental management system in accordance with ISO 14001.

NEMS FORECASTER® is an energy and emissions forecasting tool, mainly used in-house. The customer group here is all major operating companies on the Norwegian Continental Shelf. æ

Non-feverish Accounting

Yet another reporting deadline is coming up, and your 'to do' list is just as tall as ever. High bosses emphasized again only last week how important it is. As if that's all you have to do!



Text: Kristin Keiserås Bakkane
Senior Environmental Consultant
Energy & Environment

WHEREVER WE TURN, environmental specialists work hard to prioritize. As 'climate change' grew into people's everyday vocabulary, environmental reporting responsibilities seem to keep growing out of proportions. Quite a few might develop a temperature just by the thought of all these accounting deadlines. It just doesn't make much sense, letting the shuffling of numbers push away real environmental work!

There has been an enormous development in environmental accounting obligations since add novatech started environmental consultancy services in the early nineties. We learned that personnel all over the industry struggled with increasing reporting responsibilities – not due to lack of know-how but due to timepressure.

No wonder there was a market for Nems Accounter®.

Nems Accounter®

A market leading environmental accounts and management system for the offshore oil and gas industry. Nems Accounter®, which covers all relevant discharges, has been tailored to the oil and gas industry on the Norwegian Continental Shelf.

NEMS ACCOUNTER® is a web based data management system for environmental accounting services, originally designed for the offshore petroleum industry. During the years since the system was launched, the number of Norwegian oil companies implementing Nems Accounter® as their environmental management and reporting system has increased by threefold. The growth is not based on active marketing, but rather due to a growing interest among the industry to join forces, letting mutual interests in environmental management be taken care of in a methodical manner.

OUR DEVELOPMENT PHILOSOPHY is no secret: our approach was to make computers serve to man instead of man serve to computers.

We can't reduce the data volumes required, but our programmers can listen to the user's requests. And as they did, new clients started to grow interest. Besides our Norwegian clients, we today have both UK and Danish users, and cover onshore petroleum activities as well.

Implementation approaches vary, but most clients let their subcontractors feed Nems Accounter® with input data, while own personnel have approval responsibilities. Or, some fields are set up for data import from other systems. Every single input and change is automatically logged, for transparency and traceability. And data sources, references etc. – like an important e-mail or company internal requirements can be filed within the system. There is a strong reporting functionality within the system, and all data may easily be exported to for instance Excel for further analyses.

WORTH MENTIONING ALSO is that we have developed the first functional electronic reporting service for environmental reporting towards British authorities. In other words, a module in Nems Accounter® is tailor-made for the mandatory EMAS reporting in the UK sector.

After nearly 20 years with environmental consultancy, add novatech haven't seen one example yet where correct mitigation priorities were based on any less than hard facts. Such facts are derived from actual data; compiled and analyzed to know what's important and what's not. As we say; even zero is a number. And we asked ourselves; does it have to be this time consuming to document and report that?

Five years ago, we thought not. Today, we stay reassured. And the best of all; we have proved that it's possible within highly affordable cost ranges. æ

add academy

add academy is add energy group's business unit within competence, course administration, simulation, documentation, training and emergency response.

TRAINING Courses and training are organized and administered by add academy with support from and execution by professionals within add energy's different business areas.

Example of courses which add academy can organize: Process simulator training, Contingency planning, Emergency response, Introduction to Oil and Gas production, Drilling for non-drillers, Investigations and audits, Nems Accounter®, Nems Forecaster®, CHEMS®, REACH, Environmental standards, Well integrity, Blowout consequences, Next-of-Kin handling and support and even custom-made courses within most categories.

add academy can execute training and exercises for both 1st, 2nd and 3rd line emergency organizations. The instructors/advisors have long and extensive experience both nationally and internationally. Emergency Response and Crisis Response Management courses are approved by OLF/PSK (The Norwegian Oil Industry Association / Petroleum Industry's Center for Evaluation of Competence).

Text: Ted Morgan Pettersen
Manager, add academy

DOCUMENTATION The experienced and professional documentation department of add energy will add value to our customers by giving them the best systematic and user-friendly system for evaluation, revision and development of existing and new documentation. The documentation department has developed a system which focuses on simplicity and availability to ensure that documentation is used by the target personnel.

SIMULATOR SERVICES Our simulator instructors have long experience through being our customer's representatives during development of their simulators, verification and testing of design and logic, administering and coordinating upgrades, development and execution of complete course and training packages for process personnel.

ADMINISTRATION Our personnel have extensive experience in establishing competence management system, competence mapping, manning of organizations, organizing courses and training for both mature companies and companies in the establishment phase. æ

"By choosing add academy as supplier of competence the decision maker will bring added value to his own organization. Various courses and training will give their employees a better understanding, better skills and new ideas to grow within their own profession"



The KPD Centre

The KPD Centre is a good example of how oil companies can utilize the SOIL system ([Secure oil information link](#)), share data and save money. The KPD Centre operates an industry database containing ecotoxicological data of offshore chemicals.

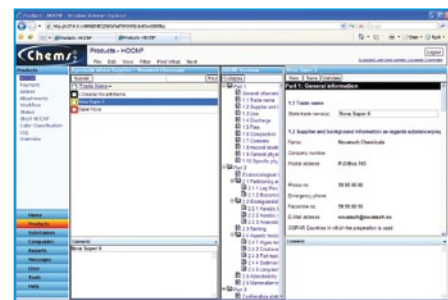
Text: Geir Husdal
Vice President
Energy & Environment



All oil companies being members of the KPD Centre have access to the data in the database. The KPD (Chemical Product Data) Centre was initiated by and is operated by add novatech.

THE DATABASE OPERATED by the KPD Centre is named CHEMS[®] and was developed by add novatech in the period 1993-95. CHEMS[®] was designed to contain data required by the HOCNF format (Harmonized Offshore Chemicals Notification Format). This is an international format under the jurisdiction of the OSPAR Convention covering discharges to sea in the North East Atlantic.

All chemicals used on offshore facilities that may end up in the sea have to be tested and documented according to HOCNF. The HOCNF format contains test data of marine toxicity, biodegradation capability and bio-accumulation potential of the ingredients in the chemical product. The tests are performed by GLP (Good Laboratory Practice) accredited laboratories according to given test standards. The documentation is rather extensive, from 20 pages for simple products to more than 50 pages for more complex products. The test data are used to calculate the environmental category according to SFT's (Norwegian State Pollution Control Authority) criteria. i.e. the test data determine whether a chemical product is categorized as green, yellow, red or black.



New and more modern web-based CHEMS[®] 2, launch autumn 2009

THE CHEMS[®] DATABASE contains all data required by the HOCNF format. The data are provided by the chemical suppliers and entered into the database by add novatech.

Simultaneously add novatech checks that the data provided by the suppliers are complete and correctly provided according to the relevant guidelines. The colour category of the chemical is calculated by CHEMS[®] and displayed for the user. The users are the KPD member companies, being oil companies. In addition SFT is a KPD member. The Member companies and SFT have access to the data, which they can sort according to area used (drilling, production, pipeline, etc.), functional group (such as scale inhibitor, defoamer, corrosion inhibitor, etc.) or colour category to mention a few. Thereby the operator can easily find environmentally acceptable products to meet his functional requirements.

Since SFT has access to all data in CHEMS[®], the member companies do not need to enclose filled-in HOCNF, they just refer to CHEMS[®] and SFT can review the data directly in CHEMS[®].

When the KPD Centre started in 1995, three companies signed the membership agreement. From 1997 all oil companies having oil or gas fields in operations on the Norwegian Continental Shelf have been members. Today a total of 15 oil companies are KPD members and a few others are in the evaluation process. Only oil companies can be KPD member companies.

THE KPD CENTRE has now been in operation since 1995 and the CHEMS[®] database has been used continuously. Although CHEMS has been updated to meet new requirements in this period, it is time for a radical upgrade of the data programme. Therefore the development of a new modern, web-based CHEMS[®], named CHEMS[®] 2 was initiated in 2008. CHEMS[®] 2, which will be launched in the second half of 2009, will introduce a new era for the KPD Centre. In CHEMS[®] 2 the suppliers will enter the data themselves and the total data entry and approval process will be simplified. CHEMS[®] 2 is also designed so that it can easily be amended to meet the reporting requirements of REACH, the new European registration system for chemical substances. æ



The author during magnetizing and testing at the operators field base.

Activity regulation challenges

IN ORDER for the operators to fulfill the activity regulations on the Norwegian Continental Shelf a relief well evaluation should be performed. According to Norsok D-010 this should include demonstration that a relief intersection and kill will be possible in case of a total loss of well control or a blowout. For wells with a shallow potential hydrocarbon flowing zone it will be very challenging to intersect a blowout well from a relief well.

ADD WELLFLOW HAS DEMONSTRATED a successful technique on a recent project for a major operator in close cooperation with the two American companies *Boots & Coots* and *Vector Magnetics*. The well targets in question included an extremely shallow gas reservoir and simulations were performed to investigate the feasibility of killing potential blowouts. Due to the shallow depth of the reservoir, it was not possible to intersect the wellbore with a relief well using conventional 'homing in' techniques.

Normally, the blowing wellbore is located by applying electricity through a wireline conveyed downhole tool, and then monitoring the resulting magnetism from the steel in the target well. This magnetism differs from the earth's natural field and enables the well to be spotted. The planned relief well directional survey was in this case not suited for wireline runs, and hence, a downhole excitation tool could not be run.

THE TECHNIQUE chosen to solve this challenge is called PMR - Passive Magnetic Ranging - which requires that the casing in the potential blowout well is magnetized prior to running in hole. For the particular well in question the job of magnetizing the casing was performed at the operator's base by representatives from Vector Magnetics and add wellflow. A Gauss meter confirmed that the magnetizing process had been a success. æ

Text: Thomas Selbekk
Senior Petroleum Engineer
Drilling & Production

Well Intervention Method

Using a modified Driller's Method through a relief well as a well-intervention alternative to bullheading

In depth



Text: Dr. Ole B. Rygg, Thomas Selbekk

based on: Oskarsen, Wright, Rygg, Selbekk & Allcorn: "A Case Study in Relief-Well Drilling Using a Modified Driller's Method as a Well-Intervention Alternative to Bullheading."

IADC Well Control Middle East 2008 Conference & Exhibition, 2-3 December 2008, Muscat, Oman.

A WELL SPUDED in eastern Syria, close to the Iraqi border, experienced an incident at 3,838 m. During a trip to change the bit, the drillstring parted at the Kelly-saver sub and dropped 28 m. To complicate matters, the well took an influx of 60 bbl while the operator was waiting for the appropriate fishing equipment. The rig crew responded by closing the blind/shear rams, which resulted in a stabilized shut-in pressure of 3,000 psig.

The two primary options considered for forward intervention included bullheading heavy mud down the annulus to push the hydrocarbons back into the reservoir or bringing in a snubbing unit to recover the fish under pressure and circulate the well dead. Bullheading calculations indicated the formation would fracture below the shoe leaving hydrocarbons in the open hole, and in the worst case cause a broach to surface behind the casing. There were no snubbing units in the country and import/export costs of the spread would be high.

The alternative was drilling a relief well with an existing rig, which had limited risk and a high probability of success. Hence, the operator decided to drill a relief well that would intersect above the formation that was predicted to be the origin of the influx.

SEVERAL ISSUES COMPLICATED this relief-well operation: no gyro-surveying tools were available in the country, the choke operator and pump operator were located on separate rigs, and the target well contained a combination of oil, gas, and several slugs of mud with different densities.

Ultimately, the combination of electromagnetic ranging and passive-magnetics analysis facilitated an efficient well-intersection process and the hydrocarbons were circulated out according to the drillpipe pressure-decline schedule, which was developed using a transient multiphase model.

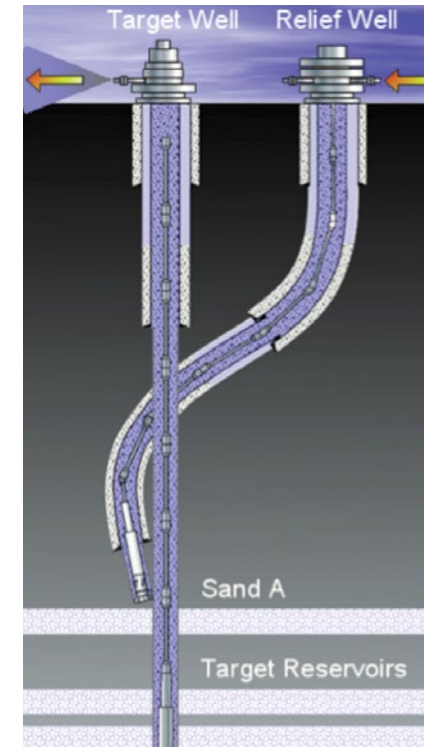
HYDRAULIC PLANNING Since all relief wells are inherently different, the planning phase should always include dynamic modeling of the kill hydraulics.

After mobilizing a hydraulic-modeling team from add wellflow, extensive dynamic simulations were performed to determine the source of the kick, the pressures and potential fluid gradients in the well after the influx, and the feasibility of intersecting above Sand A. From the hydraulic modeling, we decided to plan for pumping a 12.5 ppg OBM at 2 BPM after intersecting the target well. This approach was expected to

yield fluid pressures that would exceed the pore-pressure gradients in the openhole section of the target well while not exceeding the shoe fracture gradient.

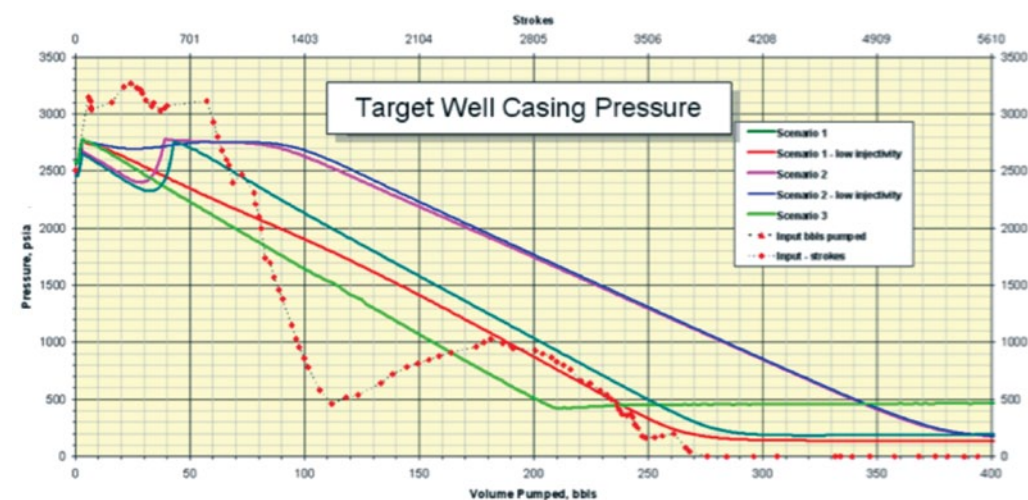
Gas bleedoff early in the operation caused the rapid pressure drop in the initial phase. As mud started filling the annulus, the pressure decline followed the same trend as the simulated curves for our base case scenario. Stabilization of pressure at zero psig

occurred as expected. Volumes pumped when mud was observed in returns at surface indicate communication between the annulus and drillpipe at the top. After pumping operations were completed, we observed 154 bbl less fluid volume at surface than pumped in the problem well. This indicated a large volume of gas in the well at the start of the operations, mud losses into the formation, or a combination.



▲ Relief well intersected target well at 2828 m MD for successful kill intervention

▼ Gas bleedoff caused rapid pressure loss during early time, but pressure behaved nearly as expected as mud filled the annulus of the target well.





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