

Arctic

Keeping up with Arctic regulations

Jerry Lee looks into Arctic-rated safety equipment that seeks to make it easier to comply with regulations around the globe.



Operating in the Arctic can be tough. There are extreme weather conditions and short operating windows in remote locations, but also stringent rules and regulations. Not much can be done about the first two, but companies are aiming to help operators with the last and one firm, at least, has successfully done so in the Russian and US Arctic.

In July this year, the US Bureau of Safety and Environmental Enforcement's (BSEE) new well control rule went into effect, requiring several changes to increase safety and ensure reliability of well control-related equipment. The rule called for expanded accumulator capacity and operational capabilities for increased functionality: 30 CFR Part 250 § 250.734(a) (b). Trendsetter Engineering is looking to address these changes with its subsea accumulator module (SAM), which can augment existing hydraulic capacities for subsea equipment.

"A SAM is basically a store of subsea hydraulic power for the purpose of providing pressurized hydraulic fluid to the desired operation through flexible hoses or flying leads, which are installed by a remotely operated vehicle (ROV)," says Brett Morry, global technical manager, Trendsetter Engineering.

Hydraulic fluid is stored and pressurized in accumulator bottles – piston or bladder type – which have been pre-charged with nitrogen gas. When opened, the nitrogen causes the hydraulic fluid to be pushed out at the desired pressure and rate; to compensate for greater water depth, the accumulators can be pre-charged with more nitrogen.

Trendsetter's SAM is designed with 40 accumulator bottles, pressure regulators (as necessary), hotstab flying leads, a structural frame with the capacity to carry tubing, and a mudmat foundation consisting of a skirt

Arctic capping stack with remote BOP control and intervention subsea accumulator module. Photos from Trendsetter Engineering.

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and hydraulically-operated mud wings for soft soil conditions. The SAM can be installed on the seafloor, typically within 250ft of the subsea equipment it will augment. It can be operated by a single ROV, or using hydraulic or acoustic controls.

“Trendsetter’s SAM provides the required bottles in a separate module so as not to impact blowout preventer (BOP) design,” says Antony Matson, engineering director, Trendsetter Engineering. “The module can be run independently from the BOP stack, allowing independent servicing and scalability as additional SAMs can be added to the system to provide greater quantities of accumulated supply depending on the operational criteria of each drilling location.”

Alaska

Trendsetter’s SAMs were used to augment the BOP system at an exploratory well during an Arctic campaign in the Chukchi Sea, offshore Alaska, in Q3 2015.

In the US Arctic, BSEE requires sub-sea wellheads to be set within a mudline cellar. This results in the BOP stack being installed in the cellar, offering limited ROV access to the BOP panel, which creates an issue due to a separate rule requiring the BOP panel to be accessible by ROV.

“Trendsetter resolved this by placing a duplicate panel on a seabed deployed SAM, with the unit connected to the BOP via a multi-line hydraulic flying lead,” Morry says. “In the event remote BOP intervention was required, the ROV could access all the required BOP functions from the SAM instead of the BOP.”

Using this system allowed the operator local direct hydraulic control of the drilling BOP, Matson says, and provided additional hydraulic supply, enabling compliance with BSEE’s regulations. The SAMs, charged to 5500psi, and located within 150ft of the drill site, were deployed for the entire drilling campaign for over 50-60 days. Though the units were not used to actuate any function, they were fully charged, connected to the BOP system and full function tested subsea. Backup SAMs were set on the back deck of the ice breaker *MSV Fennica*, as emergency response equipment for the campaign.

Mudline closure device

In the event of an Arctic well control event, although capping stacks are on standby, they may not be the most appropriate equipment for every drilling campaign – due to time or location, Matson says. As an alternative, operators can deploy a mudline closure device (MCD).

“A MCD is a pre-installed well control device used to shear, seal, and isolate a well if the rig BOP drilling system suffers a loss of well control,” Matson says. “The MCD is installed directly on the subsea wellhead with the subsea BOP landed on the MCD mandrel or connected to a surface BOP by way of a high pressure drilling riser.”

Trendsetter’s MCD is equipped with acoustic/electro-hydraulic controls, independent of the rig’s BOP controls, two blind shear ram BOPs – with ram position indicators and bore access below – local ROV overrides, and 32 onboard accumulator bottles to operate all onboard functions. If needed, the MCD can be configured to accept umbilical controls, using acoustics as backup, and SAMs can be used to augment hydraulic capacity.

“The need for an MCD is based entirely on the drilling campaign profile of specific wells or fields,” Matson says. “The main drivers are going to be remote location, environmentally sensitive areas, shallow water, and/or high discharge wells. All four drivers lend themselves to a proactive well containment approach through use of the pre-installed MCD as reactive capping stack mobilization may not be feasible (remote location, environmentally sensitive like the Arctic) and installation may not even be possible (shallow water, high discharge rates).”

Russia

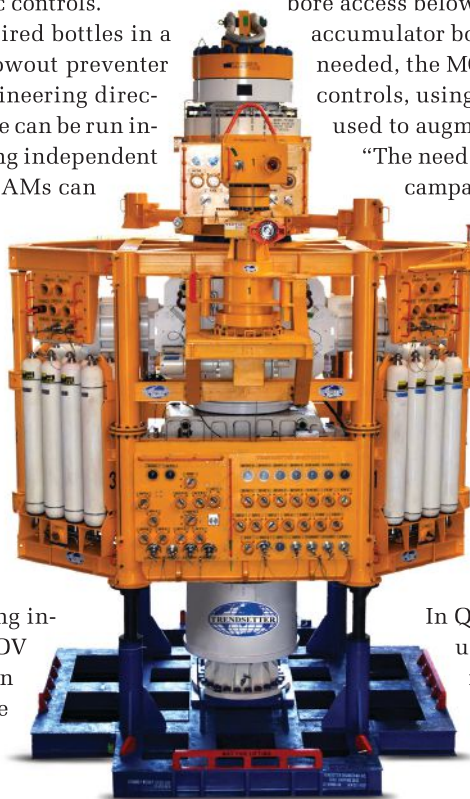
In Q3 2014, Trendsetter’s SAM and MCD were used on an exploratory well, in the Kara Sea, in the Russian Arctic.

There were several challenges associated with the well: drilling in an environmentally sensitive region, short drilling season, remote location, and shallow water depth. Should there be a loss of well control, a capping stack may not be

able to be deployed quickly enough, especially at the end of the drilling season. Additionally, accommodating all the necessary drilling equipment, rig and capping stack could be an issue in the shallow waters due to the limited space between the wellhead and rig, Morry says.

Using a MCD became an operational requirement, Matson says, due to the aforementioned challenges, governmental and environmental concerns, and operational prudence. A MCD package was pre-installed at the well, augmented by two SAMs charged to 5500psi, which gave the operator control over isolating the well. The package was deployed for 60 days and performed as expected with no loss of controls, hydraulic pressure, or acoustic communications during the duration of the campaign, Matson says. Following completion of the campaign, Trendsetter’s equipment was demobilized and sent back to Houston.

In September 2014 Rosneft announced the discovery of a new Arctic field, Pobeda (or Victory), in the East-Prinovozemelskiy-1 area, licensed by Rosneft. In this same announcement Rosneft’s President, Igor Sechin, thanked the companies involved, which included Trendsetter Engineering. According to Rosneft’s announcement, the discovery well, Universitetskaya-1 (also known as University-1), took 1.5 months to drill. According to Rosneft’s August 2014 press release, the well was operated by Karmorneftegaz SARL, a Rosneft (66.67%) and ExxonMobil (33.33%) joint venture. **OE**



Trendsetter Engineering's 18.75in 15M Drill Through Mudline Closure Device.