



Case Study – Shell UK Ltd. Gator Perforator System

By utilising the Gator Perforator System, Shell UK completed multiple Casing Perforations over 3 subsea wells. The system and perforations provided allowed for the Cement Environmental plugs to be set in the shortest time recorded in the North Sea.

Challenge

Environmental Top Plug

In order to set an environmental top plug, a conduit must be made for fluid to circulate and clean behind the production casing into the B-Annulus intermediate casing without the risk of breaching or compromising the integrity of the subsea wellhead.

Previous methods involved using low explosive casing punches which provide small holes and have the potential to damage the intermediate casing string. The small holes also create high pressures with low circulation rates reducing the effectiveness of the cleanup and causing multiple runs, thereby incurring more cost.

Shell UK had one such challenge with 9-5/8" production casing and 13-3/8" intermediate casing. With an appreciation for the challenge Lee Energy in association with Titan Torque Services, approached Shell UK with a solution. This solution was employed on 3 wells in 2017 for the Atlantic/Cromarty Campaign.

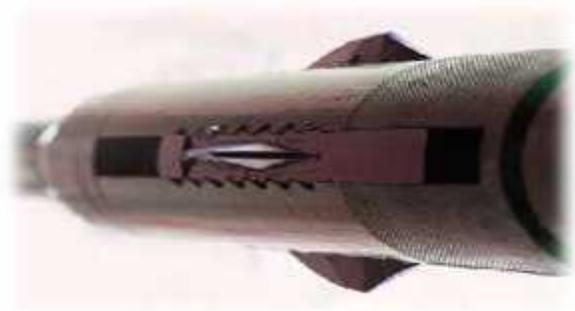
Shell UK Requirements

-) Full well integrity throughout the process
-) Explosive free perforations
-) Full displacement of annular fluids
-) Placement of cement plug
-) Create Stand-off

Shell planned to perforate approximately 1000 ft then move up as close to the wellhead as possible (6-15 ft below the subsea wellhead) to make another set of perforations. They then wanted to set a packer and clean up the B-annulus by circulating returns. Once the cleanup was complete they wanted to squeeze cement into the B-annulus and set an environmental plug to abandon the well.

Solution

The Gator Perforator is a hydro-mechanical casing cutter that uses hydraulic force to mechanically punch holes in casing. The tool can be activated multiples times in one run and has the ability to perform along with other tools allowing versatility in many applications.



Execution

Running the Gator Perforator with a mechanical set bridge plug in their 9-5/8" production casing, Shell was able to ensure isolation to their lower perforation, wash and clean (PWC) zone and then perform 2 activations of the Gator. This created 8 perforations at 1000ft. The tool string was then moved to 8 ft below the subsea wellhead for one activation of the Gator resulting in 4 perforations. The squeeze packer was set at 970 ft, 30 ft above the lower perforated zone. Cleanup of the B-annulus was then completed followed by full cement displacement. A full environmental cement plug was then completed to abandon the well.



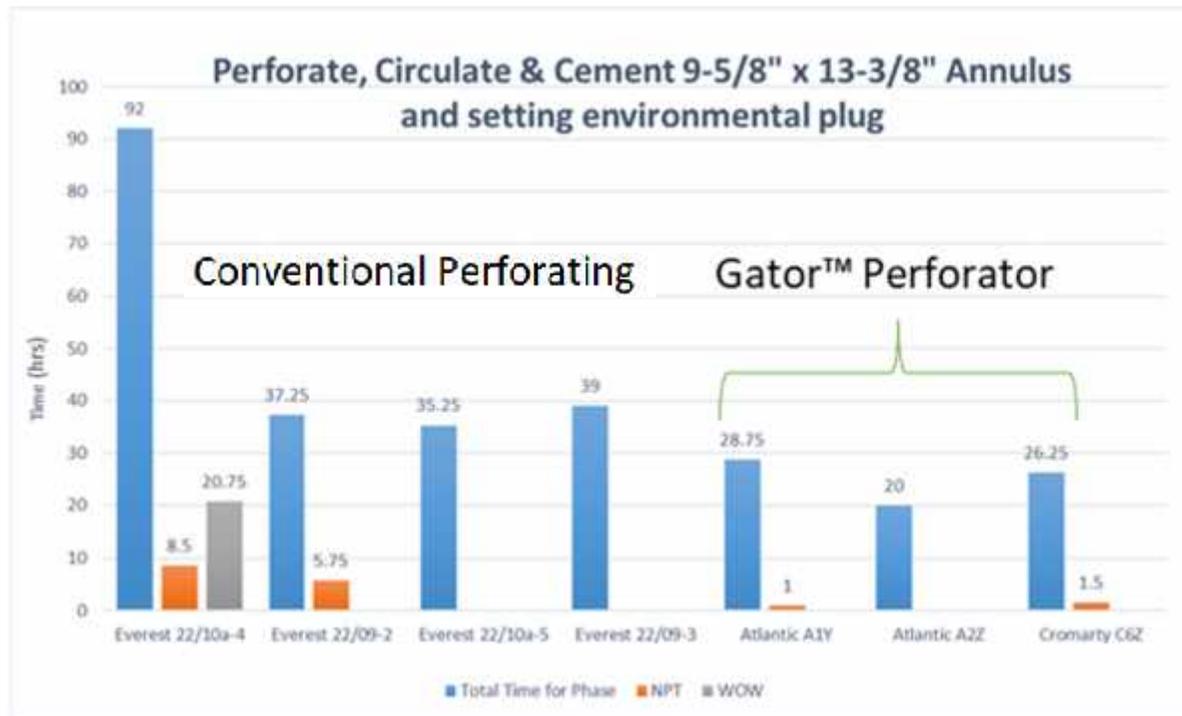
Results

With such large perforations, Shell was able to pump over 9 bpm with 320 psi pump pressure at surface. These flow rates created high velocity turbulent flow allowing for optimal cleanup of the B-annulus.

Also, since explosives were eliminated, Shell was able to get within 8 ft of the subsea wellhead without the risk of breaching well integrity. This allowed for the best possible displacement of the B-annular contaminants resulting in a safer and much more effective environmental plug.

The Bottom Line

Lee Energy Systems have a unique and game-changing product for well P&A. The Gator's effectiveness and adaptability opens opportunities in well decommissioning in a much safer, efficient and cost-effective manner.



Overall, the Gator tool has resulted in an average time saving of **12 hours per well**. The reduction in time required for this project allowed Shell to realize considerable savings on rig spread rate. By utilizing the Gator Perforator System, Shell UK completed the casing perforation, circulate clean and setting of the cement environmental plug in 3 subsea wells in a safe and time efficient method.