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ENERGY  
SYSTEMS

**GATOR<sup>®</sup>**  
**PERFORATOR<sup>™</sup>**



# MPX Two Trip P & A SYSTEM

MPX P&A SYSTEM

Explosive-free Offshore plug and  
abandonment System

**A permanent B-annulus diversion**  
**“preventing cement slumping.”**

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Our Expanding Technologies are used Globally  
Improving Well Safety & Efficiency - WORLDWIDE

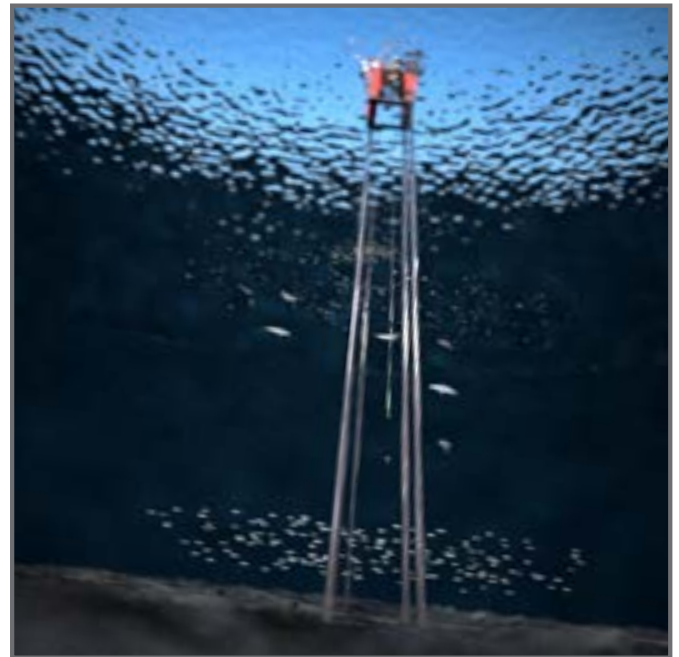
# MPX

## Explosive-free Offshore P & A system

838 Mega Packer X-pander

Bass Straight

**MPX**  
P & A SYSTEM



### Challenge

Cooper Energy required an A&B annular barrier to be placed on the 9 5/8" and 13 3/8" casing to ensure cement placement met regulatory and company policies, including cement slumping (OEUK Well Decommissioning Guidelines issue 7). Cement placement was required to be completed with perforating, well-conditioning, and cementing in a single run to allow for final abandonment without the use of explosives.

### Solution

Cooper Energy deployed LEE ENERGY SYSTEMS' 838-MPX tool to expand the 9 5/8" casing, reducing the B-annulus inside the 13 3/8" casing. After the expansion, the tool is released, leaving a permanent plug to secure cement for abandonment. This reduced annulus will facilitate the placement of a strong cement barrier. Next, the 825-HWG Gator Perforator BHA, equipped with a packer, will be run to perforate above the plug with high and low perforations. Following this, the annulus will be cleaned between the perforations, and a cement barrier will be placed across the perforations and plug to complete the abandonment. The process will utilize the Retrievable Test Packer, and the Lee Energy Gator hydraulic perforating tool, an unloader sub and a tubing ball drain.

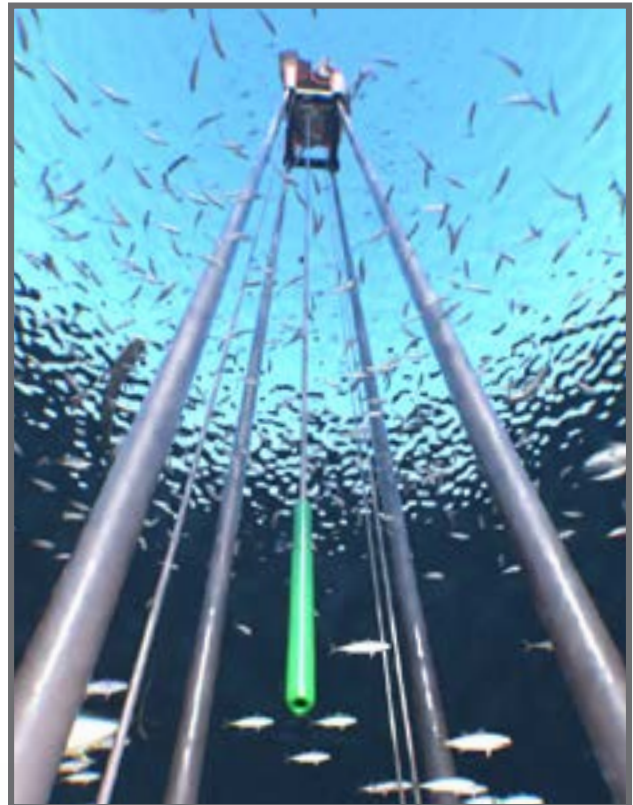


# Gator Two Trip Plug and Abandonment System

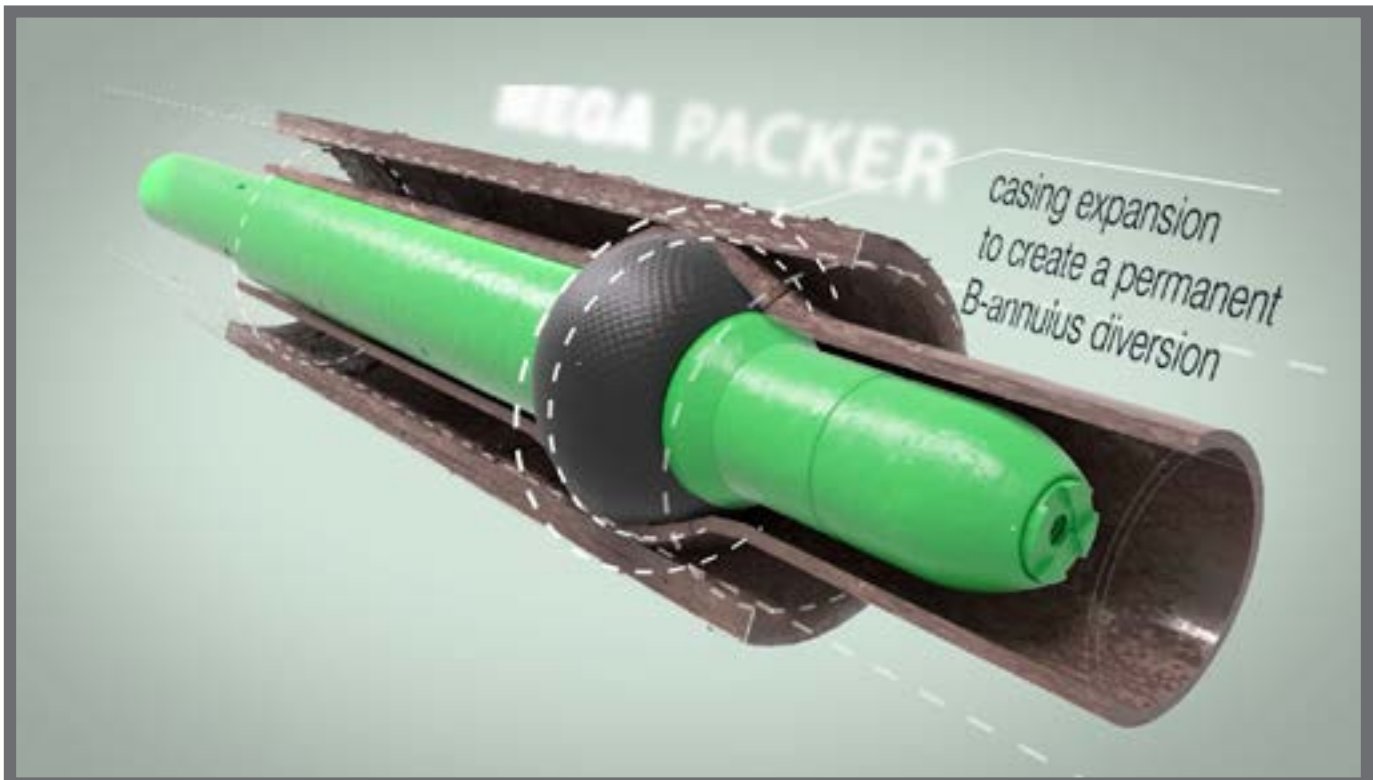
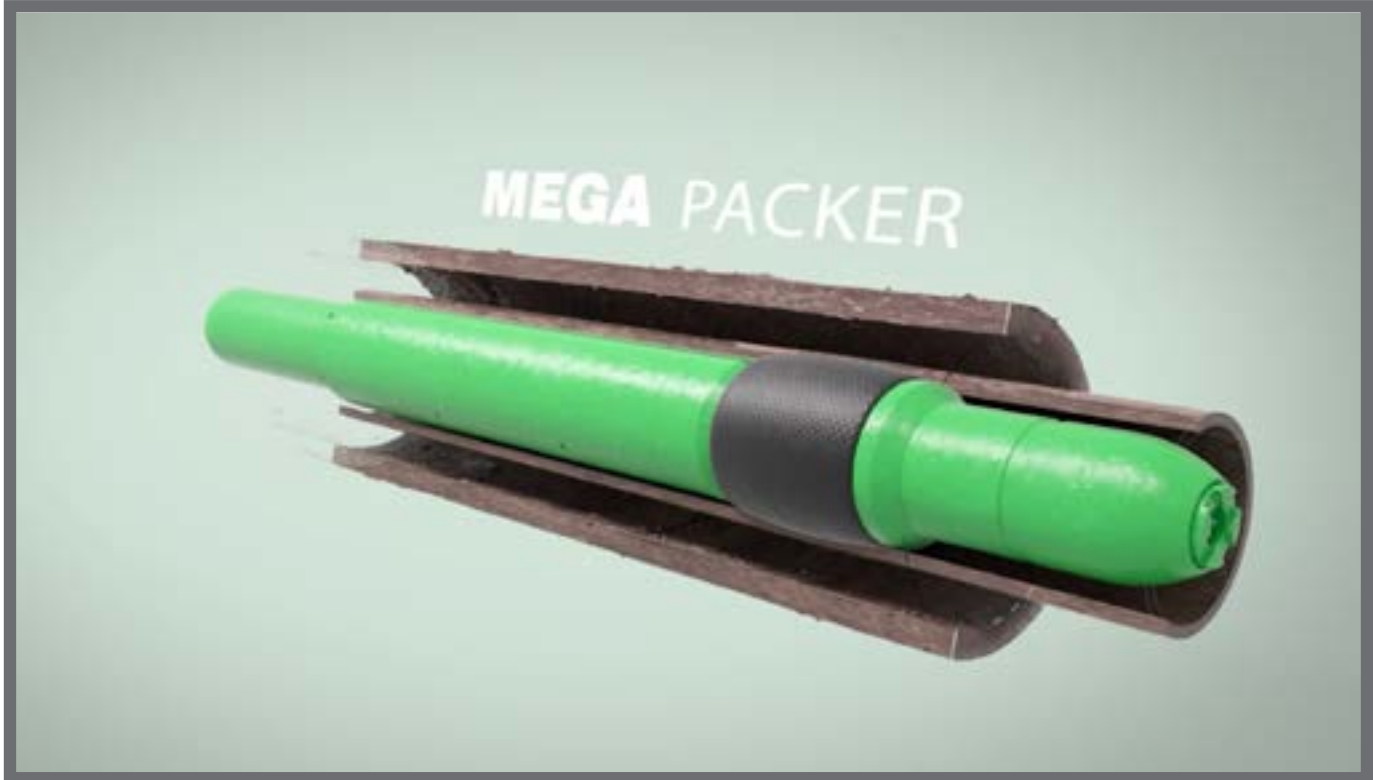


## Results

Lee Energy Systems, in partnership with Cooper Energy and R&D Solutions, successfully plugged and abandoned wells in the Bass Strait off the coast of Australia.



## 838 Mega Packer X-pander (838 MPX)



### MPX tool

Pressurized up to 3500 PSI, the MEGA PACKER expands the 9 5/8" casing to the ID of the 13 3/8" casing to create a permanent B-annulus diversion.

# MEGAPACKER

## MPX Tool

- **Pressure Section**- Through hydro-mechanical means, the MEGA PACKER tool generates 1.3 million pounds of output force.
- **Expansion Section**- Through hydro-mechanical means the Mega Packer allows a permanent plug to be set in the a annulus to be expanded in the b casing string . (The MPX can be configured to set the plug or allow for multiple expansions throughout the well bore.)
- **Bullnose Section** - Self-filling to prevent fluid surges, and to avoid top filling.

## Operation Guide

- RIH speeds limited to 60 – 90 sec/std.
- The string will fill when RIH (top filling not required)
- Once on depth with center element of 838-MPX for casing expansion, take a final PUW and SOW.
- Pressure up the work string until max casing expansion pressure is achieved ~3000 psi
- Once the on site rep has confirmed the successful 838-MPX activation, shut down pumps. Bleed pressure back to surface.
- Give sufficient time for the element to relax 15 minutes
- Rotate work string to release off the plug and return tools to surface.

Pressure Section

Expansion Section

Bullnose Section



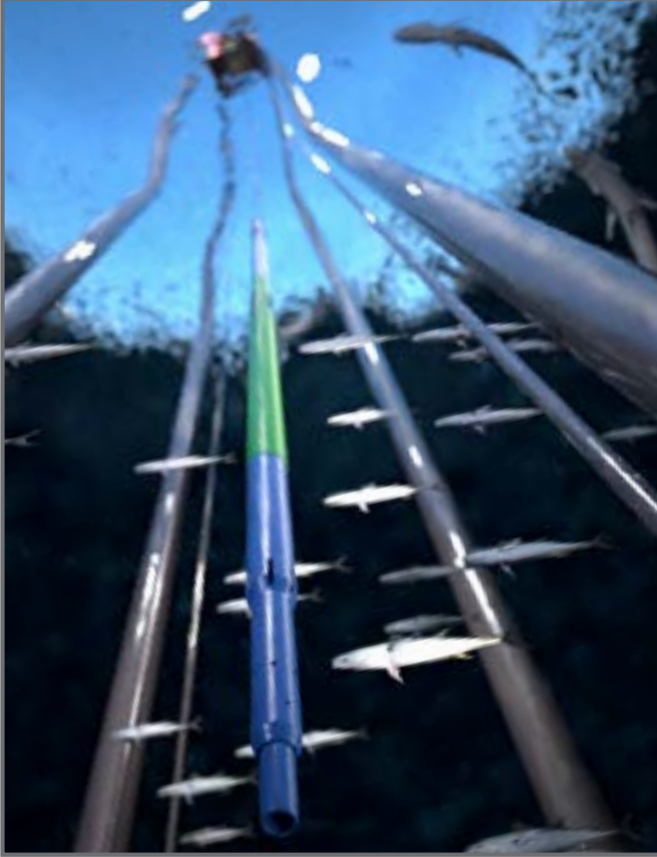
- NOTE: Casing Expansion with the 838-MPX begins at approximately 50 psi for the 9-5/8, 47 lb/ft, L80 casing where the packer will lock onto the casing.

# MPX

## Two Trip P & A system

825 Heavy Wall Gator

945 meter



The second trip BHA comprises the Gator Perforator, which is run to a depth of 954 meters—10 meters above the MEGA PACKER casing plug.

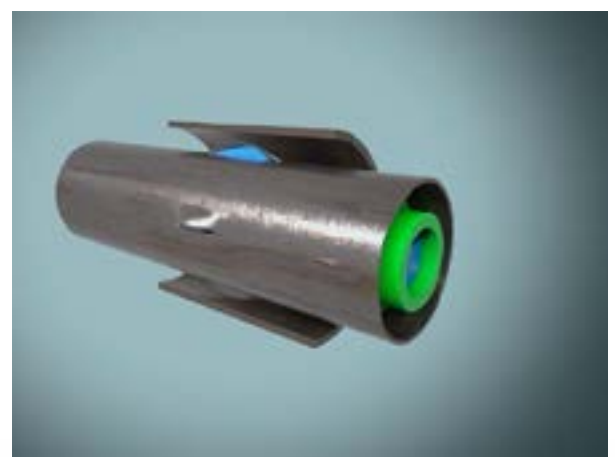


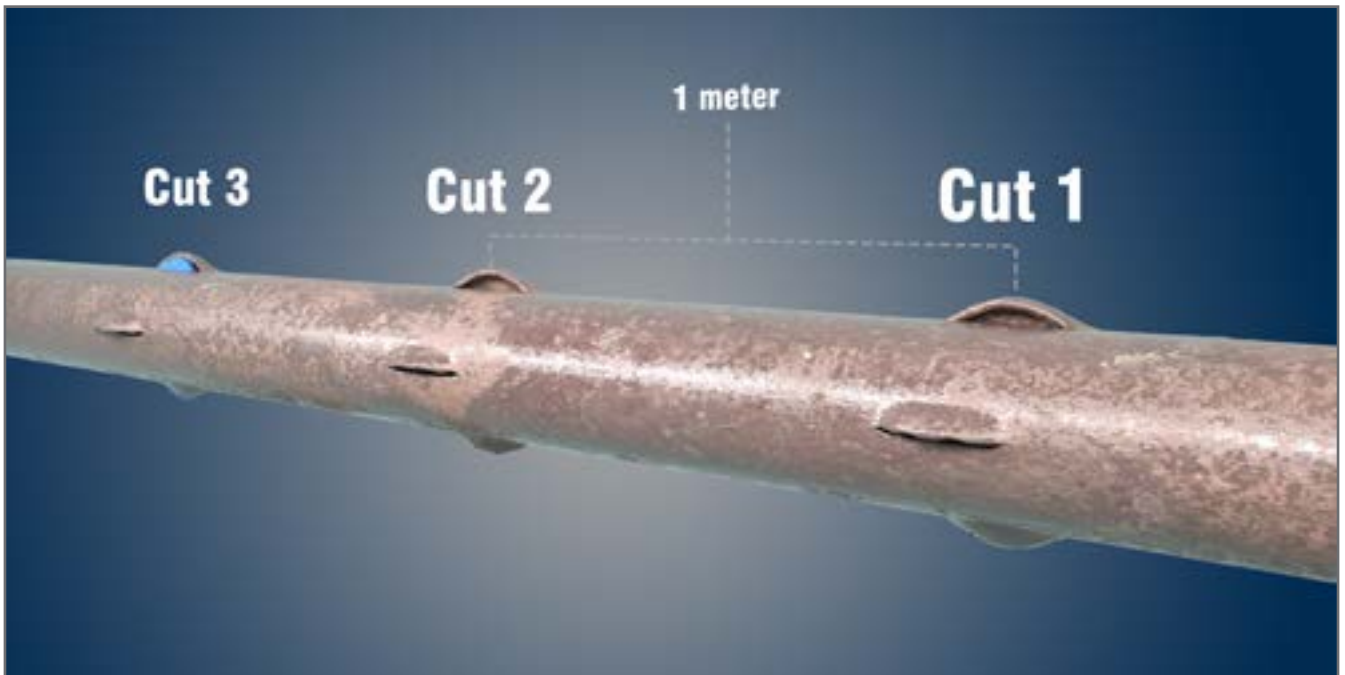
Once at depth, the Gator Perforator is pressurized to complete a series of perforations above the MPX plug and higher up in the wellbore. Three perforations spaced 1 meter apart, at the lower and upper interval were completed to prepare the well for circulation and cementing.

# Gator Two Trip Plug and Abandonment System



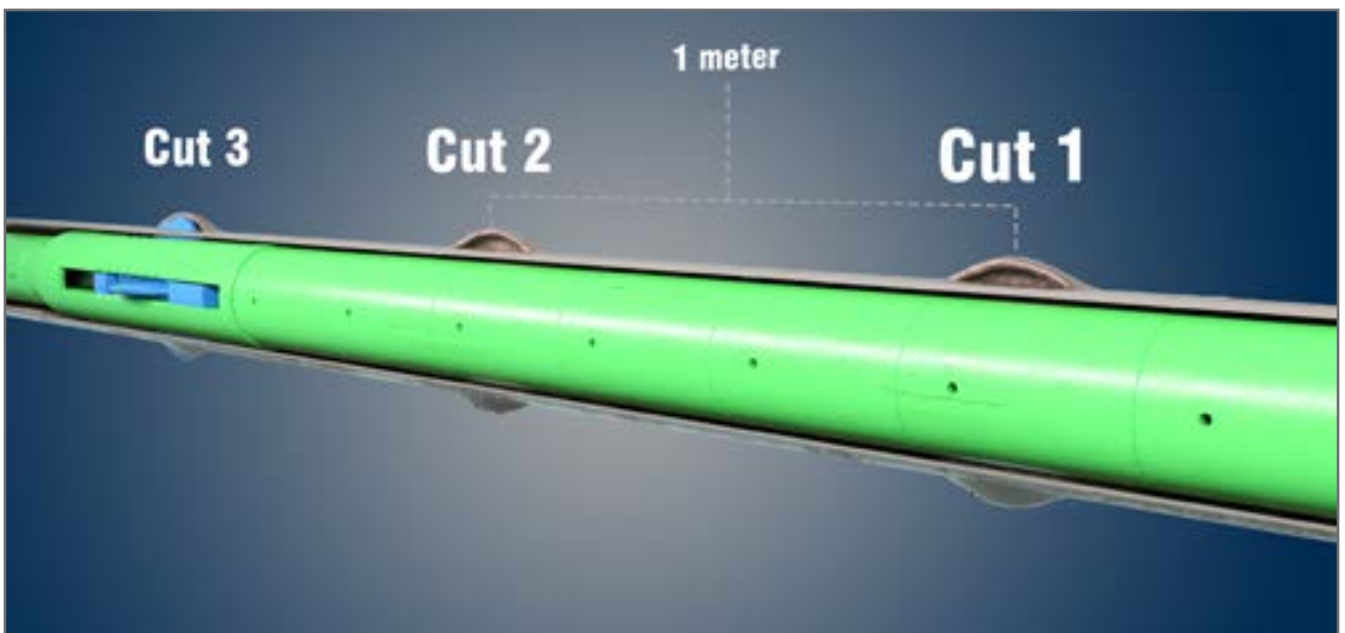
Perforations feature a large open flow area and extend into the outer annulus, enhancing casing centralization and facilitating effective annular cleanup and cement displacement. Through hydro-mechanical means, four radial perforations are achieved, spaced 90 degrees apart, guaranteeing excellent radial coverage with no ID burrs or internal damage to the casing.



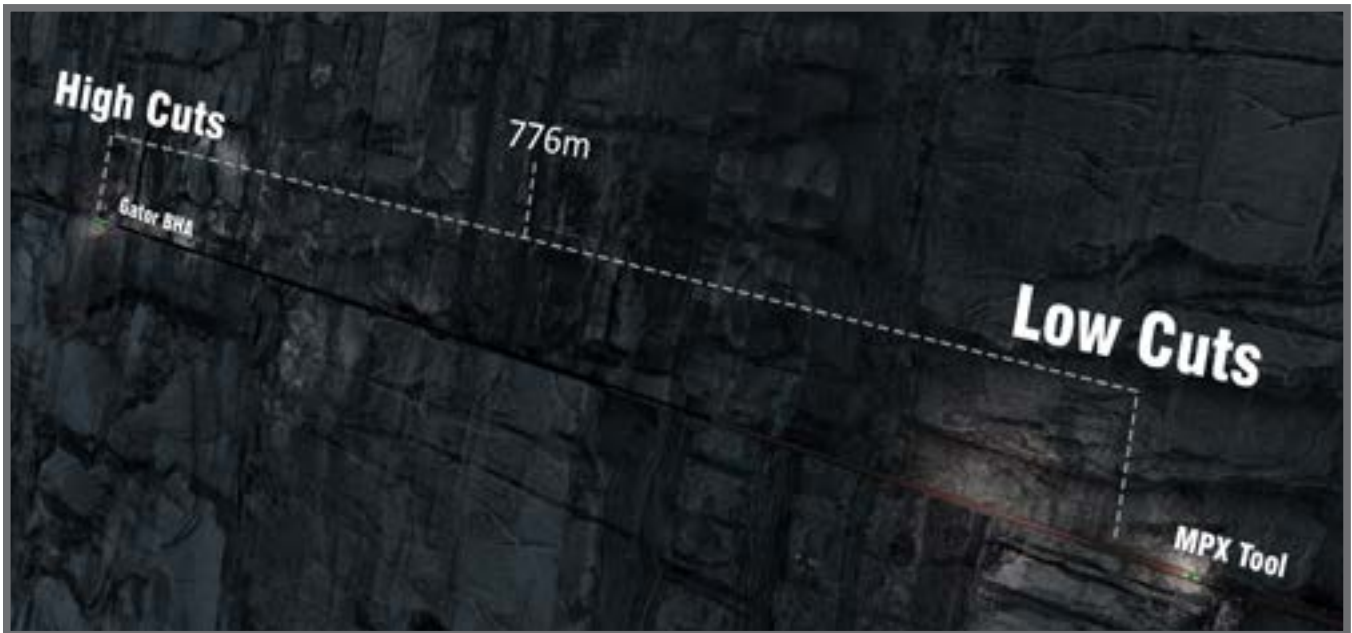


### LOW CUTS

The Gator Perforator was pressurized to activate the tool, which functions to hydro-mechanically perforate the casing, achieving 4 radial perforations spaced 90 degrees apart at 1-meter intervals, resulting in a total of 12 cuts to ensure good radial coverage.



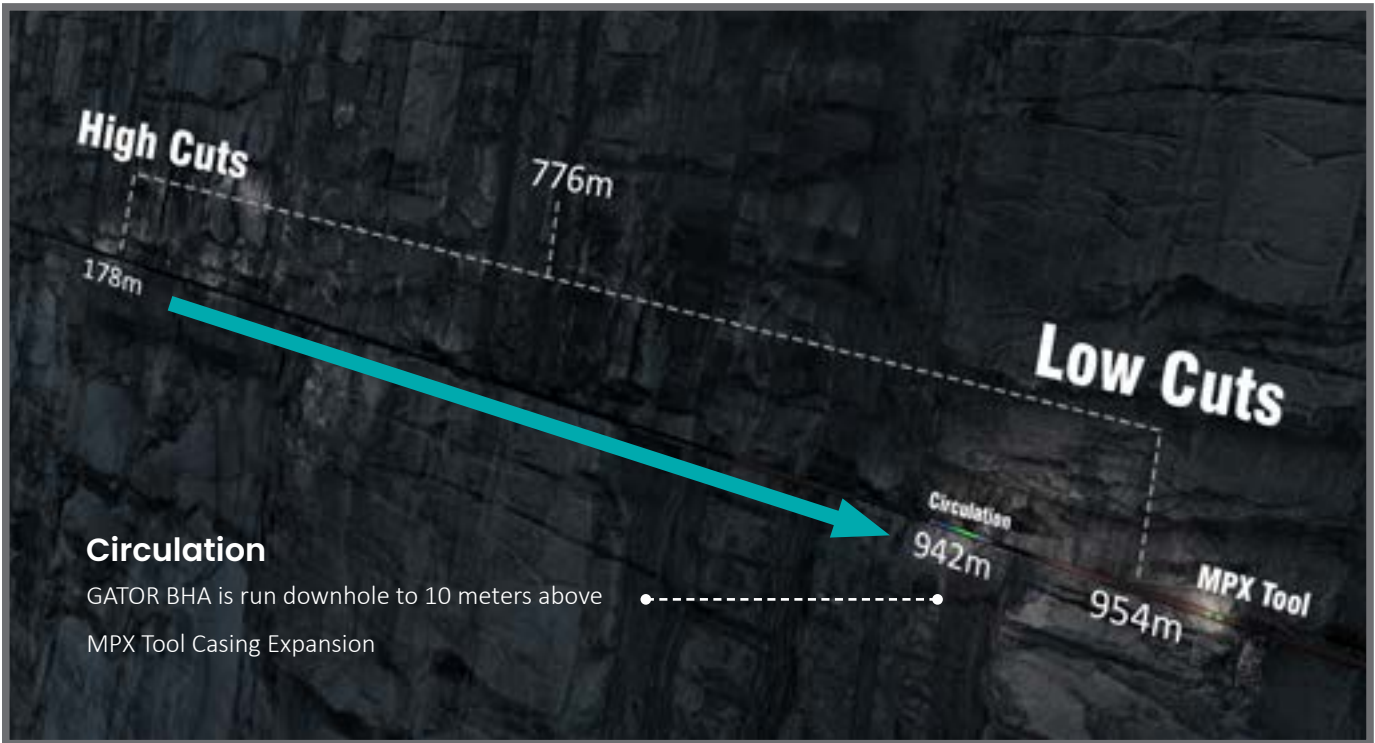




## HIGH CUTS

Once the low cuts are completed, the Gator BHA is pulled up-hole to 174 meters, and another three perforations with the same 1 meter separation are performed to a specific set of pressure settings, to complete the high cuts.





## CIRCULATION

Once the zone 1 and 2 low and high cuts are completed, the Gator BHA is run down hole to an intermediary point at a depth of nine hundred and forty-two meters, 10-12 meters off the lower perforations.

(825 Heavy Wall Gator BHA)



# Packer set and Circulation Confirmed



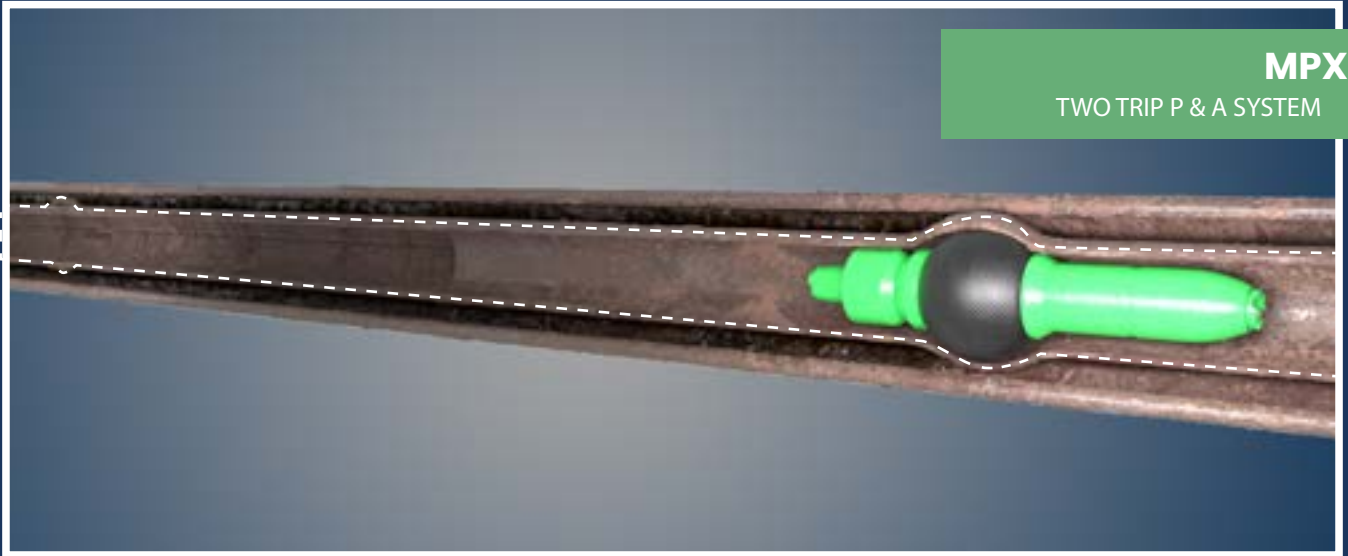
**Mechanical Packer**  
TWO TRIP P & A SYSTEM

## Circulation

The BHA's mechanical packer is engaged to create an annular seal isolating the 9 5/8-inch casing, in order to clean the B-annulus between the upper and lower perforations.



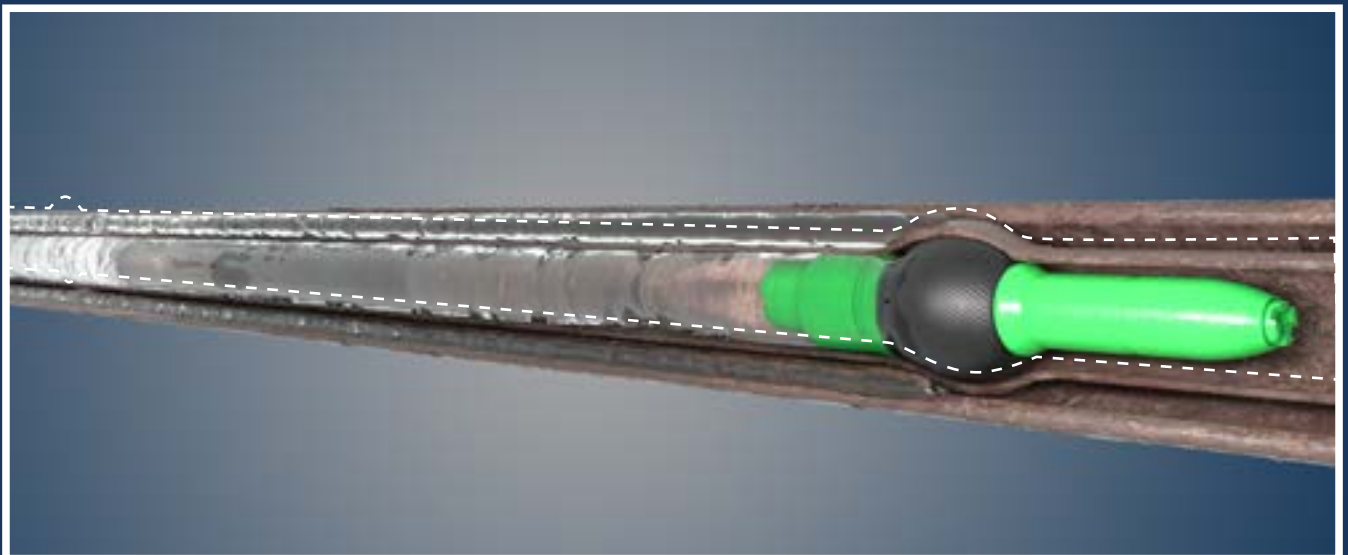
Fluid Moves down A-annulus to MPX



Fluid Pushed Out Lower Perforations into B-annulus



Fluid Cleans Mud down to B-Annulus Diversion at MPX Casing Expansion



# Packer set and Circulation Confirmed

Fluid moves up B-annulus past the Mechanical Packer



Diverted fluid then moves back into the A-annulus at the high cuts to surface



## Two Trip P & A SYSTEM



### Cementing

Once surface returns indicate good circulation and cleanup is confirmed, cement is pumped out of the Tubing Ball Drain, following the same path as the fluid down to the mega packer plug, and then up and out of the lower perforations to the expanded casing and up the B-annulus

### MPX

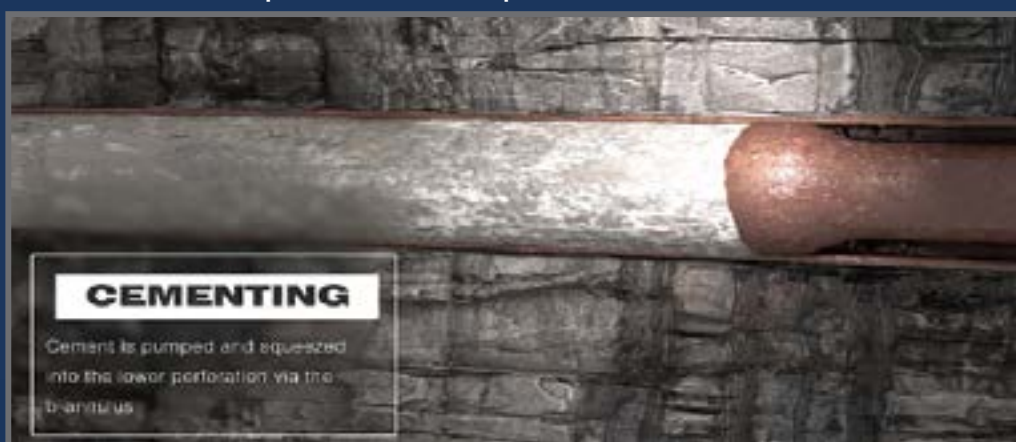
Casing expansion creates a permanent B-annulus diversion/cement plug, cementing the A and B annulus with excellent coverage.



Fluid moves up B-annulus past the Mechanical Packer

### Final Cement

During cementing, the mechanical packer can be unset, and the Gator BHA can be pulled up to balance and avoid U-tubing.





### Tool Retrieval

With the packer released, the Gator BHA can be smoothly pulled up and returned to the surface.

Achieve superior cement displacement and enhanced well integrity with Lee Energy Systems' Mega Packer and explosive-free Gator hydraulic P&A tools.



Feel free to reach out to any of our sales/engineering/operational staff globally for more information.

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## Gator Perforator Two Trip System

- **Mechanical Packer:** The Packer can be used for testing feed rates into Gator perforations down the annulus or through the string to upper sets of perforations along with cement operations. The packer is compression set and can withstand pressure from below or above, with a three-element packing system comprising a j-slot and drag block mechanism for easy setting operations. The packer is set with a ¼ turn to the right and set down weight and released with a straight pull-up, ideal for cementing operations with the Gator. (The Coretrax CX-RTP is an example of a Mechanical Packer used in conjunction with the Gator Perforator tool.)
- **Tubing Ball Drain Sub** This tool is open to the annulus and allows for higher rates to be pumped out the side of the tool including cementing operations.
- **Unloader Sub:** This tool is an equalization sub with ports to the A-annulus that close in tension and open in compression. This allows for equalization of the string and A-annulus after perforations are made.
- **825 Gator Perforator:** The Gator tool allows for a surface indication to show the Gator has made a full stroke by identifying cut pressure on both the standard four-bladed tool and the Single Blade DPT. The cut pressure allows the Staff at LES and the Operator to evaluate the mechanical integrity of the casing and the material behind the casing. Cutting at similar depths with different phasing and watching cut pressure changes allows the Operator to see the change in the material behind the casing with both the four and single-bladed tools on all forms of interventions. These cut pressures can confirm or work with the radial bond logs and other cased/open hole logs to identify strategies on how to abandon the current well and future offset locations.
- **Velocity Control Valve:** A rate-activated valve that closes once the predetermined activation rate is achieved. In this well it was set to close at 4 barrels per minute.



The Four Bladed Heavy Wall Gator offers an option to replace section milling or explosive-based perforating devices.

#GatorDone



# MPX Two Trip P & A SYSTEM

