

# Oceaneering Uses Unconventional Method to Decommission Steel Catenary Riser

## Project Overview

Williams, a major pipeline company, needed to abandon a 22-year-old, 8-inch gas export steel catenary riser (SCR) on the Morpeth tension leg platform (TLP) at Ewing Bank Block 921 (EW-921) in the Gulf of Mexico. While it had initially requested that Oceaneering use a conventional approach for this operation, Williams later asked if an unconventional approach that Oceaneering had utilized on another project would be feasible.

Ultimately, Oceaneering successfully decommissioned the SCR by utilizing this alternative method, using a series of clamps to grip the riser, which was then cut. With this method, the riser is allowed to swing beneath the vessel under water before being laid down on the ocean floor for abandonment.

## Issues

The conventional approach for decommissioning a riser involves using a topside winch package on the platform, unseating the riser from the porch, and then transferring the load to a large support vessel to be spooled or abandoned on the seafloor.

However, with this conventional method, the winch has to be placed near the top of the riser or in an adjacent position in order to route the winch line through a drop point, requiring further engineering, welded beams, and snatch blocks to access the riser. These requirements interfere with platform operations and extend the overall timeline for decommissioning the rest of the TLP.

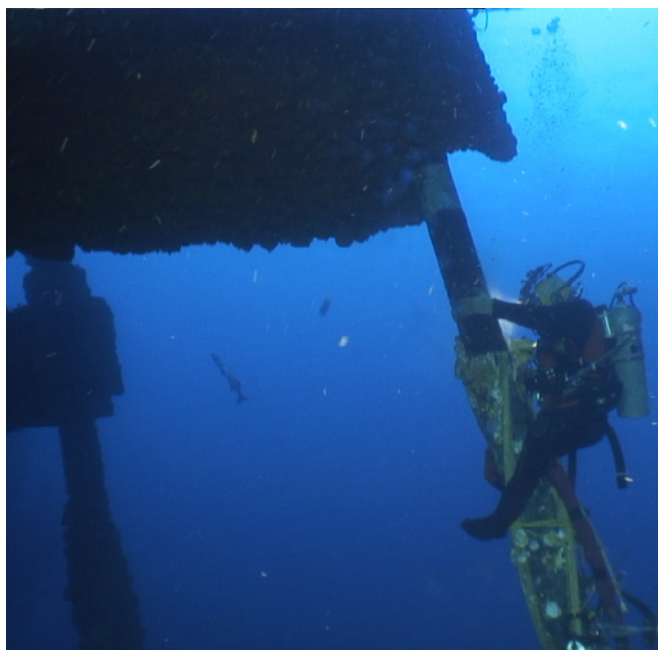
For decommissioning the Williams SCR, Oceaneering had to take several factors into account as it evaluated the use of the unconventional method. First, Williams was unable to obtain engineering drawings from the private company that had previously owned the pipeline, meaning that the SCR's actual position was unknown, thus requiring Oceaneering to make its own model. Second, Oceaneering had to avoid an adjacent and active 12-inch oil SCR (located 18 ft/5.5 m away) during operations, and also had to pig and flush the pipeline.

The TLP was located at the deepwater end of the pipeline in 1,700 fsw (518 msw), while the other end of the pipeline terminated at the fixed leg platform at Grand Isle Block 115 (GI-115) in 366 fsw (111 msw).



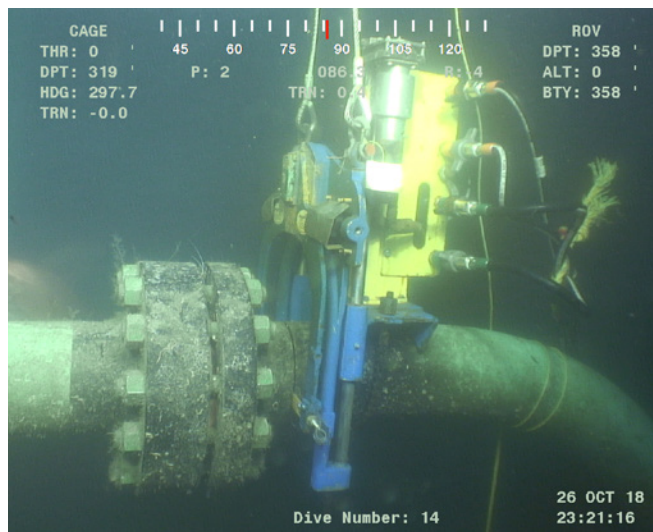
## The Oceaneering Solution

Oceaneering determined that the alternative method was achievable, and was awarded the lump-sum project. The scope of work included the pigging, flushing, and abandonment of the 20-mile (32-kilometer) 8-inch gas export pipeline and SCR (~6,500 bbl), as well as the design of a series of clamps to safely secure the load for the cut and swing of the riser. The *Ocean Patriot* diving support vessel (DSV) was required for the cleaning of marine growth, along with the installation of clamps and the pre-installation of rigging on the pipeline's deep end.



The plan also called for the winch line to be connected to the friction clamp, and then cut and laid. Next, the *Ross Candies* multi-service vessel (MSV) would assist with covering the SCR and pipeline ends with concrete mats.

Additionally, Oceaneering planned to cut and remove approximately 25 ft (7.6 m) of the pipeline's tube-turn transition—where the shallow end of the pipeline terminated at the base of the fixed-leg platform—from the pipeline to the hull piping. Finally, the DSV *Ocean Patriot* would use sandbags to plug and cover the pipeline ends.



## Execution Plan

In July 2018, Oceaneering began the project by performing a topside inspection at each of the platforms to determine pigging and flushing tie-in points. Oceaneering used the MSV *Cade Candies* to conduct a site survey to determine the SCR's actual profile, the physical position of the SCR porch, the SCR's proximity to the adjacent riser throughout the catenary, the riser's actual touchdown point, and the required offset by the MSV.

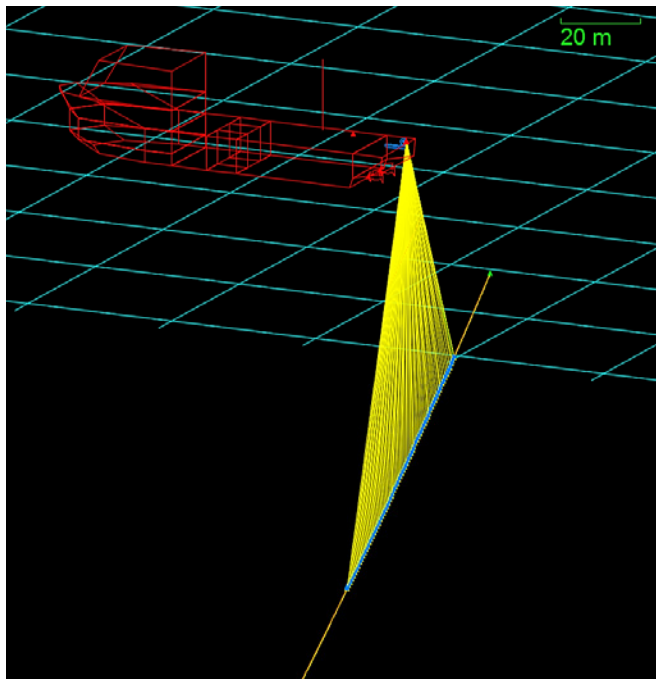
Based on the information gathered, Oceaneering decided to use a winch on the vessel with a new 2.5-inch Extra Improved Plow Steel (EIPS) wire running through a cantilevered sheave to access and connect to the friction clamp on the riser south of the SCR porch.

Oceaneering took several factors into account to best position the vessel, including how to:

- » Maximize the clearance of the adjacent oil riser during the cut and swing and maximize the clearance from the hull for when the riser swings beneath the vessel
- » Minimize the wire angle limitations on the floating sheave, which had to be strengthened with additional welding gussets
- » Maximize the weather working windows in the winter

In September 2018, Oceaneering used the *Harvey Ram* supply vessel (SV) to pig and flush the SCR and pipeline with a pumping spread (centrifugal, chemical, and triplex pumps) on the pig launcher end at the TLP. A secondary supply vessel—the *SV Harvey Worker*—along with a filtration spread (transfer pumps, carbon filter skids, capture tanks, and gas buster) were used to eliminate the risk of forming a hydrate since the primary fluid used to push the pigs behind a methanol pill was seawater. As soon as the pigs were received on GI-115, the filtration spread would capture and filter the diverted fluids to eliminate the risk of pumping unnecessary seawater into the 20-inch production line beyond the pig catcher.

Within an OrcaFlex analysis, the Oceaneering team weighed the pros and cons of each iteration with a sensitivity study based on the load on the sling -vs.- friction clamp depth, inclination of the sling with respect to the sheave -vs.- friction clamp depth, cut locations, and the effects of differing horizontal rigging lengths to minimize the dynamic behavior of the SCR prior to, during, and after the cut and swing.



The SCR static weight in catenary was 38 Te. The SCR dynamic, expected peak load during the swing was 54 Te. All project riggings and wire lengths were procured to match the model and to include an additional factor of safety.

In late October 2018, the DSV *Ocean Patriot* and its saturation divers cleaned marine growth, strakes, and insulation from the riser, and also installed the clamps and rigging necessary for the MSV *Ross Candies* to arrive later and connect the winch line, tri-plate, and horizontal rigging to the SCR at EW-921, thus allowing the vessel to hold onto the riser. The DSV *Ocean Patriot* then completed the scope of work at the GI-115 fixed platform. The MSV *Ross Candies* arrived, hooked up, and cut the riser as soon as a weather window presented itself. The line rider that monitored the load after



the cut and swing showed that the Oceaneering model was within 5% of the actual expected loads.

Subsequent cuts were made to recover the friction clamp, while the abandoned pipeline ends were plugged and covered with concrete mattresses.

## Challenges

The project methodology needed to consider adequate, yet realistic, factors of safety and procedural contingency scenarios—given the modeled loads, and also given the position and reaction of the riser swing, as illustrated in the OrcaFlex model.

Regarding the cleanliness of the pipeline, the pig train and flushing procedure (which at times would hover around the maximum allowable operating pressure of the pipeline) would need to overcome the head pressure caused by pushing the foam-disc pigs uphill—from 1,700 fsw on the TLP end, up to 336 fsw at the shallow end. At each transfer hose connection on both platforms, a quick-disconnect fitting was used in the event that either supply vessel drifted off during pumping operations.

Other challenges that Oceaneering faced during the project included laying the SCR within 200 ft (61 m) of the pipeline right of way after the cut was made, along with interfacing with multiple operators' live pipelines and avoiding their platform's operations.

## Equipment Highlights

- » A series of 8-inch clamps with a safe working load of 68 Te, installed by DSV *Ocean Patriot* divers
- » An Intercon winch with 2.5-inch EIPS wire and a winch brake system capacity of 195,000 lb (88 450 kg)
- » Floating sheave and sub-frame with a safe working load of 68 Te
- » Line rider
- » Super grinders and a guillotine pipe saw
- » Concrete mats and sandbags
- » ROV-installable plumber's plugs

## Results

Oceaneering executed the project on time and without impeding the operator's TLP decommissioning schedule with other contractors. Using this unconventional method saved the customer approximately \$500,000 by eliminating the need to further check the structure, engineer the drop points, and mobilize a topside winch package.

## Project Highlights

The project, led by the Oceaneering Subsea Projects team, encompassed multiple vessels and Oceaneering divisions (such as Diving; Survey and Mapping; Remotely Operated Vehicles; Service, Technology & Rentals; and Asset Integrity) for executing the project safely and on time, thus proving that this unconventional method is an effective choice. The SCR acted as planned, given the estimated loads and the position of the riser in the OrcaFlex model. Additionally, the friction clamp did not move during the cut and swing, as there was a 1/2-inch offset between the clamps.

Given the successful outcome of the Williams 8-inch gas export SCR abandonment, this unconventional method should be considered when there is an adjacent active riser. As the number of SCRs that are nearing the end of their lives is growing rapidly, this positive outcome ultimately highlights Oceaneering capabilities and market scalability within the decommissioning segment of Oceaneering Integrated Solutions.