

Esmil Process Systems  
Application Report  
Produced  
Water Treatment Package  
Corrib Field Development  
Bellanaboy Bridge Gas Terminal  
Shell E&P Ireland Ltd.



Esmil Process Systems Ltd, one of the UK's leading experts in the field of oil water separation and treatment have recently completed a large WWTP ( Waste Water Treatment Package) for the Corrib project in Ireland on behalf of Shell and AMEC. The contract value now exceeds £5.0 Million.

The Treatment Plant treats; Produced Water generated from the gas condensate as the gas is brought ashore, Surface Water from the facilities hard standing, and also has a combined sludge treatment system as well- all part of the Esmil supply.

Strict Environmental discharge parameters had been set by the local Environmental Protection Agency and these had to be adhered to on a 100%ile basis .With the oil in water discharge consent set at < 0.3 mg/l there was no room for error.

Esmil's experience in the field of membrane separation made them the ideal contractor to design, supply and commission the treatment system.

Esmil's membrane process was extensively tested prior to full scale design using portable membrane skid pilot plants and was carried out at Shell's Dutch research establishment, this allowed Esmil's process engineers to collate design parameters and cleaning frequencies prior to full scale plant design.

The two process streams requiring treatment are **produced water** resulting from the gas condensate and the **surface water** drainage arising from site based activities.

The produced water waste stream at 9m<sup>3</sup>/hour primarily contains suspended solids, free oil, heavy and other metals, dissolved salts and some organics. The treated water quality is required to meet the EQS level specified by the local Environmental Protection Agency.

The Surface Water stream comprises mainly surface water contaminated with oil, and has an average flow rate of approximately 30m<sup>3</sup>/hour.

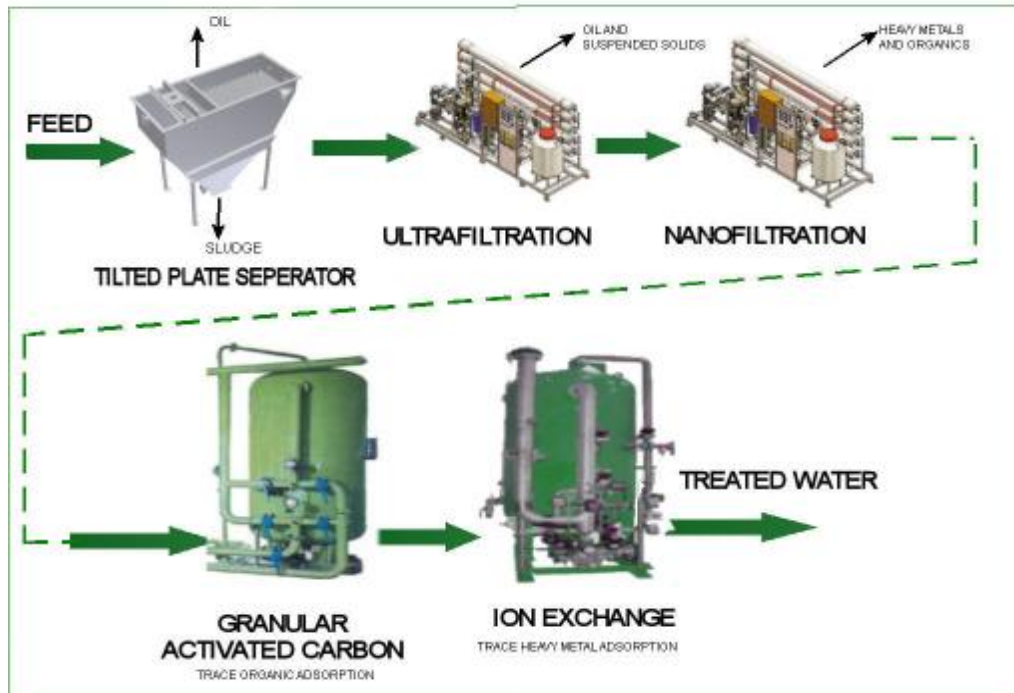
## **Produced Water**

For the Produced Water Treatment the following process steps have been installed.

- Tilted Plate Separator (TPS) for removal of suspended solids and free oil.
- Ultra filtration (UF) for removal of emulsified oil and certain organics
- Nano filtration (NF) for the removal of the majority of heavy and other metals.
- Carbon filtration for the removal of soluble organics.
- Ion Exchange for the removal of residual heavy metals.

The separated solids from the TPS, concentrate from the NF, cleaning waste from the UF and NF, activated carbon backwash water and regenerate waste from the ion exchange columns are diverted to a balance tank, from which they are pumped into a reaction / flocculation tank.

Chemicals are used to raise the pH, precipitate, coagulate and flocculate the metals in solution (including mercury). This produces a flocculated mass, which is dewatered on a filter press, producing a filter cake, which will contain the metals for separate disposal. The filtrate is recycled back to the Produced Water, TPS feed tank.



## Surface Water

The Surface Water treatment system comprises of one stream rated at 30m<sup>3</sup>/hr. The process comprises of:

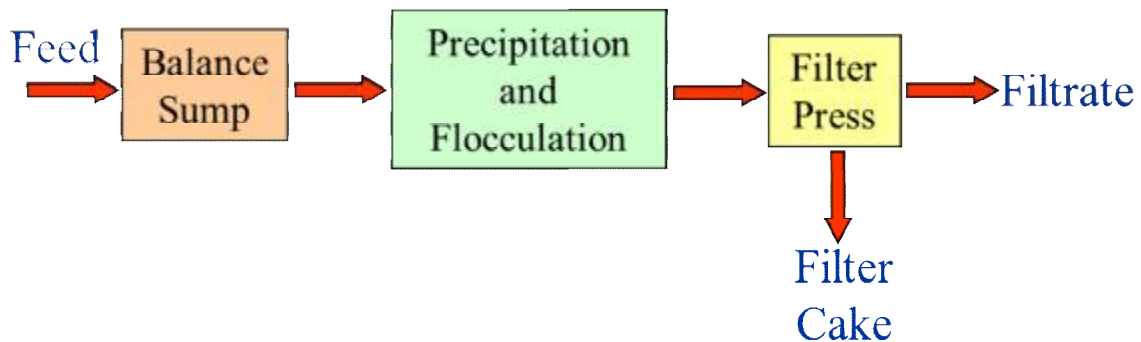
- Tilted Plate Separator (TPS) for removing the bulk of the separable oil.
- Multimedia Filters (MMF) for removal of particulate suspended solids.
- Ultra filtration (UF) for removal of the residual free oil and emulsified oil.



## Combined Sludge Treatment

The sludge treatment facility treats waste sludge's from the following sources, with the filter cake being disposed off-site and the filtrate is returned to the inlet for a further pass through the treatment process.

Feed	Products
Membrane CIP Waste	Filter Cake Filter Press Filtrate
Resin Regeneration Waste	
GAC Backwash Waste	
NF Concentrate	
PWTP TPS Sludge	
SWTP TPS Sludge	



According to Shell engineering manager John Botterill *“Esmil have shown remarkable commitment, tenacity, expertise and professionalism in fulfilling their contract for design, installation and commissioning of the Corrib Water Treatment Facilities, despite the extended regulatory delays suffered by the overall project. When the contract was awarded, Esmil were the only company able to meet and guarantee the extremely stringent water disposal specifications for Corrib. I am delighted with their performance.”*

Mr Devinder Chabba, Managing Director of Esmil, comments, *“ For Esmil this was a fantastic project, we were the only company that could offer technology to meet the exacting standards required by the Environmental Protection Agency and the only company with enough experience to be able to guarantee performance!”*

For further information on this and other Esmil projects please contact

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Further site photographs;



Showing membrane skids and filter press



Membrane Skid for Ultra-filtration Membranes