



## MPPE for removing dissolved and dispersed hydrocarbons from offshore produced water

### Reduction of toxic load and Environmental Impact Factor (EIF)

### Removal of dissolved and dispersed

- Aliphatics (dispersed oil)
- Aromatics (BTEX)
- Polyaromatic hydrocarbons (PAHs)
- Naphtalenes, phenanthrenes, dibenzothiophenes (NPDs)

### Remote controlled MPPE operations

### MPPE for present and future regulations

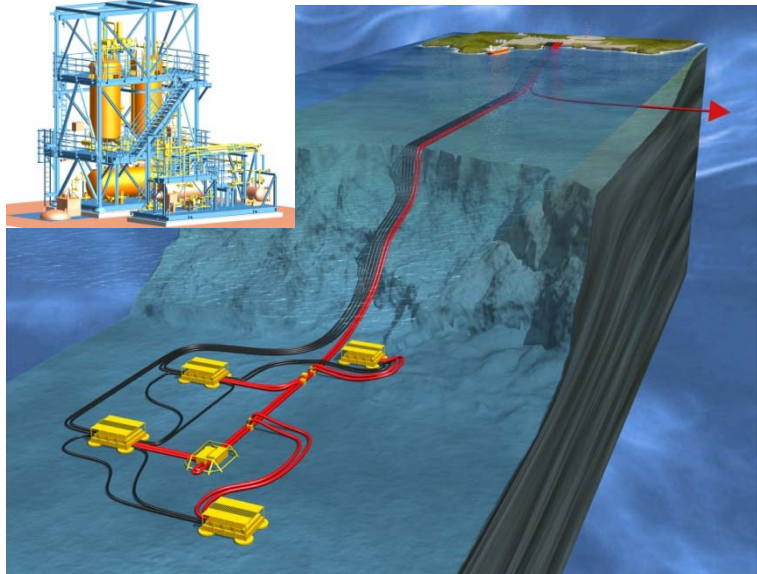
- Dissolved and dispersed oil < 1 ppm
- Zero harmful emissions (Norway, visualized in Environmental Impact Factor (EIF))

99.9999%  
Removal of hydrocarbons

**VWS OIL & GAS**

Website: [vwsmpsystems.com](http://vwsmpsystems.com)

**Robust against** salt, methanol, glycol, corrosion & scale inhibitors, H<sub>2</sub>S scavengers, demulsifiers, defoamers, dissolved (heavy) metals, varying conditions



MPPE unit StatoilHydro, Ormen Lange

### References

NAM (Shell/Exxon) - K15A, K15B, StatoilHydro - Ormen Lange, Total - F15A, StatoilHydro - Kollsnes, Woodside - PLUTO, Vermilion - Harlingen,

# MPP SYSTEMS

## MPPE in hydrocarbon removal

MPP Systems has developed a one step process that will remove both dissolved and dispersed hydrocarbons from water. Macro Porous Polymer Extraction (MPPE) can reduce organic concentrations in contaminated water from thousands of ppm to low ppb levels in order to meet discharge limits. These turn-key systems offer guaranteed performance at fixed annual costs.

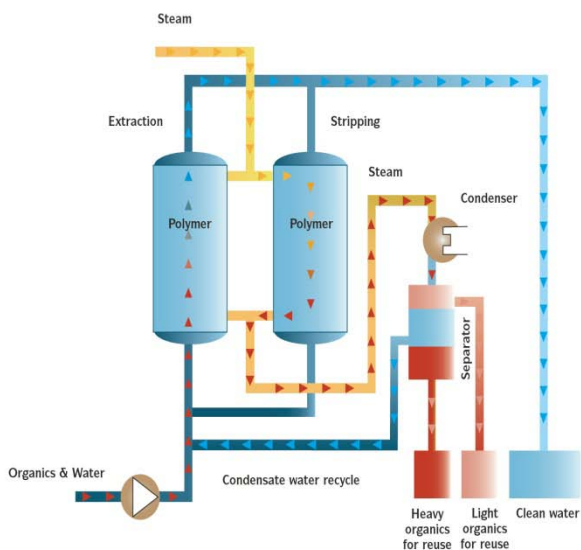


Fig 1: MPPE process scheme

### MPPE Markets

Offshore produced water, waste water, process water, groundwater.

### MPPE Process

Hydrocarbon contaminated water is passed through a column packed with MPPE particles. An extraction liquid immobilized within the polymer matrix removes the hydrocarbons from the water. The purified water then passes out of the column directly for reuse or discharge. Periodical in-situ regeneration of the MPPE particles is accomplished with low pressure steam. The steam volatilizes the hydrocarbons, which are then condensed and separated by gravity. The aqueous condensate is recycled to the system, while the hydrocarbon phase is recovered and may be sold as a product, reused or disposed. The two columns shown, allow continuous operation with simultaneous extraction and regeneration.

**References:** MPPE units have been operational since 1994 in the USA and Western Europe at recognized international companies. Descriptions of industrial applications are available on request. Flow rates of less than 1m<sup>3</sup>/hr (5 gpm) to hundreds of m<sup>3</sup>/hr (gpm) are possible (Total, Shell, Hydro, Statoil, Gaz de France, German Government, Solvay, Organon, Akzo Nobel, Orgasynth/Synthexim, Vermilion, NAM, Albemarle, Philips, Brega).

### MPPE Features

- Removal of a wide variety of aliphatic, aromatic, polyaromatic, chlorinated and halogenated hydrocarbons
- Ideal for oil & gas produced, process, waste and groundwater
- Very high separation performance: 99.9999% removal efficiency
- Cost competitive: Long polymer lifetime. Low steam consumption
- Robust against salts, methanol, glycol, corrosion inhibitors, scale inhibitors, H<sub>2</sub>S scavengers, demulsifiers, defoamers, metals
- Flexible:
  - Turn down ratio 0 – 150%
  - Reduction factor independent of influent concentration
  - Immediate on specification after start up; batchwise operation possible
- Operationally reliable, robust against composition changes
- Fully automated, remote controlled for unmanned operations
- Compact equipment: small footprint
- Low environmental impact, no waste stream
- Performance guaranteed during operational life



Fig 2: 99% removal of dissolved and dispersed Hydrocarbons from waste water

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