

CFB Trenton reduces environmental impacts of aircrafts' wash water by installation of an ultrafiltration system**Summary**

Since 2002, an ultrafiltration system has processed and recovered more than 5.5 million litres of Helicopter wash water and collected 340,585 litres of hazardous waste at CFB Trenton. As part of a pollution prevention program, the filtration system was installed to remove the hazardous contaminants at the site and to eliminate the requirement for transportation of waste water for disposal by a licensed handler. The filtration system removes emulsified oil originating from cleaning products mixed with small amount of fuel during the air craft washing process collected in an underground tank outside the hangar.

**Background
Case History- DND**

Under the Sustainable Development initiative, in the military context, DND is taking all the required measures in order for the defence activities to have minimum environmental impacts and to not compromise the ability of future generation to meet their needs.

Also, being duly diligent and accountable for the impacts of any defence activities on the environment, DND respects the environment and exercises environmental stewardship and ensures that environmental considerations are integrated into required policies and practices.

A great example of the above initiative is one of the hangers at the CFB Trenton, where during the air craft washing process wash water is collected in an underground 60,000 litre tank outside the hangar. Every three to four weeks, about 40,000 litres of waste water collected in this tank gets processed and treated. Since 2002, 5.5 million litres of helicopter and plane wash water has been collected and treated.



Installation of an ultrafiltration system at this hanger made this treatment possible.

Ultrafiltration Technology

Ultrafiltration (UF) is an industrial process in which semipermeable membranes are used to separate water and some dissolved low molecular weight materials from a mixture that requires processing. The goal of the process is to effectively fractionate the original process stream into a concentrate stream and a very low concentration permeate stream.

UF's significant feature is its ability to separate and through recirculation to concentrate certain molecules in continuous systems. The treatment is a pressurized process. A low pressure of 5 - 150 psig would

separate the contaminants of concern from aqueous solutions using semi-permeable membranes. The solvent and any dissolved component that pass through the membrane are known as permeate. The components that do not pass through are known as retentate.

The concentrate is then disposed of by the most economical means or further processed if the concentrate contains valuable material. The permeate stream is normally discharged to a sanitary sewer or recycled to rinse systems since it is relatively clean.

The membranes of the Ultra Filtration system installed at CFB Trenton are tubular membranes. The process fluid is circulated through these membrane tubes under pressure. The oil is retained and the water is separated from the mixture.



Ultrafiltration as a type of filtration has been in use in different Industries such as pharmaceutical, food and beverage processing as well as waste water treatment. The largest need for this type of filtration is when the contaminated water can be reused or recycled following the separation of contaminants.

Ultrafiltration (UF) is a variety of membrane filtration in which hydrostatic pressure forces a liquid against a semipermeable membrane. Suspended solids and solutes of high molecular weight are retained, while water and low molecular weight solutes pass through the membrane. This separation process is used in industry and research for purifying and concentrating macromolecular (103 - 106 Da) solutions. Ultrafiltration is not fundamentally different from reverse osmosis, microfiltration or nanofiltration, except in terms of the size of the molecules it retains.

Conclusion

During the aircraft washing process, particulates such as dirt and sand as well as oil and grease accumulates in the collected wash water. The aircraft cleaning process will prevent any possible corrosion and keeps them ready for the next service such as Hercules that serve in Afghanistan.

The treatment package consisting of a prefiltration followed by an ultrafiltration system removes particulates down to 400 micron as well as the hazardous contaminants which consists of emulsified oil resulted from cleaning products mixed with small amount of fuel.

As a result of this treatment, more than 340,585 litres of hazardous waste have been recovered since 2002. This has eliminated the requirement for transportation of waste water for

disposal which is a great cost saving. After recovering most of the wash water, it is sent to the CFB wastewater treatment plant for more treatment. Don kovanen, Assistant Wing Environmental Officer, said *"the Ultrafiltration's membranes have been in continuous use and outlasted their five year lifetime span. The system has been working as expected and thousands of liters of hazardous wastewater have been treated and saved disposal costs"*.

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