Nuclear Waste Clean-up

Waste Storage Tank Remediation

porvair filtration group

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Customer:	US Government EPC Contractor
Application:	Prefiltration and Removal of Radioactive Isotopes
Products:	Custom Sinterflo® M filter assembly
Primary Motive:	Process System Improvement
Location:	USA
Project Date:	2019-2020
Division:	Ashland, USA

Customer Overview:

An established US Government contractor working with the Department of Energy.

Customer's Problem:

After many years of working with an alternate filter manufacturer, the customer approached Porvair in April 2019 with a request to build an improved system that would accelerate clean-up and allow tank closure at a specific National Laboratory site.

The material to be processed is radioactive waste that was created as a by-product from the creation of plutonium based nuclear weapons at a nearby military facility during the cold war period. In some cases, the waste has been kept in inadequately designed storage tanks the structure and integrity of which have been compromised.

The majority of the waste is Cesium salt in solution that at pH14 presents a very corrosive environment.

Porvair's Solution:

In conjunction with one of its technology partners Porvair redesigned the filter assembly to improve three critical metrics, resulting in:

- A 50% increase in filtration area by installing 48 smaller filter rather than the previous 19 larger filters.
- A reduction of particle retention size from 2 microns to 1 micron or a 1 millionth of a meter or an 1/8th of the diameter of a human red blood cell.
- An increase in the open area within the filter structure from 30% to 63%

The net effect of these changes was to provide a solution that would be able to filter the waste faster and more completely using less energy thereby presenting a more efficient outcome for the site.

Project Overview:

The Porvair system is required to filter out particulate upstream of an ion exchange column that actually removes the radioactive cesium waste which would otherwise foul and need extremely costly replacement. Once the column reaches its full capacity it is removed and encapsulated in a highly stable concrete and shrouded in stainless steel for safe storage in a government authorized repository. The liquid end product is no longer radioactive and can be disposed of as normal hazardous waste. The previously used filters supplied by one of our competitors blocked far too frequently and could not be effectively cleaned. The fact that the Porvair filters can be cleaned in place has provided another huge benefit to the program.

Product and System Information:

The incorporation of the Sinterflo® M filtration media has has resulted in an overall 50% process improvement. Initial results support the two filters being installed in late 2020 and that they will then be able to start processing the 2.2 million US gallons (about 3.5. Olympic sized swimming pools) of waste in April 2021.

Other Opportunities:

The precipitation of the cold war and the race to produce nuclear weaponry in the USA and around the world left in its wake a multitude of poorly thought through nuclear waste sites that are in need of better management. There is no standard "one system fits all" solution as the make-up of the waste is never the same and is rarely completely characterized. The world's nuclear community has acknowledged this problem and is committed to addressing it through these types of remediation programs.

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World Class Filtration Solutions