

PI.2 Innovative Rotary Crossflow System for Volume Reduction of Mixed Hazardous and Rad Waste

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Abstract

DOE operations generating liquid waste that is subsequently discharged from the facility will normally have a clarifier as part of the waste treatment process. Chemicals are added to the waste stream prior to the clarifier that will flocculate and settle radioactive and hazardous components of the waste stream. The settled solids form a sludge that must be dewatered for long term storage or disposal.

The standard method of sludge dewatering at DOE facilities are precoat filters that use diatomaceous earth or a similar filter aid. The filter aid adds significantly to the amount of radioactive or hazardous material that must be stored or further processed. As an example, at one DOE facility studied it was determined that 90% of the clarifier sludge consisted of filter aids and only 10% actual radioactive/hazardous components.

The objective of the SpinTek project is to eliminate the need for precoat material, obtain higher solids removal efficiency, and concentrate the recovered solids to a thick paste for subsequent treatment or storage.

SpinTek has developed the STII rotary microfiltration system that meets all of the project objectives. The system consists of ten 11" diameter disks that are coated with a ceramic membrane on each side. The disks are rotated at 1,200 Rpm close to turbulent promoters that generate high shear at the surface of the membrane. The high shear minimizes fouling that can occur on the membrane surface and allows the system to operate for weeks before cleaning is required.

In phase I of the PRDA we successfully scaled the STII rotary microfilter from a single disk to ten disk system. The STII was operated on a wide range of surrogate materials and operational parameters of rotor speed, feed pressure and temperature were optimized. The ten disk STII unit is now at Los Alamos being installed for the on-site demonstration to begin.

Subsequent work with the STII at DOE will focus on other difficult liquid/liquid and liquid/solid separations. Of particular interest, is the development of a STII based system for the treatment and recovery of cooling water blowdown.

New Product

“Speedy” By SpinTek

- Rotating Ceramic Ultrafilter
- TiO_2 Ceramic Membrane
- Reduces downtime
- Tolerates high temperature, 0-14 pH
- 1, 5 and 10 disk systems
- Significantly less expensive than competitive systems
- Small Footprint



SpinTek ST-II-25

- 25 11" diameter Membrane Disks
- Concentrates sludge to +50% solids
- Reduces cost and concentrates waste by 30,000x
- 0.07 Micron Membrane
- Easy to clean membrane surface



Objective

- **Eliminate** the need for precoat material
- **Achieve** submicron filtration
- **Continuous** and stable operation
- **Concentrate** the recovered solids to a thick paste for subsequent treatment and storage

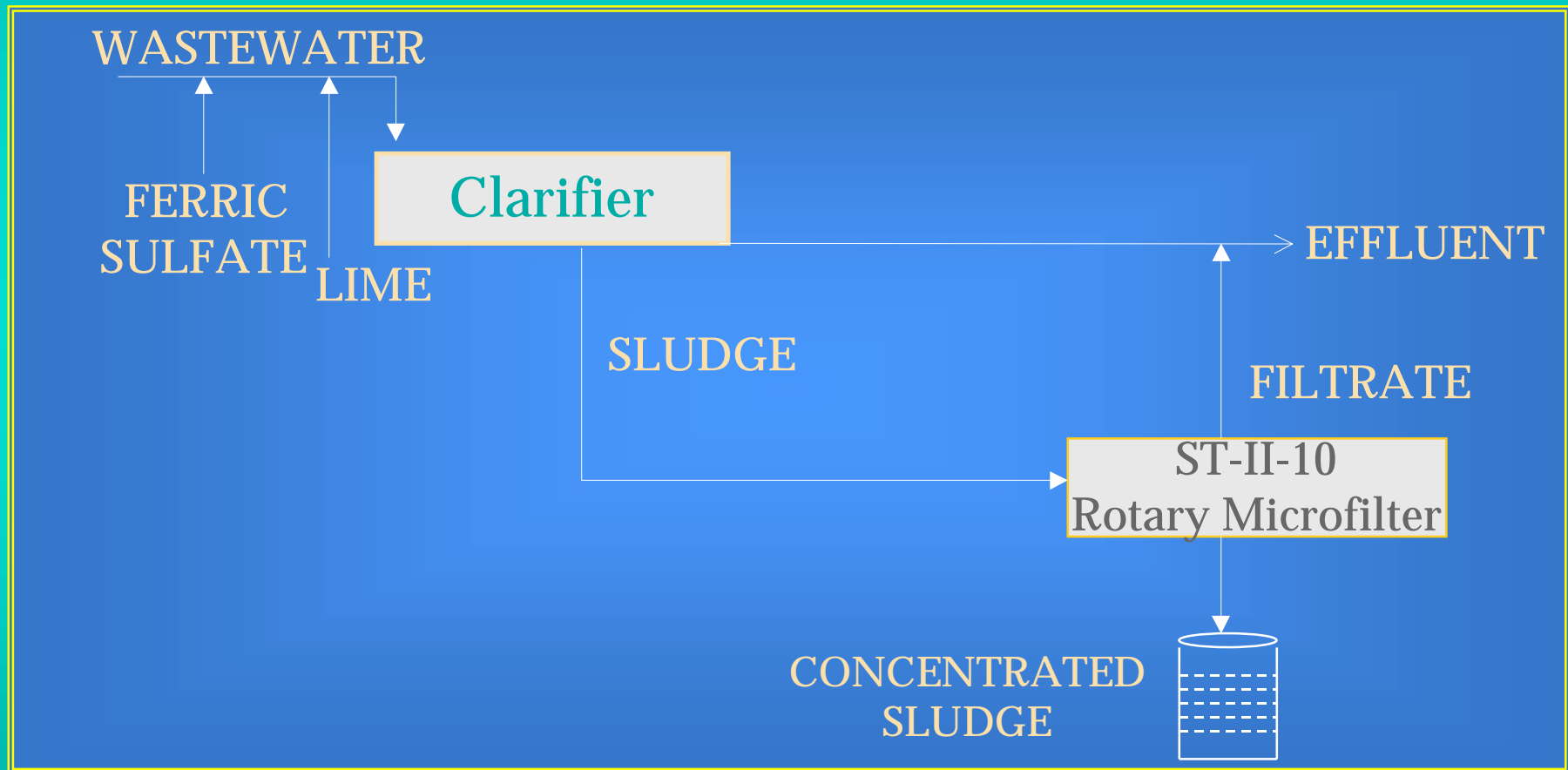


Method, Data and Analysis

- SpinTek developed the ST-II Rotary Microfiltration system to meet **all** project objectives
- Ten (10) 11" diameter membrane disks coated with a TiO₂ ceramic membrane (0.1 micron)
- Disks **rotate** at 1,200rpm
- Generates high shear at the membrane surface
- **Minimizes fouling** that can occur on the membrane surface
- Operates for **weeks before cleaning is required**



LANL Flow Sheet With Clarifier



Conclusion

- Successfully scaled the ST-II rotary microfilter from a single disk to a ten disk system.
- ST-II operated on a wide range of surrogate materials and operation parameters of rotor speed, feed pressure and temperature where optimized
- Installed at Los Alamos National Laboratory for on-site demonstration

