

## **Microfiltration/Nanofiltration Application Note CIP Caustic Recovery**

**Process Description:** CIP (clean-in-place) caustic recovery systems reclaim reusable caustic solution from spent caustic CIP solutions in food processing plants. The spent CIP caustic solution is collected in a storage tank and is processed through the membrane system either in batch mode or continuous mode depending on the volume of spent CIP caustic solution generated each day. The system has ceramic membranes that let water, caustic, salt, sugar and other small molecular-weight molecules pass through the membrane. Protein, fat, complex carbohydrates, soils, bacteria and suspended matter are retained by the membrane in the concentrated solution. Ceramic membranes are capable of operating under high pH and temperature conditions. The clean caustic solution that permeates through the membrane is stored in a storage tank for reuse. The by-product of this process is a concentrated solution of protein and fat that may be utilized as an animal feed ingredient.

**Savings:** The CIP caustic recovery system has several benefits:

- System can recover up to 95% caustic solution. Reclaimed caustic is regenerated and reused in plant CIP systems. Chemical usage is greatly reduced.
- The concentrated solids, primarily fat and protein, may be used as an animal feed supplement.
- Since the spent CIP caustic solutions do not go into the sewer, BOD and sewer charges are reduced.
- The spent CIP caustic solution is processed hot and the recovered caustic is hot, thus saving heat energy.
- The recycling of the same solution cuts down on fresh water consumption.

**Typical Results:** The following results were obtained while processing the spent CIP caustic solutions in an egg processing plant.

	<b>Feed</b>	<b>Concentrate</b>	<b>Recovered Caustic</b>
<b>NaOH</b>	4.0%	4.0%	4.0%
<b>Total Solids</b>	5.7%	11.2%	4.1%
<b>Fat</b>	0.5%	3.5%	0.01%
<b>Protein</b>	1.1%	2.7%	0.05%
<b>Volume</b>	100%	5-20%	80-95%

The results vary from plant to plant. However, the concentration of caustic (NaOH) is approximately the same in the spent CIP solution and the recovered caustic solution. For example, if the spent CIP solution has 3.5% caustic, recovered caustic solution will also have 3.5% caustic.