

# Hydrite Chemical Company

## COMPANY BACKGROUND



Established in 1929, Hydrite Chemical Company is a diversified chemical company with national reach. Hydrite Chemical Company currently has ten locations throughout Illinois, Indiana, Iowa, and Wisconsin. Established in 1984 and employing 55 people, Hydrite Chemical Company in Waterloo, Iowa, specializes in cleaning products and manufactured sulfur products. At the Waterloo facility, a majority of chemicals are in liquid solution and require large volumes of water for processing and cleaning. Hydrite claims more than \$60 million in annual sales each year.

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## PROJECT BACKGROUND

Hydrite utilizes a permitted Elementary Neutralization Unit (ENU) to pH-adjust more than 50 million gallons of wastewater each year before it is disposed to the Waterloo publically-owned treatment works (POTW). Hydrite expressed interest in substantially reducing their virgin chemical needs by more than 20 percent. The company also aims to reduce the overall volume of wastewater disposed to the POTW by more than 10 percent.

## INCENTIVES TO CHANGE

Described as the “heartbeat” of the plant, the ENU requires more than \$200,000 in virgin food-grade chemicals per year to adjust the pH of the wastewater. Due to the nature of pH adjustments and the large volume of chemical wastewater generated at Hydrite, the ENU struggles at times to keep up with neutralizing the incoming wastewater. By reducing the overall volume of generated wastewater and subsequently reducing the virgin chemical needs, Hydrite may reduce the burden on the ENU, reduce its yearly water, chemical, and disposal costs, and become more environmentally friendly.

## RESULTS

**Advanced Control Programming and Motorized Control Valves:** On average, 225 gallons of virgin caustic and 650 gallons of virgin acid are used each day to adjust the pH of chemical wastewater sent to the ENU. The current neutralization system involves an “all-or-nothing” control program to add the chemicals. When the pH of the wastewater goes outside the set boundary points, the caustic or acid valve opens completely, adding chemical to adjust the pH of the wastewater. Unfortunately, nearly 90 percent of the acid used for neutralization is wasted because of inadequate control of the neutralization chemicals. The addition of more complex control programming and motorized control valves will prevent the waste of at least 50 percent of the current neutralization chemical use. Improved control programming and motorized valves will allow for slower addition of chemical and subsequent longer reaction times. The programming will take into account the rate at which the pH is changing and the volume of the wastewater in the tank. This will result in fewer pH spikes and consumption of substantially smaller volumes of neutralization chemical.

**Marketable material:** Due to the reduction in raw material usage used for internal operations the surplus inventory can now be included with the saleable materials.



**Flow Control Valves for Pump Seals:** Pump seal flushes utilizing softened water are widely used throughout the Waterloo facility. Twenty pumps run continually throughout the plant, requiring seal flushes to remove build-up of solids. With a varying range of flow rates and water pressures, and an average of more than two gallons per minute throughout the plant, pump seal flushes are the largest wastewater generators, producing 36.7 percent of total wastewater volume, or 57,600 gallons per day. Pump manuals specify that only one-half to two gallons per minute are necessary to provide adequate flushing of solid build-up. Pump seal flow rates can therefore be reduced from 2 GPM to 1 GPM using flow control valves. It is recommended that flow control valves be installed to limit and control the liquid flow rate through pipes. This measure would prevent excessive flow rates and manual valve tampering and would significantly reduce costs by conserving large volumes of water.

PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
ENU NEUTRALIZATION CHEMICAL ADDITION ADVANCED CONTROL PROGRAMMING	\$79,205	106,945 GALLONS OF ORGANIC CHEMICAL	IMPLEMENTING
ENU NEUTRALIZATION CHEMICAL ADDITION ADVANCED CONTROL PROGRAMMING	\$79,810 (ADDITIONAL SALES)	-	RECOMMENDED
INSTALLATION OF FLOW CONTROL VALVES FOR PUMP SEALS	\$17,815	10,512,000 GALLONS	RECOMMENDED

## AIR POLLUTANTS DIVERTED IN TONS

Total for all sectors	
SO2	0.288
CO	0.735
NOx	0.254
VOC	0.383
PM	0.048

## GREEN HOUSE GASES DIVERTED IN TONS (CO2 Equivalent)

Total for all sectors	
CO2	130.8
CH4	110.2
N2O	72.9
CFC	4.58