

## Ames Goldsmith Reviews Sustainable Approaches to Nitrates in Wastewater

Ames Goldsmith Corp. (Ames Goldsmith), located in Glens Falls, manufactures various silver-based materials and reagents. Ames Goldsmith's plant has been in continuous operation as a silver refiner and fabricator for nearly 150 years. Today, with an annual silver consumption well in excess of 85 million troy ounces, they are one of the largest integrated silver fabricators in the world. Ames Goldsmith's expertise in customizing its standard materials evolved into developing new materials to meet the needs of the continually advancing precious metals products markets including automotive, aerospace, medical, electrical, renewable energy, and electronics.

### Challenge

Approximately 11.2 million gal/year of water is used at Ames Goldsmith's facility and the same amount discharged as wastewater costing the company almost \$750,000/year for water purchase and sewer fees. A majority of the water is dedicated to chemical processes and a significant amount of sodium nitrate is formed, which results in high levels of nitrates in the wastewater that must be treated prior to discharge.

Ames Goldsmith has evaluated biological treatment methods to deal with the nitrates, but these systems typically require large amounts of space and energy for the amount of wastewater generated. Ames Goldsmith would prefer alternate approaches that are less costly and require less space to reduce nitrate levels in their wastewater.

### Solution

The New York State Pollution Prevention Institute (NYSP21) worked with Clarkson University to investigate the feasibility of electrochemistry to reduce nitrates in the company's wastewater. Baseline data was collected and reviewed to provide Clarkson University with a starting point to research this process. Additionally, a series of tests using both simulated solutions and actual wastewater samples was performed. An economic analysis was also executed to provide Ames Goldsmith with a better understanding on the costs to implement electrolytic equipment.



Electrochemical Test Cell

### Results

Electrochemical reduction of nitrates in Ames Goldsmith wastewater was demonstrated on a lab-scale level. Successful use of this technology has the potential to reduce treatment costs without creating sludge and creating

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another waste stream to manage. The following results were obtained:

- Electrolysis on simulated waste indicated that reduction of nitrates with minimal amounts of undesirable side products such as nitrites is possible, with high selectivity
- Lower conversion was obtained on actual Ames Goldsmith wastewater, most likely due to presence of other chemical species in solution
- Optimization of the electrolytic process on the actual wastewater focused on testing using different cathodes
- A high surface area cathode made from copper-coated reticulated vitreous carbon provided improved conversion and selectivity on the actual wastewater
- Key process parameter ranges were defined to construct a large-scale prototype that can be evaluated onsite, as a possible follow-up project with NYSP2I

“The reduction of the nitrate levels in the effluent produced by Ames Goldsmith is critical to the future financial health and expansion of the facilities that reside in New York State. NYSP2I was instrumental in setting up and funding a research project between Ames Goldsmith, The Center for Advanced Material Processing (CAMP) at Clarkson University and NYSP2I to investigate this problem. The initial promising results have lead to discussions on setting up a pilot plant at Ames Goldsmith to continue the investigation. NYSP2I hwas great to work with, and we are looking forward to future collaborations.”

– Michael Herman  
VP Global Quality Systems  
Ames Goldsmith Corp.

## NYSP2I PARTNERS



New York Manufacturing Extension Partnership

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