

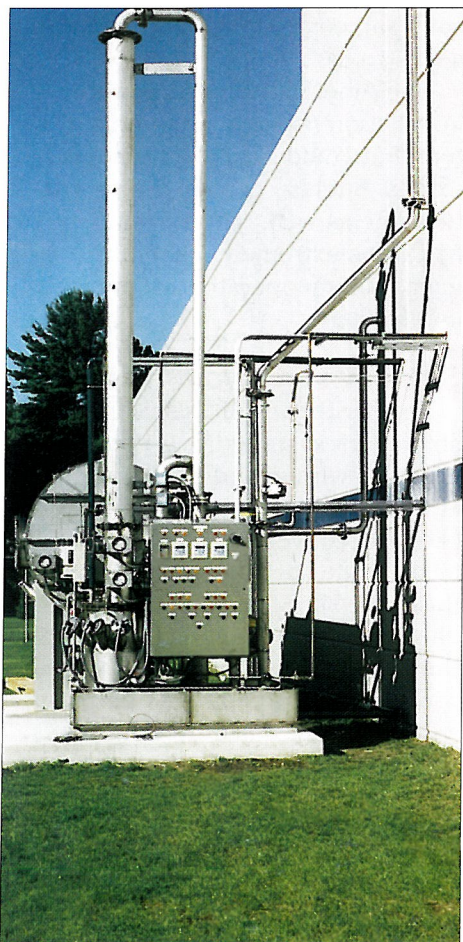
# CHEMICAL EQUIPMENT<sup>®</sup>

PRODUCTS, SYSTEMS & SERVICES FOR THE GLOBAL CHEMICAL PROCESSING INDUSTRY

## FeatureArticle

### Nitrogen Oxide Technology Gives American Superconductor an Economical, Environmentally Friendly Treatment Solution

**T**he installation of Bionomic Industries Inc.'s (Mahwah, NJ) innovative ScrubPac™



BIONOX SOLVER™ abatement system is enabling American Superconductor Corporation to treat the nitrogen oxide (NOx) emissions from a calcination process at its new, high temperature superconductor manufacturing facility (Devens, MA), in a cost-effective, environmentally responsible way.

Bionomic Industries' solution uses a unique catalyst oxidation process to convert the nitric oxide to nitrogen dioxide, which is then removed with a wet scrubber using a proprietary, highly efficient, low-toxic scrubbing chemistry. After comparing the two-stage system with other vendors' solutions that required multiple scrubbers and hazardous, expensive chemicals, American Superconductor chose the BIONOX SOLVER™ technology to meet the NOx emission control requirements for its 365,000-square-foot plant, which is the first large-scale production facility in the world for commercial high temperature superconductor wires.

#### Emission Control Requirements

Fluor Daniel, the project engineering and design contractor, learned that American Superconductor needed an air pollution control system to

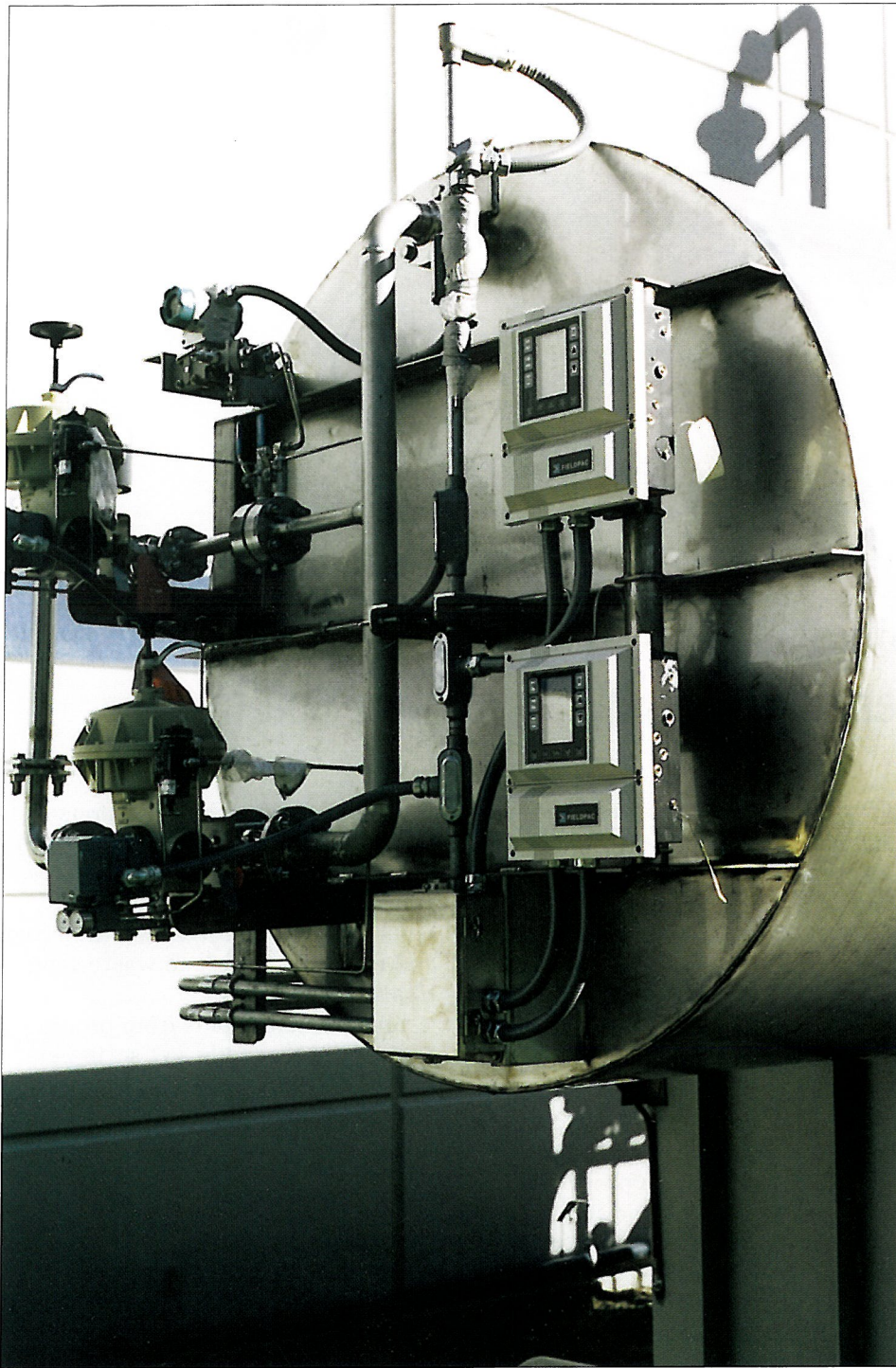
control nitrogen oxide emissions from the calcining operation used to produce the high temperature superconducting oxides. It hired Shaw Environmental, Inc. (Shaw), to design and procure the air and wastewater treatment systems.

Shaw solicited bids from producers of nitrogen oxide wet scrubber systems to supply a complete package to meet the automatic ventilation needs of the furnaces and reduce all nitrogen oxide emissions with a minimum efficiency of 98%.

Shaw's Project Manager Robert Swoyer explains, "In evaluating the proposals, we learned that the majority of the systems could not remove both the nitric oxide and dioxide species economically. In fact, several could only remove the nitrogen dioxide form. These systems required multiple chemicals consisting of caustic and hazardous sodium hydrosulfide along with complicated feed systems. To remove the nitric oxide, these vendors needed an additional wet scrubbing stage using expensive and dangerous sodium chlorite to oxidize the insoluble nitric oxide to the dioxide form so it could be scrubbed."

When Shaw contacted Bionomic





Industries for an alternative solution, the company proposed a system that eliminated multiple scrubbers and the hazards and cost of dangerous chemicals. It recommended using its ScrubPac™ BIONOX SOLVER™ system, which includes its two newly developed products: the DRI-NOx low temperature catalytic converter combined with the BIONOX SOLVER™ NOx wet scrubbing solution.

Bionomic Industries' President John Enhoffer states, "The ScrubPac™ BIONOX SOLVER™ abatement system

uses many technologically advanced industry firsts including a low cost non-precious metal catalytic reactor to convert the nitric oxide to dioxide, and a nitrogen dioxide scrubbing stage employing the relatively non-hazardous simple single chemistry BIONOX SOLVER™ nitrogen oxide fast-acting chemical solution, to remove nitrogen dioxide at extremely high removal efficiency.

"Unlike systems that require several scrubbing stages to remove just nitrogen dioxide, the

BIONOX SOLVER™ NOx chemistry enables emission requirements to be met with just one scrubber. As a result, the system eliminates the need for the use of multiple chemicals, storage tanks, complex feed systems and their associated costs. Users eliminate the problems associated with nitrogen dioxide control using hazardous sulfide chemistries. In contrast to typical nitrogen dioxide sulfide reduction chemistry, using BIONOX SOLVER™ eliminates the need for an additional hydrogen sulfide polishing scrubber ahead of multiple nitrogen oxide absorption scrubbers."

American Superconductor Principal Engineer Paul Nastas notes, "As we compared the Bionomic solution with other vendors' proposals, we were not only impressed with the elegance of the solution, but also with its cost effectiveness.

"With a two stage system, nitric oxide would be converted to nitrogen dioxide, which could be easily removed with a wet scrubber. We saw this as an exceptional use of technology that would be economically and environmentally advantageous to us."

The American Superconductor installation not only required a system that could scrub out nitrogen oxides, but also control the ventilation rate as well. The system also had to be extremely reliable requiring minimum operator attention and involvement.

### **ScrubPac™ At Work**

The ScrubPac™ BIONOX SOLVER™ abatement system draws the hot furnace gas with an induced draft blower at a precise rate into the DRI-NOx catalytic conversion stage where the nitric oxide species is adsorbed onto the catalyst. Sophisticated control dampers are modulated to maintain the needed pressure at the thermal process steps that are in operation.

The DRI-NOx proprietary catalyst holds the nitric oxide for sufficient time to react with the oxygen contained in the gas stream to convert the nitrogen oxide to dioxide. The gas then proceeds to a custom modified VentClean scrubber where the BIONOX SOLVER™ NOx scrubbing



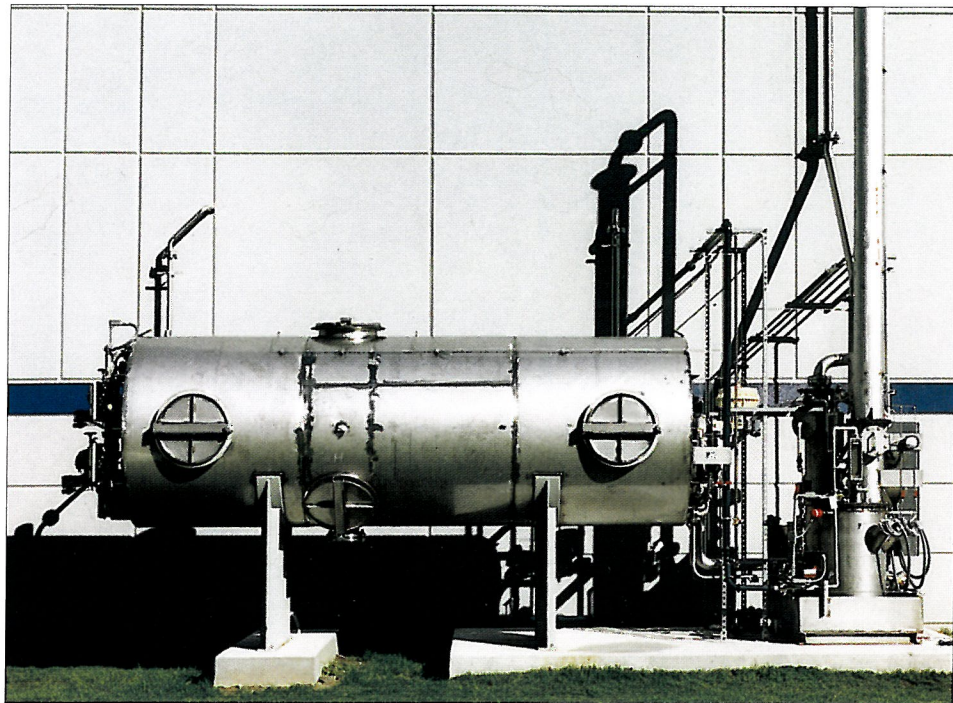
solution is added on a pH and oxidation-reduction controlled metered basis to remove the nitrogen dioxide. All the solution addition controls use extremely accurate proportional control loops to maintain high removal efficiency while eliminating wasting of the chemical.

An interface to a programmable logic controller enables the system's operating parameters to be monitored.

### Performance Plus

Nastas reports, "In its eight months of operation, the system's effective performance, ease of operation and maintenance is testimony to its robust design and construction. This indicates that Bionomic Industries has a thorough understanding of the nature of effluents and the caliber of equipment that is needed to handle them.

"Since the Bionomic system has fewer components than other wet scrubbing systems, there are fewer items that need replacement parts, fewer chemicals to handle and less labor needed for system operation. The BIONOXSOLVER™ NOx scrubbing solution is less hazardous to handle



than both sodium hydrosulfide and sodium chlorite.

"The company has demonstrated how its ability to understand our process, needs and concerns is the basis for creating best-in-class solutions that are not only economical, but also environmentally responsible."

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Systems With Unequaled Performance*

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