Woodbridge Ave Pump Station with PSP® duct running across roof to bioreactor.

Township of Woodbridge, New Jersey, USA

Corrosion resistant PSP® duct used in hi-tech wastewater odor control solution

As the oldest original township in the state of New Jersey, Woodbridge is a bustling municipality not far from Newark Liberty Airport. Today, occupying over 24 square miles and a population of 106,000 residents, Woodbridge is also the fifth largest municipality in New Jersey. Over the past 20 years, the township has experienced a large population increase resulting in increased demand of vital wastewater infrastructures.

Background:

The Woodbridge Avenue Pump Station, built in 1990, transports the town's wastewater to the Middlesex County Utilities Authority in neighboring Sayreville via a 36 inch forced main. The pump station has an average flow of 12 million gallons per day (MGD) and a peak design flow of 35.1 MGD. Increased demand, combined with inherent design flaws, resulted in a facility that often emitted strong odors, especially during warm weather. The installed system had never really functioned properly. Mayor Frank Pelzman commented, "it has been an ongoing problem on and off, and Township officials want to get to the cause of the problem and correct it." The city contracted the Alaimo Group to conduct an odor-control study to determine the origin of the smell and how best to control and reduce it.

The Alaimo Group of Mount Holly, New Jersey is an Engineering Consulting firm that currently serves over seventy municipalities in New Jersey, Pennsylvania, and Delaware. Clients range from small one million gallon per day operations to the Passaic Valley Sewerage Commission, the fifth largest wastewater authority in the United States. They specialize in the design of wastewater treatment plants, plant modifications, odor control and infrastructure improvement projects.

Project Manager David Skibicki realized right from the start that this project would require non-traditional solutions. Initial tests revealed the Woodbridge pump station discharged a fluctuating vapor stream of extremely corrosive concentrated H2S. The goal was then to design a system that would operate in a highly corrosive environment while effectively negating the malodorous vapors coming from the wet wells and the upper and lower bar screen rooms. This system would also require minimal operator attention. The existing carbon scrubber and failing fiberglass duct required upgrades that would handle anything the system would generate now - or in the future.

New Technologies:

Wastewater processing can generate large quantities of corrosive, flammable and toxic by-products. Polluted air streams nearly always contain a mixture of several compounds. Vent duct lines convey malodorous fumes as well as a witch's brew of hazardous products. Typical waste water chemical vapors can include: chlorine (C12), hydrogen chloride (HCI), hydrogen sulfide (H2S), ozone (O3), sulfuric acid, sodium hypochlorite, sodium hydroxide, methane and anaerobic digester gas. Designers are challenged to employ the best materials possible for safety, yet stay within tight budget constraints.

On the Woodbridge project, Alaimo incorporated two new technology solutions:

1. A Bioway multi layered bioreactor

Bioway multilayered bioreactors use a combination of micro-organisms to remove all pollutants from the airstream using biotechnology. Bioreactors provide environmental conditions that are difficult to obtain in a conventional biofilter system. High odor removal efficiencies and low outlet odor concentrations have been obtained with relatively small footprint units. Biological air purification technologies with minimal operating costs become more and more attractive as energy costs increase.

Plumbing PSP® duct and new BioWay multi-stage bioreactor.

2. Fab-Tech's PSP® duct to transport corrosive fumes

Fab-Tech's rugged stainless steel PSP® duct internally lined with PermaShield Fluoropolymer Barrier Coating would be used in lieu of FRP (fiberglass reinforced plastic) thermosetting duct. The combination of extreme corrosion resistance, Factory Mutual Research (FM) smoke and fire ratings, ease of installation, and overall low installed cost led Alaimo Engineering to select PSP®. They felt that a switch to PSP® duct would save the project both time and money, and give them the technology upgrade they needed.

Corrosion Resistant duct at wastewater sites:

A fluoropolymer is a polymer that contains atoms of fluorine and is characterized by a high resistance to solvents, acids, and bases. Its corrosion resistance exceeds even that of glass, exotic metal alloys, and plastics. Based on published data, PermaShield Fluoropolymer Barrier Coating far surpasses FRP in chemical resistance - and the robust stainless steel substrate will not burn, collapse, or leak in the event of fire. Fab-Tech's barrier coating with proprietary resin technology assures superior adhesion to the stainless steel - resulting in a coating that will not delaminate. With a 300 series stainless steel exterior, system components never need painting or an ultra-voilet protective coating.

When reviewing material smoke and fire ratings, it was discovered that PSP® duct carries a Factory Mutual Research flame-spread value of "0". More important was the comparison of the Factory Mutual Smoke Generation index for vinyl ester fiberglass duct (rating of over 400) versus the rating of 20 for PSP®. When exposed to flame, FRP duct generates large volumes of thick black smoke, several hundred times more than Fab-Tech's coated stainless steel.

Solution:

Several hundred feet of PSP® duct ranging in size from eight inch (8") through thirty inch (30") diameter were fabricated, packaged and shipped to arrive as scheduled. Flanged duct connections with W.L. Gore PTFE gasket seals made for quick and easy installation by Ed Almeida and the employees of Pact Two Construction of Ringoes, New Jersey. "The system went together very quickly and was done sooner than we expected. The light weight made handling very easy," commented Pact Two foreman Victor Antunes. One replacement fitting was ordered and arrived on site within 48 hours.

PSP® duct is a premier product, but is competitively priced when compared to fiberglass reinforced plastic (FRP) duct systems. Considerable installation labor cost savings were realized using PSP®.

Conclusion:

Months after conclusion of the project, the Woodbridge Pump station and its odor control components are working perfectly. "There are no discernable odors even when standing right next to the building," commented Edward Wagner, Assistant Superintendent, Township of Woodbridge, Division of Waste Water. "We are very pleased with the odor control upgrade done here at the Woodbridge Avenue Pump Station.

The solution that the Township of Woodbridge and Alaimo Group had envisioned was successful by employing a combination of superior design and cutting edge technology. For more information on high performance, cost effective PSP® duct, write or call Fab-Tech, Inc.

Fab-Tech, Inc.
A Critical Process Systems Company

480 Hercules Drive, Colchester, VT 05446 Tel: 802-655-8800 Fax: 802-655-8804 Email: sales@fabtechinc.com Web: www.fabtechinc.com