Application: DENSE PHASE PNEUMATIC CONVEYING OF FLY ASH AND QUICK LIME

Industry: Wastewater Treatment
Client: MCES Metro Wastewater Facility
Location: St. Paul, Minnesota

The Problem:
Metropolitan Council Environmental Solutions (MCES) is the regional authority that processes sanitary sewer waste for the Minneapolis-St. Paul metropolitan area. The MCES Metro Wastewater Facility in St. Paul is the largest of several MCES waste processing plants. The facility must operate 24 hours per day, 365 days per year.

At the MCES Metro Wastewater Facility, sewage sludge is dried and then disposed of by incineration, which has the added benefit of generating power. The fly ash that is created from the incineration process is collected and put into storage silos. The fly ash is then either used for land fill or for secondary purposes such as an additive in concrete.

MCES has been incinerating sewage sludge for many years. Recently, their incinerators at the Metro facility were under threat of citation by the State of Minnesota for emissions violations. To avoid a citation and significant fines, the facility was required to build an entirely new incineration facility and completely abandon the old incinerators.

The new facility was designed to be located adjacent to the existing facility. Rather than build expensive new storage silos for the fly ash, MCES sought ways to convey the fly ash from the new facility back to their existing multi-compartment cast-in-place fly ash storage silos about 2200 feet away.

MCES, after careful consideration, decided to proceed with dense phase pneumatic conveying systems for this application. One huge advantage of using the dense phase pneumatic conveying systems was that they could take advantage of an existing system of underground tunnels for the conveyor lines that would have to run between the existing facility and the planned new incineration facility. Utilizing the existing tunnels would make maintenance of the pneumatic conveying system much easier in the cold Minnesota weather, and it would be less expensive to install than an above ground approach.

Dynamic Air’s HDP 4000 Full Line Concept dense phase pneumatic conveying systems convey fly ash 2200 feet from incinerators to storage silos.
The Solution:
Dynamic Air worked with MCES and their consultants to specify HDP 4000 Full Line Concept® dense phase pneumatic conveying systems for conveying fly ash over the 2200 foot distance inside the existing tunnel system. The HDP 4000 systems were chosen because of the low conveying line velocity, which reduces wear and tear on the conveying lines. These systems could use DC-5® Air Saver controls, which add greater control of the compressed air usage and provide added system reliability over the 2200 foot long conveying distance.

The Dynamic Air dense phase systems to convey the fly ash were easily able to utilize the existing tunnels because the conveying lines are compact and able to easily route around obstacles. Due to the need for redundancy, Dynamic Air provided two (2) separate and parallel dense
phase pneumatic conveying systems to deliver the fly ash from the new incineration facility to the existing fly ash storage silos.

In addition to the long-distance fly ash conveying systems, MCES also specified the HDP 4000 conveying concept from Dynamic Air to replace some existing high wear dilute phase pneumatic conveying systems they were operating. The dilute phase systems were in their existing facility and conveyed the fly ash from the silo structure to an existing truck load-out hopper.

Other HDP 4000 concept conveying systems were specified to convey lime and fly ash from the existing storage silos back 2200 feet through the same existing tunnel system to the new incineration facility for use in treatment of the waste water.

Because the fly ash has to be conveyed from the new incinerators at a temperature of 350 degrees Fahrenheit, and because the pneumatic conveying lines are 2200 feet long, Dynamic Air provided Tuf-Lok® brand pipe couplings and expansion joints to deal with the expansion and contraction the conveying line would experience. The Tuf-Lok Therm-Line™ expansion joints included a special feature to reduce the coefficient of drag of the conveyed material, to improve conveying performance and reliability and reduce wear and energy requirements.

The Results:
The Dynamic Air HDP 4000 long-distance fly ash and lime conveying systems are operating 24 hours a day, 365 days a year, to take the fly ash away from the new incinerating facility and deliver it from storage to truck load-out hoppers, as well as to convey lime and fly ash back to the new incineration facility for water treatment.

MCES was able bring their new incineration facility on-line as scheduled, and operate it reliably, in order to avoid the citation and extensive fines.

MCES Metro Wastewater Facility
St. Paul, Minnesota