



## BACKGROUND

The Milan Wastewater Treatment Plant, located just south of Moline, Illinois, is a 1.7 MGD (6,434 m<sup>3</sup>/day) activated sludge facility with an average wastewater flow of 700,000 gpd to 800,000 gpd.

This facility dewateres primary sludge using a belt filter press (Figure 1). The press operates an average of three times per month, 8 hours per day at a pump rate of 100 gpm. The sludge is dewatered from 3-4% solids to about 23% solids.



Figure 1: Belt Filter Press at Milan (IL) Wastewater Treatment Plant.

## PROBLEM

On days when the bio-solids from the primary settling tank are dewatered, nuisance odors were a common problem. Not only did the plant experience bad odors, but the neighbors living in the general area also complained. On days when the plant dewatered sludge, City Hall employees did not welcome their odorous co-workers. The plant used deodorizers in the past, with little to no success.

A major contributor to the bad odor was hydrogen sulfide (H<sub>2</sub>S). Hydrogen sulfide is a colorless gas that is moderately soluble in water. In addition to the rotten egg odor, H<sub>2</sub>S is very corrosive to metal pipes, equipment, and general metal surfaces (Figure 2). More important, H<sub>2</sub>S is a dangerous gas with grave consequences to persons exposed to over 10 ppm over an extended period of time.



Figure 2: Surface corrosion in dewatering room due to hydrogen sulfide.



A preliminary evaluation of the odor problem found atmospheric H<sub>2</sub>S levels above the sludge conveyor belt as high as 57 ppm. The atmospheric H<sub>2</sub>S level in the press-room was 5 ppm with some measurements as high as 9.8 ppm close to the press. Without proper ventilation, levels in the plant could potentially exceeded the TWA (time weighted average) of 10 ppm during dewatering.

## SOLUTION

Permanganate (MnO<sub>4</sub><sup>-</sup>) is an easy compound to evaluate in odor control applications because the reaction with H<sub>2</sub>S is selective and very fast. Its characteristic pink or purple color, when rapidly reacting with H<sub>2</sub>S, turns to the yellow or brown color manganese dioxide (MnO<sub>2</sub>). Simple laboratory jar tests will indicate very quickly what dosages would provide the degree of odor control desired.

For this application, CARUSOL® liquid permanganate was selected for its ease of use. The material was supplied in a 55-gallon (208.2 L) drum and is fed directly into the sludge stream by means of a simple feed pump (Figure 3).



Figure 3: CARUSOL delivery system (drum and feed pump).

## RESULTS

CARUSOL dosed at a rate of 2.5 gph (9.5 L/hr) effectively reduced the atmospheric H<sub>2</sub>S levels above the sludge conveyor belt from 57 ppm to 16 ppm and reduced the atmospheric H<sub>2</sub>S levels in the dewatering room from 5 ppm to below the detection limit (Figure 4). In addition, the dissolved sulfide (S<sup>2-</sup>) in the filtrate was lowered from 20 mg/L to 5 mg/L.

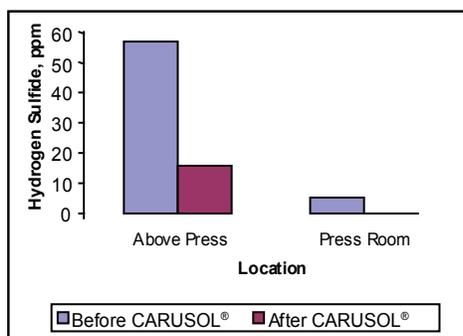


Figure 4: Hydrogen sulfide levels (ppm) before and after addition of CARUSOL.

Since implementing odor control with CARUSOL, the operators have noticed immediate odor control effectiveness during the dewatering operation. Complaints by coworkers have been significantly reduced and the neighborhood complaints have been eliminated.



## CONCLUSION

CARUSOL® liquid permanganate dosed at 2.5 gph (9.5 L/hr) reduced the H<sub>2</sub>S emissions during the dewatering process. The following additional benefits resulted:

- Reduced operator exposure to dangerous H<sub>2</sub>S gas
- Eliminated odor complaints
- Reduced atmospheric corrosion
- Reduced sulfide return to process
- Reduced odors associated with cake storage and transportation

Improvements in sludge dewatering and reduction in polymer usage will be monitored as the process is optimized.

## CARUS VALUE ADDED

### LABORATORY SUPPORT

Carus Corporation has technical assistance available to answer questions, evaluate treatment alternatives, and perform laboratory testing. Our laboratory capabilities include: consulting, treatability studies, feasibility studies, and analytical services.

### FIELD SERVICES

As an integral part of our technical support, Carus provides extensive on-site treatment assistance. We offer full application services, including technical expertise, supervision, testing, and feed equipment design and installation in order to accomplish a successful evaluation and/or application.

### ENGINEERED SYSTEMS AND EQUIPMENT SERVICES

Various options and accessories are available to meet a wide range of applications. Custom-engineered feed systems are complete, pre-engineered and prepackaged systems. System designs are customized to meet specific applications and customer needs.

### CARUS CORPORATION

During its 100 year history, Carus' ongoing emphasis on research and development, technical support, and customer service has enabled the company to become the world leader in permanganate, manganese, oxidation, and base-metal catalyst technologies.