BAURES, MARC A., Hydrite Chemical Co. 701 Sumner St. La Crosse, WI 54603. **Successful odor control in flume water, ponds, and mud presses in sugar beet processing plants.**

ABSTRACT

The formation of odor compounds results from the combination of high nutrient loading and elevated oxygen demand in waste water at many sugar beet processing plants. Sucrose and other sugars find their way into waste water streams through beet pile runoff and operational upsets within the plant. Biological activity associated with the digestion of this nutrient source leads to low oxygen levels within waste water storage and handling impoundments. As dissolved oxygen levels become limited or even non-existent, sulfate reducing bacteria (SRB) become more common. SRB utilize sulfate as an energy source while digesting sugars and plant material. The use of the oxygen from sulfates leads to the formation of sulfide species, which in turn leads to the release of odors from sugar beet processing plants. The digestion process also leads to the formation of various organic acids which contribute to odor conditions as well.

It is the presence of elevated hydrogen sulfide (H2S) levels outside of plant boundaries which has led to the intervention of regulatory agencies, while employee safety in confined areas such as tare labs and screen houses has dictated treatment within plant boundaries. In addition to public and employee health issues, hydrogen sulfide exists as hydrosulfuric acid when dissolved in water. This weak acid is corrosive to steel and concrete and can lead to the degradation of plant infrastructure. It is for these reasons that hydrogen sulfide must be eliminated from most waste water systems.

The Hydritreat HS (H HS) process utilizes proprietary catalysts to interact with peroxide solutions to form hydroxyl radicals. These free radicals have a much higher oxidation potential, twice that of chlorine gas and nearly 50% higher than both permanganate and hydrogen peroxide. This increased oxidation potential allows the radicals to destroy odor causing compounds more efficiently and much more rapidly than competing technologies. The Hydritreat HS process differs from other free radical generating technologies in that the pH need not be below pH 5.5 in order for the reaction to occur. The desired pH range for the Hydritreat HS process is 6.5-8.0. The Hydritreat HS process also does not generate significant quantities of sludge, which is a common occurrence with many sequestering technologies.

The H HS process has been applied in various locations within sugar beet processing facilities. The treatment of beet flumes has been very successful in relieving sulfide levels in tare labs and screen houses. The treatment eliminates potentially dangerous H2S levels while providing employees relief from constant exposure to unpleasant odors. The success of the treatment is easily demonstrated when treatment has been interrupted. Sulfide levels and associated odors quickly reach nuisance levels and employee complaints quickly return. Previous efforts at controlling odors in flumes had not been successful, especially in cases where oxidants were used. More than likely, this is due to the high COD loading (>30,000 mg/L) which consumes oxidants before they can oxidize the odor causing compounds. The H HS process is able to function in these high COD loading applications due to the volume and speed of hydroxyl radicals produced.

Use of the H HS process also allows fluming at a pH closer to neutral while still maintaining odor control. The use of less lime results in decreased chemical costs to maintain a neutral pH level, decreased scaling and associated maintenance, reduced equipment wear, decreased solids loading, and in specific instances, better mud settling/separation. Increased

infection rates have yet to be seen while operating at more a neutral pH when the H HS process has been used.

Sugar beet processing plants typically have large bodies of water functioning as solids settling basins, rudimentary treatment systems, or holding ponds prior to wastewater treatment facilities. These bodies of water may experience sugar or nutrient loading throughout the course of a campaign leading to the formation of odor compounds. The H HS process can be introduced into these bodies of water with influent or by utilizing circulation pumps. In this manner, correct dosing is introduced with a known flow of water, allowing for contacted odor compounds to be destroyed. The H HS process has been used to treat condenser ponds in excess of 100 million gallons as well as clarifiers as small as 250,000 gallons. The process has been successful in treating both " high strength" pond waste water (COD > 10,000 mg/L) as well as "low strength" pond waste water (COD < 2,000 mg/L). Sulfide levels in these ponds range from 2 ppm up to 20 + ppm in solution. Treatments of ponds and clarifiers have resulted in sulfide levels approaching 100% destruction.

Many plants operate presses and gravity belt thickeners to facilitate dewatering of mud collected in clarifiers. This mud is subject to the same biological processes as the waste water, and odors form rapidly in the low oxygen conditions of the sludge blanket. The Hydritreat HS process has been used to eliminate odors from a wide range of dewatering facilities using centrifuges, belt presses, and gravity thickeners. The treatment of wash water, centrate, and elluent all contribute to the control of sulfide odors. Atmospheric sulfide levels exceeding 80 ppm were measured above a 120 gpm belt press. Following treatment with the Hydritreat HS process, sulfide levels were reduced to 0-2 ppm.

The Hydritreat HS process represents an efficient process to control and eliminate troublesome odors from sugar beet processing plants. Simple application methods can easily be adapted to a wide range of specific odor generating processes and waste water streams. Combined with relatively low cost of use, minimal environmental hazards, and successful treatment programs, the Hydritreat HS advanced oxidation process offers the beet sugar industry a means of eliminating community complaints and regulatory agency involvement.