

Grinder Tank Application, North Carolina - A Case Study

Phase I

Introduction

Vacuum Bubble[®] Technology (VBT[™]) creates micro bubbles of air that are neutrally buoyant. The bubbles are created under a partial vacuum and, as a result, the internal pressure of the bubbles is lower than that of the surrounding water. Consequently, the bubbles collapse to an average dimension of 0.25 mm in diameter. Because of their small size and neutral buoyancy, the bubbles remain in the water for many minutes. These micro bubbles increase the oxygen transfer potential in the water which, in turn, enables aerobic bacteria to consume the organic waste in the water.

Background

At a major housing development in North Carolina, grinder tanks have been installed for each household, and the waste from these tanks is pumped to a treatment plant via a force main and lift station system.

Problem

Residents complained of odors emanating from the grinder tanks on their properties, lift stations, and the treatment plant.

Solution

Vacuum Bubble[®] Technology (VBT[™]) was identified as the technology to solve this problem.

Method

Quantitative measures of Hydrogen Sulfide (H₂S) levels were taken using a Rig Rat III gas detection device. Data was collected from April 25, 2007 to May 21, 2007.

H₂S levels were recorded before and after VBT™ treatment and high, low and mean values were identified for the pretreatment and treatment levels

Results:

Pre-treatment H₂S levels ranged from 0.009 ppm to 0.560 ppm with a mean of 0.0554 ppm. After VBT™ treatment H₂S levels rarely registered over 0 ppm.

Chart 1

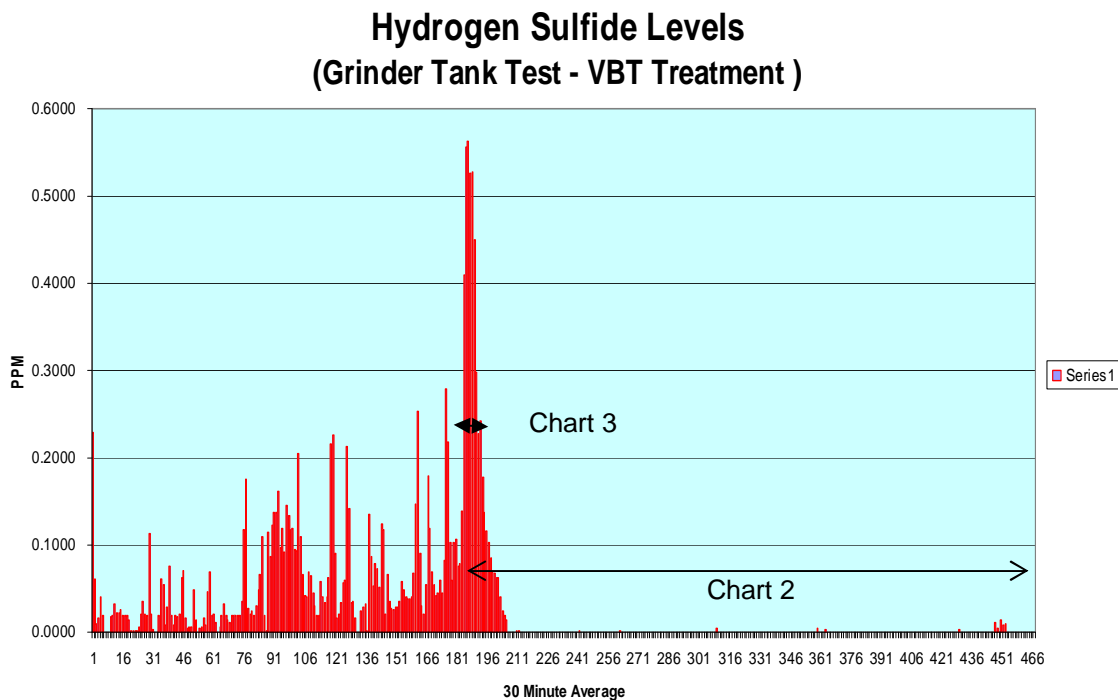


Chart 2

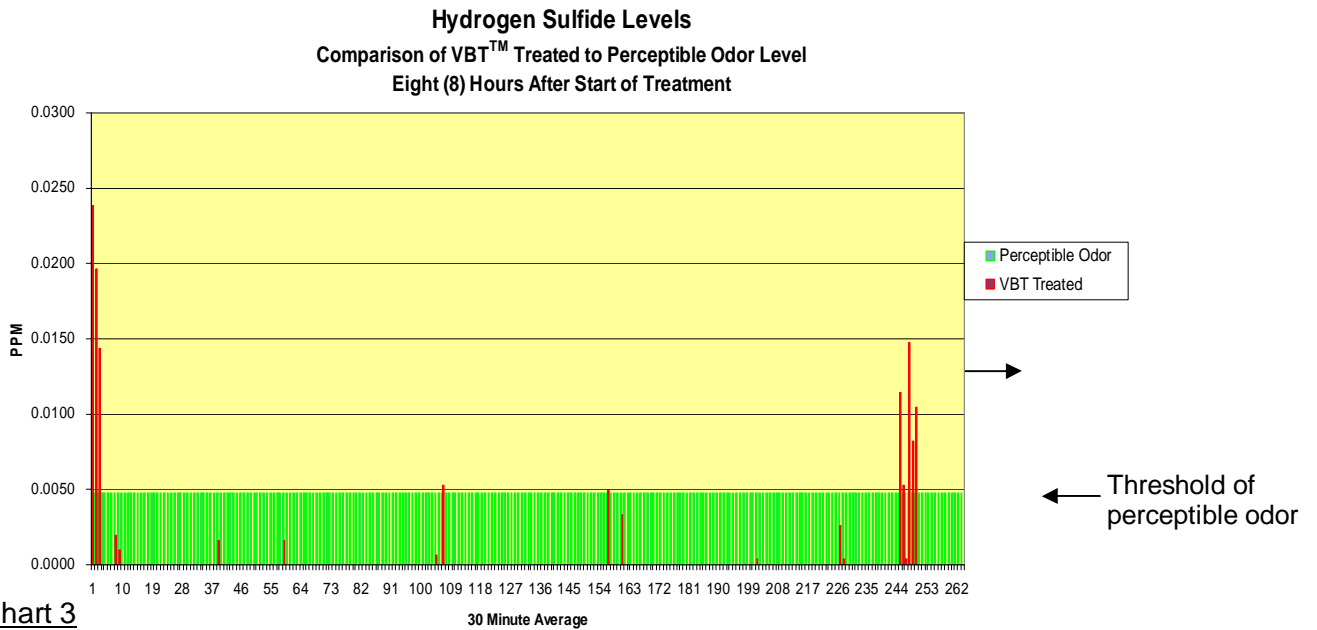
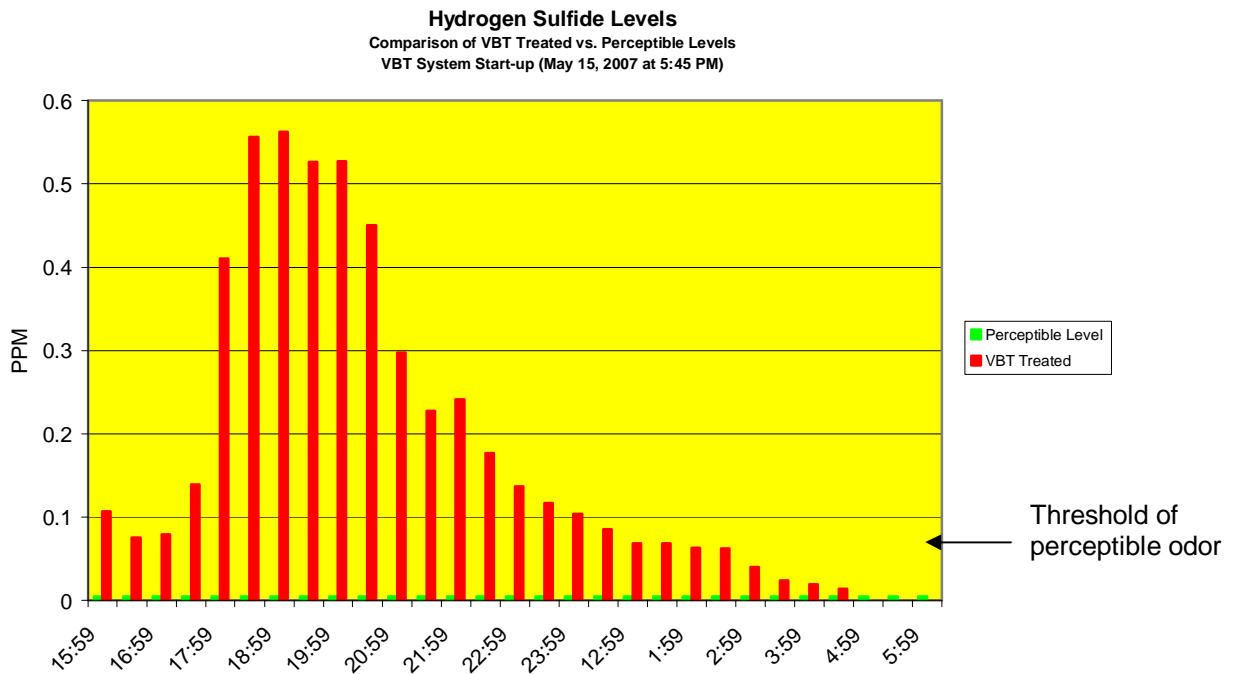


Chart 3



Note – Only 10 hours were required to reduce the H₂S values from their peak to zero.

Phase II

Performance Evaluation

It has been clearly demonstrated that the aeration capability of VBT™ changes the biological dynamics of the grinder tank from anaerobic to aerobic and hence the reduction in the offensive

gases, specifically H_2S , given off by anaerobic bacteria. The objectives of Phase II are to assess the performance capability of VBT™ in reducing the production of H_2S in the system. That is, in the grinder tank, in the force main from the grinder tank to the lift station, from the lift station to the treatment plant, and at the treatment plant. Previous experience with VBT™ in conventional septic tanks shows that the impact of aeration with this technology reaches beyond the confines of the septic tank. The effluent from the tank is aerated and the aerated water enters the drainfield and has a restorative/preventative impact upon the condition of the drainfield.

Before



After



Specific objectives of Phase II are –

Testing will be carried out at the Lift Station to determine H₂S levels to verify expected benefits of using VBT™ in the collection system as a whole. H₂S is a corrosive gas and the degree and extent of corrosion is an indirect measure of the presence and concentration of H₂S gas.

Therefore, quantitative measurements of the corrosive impact of H₂S on sample materials in the system will be made. Additionally, quantitative measurements of BOD, TSS, and NH₃ levels will be made at strategic locations in the system.

Anticipated Results:

Based upon the results from Phase I, and extensive experience with VBT™ in a number of wastewater treatment environments, there are a number of results that are anticipated in Phase

II. They are –

1. Odors (H₂S) measured at the Lift Station will be virtually eliminated.
2. DO levels exiting the Lift Station will be higher than historical levels.
3. H₂S corrosion testing will indicate significant reduction in corrosion rate which, as indicated above, is the result of less H₂S per unit time.
4. BOD, TSS, and NH₃ levels will be significantly reduced when compared with historical levels. Refer to the NSF Evaluation of VBT™ that showed significant reductions in BOD and TSS values.

Benefits of Using VBT™ –

There are a number of benefits that will arise from using VBT™ in this grinder tank wastewater treatment configuration –

1. Odor reduction leading to less complaints and potential lawsuits.
2. Reduced organic loading of treatment plant from collection system offers the opportunity to reduce design characteristics that, in turn, reduce capital outlay and operating costs.
3. Virtual elimination of H₂S significantly reduces corrosion of vital system parts reducing the operating and maintenance costs of the entire system.