

WASTEWATER ENHANCEMENT AND ODOUR CONTROL - THE UNEXPECTED BENEFITS



Paper Presented by:

Colin Stanger

Author:

Colin Stanger, *Team Leader Treatment,*

Gladstone Regional Council



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Colin Stanger, *Team Leader Treatment*, Gladstone Regional Council

ABSTRACT

The objective of this project was to obtain improved odour control, whilst minimising OH&S issues and energy consumption. A quick desktop investigation into possible options was conducted, and one product has been trialled with favourable results. The trial involved the use of a patented organic additive which increases cellular metabolism for micro organisms that occur naturally in effluent treatment systems. The indicators to be used for the performance of the trial were ammonia, sulphide, sulphate levels, odour complaints and site power consumption before and after introduction of the product and usual observation

KEYWORDS

OH&S, ammonia, sulphate, sulphide, odours, fats, oils, grease and scum

1.0 INTRODUCTION

Odour control measures for municipal wastewater treatment plants have typically been twofold. Firstly from a mechanical approach utilising hoods, scrubbers and filters, and secondly from a chemical approach using chlorine/ oxygen based or anti- bacterial agents to stop or slow the development of sulphide producing bacteria. We utilised chlorine based.

The handling of these chemical was identified as an OH&S issue in our procedures. There was likelihood that the chlorine based chemicals stored at pump station. These require special storage facilities and handling procedures posed numerous risks and hazards for filling and dosing.

The original objective of this project was to obtain improved odour control, whilst minimising OH&S issues and energy consumption. Numerous available products were known about however we were looking for product ideally is cheap efficient and no OH&S issues and no adverse secondary effects e.g.: biology at plant etc. The Boyne Island and Tannum Sands area collection system consists of 12 pumping stations servicing a population of 10,000 residents. A daily flow of 2.5ML pump to the Boyne Island Wastewater Treatment plant consisting of a 4ML oxidation ditch and secondary clarifier.

Boyne Island system consists of 3 rising mains into the treatment plant, gravity catchment and 6 pumping stations that are located in residential areas and public parks. Pumping stations 3, 4 & 6 pumps into one rising main taking half the reticulation system to the STP. No 5 pump station takes BSL (Boyne Island Smelter). With pump station No2 transferring via Arthur Street manhole to pump station 1 to Boyne STP. Tannum Sands consists of 6 pumping stations and one rising main crossing the Boyne River via the bridge to the Arthur Street manhole. Tannum Sands pump station No 6 pumps to Tannum Sands No1 pump station which pumps to Tannum Sands No 2 then to Tannum Sands No 4 pump station from here, this pump's across the Boyne River to Arthur St manhole. Tannum Sands No 5 pumps to Tannum Sands No 3 which takes in the larger gravity catchment and pumps across the bridge to Boyne Island – Arthur Street manhole.

A number of these pump stations historically received odour complaints from residents. Previously we used hypo-chloride and oxygen injection at pump stations to reduce odour.

2.0 LOCALITY ISSUE'S

- Tidal River System
- Coral spawn this has its own odour and cannot be controlled, this is also seasonal.
- King Tides, these wet areas that are above the tidal zone leaving pools in areas that don't drain well, also carry vegetation and coral spawn up into these areas when conditions are right producing odour in populated areas along the river.
- Mangroves – mangrove mud flats and decaying vegetation brings an uncontrollable source of odour
- Flying foxes – Just make odour control that little bit more difficult, with numbers in colonies ranging from 500 up to 1500 members. These live in the mangroves along the bank of river and feed on fruit trees (mangoes) and palm fruit and move there colonies up and down the river taking their odour with them where they roost. Another odour out of our control. Within residential area, upstream out the populated area this not an issue.

3.0 EXPERIMENT / TRIAL

The trial involved the use of a patented organic additive which increases cellular Metabolism for micro organisms that occur naturally in effluent treatment systems.

Origin of the product: Discovered by a University of Hawaii researcher exploring natural medical remedies over twenty years ago stumbled onto it assisting bacteria in metabolizing nutrients and controlling odour. After being given a sample to trial I researched the product further by the internet (byogon.com) read the propaganda – not more snake oil. I also sourced a number of research papers and thought this could work. Results are as follows:

The indicators to be used for the performance of the trial were ammonia, sulphide and sulphate levels odour complaints visual indications and site power consumption before and after introduction of the product.

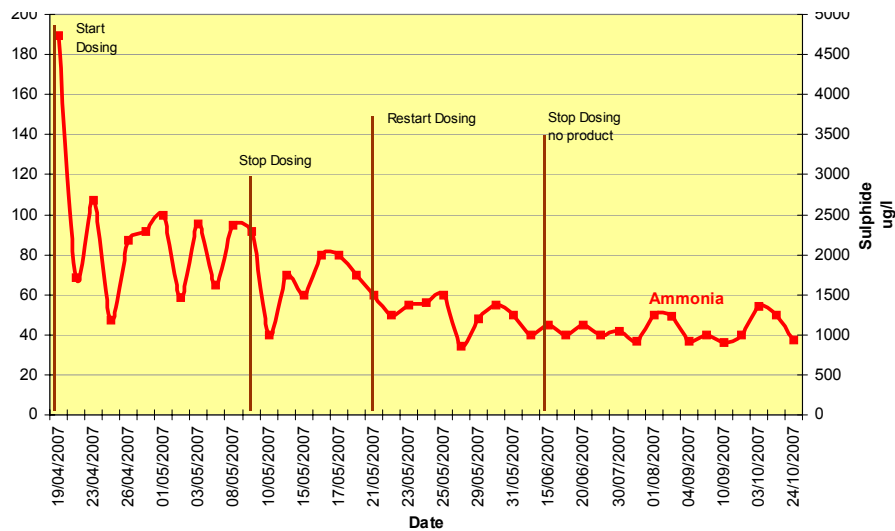
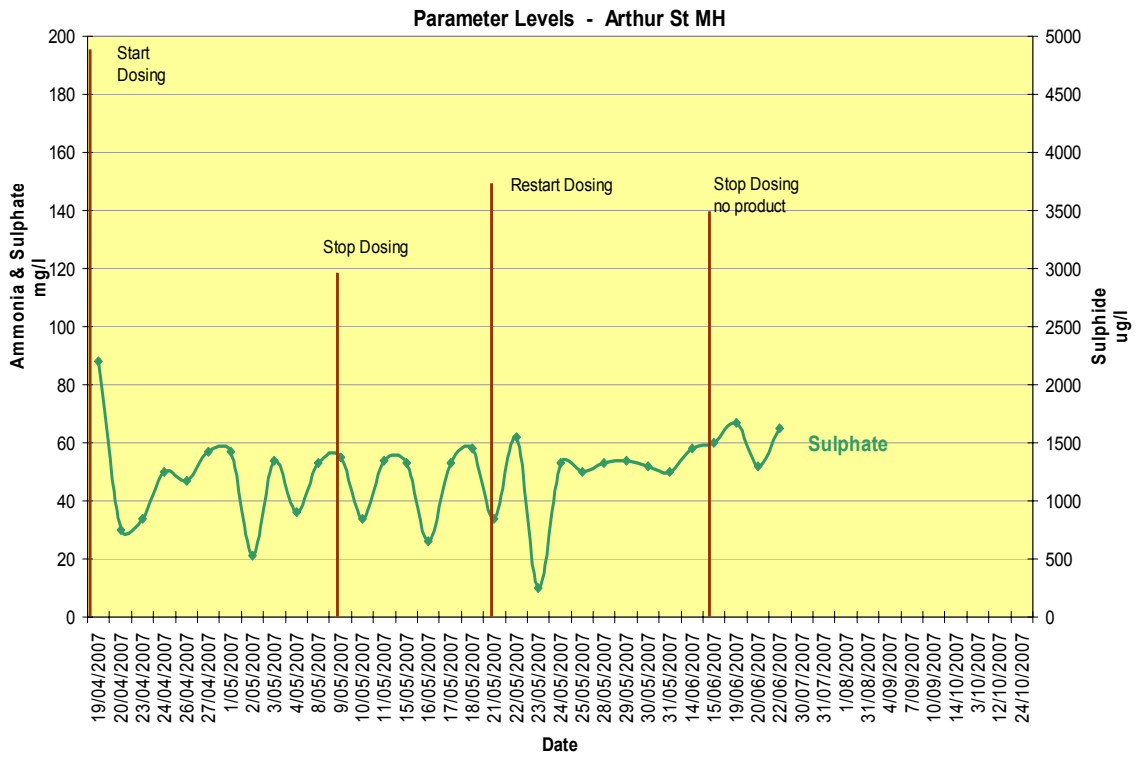


Figure 1: *Reduced reading of Ammonia, Stopped dosing means stopped*



everything, No BYO –GON no Hypochlorite

Figure 2: *Reduced levels of Sulphate, Stopped dosing means stopped everything, No BYO –GON no Hypochlorite, Peaks after dosing stopped, Restart in dosing produced a reduction in levels of sulphate.*

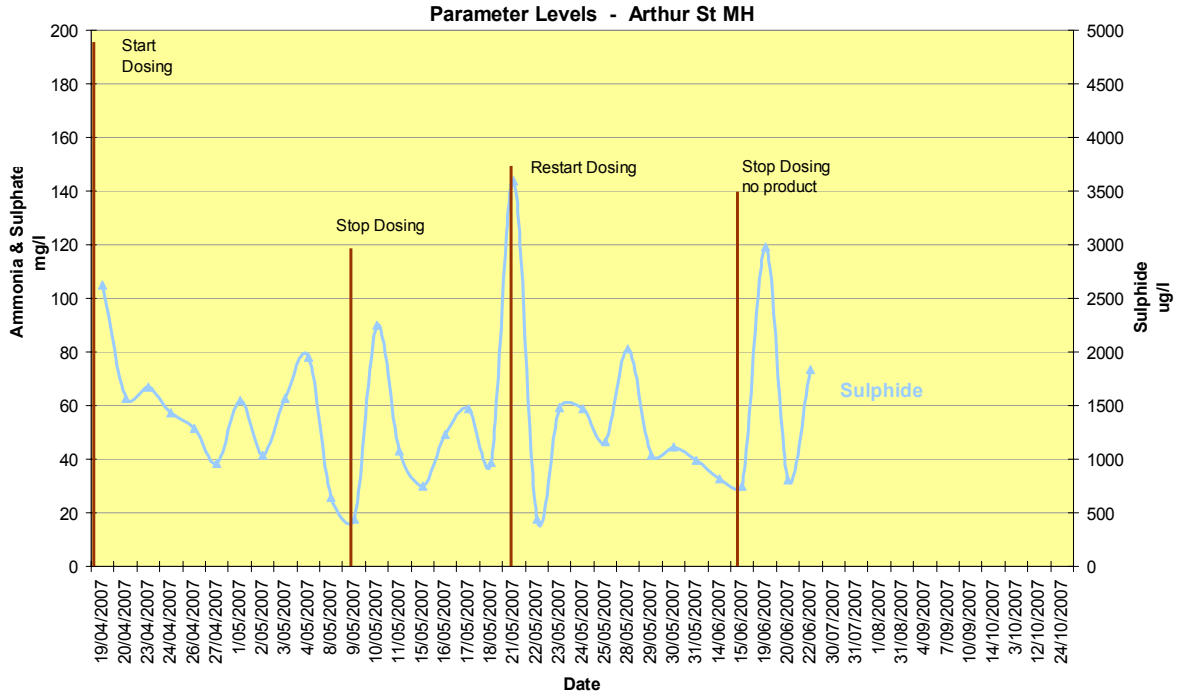


Figure 3: *A smoothing out of Sulphide levels, Stopped dosing means stopped everything, No BYO –GON no Hypochlorite, Peaks after dosing stopped, Restart in dosing produced a reduction in levels of Sulphide*

4.0 TRIAL SET UP

Initial trial was set up without knowledge of other systems dosing BYO GON. Research indicated that dosing by injection was used elsewhere.

Two different methods of dosing the product were used. Two sites trialled using different equipment.

- Atomizing spray from the top of pump station.
- Injection directly into the pump rising main.

The cost involved in conducting this trial was minimised by utilising equipment that was readily available (generally existing spares). Equipment included a small dosing pump, 70ltr plastic bin, three fan-jet spray nozzles (micro-irrigation style), 6mm plastic tubing, a plug in timer and the existing Hypo dosing station which was used for odour control prior to the trial.

4.1 Method One- Spray Atomizing

Using boom spray nozzles to produce the mist over a larger area in the wet-wells (full circle fan type) the product is delivered to the nozzles via 6.0 l/hr 10 bar chemical dosing pump which is wired into the start cycle relay. This allows the dosing pump to start on the start level and stop on the stop level. A 1000 L poly tank is used and the product is batched at 100:1 (100 L water 1 L Product) with a consumption rate of about 600 L – 800 L /week.

This method works very well in an enclosed pump station building as it controls the airborne odours that seem to greet you as you open the door to the building and are the cause of complaints. The big spin off is it also keeps the wet wells clean and reduces the fat raft, making weekly hosing quicker and easier.

*This method can be set up quite cheaply - if costs are a problem. By using a garden pump spray unit and manually dose smaller pump station daily after initial start dose.

4.2 Direct Injection

Injection into the pump discharge rising main effluent stream via a chemical dosing injection quill. The pump being used in this application is 17l/hr 10 bar also controlled by the stop/start probes. The product is diluted at the same rate and consumption is about the same rate 700 L – 900 L /week. The equipment utilised in this set was the existing Hypo dosing equipment 2000 L poly tank and ALLDOS dosing pump. This method is controlling the odour in the rising main, reticulation system and the discharge manhole reducing Ammonia, sulphides and sulphates. This does not control airborne at the pump stations.

5.0 THE EXPECTED OUTCOMES

Reduced readings of ammonia and sulphide were observed, with a smoothing of sulphide levels also noticed.

Odour complaints have stopped in this area.

The power consumption was maintained at the previous levels.

OH & S issues have been reduced due to the removal of hazardous chemicals.

The Unexpected Benefits of the trials include:

- The reduction of the fat scum raft in the pump station
- Wet well cleaning times were dramatically reduced
- Reduction in offensive odour and odour complaints.
- Improvement of the influent and effluent quality throughout the treatment process.
- Reduction in F.O.G.S.
- Lower O&M costs

6.0 CONCLUSION

After all the science has been done, the senses (eyes, nose, ears and taste) are still the best daily instrument, changes in odour ,changes in clarity ,changes at pump stations, changes in the condition of the raft and changes in cleaning times and the daily feedback for our field staff. These are the other side of operating a reticulation and treatment system. These are the forgotten results that are not measured or quantified, but provide the quickest analysis of the performance of the site.

We looked outside the square with the use of this product to get results. This created enough interest from our Australian supplier that the Director of Research and Development for BYO-GON, Gary Sober was interested enough to visit our area to see the results and our method of spraying BYO-GON into pump stations. He was also impressed with the results we had achieved using this method. As the injection method is used very successfully in Texas USA the spray method would enhance this method.

The spray method works as it knocks down the airborne odour in the mist and encapsulates the odour. The mist also covers the raft and coats the pump well walls this helps with cleaning of the wet wells.

The spray and injection methods could be used as a total control system enhancing the system from catchment to treatment.

It is unrealistic to expect BYO-GON work in every application. It has worked for us and it will work for others. The product may solve a biological problem that is present, but as an operator you haven't been able to provide an effective and safe solution.

Dosing of each site depends on required results many other situations for treatment may be available

The product, BYO-GON PX-109.

Refer to web site – byo-gon.com

Currently supplied by Royce Water Technologies - contact Rod Welling