

TRIAL OF NEW ALGAECIDE FOR BLUE GREEN ALGAE (BGA) CONTROL

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ABSTRACT

The City of Salisbury boasts a number of large and picturesque lakes in the North of Adelaide which are frequented by high volumes of local residents and visitors to the area. As common in all waterbodies of a similar nature, a number of these lakes have historically experienced Blue Green Algae (BGA) blooms - particularly during warmer months.

Traditional management options to control BGA blooms may pose a risk of harmful, long-term environmental issues to local flora and fauna, as well as disrupting the lake ecology.

The City of Salisbury has introduced an innovative approach by using an algaecide (i.e. EarthTec®) to maintain the health of two lakes within the City. EarthTec is designed as an environmentally friendly algaecide, which is effective at ultra-low doses of product (i.e. ppb - parts per billion levels of copper). The required dose is just enough to weaken the algae's defense layers, thus allowing the natural lake ecology to consume and control blooms.

Less than a week after dosing Main Lake (i.e. 107 ML @ 185 ppb as Copper), the water quality showed significant improvement. The City of Salisbury is now adopting a preventative dosing strategy which is using regular and low doses of EarthTec to control future occurrences of BGA blooms.

One of the benefits of EarthTec was the ease of application to the water bodies (only basic P.P.E is required) and seeing an improved lake appearance within a few days.

1.0 INTRODUCTION

The City of Salisbury boasts a number of large and picturesque lakes in the North of Adelaide which are frequented by high volumes of local residents and visitors to the area. As common in all waterbodies of a similar nature, a number of these lakes have historically experienced Blue Green Algae (BGA) blooms - particularly during warmer months.

Traditional, labour-intensive use of algaecides can result in harmful biomass disturbance and potential cell lysis leading to the release of toxins and/or require additional treatment to remove or destroy these toxins.



Figure 1: *Sir Douglas Mawson Lake (Main Lake) - 12 March 2021*

2.0 DISCUSSION

City of Salisbury were looking for an alternative solution, meeting the following requirements;

- Controlled application and not a spray
- Works quickly (i.e. within days)
- No impact to flora & fauna
- Not a quick temporary fix
- Minimise OH&S issues
- With reduced labour costs
- Importantly, provided a long-term positive benefit to the ecosystem.

Understanding these requirements, IXOM approached City of Salisbury to conduct a full-scale trial of a new algaecide technology called “EarthTec®”.

2.1 EarthTec Technology

EarthTec is different. EarthTec is copper-based, but uses new chemistry to deliver a highly “bioactive algaecide” - meaning the copper is 100% bioavailable, self-disperses quickly and completely without long-term harmful accumulation of copper in the environment.

EarthTec is designed to be environmentally friendly, as it is effective at ultra-low doses (i.e. ppb - parts per billion levels of copper). The required dose is just enough to weaken the algae’s defense layers, to allow the natural lake ecology to consume and control algal blooms, without cell lysis and/or release of algal toxins .

The unique self-dispersing chemistry means it can be applied at a location(s) with easy and safe access, and the product will self-disperse throughout the entire water body (i.e. no expensive mechanical mixing, application equipment or boats required). EarthTec is approved for use by Australian Pesticides Veterinary Medicines Authority (APVMA).

2.2 *Sir Douglas Mawson Lake (Main Lake) – Full Scale Trial*

The Sir Douglas Mawson Lake (i.e. Main Lake) was selected as the preferred location to trial the EarthTec algaecide. This site was experiencing the most severe algal bloom, with public warning notices indicating people to “Avoid all contact with water in this area” (refer pictures in Figure 1).

The Main Lake has the following characteristics;

- Volume: 107 ML (megalitres)
- Surface Area: 6.35ha (63,500m²)
- Depth: ~1.7m
- Lake pH: 8.4-8.5
- Purpose: Recreational (residential)

The EarthTec product (330 litres, equivalent to 185 ppb as Cu) was dosed into the Main Lake on 15/6/2021.

Dosing of the EarthTec product consisted of the local council officer pouring in the neat EarthTec solution into the Main Lake at a safe access location, then walking away to test out the self-dispersing properties of the EarthTec solution.

The Main Lake was sampled on days 1, 3, 6 & 15 post EarthTec dosing and samples analysed for the following;

- Algae speciation (incl. biovolume)
- Copper (total & dissolved)
- pH
- Dissolved Oxygen



Figure 2: EarthTec Dosing – 15/6/2021

2.3 Trial Results – EarthTec Dosing 15/6/2021

Results from the trial are shown below;

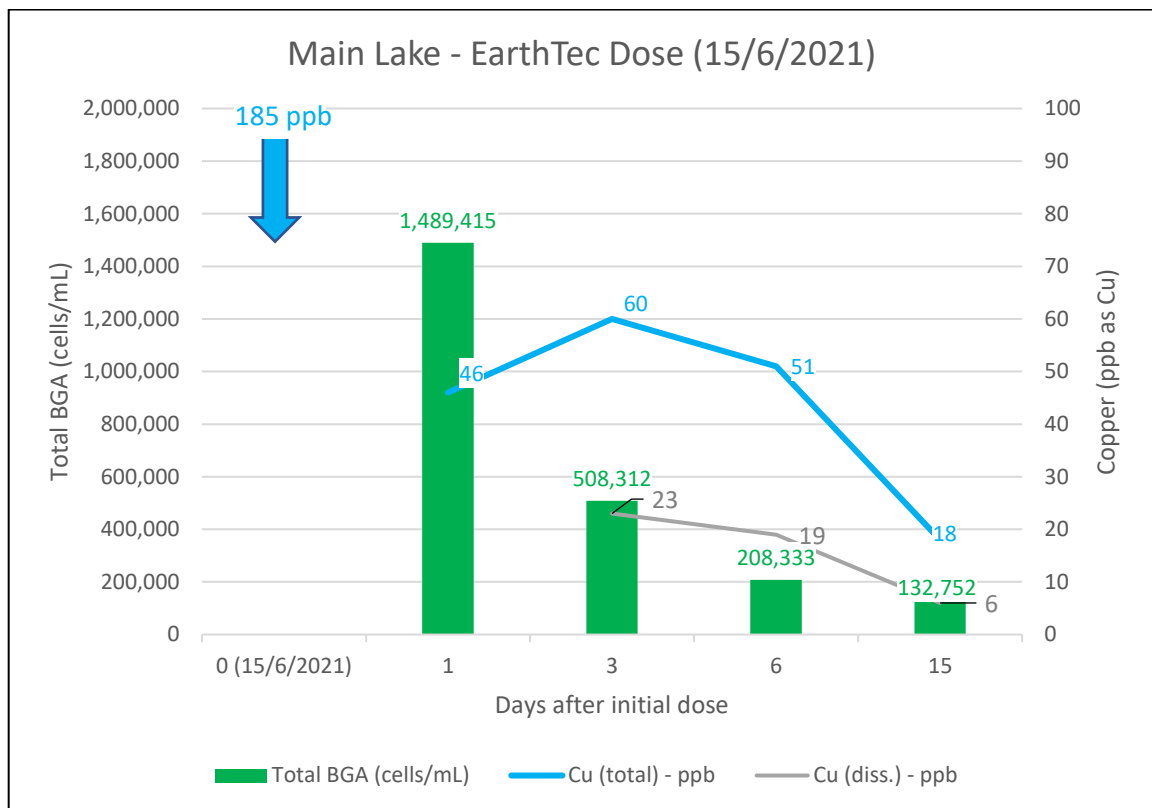


Figure 3: *Sir Douglas Mawson Lake (Main Lake) – Trial Results*

Key Outcomes from the EarthTec dosing are as follows;

- Approx. 90% reduction in BGA levels within 6 days of EarthTec dosing
- Total copper levels were maintained at 60 ppb or below

2.4 Trial Results – EarthTec Dosing Ongoing

Further periodic EarthTec dosing was conducted over a 6 month period from the dosing conducted on 15/6/2021.

The objective of this part of the trial was to;

1. Eliminate BGA from the Main Lake, and
2. Transition the management of the Main Lake from a reactive strategy, to preventative management strategy.

Results from the ongoing dosing are shown below;

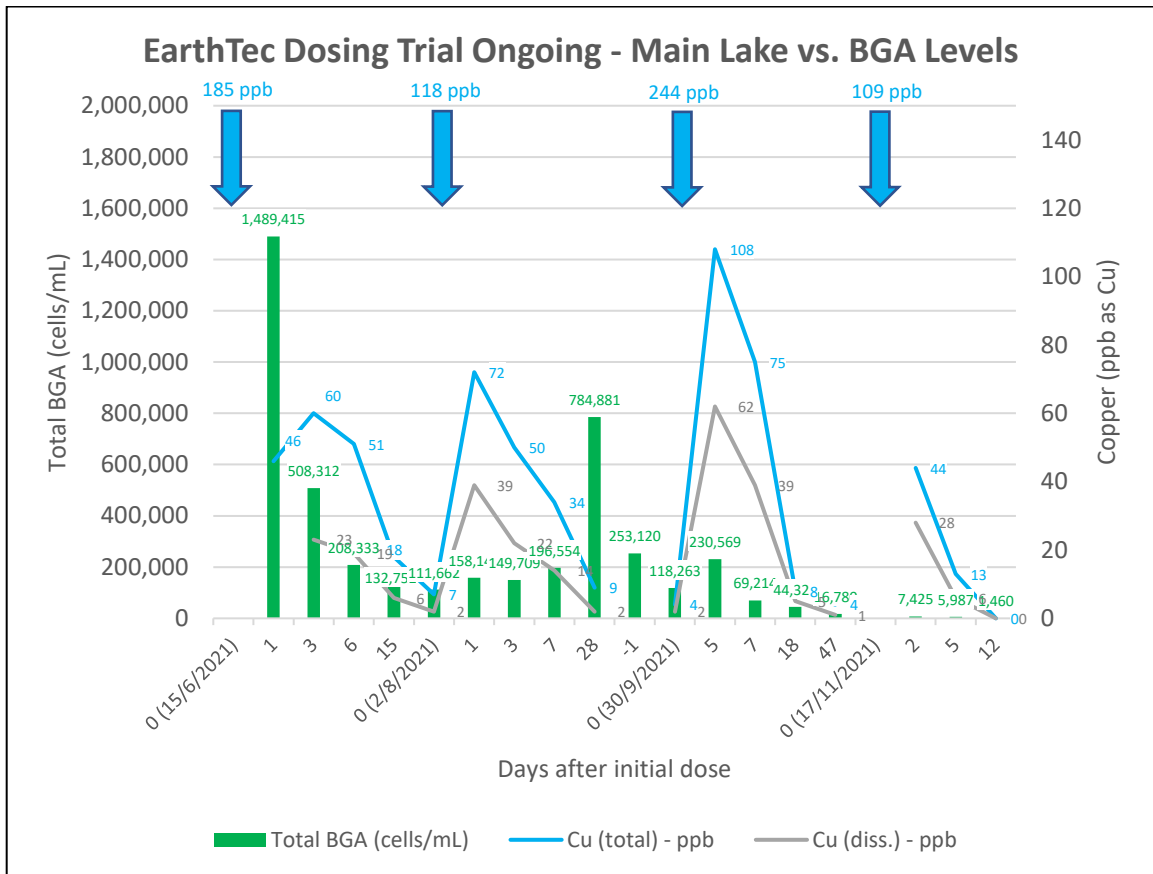


Figure 4: *Sir Douglas Mawson Lake (Main Lake) – Trial Results Ongoing*

Key Outcomes from the ongoing EarthTec dosing are as follows;

- EarthTec dosing was successfully used to regain control of the BGA bloom in Main Lake
- 99.9% reduction in BGA levels within Main Lake.
- BGA levels kept under control (i.e. in particular for preparation of the 2021/22 summer period).
- Once under control, a preventative strategy (i.e. lower doses) can then be used to prevent outbreaks of BGA (i.e. for algae management in summer seasons)

3.0 CONCLUSION

Key learnings and outcomes from the trial of the EarthTec® technology were as follows;

1. Ongoing routine monitoring is important to evaluate performance of dosing. Routine monitoring is critical for implementing a successful preventative management strategy.

Key parameters suggested for ongoing monitoring are;

- BGA speciation (incl. biovolume),
- Copper (diss. & total),
- pH

2. EarthTec Performance – effective control of algae
 - EarthTec reduced BGA levels by ~90% in less than a week (i.e. 6 days)

- Effective at ultra low Copper doses (i.e. 100-240 ppb as Cu)
3. Simple application (i.e. just pour in & walk away)
 - Reduced OH&S issues
 - No chemical solutioning required
 - No spray application
 - No contractor (cost & time savings)
 4. EarthTec product can be used in reactive &/or preventative strategy for BGA control.
 5. Minimal Impact to Environment
 - Allow local ecology to re-establish & help control BGA going forward
 - No fish kills
 - LIMA Principle – Least Intrusive, Minimally Aversive

Based on the success outcomes from this trial, The City of Salisbury has adopted a preventative dosing strategy using low doses of EarthTec to control future occurrences of BGA blooms.



4.0 ACKNOWLEDGEMENTS

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- City of Salisbury for the trial opportunity and for their ongoing support for monitoring throughout the trial.
- ALS for conducting the analysis of the water samples taken through the trial.
- Murray Jones from Earth Science Laboratories International for the technical support throughout the trial.

5.0 REFERENCES

Discover Salisbury, <https://discoversalisbury.com.au/attractions/the-boatdeck/>