Harmful Algal Blooms: Cyanotoxin Degradation Through Anaerobic Digestion

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**Introduction**

**Microcystin-LR (MC)**

- Toxic to humans, domestic animals, fish and other wildlife
- Immediate symptoms: nausea, vomiting, diarrhea, headache, and skin rash
- Carcinogen
- Liver Toxin
- Withstands high temperatures, changes in pH, photolysis, and hydrolysis
- The main toxin of concern in the Utah Lake HAB

**Utah Lake HABs**

- Lake closed to recreation
- Irrigation cut off for local ranchers and farmers
- Demands for compensation of lost livestock and produce
- Over 100 dead ducks

- Harvested HABs are a biohazard that cannot be disposed of using conventional methods
- Studies show MC biodegradation using anaerobic microorganisms
- CVWF anaerobic digesters are locally available and have suitable volumetric capacity
- HAB disposal through anaerobic digestion responsibly turns an environmental and public health liability into a value-added product

**Objective**

Determine the viability of CVWRF anaerobic sludge for microcystin degradation as a sustainable disposal option for Utah Lake harmful algal blooms (HAB)

**Methods**

- Inoculated with anaerobic sludge from CVWRF digesters
- Spiked samples with pure Microcystin-LR
- Made measurements using ABRAXIS Microcystin Recreational Water Dipstick ELISA Test and AbraScan II Dipstick Reader

**Results**

- No change in MC concentration in control
- Observed reduction trend of MC concentration in sludge

**Conclusion**

- CVWRF sludge can be used to reduce MC concentration
- Future work will confirm if reduction is due to degradation
- If successful, CVWRF digesters may play an essential role in the proactive plan to combat HABs, protect Utah environment, agriculture, and economy, and bring back happy ducks

**References**