Development of a Harmful Algae Bloom Monitoring and Response Plan

Agenda Item 7

Proposal for a HAB Response Plan

- This plan will outline the roles and responsibilities of ORSANCO and its partners in the event a HAB is identified on the Ohio River. The plan should include, but not be limited to, the following information:
  - How to determine and report the presence of a HAB
  - Communication with State Agencies (environmental and health), Federal agencies, and local water utilities
  - Monitoring of the HAB and associated toxins
  - Available Alternatives to Mitigate HAB Impacts

Algal Toxins - Drinking Water Health Advisory Levels

- US EPA Finished Drinking Water Health Advisory Concentrations

Threshold	Microcystin (ug/L)	Cylindrospermopsin (ug/L)
Children under 6 years	**0.3**	**0.7**
Children over 6 years and adults	**1.6**	**3.0**

Algal Toxins - Drinking Water Health Advisory Levels

- Ohio EPA Finished Drinking Water Guidelines

Threshold (ug/L)	Microcystin	Anatoxin a	Cylindrospermopsin	Saxitoxin
Drinking Water- Do Not Drink	**1**	**20**	**1**	**0.2**
Drinking Water- Do Not Use	**20**	**300**	**20**	**3**

Algal Toxins – World Health Organization Contact Recreation Guidelines

Threshold (µg/L)	Microcystin	Anatoxin-a	Cylindrospermopsin	Saxitoxin
Recreational Public Health Advisory	6	80	5	0.8
Recreational No Contact Advisory	20	300	20	3

Algal Toxins – World Health Organization Contact Recreation Guidelines

Guidance Level	Concentration	How Guidance Level Derived	Health Risks
Low probability of health effects	**20,000 cells/ml** or 10 ug/L of chlorophyll *a* with cyanobacteria dominant	Human bathing epidemiological study	Short term- skin irritations, gastrointestinal illness
Moderate probability of health effects	**100,000 cells/ml** or 50 ug/L of chlorophyll *a* with cyanobacteria dominant	Provisional drinking water guideline value for microcystin and other cyanotoxins	Potential for long term illness as well as short term health effects
High probability of health effects	Cyanobacteria scum formation in areas where whole body contact occurs	Inference from oral animal lethal poisonings and human illness case histories	Potential for acute poisoning

Guidelines for the Ohio River

- Propose to use the WHO guidelines for determining our response
- This will be re-evaluated when USEPA develops their guidelines
- An algae bloom will be considered “abated” when both algae concentrations are below the WHO Low Probability Guideline **and** toxin testing is negative

ORSANCO Monitoring Capabilities

- Algae analysis
  - Speciation results in 1-2 weeks
- Toxin
  - Microcystin test strips – results in minutes
    - Good for presence/absence
  - Laboratory analysis – results in 7-10 days
    - Microcystin
    - Cylidrospermopsin
    - Anatoxin a
    - Saxitoxin
- Datasondes
  - Chlorophyll and cyanobacteria sensors

HAB Determination

- Rely on users of the Ohio River to inform us of potential HABs
  - Drinking Water Utilities
  - Outreach to Marinas
  - Web Page
- If report comes from a water utility we will ship them sampling materials
- If report comes from the public ORSANCO will respond

Communication

Situation	Actions
Conditions are suitable for an algae bloom	**Communications:** ORSANCO will inform the Ohio River water utilities of the conditions. **Actions:** Continue to monitor

Communication (Cont.)

Situation	Actions
Potential algae bloom reported	**Communications:** If a potential algae bloom is reported, ORSANCO will coordinate with the affected States for confirmation samples. Ohio River water utilities will be informed **Actions:** If the reporting entity is a water utility ORSANCO will provide sampling materials. If the reporting party is not a water utility ORSANCO will collect water samples for confirmation of algae concentration. A toxin test strip will be used as a presence/absence test.

Communication (Cont.)

Situation	Actions
Algae bloom confirmed >20,000 cells per milliliter Negative result on toxin test strip	**Communications:** If an algae bloom occurs but it is not made up of Cyanobacteria ORSANCO will inform the States and the Ohio River water utilities. **Actions:** Attempt to identify the extent of the bloom with satellite imagery and local resources

Communication (Cont.)

Situation	Actions
Harmful Algae Bloom Confirmed <100,000 cells per milliliter and Negative result on toxin test strip	**Communications:** If analytical reports indicate the bloom is made up of Cyanobacteria ORSANCO will inform the States and Ohio River water utilities. **Actions:** ORSANCO will coordinate with the States to continue monitoring the bloom. The extent of the bloom will be determined through local resources, satellite imagery and on-site investigation. Toxin test strips will be used weekly until either the bloom abates or the test strip is positive.

Communication (Cont.)

Situation	Actions
Harmful Algae Bloom Confirmed >100,000 cells per milliliter or positive result on toxin test strip	**Communications:** If analytical reports indicate the bloom is made up of Cyanobacteria ORSANCO will inform the States and Ohio River water utilities. ORSANCO will coordinate with the States to report the conditions to the local health departments. **Actions:** ORSANCO will coordinate with the States to collect samples for toxin analysis. Toxin analysis will continue weekly until the HAB abates. The extent of the bloom will be determined through local resources, satellite imagery and on-site investigation.

Communication (Cont.)

Situation	Actions
Toxins in river confirmed	**Communications:** If analytical reports indicate the presence of algal toxins ORSANCO will inform the States and Ohio River water utilities. ORSANCO will coordinate with the States to report the conditions to the local health departments. **Actions:** Toxin analysis will continue weekly until the HAB abates

Communication (Cont.)

Situation	Actions
Harmful Algae Bloom abates	**Communications:** ORSANCO will inform all parties that the HAB has abated. **Actions:** None

Next Steps

- Develop materials for public outreach
- Web Page
- Investigate use of satellite data for both identification of potential blooms and post-event extent analysis
- Investigate additional monitoring needs
  - Real time physical parameters (temp, pH, algae)
- Studies to increase our understanding of Ohio River Algae
  - How often are toxins present
  - What role do tributaries play
  - Long range transport of toxins