

**Anatoxin-a, Cylindrospermopsin, Microcystin & Saxitoxin Report**  
(Utah Division of Water Quality)

<u>Sample Identification</u>	<u>Site</u>	<u>Collection Date</u>
Utah Lake	Lindon Boat Harbor	10/8/2014
Utah Lake	Provo State Park Harbor	10/8/2014
Utah Lake	Outlet to Jordan River	10/8/2014
Jordan River	4994790-Utah Lake outlet	10/8/2014
Jordan River	4994720-Narrows Pump Station	10/8/2014

**Toxins** – Anatoxin-a (ANTX-A), cylindrospermopsin (CYN), microcystin (MC), saxitoxin (STX)

**Sample Prep** – The samples were ultra-sonicated to lyse all cells and release toxins. Solid phase extraction (SPE) was also utilized for anatoxin-a prep and pre-concentration (20x) followed by filtration. Lab Fortified Matrix (LFM) duplicates were prepared at 1.0 µg/L ANTX-A, 1.0 µg/L CYN and 0.2 µg/L STX.

**Analytical Methodology** – Liquid chromatography/ mass spectrometry/ mass spectrometry (LC/MS/MS) was utilized for the determination of ANTX-A. The  $[M+H]^+$  ion for ANTX-A ( $m/z$  166) was fragmented and the major product ions ( $m/z$  91, 106, 131, 149) were monitored. The current method limit of detection (LOD) is 0.1 µg/L, with a limit of quantification (LOQ) of 0.2 µg/L for ANTX-A.

A microcystins enzyme linked immunosorbent assay (ELISA) was utilized for the quantitative and sensitive congener-independent detection of MCs. The current assay is sensitive to down to a LOD/LOQ of 0.15 µg/L for total MCs. The average recovery of a laboratory fortified blank (LFB) spiked with 1 µg/L MCLR was 112%.

A cylindrospermopsin enzyme linked immunosorbent assay (ELISA) was also utilized for the quantitative detection of CYN. The current assay is sensitive down to a LOD/LOQ of 0.1 µg/L for CYN. A lab fortified blank (LFB) spiked with 1.0 µg/L CYN was recovered at 94%.

A saxitoxin enzyme linked immunosorbent assay (ELISA) was utilized for the quantitative detection of saxitoxin. The current assay is sensitive down to a LOD/LOQ of 0.02 µg/L saxitoxin. The LFB (0.2 µg/L STX spike) recovery was 100%.

### Summary of Results

( $\mu\text{g/L}$ )

<u>Sample</u>	<u>MC</u> (ELISA)	<u>CYN</u> (ELISA)	<u>STX</u> (ELISA)	<u>ANTX-A</u> (LC-MS/MS)
Utah Lake- Lindon Boat Harbor	<b>0.18</b>	<b>0.22</b>	ND	ND
Utah Lake- Provo State Park Harbor	<b>0.30</b>	ND	ND	ND
Utah Lake- Outlet to Jordan River	<b>0.21</b>	ND	ND	ND
Jordan River-4994790-Utah Lake outlet	<b>0.19</b>	ND	ND	ND
Jordan River-4994720-Narrows Pump Station	<b>0.20</b>	ND	ND	ND
<i>Detection Limits (<math>\mu\text{g/L}</math>)</i>	<i>0.15</i>	<i>0.10</i>	<i>0.05</i>	<i>0.1</i>

ND = Not detected above the detection limit

Submitted by:



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Date:

10/10/14