# Appendix D: Selected Biotoxin Methods

## SAM 2022 — Appendix D: Selected Biotoxin Methods

The fitness of a method for its intended use is related to data quality objectives (DQOs) for a particular environmental remediation activity. The tiers below have been assigned to the methods selected for each biotoxin/sample type pair to indicate a level of method usability for the specific biotoxin and sample type for which it has been selected. The assigned tiers reflect the conservative view for DQOs involving timely implementation of methods for analysis of a high number of samples (such that multiple laboratories are necessary), and appropriate quality control. The sample types indicated reflect respresentative examples and are not necessarily inclusive of all sample types that might be encountered by laboratories following a contamination incident. Assigned usability tiers are indicated next to each method or method combination throughout this appendix.

Tier I: The biotoxin and sample type are both targets of the method(s). Data are available for all aspects of method performance and QC measures supporting its use without modifications.

Tier II: The biotoxin is a target of the method, and the method has been evaluated by one or more laboratories. The sample type may or may not be a target of the method, and available data and/or information regarding sample preparation indicate that analyses of similar sample types were successful. However, additional testing and/or modifications may be needed.

Tier III: The sample type is not a target of the method, and no reliable data supporting the method's fitness for its intended use are available. Data suggest, however, that the method(s) may be applicable with significant modification.

***Notes*:**
**The presence of disinfectants (e.g., chlorine) and/or preservatives added during water sample collection to slow degradation (e.g., pH adjustors, de-chlorinating agents) could possibly affect analytical results. When present, the impact of these agents on method performance should be evaluated if not previously determined.**

**Column headings are defined in Section 8.0.**

| Analyte(s) | CAS RN | Analysis Type | Analytical Technique | Aerosol (air filter, filter cassette, liquid impinger) | | Solid (soil, powder) | | Particulate (swab, wipe, filter cassette) | | Non-Drinking Water (surface water, waste water) | | Drinking Water | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Abrin | Abrin (1393-62-0)<br>Abrine (526-31-8) | Presumptive | Immunoassay (LFA) | Adapted from Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science (2014) 12(1): 49-62 | I | Adapted from Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science (2014) 12(1): 49-62 | I | Adapted from Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science (2014) 12(1): 49-62 | II | Adapted from Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science (2014) 12(1): 49-62 | II | Adapted from Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science (2014) 12(1): 49-62 | II |
| | | Presumptive (Abrine) | LC-MS-MS | EPA 600/R-13/022 | II | EPA 600/R-13/022 | II | EPA 600/R-13/022 | II | EPA 600/R-13/022 | II | EPA 600/R-13/022 | I |
| | | Presumptive | Immunoassays (ELISA and ECL) | Adapted from Journal of Food Protection (2008) 71(9): 1868-1874 | II | Adapted from Journal of Food Protection (2008) 71(9): 1868-1874 | II | Adapted from Journal of Food Protection (2008) 71(9): 1868-1874 | II | Adapted from Journal of Food Protection (2008) 71(9): 1868-1874 | II | Adapted from Journal of Food Protection (2008) 71(9): 1868-1874 | II |
| | | Confirmatory | LC-MS-MS | Adapted from Analytical Chemistry (2017) 89(21): 11719-11727 | II | Adapted from Analytical Chemistry (2017) 89(21): 11719-11727 | I | Adapted from Analytical Chemistry (2017) 89(21): 11719-11727 | II | Adapted from Analytical Chemistry (2017) 89(21): 11719-11727 | I | Adapted from Analytical Chemistry (2017) 89(21): 11719-11727 | I |
| | | Biological Activity | Enzyme activity | Adapted from Analytical Biochemistry (2008) 378(1): 87-89 | II | Adapted from Analytical Biochemistry (2008) 378(1): 87-89 | II | Adapted from Analytical Biochemistry (2008) 378(1): 87-89 | II | Adapted from Analytical Biochemistry (2008) 378(1): 87-89 | II | Adapted from Analytical Biochemistry (2008) 378(1): 87-89 | II |
| Aflatoxins | B1 (27261-02-5)<br>B2 (22040-96-6)<br>G1 (1385-95-1)<br>G2 (7241-98-7) | Presumptive (B1, B2, G1, G2) | Immunoaffinity (column) purification / LC-FL (detection) | Adapted from 991.31 (AOAC) | II | Adapted from 991.31 (AOAC) | II | Adapted from 991.31 (AOAC) | II | Adapted from 991.31 (AOAC) | II | Adapted from 991.31 (AOAC) | II |
| | | Presumptive | Immunoassay (LFA) | See summary in Section 8.2.2.2 | III | See summary in Section 8.2.2.2 | III | See summary in Section 8.2.2.2 | III | See summary in Section 8.2.2.2 | III | See summary in Section 8.2.2.2 | III |
| | | Presumptive (B1, B2, G1, G2) | Immunoassay (ELISA) | See summary in Section 8.2.2.3 | III | See summary in Section 8.2.2.3 | III | See summary in Section 8.2.2.3 | III | See summary in Section 8.2.2.3 | III | See summary in Section 8.2.2.3 | III |
| | | Confirmatory (B1, B2, G1, G2) | LC-MS-MS | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II |

| Analyte(s) | CAS RN | Analysis Type | Analytical Technique | Aerosol (air filter, filter cassette, liquid impinger) | | Solid (soil, powder) | | Particulate (swab, wipe, filter cassette) | | Non-Drinking Water (surface water, waste water) | | Drinking Water | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Amanitin | α-amanitin (23109-05-9)<br>β-amanitin (21150-22-1)<br>γ-amanitin (21150-23-2) | Presumptive (α-amanitin) | Immunoassay (ELISA) | Adapted from Journal of Food Protection (2005) 68(6): 1294-1301 | II | Adapted from Journal of Food Protection (2005) 68(6): 1294-1301 | II | Adapted from Journal of Food Protection (2005) 68(6): 1294-1301 | II | Adapted from Journal of Food Protection (2005) 68(6): 1294-1301 | II | Adapted from Journal of Food Protection (2005) 68(6): 1294-1301 | II |
| | | Presumptive (α-amanitin β-amanitin γ-amanitin) | Immunoassay (LFA) | Adapted from Toxins (2020) 12(2): 123 | II | Adapted from Toxins (2020) 12(2): 123 | II | Adapted from Toxins (2020) 12(2): 123 | II | Adapted from Toxins (2020) 12(2): 123 | II | Adapted from Toxins (2020) 12(2): 123 | II |
| | | Confirmatory (α-amanitin) | LC-MS-MS | EPA 600/R-13/022 | II | EPA 600/R-13/022 | II | EPA 600/R-13/022 | II | EPA 600/R-13/022 | II | EPA 600/R-13/022 | I |
| Anatoxin-a | 64285-06-9 | Presumptive | Immunoassay (ELISA) | Adapted from Inland Waters (2020) 10(1): 109-117 | II | Adapted from Inland Waters (2020) 10(1): 109-117 | II | Adapted from Inland Waters (2020) 10(1): 109-117 | II | Adapted from Inland Waters (2020) 10(1): 109-117 | I | Adapted from Inland Waters (2020) 10(1): 109-117 | I |
| | | Confirmatory | LC-MS-MS | Method 545 (EPA) | II | Method 545 (EPA) | II | Method 545 (EPA) | II | EPA/600/R-17/130 | I | Method 545 (EPA) | I |
| Botulinum neurotoxins (Serotoypes A, B, C, D, E, F, and G) | Type A (93384-43-1)<br>Type B (93384-44-2)<br>Type C (93384-45-3)<br>Type D (93384-46-4)<br>Type E (93384-47-5)<br>Type F (107231-15-2)<br>Type G (107231-16-3) | Presumptive (Types A and B) | Immunoassay (LFA) | Adapted from EPA Environmental Technology Verification report | II | Adapted from EPA Environmental Technology Verification report | II | Adapted from EPA Environmental Technology Verification report | II | Adapted from EPA Environmental Technology Verification report | II | Adapted from EPA Environmental Technology Verification report | I |
| | | Presumptive (Types A, B, D, E, F, and G) | Immunocapture Forster Resonance Energy Transfer (FRET)-based activity assay | Adapted from Analytical Biochemistry (2011) 411(2): 200-209 | II | Adapted from Analytical Biochemistry (2011) 411(2): 200-209 | II | Adapted from Analytical Biochemistry (2011) 411(2): 200-209 | II | Adapted from Analytical Biochemistry (2011) 411(2): 200-209 | II | Adapted from Analytical Biochemistry (2011) 411(2): 200-209 | II |
| | | Presumptive (Types A-G) | Immunoassay (fluorescent bead-based) | See summary in Section 8.2.5.3 | II | See summary in Section 8.2.5.3 | II | See summary in Section 8.2.5.3 | II | See summary in Section 8.2.5.3 | II | See summary in Section 8.2.5.3 | II |
| | | Presumptive (Type A) | Immunoassay (ECL) | Adapted from Journal of the Science of Food and Agriculture (2014) 94: 707-712 | II | Adapted from Journal of the Science of Food and Agriculture (2014) 94: 707-712 | II | Adapted from Journal of the Science of Food and Agriculture (2014) 94: 707-712 | II | Adapted from Journal of the Science of Food and Agriculture (2014) 94: 707-712 | II | Adapted from Journal of the Science of Food and Agriculture (2014) 94: 707-712 | II |
| | | Presumptive (Type A) | Immunoassay (B-cell based) | Adapted from Toxins (2018) 10(11): 476 | II | Adapted from Toxins (2018) 10(11): 476 | II | Adapted from Toxins (2018) 10(11): 476 | II | Adapted from Toxins (2018) 10(11): 476 | I | Adapted from Toxins (2018) 10(11): 476 | I |
| | | Confirmatory (Types A-G) | LC-MS-MS (Types A, B, E and F)<br>MALDI-TOF MS (Types A-G) | Adapted from J. Agric.Food Chem. (2015) 63(4): 1133-1141 | II | Adapted from J. Agric.Food Chem. (2015) 63(4): 1133-1141 | II | Adapted from J. Agric.Food Chem. (2015) 63(4): 1133-1141 | II | Adapted from J. Agric.Food Chem. (2015) 63(4): 1133-1141 | II | Adapted from J. Agric.Food Chem. (2015) 63(4): 1133-1141 | II |
| | | Biological Activity (Total) | Mouse Bioassay | APHA Press Compendium of Methods, Chapter 32 | I | APHA Press Compendium of Methods, Chapter 32 | I | APHA Press Compendium of Methods, Chapter 32 | I | APHA Press Compendium of Methods, Chapter 32 | I | APHA Press Compendium of Methods, Chapter 32 | I |
| Brevetoxins | 98112-41-5 (A-type, congeners BTX-1, BTX-7, BTX-10)<br>79580-28-2 (B-type, congeners BTX-2, BTX-3, BTX-5, BTX-6, BTX-8, BTX-9) | Presumptive (B-type) | Immunoassay (ELISA) | Adapted from Journal of Shellfish Research (2020) 39(2): 491-500 | II | Adapted from Journal of Shellfish Research (2020) 39(2): 491-500 | II | Adapted from Journal of Shellfish Research (2020) 39(2): 491-500 | II | Adapted from Journal of Shellfish Research (2020) 39(2): 491-500 | II | Adapted from Journal of Shellfish Research (2020) 39(2): 491-500 | II |
| | | Confirmatory (A and B-types) | LC-MS | Adapted from Toxicon (2015) 96: 82-88 | II | Adapted from Toxicon (2015) 96: 82-88 | II | Adapted from Toxicon (2015) 96: 82-88 | II | Adapted from Toxicon (2015) 96: 82-88 | II | Adapted from Toxicon (2015) 96: 82-88 | II |

| Analyte(s) | CAS RN | Analysis Type | Analytical Technique | Aerosol (air filter, filter cassette, liquid impinger) | | Solid (soil, powder) | | Particulate (swab, wipe, filter cassette) | | Non-Drinking Water (surface water, waste water) | | Drinking Water | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| α-Conotoxins* | Various | Confirmatory | LC-MS | Adapted from Toxins (2017) 9(9): 281 | III | Adapted from Toxins (2017) 9(9): 281 | III | Adapted from Toxins (2017) 9(9): 281 | III | Adapted from Toxins (2017) 9(9): 281 | III | Adapted from Toxins (2017) 9(9): 281 | III |
| Cylindrospermopsin | 143545-90-8 | Presumptive | Immunoassay (ELISA) | Adapted from Environmental Sciences and Technology (2010) 44: 7361-7368 | II | Adapted from Environmental Sciences and Technology (2010) 44: 7361-7368 | II | Adapted from Environmental Sciences and Technology (2010) 44: 7361-7368 | II | Adapted from Environmental Sciences and Technology (2010) 44: 7361-7368 | II | Adapted from Environmental Sciences and Technology (2010) 44: 7361-7368 | II |
| | | Confirmatory | LC-MS-MS | Method 545 (EPA) | II | Method 545 (EPA) | II | Method 545 (EPA) | II | EPA/600/R-17/130 | I | Method 545 (EPA) | I |
| Deoxynivalenol* | 51481-10-8 | Confirmatory | LC-MS-MS | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II |
| Domoic acid (DA) | 14277-97-5 | Presumptive | Immunoassay (ELISA) | Adapted from Journal of AOAC International (2007) 90(4): 1011-1027 | II | Adapted from Journal of AOAC International (2007) 90(4): 1011-1027 | II | Adapted from Journal of AOAC International (2007) 90(4): 1011-1027 | II | Adapted from Journal of AOAC International (2007) 90(4): 1011-1027 | II | Adapted from Journal of AOAC International (2007) 90(4): 1011-1027 | II |
| | | Presumptive | Immunoassay (ELISA) | Adapted from Journal of Shellfish Research (2008) 27(5): 1301-1310 | II | Adapted from Journal of Shellfish Research (2008) 27(5): 1301-1310 | II | Adapted from Journal of Shellfish Research (2008) 27(5): 1301-1310 | II | Adapted from Journal of Shellfish Research (2008) 27(5): 1301-1310 | II | Adapted from Journal of Shellfish Research (2008) 27(5): 1301-1310 | II |
| | | Presumptive | Immunoassay (LFA) | See summary in Section 8.2.10.3 | II | See summary in Section 8.2.10.3 | II | See summary in Section 8.2.10.3 | II | See summary in Section 8.2.10.3 | II | See summary in Section 8.2.10.3 | II |
| | | Confirmatory | LC-MS | Adapted from Journal of AOAC International (2014) 97(2): 316-324 | II | Adapted from Journal of AOAC International (2014) 97(2): 316-324 | II | Adapted from Journal of AOAC International (2014) 97(2): 316-324 | II | Adapted from Journal of AOAC International (2014) 97(2): 316-324 | II | Adapted from Journal of AOAC International (2014) 97(2): 316-324 | II |
| Fumonisin* | 116355-83-0 (B1)<br>116355-84-1 (B2)<br>136379-59-4 (B3) | Confirmatory | LC-MS-MS | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II |
| Microcystins | 96180-79-9 (LA)<br>154037-70-4 (LF)<br>101043-37-2 (LR)<br>123304-10-9 (LY)<br>111755-37-4 (RR)<br>101064-48-6 (YR) | Presumptive (Total Adda-containing microcystins) | Immunoassay (ELISA) | Method 546 (EPA) | II | Method 546 (EPA) | II | Method 546 (EPA) | II | Method 546 (EPA) | I | Method 546 (EPA) | I |
| | | Confirmatory (Total Adda-containing microcystins) | LC-MS-MS | EPA/600/R-17/344 | II | EPA/600/R-17/344 | II | EPA/600/R-17/344 | II | EPA/600/R-17/344 | I | Method 544 (EPA) | I |
| | | Biological Activity (Total Adda-containing microcystins) | Protein phosphatase 2A (PP2A) Activity Assay | Adapted from Toxins (2019) 11(12): 729 | II | Adapted from Toxins (2019) 11(12): 729 | II | Adapted from Toxins (2019) 11(12): 729 | II | Adapted from Toxins (2019) 11(12): 729 | II | Adapted from Toxins (2019) 11(12): 729 | II |
| Ochratoxin A* | 303-47-9 | Confirmatory | LC-MS-MS | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II |
| Picrotoxin* | 124-87-8 | Confirmatory | LC-UV | Adapted from Journal of Pharmaceutical and Biomedical Analysis (1989) 7(3): 369-375 | II | Adapted from Journal of Pharmaceutical and Biomedical Analysis (1989) 7(3): 369-375 | II | Adapted from Journal of Pharmaceutical and Biomedical Analysis (1989) 7(3): 369-375 | II | Adapted from Journal of Pharmaceutical and Biomedical Analysis (1989) 7(3): 369-375 | II | Adapted from Journal of Pharmaceutical and Biomedical Analysis (1989) 7(3): 369-375 | II |

| Analyte(s) | CAS RN | Analysis Type | Analytical Technique | Aerosol (air filter, filter cassette, liquid impinger) | | Solid (soil, powder) | | Particulate (swab, wipe, filter cassette) | | Non-Drinking Water (surface water, waste water) | | Drinking Water | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ricin | Ricin (9009-86-3)<br>Ricinine (5254-40-3) | Presumptive | Immunoassay (LFA) | Adapted from Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science (2013) 11(4): 237-250 | I | Adapted from Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science (2013) 11(4): 237-250 | I | Adapted from Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science (2013) 11(4): 237-250 | I | Adapted from Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science (2013) 11(4): 237-250 | I | Adapted from Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science (2013) 11(4): 237-250 | I |
| | | Presumptive | Immunoassay (ELISA) | Adapted from Journal of Food Protection (2005) 68(6): 1294-1301 | II | Adapted from Journal of Food Protection (2005) 68(6): 1294-1301 | II | Adapted from Journal of Food Protection (2005) 68(6): 1294-1301 | II | Adapted from Journal of Food Protection (2005) 68(6): 1294-1301 | II | Adapted from Journal of Food Protection (2005) 68(6): 1294-1301 | II |
| | | Presumptive | Immunoassay (ECL) | EPA/600/R-22/033A | II | EPA/600/R-22/033A | II | EPA/600/R-22/033A | I | EPA/600/R-22/033A | II | EPA/600/R-22/033A | I |
| | | Presumptive (Ricinine) | LC-MS-MS | EPA 600/R-13/022 (EPA/CDC) | II | EPA 600/R-13/022 (EPA/CDC) | II | EPA 600/R-13/022 (EPA/CDC) | II | EPA 600/R-13/022 (EPA/CDC) | II | EPA 600/R-13/022 (EPA/CDC) | I |
| | | Presumptive | Time-Resolved Fluorescence (TRF) Immunoassay | CDC LRN** | – | CDC LRN** | – | CDC LRN** | – | CDC LRN** | – | CDC LRN** | – |
| | | Confirmatory | Immunocapture / LC-MS-MS | Adapted from Analytical Chemistry (2011) 83: 2897-2905 | II | Adapted from Analytical Chemistry (2011) 83: 2897-2905 | II | Adapted from Analytical Chemistry (2011) 83: 2897-2905 | II | Adapted from Analytical Chemistry (2011) 83: 2897-2905 | II | Adapted from Analytical Chemistry (2011) 83: 2897-2905 | I |
| | | Biological Activity | Immunocapture / MALDI-TOF MS | Adapted from Analytical Chemistry (2016) 88: 6867-6872 | II | Adapted from Analytical Chemistry (2016) 88: 6867-6872 | II | Adapted from Analytical Chemistry (2016) 88: 6867-6872 | II | Adapted from Analytical Chemistry (2016) 88: 6867-6872 | II | Adapted from Analytical Chemistry (2016) 88: 6867-6872 | I |
| Saxitoxins | 35523-89-8 (STX)<br>64296-20-4 (NEO)<br>58911-04-9 (dcSTX)<br>68683-58-9 (dcNEOSTX)<br>143084-69-9 (doSTX)<br>77462-64-7 (GTX 1 - 6)<br>122075-86-9 (dcGTX 1 - 4) | Presumptive (Total) | Receptor Binding Assay | Method 2011.27 (AOAC) | II | Method 2011.27 (AOAC) | II | Method 2011.27 (AOAC) | II | Method 2011.27 (AOAC) | II | Method 2011.27 (AOAC) | II |
| | | Presumptive (Total) | Immunoassay (ELISA) | Adapted from Toxicon (2009) 54: 313-320 | II | Adapted from Toxicon (2009) 54: 313-320 | II | Adapted from Toxicon (2009) 54: 313-320 | II | Adapted from Harmful Algae (2016) 56: 77-90 | I | Adapted from Harmful Algae (2016) 56: 77-90 | I |
| | | Confirmatory (STXs and GTXs) | LC-MS-MS | Adapted from Journal of Chromatography A (2015) 1387: 1-12 | II | Adapted from Journal of Chromatography A (2015) 1387: 1-12 | II | Adapted from Journal of Chromatography A (2015) 1387: 1-12 | II | Adapted from Journal of Chromatography A (2015) 1387: 1-12 | II | Adapted from Journal of Chromatography A (2015) 1387: 1-12 | II |
| Shiga and Shiga-like Toxins | Stx (75757-64-1) | Presumptive (Stx, Stx-1 and Stx-2) | Immunoassay (ELISA) | Adapted from Austin Immunology (2016) 1(2): 1007:1-7 | II | Adapted from Austin Immunology (2016) 1(2): 1007:1-7 | II | Adapted from Austin Immunology (2016) 1(2): 1007:1-7 | II | Adapted from Austin Immunology (2016) 1(2): 1007:1-7 | I | Adapted from Austin Immunology (2016) 1(2): 1007:1-7 | II |
| | | Confirmatory (Stx, Stx-1 and Stx-2) | LC-MS-MS | Adapted from Analytical Chemistry (2014) 86: 4698-4706 | II | Adapted from Analytical Chemistry (2014) 86: 4698-4706 | II | Adapted from Analytical Chemistry (2014) 86: 4698-4706 | II | Adapted from Analytical Chemistry (2014) 86: 4698-4706 | II | Adapted from Analytical Chemistry (2014) 86: 4698-4706 | II |
| Staphylococcal enterotoxins | 37337-57-8 (SEA)<br>39424-53-8 (SEB)<br>39424-54-9 (SEC)<br>12788-99-7 (SED)<br>39424-55-0 (SEE) | Presumptive (SEA - SEE) | Enzyme Immunoassay (ELFA) | 2007.06 (AOAC) | II | 2007.06 (AOAC) | II | 2007.06 (AOAC) | II | 2007.06 (AOAC) | II | 2007.06 (AOAC) | II |
| | | Presumptive (SEB) | Immunoassay (ECL) | Adapted from Journal of AOAC International (2014) 97(3): 862-867 | III | Adapted from Journal of AOAC International (2014) 97(3): 862-867 | III | Adapted from Journal of AOAC International (2014) 97(3): 862-867 | III | Adapted from Journal of AOAC International (2014) 97(3): 862-867 | III | Adapted from Journal of AOAC International (2014) 97(3): 862-867 | III |
| | | Confirmatory (SEA - SEE) | Immunoassay (ELISA) | Adapted from Letters in Applied Microbiology (2011) 52: 468-474 | II | Adapted from Letters in Applied Microbiology (2011) 52: 468-474 | II | Adapted from Letters in Applied Microbiology (2011) 52: 468-474 | II | Adapted from Letters in Applied Microbiology (2011) 52: 468-474 | II | Adapted from Letters in Applied Microbiology (2011) 52: 468-474 | II |

| Analyte(s) | CAS RN | Analysis Type | Analytical Technique | Aerosol (air filter, filter cassette, liquid impinger) | | Solid (soil, powder) | | Particulate (swab, wipe, filter cassette) | | Non-Drinking Water (surface water, waste water) | | Drinking Water | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-2 Mycotoxin | 21259-20-1 (T-2)<br>26934-87-2 (HT-2) | Presumptive (T-2) | Immunoassay (ELISA) | Adapted from Journal of Food Protection (2005) 68(6): 1294-1301 | II | Adapted from Journal of Food Protection (2005) 68(6): 1294-1301 | II | Adapted from Journal of Food Protection (2005) 68(6): 1294-1301 | II | Adapted from Journal of Food Protection (2005) 68(6): 1294-1301 | II | Adapted from Journal of Food Protection (2005) 68(6): 1294-1301 | II |
| | | Confirmatory (T-2 and HT-2) | LC-MS | Adapted from Rapid Communications in Mass Spectrometry (2006) 20(9): 1422-1428 | II | Adapted from Rapid Communications in Mass Spectrometry (2006) 20(9): 1422-1428 | II | Adapted from Rapid Communications in Mass Spectrometry (2006) 20(9): 1422-1428 | II | Adapted from Rapid Communications in Mass Spectrometry (2006) 20(9): 1422-1428 | II | Adapted from Rapid Communications in Mass Spectrometry (2006) 20(9): 1422-1428 | II |
| Tetrodotoxin | 9014-39-5 | Presumptive | Receptor Binding Assay | Method 2011.27 (AOAC) | II | Method 2011.27 (AOAC) | II | Method 2011.27 (AOAC) | II | Method 2011.27 (AOAC) | II | Method 2011.27 (AOAC) | II |
| | | Confirmatory | LC-MS-MS | Adapted from Journal of AOAC International (2017) 100(5): 1469-1482 | II | Adapted from Journal of AOAC International (2017) 100(5): 1469-1482 | II | Adapted from Journal of AOAC International (2017) 100(5): 1469-1482 | II | Adapted from Journal of AOAC International (2017) 100(5): 1469-1482 | II | Adapted from Journal of AOAC International (2017) 100(5): 1469-1482 | II |
| Zearalenone* | 17924-92-4 | Confirmatory | LC-MS-MS | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II | Adapted from Journal of Agricultural and Food Chemistry (2017) 65(33): 7138-7152 | II |

* At the time of publication, methods for presumptive analysis were not identified. If updates become available, information will be provided on the SAM website: https://www.epa.gov/esam/selected-analytical-methods-environmental-remediation-and-recovery-sam.

**A standardized procedure, reagents and agent-specific algorithms are available only to LRN member laboratories (see Section 7.1.4 of SAM for more information on the LRN).