

Approved Methods for the Sampling and Analysis of Water Pollutants in New South Wales



Department of
Environment and Conservation (NSW)



The Environment Protection Authority (EPA) is a statutory body with specific powers under environment protection legislation. In September 2003, the EPA became part of the Department of Environment and Conservation (DEC).

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For technical information on the matters discussed in this document, contact the Department of Environment and Conservation (NSW) on (02) 9995 5555.

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CONTENTS

Introduction	1
Sample collection and handling guidelines	1
Methods of analysis	2
References	32
Appendix 1 Alternative names for analytes	36

INTRODUCTION

This document lists the sampling and analysis methods to be used when complying with a requirement by, or under, the environment protection legislation, or a licence or notice under that legislation, to test for the presence or concentration of matter in water and the volume, depth and flow of water or wastewater.

The **environment protection legislation** includes, among other legislation, the *Protection of the Environment Operations Act 1997* and regulations under it.

This document is referred to in:

- the Protection of the Environment Operations (General) Regulation 1998
- the Clean Waters Regulations 1972 (for the purposes of Classification of Waters)
- the Load Calculation Protocol.

This document also may be referred to in conditions attached to statutory instruments issued by the Environment Protection Authority, New South Wales (EPA).

The following process should be followed in determining the sampling and analysis methods to be used:

1. Use the specified method(s) on the relevant environment protection licence.
2. If no method is specified on a licence, use the method(s) specified in this document.
3. If no method is specified in this document, or if you wish to use another method for sampling or analysis that is not included in this document, you must seek approval from the EPA **before** you commence sampling or analysis using that method.

In exceptional circumstances, the EPA may approve the use of alternative methods. Approval to use alternative methods must be sought in writing from the EPA. In the first instance, licensees should contact the EPA regional office that issues the licence.

Where there is a choice of more than one approved method for an analyte, unless stated otherwise by the relevant environment protection licence, a licensee may use any of the approved methods given for that analyte, provided that the method can achieve the reporting limits required for compliance with the licence. If there are no methods that will achieve the reporting limits required, licensees should contact the EPA. Once a licensee has selected an approved method, however, that licensee must not then change to another method for the same analyte without seeking permission in writing from the EPA.

In the sampling and analysis of water pollutants, the procedural details specified in the relevant method in this document may be varied by the person carrying out the sampling or analysis, provided that the variation is not such as can affect the results of the test and the person conducting the test can establish that.

SAMPLE COLLECTION AND HANDLING GUIDELINES

A sample should be collected so that it is representative of the condition being investigated, and in a manner consistent with the collection, handling and preservation principles enunciated in Standards Association of Australia (1998) AS/NZS 5667.1:1998, and APHA (1998) section 1060. If there is any inconsistency between these references, Standards Association of Australia (1998) prevails.

METHODS OF ANALYSIS

Analyses should be undertaken by a laboratory accredited to perform those analyses by an independent accreditation body acceptable to the EPA, such as the National Association of Testing Authorities (NATA), or equivalent.

Such analyses should conform to the generic methods prescribed at Part 1000 of APHA (1998), covering quality assurance, data quality, expression of results, method development and evaluation, and laboratory procedures. These generic methods are applicable to each of the methods approved below for specific analytes.

Methods approved by the EPA for specific analytes are listed in Table 1. Where there are multiple methods, some may be indicated as preferred methods. These methods are preferred because they use modern equipment and/or particular techniques that are most practicable and/or give the most reliable results. However, because in some circumstances it may not be possible to gain access to the most up-to-date equipment or laboratories accredited for all methods, acceptable alternatives are given.

How to find an analyte in the table

Analytes are listed in alphabetical order, generally on the basis of the main analyte considered. For instance, Faecal Coliforms are listed under Coliforms, and Total Suspended Solids under Solids. Both the groups of analytes and the individual analytes that fall into each group are listed. For instance, Organochlorine Pesticides include Aldrin and Dieldrin, among others: both of these are also listed separately. If the analytes listed on the licence are not listed in Table 1, refer to Appendix 1, which gives alternative names that are sometimes used for the listed analytes.

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Acenaphthene</i>	APHA (1998) section 6410; or APHA (1998) section 6440; or *USEPA (1986a) method 8100; or *USEPA (1996a) method 8270C; or *USEPA (1986b) method 8310
<i>Acenaphthylene</i>	APHA (1998) section 6410; or APHA (1998) section 6440; or *USEPA (1986a) method 8100; or *USEPA (1996a) method 8270C; or *USEPA (1986b) method 8310
<i>Acrolein</i>	USEPA (40 CFR, 1994d) method 603; or UESPA (1994a) method 8316; or USEPA (1996b) method 8260B
<i>Acrylonitrile</i>	USEPA (40 CFR, 1994d) method 603; USEPA (1994a) method 8316; or USEPA (1996b) method 8260B
<i>Aldrin</i>	APHA (1998) section 6630; or APHA (1998) section 6410; or *USEPA (1998c) method 8081B; or *USEPA (1996a) method 8270C
<i>Alkalinity (bicarbonate)</i>	APHA (1998) section 2320
<i>Alkalinity (total)</i>	APHA (1998) section 2320

* Preferred methods

† Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Aluminium (acid extractable)</i>	Preliminary treatment APHA (1998) section 3030(E – K); or USEPA (1992a) method 3005A; or USEPA (1992b) method 3010A; or USEPA (1994g) method 3015; or USEPA (1992c) method 3020A Then use *APHA (1998) section 3111D; or *APHA (1998) section 3111E; or *APHA (1998) section 3113; or *APHA (1998) section 3120; or *APHA (1998) section 3125 [†] ; or USEPA (1994b) method 200.7; or USEPA (1994b) method 200.8 [†] ; or *USEPA (1996c) method 6010B; or *USEPA (1994f) method 6020 [†] ; or *APHA (1998) section 3500-A1 Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A.
<i>Anionic surfactants</i>	APHA (1998) section 5540
<i>Anthracene</i>	APHA (1998) section 6410; or APHA (1998) section 6440; or *USEPA (1986a) method 8100; or *USEPA (1996a) method 8270C; or *USEPA (1986b) method 8310

* Preferred methods

[†] Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Antimony (acid extractable)</i>	<p>Preliminary treatment APHA (1998) section 3030(E – K); or</p> <p>USEPA (1992a) method 3005A; or</p> <p>USEPA (1992b) method 3010A; or</p> <p>USEPA (1994g) method 3015; or</p> <p>USEPA (1992c) method 3020A Then use *APHA (1998) section 3111B; or</p> <p>*APHA (1998) section 3113; or</p> <p>*APHA (1998) section 3120; or</p> <p>*APHA (1998) section 3125[†]; or</p> <p>USEPA (1994b) method 200.7; or</p> <p>USEPA (1994b) method 200.8[†]; or</p> <p>*USEPA (1996c) method 6010B; or</p> <p>*USEPA (1994f) method 6020[†]</p> <p>Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A.</p>
<i>Arsenic (acid extractable)</i>	<p>Preliminary treatment APHA (1998) section 3030(E – K); or</p> <p>USEPA (1992a) method 3005A; or</p> <p>USEPA (1992b) method 3010A; or</p> <p>USEPA (1994g) method 3015; or</p> <p>USEPA (1992c) method 3020A</p> <p>Then use *APHA (1998) section 3113; or</p> <p>*APHA (1998) section 3114; or</p> <p>*APHA (1998) section 3120; or</p> <p>*APHA (1998) section 3125[†]; or</p> <p>USEPA (1994b) method 200.7; or</p> <p>USEPA (1994b) method 200.8[†]; or</p> <p>*USEPA (1996c) method 6010B; or</p> <p>*USEPA (1994f) method 6020[†]; or</p> <p>*APHA (1998) section 3500-As</p> <p>Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A</p>

* Preferred methods

[†] Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Atrazine</i>	USEPA (1998a) method 8141B
<i>Barium (acid extractable)</i>	<p>Preliminary treatment APHA (1998) section 3030(E – K); or</p> <p>USEPA (1992a) method 3005A; or</p> <p>USEPA (1992b) method 3010A; or</p> <p>USEPA (1994g) method 3015; or</p> <p>USEPA (1992c) method 3020A</p> <p>Then use *APHA (1998) section 3111D; or</p> <p>*APHA (1998) section 3113; or</p> <p>*APHA (1998) section 3120; or</p> <p>*APHA (1998) section 3125[†]; or</p> <p>USEPA (1994b) method 200.7; or</p> <p>USEPA (1994b) method 200.8[†]; or</p> <p>*USEPA (1996c) method 6010B; or</p> <p>*USEPA (1994f) method 6020[†]</p> <p>Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A.</p>
<i>Benzene</i>	<p>APHA (1998) section 6200; or</p> <p>*USEPA (1996d) method 8021B; or</p> <p>*USEPA (1996b) method 8260B</p>
<i>Benzidine</i>	<p>APHA (1998) section 6410; or</p> <p>*USEPA (1996a) method 8270C</p>
<p><i>Benzo(a)anthracene</i></p> <p><i>Benzo(a)pyrene</i></p> <p><i>Benzo(b)fluoranthene</i></p> <p><i>Benzo(e)pyrene</i></p> <p><i>Benzo[ghi]perylene</i></p> <p><i>Benzo(k)fluoranthene</i></p>	<p>APHA (1998) section 6410; or</p> <p>APHA (1998) section 6440; or</p> <p>*USEPA (1986a) method 8100; or</p> <p>*USEPA (1996a) method 8270C; or</p> <p>*USEPA (1986b) method 8310</p>

* Preferred methods

[†] Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Beryllium (acid extractable)</i>	Preliminary treatment APHA (1998) section 3030(E – K); or USEPA (1992a) method 3005A; or USEPA (1992b) method 3010A; or USEPA (1994g) method 3015; or USEPA (1992c) method 3020A Then use *APHA (1998) section 3111D; or *APHA (1998) section 3111E; or *APHA (1998) section 3113; or *APHA (1998) section 3120; or *APHA (1998) section 3125 [†] ; or USEPA (1994b) method 200.7; or USEPA (1994b) method 200.8 [†] ; or *USEPA (1996c) method 6010B; or *USEPA (1994f) method 6020 [†] Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A.
<i>alpha-BHC</i> <i>beta-BHC</i>	APHA (1998) section 6630; or APHA (1998) section 6410; or *USEPA (1998c) method 8081B; or *USEPA (1996a) method 8270C
<i>Biochemical oxygen demand</i>	APHA (1998) section 5210B, using APHA (1998) section 4500-O for the determination of dissolved oxygen

* Preferred methods

[†] Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Boron (acid extractable)</i>	Preliminary treatment APHA (1998) section 3030(E – K); or USEPA (1992a) method 3005A; or USEPA (1992b) method 3010A; or USEPA (1994g) method 3015; or USEPA (1992c) method 3020A Then use *APHA (1998) section 3120; or USEPA (1994b) method 200.7; or *USEPA (1996c) method 6010B; or *USEPA (1994f) method 6020 [†] ; or *APHA (1998) section 4500-B Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A.
<i>Bromide</i>	APHA (1998) section 4110; or APHA (2001 supplement) section 4110; or APHA (1998) section 4140; or APHA (1998) section 4500-Br
<i>Bromoform</i>	APHA (1998) section 6200; or APHA (1998) section 6232; or *USEPA (1996d) method 8021B; or *USEPA (1996b) method 8260B

* Preferred methods

[†] Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Cadmium (acid extractable)</i>	<p>Preliminary treatment APHA (1998) section 3030(E – K); or</p> <p>USEPA (1992a) method 3005A; or</p> <p>USEPA (1992b) method 3010A; or</p> <p>USEPA (1994g) method 3015; or</p> <p>USEPA (1992c) method 3020A</p> <p>Then use *APHA (1998) section 3111B; or</p> <p>*APHA (1998) section 3111C; or</p> <p>*APHA (1998) section 3113; or</p> <p>*APHA (1998) section 3120; or</p> <p>*APHA (1998) section 3125[†]; or</p> <p>USEPA (1994b) method 200.7; or</p> <p>USEPA (1994b) method 200.8[†]; or</p> <p>*USEPA (1996c) method 6010B; or</p> <p>*USEPA (1994f) method 6020[†]</p> <p>Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A.</p>
<i>Calcium (acid extractable)</i>	<p>Preliminary treatment APHA (1998) section 3030(E – K); or</p> <p>USEPA (1992a) method 3005A; or</p> <p>USEPA (1992b) method 3010A; or</p> <p>USEPA (1994g) method 3015; or</p> <p>USEPA (1992c) method 3020A</p> <p>Then use *APHA (1998) section 3111B; or</p> <p>*APHA (1998) section 3111D; or</p> <p>*APHA (1998) section 3120; or</p> <p>USEPA (1994b) method 200.7; or</p> <p>*USEPA (1996c) method 6010B; or</p> <p>*USEPA (1994f) method 6020[†]; or</p> <p>*APHA (1998) section 3500-Ca</p> <p>Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A.</p>

* Preferred methods

[†] Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Carbamate pesticides</i> <i>Includes:</i> <i>carbaryl</i> <i>methomyl</i>	APHA (1998 or 2001 supplement) section 6610; or *USEPA (1994e) method 8318; or USEPA (1996e) method 8321A
<i>Carbaryl</i>	APHA (1998 or 2001 supplement) section 6610; or *USEPA (1994e) method 8318; or USEPA (1996e) method 8321A
<i>Carbon tetrachloride</i>	APHA (1998) section 6200; or *USEPA (1996d) method 8021B; or *USEPA (1996b) method 8260B
<i>Chemical oxygen demand</i>	APHA (1998) section 5220
<i>Chlordane and isomers (cis, trans and total)</i>	APHA (1998) section 6410; or APHA (1998) section 6630; or *USEPA (1998c) method 8081B; or *USEPA (1996a) method 8270C
<i>Chloride</i>	APHA (1998) section 4110; or APHA (2001 supplement) section 4110; or APHA (1998) section 4140; or APHA (1998) section 4500-Cl B; or APHA (1998) section 4500-Cl D; or APHA (1998) section 4500-Cl E
<i>Chlorinated phenoxy acid herbicides</i> <i>Includes:</i> <i>2,4-D</i> <i>pentachlorophenol</i> <i>2,4,5-T</i>	APHA (1998) section 6640; or *USEPA (1996f) method 8151A; or USEPA (1996e) method 8321A Note: When using method 8321A it is recommended that samples be hydrolysed to the ester form to simplify analysis.

* Preferred methods

† Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Chlorine (combined residual)</i>	<p>APHA (1998) section 4500-C1 D; or APHA (1998) section 4500-C1 F; or APHA (1998) section 4500-C1 G</p> <p>Note: The loss of free chlorine because of reaction with organic material and/or with reducing agents, and/or by volatilisation from water samples can make analysing for Chlorine (total residual), Chlorine (free residual) or Chlorine (combined residual) difficult. As a result, the most appropriate analytical technique to demonstrate compliance with a licence limit is likely to be analysis on site using a kit. The only kits that are acceptable to the EPA are those that use a portable spectrophotometer or colorimeter to measure the colour development that indicates the concentration of chlorine present. Kits that use comparison with a colour chart to determine concentration are not acceptable. Normal QA procedures must be followed. These include the analysis of blanks with every batch of samples, and the use of certified chlorine standards on each occasion the kit is used (if it is not used every day) or weekly if the kit is used constantly. Samples need to be taken immediately before analysis and need to be taken in bottles, such as BOD bottles, that can be filled completely. The bottles should be wrapped in foil. These directions are based on the requirements set down in the APHA methods listed above for chlorine analysis. If the concentration of chlorine being measured is likely to be around 0.05–0.2 mg/L, it will be necessary to validate the detection limit for the specific wastewater being analysed and the kit being used for the analysis.</p>
<i>Chlorine (free residual)</i>	<p>APHA (1998) section 4500-C1 D; or APHA (1998) section 4500-C1 F; or APHA (1998) section 4500-C1 G; or APHA (1998) section 4500-C1 H</p> <p>Refer to note on the use of kits, under <i>Chlorine (combined residual)</i>.</p>

* Preferred methods

† Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Chlorine (total residual)</i>	APHA (1998) section 4500-CI B; or APHA (1998) section 4500-CI C; or APHA (1998) section 4500-CI D; or APHA (1998) section 4500-CI E; or APHA (1998) section 4500-CI F; or APHA (1998) section 4500-CI G; or APHA (1998) section 4500-CI I Refer to note on the use of kits, under <i>Chlorine (combined residual)</i> .
<i>Chlorobenzene</i>	APHA (1998) section 6200; or *USEPA (1996d) method 8021B; or *USEPA (1996b) method 8260B
<i>Chloroform</i>	APHA (1998) section 6200; or APHA (1998) section 6232; or *USEPA (1996d) method 8021B; or *USEPA (1996b) method 8260B
<i>1-Chloronaphthalene</i>	APHA (1998) section 6410; or *USEPA (1996a) method 8270C
<i>2-Chlorophenol</i>	APHA (1998) section 6410; or APHA (1998) section 6420; or *USEPA (1996) method 8041; or *USEPA (1996a) method 8270C
<i>Chlorophyll a</i>	APHA (1998) section 10200 H
<i>Chlorpyrifos</i>	USEPA (1998a) method 8141B; or USEPA (1996a) method 8270C Note: Chlorpyrifos may be analysed using USEPA method 8270C, provided that the extraction is performed at a neutral pH as per method USEPA 8141B.

* Preferred methods

† Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Chromium (acid extractable)</i>	Preliminary treatment APHA (1998) section 3030(E – K); or USEPA (1992a) method 3005A; or USEPA (1992b) method 3010A; or USEPA (1994g) method 3015; or USEPA (1992c) method 3020A Then use *APHA (1998) section 3111C; or *APHA (1998) section 3113; or *APHA (1998) section 3120; or *APHA (1998) section 3125 [†] ; or USEPA (1994b) method 200.7; or USEPA (1994b) method 200.8 [†] ; or *USEPA (1996c) method 6010B; or *USEPA (1994f) method 6020 Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A.
<i>Chromium (hexavalent)</i>	APHA (1998) section 3500-Cr; or AS 2882—1986; or USEPA (1994b) method 218.6; or USEPA (1992d) method 7196A
<i>Chromium (trivalent)</i>	Trivalent chromium is to be calculated: $\text{Cr}^{3+} = \text{Cr (acid extractable)} - \text{Cr}^{6+}$
<i>Chrysene</i>	APHA (1998) section 6410; or APHA (1998) section 6440; or *USEPA (1986a) method 8100; or *USEPA (1996a) method 8270C; or *USEPA (1986b) method 8310

* Preferred methods

[†] Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Cobalt (acid extractable)</i>	<p>Preliminary treatment APHA (1998) section 3030(E – K); or USEPA (1992a) method 3005A; or USEPA (1992b) method 3010A; or USEPA (1994g) method 3015; or USEPA (1992c) method 3020A Then use *APHA (1998) section 3111B; or *APHA (1998) section 3111C; or *APHA (1998) section 3113; or *APHA (1998) section 3120; or *APHA (1998) section 3125[†]; or USEPA (1994b) method 200.7; or USEPA (1994b) method 200.8[†]; or *USEPA (1996c) method 6010B; or *USEPA (1994f) method 6020[†]</p> <p>Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A.</p>
<p><i>Coliforms:</i> <i>(a) Total coliforms</i></p> <p><i>(b) Faecal coliforms</i></p>	<p>APHA (1998 or 2001 supplement) section 9221; or APHA (1998) section 9222; or APHA (1998) section 9223; or AS 4276.4—1995 and AS 4276.5—1995</p> <p>APHA (1998 or 2001 supplement) section 9221; or APHA (1998) section 9222 or AS 4276.7—1995</p>
<i>Colour (true)</i>	APHA (1998) section 2120
<i>Conductivity</i>	APHA (1998) section 2510

* Preferred methods

[†] Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Copper (acid extractable)</i>	Preliminary treatment APHA (1998) section 3030(E – K); or USEPA (1992a) method 3005A; or USEPA (1992b) method 3010A; or USEPA (1994g) method 3015; or USEPA (1992c) method 3020A followed by *APHA (1998) section 3111B; or *APHA (1998) section 3111C; or *APHA (1998) section 3113; or *APHA (1998) section 3120; or *APHA (1998) section 3125 [†] ; or USEPA (1994b) method 200.7; or USEPA (1994b) method 200.8 [†] ; or *USEPA (1996c) method 6010B; or *USEPA (1994f) method 6020 [†] Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A.
<i>Coronene</i>	APHA (1998) section 6410; or APHA (1998) section 6440; or *USEPA (1986a) method 8100; or *USEPA (1996a) method 8270C; or *USEPA (1986b) method 8310
<i>Cyanide (amenable to chlorination)</i>	Preliminary treatment, if required, APHA (1998 or 2001 supplement) section 4500-CN- B; followed by APHA (1998) section 4500-CN- G; or APHA (1998) section 4500-CN- H
<i>Cyanide (free)</i>	Preliminary recovery ASTM (2002) method D4282-02; followed by APHA (1998) section 4500-CN- D; or APHA (1998) section 4500-CN- E; or APHA (1998) section 4500-CN- F; or ASTM (2002) D4282-02

* Preferred methods

[†] Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Cyanide (total)</i>	<p>Preliminary treatment, if required, APHA (1998 or 2001 supplement) section 4500-CN- B; followed by</p> <p>distillation APHA (1998 or 2001 supplement) section 4500-CN- C; followed by</p> <p>APHA (1998) section 4500-CN- D; or</p> <p>APHA (1998) section 4500-CN- E; or</p> <p>APHA (1998) section 4500-CN- F</p> <p>or</p> <p>USEPA (1980) method 335.2</p> <p>Note: If your discharge is a slurry—that is, contains a high fraction of solids—contact your licensing officer for further advice on the appropriate method.</p>
<i>Cyanide (weak acid dissociable)</i>	<p>Preliminary treatment, if required, APHA (1998 or 2001 supplement) section 4500-CN- B; followed by</p> <p>APHA (1998) section 4500-CN- I</p> <p>Note: If your discharge is a slurry—that is, contains a high fraction of solids—contact your licensing officer for further advice on the appropriate method.</p>
<i>2,4-D</i>	<p>APHA (1998) section 6640; or</p> <p>*USEPA (1996f) method 8151A; or</p> <p>USEPA (1996e) method 8321A</p> <p>Note: When using method 8321A it is recommended that samples be hydrolysed to the ester form to simplify analysis.</p>
<i>4,4'-DDD</i> <i>4,4'-DDE</i> <i>4,4'-DDT</i>	<p>APHA (1998) section 6410; or</p> <p>APHA (1998) section 6630; or</p> <p>*USEPA (1998c) method 8081B; or</p> <p>*USEPA (1996a) method 8270C</p>
<i>Depth</i>	<p>AS 3550.7—1993; or</p> <p>AS 3778—2001</p>
<i>Diazinon</i>	<p>USEPA (1998a) method 8141B; or</p> <p>USEPA (1996a) method 8270C</p> <p>Note: Diazinon may be analysed using USEPA method 8270C provided that the extraction is performed at a neutral pH as per method USEPA 8141B.</p>

* Preferred methods

† Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Dibenzo(a,h)anthracene</i>	APHA (1998) section 6410; or APHA (1998) section 6440; or *USEPA (1986a) method 8100; or *USEPA (1996a) method 8270C; or *USEPA (1986b) method 8310
<i>Dibromochloromethane</i>	APHA (1998) section 6200; or APHA (1998) section 6232; or *USEPA (1996d) method 8021B; or *USEPA (1996b) method 8260B
<i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i>	APHA (1998) section 6200; or APHA (1998) section 6410; or *USEPA (1996d) method 8021B; or *USEPA (1996b) method 8260B; or *USEPA (1996a) method 8270C
<i>3,3'-Dichlorobenzidine</i>	APHA (1998) section 6410; or *USEPA (1996a) method 8270C
<i>1,1-Dichloroethane</i> <i>1,2-Dichloroethane</i> <i>1,1-Dichloroethene</i>	APHA (1998) section 6200; or *USEPA (1996d) method 8021B; or *USEPA (1996b) method 8260B
<i>2,4-Dichlorophenol</i>	APHA (1998) section 6410; or APHA (1998) section 6420; or *USEPA (1996g) method 8041; or *USEPA (1996a) method 8270C
<i>Dieldrin</i>	APHA (1998) section 6410; or APHA (1998) section 6630; or *USEPA (1998c) method 8081B; or *USEPA (1996a) method 8270C
<i>2,4-Dimethylphenol</i>	APHA (1998) section 6410; or APHA (1998) section 6420; or *USEPA (1996g) method 8041; or *USEPA (1996a) method 8270C

* Preferred methods

† Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>1,2-Diphenylhydrazine</i>	USEPA (1996a) method 8270C
<i>Diquat</i>	USEPA (1992e) method 549.1 (EPA-500 Series Supplement II, Aug 1992)
<i>Dissolved organic carbon</i>	APHA (1998) section 5310
<i>Dissolved organic halogen</i> <i>Includes:</i> <i>Trihalomethanes</i> <i>Trichloroethene</i> <i>Tetrachloroethene</i> <i>Other halogenated alkanes and alkenes</i> <i>Chlorinated and brominated pesticides</i> <i>Polychlorinated biphenyls</i> <i>Hexachlorobenzene</i> <i>2,4-Dichlorophenol</i>	APHA (1998) section 5320 B Note: this is a general screening method. Individually listed compounds should preferably be tested by their specific methods, where included in this list.
<i>Dissolved oxygen</i>	APHA (1998) section 4500-O
<i>Diuron</i>	USEPA (1998b) method 8321B
<i>DTPA</i>	There is no approved method for DTPA. Contact your licensing officer for further information
<i>Endosulfan I</i> <i>Endosulfate II</i> <i>Endosulfan sulfate</i>	APHA (1998) section 6410; or APHA (1998) section 6630; or *USEPA (1998c) method 8081B; or *USEPA (1996a) method 8270C
<i>Endrin</i>	APHA (1998) section 6410; or APHA (1998) section 6630; or *USEPA (1998c) method 8081B; or *USEPA (1996a) method 8270C
<i>Enterococci</i>	APHA (1998) section 9230; or AS 4276.8—1995; or AS 4276.9—1995
<i>Ethanol</i>	USEPA (1996h) method 8015B
<i>Ethyl benzene</i>	APHA (1998) section 6200; or *USEPA (1996d) method 8021B; or *USEPA (1996b) method 8260B

* Preferred methods

† Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Extractable base/neutrals and acids</i> <i>Includes:</i> <i>Acenaphthene</i> <i>Acenaphthylene</i> <i>Aldrin</i> <i>Anthracene</i> <i>Benzo(a)anthracene</i> <i>Benzo(a)pyrene</i> <i>Benzo(b)fluoranthene</i> <i>Benzo(ghi)perylene</i> <i>Benzo(k)fluoranthene</i> <i>beta-BHC</i> <i>Chlordane</i> <i>2-Chlorophenol</i> <i>Chrysene</i> <i>4,4-[†]DDD</i> <i>4,4-[†]DDE</i> <i>4,4-[†]DDT</i> <i>Dibenzo(a,h)anthracene</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>3,3-[†]Dichlorobenzidine</i> <i>2,4-Dichlorophenol</i> <i>Dieldrin</i> <i>2,4-Dimethylphenol</i> <i>Endosulfan sulfate</i> <i>Fluoranthene</i> <i>Heptachlor</i> <i>Heptachlor epoxide</i> <i>Hexachlorobenzene</i> <i>Indeno(1,2,3-cd)pyrene</i> <i>Naphthalene</i> <i>Nitrobenzene</i> <i>Pentachlorophenol</i> <i>Phenol</i> <i>Polychlorinated biphenyls (PCB-1016, PCB-1221, PCB-1232, PCB-1242, PCB-1248, PCB-1254, PCB-1260)</i> <i>Pyrene</i> <i>2,4,6-Trichlorophenol</i>	APHA (1998) section 6410; or *USEPA (1996a) method 8270C
<i>Faecal coliforms</i>	Refer to section on <i>Coliforms</i>
<i>Floatables</i>	APHA (1998) section 2530

* Preferred methods

† Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Flow</i>	AS 3778 (several volumes) Note: This standard covers methods for use in open channels and waterways. To determine flow in pipes, use pumping capacity, pressure differences, or electromagnetic, ultrasonic or other techniques.
<i>Fluoranthene</i>	APHA (1998) section 6410; or APHA (1998) section 6440; or *USEPA (1986a) method 8100; or *USEPA (1996a) method 8270C; or *USEPA (1986b) method 8310
<i>Fluoride</i>	Preliminary distillation step, if required, APHA (1998) section 4500-F- B; followed by APHA (1998) section 4140; or APHA (1998) section 4500-F- C; or APHA (1998) section 4500-F- D; or APHA (1998) section 4500-F- E
<i>Formaldehyde</i>	USEPA (1996i) method 8315A
<i>Glyphosate</i>	APHA (1998) section 6651; or USEPA (1990) method 547
<i>Heptachlor</i> <i>Heptachlor epoxide</i>	APHA (1998) section 6410; or APHA (1998) section 6630; or *USEPA (1998c) method 8081B; or *USEPA (1996a) method 8270C
<i>Hexachlorobenzene</i>	APHA (1998) section 6410; or *USEPA (1996a) method 8270C; or USEPA (1998c) method 8081B
<i>Hydrogen sulfide (un-ionised)</i>	Refer to section on <i>Sulfide</i>
<i>Indeno(1,2,3-cd)pyrene</i>	APHA (1998) section 6410; or APHA (1998) section 6440; or *USEPA (1986a) method 8100; or *USEPA (1996a) method 8270C; or *USEPA (1986b) method 8310

* Preferred methods

† Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Iron (acid extractable)</i>	Preliminary treatment APHA (1998) section 3030(E – K); or USEPA (1992a) method 3005A; or USEPA (1992b) method 3010A; or USEPA (1994g) method 3015; or USEPA (1992c) method 3020A Then use *APHA (1998) section 3111B; or *APHA (1998) section 3111C; or *APHA (1998) section 3113; or *APHA (1998) section 3120; or USEPA (1994b) method 200.7; or *USEPA (1996c) method 6010B; or *USEPA (1994f) method 6020† Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A.
<i>Iron (dissolved)</i>	Preliminary treatment APHA (1998) section 3030B; then treat according to <i>Iron (acid extractable)</i>
<i>Iron (suspended)</i>	Preliminary treatment APHA (1998) section 3030B; then treat according to <i>Iron (acid extractable)</i>
<i>Lead (acid extractable)</i>	Preliminary treatment APHA (1998) section 3030(E – K); or USEPA (1992a) method 3005A; or USEPA (1992b) method 3010A; or USEPA (1994g) method 3015; or USEPA (1992c) method 3020A Then use *APHA (1998) section 3111B; or *APHA (1998) section 3111C; or *APHA (1998) section 3113; or *APHA (1998) section 3120; or *APHA (1998) section 3125†; or USEPA (1994b) method 200.7; or USEPA (1994b) method 200.8†; or *USEPA (1996c) method 6010B; or *USEPA (1994f) method 6020† Note: For the purposes of this document, the term “acid

* Preferred methods

† Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
	extractable” is as defined in APHA (1998) section 3030A.
<i>Lead (dissolved)</i>	Preliminary treatment APHA (1998) section 3030B; then treat according to <i>Lead (acid extractable)</i>
<i>Lead (suspended)</i>	Preliminary treatment APHA (1998) section 3030B; then treat according to <i>Lead (acid extractable)</i>
<i>Lindane</i>	<p>APHA (1998) section 6410; or</p> <p>APHA (1998) section 6630; or</p> <p>*USEPA (1998c) method 8081B; or</p> <p>*USEPA (1996a) method 8270C</p>
<i>Lithium (acid extractable)</i>	<p>Preliminary treatment APHA (1998) section 3030(E – K); or</p> <p>USEPA (1992a) method 3005A; or</p> <p>USEPA (1992b) method 3010A; or</p> <p>USEPA (1994g) method 3015; or</p> <p>USEPA (1992c) method 3020A</p> <p>Then use USEPA (1994b) method 200.7; or</p> <p>*APHA (1998) section 3111B; or</p> <p>*APHA (1998) section 3120; or</p> <p>USEPA (1996c) method 6010B</p> <p>Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A.</p>
<i>Magnesium (acid extractable)</i>	<p>Preliminary treatment APHA (1998) section 3030(E – K); or</p> <p>USEPA (1992a) method 3005A; or</p> <p>USEPA (1992b) method 3010A; or</p> <p>USEPA (1994g) method 3015; or</p> <p>USEPA (1992c) method 3020A</p> <p>Then use *APHA (1998) section 3111B; or</p> <p>*APHA (1998) section 3120; or</p> <p>USEPA (1994b) method 200.7; or</p> <p>*USEPA (1996c) method 6010B; or</p> <p>*USEPA (1994f) method 6020†</p> <p>Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A.</p>

* Preferred methods

† Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Malathion</i>	USEPA (1998a) method 8141B; or USEPA (1996a) method 8270C

* Preferred methods

† Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Manganese (acid extractable)</i>	Preliminary treatment APHA (1998) section 3030(E – K); or USEPA (1992a) method 3005A; or USEPA (1992b) method 3010A; or USEPA (1994g) method 3015; or USEPA (1992c) method 3020A Then use *APHA (1998) section 3111B; or *APHA (1998) section 3111C; or *APHA (1998) section 3113; or *APHA (1998) section 3120; or *APHA (1998) section 3125 [†] ; or USEPA (1994b) method 200.7; or USEPA (1994b) method 200.8 [†] ; or *USEPA (1996c) method 6010B; or *USEPA (1994f) method 6020 [†] Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A.
<i>Manganese (dissolved)</i>	Preliminary treatment APHA (1998) section 3030B; then treat according to <i>Manganese (acid extractable)</i>
<i>MCPA</i>	APHA (1998) section 6640; or *USEPA (1996f) method 8151A; or USEPA (1996e) method 8321A Note: When using method 8321A samples should be hydrolysed to the ester form to simplify analysis.
<i>Mercury (dissolved)</i>	Preliminary treatment APHA (1998) section 3030B; then treat according to <i>Mercury (total)</i>

* Preferred methods

[†] Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Mercury (total)</i>	Preliminary treatment APHA (1998) section 3030(E – K); or USEPA (1992a) method 3005A; or USEPA (1992b) method 3010A; or USEPA (1994g) method 3015; or USEPA (1992c) method 3020A Then use APHA (1998) section 3112; or USEPA (1994b) method 200.7; or USEPA (1994b) method 200.8 [†] ; or USEPA (1994b) method 245.1; or *USEPA (1996c) method 6010B; or *USEPA (1994f) method 6020 [†] or USEPA (2002) 1631E
<i>Methane</i>	APHA (1998) section 6211
<i>Methomyl</i>	APHA (1998 or 2001 supplement) section 6610; or *USEPA (1994e) method 8318; or USEPA (1996e) method 8321A
<i>Methoxychlor</i>	APHA (1998) section 6410; or APHA (1998) section 6630; or *USEPA (1998c) method 8081B; or *USEPA (1996a) method 8270C
<i>Methyl azinphos</i>	USEPA (1998a) method 8141B; or USEPA (1996a) method 8270C
<i>Methylene blue active substances</i>	Refer to section on <i>Anionic surfactants</i>
<i>Methyl ethyl ketone</i>	USEPA (1996b) method 8260B
<i>2-Methylphenol</i> <i>3-Methylphenol</i> <i>4-Methylphenol</i>	USEPA (1996g) method 8041; or USEPA (1996a) method 8270C
<i>Metolachlor</i>	USEPA (1998c) method 8081B; or USEPA (1998a) method 8141B; or USEPA (1996a) method 8270C
<i>Molinate</i>	*USEPA (1996a) method 8270C; or USEPA (1993a) method 634

* Preferred methods

[†] Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Molybdenum (acid extractable)</i>	Preliminary treatment APHA (1998) section 3030(E – K); or USEPA (1992a) method 3005A; or USEPA (1992b) method 3010A; or USEPA (1994g) method 3015; or USEPA (1992c) method 3020A Then use *APHA (1998) section 3111D; or *APHA (1998) section 3113; or *APHA (1998) section 3120; or *APHA (1998) section 3125 [†] ; or USEPA (1994b) method 200.7; or USEPA (1994b) method 200.8 [†] ; or *USEPA (1996c) method 6010B; or *USEPA (1994f) method 6020 [†] Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A.
<i>Molybdenum (dissolved)</i>	Preliminary treatment APHA (1998) section 3030B; then treat according to <i>Molybdenum (acid extractable)</i>
<i>Naphthalene</i>	APHA (1998) section 6200; or APHA (1998) section 6410; or APHA (1998) section 6440; or *USEPA (1986a) method 8100; or *USEPA (1996b) method 8260B; or *USEPA (1996a) method 8270C; or *USEPA (1986b) method 8310

* Preferred methods

[†] Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Nickel (acid extractable)</i>	Preliminary treatment APHA (1998) section 3030(E – K); or USEPA (1992a) method 3005A; or USEPA (1992b) method 3010A; or USEPA (1994g) method 3015; or USEPA (1992c) method 3020A Then use *APHA (1998) section 3111B; or *APHA (1998) section 3111C; or *APHA (1998) section 3113; or *APHA (1998) section 3120; or *APHA (1998) section 3125 [†] ; or USEPA (1994b) method 200.7; or USEPA (1994b) method 200.8 [†] ; or *USEPA (1996c) method 6010B; or *USEPA (1994f) method 6020 [†] Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A.
<i>Nickel (dissolved)</i>	Preliminary treatment APHA (1998) section 3030B; then treat according to <i>Nickel (acid extractable)</i>
<i>Nitrobenzene</i>	APHA (1998) section 6410; or *USEPA (1996a) method 8270C
<i>Nitrogen (ammonia)</i>	APHA (1998) section 4500-NH ₃ ; or APHA (1998) section 4120; or APHA (1998) section 4130; or USEPA (1993b) method 350.1 Note: For trade waste samples distillation is required using APHA 4500-NH ₃ -C

* Preferred methods

[†] Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Nitrogen (nitrate)</i>	APHA (1998) section 4110; or APHA (1998) section 4120; or APHA (1998) section 4130; or APHA (2001 supplement) section 4110; or APHA (1998) section 4500-NO ₃ D; or APHA (1998) section 4500-NO ₃ E; or APHA (1998) section 4500-NO ₃ F; or APHA (1998) section 4500-NO ₃ I
<i>Nitrogen (nitrite)</i>	APHA (1998) section 4110; or APHA (2001 supplement) section 4110; or APHA (1998) section 4120; or APHA (1998) section 4130; or APHA (1998) section 4500-NO ₂ ; or APHA (1998) section 4500-NO ₃ F (with cadmium column removed); or APHA (1998) section 4500-NO ₃ I (with cadmium column removed); or USEPA (1993b) method 354.1
<i>Nitrogen (organic)</i>	Organic nitrogen is to be calculated as: $\text{Nitrogen (organic)} = \text{Total Kjeldahl nitrogen} - \text{Nitrogen (ammonia)}$ or $\text{Nitrogen (organic)} = \text{Nitrogen (total)} - [\text{Nitrogen (ammonia)} + \text{Nitrogen (total oxidised)}]$
<i>Nitrogen (total)</i>	Nitrogen (total) can be determined through calculation, using: $\text{Nitrogen (total)} = \text{Total Kjeldahl nitrogen} + \text{Nitrogen (total oxidised)}$ or measured directly using APHA (1998) section 4500-N C Where a licensee can demonstrate equivalent results, the following direct Nitrogen (total) methods can also be used: APHA (1998) section 4120; or APHA (1998) section 4130. Note: The direct persulfate digestion method (4500-N C) for analysis of <i>Nitrogen (total)</i> may not be suitable where there are high levels of particulates in the sample.

* Preferred methods

† Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Nitrogen (total oxidised)</i>	This is the sum total of oxidised forms of nitrogen, i.e. <i>Nitrogen (nitrate) + Nitrogen (nitrite)</i> . For the approved methods, refer to <i>Nitrogen (nitrate)</i> .
<i>Total Kjeldahl nitrogen</i>	APHA (1998) section 4120; or APHA (1998) section 4130; or APHA (1998) section 4500-N _{org} ; or APHA (1998) section 4500-N _{org} with Jirka modification (Jirka et al. 1976); or USEPA (1993b) method 351.2
<i>Nonylphenol ethoxylates</i> <i>Octylphenol ethoxylates</i>	There are no standard methods for these analytes. If you need to monitor for these analytes, seek advice from your licensing officer before commencing sampling or analysis.
<i>Odour</i>	APHA (1998) section 2150 Note: Exercise great care if undertaking this method of analysis. There are potential hazards to the tester.
<i>Oil and grease</i>	APHA (1998) section 5520B; or APHA (1998) section 5520C; or APHA (1998) section 5520D; or *USEPA (1994c) method 1664; or APHA (1998) section 5520F (hydrocarbons only)
<i>Organochlorine pesticides</i> <i>Includes:</i> <i>Aldrin</i> <i>alpha-BHC</i> <i>beta-BHC</i> <i>4,4-α-DDD</i> <i>4,4-α-DDE</i> <i>4,4-α-DDT</i> <i>Dieldrin</i> <i>Endosulfan sulfate</i> <i>Endrin</i> <i>Heptachlor</i> <i>Heptachlor epoxide</i> <i>Lindane</i> <i>Methoxychlor</i>	APHA (1998) section 6410; or APHA (1998) section 6630; or *USEPA (1998c) method 8081B; or *USEPA (1996a) method 8270C

* Preferred methods

† Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Organophosphorus pesticides</i> <i>Includes:</i> <i>Chlorpyrifos</i> <i>Chlorpyrifos Methyl</i> <i>Diazinon</i> <i>Dimethoate</i> <i>Ethion</i> <i>Malathion</i> <i>Methyl azinphos</i> <i>Parathion</i> <i>Parathion methyl</i>	USEPA (1996a) method 8270C; or USEPA (1998a) method 8141B
<i>Oxidation–reduction potential</i>	APHA (1998) section 2580
<i>Paraquat</i>	USEPA (1992e) method 549.1 (EPA-500 Series Supplement II, Aug. 1992)
<i>Parathion</i>	USEPA (1998a) method 8141B; or USEPA (1996a) method 8270C
<i>Pentachlorophenol</i>	APHA (1998) section 6410; or APHA (1998) section 6420; or APHA (1998) section 6640; or *USEPA (1996g) method 8041; or *USEPA (1996f) method 8151A; or *USEPA (1996a) method 8270C; or USEPA (1996e) method 8321A Note: When using method 8321A, samples should be hydrolysed to the ester form to simplify analysis.
<i>Perylene</i>	APHA (1998) section 6410; or APHA (1998) section 6440; or *USEPA (1986a) method 8100; or *USEPA (1996a) method 8270C; or *USEPA (1986b) method 8310

* Preferred methods

† Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<p><i>Petroleum hydrocarbons and BTEX:</i></p> <p>(a) Total petroleum hydrocarbons</p> <p>(b) BTEX (equals Benzene + Ethyl benzene + Toluene + Xylene, including: <i>m</i>-Xylene, <i>o</i>-Xylene and <i>p</i>-Xylene)</p>	<p>(a) Petroleum hydrocarbons: USEPA (1996h) method 8015B</p> <p>(b) BTEX: APHA (1998) section 6200; or *USEPA (1996d) method 8021B; or *USEPA (1996b) method 8260B</p>
<i>pH value</i>	APHA (1998) section 4500-H ⁺
<p><i>Phenol and individual phenolic compounds</i></p> <p><i>Includes:</i></p> <p><i>2-Chlorophenol</i></p> <p><i>2,4-Dichlorophenol</i></p> <p><i>2,4-Dimethylphenol</i></p> <p><i>Phenol</i></p> <p><i>2,4,6-Trichlorophenol</i></p>	<p>APHA (1998) section 6410; or APHA (1998) section 6420; or *USEPA (1996g) method 8041; or *USEPA (1996a) method 8270C</p> <p>For individual phenolic compounds, refer to their individual listings or look under <i>Extractable base/neutrals and acids</i></p>
<i>Substituted phenols and cresols</i>	<p>APHA (1998) section 6410; or APHA (1998) section 6420; or *USEPA (1996g) method 8041; or *USEPA (1996a) method 8270C</p>
<i>Total phenolics</i>	APHA (1998) section 5530
<i>Phosphorus (dissolved reactive)</i>	<p>APHA (1998) section 4500-P B; followed by APHA (1998) section 4110; or APHA (2001 supplement) section 4110; or APHA (1998) section 4120; or APHA (1998) section 4130; or APHA (1998) section 4500-P E; or APHA (1998) section 4500-P F; or APHA (1998) section 4500-P G; or USEPA (1971) method 365.2; or USEPA (1978a) method 365.3</p>

* Preferred methods

† Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Phosphorus (total)</i>	<p>APHA (1998) section 4500-N_{org} with Jirka modification—Jirka et al. (1976); or</p> <p>APHA (1998) section 4500-P B; Persulfate digestion; followed by:</p> <p>APHA (1998) section 4500-P E; or</p> <p>APHA (1998) section 4500-P F; or</p> <p>APHA (1998) section 4500-P H</p> <p>or</p> <p>USEPA (1971) method 365.2; or</p> <p>USEPA (1978a) method 365.3; or</p> <p>USEPA (1996c) method 6010B</p> <p>Note: The direct persulfate digestion method (4500-P B) for analysis of <i>Phosphorus (total)</i> may not be suitable where there are high levels of particulates in the sample.</p>
<i>Phosphorus (total dissolved)</i>	<p>Filtration through 0.45-μm membrane filter followed by:</p> <p>APHA (1998) section 4500-N_{org} with Jirka modification—Jirka et al. (1976); or</p> <p>APHA (1998) section 4500-P B; Persulfate digestion; followed by:</p> <p>APHA (1998) section 4500-P E; or</p> <p>APHA (1998) section 4500-P F; or</p> <p>APHA (1998) section 4500-P H</p> <p>or</p> <p>USEPA (1971) method 365.2; or</p> <p>USEPA (1978a) method 365.3</p>
<i>Polychlorinated biphenyls</i>	<p>APHA (1998) section 6431; or</p> <p>*USEPA (2000) method 8082A</p>

* Preferred methods

† Used when very low concentrations (< 100 μ g/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<p><i>Polynuclear aromatic hydrocarbons</i></p> <p><i>Includes:</i></p> <p><i>Acenaphthene</i></p> <p><i>Acenaphthylene</i></p> <p><i>Anthracene</i></p> <p><i>Benzo(a)anthracene</i></p> <p><i>Benzo(a)pyrene</i></p> <p><i>Benzo(b)fluoranthene</i></p> <p><i>Benzo(ghi)perylene</i></p> <p><i>Benzo(k)fluoranthene</i></p> <p><i>Chrysene</i></p> <p><i>Dibenzo(a,h)anthracene</i></p> <p><i>Fluoranthene</i></p> <p><i>Indeno(1,2,3-cd)pyrene</i></p> <p><i>Naphthalene</i></p> <p><i>Pyrene</i></p>	<p>APHA (1998) section 6410; or</p> <p>APHA (1998) section 6440; or</p> <p>*USEPA (1986a) method 8100; or</p> <p>*USEPA (1996a) method 8270C; or</p> <p>*USEPA (1986b) method 8310</p>
<p><i>Potassium (acid extractable)</i></p>	<p>Preliminary treatment APHA (1998) section 3030(E – K); or</p> <p>USEPA (1992a) method 3005A; or</p> <p>USEPA (1992b) method 3010A; or</p> <p>USEPA (1994g) method 3015; or</p> <p>USEPA (1992c) method 3020A</p> <p>Then use *APHA (1998) section 3111B; or</p> <p>*APHA (1998) section 3120; or</p> <p>*APHA (1998) section 3500-K; or</p> <p>USEPA (1994b) method 200.7; or</p> <p>*USEPA (1996c) method 6010B; or</p> <p>*USEPA (1994f) method 6020[†]</p> <p>Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A.</p>
<p><i>Pyrene</i></p>	<p>APHA (1998) section 6410; or</p> <p>APHA (1998) section 6440; or</p> <p>*USEPA (1986a) method 8100; or</p> <p>*USEPA (1996a) method 8270C; or</p>

* Preferred methods

[†] Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
	*USEPA (1986b) method 8310

* Preferred methods

† Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<p><i>Quaternary salts</i> <i>Includes:</i> <i>Diquat</i> <i>Paraquat</i></p>	<p>USEPA (1992e) method 549.1 (EPA-500 Series Supplement II, Aug. 1992)</p>
<p><i>Radionuclide(s)</i></p>	<p>For gross alpha and beta: AS 3550.5—1990; or APHA (1998) section 7110 B; or APHA (1998) section 7110 C For gamma-emitting radionuclides: APHA (1998) section 7120 B; or APHA (1998) section 7500-Cs B (Caesium); or APHA (1998) section 7500-I (Iodine); or APHA (1998) section 7500-Ra (Radium) For Strontium: APHA (1998) section 7500-Sr B For Tritium: APHA (1998) section 7500-³HB For Uranium: APHA (1998) section 7500-U</p>
<p><i>Salinity</i> <i>Includes:</i> <i>Use for calculation of salt load [in the load calculation protocol only]</i></p>	<p>Conductivity—APHA (1998) section 2510; or Salinity—APHA (1998) section 2520</p>

* Preferred methods

† Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Selenium (acid extractable)</i>	Preliminary treatment APHA (1998) section 3030(E – K); or USEPA (1992a) method 3005A; or USEPA (1992b) method 3010A; or USEPA (1994g) method 3015; or USEPA (1992c) method 3020A Then use *APHA (1998) section 3113; or *APHA (1998) section 3114; or *APHA (1998) section 3120; or *APHA (1998) section 3125 [†] ; or APHA (1998) section 3500-Se; or USEPA (1994b) method 200.7; or USEPA (1994b) method 200.8; or *USEPA (1996c) method 6010B; or *USEPA (1994f) method 6020 [†] Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A.
<i>Semi-volatile organic hydrocarbons</i>	APHA (1998) section 6410; or *USEPA (1996a) method 8270C
<i>Silver (acid extractable)</i>	Preliminary treatment APHA (1998) section 3030(E – K); or USEPA (1992a) method 3005A; or USEPA (1992b) method 3010A; or USEPA (1994g) method 3015; or USEPA (1992c) method 3020A; or acid digestion by the method of Yang <i>et al.</i> (2002) Then use *APHA (1998) section 3111B; or *APHA (1998) section 3111C; or *APHA (1998) section 3113; or *APHA (1998) section 3120; or *APHA (1998) section 3125 [†] ; or USEPA (1994b) method 200.7; or USEPA (1994b) method 200.8 [†] ; or *USEPA (1996c) method 6010B; or *USEPA (1994f) method 6020 [†]

* Preferred methods

[†] Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
	Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A.
<i>Simazine</i>	USEPA (1998a) method 8141B; or USEPA (1996a) method 8270C Note: Simazine may be analysed using USEPA method 8270C provided the extraction is performed at a neutral pH as per method USEPA 8141B.
<i>Sodium (acid extractable)</i>	Preliminary treatment APHA (1998) section 3030(E – K); or USEPA (1992a) method 3005A; or USEPA (1992b) method 3010A; or USEPA (1994g) method 3015; or USEPA (1992c) method 3020A Then use *APHA (1998) section 3111B; or *APHA (1998) section 3120; or APHA (1998) section 3500-Na; or USEPA (1994b) method 200.7; or *USEPA (1996c) method 6010B; or *USEPA (1994f) method 6020† Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A.
<i>Solids:</i> <i>(a) Total dissolved solids</i> <i>(b) Total suspended solids</i>	APHA (1998) section 2540C APHA (1998) section 2540D; or USEPA (1999) method 160.2; or AS 3550.4—1990
<i>Standing water level</i>	Refer to section on <i>Depth</i>
<i>Styrene</i>	APHA (1998) section 6200; or *USEPA (1996d) method 8021B; or *USEPA (1996b) method 8260B
<i>Substituted phenols and cresols</i>	Refer to sections on <i>Phenol</i>

* Preferred methods

† Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Sulfate</i>	APHA (1998) section 4110; or APHA (2001 supplement) section 4110; or APHA (1998) section 4140; or APHA (1998) section 4500-SO ₄ ²⁻ E; or APHA (1998) section 4500-SO ₄ ²⁻ F; or USEPA (1978b) method 375.4
<i>Sulfide (dissolved)</i>	APHA (1998 or 2001 supplement) section 4500-S ²⁻ Note: If sample contains suspended solids, then use 4500-S ²⁻ -B followed by 4500-S ²⁻ -D; If sample contains no suspended solids then use 4500-S ²⁻ -D.
<i>Sulfide (total)</i>	APHA (1998 or 2001 supplement) section 4500-S ²⁻
<i>Hydrogen sulfide (un-ionised)</i>	APHA (1998 or 2001 supplement) section 4500-S ²⁻ -H Note: Use dissolved sulfide value in the calculations
<i>2,4,5-T</i>	APHA (1998) section 6640; or *USEPA (1996f) method 8151A; or USEPA (1996e) method 8321A Note: When using method 8321A, samples should be hydrolysed to the ester form to simplify analysis.
<i>Temperature</i>	APHA (1998) section 2550
<i>Tetrachloroethene</i>	APHA (1998) section 6200; or *USEPA (1996d) method 8021B; or *USEPA (1996b) method 8260B
<i>2,3,4,6-Tetrachlorophenol</i>	APHA (1998) section 6410; or APHA (1998) section 6420; or *USEPA (1996g) method 8041; or *USEPA (1996a) method 8270C
<i>Thermotolerant coliforms</i> <i>(also known as faecal coliforms)</i>	APHA (1998 or 2001 supplement) section 9221; or APHA (1998) section 9222 or AS 4276.6—1995 or AS 4276.7—1995
<i>Thiobencarb</i>	USEPA (1996a) method 8270C

* Preferred methods

† Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Tin (acid extractable)</i>	Preliminary treatment APHA (1998) section 3030(E – K); or USEPA (1992a) method 3005A; or USEPA (1992b) method 3010A; or USEPA (1994g) method 3015; or USEPA (1992c) method 3020A Then use APHA (1998) section 3111B; or *APHA (1998) section 3111D; or *APHA (1998) section 3113; or APHA (1998) section 3125; or *USEPA (1996c) method 6010B; or USEPA (1994b) method 200.7; or USEPA (1994b) method 200.8; or USEPA (1994f) method 6020 Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A.
<i>Titanium (acid extractable)</i>	Preliminary treatment APHA (1998) section 3030(E – K); or USEPA (1992a) method 3005A; or USEPA (1992b) method 3010A; or USEPA (1994g) method 3015; or USEPA (1992c) method 3020A Then use *APHA (1998) section 3111D; or USEPA (1994b) method 200.7; or *USEPA (1996c) method 6010B Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A.
<i>Toluene</i>	APHA (1998) section 6200; or *USEPA (1996d) method 8021B; or *USEPA (1996b) method 8260B
<i>Toluene 2,4-diisocyanate (TDI)</i>	USEPA (1996a) method 8270C
<i>Total Kjeldahl nitrogen</i>	Refer to sections on <i>Nitrogen</i>
<i>Total organic carbon (in water)</i>	APHA (1998) section 5310
<i>Total dissolved solids</i>	Refer to section on <i>Solids</i>
<i>Total suspended solids</i>	

* Preferred methods

† Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Toxicity testing</i>	Where toxicity testing is required, the details should be negotiated on a case-by-case basis with the licensing officer and specialist staff from DEC. Guidance on appropriate methods for toxicity testing will be provided as part of these negotiations.
<i>Tributyltin</i>	Greaves and Unger (1988); or USEPA (1989) method 282.3 or USEPA (2003) method 8323. Note: USEPA method 282.3 has not been promulgated and may be hard to obtain (USEPA regional method)
<i>1,1,1-Trichloroethane</i> <i>1,1,2-Trichloroethane</i>	APHA (1998) section 6200; or *USEPA (1996d) method 8021B; or *USEPA (1996b) method 8260B
<i>Trichloroethene</i>	APHA (1998) section 6200; or *USEPA (1996d) method 8021B; or *USEPA (1996b) method 8260B
<i>2,4,6-Trichlorophenol</i>	APHA (1998) section 6410; or APHA (1998) section 6420; or *USEPA (1996g) method 8041; or *USEPA (1996a) method 8270C
<i>Trifluralin</i>	USEPA (1998c) method 8081B; or USEPA (1996a) method 8270C
<i>Trihalomethanes and chlorinated organic solvents</i> <i>Includes:</i> <i>Bromoform</i> <i>Bromodichloromethane</i> <i>Carbon tetrachloride</i> <i>Chloroform</i> <i>Dibromochloromethane</i> <i>Tetrachloroethene</i> <i>1,1,1-Trichloroethane</i> <i>1,1,2-Trichloroethane</i> <i>Trichloroethene</i>	APHA (1998) section 6232; or APHA (1998) section 6200; or *USEPA (1996d) method 8021B; or *USEPA (1996b) method 8260B
<i>Turbidity</i>	APHA (1998) section 2130

* Preferred methods

† Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Vanadium (acid extractable)</i>	Preliminary treatment APHA (1998) section 3030(E – K); or USEPA (1992a) method 3005A; or USEPA (1992b) method 3010A; or USEPA (1994g) method 3015; or USEPA (1992c) method 3020A Then use *APHA (1998) section 3111D; or *APHA (1998) section 3120; or *APHA (1998) section 3125 [†] ; or USEPA (1994b) method 200.7; or USEPA (1994b) method 200.8 [†] ; or *USEPA (1996c) method 6010B; or *USEPA (1994f) method 6020 [†] Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A.
<i>Velocity [of flow]</i>	AS 3778 (several volumes)
<i>Vinyl chloride</i>	APHA (1998) section 6200; or USEPA (1996b) method 8260B; or USEPA (1996d) method 8021B
<i>Volatile halogenated compounds</i>	APHA (1998) section 6200; or USEPA (1996b) method 8260B; or USEPA (1996d) method 8021B

* Preferred methods

[†] Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Volatile organic compounds</i> <i>Includes:</i> <i>Benzene</i> <i>Bromoform</i> <i>Carbon tetrachloride</i> <i>Chlorobenzene</i> <i>Chloroform</i> <i>Dibromochloromethane</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>1,1-Dichloroethane</i> <i>1,2-Dichloroethane</i> <i>1,1-Dichloroethene</i> <i>Ethyl benzene</i> <i>Naphthalene</i> <i>Styrene</i> <i>Tetrachloroethene</i> <i>Toluene</i> <i>1,1,1-Trichloroethane</i> <i>1,1,2-Trichloroethane</i> <i>Trichloroethene</i> <i>Vinyl chloride</i> <i>m-Xylene</i> <i>o-Xylene</i> <i>p-Xylene</i>	APHA (1998) section 6200; or *USEPA (1996b) method 8260B; or *USEPA (1996d) method 8021B

* Preferred methods

† Used when very low concentrations (< 100 µg/L) are tested

Table 1: EPA-approved methods for the analysis of water pollutants

Analyte	Method
<i>Volume</i>	<p>AS 3778 covers methods for determining width, depth and velocity in open channels and waterways. For a standing water body, volume can be calculated as:</p> $\text{Volume} = \text{width} \times \text{length} \times \text{depth}$ <p>A volume of flowing water can be calculated as:</p> $\text{Volume} = \text{cross-sectional area} \times \text{flow (velocity)}, \text{ where cross-sectional area} = \text{width} \times \text{depth}$ <p>For pipes, the volume can be estimated from the known pump capacity multiplied by the duration of pumping.</p> <p>In all calculations, ensure that measuring instruments are calibrated and the units of measurement are the same. Averages of several measurements should be used when calculating values. See also <i>Depth</i>, <i>Flow</i> and <i>Velocity</i>.</p>
<p><i>Xylene</i></p> <p><i>Includes:</i></p> <p><i>m-Xylene</i></p> <p><i>o-Xylene</i></p> <p><i>p-Xylene</i></p>	<p>APHA (1998) section 6200; or</p> <p>*USEPA (1996b) method 8260B; or</p> <p>*USEPA (1996d) method 8021B</p>
<i>Zinc (acid extractable)</i>	<p>Preliminary treatment APHA (1998) section 3030(E – K); or</p> <p>USEPA (1992a) method 3005A; or</p> <p>USEPA (1992b) method 3010A; or</p> <p>USEPA (1994g) method 3015; or</p> <p>USEPA (1992c) method 3020A</p> <p>Then use *APHA (1998) section 3111B; or</p> <p>*APHA (1998) section 3111C; or</p> <p>*APHA (1998) section 3120; or</p> <p>*APHA (1998) section 3125[†]; or</p> <p>*APHA (1998) section 3130B; or</p> <p>USEPA (1994b) method 200.7; or</p> <p>USEPA (1994b) method 200.8[†]; or</p> <p>*USEPA (1996c) method 6010B; or</p> <p>*USEPA (1994f) method 6020[†]</p> <p>Note: For the purposes of this document, the term “acid extractable” is as defined in APHA (1998) section 3030A.</p>
<i>Zinc (dissolved)</i>	<p>Preliminary treatment APHA (1998) section 3030B; then treat according to <i>Zinc (acid extractable)</i></p>

* Preferred methods

[†] Used when very low concentrations (< 100 µg/L) are tested

* Preferred methods

† Used when very low concentrations ($< 100 \mu\text{g/L}$) are tested

References

- APHA 1998. *Standard Methods for the Examination of Water and Waste Water*, 20th Edition. American Public Health Association, Washington DC.
- APHA 2001. *Revisions to Standard Methods for the Examination of Water and Wastewater*. (Supplement). American Public Health Association, Washington DC.
- ASTM 2002. D4282-02: *Standard Test Method for Determination of Free Cyanide in Water and Wastewater by Microdiffusion*. American Society for Testing and Materials, Washington DC.
- Greaves J. and Unger M.A. 1988. A selected ion monitoring assay for tributyltin and its degradation products. *Biomedical and Environmental Mass Spectrometry* 15: 565–569.
- Jirka A.M., Carter M.J., May D. and Fuller F.D. 1976. Ultra-micro semi-automated method for simultaneous determination of total phosphorus and total Kjeldahl nitrogen in wastewaters. *Environmental Science and Technology* 10 (10): 1038–1044.
- Standards Association of Australia 1986. AS 2882—1986: *Waters—Determination of Chromium(VI) (Diphenylcarbazide spectrophotometric method)*. Standards Australia, Sydney.
- Standards Association of Australia 1998. AS/NZS 5667.1—1998: *Water Quality—Sampling— Part 1: Guidance on the Design of Sampling Programs, Sampling Techniques and the Preservation and Handling of Samples*. Standards Association of Australia, Sydney.
- Standards Australia 1990. AS 3550.4—1990: *Waters—Determination of Solids— Gravimetric Method*. Standards Australia, Sydney.
- Standards Australia 1990. AS 3550.5—1990: *Waters—Determination of Gross Alpha and Gross Beta Activities*. Standards Australia, Sydney.
- Standards Australia 1993. AS 3550.7—1993: *Waters— The construction and use of the Secchi disc*. Standards Australia, Sydney.
- Standards Australia 1995. AS 4276.4—1995: *Water Microbiology—Coliforms—Estimation of Most Probable Number (MPN)*. Standards Australia, Sydney.
- Standards Australia 1995. AS 4276.5—1995: *Water Microbiology—Coliforms—Membrane Filtration Method*. Standards Australia, Sydney.
- Standards Australia 1995. AS 4276.6—1995: *Water Microbiology—Thermotolerant Coliforms and Escherichia coli—Estimation of Most Probable Number (MPN)*. Standards Australia, Sydney.
- Standards Australia 1995. AS 4276.7—1995: *Water Microbiology—Thermotolerant Coliforms and Escherichia coli—Membrane Filtration Method*. Standards Australia, Sydney.
- Standards Australia 1995. AS 4276.8—1995: *Water microbiology—Faecal streptococci - Estimation of Most Probable Number (MPN)*. Standards Australia, Sydney.
- Standards Australia. 1995. AS 4276.9—1995: *Water microbiology— Faecal streptococci - Membrane Filtration Method*. Standards Australia, Sydney.
- Standards Australia. 2001. AS 3778: *Measurement of Water Flow in Open Channels* [Various volumes; years 1990, 1991, 1992 and 2001]. Standards Australia, Sydney.
- USEPA 1971. Method 365.2. *Phosphorus, All Forms (Colorimetric, Ascorbic, Acid, Single Reagent)*. United States Environmental Protection Agency, Washington, D.C. (EPA 600/4-79-020) Available at: www.epa.gov/clariton/clhtml/pubtitleORD.html

USEPA 1978a. Method 365.3. *Phosphorus, All Forms (Colorimetric, Ascorbic, Acid, Single Reagent)*. United States Environmental Protection Agency, Washington, D.C. (EPA 600/4-79-020) Available at: www.epa.gov/clariton/clhtml/pubtitleORD.html

USEPA 1978b. Method 375.4. *Sulfate (Turbidimetric)*. United States Environmental Protection Agency, Washington, D.C. (EPA 600/4-79-020) Available at: www.epa.gov/clariton/clhtml/pubtitleORD.html

USEPA 1980. Method 335.2. *Cyanide, Total (Titrimetric, Spectrophotometric)*. United States Environmental Protection Agency, Washington, D.C. (EPA 600/4-79-020) Available at: www.epa.gov/clariton/clhtml/pubtitleORD.html

USEPA 1986a. Method 8100. *Polynuclear Aromatic Hydrocarbons*. United States Environmental Protection Agency, Washington, DC. Available at: <http://www.epa.gov/epaoswer/hazwaste/test/main.htm>

USEPA 1986b. Method 8310. *Polynuclear Aromatic Hydrocarbons*. United States Environmental Protection Agency, Washington, DC. Available at: <http://www.epa.gov/epaoswer/hazwaste/test/main.htm>

USEPA 1989. Method 282.3. *The Determination of Tributyltin Chloride in Marine and Freshwaters by Liquid-Solid Extraction and Gas Chromatography with Electron-Capture Detection*. (01A0006709). Boston, MA, USA.

USEPA 1990. Method 547. *Determination of Glyphosate in Drinking Water by Direct—Aqueous—Injection HPLC, Post Column Derivatization, and Fluorescence Detection*. United States Environmental Protection Agency, Cincinnati. (EPA 600/4-90-020) Available at: <http://www.epa.gov/clhtml/clprint.htm>

USEPA 1992a Method 3005A. *Acid Digestion of Waters for Total Recoverable or Dissolved Metals for Analysis by FLAA or ICP Spectroscopy In Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846*, 3rd edition. United States Environmental Protection Agency, Washington DC. Available at: <http://www.epa.gov/epaoswer/hazwaste/test/main.htm>

USEPA 1992b Method 3010A. *Acid Digestion of Aqueous Samples and Extracts for Total Metals for Analysis by FLAA or ICP Spectroscopy In Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846*, 3rd edition. United States Environmental Protection Agency, Washington DC. Available at: <http://www.epa.gov/epaoswer/hazwaste/test/main.htm>

USEPA 1992c Method 3020A. *Acid Digestion of Aqueous Samples and Extracts for Total Metals for Analysis by GFAA Spectroscopy In Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846*, 3rd edition. United States Environmental Protection Agency, Washington DC. Available at: <http://www.epa.gov/epaoswer/hazwaste/test/main.htm> USEPA 1992d Method 7196A. *Chromium Hexavalent (Colorimetric) In Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846*, 3rd edition. United States Environmental Protection Agency, Washington DC. Available at: <http://www.epa.gov/epaoswer/hazwaste/test/main.htm>

USEPA 1992e. Supplement II. Method 549.1. *Determination of Diquat and Paraquat in Drinking Water by Liquid-Solid Extraction and High Performance Liquid Chromatography with Ultraviolet Detection*. United States Environmental Protection Agency, Cincinnati, OH, USA.

USEPA 1993a. Method 634. *Methods for the Determination of Nonconventional Pesticides in Municipal and Industrial Wastewater*. United States Environmental Protection Agency, Washington DC. (EPA 821/R-93-010-A).

USEPA 1993b. *Methods for the Determination of Inorganic Substances in Environmental Samples*. United States Environmental Protection Agency, Washington DC. (EPA 600/R-93-100).

USEPA 1994a Method 8316: *Acrylamide, Acrylonitrile and Acrolein by High Performance Liquid Chromatography (HPLC)*. United States Environmental Protection Agency, Washington DC. Available at : <http://www.epa.gov/epaoswer/hazwaste/test/main.htm>

USEPA 1994b. Supplement I. *Methods for the Determination of Metals in Environmental Samples*. United States Environmental Protection Agency, Cincinnati, OH, USA.

USEPA 1994c. Method 1664: *N-Hexane Extractable Material (HEM) and Silica Gel Treated N-Hexane Extractable Material (SGT-HEM) by Extraction and Gravimetry (Oil and Grease and Total Petroleum Hydrocarbons)*. Office of Water Engineering and Analysis Division (4303), United States Environmental Protection Agency, Washington DC. (EPA-821-B-94-004). October.

USEPA 1994d. 40 CFR (Code of Federal Regulations) 136, Method 603—*Acrolein and Acrylonitrile*. Office of the Federal Register, Washington DC.

USEPA 1994e. Method 8318. *N-Methylcarbamates by high Performance Liquid Chromatography (HPLC)*. United States Environmental Protection Agency, Washington, DC. Available at : <http://www.epa.gov/epaoswer/hazwaste/test/main.htm>

USEPA 1994f. Method 6020. *Inductively Coupled Plasma—Mass Spectrometry*. United States Environmental Protection Agency, Washington, DC. Available at : <http://www.epa.gov/epaoswer/hazwaste/test/main.htm>

USEPA 1994g. Method 3015. *Microwave Assisted Acid Digestion of Aqueous Samples and Extracts*. In *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846*, 3rd edition. United States Environmental Protection Agency, Washington, DC. Available at : <http://www.epa.gov/epaoswer/hazwaste/test/main.htm>

USEPA 1996a. Method 8270C. *Semivolatile Organic Compounds by Gas Chromatography / Mass Spectrometry (GC/MS)*. In *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846*, 3rd edition. United States Environmental Protection Agency, Washington, DC. Available at : <http://www.epa.gov/epaoswer/hazwaste/test/main.htm>

USEPA 1996b. Method 8260B. *Volatile Organic Compounds by Gas Chromatography / Mass Spectrometry (GC/MS)*. In *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846*, 3rd edition. United States Environmental Protection Agency, Washington, DC. Available at : <http://www.epa.gov/epaoswer/hazwaste/test/main.htm>

USEPA 1996c. Method 6010B. *Inductively Coupled Plasma—Atomic Emission Spectrometry*. In *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846*, 3rd edition. United States Environmental Protection Agency, Washington, DC. Available at : <http://www.epa.gov/epaoswer/hazwaste/test/main.htm>

USEPA 1996d. Method 8021B. *Aromatic Halogenated Volatiles by Gas Chromatography Using Photoionization and/or Electrolytic Conductivity Detectors*. In *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846*, 3rd edition. United States Environmental Protection Agency, Washington, DC. Available at : <http://www.epa.gov/epaoswer/hazwaste/test/main.htm>

USEPA 1996e. Method 8321A. *Solvent Extractable Non-volatile Compounds by High Performance Chromatography / Thermospray / Mass Spectrometry (HPLC/TS/MS) or ultraviolet (UV) Detection*. In *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846*, 3rd edition. United States Environmental Protection Agency, Washington, DC. Available at : <http://www.epa.gov/epaoswer/hazwaste/test/main.htm>

USEPA 1996f. Method 8151A. *Chlorinated Herbicides by GC Using Methylation Pentafluorobenzoylation Derivatization*. In *Test Methods for Evaluating Solid Waste: Physical/Chemical*

- Methods, SW-846*, 3rd edition. United States Environmental Protection Agency, Washington, DC. Available at : <http://www.epa.gov/epaoswer/hazwaste/test/main.htm>
- USEPA 1996g. Method 8041. *Phenols by Gas Chromatography*. In *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846*, 3rd edition. United States Environmental Protection Agency, Washington, DC. Available at : <http://www.epa.gov/epaoswer/hazwaste/test/main.htm>
- USEPA 1996h. Method 8015B. *Nonhalogenated Organics Using GC/FID*. In *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846*, 3rd edition. United States Environmental Protection Agency, Washington, DC. Available at : <http://www.epa.gov/epaoswer/hazwaste/test/main.htm>
- USEPA 1996i. Method 8315A. *Determination of Carbonyl Compounds by High Performance Liquid Chromatography (HPLC)*. In *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846*, 3rd edition. United States Environmental Protection Agency, Washington, DC. Available at : <http://www.epa.gov/epaoswer/hazwaste/test/main.htm>
- USEPA 1998a. Draft Update IVA. January 1998. Method 8141B. *Organophosphorus Compounds by Gas Chromatography*. United States Environmental Protection Agency, Washington DC. Available at: <http://www.epa.gov/epaoswer/hazwaste/test/up4a.htm>
- USEPA 1998b. Draft Update IVA. January 1998. Method 8321B. *Solvent Extractable Nonvolatile Compounds by High Performance Liquid Chromatography/Thermospray/Mass Spectrometry (HPLC/TS/MS) or Ultraviolet (UV) Detection*. United States Environmental Protection Agency, Washington DC. Available at: <http://www.epa.gov/epaoswer/hazwaste/test/up4a.htm>
- USEPA 1998c. Draft Update IVB. January 1998. Method 8081B. *Organochlorine Pesticides by Gas Chromatography*. United States Environmental Protection Agency, Washington DC. Available at: <http://www.epa.gov/epaoswer/hazwaste/test/up4b.htm>
- USEPA 1999. Method 160.2. *Methods for Chemical Analysis of Water and Wastes*. (EPA 600/4-79-020). United States Environmental Protection Agency, Washington DC. Available at: <http://www.epa.gov/cincl>
- USEPA 2000. Draft Update IVB. November 2000. Method 8082A. *Polychlorinated Biphenyls (PCBs) by Gas Chromatography*. United States Environmental Protection Agency, Washington DC. Available at: <http://www.epa.gov/epaoswer/hazwaste/test/pdfs/8082a.pdf>
- USEPA 2002. Method 1631 Revision E. *Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry*. United States Environmental Protection Agency, Washington DC. (EPA-821-R-02-019) August 2002. Available at: <http://www.epa.gov/ost/methods/1631.html>
- USEPA 2003. Method 8323. *Determination of Organotins by Micro-Liquid Chromatography—Electrospray Ion Trap Mass Spectrometry*. United States Environmental Protection Agency, Washington DC. Available at: <http://www.epa.gov/epaoswer/hazwaste/test/new-meth.htm#8323>
- Yang X.J., Foley R. and Low G.K.C. 2002. A modified digestion procedure for analysing silver in environmental water samples. *The Analyst* 127: 315–318.

APPENDIX 1 ALTERNATIVE NAMES FOR ANALYTES

Table A1 this appendix gives the alternative names of analytes that are held to be synonymous with those given in the Approved Methods table. Table A2 gives the names of the Approved Methods analytes and possible synonymous alternative names. Alternative names may appear in regulations, in the load calculation protocol or on licences.

Table A1: Alternative names and their synonyms in the Approved Methods table

Alternative analyte name	Analyte name in Approved Methods table
AOX	Dissolved organic halogen
Adsorbable organic halogens	Dissolved organic halogen
Alkalinity (as calcium carbonate)	Alkalinity (total)
Aluminium	Aluminium (acid extractable)
Ammonia	Nitrogen (ammonia)
Ammonia nitrogen	Nitrogen (ammonia)
Antimony	Antimony (acid extractable)
Arsenic	Arsenic (acid extractable)
Barium	Barium (acid extractable)
Benzo(ghl)perylene, benzo(g,h,l)perylene (Note: incorrect names)	Benzo(ghi)perylene
Beryllium	Beryllium (acid extractable)
a-BHC	alpha-BHC
b-BHC	beta-BHC
Bicarbonate	Alkalinity (bicarbonate)
Biochemical oxygen demand	Biochemical oxygen demand (5-day)
BOD, BOD ₅	Biochemical oxygen demand (5-day)
BOD (for the purpose of determining the 3DGM)	Biochemical oxygen demand (5-day)
Boron	Boron (acid extractable)
Boron (total)	Boron (acid extractable)
Cadmium	Cadmium (acid extractable)
Calcium	Calcium (acid extractable)
COD	Chemical oxygen demand
Chloramines	Chlorine (combined residual)
Chlorine	Chlorine (free residual)
Chloronaphthalene	1-Chloronaphthalene

Table A1: Alternative names and their synonyms in the Approved Methods table

Alternative analyte name	Analyte name in Approved Methods table
Chloronaphthalene(1)	1-Chloronaphthalene
Chromium (VI) compounds	Chromium (hexavalent)
Chromium (III) compounds	Chromium (trivalent)
Chromium (total)	Chromium (acid extractable)
Copper	Copper (acid extractable)
DDD	4,4'-DDD
DDE	4,4'-DDE
DDT	4,4'-DDT
2,4-Dichlorophenoxyacetic acid	2,4-D
Dichlorobenzidine	3,3'-Dichlorobenzidine
Diphenyl hydrazine	1,2-Diphenyl hydrazine
DO	Dissolved oxygen
DOX	Dissolved organic halogen
FC, fc	Faecal coliforms [see under <i>Coliforms</i> in approved methods table]
FRC	Chlorine (free residual)
Free cyanide	Cyanide (free)
Free residual chlorine	Chlorine (free residual)
Filterable iron	Iron (dissolved)
Filterable manganese	Manganese (dissolved)
gamma-BHC (lindane)	Lindane
g-BHC (lindane)	Lindane
Guthion (methyl azinphos)	Methyl azinphos
Hexachlorobenzene (HCB)	Hexachlorobenzene
Hexavalent chromium	Chromium (hexavalent)
Insoluble lead	Lead (suspended)
Iron	Iron (acid extractable)
Lead	Lead (acid extractable)
Lithium	Lithium (acid extractable)
Magnesium	Magnesium (acid extractable)
Manganese	Manganese (acid extractable)
MBAS	Anionic surfactants
MCPA	2-Methyl-4-chlorophenoxyacetic acid
Mercury	Mercury (total)

Table A1: Alternative names and their synonyms in the Approved Methods table

Alternative analyte name	Analyte name in Approved Methods table
Mercury (inorganic)	Mercury (total)
Methylene blue active substances	Anionic surfactants
3-Methylphenol (<i>m</i> -cresol)	3-Methylphenol
2-Methylphenol (<i>o</i> -cresol)	2-Methylphenol
4-Methylphenol (<i>p</i> -cresol)	4-Methylphenol
Molybdenum	Molybdenum (acid extractable)
NH ₃ -N	Nitrogen (ammonia)
Nickel	Nickel (acid extractable)
Nitrate	Nitrogen (nitrate)
Nitrate + nitrite (oxidised nitrogen)	Nitrogen (total oxidised)
Nitrite	Nitrogen (nitrite)
Nitrogen	Nitrogen (total)
Nitrogen as ammonia	Nitrogen (ammonia)
Non-filterable iron	Iron (suspended)
Non-filterable residue	Total suspended solids
<i>o</i> -Dichlorobenzene	1,2-Dichlorobenzene
Organic nitrogen	Nitrogen (organic)
Organophosphate pesticides	Organophosphorus pesticides
Orthophosphate	Phosphorus (dissolved reactive)
PAHs	Polynuclear aromatic hydrocarbons
PCBs	Polychlorinated biphenyls
Polyaromatic hydrocarbons	Polynuclear aromatic hydrocarbons
<i>p,p'</i> -DDD, <i>p,p'</i> -DDD (4,4)	4,4'-DDD
<i>p,p'</i> -DDE, <i>p,p'</i> -DDE (4,4)	4,4'-DDE
<i>p,p'</i> -DDT, <i>p,p'</i> -DDT (4,4)	4,4'-DDT
Reactive phosphorus	Phosphorus (dissolved reactive)
Redox potential	Oxidation-reduction potential
Salt	Salinity, conductivity
Silicate (SiO ₂)	Silica (acid extractable)
Soluble lead	Lead (dissolved)
Soluble phosphorus	Phosphorus (dissolved reactive)
Sulfur	May mean sulfate or hydrogen sulfide (un-ionised). Seek further advice from your EPA regional office.

Table A1: Alternative names and their synonyms in the Approved Methods table

Alternative analyte name	Analyte name in Approved Methods table
TDS	Total dissolved solids
Thermotolerant coliforms	Faecal coliforms
TKN	Total Kjeldahl nitrogen
TKN-N	Total Kjeldahl nitrogen
TN	Nitrogen (total)
TOC	Total organic carbon
Total aluminium	Aluminium (acid extractable)
Total cadmium	Cadmium (acid extractable)
Total chromium	Chromium (acid extractable)
Total copper	Copper (acid extractable)
Total cyanide	Cyanide (total)
Total iron	Iron (acid extractable)
Total lead	Lead (acid extractable)
Total manganese	Manganese (acid extractable)
Total nitrogen	Nitrogen (total)
Total PAHs	Polynuclear aromatic hydrocarbons
Total phosphorus	Phosphorus (total)
Total phosphorus—filtered	Phosphorus (total dissolved)
Total phosphorus—unfiltered	Phosphorus (total)
Total residual chlorine	Chlorine (total residual)
Total zinc	Zinc (acid extractable)
TP	Phosphorus (total)
TRC	Chlorine (total residual)
Trivalent chromium	Chromium (trivalent)
TSS	Total suspended solids
Vanadium	Vanadium (acid extractable)
WAD cyanide	Cyanide (weak acid dissociable)
% Water-stable aggregates	Aggregate stability
WSA—Water-stable aggregates	Aggregate stability
Zinc	Zinc (acid extractable)

Table A2: Names of analytes, as listed in the Approved Methods table, and their common alternative names

Analyte name in Approved Methods table	Alternative analyte name
Anionic surfactants	Methylene blue active substances
Acrylonitrile	Acrylonitrile (2-propenenitrile)
Alkalinity (bicarbonate)	Bicarbonate
Alkalinity (total)	Alkalinity (as calcium carbonate)
Aluminium (acid extractable)	Aluminium, total aluminium
Antimony (acid extractable)	Antimony
Arsenic (acid extractable)	Arsenic
Barium (acid extractable)	Barium
Benzo(ghi)perylene	Benzo(ghl)perylene, benzo(g,h,l)perylene (Note: incorrect names)
Beryllium (acid extractable)	Beryllium
alpha-BHC	a-BHC
beta-BHC	b-BHC
Biochemical oxygen demand (5-day)	Biochemical oxygen demand, BOD, BOD ₅ , BOD (for the purpose of determining the 3DGM)
Boron (acid extractable)	Boron, boron (total)
Cadmium (acid extractable)	Cadmium, total cadmium
Calcium (acid extractable)	Calcium
Chemical oxygen demand	COD
Chlorine (combined residual)	Chloramines
Chlorine (free residual)	Chlorine, FRC, free residual chlorine
Chlorine (total residual)	TRC, total residual chlorine
1-Chloronaphthalene	Chloronaphthalene(1)
Chromium (acid extractable)	Chromium (total), total chromium
Chromium (hexavalent)	Chromium (VI) compounds, hexavalent chromium
Chromium (trivalent)	Chromium (III) compounds, trivalent chromium
Conductivity	Salt [load calculation protocol only]
Copper (acid extractable)	Copper, total copper
Cyanide (free)	Free cyanide
Cyanide (total)	Total cyanide
Cyanide (weak acid dissociable)	WAD cyanide
4,4'-DDD	DDD, <i>p,p'</i> -DDD, <i>p,p'</i> -DDD (4,4)

Table A2: Names of analytes, as listed in the Approved Methods table, and their common alternative names

Analyte name in Approved Methods table	Alternative analyte name
4,4'-DDE	DDE, <i>p,p'</i> -DDE, <i>p,p'</i> -DDE (4,4)
4,4'-DDT	DDT, <i>p,p'</i> -DDT, <i>p,p'</i> -DDT (4,4)
1,2-Dichlorobenzene	<i>o</i> -Dichlorobenzene
3,3'-Dichlorobenzidine	Dichlorobenzidine
1,2-Diphenyl hydrazine	Diphenyl hydrazine
Dissolved organic halogen	AOX, absorbable organic halogens
Dissolved oxygen	DO
DTPA	Diethylenetriaminepentaacetic acid pentasodium salt
Faecal coliforms	FC, fc,
Hexachlorobenzene	Hexachlorobenzene (HCB)
Iron (acid extractable)	Iron, total iron
Iron (dissolved)	Filterable iron
Iron (suspended)	Non-filterable iron
Lead (acid extractable)	Lead, total lead
Lead (dissolved)	Soluble lead
Lead (suspended)	Insoluble lead
Lindane	gamma-BHC (lindane), g-BHC (lindane)
Lithium (acid extractable)	Lithium
Magnesium (acid extractable)	Magnesium
Manganese (acid extractable)	Manganese, total manganese
Manganese (dissolved)	Filterable manganese
Mercury (total)	Mercury, mercury (inorganic)
Methyl azinphos	Guthion (methyl azinphos)
2-Methyl-4-chlorophenoxyacetic acid	MCPA
2-Methylphenol	2-Methylphenol (<i>o</i> -cresol)
3-Methylphenol	3-Methylphenol (<i>m</i> -cresol)
4-Methylphenol	4-Methylphenol (<i>p</i> -cresol)
Molybdenum (acid extractable)	Molybdenum
Nickel (acid extractable)	Nickel
Nitrogen (ammonia)	Nitrogen as ammonia, ammonia, ammonia nitrogen, NH ₃ -N
Nitrogen (organic)	Organic nitrogen
Nitrogen (nitrate)	Nitrate

Table A2: Names of analytes, as listed in the Approved Methods table, and their common alternative names

Analyte name in Approved Methods table	Alternative analyte name
Nitrogen (nitrite)	Nitrite
Nitrogen (total)	Nitrogen, TN, total nitrogen
Nitrogen (total oxidised)	Nitrate + nitrite (oxidised nitrogen)
Organophosphorus pesticides	Organophosphate pesticides
Oxidation-reduction potential	Redox potential
Phosphorus (dissolved reactive)	Orthophosphate, reactive phosphorus, soluble phosphorus
Phosphorus (total)	TP, total phosphorus, total phosphorus—unfiltered
Phosphorus (total dissolved)	Total phosphorus—filtered
Polychlorinated biphenyls	PCBs
Polynuclear aromatic hydrocarbons	Total PAHs
Salinity	Salt [load calculation protocol only]
Silica (acid extractable)	Silicate (SiO ₂)
2,4,5-T	2,4,5-Trichlorophenoxyacetic acid
Total dissolved solids	TDS
Total Kjeldahl nitrogen	TKN, TKN-N
Total organic carbon	TOC
Total suspended solids	TSS
Vanadium (acid extractable)	Vanadium
Aggregate stability	% Water-stable aggregates, WSA—water-stable aggregates
Zinc (acid extractable)	Total zinc, zinc