

**Virginia Division of Consolidated Laboratory Services**

**ENVIRONMENTAL LABORATORY CERTIFICATION PROGRAM  
1VAC30-46**

**GUIDANCE DOCUMENT**

**QUALITY CONTROL REQUIREMENTS FOR TESTING DONE BY  
*Standard Methods for the Examination of Water and Wastewater***

**March 13, 2013**

The Division of Consolidated Laboratory Services (DCLS) is issuing the following guidance concerning the quality assurance and quality control (QA/QC) procedures associated with testing done by *Standard Methods for the Examination of Water and Wastewater* (*Standard Methods* or SM) for compliance testing done in accordance with 40 CFR 136.

Beginning February 1, 2014, DCLS will assess *all laboratories accredited under 1VAC30-46 for testing by Standard Methods* using the QA/QC requirements published in SM 22<sup>nd</sup> Edition and available at *Standard Methods Online*. The effective date of February 1, 2014, is the same effective date for environmental laboratories to become fully compliant with the Method Update Rule (MUR) published by EPA in the July 1, 2012 update to Title 40 of the *Code of Federal Regulations* and incorporated by reference into 9VAC25-31 on January 31, 2013.

The 2003 NELAC Standard at 5.5.4.2.1 (Sources of Methods) states that a "laboratory shall ensure that it uses the latest valid edition of a standard unless it is not appropriate or possible to do so."

In a letter dated June 20, 2012 the Engineering and Analytical Support Branch of the United States Environmental Protection Agency (US EPA) recognized 115 methods published in the 22<sup>nd</sup> Edition of *Standard Methods* as acceptable versions of approved methods listed in 40 CFR 136.3, Tables 1B and 1C. These methods are editorially changed from the MUR-approved revision, to include the QA/QC requirements most recently published by *Standard Methods*. The full list of methods approved by EPA is attached to this document as Tables 1B and 1C, pages 2 through 18.

Where applicable, commercial laboratories will be assessed to the requirements of the QA/QC published in SM 22<sup>nd</sup> Edition in accordance with NELAC's requirement for the latest valid edition of a standard to be used, and EPA's endorsement of the QA/QC included in the latest *Standard Methods* publication.

The QA/QC requirements for *Standard Methods* are located in the following sections: 1020, 2020, 3020, 4020, 5020, 6020, 7020, 8020, and 9020. Section 1020 is available for purchase at [www.standardmethods.org](http://www.standardmethods.org). The other QA/QC sections are available at the same website and may be downloaded at no charge.

TABLE 1B – LIST OF APPROVED INORGANIC TEST PROCEDURES and EDITORIAL CHANGE

Parameter	Methodology	Approved Standard Methods in Current MUR	Standard Methods 22nd Edition Editorial Updates
1. Acidity, as CaCO <sub>3</sub> , mg/L	Electrometric endpoint or phenolphthalein endpoint	2310 B-1997	2310 B-2011
2. Alkalinity, as CaCO <sub>3</sub> , mg/L	Electrometric or Colorimetric titration to pH 4.5, Manual	2320 B-1997	2320 B-2011
	Automatic		
3. Aluminum—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration	3111 D-1999 or 3111 E-1999	3111 D-2011 or 3111 E-2011
	AA furnace	3113 B-2004	
	STGFAA		
	ICP/AES	3120 B-1999	3120 B-2011
	ICP/MS	3125 B-2009	3125 B-2011
	Direct Current Plasma (DCP)		
4. Ammonia (as N), mg/L	Colorimetric (Eriochrome cyanine R)	3500–Al B-2001	3500–Al B-2011
	Manual distillation or gas diffusion (pH > 11) followed by any of the following:	4500–NH <sub>3</sub> B-1997	4500–NH <sub>3</sub> B-2011
	Nesslerization		
	Titration	4500–NH <sub>3</sub> C-1997	4500–NH <sub>3</sub> C-2011
	Electrode	4500–NH <sub>3</sub> D-1997 or E-1997	4500–NH <sub>3</sub> D-2011 or E-2011
	Manual phenate, salicylate, or other substituted phenols in Berthelot reaction based methods	4500–NH <sub>3</sub> F-1997	4500–NH <sub>3</sub> F-2011
	Automated phenate, salicylate, or other substituted phenols in Berthelot reaction based methods	4500–NH <sub>3</sub> G-1997 or 4500–NH <sub>3</sub> H-1997	4500–NH <sub>3</sub> G-2011
	Automated electrode		
5. Antimony—Total, mg/L	Ion Chromatography		
	Digestion followed by any of the following:		
	AA direct aspiration	3111 B-1999	3111 B-2011
	AA furnace	3113 B-2004	
	STGFAA		
	ICP/AES	3120 B-1999	3120 B-2011
6. Arsenic—Total, mg/L	ICP/MS	3125 B-2009	3125 B-2011
	Digestion followed by any of the following:		
	AA gaseous hydride	3114 B-2009 or 3114 C-2009	3114 B-2011 or 3114 C-2011

	AA furnace	3113 B-2004	
	STGFAA		
	ICP/AES	3120 B-1999	3120 B-2011
	ICP/MS	3125 B-2009	3125 B-2011
	Colorimetric (SDDC)	3500-As B-1997	3500-As B-2011
7. Barium—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration	3111 D-1999	3111 D-2011
	AA furnace	3113 B-2004	
	ICP/AES	3120 B-1999	3120 B-2011
	ICP/MS	3125 B-2009	3125 B-2011
	DCP		
8. Beryllium—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration	3111 D-1999 or 3111 E-1999	3111 D-2011 or 3111 E-2011
	AA furnace	3113 B-2004	
	STGFAA		
	ICP/AES	3120 B-1999	3120 B-2011
	ICP/MS	3125 B-2009	3125 B-2011
	DCP		
	Colorimetric (aluminon)		
9. Biochemical oxygen demand (BOD5), mg/L	Dissolved Oxygen Depletion	5210 B-2001	5210 B-2011
10. Boron—Total, mg/L	Colorimetric (curcumin)	4500-B B -2000	4500-B B -2011
	ICP/AES	3120 B-1999	3120 B-2011
	ICP/MS	3125 B-2009	3125 B-2011
	DCP		
11. Bromide, mg/L	Electrode		
	Ion Chromatography	4110 B-2000, C-2000, D-2000	4110 B-2011, C-2011, D-2011
	CIE/UV	4140 B-1997	4140 B-2011
12. Cadmium—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration	3111 B -1999 or C-1999	3111 B -2011 or C-2011
	AA furnace	3113 B -2004	
	STGFAA		
	ICP/AES	3120 B-1999	3120 B-2011
	ICP/MS	3125 B-2009	3125 B-2011
	DCP		
	Voltametry		
	Colorimetric (Dithizone)	3500-Cd-D-1990	
13. Calcium—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration	3111 B-1999	3111 B-2011
	ICP/AES	3120 B-1999	3120 B-2011

	ICP/MS	3125 B-2009	3125 B-2011
	DCP		
	Titrimetric (EDTA)	3500–Ca-B-1997	3500–Ca B-2011
	Ion Chromatography		
14. Carbonaceous biochemical oxygen demand (CBOD <sub>5</sub> ), mg/L	Dissolved Oxygen Depletion with nitrification inhibitor	5210 B-2001	5210 B-2011
15. Chemical oxygen demand (COD), mg/L	Titrimetric	5220 B -1997 or C-1997	5220 B -2011 or C-2011
	Spectrophotometric, manual or automatic	5220 D-1997	5220 D-2011
16. Chloride, mg/L	Titrimetric: (silver nitrate)	4500–Cl <sup>-</sup> B-1997	4500–Cl—B-2011
	(Mercuric nitrate)	4500–Cl <sup>-</sup> C-1997	4500–Cl—C-2011
	Colorimetric: manual		
	Automated (Ferricyanide)	4500–Cl <sup>-</sup> E-1997	4500–Cl—E-2011
	Potentiometric Titration	4500–Cl <sup>-</sup> D-1997	4500–Cl—D-2011
	Ion Selective Electrode		
	Ion Chromatography	4110 B-2000 or C-2000	4110 B-2011 or C-2011
	CIE/UV	4140 B-1997	4140 B-2011
17. Chlorine—Total residual, mg/L	Amperometric direct	4500–Cl D-2000	4500–Cl D-2011
	Amperometric direct (low level)	4500–Cl E-2000	4500–Cl E-2011
	Iodometric direct	4500–Cl B-2000	4500–Cl B-2011
	Back titration ether end-point	4500–Cl C-2000	4500–Cl C-2011
	DPD–FAS	4500–Cl F-2000	4500–Cl F-2011
	Spectrophotometric, DPD	4500–Cl G-2000	4500–Cl G-2011
	Electrode		
17A. Chlorine—Free Available, mg/L	Amperometric direct	4500–Cl D-2000	4500–Cl D-2011
	Amperometric direct (low level)	4500–Cl E-2000	4500–Cl E-2011
	DPD–FAS	4500–Cl F-2000	4500–Cl F-2011
	Spectrophotometric, DPD	4500–Cl G-2000	4500–Cl G-2011
18. Chromium VI dissolved, mg/L	0.45–micron Filtration followed by any of the following:		
	AA chelation–extraction	3111 C-1999	3111 C-2011
	Ion Chromatography	3500–Cr C-2009	3500–Cr C-2011
	Colorimetric (Diphenyl–carbazine)	3500–Cr B-2009	3500–Cr B-2011
19. Chromium—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration	3111 B-1999	3111 B-2011
	AA chelation–extraction	3111 C-1999	3111 C-2011
	AA furnace	3113 B-2004	
	STGFAA		
	ICP/AES	3120 B-1999	3120 B-2011
	ICP/MS	3125 B-2009	3125 B-2011
	DCP,		

	Colorimetric (Diphenyl-carbazide)	3500-Cr B-2009	3500-Cr B-2011
20. Cobalt—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration	3111 B-1999 or C-1999	3111 B-2011 or C-2011
	AA furnace	3113 B-2004	
	STGFAA		
	ICP/AES	3120 B-1999	3120 B-2011
	ICP/MS	3125 B-2009	3125 B-2011
	DCP		
21. Color, platinum cobalt units or dominant wavelength, hue, luminance purity	Colorimetric (ADMI)		
	(Platinum cobalt)	2120 B-2001	2120 B-2011
	Spectrophotometric		
22. Copper—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration	3111 B-1999 or C-1999	3111 B-2011 or C-2011
	AA furnace	3113 B-2004	
	STGFAA		
	ICP/AES	3120 B-1999	3120 B-2011
	ICP/MS	3125 B-2009	3125 B-2011
	DCP		
	Colorimetric (Neocuproine)	3500-Cu B-1999	3500-Cu B-2011
	Colorimetric (Bathocuproine)	3500-Cu C-1999	3500-Cu C-2011
23. Cyanide—Total, mg/L	Automated UV digestion /distillation and Colorimetry		
	Segmented Flow Injection, In-Line Ultraviolet Digestion followed by gas diffusion amperometry		
	Manual distillation with MgCl <sub>2</sub> followed by any of the following:	4500-CN <sup>-</sup> B-1999 or C-1999	4500-CN <sup>-</sup> B-2011 or C-2011
	Flow Injection , gas diffusion amperometry		
	Titrimetric	4500-CN <sup>-</sup> D-1999	4500-CN <sup>-</sup> D-2011
	Spectrophotometric, manual	4500-CN <sup>-</sup> E-1999	4500-CN <sup>-</sup> E-2011
	Semi - Automated		
	Ion Chromatography		
	Ion Selective Electrode	4500-CN <sup>-</sup> F-1999	4500-CN <sup>-</sup> F-2011
24. Cyanide-Available, mg/L	Cyanide Amenable to Chlorination (CATC); Manual distillation with MgCl <sub>2</sub> followed by Titrimetric or Spectrophotometric	4500-CN <sup>-</sup> G-1999	4500-CN <sup>-</sup> G-2011
	Flow injection and ligand exchange, followed by gas diffusion amperometry		

	Automated Distillation and Colorimetry (no UV digestion)		
24.A Cyanide-Free, mg/L	Flow Injection , followed by gas diffusion amperometry		
	Manual micro-diffusion and colorimetry		
25. Fluoride—Total, mg/L	Manual distillation followed by any of the following:	4500-F <sup>-</sup> B-1997	4500-F- B-2011
	Electrode, manual	4500-F <sup>-</sup> C-1997	4500-F- C-2011
	Electrode, automated		
	Colorimetric, (SPADNS)	4500-F <sup>-</sup> D-1997	4500-F- D-2011
	Automated complexone	4500-F <sup>-</sup> E-1997	4500-F- E-2011
	Ion Chromatography	4110 B-2000 or C-2000	4110 B-2011 or C-2011
	CIE/UV	4140 B-1997	4140 B-2011
26. Gold—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration,	3111 B-1999	3111 B-2011
	AA furnace,	3113 B-2004	
	ICP/MS	3125 B-2009	3125 B-2011
	DCP		
27. Hardness—Total, as CaCO <sub>3</sub> , mg/L	Automated colorimetric,		
	Titrimetric (EDTA)	2340 C-1997	2340 C-2011
	Ca plus Mg as their carbonates, by inductively coupled plasma or AA direct aspiration.	2340 B-1997	2340 B-2011
28. Hydrogen ion (pH), pH units	Electrometric measurement	4500-H <sup>+</sup> -2000	4500-H+-2011
	Automated electrode		
29. Iridium—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration	3111 B-1999	3111 B-2011
	AA furnace		
	ICP/MS	3125 B-2009	3125 B-2011
30. Iron—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration	3111 B-1999 or C-1999	3111 B-2011 or C-2011
	AA furnace	3113 B -2004	
	STGFAA		
	ICP/AES	3120 B-1999	3120 B-2011
	ICP/MS	3125 B-2009	3125 B-2011
	DCP		
	Colorimetric (Phenanthroline)	3500-Fe B-1997	3500-Fe B-2011
31. Kjeldahl Nitrogen — Total, (as N), mg/L	Manual digestion and distillation or gas diffusion followed by any of the following::	4500-Norg B-1997 or C-1997 and 4500-NH <sub>3</sub> B-1997	4500-Norg B-2011 or C-2011 and 4500-NH <sub>3</sub> B-2011
	Titration	4500-NH <sub>3</sub> C-1997	4500-NH <sub>3</sub> C-2011

	Nesslerization		
	Electrode	4500–NH <sub>3</sub> D-1997 or E-1997	4500–NH <sub>3</sub> D-2011 or E-2011
	Semi-automated phenate	4500–NH <sub>3</sub> G-1997	4500–NH <sub>3</sub> G-2011
		4500 NH <sub>3</sub> H-1994	4500 NH <sub>3</sub> H-2011
	Manual phenate, salicylate, or other substituted phenols in Berthelot reaction based methods	4500–NH <sub>3</sub> F-1997	4500–NH <sub>3</sub> F-2011
	Automated phenate, salicylate, or other substituted phenols in Berthelot reaction based methods colorimetric (auto digestion and distillation)		
	Semi-automated block digester colorimetric (distillation not required)	4500–Norg D-1997	4500–Norg D-2011
	Block digester, followed by Auto distillation and Titration		
	Block digester, followed by Auto distillation and Nesslerization,		
	Block Digester, followed by Flow injection gas diffusion (distillation not required)		
32. Lead—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration	3111 B-1999 or C-1999	3111 B-2011 or C-2011
	AA furnace	3113 B-2004	
	STGFAA		
	ICP/AES	3120 B-1999	3120 B-2011
	ICP/MS	3125 B-2009	3125 B-2011
	DCP		
	Voltametry		
	Colorimetric (Dithizone)	3500–Pb B-1997	3500–Pb B-2011
33. Magnesium—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration	3111 B-1999	3111 B-2011
	ICP/AES	3120 B-1999	3120 B-2011
	ICP/MS	3125 B-2009	3125 B-2011
	DCP		
	Gravimetric		
	Ion Chromatography		
34. Manganese—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration	3111 B-1999	3111 B-2011
	AA furnace	3113 B-2004	

	STGFAA		
	ICP/AES	3120 B-1999	3120 B-2011
	ICP/MS	3125 B-2009	3125 B-2011
	DCP		
	Colorimetric (Persulfate)	3500-Mn B-1999	3500-Mn B-2011
	Colorimetric (Periodate)		
35. Mercury—Total , mg/L	Cold vapor, Manual	3112 -2009	3112 -2011
	Cold vapor, Automated		
	Cold vapor atomic fluorescence spectrometry (CVAFS)		
	Purge and Trap CVAFS		
36. Molybdenum—Total , mg/L	Digestion followed by any of the following:		
	AA direct aspiration	3111 D-1999	3111 D-2011
	AA furnace	3113 B-2004	
	ICP/AES	3120 B-1999	3120 B-2011
	ICP/MS	3125 B-2009	3125 B-2011
37. Nickel—Total, mg/L	DCP		
	Digestion followed by any of the following:		
	AA direct aspiration	3111 B-1999 or C-1999	3111 B-2011 or C-2011
	AA furnace	3113 B-2004	
	STGFAA		
	ICP/AES	3120 B-1999	3120 B-2011
	ICP/MS	3125 B-2009	3125 B-2011
38. Nitrate (as N), mg/L	DCP		
	Ion Chromatography	4110 B-2000 or C-2000	4110 B-2011 or C-2011
	CIE/UV	4140 B-1997	4140 B-2011
	Ion Selective Electrode	4500-NO <sub>3</sub> <sup>-</sup> D-2000	4500-NO <sub>3</sub> <sup>-</sup> D-2011
	Colorimetric (Brucine sulfate)		
39. Nitrate-nitrite (as N), mg/L	Nitrate-nitrite N minus Nitrite N		
	Cadmium reduction, Manual	4500-NO <sub>3</sub> <sup>-</sup> E-2000	4500-NO <sub>3</sub> <sup>-</sup> E-2011
	Cadmium reduction, Automated	4500-NO <sub>3</sub> <sup>-</sup> F-2000	4500-NO <sub>3</sub> <sup>-</sup> F-2011
	Automated hydrazine	4500-NO <sub>3</sub> <sup>-</sup> H-2000	4500-NO <sub>3</sub> <sup>-</sup> H-2011
	Ion Chromatography	4110 B-2000 or C-2000	4110 B-2011 or C-2011
40. Nitrite (as N), mg/L	CIE/UV	4140 B-1997	4140 B-2011
	Spectrophotometric: Manual	4500-NO <sub>2</sub> <sup>-</sup> B-2000	4500-NO <sub>2</sub> <sup>-</sup> B-2011
	Automated (Diazotization)		
	Automated (*bypass cadmium reduction)	4500-NO <sub>3</sub> <sup>-</sup> F-2000	4500-NO <sub>3</sub> <sup>-</sup> F-2011
	Manual (*bypass cadmium reduction)	4500-NO <sub>3</sub> <sup>-</sup> E-2000	4500-NO <sub>3</sub> <sup>-</sup> E-2011
	Ion Chromatography	4110 B-2000 or C-2000	4110 B-2011 or C-2011
CIE/UV	4140 B-1997	4140 B-2011	



41. Oil and grease—Total recoverable, mg/L	Hexane extractable material (HEM): n-Hexane extraction and gravimetry	5520 B-2001	5520 B-2011
	Silica gel treated HEM (SGT-HEM): Silica gel treatment and gravimetry.	5520 B-2001 and 5520 F-2001	5520 B-2011 and 5520 F-2011
42. Organic carbon—Total (TOC), mg/L	Combustion	5310 B-2000	5310 B-2011
	Heated persulfate or UV persulfate oxidation	5310 C 2000	5310 C 2011
		5310 D 2000	5310 D 2011
43. Organic nitrogen (as N), mg/L	Total Kjeldahl N minus ammonia N		
44. Orthophosphate (as P), mg/L	Ascorbic acid method:		
	Automated	4500-P F-1999 or G-1999	4500-P F-2011 or G-2011
	Manual single reagent	4500-P E-1999	4500-P E-2011
	Manual two reagent		
	Ion Chromatography	4110 B-2000 or C-2000	4110 B-2011 or C-2011
	CIE/UV	4140 B-1997	4140 B-2011
45. Osmium—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration,	3111 D-1999	3111 D-2011
	AA furnace		
46. Oxygen, dissolved, mg/L	Winkler (Azide modification)	4500-O B-2001, C-2001, D-2001, E-2001, F-2001	4500-O B-2011, C-2011, D-2011, E-2011, F-2011
	Electrode	4500-O G-2001	4500-O G-2011
47. Palladium—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration	3111 B-1999	3111 B-2011
	AA furnace		
	ICP/MS	3125 B-2009	3125 B-2011
	DCP		
48. Phenols, mg/L	Manual distillation <sup>(1)</sup> Followed by any of the following:	5530 B-2005	
	Colorimetric (4AAP) manual,	5530 D-2005 <sup>(2)</sup>	
	Automated colorimetric (4AAP)		
49. Phosphorus (elemental), mg/L	Gas-liquid chromatography		
50. Phosphorus—Total, mg/L	Persulfate digestion followed by any of the following:	4500-P B(5)-1999	4500-P B(5)-2011
	Manual	4500-P E-1999	4500-P E-2011
	Automated ascorbic acid reduction	4500-P F-1999, G-1999, H-1999	4500-P F-2011, G-2011, H-2011
	ICP/AES ,	3120 B-1999	3120 B-2011
	Semi-automated block digester (TKP digestion)		
51. Platinum—Total, mg/L	Digestion followed by any of the following:		

	AA direct aspiration	3111 B-1999	3111 B-2011
	AA furnace		
	ICP/MS	3125 B-2009	3125 B-2011
	DCP		
52. Potassium—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration	3111 B-1999	3111 B-2011
	ICP/AES	3120 B-1999	3120 B-2011
	ICP/MS	3125 B-2009	3125 B-2011
	Flame photometric	3500-K B-1997	3500-K B-2011
	Electrode	3500-K C-1997	3500-K C-2011
	Ion Chromatography		
53. Residue—Total, mg/L	Gravimetric, 103–105°	2540 B-1997	2540 B-2011
54. Residue—filterable, mg/L	Gravimetric, 180°	2540 C-1997	2540 C-2011
55. Residue—non-filterable (TSS), mg/L	Gravimetric, 103–105 °C post washing of residue	2540 D-1997	2540 D-2011
56. Residue—settleable, mg/L	Volumetric, (Imhoff cone), or gravimetric	2540 F-1997	2540 F-2011
57. Residue—Volatile, mg/L	Gravimetric, 550 °C	2540-E-1997	2540-E-2011
58. Rhodium—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration, or	3111 B-1999	3111 B-2011
	AA furnace		
	ICP/MS	3125 B-2009	3125 B-2011
59. Ruthenium—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration, or	3111 B-1999	3111 B-2011
	AA furnace		
	ICP/MS	3125 B-2009	3125 B-2011
60. Selenium—Total, mg/L	Digestion followed by any of the following:		
	AA furnace	3113 B-2004	
	STGFAA		
	ICP/AES	3120 B-1999	3120 B-2011
	ICP/MS	3125 B-2009	3125 B-2011
	AA gaseous hydride	3114 B-2009 or C-2009	3114 B-2011 or C-2011
61. Silica—Dissolved, mg/L	0.45 micron filtration followed by any of the following:		
	Colorimetric, Manual	4500–SiO <sub>2</sub> C-1997	4500–SiO <sub>2</sub> C-2011
	Automated (Molybdosilicate)	4500–SiO <sub>2</sub> E-1997 or F-1997	4500–SiO <sub>2</sub> E-2011 or F-2011
	ICP/AES	3120 B-1999	3120 B-2011
	ICP/MS	3125 B-2009	3125 B-2011
62. Silver—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration	3111 B-1999 or C-1999	3111 B-2011 or C-2011

	AA furnace	3113 B-2004	
	STGFAA		
	ICP/AES	3120 B-1999	3120 B-2011
	ICP/MS	3125 B-2009	3125 B-2011
	DCP		
63. Sodium—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration	3111 B-1999	3111 B-2011
	ICP/AES	3120 B-1999	3120 B-2011
	ICP/MS	3125 B-2009	3125 B-2011
	DCP		
	Flame photometric	3500—Na B-1997	3500—Na B-2011
	Ion Chromatography		
64. Specific conductance, micromhos/cm at 25°C	Wheatstone bridge	2510 B-1997	2510 B-2011
65. Sulfate (as SO <sub>4</sub> ), mg/L	Automated colorimetric	4500-SO <sub>4</sub> <sup>2-</sup> F-1997 or G-1997	4500-SO42- F-2011 or G-2011
	Gravimetric	4500-SO <sub>4</sub> <sup>2-</sup> C-1997 or D-1997	4500-SO42- C-2011 or D-2011
	Turbidimetric	4500-SO <sub>4</sub> <sup>2-</sup> E-1997	4500-SO42- E-2011
	Ion Chromatography	4110 B-2000 or C-2000	4110 B-2011 or C-2011
	CIE/UV	4140 B-1997	4140 B-2011
66. Sulfide (as S), mg/L	Sample Pretreatment	4500—S <sup>2-</sup> B, C -2000	4500—S2- B, C -2011
	Titrimetric (iodine)	4500—S <sup>2-</sup> F-2000	4500—S2-F-2011
	Colorimetric (methylene blue)	4500—S <sup>2-</sup> D-2000	4500—S2-D-2011
	Ion Selective Electrode	4500—S <sup>2-</sup> G-2000	4500—S2-G-2011
67. Sulfite (as SO <sub>3</sub> ), mg/L	Titrimetric (iodine-iodate)	4500—SO <sub>3</sub> <sup>2-</sup> B-2000	4500—SO32-B-2011
68. Surfactants, mg/L	Colorimetric (methylene blue)	5540 C-2000	5540 C-2011
69. Temperature, °C	Thermometric	2550 B-2000	
70. Thallium—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration	3111 B-1999	3111 B-2011
	AA furnace	3113 B-2004	
	STGFAA		
	ICP/AES	3120 B-1999	3120 B-2011
	ICP/MS	3125 B-2009	3125 B-2011
71. Tin—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration	3111 B-1999	3111 B-2011
	AA furnace	3113 B-2004	
	STGFAA		
	ICP/AES		
	ICP/MS	3125 B-2009	3125 B-2011
72. Titanium—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration	3111 D-1999,	3111 D-2011

	AA furnace		
	DCP		
	ICP/MS	3125 B-2009	3125 B-2011
73. Turbidity, NTU	Nephelometric	2130 B-2001	2130 B-2011
74. Vanadium—Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration	3111 D-1999	3111 D-2011
	AA furnace	3113 B-2004	
	ICP/AES	3120 B-1999	3120 B-2011
	ICP/MS	3125 B-2009	3125 B-2011
	DCP,		
	Colorimetric (Gallic Acid)	3500–V B-1997	3500–V B-2011
75. Zinc –Total, mg/L	Digestion followed by any of the following:		
	AA direct aspiration	3111 B-1999 or C-1999	3111 B-2011 or C-2011
	AA furnace		
	ICP/AES	3120 B-1999	3120 B-2011
	ICP/MS	3125 B-2009	3125 B-2011
	DCP,		
	Colorimetric (Dithizone)		
	(Zincon)	3500–Zn -1997	3500–Zn -2011

**Table IC.–List of Approved Pesticide Test Procedures and Editorial Change**

<b>Parameter</b>	<b>Method</b>	<b>Approved Standard Methods</b>	<b>Standard Methods 22nd Edition Editorial Updates</b>
1. Acenaphthene	GC		
	GC/MS	6410 B-00	
	HPLC	6440 B-00	
2. Acenaphthylene	GC		
	GC/MS	6410 B-00	
	HPLC	6440 B-00	
3. Acrolein	GC		
	GC/MS		
4. Acrylonitrile	GC		
	GC/MS		
5. Anthracene	GC		
	GC/MS	6410 B-00	
	HPLC	6440 B-00	
6. Benzene	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
7. Benzidine			
	GC/MS	6410 B-00	
	HPLC		
8. Benzo(a)anthracene	GC		
	GC/MS	6410 B-00	
	HPLC	6440B-00	
9. Benzo(a)pyrene	GC		
	GC/MS	6410 B-00	
	HPLC	6440 B-00	
10. Benzo(b)fluor-anthene	GC		
	GC/MS	6410 B-00	
	HPLC	6440 B-00	
11. Benzo(g,h,i) perylene	GC		
	GC/MS	6410 B-00	
	HPLC	6440 B-00	
12. Benzo(k) fluoranthene	GC		
	GC/MS	6410 B-00	
	HPLC	6440 B-00	
13. Benzyl chloride	GC		
	GC/MS		

14. Benzyl butyl phthalate	GC		
	GC/MS	6410 B-00	
15. Bis(2-chloroethoxy) methane	GC		
	GC/MS	6410 B-00	
16. Bis(2-chloroethyl) ether	GC		
	GC/MS	6410 B-00	
17. Bis(2-ethylhexyl) phthalate	GC		
	GC/MS	6410 B-00	
18. Bromodichloromethane	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
19. Bromoform	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
20. Bromomethane	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
21. 4-Bromophenyl phenyl ether	GC		
	GC/MS	6410 B-00	
22. Carbon tetrachloride	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
23. 4-Chloro-3-methyl phenol	GC	6420 B-00	
	GC/MS	6410 B-00	
24. Chlorobenzene	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
25. Chloroethane	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
26. 2-Chloroethylvinyl ether	GC		
	GC/MS		
27. Chloroform	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
28. Chloromethane	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
29. 2-Chloronaphthalene	GC		
	GC/MS	6410 B-00	
30. 2-Chlorophenol	GC	6420 B-00	
	GC/MS	6410 B-00	
31. 4-Chlorophenyl phenyl ether	GC		
	GC/MS	6410 B-00	
32. Chrysene	GC		
	GC/MS	6410 B-00	
	HPLC	6440 B-00	
33. Dibenzo(a,h)anthracene	GC		
	GC/MS	6410 B-00	

	HPLC	6440 B-00	
34. Dibromochloromethane	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
35. 1,2-Dichlorobenzene	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
36. 1,3-Dichlorobenzene	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
37. 1,4-Dichlorobenzene	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
38. 3,3-Dichlorobenzidine	GC/MS	6410 B-00	
	HPLC		
39. Dichlorodifluoromethane	GC		
	GC/MS		
40. 1,1-Dichloroethane	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
41. 1,2-Dichloroethane	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
42. 1,1-Dichloroethene	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
43. trans-1,2-Dichloroethene	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
44. 2,4-Dichlorophenol	GC	6420 B-00	
	GC/MS	6410 B-00	
45. 1,2-Dichloropropane	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
46. cis-1,3-Dichloropropene	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
47. trans-1,3-Dichloropropene	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
48. Diethyl phthalate	GC		
	GC/MS	6410 B-00	
49. 2,4-Dimethylphenol	GC	6420 B-00	
	GC/MS	6410 B-00	
50. Dimethyl phthalate	GC		
	GC/MS	6410 B-00	
51. Di-n-butyl phthalate	GC		
	GC/MS	6410 B-00	
52. Di-n-octyl phthalate	GC		
	GC/MS	6410 B-00	
53. 2,3-Dinitrophenol	GC	6420 B-00	
	GC/MS	6410 B-00	

54. 2,4-Dinitrotoluene	GC		
	GC/MS	6410 B-00	
55. 2,6-Dinitrotoluene	GC		
	GC/MS	6410 B-00	
56. Epichlorohydrin	GC		
	GC/MS		
57. Ethylbenzene	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
58. Fluoranthene	GC		
	GC/MS	6410 B-00	
	HPLC	6440 B-00	
59. Fluorene	GC		
	GC/MS	6410 B-00	
	HPLC	6440 B-00	
60. 1,2,3,4,6,7,8- Heptachloro-dibenzofuran	GC/MS		
61. 1,2,3,4,7,8,9-Heptachloro-dibenzofuran	GC/MS		
62. 1,2,3,4,6,7,8- Heptachlorodibenzo- <i>p</i> -dioxin	GC/MS		
63. Hexachlorobenzene	GC		
	GC/MS	6410 B-00	
64. Hexachloro-butadiene	GC		
	GC/MS	6410 B-00	
65. Hexachlorocyclopentadiene	GC		
	GC/MS	6410 B-00	
66. 1,2,3,4,7,8- Hexachlorodibenzofuran	GC/MS		
67. 1,2,3,6,7,8- Hexachlorodibenzofuran	GC/MS		
68. 1,2,3,7,8,9- Hexachlorodibenzofuran	GC/MS		
69. 2,3,4,6,7,8- Hexachlorodibenzofuran	GC/MS		
70. 1,2,3,4,7,8- Hexachlorodibenzo- <i>p</i> -dioxin	GC/MS		
71. 1,2,3,6,7,8- Hexachlorodibenzo- <i>p</i> -dioxin	GC/MS		
72. 1,2,3,7,8,9- Hexachlorodibenzo- <i>p</i> -dioxin	GC/MS		
73. Hexachloroethane	GC		
	GC/MS	6410 B-00	
74. Ideno(1,2,3-cd) pyrene	GC		
	GC/MS	6410 B-00	
	HPLC	6440 B-00	
75. Isophorone	GC		
	GC/MS	6410 B-00	
76. Methylene chloride	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11



77. 2-Methyl-4,6-dinitrophenol	GC	6420 B-00	
	GC/MS	6410 B-00	
78. Naphthalene	GC		
	GC/MS	6410 B-00	
	HPLC	6440 B-00	
79. Nitrobenzene	GC		
	GC/MS	6410 B-00	
	HPLC		
80. 2-Nitrophenol	GC	6420 B-00	
	GC/MS	6410 B-00	
81. 4-Nitrophenol	GC	6420 B-00	
	GC/MS	6410 B-00	
82. N-Nitroso-dimethylamine	GC		
	GC/MS	6410 B-00	
83. N-Nitrosodi-n-propylamine	GC		
	GC/MS	6410 B-00	
84. N-Nitroso-diphenylamine	GC		
	GC/MS	6410 B-00	
85. Octachloro-dibenzofuran	GC/MS		
86. Octachlorodibenzo- <i>p</i> -dioxin	GC/MS		
87. 2,2'-Oxybis(2-chloropropane) [also known as bis(2-chloroisopropyl) ether]	GC		
	GC/MS	6410 B-00	
88. PCB-1016	GC		
	GC/MS	6410 B-00	
89. PCB-1221	GC		
	GC/MS	6410 B-00	
90. PCB-1232	GC		
	GC/MS	6410 B-00	
91. PCB-1242	GC		
	GC/MS	6410 B-00	
92. PCB-1248	GC		
	GC/MS	6410 B-00	
93. PCB-1254	GC		
	GC/MS	6410 B-00	
94. PCB-1260	GC		
	GC/MS	6410 B-00	
95. 1,2,3,7,8- Pentachloro-dibenzofuran	GC/MS		
96. 2,3,4,7,8- Pentachloro-dibenzofuran	GC/MS		
97. 1,2,3,7,8,- Pentachlorodibenzo- <i>p</i> -dioxin	GC/MS		
98. Pentachlorophenol	GC	6420 B-00	
	GC/MS	6410 B-00	

99. Phenanthrene	GC		
	GC/MS	6410 B-00	
	HPLC	6440 B-00	
100. Phenol	GC	6420 B-00	
	GC/MS	6410 B-00	
101. Pyrene	GC		
	GC/MS	6410 B-00	
	HPLC	6440 B-00	
102. 2,3,7,8- Tetra-chlorodibenzofuran	GC/MS		
103. 2,3,7,8- Tetra-chlorodibenzo- <i>p</i> -dioxin	GC/MS		
104. 1,1,2,2-Tetra-chloro ethane	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
105. Tetrachloroethene	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
106. Toluene	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
107. 1,2,4-Trichloro-benzene	GC		
	GC/MS	6410 B-00	
108. 1,1,1-Trichloro-ethane	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
109. 1,1,2-Trichloro-ethane	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
110. Trichloroethene	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
111. Trichlorofluoromethane	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11
112. 2,4,6-Trichlorophenol	GC	6420 B-00	
	GC/MS	6410 B-00	
113. Vinyl chloride	GC	6200 C-97	6200 C-11
	GC/MS	6200 B-97	6200 B-11