FILED
SUPREME COURT
STATE OF WASHINGTON
8/28/2017 3:36 PM
BY SUSAN L. CARLSON
CLERK

NO. 94293-5
Court of Appeals, Division II Case No. 48267-3-II

SUPREME COURT OF THE STATE OF WASHINGTON

PUGET SOUNDKEEPER ALLIANCE,

Petitioner,

v.

STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY; and STATE OF WASHINGTON POLLUTION CONTROL HEARINGS BOARD,

Respondents.

PUGET SOUNDKEEPER ALLIANCE'S SUPPLEMENTAL BRIEF

RICHARD A. SMITH, WSBA #21788
CLAIRE E. TONRY, WSBA #44497
Smith & Lowney, PLLC
2317 E. John St.
Seattle, WA 98112
(206) 860-2883
Attorneys for Petitioner Puget Soundkeeper Alliance

TABLE OF CONTENTS

I. Introduction 1

II. Assignments of Error 3

III. Statement of the Case.....4

A. Essential background 4

B. The court of appeals decision.....6

IV. Argument 7

A. Standard of review 7

B. If PCB effluent limit compliance monitoring can only be by Method 608, RCW 90.48.520 prohibits the issuance of the permit 8

C. The Decision's deference to agency interpretation of WAC 173-201A-260(3)(h) is incorrect.....11

1. Interpretation of WAC 173-201A-260(3)(h) must conform to rules of statutory construction.....12

2. Interpretation of WAC 173-201A-260(3)(h) must not negate RCW 90.48.010 and RCW 90.48.520, and should be guided by SEPA.....16

V. Conclusion and Request for Relief 20

Appendix 1

Puget Soundkeeper Alliance v. State of Washington, Department of Ecology; and State of Washington Pollution Control Hearings Board, No. 48267-3-II, Unpublished Decision (Feb. 22, 2017) ("Decision")

Puget Soundkeeper Alliance v. State of Washington, Department of Ecology; and Seattle Iron & Metals Corp., PCHB No. 13-137c, Finding of Fact, Conclusions of Law, and Order (July 23, 2015) ("Board Order")

Puget Soundkeeper Alliance v. State of Washington, Department of Ecology; and Seattle Iron & Metals Corp., PCHB No. 15-050, Order Granting Respondents' Motion For Summary Judgement (Jan. 6 , 2016)

Appendix 2

33 U.S.C. § 1370

RCW 42.21C.020

RCW 42.21C.030

RCW 90.48.010

RCW 90.48.520

Appendix 3

40 C.F.R. § 136 (less appendices)

WAC 173-201A-240, -260, -510

WAC 173-220-130, -150

TABLE OF AUTHORITIES

Cases

Abdul-Akbar v. McKelvie, 239 F.3d 307 (3d Cir. 2001) 9

Aldrich v. McCulloch Props., 627 F.2d 1036 (10th Cir. 1980) 9

Arkansas v. Oklahoma, 503 U.S. 91 (1992) 11

Bowles v. Seminole Rock & Sand Co., 325 U.S. 410 (1945) 15

Burns v. City of Seattle, 161 Wn.2d 129 (2007).....16

Burton v. Lehman, 153 Wn.2d 416 (2005) 8

Calaway ex rel. Calaway v. Schucker, 193 S.W.3d 509 (Tenn. 2005) 9

Catskill Mtns. Chapter of Trout Unlimited, Inc. v. City of New York,
451 F.3d 77 (2d Cir. 2006).....2

Caviness v. DeRand Res. Corp., 983 F.2d 1295 (4th Cir. 1993) 9

Defenders of Wildlife v. Browner, 191 F.3d 1159 (9th Cir. 1999) 15

Dep't of Ecology v. Campbell & Gwinn, LLC, 146 Wn.2d 1 (2002) 20

Dep't of Labor & Indus. v. Granger, 159 Wn.2d 752 (2007) 11

Dot Foods, Inc. v. Dep't of Revenue, 166 Wn.2d 912 (2009) 8

Dubuc v. Johnson, 314 F.3d 1205 (10th Cir. 2003) 9

Footbridge Ltd. Tr. v. Countrywide Fin. Corp.,
770 F. Supp. 2d 618 (S.D.N.Y. 2011) 9

Gen. Motors Acceptance Corp. v. McCallum,
10 S.W.2d 687 (Tex. 1928) 9

Gilger v. Lee Constr., 820 P.2d 390 (Kan. 1991).....9

Hartman v. Wash. State Game Com., 85 Wn.2d 176 (1975) 16

Hearst Corp. v. Hoppe, 90 Wash.2d 123 (1978) 16

In re Custody of M.W., 185 Wn.2d 803 (2016) 16

ITT Rayonier, Inc. v. Dalman, 122 Wn.2d 801 (1993) 18

Kurr v. Cicero, 601 N.E.2d 1233 (Ill. App. 1992) 9

Natural Resources Defense Council v. Costle,
568 F.2d 1369 (D.C. Cir. 1977) 11

Natural Resources Defense Council v. U.S. EPA,
966 F.2d 1292 (9th Cir. 1992) 15

Natural Resources Defense Council v. U.S. EPA,
915 F.2d 1314 (9th Cir. 1990) 15

Oklahoma v. EPA, 908 F.2d 595, (10th Cir. 1990).....11

Port of Seattle v. Pollution Control Hearings Board., 151 Wn.2d 568
(2004).....7

Puget Soundkeeper Alliance v. Pollution Control Hearings Board,
189 Wn.App. 127 (2015) ..... *passim*

Roller v. Dep't of Labor & Indus., 128 Wn.App. 922 (2005) 8

Santa Clara Valley Hous. Grp., Inc. v. United States, No. 5:08-cv-05097-
WHA, 2012 U.S. Dist. LEXIS 5651 (N.D. Cal. Jan. 18, 2012) 9

Short v. Belleville Shoe Mfg. Co., 908 F.2d 1385 (7th Cir. 1990) 9

Silverstreak, Inc. v. Dep't of Labor & Indus., 159 Wn.2d 868 (2007).....8

Simmons v. United States, 225 F.R.D. 688 (N.D. Ga. 2004) 9

Smith v. Brown, 35 F.3d 1516 (Fed. Cir. 1994) 15

State v. Burke, 92 Wn.2d 474 (1979) 13

State v. J.P., 149 Wn.2d 444 (2003) 8, 13

United States v. Union Corp., 259 F.Supp.2d 356 (E.D. Pa. 2003). ...12, 14

U.S. EPA v. California ex rel. State Water Resources Control Board, 426 U.S. 200 (1976).....2

Whitman v. Am. Trucking Ass'ns, 531 U.S. 457 (2001) 15

Federal Statutes
33 U.S.C. § 1251(a)(2).....15
33 U.S.C. § 1251(a)(3).....15
33 U.S.C. § 1370.....2
42 U.S.C. § 9601.....4

State Statutes
RCW 34.05 7
RCW 34.05.570(1).....7
RCW 34.05.570(3).....7
RCW 42.21C.020(2) 18
RCW 43.21C.....17
RCW 43.21C.030.....17
RCW 90.48.010 2,4,11,16,17,19
RCW 90.48.520 ..... *passim*

Federal Regulations
40 C.F.R. § 136.....10,12,13,15
40 C.F.R. § 136.1.....6, 18
40 C.F.R. § 136.3..... *passim*
40 C.F.R. § 136.5.....10, 20

State Regulations
WAC 173-201A.....9, 16
WAC 173-201A-010(4).....9
WAC 173-201A-240(1).....11, 18
WAC 173-201A-240(2).....18
WAC 173-201A-260(3).....3
WAC 173-201A-260(3)(h) ..... *passim*
WAC 173-201A-260(3)(g) 12
WAC 173-201A-500.....19
WAC 173-201A-510(1).....11, 18
WAC 173-201A-510(1)(b) 19

WAC 173-220 16
WAC 173-220-110 19
WAC 173-220-130(1)(a) 12
WAC 173-220-130(1)(b)(i) 11,19
WAC 173-220-130(2) 19
WAC 173-220-150(1)(c) 19
WAC 173-220-210(1) 12

<u>*Other*</u>

Puget Soundkeeper Alliance v. Ecology, PCHB No. 15-050, Order Granting Resp'ts' Mot. for Summ. J. (Jan. 6, 2016) 6, 10
63 Fed.Reg. 36742 .....
64 Fed.Reg. 61182 12
77 Fed.Reg. 29757 12

I. INTRODUCTION

Now the Court must interpret and implement the prohibition of the final sentence of RCW 90.48.520: "In no event shall the discharge of toxicants be allowed that would violate any water quality standard, including toxicant standards, sediment criteria, and dilution zone criteria." Numerous provisions of state regulation mirror this prohibition, confirming its centrality to state water pollution control law.

In proceedings below, the Pollution Control Hearings Board ("Board") found that the discharge of total PCBs authorized by the National Pollution Discharge Elimination System ("NPDES") permit issued by the Department of Ecology ("Ecology") to Seattle Iron & Metals ("SIM") pursuant to state and federal law must be subject to an effluent limitation of 0.00017 µg/L to ensure against violations of water quality standards in the Lower Duwamish Waterway ("LDW"), to avoid recontamination of contaminated sediment areas cleaned up as part of the LDW Site Superfund action, and to prevent worsening of the public health hazard presented by eating contaminated LDW resident fish.[1] The ongoing dispute, presented here, is whether the SIM permit can be issued with a requirement for inadequate compliance testing (Method 608) that can

[1] *Puget Soundkeeper Alliance v. Ecology and SIM*, PCHB No. 13-137c, Findings of Fact, Concl. of Law, and Order (July 23, 2015) ("Board Order") at 3-7, 13-18, 23-24, 45-47.

quantify effluent PCBs only down to 0.5 µg/L, as Ecology, the Board, and the court of appeals found it may. This specific monitoring requirement effectively raises the total PCB effluent limitation to that 0.5 µg/L level, which is manifestly impermissible under RCW 90.48.520 because it exceeds by orders of magnitude the critical 0.00017 µg/L limit.

In its cooperative federalism, the Clean Water Act ("CWA") expressly preserves the right of states to implement more stringent water pollution controls than federal law requires.[2] Not only is the toxic discharge prohibition of RCW 90.48.520 "even more categorical" than comparable provisions of federal law, its meaning and operation must be guided by the legislative intent, illuminated by the policy statement of RCW 90.48.010.[3] This statement, which could have been written to direct the outcome of this case, insists that Washington will preserve and vigorously exercise its powers to allow the state itself to determine the standards for water quality and pollution controls, rather than leaving these matters to lagging federal regulation.

Appellant Puget Soundkeeper Alliance asks the Court to hold that state water pollution control law bars the issuance of SIM's NPDES

---

[2] 33 U.S.C. § 1370; *U.S. EPA v. California ex rel. State Water Res. Control Board*, 426 U.S. 200, 217 – 218 (1976); *Catskill Mtns. Chapter of Trout Unlimited, Inc. v. City of New York*, 451 F.3d 77, 79 (2nd Cir. 2006).
[3] *Puget Soundkeeper Alliance v. Pollution Control Hearings Board*, 189 Wn.App. 127, 149 (2015).

permit with an effective total PCB effluent limitation of 0.5 µg/L. However, the Environmental Protection Agency's ("EPA") scientific research efforts afford alternative relief – the designation of a modern, superior PCB laboratory analysis method (Method 1668C), capable of quantifying total PCBs at the level of the crucial 0.00017 µg/L effluent limitation. To allow the issuance of SIM's permit with a requirement to use the modern laboratory method, the Court must reverse the court of appeals' deference to the state agencies' interpretation of WAC 173-201A-260(3). Besides the manifest policy and practical reasons, the challenged regulatory interpretation should be reversed because it renders superfluous an operative clause contrary to rules of construction, and because it utterly frustrates the intent of state water pollution control law.

II. ASSIGNMENTS OF ERROR

Soundkeeper assigns error to the Court of Appeals, Division II, Unpublished Opinion, dated February 22, 2017, in case No. 48267-3-II, which is included in the Appendix at A-1 (hereinafter, "Decision"). Issues pertaining to the assignment of error are:

1. May Ecology issue an NPDES permit that authorizes discharges of total PCBs at concentrations up to 0.5 µg/L when total PCB discharge concentrations must be limited to 0.00017 µg/L to ensure compliance with water quality standards?

2. Does WAC 173-201A-260(3) allow the specification of EPA Method 1668C for compliance monitoring in NPDES permits to ensure

against the discharge of total PCBs that would violate water quality standards as required by RCW 90.48.010 and RCW 90.48.520?

III. STATEMENT OF THE CASE

A. Essential background

Following its four-day hearing on Soundkeeper's appeal of the NPDES permit issued by Ecology to SIM, the Board held, *inter alia*, that the permit's total PCB effluent limitation must be held strictly to the applicable human health water quality criterion of 0.00017 µg/L, and that the higher limits Ecology assigned were inadequate to protect against violations of water quality standards in the Lower Duwamish Waterway.[4]

The Board was particularly concerned about unacceptable degradation of sediment quality threatened by levels of PCBs in SIM's discharges above the 0.00017 µg/L level.[5] Sediments in the LDW are already so contaminated with PCBs that eating it's resident fish or shellfish is considered a public health hazard by the Washington Department of Health.[6] Consequently, the LDW is a high profile PCB-contamination site listed for cleanup under the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA" or "Superfund"), 42 U.S.C. § 9601, *et seq.*[7] SIM's PCB discharges at the

---

[4] Board Order at 45 – 47.
[5] *Id.* at 3 – 7, 13 – 18, 23 – 24, 45 – 47.
[6] *Id.* at 4 and 45; AR 2001.
[7] Board Order at 3 – 6; AR 3589 *et seq.*; AR 3677-83.

levels initially allowed by the permit would be "counterproductive" to the CERCLA effort.[8]

The Board noted that SIM's automobile shredding activities generate total PCBs for discharge to the river, and that elevated PCB levels are present in sediments in the vicinity of SIM's outfall.[9] It saw the persistent and bioaccumulative nature of highly toxic PCBs, and that the LDW water column itself had been found to exceed applicable PCB water quality criteria, demonstrating the river's lack of assimilative capacity for additional PCB discharges.[10]

However, the Board upheld the permit's use of laboratory Method 608 to determine compliance with SIM's total PCB effluent limitations.[11] Because Method 608 has a practical quantitation level[12] ("PQL") of 0.5 µg/L, lab results indicating that SIM's discharge contained between 0.00017 µg/L and 0.5 µg/L would not indicate effluent limitation violations, i.e., would be allowed by the permit.[13] In practical effect, this lab analysis method designation changes the total PCB effluent limitation

---

[8] Board Order at 47.
[9] *Id*. at 6 and 46 ("Because PCBs are found in the types of materials processed by SIM, it is recognized as a potential source of contaminants ….").
[10] *Id*. at 4, 15 – 18.
[11] *Id.* at 34 – 35.
[12] Decision at 10, n.10 ("The PQL represents the lowest level at which a pollutant concentration *reliably* can be quantified.").
[13] Board Order at 26.

to 0.5 µg/L.[14] In developing SIM's permit, Ecology did not even consider the use of alternative Method 1668C, which EPA developed to provide more precise measurements of PCBs – down to a PQL less than the critical 0.00017 µg/L level – which would make the 0.00017 µg/L limitation actually effective.[15] But, the Board essentially deferred to Ecology's determination that it could do nothing but designate Method 608 for compliance monitoring because Method 608 is the only method approved for PCBs under federal regulation, 40 C.F.R. § 136.1 and .3.[16]

For a more complete statement of relevant facts and legal background, Soundkeeper incorporates by reference the statement of the case provided in its Opening Brief to the Court of Appeals.[17]

B. <u>The court of appeals decision.</u>

After accepting direct review, the court of appeals rejected Soundkeeper's arguments as to RCW 90.48.520, PCB monitoring requirements and effective effluent limitations, and affirmed the Board

---

[14] *Puget Soundkeeper Alliance v. Ecology*, PCHB No. 15-050, Order Granting Resp'ts' Mot. for Summ. J. (Jan. 6, 2016) at 4 – 5 (mistakenly identifying the Method 608 PQL as 0.25 µg/L).

[15] RP 63:18-64:14; 69:19-71:20; 85:15-86:7.

[16] Board Order at 27 and 34 – 35.

[17] The relevant human health criteria for total PCBs is 0.00017 µg/L, which the Board also held is the appropriate (and maximum allowable) maximum daily effluent limitation for SIM's discharges of total PCBs. Soundkeeper sheepishly acknowledges that it mistakenly inserted an additional "0" and decimal place into this figure (incorrectly identifying it as 0.000017 µg/L) in more than one location in its appeal briefing.

Order in an unpublished decision dated February 22, 2017.[18] In so doing, the court interpreted WAC 173-201A-260(3)(h) by deferring to the narrow interpretation preferred by Ecology and the Board, which excludes Method 1668C as a published superseding method that Ecology could consider for use in SIM's NPDES permit. The court also rejected Soundkeeper's closely-related assertion that RCW 90.48.520 prohibits Ecology from issuing SIM's NPDES permit with an effective total PCB effluent limitation at the PQL of Method 608, 0.5 µg/L.

IV. ARGUMENT

A. Standard of review

The Washington Administrative Procedure Act ("APA"), RCW Chapter 34.05, governs review.[19] This Court may overturn the Decision based on any of the nine grounds enumerated in the APA, including 1) the order is outside statutory authority or jurisdiction conferred by law upon the agency; 2) the agency has erroneously interpreted or applied the law; 3) the order is inconsistent with a rule of the agency; or 4) the order is arbitrary or capricious.[20] The party challenging an administrative order bears the burden of demonstrating its invalidity.[21]

---

[18] The court of appeals granted Soundkeeper relief on a second, distinct issue.
[19] *Port of Seattle v. Pollution Control Hearings Bd*., 151 Wn.2d 568, 587 (2004).
[20] RCW 34.05.570(3)(b), (d), (e), (h), and (i).
[21] RCW 34.05.570(1)(a).

When interpreting a statute, the Court's fundamental objective is discerning and implementing the legislature's intent.[22] This Court should not afford deference to an agency's interpretation of a statutory provision that is unambiguous, meaning not "susceptible to two or more reasonable interpretations."[23] Only where a statutory or regulatory provision is ambiguous and within an agency's area of expertise may the Court defer to an agency's interpretation.[24] However, the Court should not defer to such an agency's interpretation that "conflicts with legislative intent or is in excess of the agency's authority."[25] The "error of law" standard applies, allowing the Court to substitute its view of the law for the agency's.[26]

B. <u>If PCB effluent limit compliance monitoring can only be by Method 608, RCW 90.48.520 prohibits the issuance of the permit</u>.

Using Method 608 for total PCB compliance monitoring effectively raises the PCB effluent limitation to 0.5 µg/L, Method 608's PQL, which violates the RCW 90.48.520 prohibition on toxic discharges that cause violation of water quality standards. We know this because the Board rightfully determined that SIM's total PCB discharges must be

---

[22] *Burton v. Lehman*, 153 Wn.2d 416, 423 (2005); *State v. J.P.*, 149 Wn.2d 444, 450 (2003). Regulations are interpreted under the same rules. *Roller v. Dep't of Labor & Indus.*, 128 Wn.App. 922, 926 – 927 (2005).
[23] *Dot Foods, Inc. v. Dep't of Revenue*, 166 Wn.2d 912, 921 (2009).
[24] *Id.*
[25] *Silverstreak, Inc. v. Dep't of Labor & Indus.*, 159 Wn.2d 868, 884 (2007).
[26] *Puget Soundkeeper Alliance*, 189 Wn.App. at 136.

subject to a 0.00017 µg/L effluent limitation to prevent violations of applicable water quality standards.[27] "In no event," the RCW 90.48.520 prohibition's operative clause, is interpreted under the plain meaning rule as unambiguously, simply, absolutely, and strictly meaning "may not."[28]

Ecology's assertions that the SIM permit's total PCB effluent limitations are not really affected by the designation of Method 608 are spurious.[29] The permit itself makes this clear in footnote C to Condition S1.A, as does the deposition testimony of Ecology's designated representative.[30] The Board clarified that, "[i]f the effluent limit specified

---

[27] "Water quality standards" includes WAC Ch. 173-201, Sediment Management Standards. WAC 173-201A-010(4).

[28] *Abdul-Akbar v. McKelvie*, 239 F.3d 307, 312-14 (3d Cir. 2001) ("may not"); *Dubuc v. Johnson*, 314 F.3d 1205, 1207-08 (10th Cir. 2003) ("absolute bar"); *Caviness v. DeRand Res. Corp*., 983 F.2d 1295, 1301 (4th Cir. 1993) (plain meaning); *Short v. Belleville Shoe Mfg. Co*., 908 F.2d 1385, 1391 (7th Cir. 1990); *Aldrich v. McCulloch Props*., 627 F.2d 1036, 1042-43 (10th Cir. 1980) ("absolute bar"); *Santa Clara Valley Hous. Grp., Inc. v. United States*, No. 5:08-cv-05097-WHA, 2012 U.S. Dist. LEXIS 5651, at *4-6 (N.D. Cal. Jan. 18, 2012) ("unambiguous"); *Footbridge Ltd. Tr. v. Countrywide Fin. Corp*., 770 F. Supp. 2d 618, 624 (S.D.N.Y. 2011) (absolute plain language; "[s]imply put, the words 'in no event' mean what they say"); *Simmons v. United States*, 225 F.R.D. 688, 695 (N.D. Ga. 2004) (strictly enforced); *Calaway ex rel. Calaway v. Schucker*, 193 S.W.3d 509, 521 (Tenn. 2005); *Gilger v. Lee Constr.*, 820 P.2d 390, 397 (Kan. 1991) (absolute limit); *Kurr v. Cicero*, 601 N.E.2d 1233, 1236 (Ill. App. 1992) (mandatory); *Gen. Motors Acceptance Corp. v. McCallum*, 10 S.W.2d 687, 689 (Tex. 1928) ("under no circumstances").

[29] State's Answer to Amici Curiae Briefs of Spokane Riverkeeper and Squaxin Island Tribe (June 20, 2017) at 4.

[30] AR 3259; RP 61:7 – 62:16 ("Q. Question: 'So if the true concentration, let's say, is 50 nanograms per liter [0.0005 µg/L], it's going to be above the effluent limitations but below the practical quantitation limits and not be a permit violation; is that right?' Answer. A. 'That's correct.' … Q. Why when the numeric effluent limitation is less than the PQL and the MDL, were (sic) the required lab method is it appropriate to use the PQL and not the MDL for the effective numeric effluent limitation? A. Even though the limit is less than the MDL and the PQL, you would use the PQL because between the MDL and PQL, you do not know what the concentration is, so you do not know if it really exceeds the limit.").

in the 2013 Permit is less than PQL, then the effluent limit effectively becomes the PQL of the testing method."[31]

EPA identifies the test methods required for NPDES permits in 40 C.F.R. § 136, which also allows for deviations and provides a process for permitting the use of alternative methods.[32] Understandably, EPA does not consider or interpret the mandates of state statute in deciding which lab methods to specify in 40 C.F.R. § 136 for NPDES compliance testing. Ecology, in the first instance, and now this Court are charged with interpreting and enforcing the RCW 90.48.520 prohibition on toxic discharges that cause violation of water quality standards. The PCHB's unchallenged finding is that ensuring against violation of PCB water quality standards in the Duwamish requires the SIM NPDES permit total PCB effluent limitations be no higher than 0.00017 µg/L.[33] The Decision's allowance of compliance determinations by Method 608 effectively raises the maximum allowable PCB concentration in SIM's discharges to the Method 608 PQL of 0.5 µg/L. This discharge authorization falls squarely

---

[31] Board Order at 26; *Puget Soundkeeper Alliance v. Ecology*, PCHB No. 15-050, Order Granting Resp'ts' Mot. for Summ. J. (Jan. 6, 2016) at 4 – 5 ("The change in the detection method will impact the evaluation of whether the facility is in compliance with the Permit, because compliance with the Permit limits is actually determined by the sensitivity of the analytical testing method that is used to measure compliance." … "If the effluent limit specified in the Permit is less than the [PQL], then the effluent limit effectively becomes the [PQL] of the testing method.")
[32] 40 C.F.R. § 136.3 and .5.
[33] Board Order at 47; Decision at 4 – 5.

within the RCW 90.48.520 prohibition, and essentially mocks the policy of RCW 90.48.010 to have the state "vigorously" exercise its authority to determine for itself what level of water quality and pollution controls will be imposed. Nothing entitles SIM to an NPDES permit authorizing its pollution of the Duwamish. The law manifestly authorizes Ecology to deny permit authorization.[34] It must do so if permit conditions cannot ensure against violations of PCB water quality standards in the river.[35]

C. The Decision's deference to agency interpretation of WAC 173-201A-260(3)(h) is incorrect.

The court of appeals' deference to the narrow interpretation of WAC 173-201A-260(3)(h) proffered by Ecology and the Board cannot stand because it is contrary to rules of construction and because it impermissibly conflicts with the mandate and underlying intent of RCW 90.48.010 and RCW 90.48.520.[36] The regulation's reference to "superseding methods published" should not be limited to methods listed by EPA at 40 C.F.R. § 136.3, and should include Method 1668C.

---

[34] RCW 90.48.520; WAC 173-201A-510(1); *Puget Soundkeeper Alliance*, 189 Wn.App. at 138 and 149; *Oklahoma v. EPA*, 908 F.2d 595, 632 (10th Cir. 1990), *rev'd on other grounds sub nom. Arkansas v. Oklahoma*, 503 U.S. 91 (1992); *Natural Resources Defense Council, Inc. v. Costle*, 568 F.2d 1369, 1374-1375 (D.C. Cir. 1977).
[35] RCW 90.48.520; WAC 173-201A-240(1), -510(1); WAC 173-220-130(1)(b)(i).
[36] *Dep't of Labor & Indus. v. Granger*, 159 Wn.2d 752, 764 (2007); *Puget Soundkeeper Alliance*, 189 Wn.App. at, 136.

Ecology's selection of analytic methods in NPDES permits is subject to WAC 173-201A-260(3)(h), which provides three options:

> The analytical testing methods for these numeric criteria must be in accordance with [1] the *"Guidelines Establishing Test Procedures for the Analysis of Pollutants" (40 CFR Part 136)* **or** [2] **superseding methods published**. [3] [Ecology] may also approve other methods following consultation with adjacent states and with the approval of the USEPA.[37]

With regard to NPDES permit monitoring, Ecology's regulations also provide that it may establish "reasonable" effluent monitoring requirements, and must consider the precision and accuracy of analytical methods in applying numeric water quality criteria.[38]

While Method 608 is the only method for PCB analysis that EPA has included in 40 C.F.R. § 136.3 for NPDES compliance purposes, EPA subsequently developed and published Method 1668C to allow quantification of all 209 PCB congeners[39], and thus derivation of a true "total PCB" sample result, at low enough levels to allow comparison to similarly low total PCB water quality criteria.[40]

1. <u>Interpretation of WAC 173-201A-260(3)(h) must conform to rules of statutory construction.</u>

---

[37] WAC 173-201A-260(3)(h) (italics in original, bold emphasis added).
[38] WAC 173-201A-260(3)(g); WAC 173-220-210(1)(a).
[39] There are 209 different types or "congeners" of PCBs, differentiated by the number of chlorine atoms and their position on the carbon rings of the PCB molecules. *United States v. Union Corp.*, 259 F.Supp.2d 356, 375 (E.D. Pa. 2003).
[40] AR 2749 *et seq.*; 64 Fed.Reg. 61182, 61186; 77 Fed.Reg. 29757, 29763.

The narrow reading affirmed by the Decision – that a lab method cannot be "superseding" unless EPA adds it to the 40 C.F.R. § 136 list – renders WAC 173-201A-260(3)(h)'s second clause, "or superseding method published," superfluous contrary to a fundamental rule of construction because inclusion in § 136 is the sole criterion for -260(3)(h)'s first clause.[41] "Superseding methods published" must mean something distinct from inclusion by EPA in 40 C.F.R. § 136.3.

As the court of appeals recognized, the plain meaning of the term "supersede" includes "to take the place of and outmode by superiority: supplant and make inferior by better or more efficiently serving a function."[42] The Decision erred, however, in upholding Ecology's interpretation of the phrase "or superseding methods published" to mean "new *versions* of methods already included in 40 C.F.R. Part 136, not entirely new methods."[43] That interpretation impermissibly alters the plain language of the regulation by inserting language that is not there and circumscribing the plain meaning of the language that is.

---

[41] *State v. J.P.*, 149 Wn.2d at 450 ("Statutes must be interpreted and construed so that all the language used is given effect, with no portion rendered meaningless or superfluous." (citations omitted); *State v. Burke*, 92 Wn.2d 474, 478 (1979) (rules of statutory construction apply to regulations).
[42] Decision at 13-14.
[43] Decision at 13 – 14.

EPA intended Method 1668C to supersede Method 608 to meet modern PCB analysis needs. Method 608 was developed in the 1970s and measures the concentrations of various PCB aroclors.[44] Method 1668 was developed by EPA as a congener-based method for use in CWA programs to match the revision of the National Toxics Rule's PCB human health criteria from an aroclor-based criteria to a "Total PCB"-based criteria, which necessitates a congener-based analysis.[45] Measuring congeners instead of aroclors provides an advantage because aroclors weather and degrade from their original compositions with the passage of time, while the total of PCB congeners always captures all species of PCBs, no matter their mutations.[46] As EPA explicitly stated in April, 2010, it developed Method 1668C "for use in Clean Water Act (CWA) programs" and published Method 1668C "for users who wish to measure PCBs as congeners *now*" despite equally explicit recognition that EPA had yet to add Method 1668C to 40 C.F.R. § 136.3.[47] EPA thus published Method 1668C to take the place of Method 608, which is generally inadequate to measure compliance with PCB human health criteria and otherwise inferior to Method 1668C.

---

[44] AR 3226 – 3227. PCBs were manufactured as complex mixtures of individual congeners known as "aroclors." *Union Corp.*, 259 F.Supp.2d at 375.
[45] AR 2751, 3227; *Union Corp.*, 259 F.Supp.2d at 383.
[46] AR 3227; RP 64:19-67:10; *Union Corp.*, 259 F.Supp.2d at 375 – 376.
[47] AR 2751.

WAC 173-201A-260(3)(h) allows Ecology to specify Method 1668C as the compliance monitoring method for SIM's NPDES permit because the method is published, by EPA, and because it supersedes the 40 C.F.R. § 136-approved Method 608.

Indeed, the State's attempt to use the 40 C.F.R. § 136.3 list to straightjacket itself to the inadequately precise approved method would pervert that federal regulation into a rule directly contradicting the explicit federal policies behind mandating effluent limitations effective to prevent violation of water quality standards, particularly for toxics.[48] This cannot be EPA's intention.[49,50] Given the centrality to the NPDES permit regime of the federal water quality-protection mandate,[51] 40 C.F.R. § 136 can only have been intended to prevent the use of inferior lab analysis methods of inadequate precision or accuracy that would frustrate the objectives of

---

[48] 33 U.S.C. § 1251(a)(2) and (3); *Defenders of Wildlife v. Browner*, 191 F.3d at 1163.
[49] *See* AR 2751; *Natural Resources Defense Council v. U.S. EPA*, 966 F.2d 1292, 1300 (9th Cir. 1992) (courts presume EPA dutifully follows Congress's dictates); *Smith v. Brown*, 35 F.3d 1516, 1526 (Fed. Cir. 1994) (regulations must be construed to avoid conflict with a statute if fairly possible). *See also Bowles v. Seminole Rock & Sand Co.*, 325 U.S. 410, 414 (1945) (Court will invalidate an agency regulatory interpretation that is contrary to a federal statute); *Whitman v. Am. Trucking Ass'ns*, 531 U.S. 457, 485 (2001) ("EPA may not construe the statute in a way that completely nullifies textually applicable provisions . . .")
[50] Indeed, EPA explicitly stated that its decision to defer inclusion of Method 1668C in 40 C.F.R. § 136 "does not negate the merits of this method for the determination of PCB congeners in regulatory programs." AR 3587; RP 77:6 – 21; 82:13 – 83:9.
[51] *Natural Resources Defense Council v. U.S. EPA*, 915 F.2d 1314, 1316 – 1318 (9th Cir. 1990).

the federal regulatory regime. Ironically, frustration of this exact nature results from Ecology's insistence on Method 608 for the permit at issue.

2. Interpretation of WAC 173-201A-260(3)(h) must not negate RCW 90.48.010 and RCW 90.48.520, and should be guided by SEPA.

RCW 90.48.010 is a declaration of policy that, although without operative force itself, serves as an important guide in determining the intended effect of operative statutory and regulatory sections.[52] The Court should interpret the meaning of the RCW 90.48.520 prohibition and the provisions of relevant regulations, WAC Chapters 173-201A and 173-220, to ascertain and give effect to the intent of the legislature by looking at the statutory context as a whole.[53] The RCW 90.48.010 statement of purpose is "an important guide" in understanding this context.[54]

Indeed, RCW 90.48.010 could have been written to guide the Court in consideration of the precise issues presented by this case:

> It is declared to be the public policy of the state of Washington to maintain the highest possible standards to insure the purity of all waters of the state consistent with public health and public enjoyment thereof, the propagation and protection of wildlife, birds, game, fish and other aquatic life, and the industrial development of the state, and to that end require the use of all known available and reasonable methods by industries and others to prevent and control the pollution of the waters of the state of

---

[52] *Hearst Corp. v. Hoppe*, 90 Wash.2d 123, 128 (1978); *e.g., Puget Soundkeeper Alliance*, 189 Wn.App. at 136 and 142 – 149.
[53] *Burns v. City of Seattle*, 161 Wn.2d 129, 140 (2007); *Hartman v. Wash. State Game Com.*, 85 Wn.2d 176, 179 (1975).
[54] *In re Custody of M.W.*, 185 Wn.2d 803, 814 (2016); *Hartman*, 85 Wn.2d at 179.

> Washington. Consistent with this policy, *the state of Washington will exercise its powers, as fully and as effectively as possible, to retain and secure high quality for all waters of the state*. The state of Washington in recognition of the federal government's interest in the quality of the navigable waters of the United States, of which certain portions thereof are within the jurisdictional limits of this state, proclaims a *public policy of working cooperatively with the federal government in a joint effort to extinguish the sources of water quality degradation, while at the same time preserving and vigorously exercising state powers to insure that present and future standards of water quality within the state shall be determined by the citizenry, through and by the efforts of state government, of the state of Washington*.[55]

Blindly following EPA's lead in the crucial practicalities of pollution control contradicts this policy, particularly where, as here, it allows discharges expected to violate water quality standards for toxics.

Interpretation of Ecology's rules must also be consistent with its responsibilities under the State Environmental Policy Act ("SEPA"), Ch. 43.21C RCW.[56] SEPA "directs that, to the fullest extent possible; (1) The policies, regulations, and laws of the state of Washington shall be interpreted and administered in accordance with the policies set forth in this chapter."[57] Among those policies is recognition of "the responsibilities of each generation as trustee of the environment for succeeding generations," and recognition that "each person has a fundamental and

---

[55] RCW 90.48.010 (italics added).
[56] *Puget Soundkeeper Alliance*, 189 Wn.App. at 148.
[57] RCW 43.21C.030.

inalienable right to a healthful enhancement of the environment."[58] "Although these policies apply to the State generally, they speak with an insistent voice to the Department of Ecology."[59]

Ecology's position that it must use Method 608 rather than Method 1668C, affirmed by the Decision, impermissibly elevates a federal regulation, 40 C.F.R. § 136.1, and a cramped interpretation of a single state regulation, WAC 173-201A-260(3)(h), over the bedrock principles of state statute.[60] That Ecology may **not** issue an NPDES permit allowing toxic discharges that would violate water quality standards, as RCW 90.48.520 unequivocally demands, is also reflected by a number of specific and unambiguous state regulations demoted by the Decision. These include WAC 173-201A-240(1) (prohibiting the introduction into waters of toxic substances that have the potential to adversely affect characteristic water uses or public health, or cause toxicity), -240(2) (mandating the imposition on permittees of chemical testing requirements appropriate to evaluate compliance with the -240(1) standard), -510(1) (NPDES permits "must be conditioned so the discharge authorized will

[58] RCW 42.21C.020(2)(a) and .030.
[59] *Puget Soundkeeper Alliance*, 189 Wn.App. at 148.
[60] *ITT Rayonier, Inc. v. Dalman*, 122 Wn.2d 801, 807 (1993) (a term in a regulation should not be read in isolation but rather within the context of the regulatory and statutory scheme as a whole; statutory provisions must be read in their entirety and construed together, not by piecemeal).

meet the water quality standards" and that no permit can be issued that "causes or contributes to a violation of water quality criteria"), -510(1)(b) (permits must be modified if authorized discharge found to contribute to violation of water quality standards), WAC 173-220-130(1)(b)(i) (NPDES permits must apply and ensure compliance with limitations necessary to meet water quality standards), -130(2) (when only technology-based effluent limitations included in permit, a finding that authorized discharge will not violate water quality standards is required), and -150(1)(c) (discharge exceeding effluent limitation must be permit violation).

The elevation of the two monitoring regulations over the fundamental prohibition of RCW 90.48.520 and its implementing regulations represents an abdication of Ecology's power and assent to EPA's determination of water quality conditions in Washington, rather than the exercise of control by state government called for by RCW 90.48.010. No matter whether EPA considers PCB compliance monitoring by Method 608 satisfactory for federal CWA water quality protection mandates – state law charges Ecology with making determinations of protection adequacy itself with regard to water quality protection mandates of Washington statute.[61]

[61] RCW 90.48.520; WAC 173-201A-500; WAC 173-220-110.

Ecology's interpretation of WAC 173-201A-260(3)(h), wrongfully affirmed by the Decision, provides for issuance of an NPDES permit authorizing SIM's discharges at 0.5 µg/L total PCBs, far exceeding the 0.00017 µg/L effluent limitation that the Board found necessary to ensure against PCB water quality standard violations in the LDW. Strict compliance with water quality standards for toxics is exactly what RCW 90.48.520 unequivocally demands. Thus, an interpretation that actually allows higher PCB-concentration discharges plainly conflicts with the RCW 90.48.520 statutory mandate, and cannot be allowed.[62]

V. CONCLUSION AND REQUEST FOR RELIEF

For these reasons, and those set forth in Soundkeeper's court of appeals briefing, the Court should reverse the lower decision. Soundkeeper asks that the Court remand SIM's permit to Ecology with instructions to either deny permit issuance or condition permit issuance on EPA's approval, under 40 C.F.R. § 136.5 and in accord with WAC 173-201A-260(3)(h), to use of Method 1668C to ensure compliance with the PCB effluent limitation demanded by RCW 90.48.520 and its implementing regulations.

---

[62] *Dep't of Ecology v. Campbell & Gwinn, LLC*, 146 Wn.2d 1, 11-12 (2002) (construction must accord with statute's plain meaning, as confirmed by entire statutory scheme); *Puget Soundkeeper Alliance*, 189 Wn.App. at 136.

RESPECTFULLY SUBMITTED this 28th day of August, 2017

SMITH & LOWNEY, P.L.L.C.

By: _____
Richard A. Smith, WSBA No. 21788
Claire E. Tonry, WSBA No. 44497
Attorneys for Petitioner
Puget Soundkeeper Alliance

APPENDIX 1

Filed
Washington State
Court of Appeals
Division Two

February 22, 2017

IN THE COURT OF APPEALS OF THE STATE OF WASHINGTON

DIVISION II

PUGET SOUNDKEEPER ALLIANCE, Appellant, v. STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY; and STATE OF WASHINGTON POLLUTION CONTROL HEARINGS BOARD, Respondents.	No. 48267-3-II UNPUBLISHED OPINION

MAXA, A.C.J. – Puget Soundkeeper Alliance (Soundkeeper) appeals the decision of the Pollution Control Hearings Board (Board) to uphold in part a National Pollutant Discharge Elimination System (NPDES) permit issued by the Washington Department of Ecology (Ecology) to Seattle Iron and Metals (SIM) for SIM's wastewater and stormwater discharges into the Lower Duwamish Waterway. Soundkeeper challenges the permit provisions that (1) require discharges to be tested for polychlorinated biphenyls (PCBs)[1] using Method 608 instead of the more sensitive Method 1668C, and (2) establish limitations on copper and zinc levels in

[1] PCBs are a group of manmade chlorinated organic chemicals that contain multiple individual compounds ("congeners") and are highly toxic to humans and animals.

untreated stormwater discharges based on the benchmarks in Ecology's 2009 Industrial Stormwater General Permit (General Permit) instead of based on site-specific water quality standards for those substances.

We hold that (1) SIM's permit properly required the use of Method 608 for testing PCBs because we defer to Ecology's determination that Method 608 is the testing method approved by the United States Environmental Protection Agency (EPA) and allowed under Washington law; and (2) substantial evidence does not support the Board's conclusion that there was insufficient data to calculate site-specific water quality-based effluent limitations (WQBELs), and Washington law requires that SIM's discharges be subject to WQBELs instead of the less restrictive limitations based on the General Permit. Accordingly, we affirm in part and reverse in part the Board's decisions on the two challenged NPDES permit provisions. We remand to Ecology for revision of the effluent limitations for copper and zinc consistent with this opinion.

FACTS

SIM's Discharges into Lower Duwamish Waterway

SIM operates an auto shredding and metal recycling facility adjacent to the Lower Duwamish Waterway (LDW). The SIM facility is located in the LDW federal and state cleanup site, which includes the approximately 5.5 mile stretch of the Duwamish River that flows into Elliot Bay. The LDW is heavily contaminated because of major industrial activity in the area over the last 100 years. Ecology is the lead agency for source control at the LDW site.

SIM's operations produce two types of water that must be discharged from the facility. A mix of wastewater from SIM's operations and some stormwater (referred to as "outfall 001") is collected and treated before discharge. Stormwater runoff from rooftops and parking lots

(referred to as "outfall 002") is not treated before discharge. SIM discharges both the treated wastewater and the untreated stormwater into the LDW. SIM's discharges into the LDW are recognized as a possible source of contaminants in the LDW sediments.

NPDES Permit

Ecology first issued an NPDES permit specific to the SIM site in 2007. The 2007 permit imposed WQBELs for SIM's treated discharges from outfall 001, with numeric effluent limits for cooper, zinc, total PCBs, and other pollutants. That permit did not regulate SIM's discharge of untreated stormwater from outfall 002.

On September 16, 2013, Ecology issued an NPDES waste discharge permit to SIM relating to the discharges of both outfall 001 and outfall 002 into the LDW.[2] The permit imposed daily limitations for PCBs, copper, zinc, and other contaminants at both outfalls.

Regarding PCBs, the permit imposed daily limitations of 0.0089 micrograms per liter (µg/L) for outfall 001 discharges. That limitation was based on the PCB human health criteria of 0.00017 µg/L adjusted for a dilution factor for the "mixing zone," the area surrounding the discharge point where wastewater mixes with receiving water.[3] The permit stated that Method 8082A would be used to test PCB levels in outfall 001.[4]

---

[2] The permit was first issued in 2007, but NPDES permits expire after five years and must be reissued. On August 26, 2014, before the Board's review, Ecology modified certain portions of the permit. The Board reviewed the permit as modified, but still referred to it as the "2013 permit" in its ruling.

[3] Pollutant concentrations within mixing zones may exceed the numeric standards without penalty on the theory that the pollutants will dilute quickly into the receiving water.

[4] Before the Board hearing, Ecology modified the 2013 NPDES permit for outfall 001 and replaced the requirement to use Method 8082A with the requirement to use Method 608.

For outfall 002, the permit imposed a daily PCB limitation of 0.25 µg/L, significantly higher than the PCB human health criteria used for outfall 001. This limitation was determined based on the detection limit of Method 608, the EPA-approved analytical test that Ecology required for outfall 002 PCB testing. The limitation level represented the minimum value that Method 608 could detect.

Regarding copper and zinc, Ecology's permit writer Ed Abassi calculated WQBELs for outfall 001 using historical data from the site. But for outfall 002, Ecology had only two data points because that discharge had not previously been regulated. Instead of calculating WQBELs, Abassi imported numeric benchmark values from the 2009 General Permit. The General Permit is an NPDES permit that Ecology issued to regulate more than 1,000 facilities statewide that discharge industrial stormwater. Using the General Permit benchmarks, Ecology imposed daily limitations of 14 µg/L for copper and 117 µg/L for zinc in outfall 002 discharges.

Board Appeal

On October 14, 2013, Soundkeeper filed a petition for Board review of certain portions of SIM's permit. Soundkeeper challenged (1) the inclusion of a mixing zone for PCBs, (2) the imposition of different PCB limits for outfall 001 and outfall 002, (3) the use of Method 608 for PCB testing instead of more sensitive methods, and (4) the imposition of limits on copper and zinc levels for outfall 002 based on General Permit benchmark values instead of site-specific WQBELs. The Board reviewed the permit, as modified by Ecology, during a four-day hearing in March 2015.

The Board entered extensive findings of fact and conclusions of law. The Board agreed with Soundkeeper that Ecology could not grant a mixing zone for PCBs because the LDW was

known to be saturated by PCBs and PCBs do not dilute easily. The Board also agreed with Soundkeeper that there was no basis for Ecology to impose higher PCB limits for outfall 002 than for outfall 001. The Board remanded the permit to Ecology for correction of the discharge limitations for PCBs.[5]

However, the Board rejected Soundkeeper's two other challenges. The Board ruled that the use of Method 608 for PCB testing was consistent with existing law because Method 608 was the only method approved by the EPA. The Board also ruled that Ecology's use of the General Permit's benchmark values to impose limitations on daily copper and zinc levels in outfall 002 discharges was reasonable and that those limitations were consistent with applicable law. The Board deferred to Ecology's determination that it lacked sufficient data to develop site-specific limitations.

APA Appeal

Soundkeeper petitioned for judicial review in the superior court, and this court granted its petition for direct review of the Board's order. Ruling Accepting Direct Review, *Puget Soundkeeper All. v. Dep't of Ecology*, No. 45609-3-II, at 3 (Wash. Ct. App. Dec. 22, 2015).

ANALYSIS

A. STANDARD OF REVIEW

The Administrative Procedures Act (APA) governs our review of agency decisions, which includes decisions by the Board. RCW 34.05.510; *Cornelius v. Dep't of Ecology*, 182

[5] The Board did not state what PCB limitation should be imposed on remand for outfall 002. Presumably, the limitation will be the same as for outfall 001: 0.00017 µg/L.

Wn.2d 574, 584-85, 344 P.3d 199 (2015). We can provide direct review of an environmental board's decision if that board files a certificate of appealability. RCW 34.05.518(1).

Under the APA, we may grant relief from the Board's order based on one of nine reasons listed in RCW 34.05.570(3), including that the order is (1) outside the agency's statutory authority, (2) based on an erroneous interpretation or application of the law, (3) unsupported by substantial evidence, (4) inconsistent with an agency rule, or (5) arbitrary and capricious. RCW 34.05.570(3)(b), (d), (e), (h), (i). The party challenging the Board's decision has the burden of demonstrating the invalidity of that decision. RCW 34.05.570(1)(a).

We review questions of law and an agency's application of the law to the facts de novo. *Cornelius*, 182 Wn.2d at 585. We give great weight to an agency's interpretation of a statute when the statute is ambiguous and falls within the agency's area of expertise, if the interpretation does not conflict with the statutory language or intent. *Puget Soundkeeper All. v. Pollution Control Hr'gs Bd.*, 189 Wn. App 127, 136, 356 P.3d 753 (2015). We show the same deference to an agency's interpretation of its own regulations. *Id.* More specifically, Ecology's interpretation of environmental statutes is entitled to great weight "[g]iven that the legislature designated Ecology as the agency to regulate the State's water resources." *Snohomish County v. Pollution Control Hr'gs Bd.*, ____ Wn.2d ____, 386 P.3d 1064, 1075 (2016). And the Board's review of Ecology's actions also is entitled to deference. *Id.*

However, we are not bound by an agency's interpretation of the law. *Puget Soundkeeper All.*, 189 Wn.2d at 136; *see also* RCW 34.05.570(3)(d). "[D]eference to an agency is inappropriate where the agency's interpretation conflicts with a statutory mandate." *Dep't of Labor & Indus. v. Granger*, 159 Wn.2d 752, 764, 153 P.3d 839 (2007).

B. LEGAL PRINCIPLES

1. General Water Quality Policy

The goal of the federal Clean Water Act (CWA)[6] is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters" and attain water quality which provides for the protection and propagation of fish, shellfish, and wildlife. 33 U.S.C. § 1251(a)(2). The CWA expresses "the national policy that the discharge of toxic pollutants in toxic amounts be prohibited," 33 U.S.C. § 1251(a)(3), and states that "the discharge of any pollutant by any person shall be unlawful," except as authorized by specified statutory provisions. 33 U.S.C. § 1311(a).

The CWA prohibits any discharge of pollutants into the nation's waters unless the discharge is made according to the terms of an NPDES permit. 33 U.S.C. §§ 1311(a), 1342[7]. Congress authorized the EPA to delegate the NPDES permitting program to the states. 33 U.S.C. § 1342(b). The EPA delegated authority to Ecology to implement the NPDES permitting program in Washington. RCW 90.48.260(1). The legislature has recognized that Ecology has "[c]omplete authority to establish and administer" the program. RCW 90.48.260(1)(a); *Snohomish County*, 386 P.3d at 1067.

The Washington legislature also has adopted a water quality policy, which seeks to "maintain the highest possible standards to insure the purity of all waters of the state." RCW 90.48.010. And RCW 90.48.520 states, "In no event shall the discharge of toxicants be allowed

---

[6] The CWA's formal name is the Federal Water Pollution Control Act, 33 U.S.C. §§ 1251-1388.

[7] 33 U.S.C. § 1342 has been amended since the events of this case transpired. However, these amendments do not impact the statutory language relied on by this court. Accordingly, we do not include the word "former" before 33 U.S.C. § 1342.

that would violate any water quality standard, including toxicant standards, sediment criteria, and dilution zone criteria."

2. NPDES Permit Compliance with Water Quality Standards

Under federal law, NPDES permits must impose limits on discharges as necessary to meet water quality standards set by both state and federal statutes and regulations. 33 U.S.C. § 1311(b)(1)(C); *Snohomish County*, 386 P.3d at 1067. Specifically, State agencies may not issue NPDES permits if "the conditions of the permit do not provide for compliance with the applicable requirements of CWA, or regulations promulgated under CWA" or if "the imposition of conditions cannot ensure compliance with the applicable water quality requirements of all affected States." 40 C.F.R. § 122.4(a), (d).

Similarly, WAC 173-220-130(1)(b)(i) provides that any NPDES permit shall apply and ensure compliance with limitations necessary to "[m]eet water quality standards . . . pursuant to any state law or regulation." And WAC 173-201A-510(1) states that NPDES permits "must be conditioned so the discharges authorized will meet the water quality standards" and that no permit can be issued that "causes or contributes to a violation of water quality criteria."

These provisions demonstrate that the purpose of the NPDES permitting system is to ensure compliance with state water quality standards. *Port of Seattle v. Pollution Control Hr'gs Bd.*, 151 Wn.2d 568, 603, 90 P.3d 659 (2004). The Washington legislature has "in no uncertain terms" prohibited Ecology from issuing NPDES permits that allow discharges of toxic substances in violation of applicable standards. *Puget Soundkeeper All.*, 189 Wn. App at 138. As a result, "NPDES permits may be issued only where the discharge in question will comply with state water quality standards." *Port of Seattle*, 151 Wn.2d at 603.

Finally, WAC 173-220-150(1)(c) provides that each NPDES permit shall require that "*[a]ny discharge of any pollutant* . . . at a level in excess of that identified and authorized by the permit" constitutes a violation of permit terms and conditions. (Emphasis added.) Under this regulation, NPDES permits must require that *each discharge* comply with applicable water quality regulations. *See Puget Soundkeeper All.*, 189 Wn. App at 138.

3. Washington Water Quality Standards

Washington has developed its own water quality standards. *Port of Seattle*, 151 Wn.2d at 590. These standards include narrative water quality statements and numeric criteria for toxic substances. *Id.*

WAC 173-201A-240(1) provides the narrative water quality standard governing discharges of toxic substances.[8]

> Toxic substances shall not be introduced above natural background levels in waters of the state which have the potential either singularly or cumulatively to adversely affect characteristic water uses, cause acute or chronic toxicity to the most sensitive biota dependent upon those waters, or adversely affect public health, as determined by the department.

See also Puget Soundkeeper All., 189 Wn. App at 138-39.

WAC 173-201A-240(5) and the attached Table 240 provide specific numeric water quality standards for numerous toxic substances. The human health criteria for PCBs is 0.00017 µg/L. WAC 173-201A-240(5), tbl.240. The toxic substances criteria for marine water aquatic life for

[8] WAC 173-201A-240 has been amended since the events of this case transpired. However, these amendments do not impact the statutory language relied on by this court. Accordingly, we do not include the word "former" before WAC 173-201A-240.

copper is 4.8 µg/L (acute) and 3.1 µg/L (chronic) and for zinc is 90 µg/L (acute) and 81 µg/L (chronic).[9] WAC 173-201A-240(5), tbl.240.

C. USE OF METHOD 608 FOR TESTING PCB LEVELS

SIM's NPDES permit requires the use of Method 608, an EPA-approved PCB testing method, to measure PCBs in discharges from outfall 002. But the minimum detection limit of Method 608 is only 0.25 µg/L and Method 608 has a practical quantitation limit (PQL) of 0.5 µg/L.[10] This PQL is significantly higher than the PCB human health criteria of 0.00017 µg/L.[11]

Soundkeeper argues that Ecology violated Washington law by issuing an NPDES permit that required the use of Method 608, because that method is not sensitive enough to determine whether SIM's discharges violated the applicable water quality standard for PCBs. Soundkeeper claims that Ecology could not lawfully have issued the permit unless it specified the use of Method 1668C, a more sensitive test that can quantify PCB concentrations in the range of the water quality standard. Ecology argues that it was required to specify Method 608 in the permit under WAC 173-201A-260(3)(h) because it is the only testing method approved by the EPA. We agree with Ecology.

---

[9] "Acute" refers to short-term exposure, and "chronic" refers to long-term exposure. WAC 173-201A-020. The permit's "daily" limits relate to acute limits.

[10] The PQL represents the lowest level at which a pollutant concentration *reliably* can be quantified.

[11] Ecology imposed an effluent limitation for PCBs of 0.25 µg/L on outfall 002 discharges based on the minimum detection limit of Method 608. However, the Board ruled that this high detection limit did not justify imposing a higher effluent limit than the 0.00017 µg/L limitation for outfall 001. The Board remanded to Ecology for the revision of effluent limits for PCBs. Presumably, on remand Ecology will impose the 0.00017 µg/L limitation for outfall 002.

1. Legal Principles

Under federal law, monitoring must be done using "sufficiently sensitive" test methods. 40 C.F.R. § 122.44(i)(1)(iv). A method is sufficiently sensitive when either (1) the method minimum level is at or below the effluent limit established in the permit for the measured pollutant or (2) the method has the lowest minimum level of the analytical methods approved under 40 C.F.R. part 136 for the measured pollutant. 40 C.F.R. § 122.44(i)(1)(iv)(A)(1)-(2).

Washington law provides additional regulations regarding testing methods. WAC 173-201A-260(3) outlines how Ecology should set and measure water quality criteria. When setting numeric criteria for water quality, Ecology "will give consideration to the precision and accuracy of the sampling and analytical methods used, as well as the existing conditions at the time." WAC 173-201A-260(3)(g). Further, WAC 173-201A-260(3)(h) provides:

> The analytical testing methods for these numeric criteria must be in accordance with the '"*Guidelines Establishing Test Procedures for the Analysis of Pollutants*'" (*40 C.F.R. Part 136*) or superseding methods published. [Ecology] may also approve other methods following consultation with adjacent states and with approval of the [EPA].

This regulation allows the use of a testing method that is (1) listed in 40 C.F.R. Part 136, (2) a superseding method that has been published, or (3) approved for use by Ecology following consultation with the EPA.

Method 608 is listed in 40 C.F.R. Part 136 for monitoring PCBs, but Method 1668C is not. 40 C.F.R. 136, app. A. And Ecology has not approved Method 1668C for testing PCBs.

The EPA developed Method 1668C with the intention of listing it as an approved PCB testing method in 40 C.F.R. Part 136. The EPA also "published" Method 1668C for use in CWA programs. In April 2010, the EPA stated:

> The Office of Science and Technology (OST) in EPA's Office of Water developed Method 1668C . . . for use in Clean Water Act (CWA) programs. *EPA is publishing this Method* for users who wish to measure PCBs as congeners now, and in 2010, EPA expects to publish a proposal in the *Federal Register* for public comment to add this Method to other CWA Methods published at 40 CFR Part 136.

Administrative Record (AR) at 2751 (emphasis added).

Although the EPA proposed rulemaking to add Method 1668C to the list in 40 C.F.R. Part 136, it chose not to add the method. The EPA did not reject Method 1668C, but merely deferred approval. The EPA noted that it "is aware that this method is being used in some states in their regulatory programs and by other groups for some projects with good success." AR at 3587. But the EPA stated that it was "still evaluating the large number of public comments and intends to make a determination on the approval of this method at a later date. . . . This decision does not negate the merits of this method for the determination of PCB congeners in regulatory programs." AR at 3587.

2. Interpretation of WAC 173-201A-260(3)(h)

The Board concluded that Ecology's specification of Method 608 as the PCB testing method in SIM's NPDES permit was consistent with WAC 173-201A-260(3)(h) because Method 608 is the only method the EPA has approved. Soundkeeper argues that Ecology could have required Method 1668C for PCB testing because that method qualifies as a "superseding method[] published" under WAC 173-201A-260(3)(h).

To interpret agency regulations, we apply the same principles used to interpret statutes. *Puget Soundkeeper All.*, 189 Wn. App. at 136. Statutory interpretation is a matter of law that we review de novo. *Jametsky v. Olsen*, 179 Wn.2d 756, 761, 317 P.3d 1003 (2014). The purpose of statutory interpretation is to determine and give effect to the legislature's intent. *Gray v. Suttell*

& Assocs., 181 Wn.2d 329, 339, 334 P.3d 14 (2014). To determine legislative intent, we first look to the plain language of the statute, considering the text of the provision, the context of the statute, related provisions, and the statutory scheme as a whole. *Id.* If a statutory term is undefined, we may use a dictionary to determine its plain meaning. *Nissen v. Pierce County*, 183 Wn.2d 863, 881, 357 P.3d 45 (2015).

The parties apparently agree that Method 1668C is a "published" method. The question is whether Method 1668C is a "superseding" method. WAC 173-201A-260(3)(h) does not define the term "superseding." Supersede has numerous dictionary definitions, including "[1] to make obsolete, inferior, or outmoded, [2] to make superfluous or unnecessary, [3] to take the place of and outmode by superiority: supplant and make inferior by better or more efficiently serving a function." WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY 2295 (2002).

Soundkeeper argues that Method 1668C falls within the definition of a superseding method. Method 1668C has a PQL as low as 0.000022 µg/L.[12] Method 608's PQL is only 0.5 µg/L. Because Method 1668C's detection limit is much lower than Method 608's detection limit, Method 1668C can be considered a superior testing method that can take the place of Method 608.

But Ecology emphasizes that the EPA decided not to add Method 1668C to the list in 40 C.F.R. Part 136, and therefore Method 1668C cannot be said to have "superseded" the approved Method 608. Method 608 is not "superfluous or unnecessary" because it is still the only EPA-approved testing method. Ecology also argues that WAC 173-201A-260(3)(h)'s reference to a

[12] Method 1668C tests each of the 209 congeners that comprise the total PCBs individually, so the PQL may vary among the congeners.

superseding method refers only to new *versions* of methods already included in 40 C.F.R. Part 136, not entirely new methods.

The term "superseding method" is ambiguous. But Ecology and the Board have interpreted WAC 173-201A-260(3)(h) as not applying to Method 1668C. Because the regulation is ambiguous and its interpretation falls within Ecology's area of expertise, we will defer to Ecology's interpretation of its own regulation.[13] *See Snohomish County*, 386 P.3d at 1075.

We hold that under Ecology's interpretation of WAC 173-201A-260(3)(h), Method 1668C is not a published superseding method, and therefore Ecology could not consider that method for use in SIM's NPDES permit.

3. Use of Method 608

Soundkeeper also argues that even if Method 608 is the only approved method for testing PCBs, Washington law precludes Ecology from using Method 608 because it is not sensitive enough to enforce compliance with water quality standards. Soundkeeper's position is that Ecology's only lawful option is to refuse to issue the NPDES permit. We disagree.

The human health criteria for PCBs is 0.00017 µg/L. WAC 173-201A-240(5), tbl.240. Ecology adopted that standard as the effluent limitation for outfall 001, and the Board ruled that there was no justification for a higher effluent limitation at outfall 002. The problem is that Method 608 has a PQL of 0.5 µg/L. This means that Method 608 cannot detect when the PCB levels in SIM's discharges are higher than the 0.00017 µg/L limitation but less than 0.5 µg/L.

[13] Under WAC 173-201A-260(3)(h), Ecology also could use Method 1668C in NPDES permits if it approved that method after consulting with adjacent states and with the approval of the EPA. But the regulation states that Ecology "may" give such approval, WAC 173-201A-260(3)(h), and the Board noted that it had no authority to require Ecology to seek EPA approval of a different method.

Therefore, Soundkeeper argues that the use of Method 608 is improper because it potentially would allow SIM to discharge PCBs in concentrations that would violate the water quality standards in its NPDES permit.

But Soundkeeper's argument is inconsistent with federal and state law regarding testing methods. Federal law requires that monitoring be done using "sufficiently sensitive" test methods. 40 C.F.R. § 122.44(i)(1)(iv). Under 40 C.F.R. § 122.44(i)(1)(iv)(A)(2), a method is sufficiently sensitive when it has the lowest minimum level of the analytical methods approved under 40 C.F.R. part 136 for the measured pollutant. Method 608 is the only approved method for PCBs, and therefore it necessarily is the method with the lowest minimum level.

We hold that it is lawful for Ecology to issue an NPDES permit that calls for the use of Method 608 to test PCBs.

D. EFFLUENT LIMITATIONS FOR COPPER AND ZINC IN OUTFALL 002

In developing effluent limitations for copper and zinc discharges from outfall 002, Ecology imported numeric benchmark values from the 2009 General Permit. Use of the General Permit benchmarks resulted in daily effluent limitations of 14 µg/L for copper and 117 µg/L for zinc. These limitations are significantly higher than what Soundkeeper asserts site-specific WQBELs would be – daily limits of 4.8 µg/L for copper and 90 µg/L for zinc.

Soundkeeper argues that the Board erred in allowing Ecology to use copper and zinc limitations taken from the General Permit, which it characterizes as technology-based limitations, instead of calculating site-specific WQBELs. Ecology argues that the permit had to apply copper and zinc limitations taken from the General Permit because there was insufficient data for the permit writer to calculate site-specific WQBELs. Ecology also claims that the

General Permit limitations were water quality-based, not technology-based. We agree with Soundkeeper.[14]

1. Imposition of Effluent Limitations

When addressing the discharge of pollutants in an NPDES permit, Ecology must first determine whether an effluent limitation is required. An NPDES permit must contain effluent limits for a pollutant if there is a reasonable potential that a discharge will contain the pollutant in excess of water quality standards. 40 C.F.R. § 122.44(d)(1)(iii). A permit writer determines if an effluent limitation must be included in the permit by conducting a reasonable potential analysis: whether a facility's discharge will cause, has the reasonable potential to cause, or will contribute to a violation of water quality standards. 40 C.F.R. 122.44(d)(1)(ii), (iv).

Ecology's Permit Writer's Manual contains instructions for conducting a reasonable potential analysis. In order to perform a statistical reasonable potential analysis, a permit writer must develop an estimate of variability over time for each pollutant in a discharge. The most commonly used estimator is the coefficient of variation (CV), which is based on site discharge data. The CV is also used in the formula for calculating effluent limits for a permit.

Here, permit writer Abassi stated that in order to accurately calculate a CV, he needed at least 10 to 12 data points. But only two data points from SIM's outfall 002 discharge were available. Abassi testified that based on the lack of outfall 002 data, he could not calculate a CV and therefore could not perform a statistical reasonable potential analysis.

[14] The Board stated that Ecology considered the copper and zinc limitations to be interim limitations. Soundkeeper argues, and Ecology concedes, that the technology-based copper and zinc limits cannot be justified as interim limits because they are not part of a compliance schedule.

However, the Board concluded that Ecology actually *did* perform a reasonable potential analysis and determined that SIM's outfall 002 discharges had the reasonable potential to exceed water quality standards. The Board stated that although Abassi did not perform a statistical calculation of reasonable potential, he nevertheless decided that effluent limitations were necessary. And the Board noted that Abassi's supervisor testified that Abassi's evaluation of the outfall 0002 discharge was the equivalent of a reasonable potential analysis.

Ecology does not dispute the Board's conclusion that Abassi essentially conducted a reasonable potential analysis and that effluent limitations were required for zinc and copper for outfall 002 in SIM's NPDES permit. The question here is how to calculate those limitations.

2. Calculation of Effluent Limitations

Once Ecology determines that an effluent limitation is required, it next must determine the level of that limitation. Ecology claims that Abassi had insufficient data to develop WQBELs for copper and zinc at outfall 002. Abassi testified that because he could not calculate a CV, he could not calculate site-specific effluent limits. The Board deferred to "Ecology's technical determination that it lacked sufficient monitoring data for SIM's untreated stormwater discharge to develop site-specific numeric effluent limits." Clerk's Papers (CP) at 50. And the Board concluded that Abassi's decision to rely on the General Permit under these circumstances was reasonable.

Under the APA, we may grant relief from an agency order if it is not supported by substantial evidence. RCW 34.05.570(3)(e). Substantial evidence does not support the Board's conclusion for three reasons. First, Ecology did not make a "technical determination" that it had insufficient data to develop site-specific limitations. Abassi did testify about the absence of

sufficient data, but primarily in the context of his inability to calculate a CV for a specific effluent limit and to conduct a statistical reasonable potential analysis.

Ecology points to Abassi's statement that he would not use two data points "for enforcement or for limit." Report of Proceedings at 537. But this is Abassi's only reference to insufficient data in the context of developing effluent limitations. Further, Abassi did not expressly state that he was forced to use the General Permit benchmarks because he had insufficient data. He simply stated that the effluent limits in the permit came from the General Permit and that they seemed accurate and protective. This testimony did not establish a "technical determination that it lacked sufficient monitoring data" to develop site-specific limitations. CP at 50.

Second, the evidence shows that Abassi could have calculated site-specific WQBELs for outfall 002 despite the lack of data. Soundkeeper's expert, Allan Chartrand, testified that effluent data was not necessary to calculate water quality-based limits for an NPDES permit. Ecology's Permit Writer's Manual states that when there are fewer than 20 data points available to calculate a CV, a default CV of 0.6 may be used instead of a calculated CV. Therefore, Abassi could have calculated site-specific WQBELs using the default CV. Ecology does not address why this default CV was not used.

Third, Abassi testified that assuming a finding of reasonable potential, he could have determined the WQBELs for outfall 002. He stated that he would have used the human health calculations in Ecology's fact sheet: water quality standards for copper of 4.8 µg/L (acute) and 3.1 µg/L (chronic) and water quality standards for zinc of 90 µg/L (acute) and 81 µg/L (chronic). Because the Board found that Ecology had determined that SIM's discharges had the reasonable

potential to exceed water quality standards, this testimony means that Abassi did have sufficient information to determine site-specific WQBELs for outfall 002.

We hold that the Board's conclusion that Ecology lacked sufficient data to develop site-specific effluent limits for outfall 002 is not supported by sufficient evidence. Because this conclusion depends on an evaluation of the applicable facts rather than an interpretation of statutes or regulations, we do not give special deference to Ecology or the Board on this issue. *See Port of Seattle*, 151 Wn.2d at 594 (stating the standard of review for factual findings inherently includes an element of deference to the Board). As a result, we hold that the Board erred in concluding that Abassi acted reasonably when he relied on the General Permit.

3. Inadequacy of NPDES Permit Limitations

The Board concluded that the effluent limits in the NPDES permit for copper and zinc, which were based on the General Permit benchmarks, were consistent with applicable law. Soundkeeper argues that Washington law requires Ecology to use the lower site-specific WQBELs instead of the higher General Permit limitations. We agree with Soundkeeper.

Initially, Ecology argues that the limitations based on the General Permit were consistent with applicable law because they were in fact water quality-based limitations. Ecology claims that these limitations are water quality-based because the General Permit benchmarks involved pollutant discharge levels that would not exceed water quality standards for the likely pollutants found in industrial stormwater and were designed to protect water quality in the majority of receiving water conditions.

However, the Board referred to the limitations based on the General Permit benchmark as technology-based limits. Ecology does not challenge the Board's reference to the permit

limitations as technology-based. In addition, Ecology's own fact sheet for SIM's NPDES permit refers to the limitations as technology-based.

More significantly, even if the General Permit limitations were based on water quality standards generally applicable to all industrial dischargers, Ecology does not explain why those limitations complied with Washington law. The evidence shows that the limitations Ecology imposed do not comply with the specific water quality standards applicable here.

Both Abassi and Chartrand' testified that properly calculated WQBELs for the 002 outfall would have been the same as the water quality criteria in WAC 173-201A-240(5), Table 240: 4.8 µg/L (acute) and 3.1 µg/L (chronic) for copper and is 90 µg/L (acute) and 81 µg/L (chronic) for zinc.[15] But the permit limitations were significantly higher: daily limitations of 14 µg/L for copper and 117 µg/L for zinc. Therefore, SIM's NPDES permit would allow the discharge of pollutants in concentrations that would far exceed established water quality standards.

As stated above, Washington law is clear that Ecology cannot issue NPDES permits that would allow discharges of toxic substances that would violate applicable water quality standards. RCW 90.48.520; *Port of Seattle*, 151 Wn.2d at 603; *Puget Soundkeeper All.*, 189 Wn. App at 138. Therefore, we hold that the Board erred in concluding that the effluent limitations in SIM's NPDES permit – which were significantly higher than the water quality standards – were consistent with applicable law.

[15] Normally the water quality criteria are adjusted to account for a mixing zone and dilution to develop WQBELs. But for the untreated wastewater at outfall 002, there was no mixing zone and no dilution factor. This means that the water quality criteria would have been the effluent limit.

CONCLUSION

We affirm in part and reverse in part the Board's rulings on the proper PCB testing method and on the effluent limitations for copper and zinc. We remand to Ecology for revision of the effluent limitations for copper and zinc consistent with this opinion.

A majority of the panel having determined that this opinion will not be printed in the Washington Appellate Reports, but will be filed for public record in accordance with RCW 2.06.040, it is so ordered.

MAXA, A.C.J.

We concur:

WORSWICK, J.

SUTTON, J.

POLLUTION CONTROL HEARINGS BOARD
STATE OF WASHINGTON

PUGET SOUNDKEEPER ALLIANCE, Appellant, v. STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY; and SEATTLE IRON & METALS CORP., Respondent.	PCHB No. 13-137c FINDINGS OF FACT, CONCLUSIONS OF LAW, AND ORDER

INTRODUCTION

Puget Soundkeeper Alliance (PSA) appealed the National Pollutant Discharge Elimination System Waste Discharge (NPDES) Permit No. WA0031968 (Permit), issued by the Department of Ecology (Ecology) to Seattle Iron & Metals Corporation (SIM) for the discharge of wastewater and stormwater to the Lower Duwamish Waterway (LDW).

PSA asserts that the effluent limitations and conditions included in SIM's Permit violate applicable law and are insufficient to protect both surface water and sediment quality in the LDW. Prior to the hearing, PSA filed a motion for partial summary judgment which sought to invalidate the Permit on multiple grounds. The Pollution Control Hearings Board (Board) determined that genuine issues of material fact precluded a ruling on summary judgment.

The Board held a hearing in this matter on March 16-19, 2015, at its offices in Tumwater, Washington. The members of the Board hearing the matter were Chair Joan M. Marchioro, Kay M. Brown, and Thomas C. Morrill, with Administrative Appeals Judge Kristie C. Elliott

presiding at the hearing. Attorneys Richard A. Smith and Claire E. Tonry represented PSA. Assistant Attorney General Gordon Karg represented Ecology. Attorneys Stephen Parkinson and Matthew J. Stock represented SIM. Pennington Court Reporting provided court reporting services.

The Board received the sworn testimony of witnesses, admitted exhibits, and heard arguments on behalf of the parties. Written closing arguments were filed on April 6, 2015. Having fully considered the record, the Board enters the following:

FINDINGS OF FACT

1.

SIM operates an auto shredding and metal recycling operation on multiple adjacent properties on the east bank of the LDW near River Mile (RM) 2.5. Ex. E-11. SIM has operated on the LDW since moving to this general location in 1999. Operations on-site include the mechanical reduction and extraction of recoverable metal from auto shredder residue. Recovered metals are stockpiled, handled, sorted, and sold for use by other processors, while the non-metallic portion of auto shredder residue is disposed of at a landfill. As part of these operations, SIM discharges wastewater and stormwater to the City of Seattle's storm drain system, which then discharges to the LDW. Ex. E-2 at 5-8.

2.

PSA is a nonprofit citizen's organization founded in 1984 with the mission to preserve and protect the waters of Puget Sound. PSA has an interest in ensuring that discharge permits will be protective of the water and sediment quality, and that permit terms and conditions are

clearly and effectively tailored for purposes of enforcement. PSA patrols the Duwamish Waterway by boat in order to monitor discharges to the river. Wilke Testimony; Frederickson Testimony. During its patrols near SIM's facility, PSA members have observed SIM's discharge foaming or creating a colored film on the water and scrap metal from SIM's grabber falling into the LDW. Fredrickson Testimony; Exs. P-61, P-62, P-63.

3.

In conjunction with upland sources of contamination, the LDW constitutes a designated cleanup site under state and federal law, known as the LDW Site. The LDW Site is the approximately 5.5 mile stretch of the Duwamish River that flows into Elliot Bay. Ex. E-2 at 8. The LDW has served as Seattle's major industrial corridor since the early 1900s. Its heavy industrial use over the past century resulted in extensive contamination of the waterway. Exs. E-2 at 8-9, E-8 at 1-2. On September 13, 2001, the U.S. Environmental Protection Agency (EPA) placed the LDW Site on the National Priorities List, the list of the nation's most contaminated sites. Certain portions of the Duwamish Waterway are also listed on the state's 303(d) list, which Ecology prepares under the federal Clean Water Act (CWA), 33 U.S.C. § 1313(d), to identify water bodies that do not meet water quality standards. Chartrand Testimony; Exs. P-90, P-91. Source investigations and remedial actions for the LDW Site are ongoing. Exs. E-8 at 1, P-95 at 4.

4.

Hazardous substances can be found at elevated levels in LDW sediments and in fish and shellfish tissue in the LDW. Exs. E-8 at 22-31, P-89 (Tables 26, 28, 30), P-94 (Table A-1). The

four types of contaminants that pose the greatest risk to human health in the LDW are arsenic, polycyclic aromatic hydrocarbons (PAHs), dioxins/furans, and polychlorinated biphenyls (PCBs). Ex. E-8 at 39.

5.

PCBs are man-made chemicals that were widely used in electric transformers, hydraulic fluids, paint additives, plasticizers, adhesives, and fire retardants prior to being banned in the late 1970s. They are highly toxic and persist in the environment. They also bioaccumulate and biomagnify, which means they increase in concentration both in individual organisms and with each successive level of the food chain. PCBs do not readily dissolve in water but rather accumulate in fatty tissue in living organisms and in sediments or particulates in the organic substrate. Exposure to PCBs is linked to liver toxicity in adults, and thyroid dysfunction and adverse developmental effects in children exposed in the womb. Chartrand Testimony; Ex. P-95 at 9, 15.

6.

Due to elevated levels of PCBs found in LDW seafood tissue, the Washington Department of Health (DOH) concluded that "[e]ating even minimal amounts of resident seafood from the LDW would result in exposure to PCBs at levels of public health concern. For this reason, consumption of LDW resident seafood (fish and shellfish that live in the LDW) is a *public health hazard*." Ex. P-95 at 9 (emphasis original). A DOH-issued Fish Advisory is now in place warning the public not to eat resident fish, shellfish, or crab from the Duwamish River. Exs. P-97, P-98.

7.

A coordinated federal-state strategy for cleaning up the LDW Site is underway. The overall approach includes: (1) early identification and cleanup of the most contaminated areas of the waterway, (2) controlling sources of contamination to the waterway, and (3) implementation of a final cleanup remedy for the In-waterway Portion of the Site. Ex. E-8 at 1.

8.

EPA is the lead agency for investigation and cleanup of the In-waterway Portion of the Site under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. § 9601. In November of 2014, EPA issued a Record of Decision that selected the final remedy for the In-water Portion of the LDW Site. The Selected Remedy includes dredging and capping of the most contaminated areas that remain in the waterway, application of enhanced natural recovery for areas with more moderate contamination, and reliance on monitored natural recovery to further reduce concentrations over time in areas with lesser contamination. Ex. E-8 at 119-20. "The intent of the Selected Remedy is to reduce contaminant concentrations in sediments, surface water, and fish and shellfish tissue to the extent practicable, and to minimize reliance on fish and shellfish consumption advisories to reduce human exposure from ingestion of contaminated resident fish and shellfish." Ex. 8 at 13. The goal is also that "[o]ver time, the integrated approach of CERCLA and longer-term clean water actions is expected to result in attainment of applicable surface water quality criteria and uses designated under the CWA." Ex. E-8 at 14. The designated uses under the CWA for the LDW include fish and shellfish harvesting. E-8 at 34.

9.

Ecology is the lead agency for source control for the LDW Site. Ex. P-88 at 3. "The source control strategy focuses on controlling contamination that affects LDW sediments." *Id*. at 4. Ecology released a broad plan entitled "LDW Source Control Strategy" in 2004, followed by a more specific "East Source Control Action Plan for RM 2.3-2.8" in 2009. Mercury, PCBs, PAHs, dioxins/furans, and organo-tin compounds are considered to be the major contaminants of concern in sediments associated with RM 2.3–2.8. Exs. P-85, P-88.

10.

The area near SIM is not slated for active cleanup of PCBs in sediment and is not on the 303(d) list for PCBs. McCrea Testimony, Shervey Testimony. SIM's materials acceptance policy disallows the acceptance of any material knowingly containing PCBs. Geiselbrecht Testimony. However, sediment samples collected in the LDW indicate the presence of PCBs near the SIM facility at concentrations above the Sediment Quality Standards, WAC 173-204-300, -350. Exs. P-15 at 3, P-88 at 29; Chartrand Testimony.

11.

While there are numerous historic sources for the PCBs in the LDW and the presence of contaminants in sediment near the SIM facility could be related to past operations by previous property owners and/or other businesses in the area, PCBs are found in the types of materials processed by SIM. As a result, SIM is recognized as a potential source of contaminants that may contribute to recontamination of sediments at or near its facility. McCrea Testimony, Horner Testimony, Geiselbrecht Testimony; Ex. P-88 at 23-31. Elevated levels of PCBs have been

found in stormwater drainage facilities and other surface locations onsite or in SIM's vicinity. Although additional sources contribute stormwater to these drainage facilities, EPA and the City of Seattle have indicated there is a need to implement effective source control measures at SIM's facility. Exs. P-15, P-21, P-26.

12.

Prior to 2007, SIM's discharge to the LDW was authorized under the Industrial Stormwater General Permit (ISGP) in effect at the time. Starting in 2007, Ecology issued individual NPDES permits to SIM. Abbasi Testimony. The NPDES permit issued to SIM in 2007 (2007 Permit) imposed water quality-based effluent limitations (WQBELs) for SIM's treated discharges to Outfall 001, with numeric effluent limits for copper, lead, zinc, total PCBs, and total petroleum hydrocarbons. Ex. P-4 at 5. The 2007 Permit did not authorize a mixing zone for the treated discharge and did not regulate SIM's discharge of untreated stormwater. Ex. P-4.

13.

SIM's failure to meet certain effluent limits in the 2007 Permit resulted in Ecology issuing a Notice of Violation and Administrative Order (Order) in July 2008. Ex. E-2 at 1. The Order covered SIM's violations of the 2007 Permit effluent limits occurring between December 2007 and June 2008 and for an unauthorized discharge. *Id.* at 12-14. Addressing some of the noncompliance issues, SIM made several improvements to its treatment system. Geiselbrecht Testimony. The improvements included increasing detention capacity, improving the filtration system and adding pretreatment. *Id.*

14.

The individual NPDES Permit issued to SIM in 2013 (2013 Permit) is at issue in this appeal. The 2013 Permit was subsequently modified and reissued in 2014.[1] Ex. E-2 at 11-12. The 2013 Permit's effective period runs from October 1, 2013 to October 1, 2018. Ex. E-1. *Id.* at 25.

15.

The 2013 Permit covers two separate effluent streams that originate from SIM's facility and which are physically combined prior to discharge. The first effluent stream, Outfall 001, includes stormwater and some processed wastewater from SIM's industrial areas and the roof of its maintenance building. This effluent is treated prior to discharge (treated wastewater). The second effluent stream, Outfall 002, includes stormwater from most facility roofs and a parking lot. The effluent from Outfall 002 is not treated prior to discharge (untreated stormwater). Ex. E-2 at 5-8.

16.

An NPDES permit writer must determine whether effluent limits are necessary for a facility's discharges. Ecology's Water Quality Permit Writer's Manual (Manual) and EPA's Technical Support Document provide guidance for determining whether an effluent limit is necessary and, if so, how to calculate such a limit. Exs. E-4 at VII-8-VII-17; P-108 at 50-51.

[1] The Board consolidated for review the two appeals brought by PSA on the Permit's issuance and reissuance in 2013 and 2014, respectively, and this decision will refer to the Permit as the "2013 Permit." Ecology also modified the Permit on March 12, 2015, which is the subject of a separate appeal by PSA. *Puget Soundkeeper Alliance v. Ecology*, PCHB No. 15-050. The Board's decision in this case only considers the 2013 Permit as modified in 2014, and does not address the 2015 Permit modification.

Regarding the first question, is an effluent limit required, the permit writer is to determine whether the discharge has a reasonable potential to cause or contribute to a violation of water quality standards. *Id*. If the analysis shows that there is a reasonable potential, then the permit writer evaluates whether there is sufficient information to develop a numeric effluent limit for the pollutant(s) of concern. *Id*. When sufficient information exists, Ecology uses that information to calculate WQBELs. Abbasi Testimony.

17.

In drafting the 2013 Permit, Ecology's permit writer, Hamid "Ed" Abbasi, performed a reasonable potential analysis on SIM's treated wastewater discharge and determined that there was a reasonable potential for that discharge to adversely impact surface water quality. Mr. Abbasi calculated WQBELs for copper, lead, mercury, silver, zinc, and PCBs using historical data from the site. Abbasi Testimony. The 2013 Permit contains numeric effluent limits for those parameters applicable to SIM's treated wastewater. Ex. E-1 at 6.

18.

The numeric effluent limits for total PCBs in SIM's treated wastewater, which are based on human health criteria, are 5.1 ng/L average monthly and 8.9 ng/L maximum daily. The 2013 Permit also imposes a maximum daily Total Suspended Solids (TSS) limit of 10 mg/L as an additional effort to protect sediment quality. Exs. E-1 at 6, E-2 at 15. According to Ecology, since PCBs attach to solids, limiting the particulate discharge from SIM's treatment system will limit the amount of PCBs discharged. Ecology testified that SIM's treatment system is effective in extracting large particles, and thus using a TSS limit of 10 mg/L will result in a discharge of a

small quantity of small particles and fewer PCBs. Abbasi Testimony, Shervey Testimony, Ex. E-2 at 15.

19.

The 2013 Permit also allows a mixing zone for SIM's treated wastewater. *Id*. at 8. A mixing zone authorizes a limited area in the receiving water where certain numeric water quality criteria can be exceeded. Use of a mixing zone in the 2013 Permit resulted in applying dilution factors that raised the calculated limits for copper, lead, mercury, silver, zinc, and PCBs by a factor of 5.3 in the acute zone and 30.2 in the chronic zone. Abbasi Testimony, Ex. E-1 at 8. For example, the applicable ambient human health water quality criteria for PCBs is 0.00017 µg/L. Applying a mixing zone with a 30.2 dilution factor increases the effluent limit from the 0.00017 µg/L water quality standard to the 5.1 ng/L (.00051 µg/L) figure set forth in the Permit. Ex. E-1 at 6; Chartrand Testimony. The size of the 2013 Permit's acute and chronic mixing zones are the maximum allowed under Ecology's regulation, WAC 173-201A-400(7), (8). Ex. E-1 at 8.

20.

The 2013 Permit adds discharge limits for SIM's untreated stormwater effluent under Condition S1.B. Ex. E-1 at 7. The new requirements were added, in part, to address concerns raised by the City of Seattle and EPA regarding potential contamination from fugitive dust on SIM's roof and employee parking lot. Ex. P-26. When selecting effluent limits for SIM's untreated stormwater discharge, Mr. Abbasi evaluated the available data. Because the 2013 Permit constituted the first time that Ecology imposed effluent limits on that discharge, SIM's

permit application contained just two data points representing samples taken from roof runoff. Sampling conducted by EPA and the City of Seattle provided Ecology with one additional sample result. Mr. Abbasi concluded that there was insufficient data to conduct a reasonable potential analysis, which is a statistical-based calculation. Based on the available data, Mr. Abbasi concluded that the untreated stormwater was not clean and effluent limits should be imposed on that discharge. Abbasi Testimony.

21.

The numeric effluent limits for the untreated stormwater, with the exception of the limit for PCBs, were taken from the ISGP. Mr. Abbasi considered the use of ISGP benchmarks to be a conservative approach that would be protective of the LDW because the ISGP applies to other facilities in the area, and the benchmarks in the ISGP had been used for those facilities for approximately ten years. Abbasi Testimony, Exs. E-1 at 7 and E-2 at 40. In addition, he determined that the same benchmarks had been used in the multi-sector general permit issued by EPA throughout the country. Abbasi Testimony. For total PCBs in the untreated stormwater discharge, the 2013 Permit imposes a limit of .25 µg/L. Ex. E-1 at 7. This limit is a method detection limit rather than a WQBEL. The detection limit is based on the use of Method 608 for testing for the presence of PCBs. Ex. E-1, at 7.

22.

The 2013 Permit also requires SIM to develop an engineering report that addresses fugitive dust control, runoff from roofs and parking lots, and the potential for dust to be tracked out of the facility on vehicle tires. Ex. E-1 at 19-20. Initially, SIM's engineering report was due

four months after the effective date of the Permit (January 1, 2014), with construction of a treatment system to be completed by June 1, 2014, and an operations and maintenance plan prepared by January 1, 2015. Ex. E-2 at 30-31. SIM requested that Ecology extend the compliance schedule for one year because the company had been unable to obtain sufficient data on the stormwater runoff from the building roofs to develop the engineering report and construct a treatment system. Ecology concluded that SIM's request was appropriate and modified the Permit establishing a new compliance schedule and allowing SIM to submit its engineering report in two phases. Under Condition S9, SIM is required to submit its engineering reports and complete construction of the treatment system by June 1, 2015. The operations and maintenance manual is required to be completed by January 1, 2016. Abbasi Testimony, Shervey Testimony; Exs. E-1 at 20, E-2A at 1.

23.

SIM is also required to put in place best management practices (BMPs) to meet the technology-based limits for Outfall 002. Ecology considers the effluent limits in the 2013 Permit for the untreated stormwater to be interim limits as those limits will be modified based on the engineering report, the effectiveness of the BMPs and the data collected by SIM under the terms of the 2013 Permit. Shervey Testimony.

24.

PSA raises several objections to the effluent limits in the 2013 Permit applicable to both the treated wastewater and the untreated stormwater discharges. With regard to treated wastewater discharges from Outfall 001, PSA objects to Ecology granting SIM a mixing zone.

PSA asserts that the mixing zone does not meet the requirements of WAC 173-201A-400, particularly with regard to PCBs. LaLiberte Testimony; Chartrand Testimony. PSA claims that the discharge of PCBs from SIM's facility will result in the contamination or recontamination of sediments in the LDW. Chartrand Testimony.

25.

In order to allow the use of a mixing zone, Ecology must determine what, if any, dilution factor can be applied to an effluent concentration in light of the specific ambient pollutant concentration of the receiving water and the requirement that water quality criteria have to be met at the edge of any allowable regulatory mixing zone. Ahmed Testimony. Ecology's regulations provide that the use of mixing zones is limited:

> No mixing zone shall be granted unless the supporting information clearly indicates the mixing zone does not have a reasonable potential to cause a loss of sensitive or important habitat, substantially interfere with the existing or characteristic uses of the waterbody, result in damage to the ecosystem, or adversely affect public health as determined by the department.

WAC 173-201A-400(4).

26.

The permit writer must also consider the effect of a discharge to surface water on the quality of aquatic sediments. Ex. E-4 at IX-1. Ecology's Manual provides guidance on the derivation of effluent limits to protect aquatic sediments from contamination. The initial screening-level evaluation of a discharge's potential to impact sediments consists of a narrative evaluation and technical evaluation and is primarily based on readily available qualitative and quantitative information. "In general, facilities handling or producing known contaminants that

are commonly associated with pollution problems are considered to have a potential for causing sediment contamination and will generally undergo a detailed evaluation by the [Sediment Management Unit]." Ex. E-4 at IX-18.

27.

The Manual sets out a narrative evaluation that "may be used to identify facilities that have a low potential for sediment impacts, based on the general characteristics of the facility and the nature of the discharge." *Id*. at IX-20. The narrative evaluation is a two-step process. Under Step 1, "a discharge is generally considered not to have a risk for causing adverse sediment impacts if the facility has all of the following three characteristics: [a] a freshwater discharge to marine water, and [b] has secondary wastewater treatment or equivalent, and [c] discharges to an area with an average tidal velocity of 1 cm/sec or greater." *Id*. at IX-24 (emphasis original). If any of the three factors is not applicable, the permit writer proceeds to Step 2, which consists of a more thorough evaluation of the nature of the facility and the particular constituents in its discharge. *Id*. If the facility meets any of the criteria in Step 2, the discharge is "generally considered to have a risk for causing adverse sediment impacts." *Id*. One criterion under Step 2 is whether the discharge "has the potential to include toxic substances that may accumulate in the sediment." *Id*.

28.

Ecology conducted a narrative evaluation of SIM's discharge, concluding the analysis into potential sediment impacts after answering all three questions in Step 1 in the affirmative. Abbasi Testimony, Shervey Testimony. On this basis, Ecology determined that a mixing zone

could be applied to SIM's discharge without creating a reasonable potential to cause adverse sediment impacts. In making this initial determination, Mr. Abbasi considered no additional data regarding SIM's discharge and its potential to impact sediments, nor any data related to LDW fish tissue, water column, or sediment quality conditions. Abbasi Testimony; Shervey Testimony; Ex. S-2.

29.

The Board finds that Mr. Abbasi's analysis of the potential for SIM's discharge to cause sediment impacts with respect to PCBs was insufficient. Despite available information on PCB contamination in the LDW, sediment sampling data from stormwater catch basins on and in the vicinity of SIM's facility showing elevated levels of PCBs, and the presence of PCBs in SIM's own discharge, Mr. Abbasi ended his analysis at the conclusion of Step 1. The Board finds that Ecology's Screening-Level Evaluation of the Potential for Sediment Impacts form (Ex. E-4 at IX-20) fails to require an appropriate analysis of toxic pollutants such as PCBs, which bioaccumulate, biomagnify, persist in the environment and are not soluble. By concluding the analysis after Step 1, Ecology made no inquiry as to whether SIM's discharge "has the potential to include toxic substances that may accumulate in the sediment' and, therefore, did not thoroughly evaluate whether SIM's discharge posed a risk of causing adverse sediment impacts. Ex. E-4 at IX-24.

30.

In support of its challenge to the 2013 Permit's mixing zone, PSA presented the testimony of Allan B. Chartrand, a Senior Environmental Scientist with expertise in toxicology

and contaminated sediments. Ex. P-67. Mr. Chartrand opined that, due to the nature of SIM's discharge and the state of contamination in the LDW, Ecology should have elevated the reasonable potential inquiry. Mr. Chartrand testified that Ecology should have considered all available information and performed a higher-level technical review to assess potential sediment impacts. Such analysis would take into consideration the available tissue/sediment/water quality monitoring data, DMR data for SIM's discharge, information on the state of contamination and remedial actions required in the LDW at or near SIM's facility, data on PCB levels in catch basins/storm drains in the vicinity of SIM, fish advisory data, and partitioning behavior of PCBs. Mr. Chartrand testified that considering the available information, in his opinion a mixing zone for SIM's discharge was not appropriate as the discharge has a high potential to cause or contribute to adverse sediment impacts. Chartrand Testimony.

31.

Mr. Chartrand also testified that the application of a mixing zone for dilution of contaminants is inappropriate for PCBs. Persistent, bioaccumulative contaminants (PBTs), such as PCBs, do not effectively dilute as they move away from a source. EPA recognizes that mixing zones may be inappropriate for PBTs like PCBs. Chartrand Testimony; Exs. P-111 at Section 5.1.2, P-112 (63 Fed. Reg. 36791), P-115 at 11, P-131. EPA's mixing zone guidance emphasizes that a state's determination to authorize a mixing zone must be accompanied by a determination that there is available assimilative capacity in the receiving water. Chartrand Testimony; Ex. P-112 (63 Fed. Reg. 36742, 36787, 36791). According to EPA:

> The impacts of bioaccumulative compounds may extend beyond the boundaries of a given mixing zone with resulting impairment of a water body's designated uses, particularly where stationary species (e.g. shellfish) are present, where uncertainties exist regarding the assimilative capacity of a water body or where bioaccumulation in the food chain is known to be a problem. Sediment contamination has also become a major concern in both flowing and non-flowing water bodies. Concerns about sediment contamination require additional attention since typical mixing zone evaluations focus only on water column toxicity. The effects of persistent and bioaccumulative pollutants may not be detected for some distance from the point of discharge, well outside the mixing zone, or possibly not in the water column at all.

Ex. P-112 (63 Fed. Reg. 36791). The "assimilative capacity" of a water body "is the difference between the background level of a pollutant and the highest level that would comply with the water quality criterion." *Id*. at 36793.

32.

In Mr. Chartrand's opinion, the available information indicates that the LDW's assimilative capacity for additional PCBs is exhausted and the effluent limit for PCBs should be no more that the chronic water column criteria protective of human health (0.00017 µg/L). The mixing zone authorized for SIM's discharge allows a 30-fold increase in the allowable concentration and loading of PCBs discharged to the LDW. Mr. Chartrand testified that this will likely increase environmental damage to a water body already beyond assimilative capacity for PCBs. Chartrand Testimony; Exs. P-111 at Section 5.1.2, P-112 (63 Fed. Reg. 36791); P-115 at 11, P-131.

33.

Jerry Shervey, supervisor of the Industrial Wastewater Permit Writing Unit in Ecology's Northwest Regional Office, testified that water column data on background levels for PCBs in

the Duwamish River were lacking at the time the 2013 Permit was written. As a result, Ecology was unable to determine whether the LDW had available assimilative capacity for additional PCBs. At the time the 2013 Permit was being drafted, the stretch of river in question was not listed on the state's 303(d) list for PCBs. Shervey Testimony.

34.

Water column monitoring data recently published by King County shows that PCB levels in the Green River above the Duwamish River exceed applicable human health criteria. Mr. Shervey acknowledged that this more recent data suggests the LDW lacks additional assimilative capacity for PCBs, and that it would probably not be appropriate to grant a mixing zone in the future. Shervey Testimony; *see also* Chartrand Testimony.

35.

In addition to challenging Ecology's authorization of a mixing zone, PSA also questioned the accuracy of the Mixing Zone Study prepared by SIM's consultant and adopted by Ecology to establish the mixing zone in the 2013 Permit. Exs. S-1, E-1. The Mixing Zone Study describes the computer program used to model SIM's effluent discharge, identifies the variables used as model inputs to characterize the discharge and ambient flow environment, and recommends numeric effluent limits for various parameters based on the dilution factors derived from the model. Ex. S-2.

36.

The computer model applied by SIM's consultant was Version 6 of the Cornell Mixing Zone Expert System (CORMIX) model. Geiselbrecht Testimony. The environmental factors

reviewed in the Mixing Zone Study include the existing level of certain contaminants in the LDW, the shape of the LDW at the discharge location, data on tides and currents near the discharge location, the size and shape of the discharge pipe, the height of the discharge pipe in relation to the surface of the river, the constituents in the effluent, the effluent flow rate, the effluent temperature, and the wind speed near the discharge location. Exs. S-2 at 3-2 to 3-6, S-6 at 24; Geiselbrecht Testimony. The Mixing Zone Study reviewed 16 discharge scenarios. Three of the scenarios were modeled "as surface flow scenarios where the outfall is submerged at the surface of the receiving water body." S-2 at 4-8. After analyzing the 2008 LDW tide data and considering the intermittent nature of SIM's discharge, SIM's consultant determined that the submerged outfall surface flow scenario is a rare occurrence and that the version of CORMIX used in the study was unable to evaluate a partially-submerged outfall geometry. In light of those conclusions, the three submerged outfall surface flow scenarios were excluded from further analysis. The three excluded scenarios would have led to more stringent dilution factors if they had been included in the analysis. Ahmed Testimony; Ex. S-2 (Table 4.1). The Mixing Zone Study recommended a minimum dilution factor of 5.3 at the acute boundary and of 30.2 at the edge of the regulatory mixing zone. Ex. S-2 at 6-1.

37.

PSA's mixing zone expert, David LaLiberte, testified that the model used to develop the mixing zone in the 2013 Permit was an incorrect version of CORMIX and that many of the inputs used in the model were inaccurate. Mr. LaLiberte criticized the exclusion of the three flow scenarios as a misuse of CORMIX. In his opinion, excluding the three flow scenarios

improperly increased the dilution factor. Mr. Laliberte identified numerous other mistakes that he believed were made in the Mixing Zone Study. He testified that the discharge type was incorrectly characterized in terms of whether it was jet-like or spray-like. Mr. LaLiberte also questioned the assumed distance between the discharge pipe and the surface water and the assumption that the discharge always went directly into the surface water rather than landing on rocks on the bank of the river. He also testified that the assumed discharge was too cold, the assumed wind action was too strong, and the assumed current velocity and tidal action was too great. In Mr. LaLiberte's opinion, all of these errors result in a mixing zone dilution factor that is too high, leading to effluent limitations in the 2013 Permit that are not restrictive enough to protect the LDW. LaLiberte Testimony, Ex. S-4.

38.

Dr. Alison Geiselbrecht, SIM's consultant who oversaw the CORMIX modeling in the Mixing Zone Study, testified that the excluded flow scenarios had minimal impact on the calculation of the dilution factor because those scenarios would not normally take place in any significant number of events at the facility. She testified that any inaccuracies in the figures used in the model concerning the distance between the discharge point and the surface water were due to limitations in the model, rather than mistakes in the characterization of the discharge. CORMIX will only accept certain parameters because it is modeling a rectangular box, whereas river beds have contours that are much more irregular. Geiselbrecht Testimony; Ex. S-6 at 44-45.

39.

Dr. Geiselbrecht also testified that the figures used in the Mixing Zone Study for temperature, wind speed, current velocity, and tidal action were either accurate or were sufficiently accurate as to not materially impact the validity of the calculated dilution factor. In response to Mr. LaLiberte's critiques, SIM's consultant ran new calculations for the mixing zone using a newer version of CORMIX, Version 8, and determined that there was no need for any changes to the mixing zone set forth in the Permit. Geiselbrecht Testimony; Ex. S-5. Dr. Geiselbrecht testified that CORMIX 8 was capable of modeling a partially submerged outfall. Geiselbrecht Testimony.

40.

Mr. Abbasi asked Anise Ahmed, an environmental engineer with Ecology's Environmental Assessment Program, to review the Mixing Zone Study. Dr. Ahmed is familiar with mixing zone models, including CORMIX, and acts as a consultant to Ecology's NPDES permit writers. Dr. Ahmed testified that he had responsibility for approving the Mixing Zone Study on behalf of Ecology. The Water Quality Program is responsible for determining the dilution factor to include in an NPDES permit. Ahmed Testimony.

41.

Discussing the excluded critical discharge scenarios, Dr. Ahmed testified that he would have considered all of those conditions in a mixing zone analysis. EPA reviewed the Mixing Zone Study and expressed its concerns to Dr. Ahmed that exclusion of the three critical discharge scenarios resulted in less stringent dilution factors. Ahmed Testimony. Dr. Ahmed

told SIM's consultant and Mr. Abbasi that if those scenarios were excluded from the analysis then, consistent with the recommendation in the Mixing Zone Study, SIM should evaluate whether it could limit its discharge at times when the outfall was partially submerged. Dr. Ahmed did not review any engineering analysis prepared by SIM on this issue. After his initial review of the Mixing Zone Study, Dr. Ahmed provided comments on the study and a revised report was prepared. Dr. Ahmed testified that SIM's consultants addressed all of his concerns in the final report. Ahmed Testimony.

42.

SIM's Stormwater Treatment Engineering Report, dated April 9, 2010, included an evaluation of the percentage of time the site discharges treated wastewater to the LDW while the outfall is submerged. Ex. S-8 (Appendix L). Using data from 2008, the study stated that such discharges occurred 0.561 percent of the time. *Id*. Based on its determination that the three critical flow scenarios are rare occurrences and could be ignored, SIM's Stormwater Treatment Engineering Report did not include the requested evaluation of whether it would be possible to minimize discharges at times when the outfall was submerged. *Id*.; Geiselbrecht Testimony.

43.

The 0.561 percent figure was calculated by comparing the number of hours the outfall was both submerged and discharging with the total number of hours in the applicable month. The calculation represents the percentage of time the outfall is expected to be discharging when it is submerged in any given month. *Id*.; Shervey Testimony. Mr. Shervey agreed that another way to calculate the percentage of time that SIM discharges when the outfall is submerged is to

divide the number of hours the outfall was submerged and discharging by the total number of hours the outfall actually was discharging during the month. Mr. Shervey testified that SIM's use of the total hours in each month rather than just the amount of time there was an actual discharge was appropriate because the discharge limits are based on a steady-state, rather than intermittent, discharge. Concluding that SIM's engineering report demonstrated that the three critical discharge scenarios were rare and applying Permit Writer's Manual's guidance concerning mixing zones, Ecology agreed that those scenarios could be excluded from SIM's mixing zone analysis. Shervey Testimony. A similar analysis was not performed to evaluate the rarity of the other discharge scenarios modeled. *Id*. As noted above, SIM's Stormwater Treatment Engineering Report did not evaluate the possibility of minimizing discharges at times when the outfall was submerged. Ex. E-8.

44.

PSA also challenged the 2013 Permit's effluent limits for untreated stormwater. Mr. Chartrand testified that, in his opinion, Ecology had not completed a reasonable potential analysis for that discharge. According to Mr. Chartrand, the levels allowed for PCBs, copper, zinc, and mercury in the untreated stormwater will cause impacts to water and sediment quality in light of the history of exceedances at or near the facility. Ex. P-16, 17, 21, 22, 24, Chartrand Testimony. Mr. Chartrand stated that the effluent limits for metals in the untreated stormwater are technology-based limits and are less protective than water quality-based limits. Finally, Mr. Chartrand testified that for PCBs the effluent limit should not be a method detection limit of 0.25

µg/L, rather the effluent limit should be the human health criteria limit of 170 picograms per liter (.00017 µg/L). Chartrand Testimony.

45.

Mr. Abbasi testified that in evaluating SIM's untreated stormwater discharge, he reviewed the available monitoring data. Because there were only three data points, he concluded that he could not perform a statistical-analysis of the discharge's reasonable potential. Mr. Abbasi also concluded that SIM's discharge was "not clean" and required the imposition of numeric effluent limits. Mr. Abbasi used the ISGP's benchmarks as interim numeric limits for Outfall 002. Abbasi Testimony; Ex. E-1 at 7. While Mr. Abbasi did not conduct a statistical calculation for a reasonable potential analysis, his supervisor testified that the analysis performed by Mr. Abbasi to determine the effluent limits for the untreated stormwater was equivalent to a reasonable potential analysis. Shervey Testimony.

46.

PSA challenges the analytical testing methods prescribed by the 2013 Permit for determining the presence of PCBs in SIM's discharges. The effluent limit for total PCBs in SIM's untreated stormwater is 0.25 µg/L. Ex. E-1 at 7. This limit represents the minimum value that the approved analytical test, Method 608, can detect. Abbasi Testimony. Although there are other analytical tests for PCBs, such as Methods 8082A and 1662, Ecology is required to use the current EPA-approved analytical testing method. WAC 173-201A-260(3)(h). Ecology selected Method 608 for SIM's untreated stormwater discharge because it is the only method approved by

EPA for use in NPDES permits for compliance purposes. Abbasi Testimony; Shervey Testimony.

47.

Effluent discharged at Outfall 001 is required to be analyzed under Method 8082A, while effluent discharged at Outfall 002 is analyzed under Method 608. Ex. E-1 at 6-7. PSA argues that those methods are insufficient to assess compliance with effluent limits and to ensure that there is no potential for PCBs in SIM's discharges to adversely impact sediment. Ann Bailey, a Senior Environmental Scientist with EcoChem, Inc., testified that the appropriate method to require is Method 1668, which detects PCBs at much lower concentrations than either Method 608 or 8082A. Bailey Testimony.

48.

The parties presented testimony regarding the three analytical testing methods used for detecting PCBs. The oldest, Method 608, is the only method approved by EPA for use in NPDES permits for compliance purposes. Method 8082A, while not approved for compliance in NPDES permits, is a method that EPA has used for years in solid waste testing. It is a more sensitive testing method than Method 608, and is the analytical testing method used by the City of Seattle and Ecology's toxics cleanup program for source tracing in the LDW. McCrea Testimony; Shervey Testimony. The most recently developed method is Method 1668. It is the most sensitive testing method for detecting the presence of PCBs in water and is approximately ten times more expensive than Methods 608 or 8082A. EPA has not approved Method 1668 for use in NPDES permits and, at the time the 2013 Permit was being written, only one lab in the

United States, located in Florida, was accredited to perform this method. Ecology did not consider the use of Model 1668 in the 2013 Permit. Ex. E-1, Shervey Testimony, Bailey Testimony.

49.

All testing methods have a method detection level (MDL), considered the lowest level at which the concentration of a substance can reliably be detected. Using the MDL, the Practical Quantitation Limit (PQL) is then statistically calculated. The PQL represents the lowest level at which a concentration can be detected where the accuracy (precision and bias) of the detection achieves the objectives of the intended purpose. If the effluent limit specified in the 2013 Permit is less than PQL, then the effluent limit effectively becomes the PQL of the testing method. Bailey Testimony, Ex. E-1 at 6, 7, 52, 53.

50.

For the treated wastewater discharged at Outfall 001, the 2013 Permit specifies the use of Method 8082A and explains that the PQL for Method 8082A is 0.1 µg/L and the MDL is 0.017 µg/L. Ecology elected to use PQL to determine compliance with the effluent limits for total PCBs. Ex. E-1 at 6. Accordingly, if the measured effluent concentration for PCBs is less than the PQL, SIM must report less than 0.1 µg/L on the discharge monitoring report form. *Id.* For the untreated stormwater discharged at Outfall 002, the 2013 Permit specifies the use of Method 608 and explains that the final maximum daily total PCB limit (0.25 µg/L) is based on the MDL for Method 608. Ex. E-1 at 6-7.

51.

Mr. Shervey testified that Method 608 is the only method for testing PCBs currently approved by EPA for use in NPDES permits for compliance monitoring and that WAC 173-201A-260(3)(h) requires Ecology to use the analytical testing method specified by EPA in the current code of federal regulations. Under that rule, Ecology can use other analytical testing methods with the approval of EPA. Shervey Testimony. Mr. Shervey explained that Ecology included Method 8082A in the 2013 Permit because the agency felt that it needed to detect PCBs in effluent at lower levels than Method 608 would allow. Method 8082A is used extensively in the LDW for source tracing by EPA, King County, the City of Seattle and Ecology's clean-up program, and is used in administrative orders issued by Ecology's Water Quality Program. In addition, the method is commonly available and affordable. SIM agreed to use Method 8082A to analyze its treated effluent from Outfall 001. Shervey Testimony.

52.

Ecology subsequently determined it was legally incorrect to require SIM to use Method 8082A as the agency had not obtained EPA approval. Prior to the hearing, Ecology modified the 2013 Permit, replacing the requirement to use Method 8082A for the treated effluent with Method 608.[2] Mr. Shervey testified that requesting blanket approval from EPA to use Method 8082A in the Duwamish River would be a good proposal because the method is already being used by several government agencies, including Ecology. Shervey Testimony.

[2] PSA appealed this modification to the Board. *See Puget Soundkeeper Alliance v. Ecology*, PCHB No. 15-050. This decision does not address the propriety of Ecology's recent modification of the 2013 Permit.

53.

The parties disagree on whether the 2013 Permit requires "all known, available, and reasonable methods of prevention, control, and treatment" (AKART). WAC 173-201A-020. To implement AKART for stormwater permits, Ecology considers what the known and utilized treatment systems are for the particular industry or similar industries within the state or sometimes across the entire country. Ecology keeps a reference list of known, proven technologies for stormwater treatment and requires that an applicant's engineer prepare a report for Ecology's review that examines different treatment alternatives and identifies technologies best suited to the facility. Ecology considers economic feasibility if the facility identifies a viable treatment alternative but may reject that treatment technology on the basis of cost. Shervey Testimony.

54.

PSA's expert Dr. Richard Horner asserted that the 2013 Permit does not require AKART for SIM's facility. Dr. Horner, an engineer with experience advising on BMPs for scrap metal facilities like SIM, believes that SIM's treatment system is being overloaded by the amount of pollutants directed to it and is not being operated effectively. He testified it is very unlikely, for example, that SIM cleans its catch basins frequently enough, and noted that SIM's Stormwater Pollution Prevention Plan states only that catch basins will be cleaned with no mention of frequency. Dr. Horner also suggested that SIM could utilize an enhanced sand treatment system, which operates on the principle of coagulating and flocculating solids so they are more easily filtered. Because Dr. Horner did not perform an analysis of SIM's treatment system he was not

able to offer an opinion on whether specific changes to the system were necessary. Horner Testimony, Ex. P-45.

55.

Dr. Horner's primary opinion is that SIM should be required to cover and contain its operations as part of implementing appropriate source control and BMPs to avoid or minimize stormwater contamination. He explained that enclosing operations would be more effective than treatment, but could also improve the efficacy of the treatment system such that changes to the system may not be necessary. Dr. Horner did not assess the feasibility or cost associated with enclosing operations at SIM's facility. He did testify that several auto shredders in other states have enclosed their operations. In Dr. Horner's opinion, this demonstrates that covering an auto shredding facility constitutes AKART and SIM should be required to meet that standard. Horner Testimony; Exs. P-72, P-74, P-80, P-120.

56.

Mr. Shervey did not agree with Dr. Horner's assessment that meeting AKART requires that SIM enclose its operations. He recognized that SIM could better operate its treatment system to achieve more consistent compliance with effluent limits, and that improvements to the system may be warranted. Mr. Shervey acknowledged that enclosing operations at the facility, thereby reducing or eliminating stormwater contact, could improve the efficacy of the system. However, only limited evaluation of the feasibility for enclosing operations has been performed to date. While containment may be a consideration in the future, Ecology is still evaluating the

treatment system's performance under the 2013 Permit, and has made no determinations yet on whether changes might be needed. Shervey Testimony.

57.

The Board finds that Ecology performed an AKART analysis for the 2013 Permit. Mr. Abbasi visited another large scrap metal facility in Washington. He also required SIM to submit an engineering report that addressed AKART. Abbasi Testimony. The report addressed available technologies and reviewed stormwater processes at other facilities. Ex. S-8. The report discussed roofing the entire facility as a technology for controlling stormwater. Roofing the facility was rejected as infeasible because the roof would need to be 6.47 acres in size and the placement of support pillars would disrupt or prohibit necessary facility operations. The size of the roof would also make it prohibitively expensive, with a "conceptual cost of $28 to $37 million." Ex S-8 at 4-24; Abbasi Testimony.

58.

Ecology concluded that, through treatment of its wastewater discharged from Outfall 001 by use of a Dissolved Air Flotation (DAF) treatment system, along with the addition of a pre-treatment system and other proposed enhancements, SIM is implementing AKART. SIM's treatment system uses DAF to remove oil that is present from processing automobiles. This is followed by a mixing tank, which mixes settling chemicals called flocculants, into the waste stream. The mixture is allowed time to settle and for the particles to come together. Finally, the liquid is run through a sand filter to remove the particles that have been accumulated together. Abbasi Testimony; Shervey Testimony; Ex. P-45.

59.

For Outfall 002, Ecology used an adaptive management approach to implement AKART. SIM is required to implement BMPs such as cleaning the roofs and drains on a regular basis. The 2013 Permit sets effluent limits for runoff from the roofs and drains. Ecology also required SIM to conduct a study of runoff from roofs and the employee parking lot and to submit engineering reports assessing measures to be implemented for dust control and application of BMPs. A treatment system for Outfall 002's discharge must be constructed by June 1, 2015. Abbasi Testimony, Shervey Testimony, Exs. E-1 at 19-20, E-2.

60.

Any Conclusion of Law deemed to be properly considered a Finding of Fact is hereby adopted as such.

Based upon the foregoing Findings of Fact, the Board enters the following:

CONCLUSIONS OF LAW

1.

The Board has jurisdiction over the subject matter and the parties pursuant to RCW 43.21B.110(1)(d). The burden of proof is on the appealing party as to the issues in the case. WAC 371-08-485(3). The Board considers the matter *de novo*, giving deference to Ecology's expertise in administering water quality laws and on technical judgments, especially where they involve complex scientific issues. *Port of Seattle v. Pollution Control Hearings Board*, 151 Wn.2d 568, 593-94, 90 P.3d 659 (2004). Similarly, Ecology's interpretations of water quality statutes and its own regulations are entitled to great weight, unless such interpretation conflicts

with the statute's plain language. *Id*. at 593-94. Pursuant to WAC 371-08-540(2), "[i]n those cases where the board determines that the department issued [an NPDES] permit that is invalid in any respect, the board shall order the department to reissue the permit as directed by the board and consistent with all applicable statutes and guidelines of the state and federal governments."

2.

The CWA was enacted with the broad policy objective of restoring and maintaining the chemical, physical, and biological diversity of the nation's waters. One action in furtherance of this goal was creation of the NPDES permit program. *Puget Soundkeeper Alliance v. Ecology*, 102 Wn. App. 783, 788, 9 P.3d 892 (2000). To serve those ends, the CWA prohibits the discharge of any pollutant by any person unless done in compliance with provisions of the Act and/or in compliance with an NPDES permit. 33 U.S.C. §§ 1311(a) and 1342. Pursuant to RCW 90.48.260, the legislature authorized Ecology to implement and enforce all programs necessary to comply with the CWA, 33 U.S.C. § 1251. Such powers include the authority to administer the NPDES permit program (ch. 173-220 WAC) and to establish water quality standards for surface water (ch. 173-201A WAC).

3.

The issues identified for resolution in the Pre-Hearing Order are:[3]

1. Is National Pollution Discharge Elimination System (NPDES) Permit No. WA0031968, issued September 16, 2013 and modified August 26, 2014, to Seattle Iron and Metals Corp. (SIM), ("the permit"), inconsistent with applicable law, including 33 U.S.C. § 1311(b)(1)(C), 40 C.F.R. § 122.44, RCW 90.48.520, WAC 173-201A-010, -260, and -510, and WAC 173-204, because the effluent

[3] PSA voluntarily withdrew Issues 5, 8, 9, 12b, and 12c.

limitations and other conditions pertaining to the discharge from outfall 001 are inadequate to ensure that discharges do not cause or contribute to violations of water quality and sediment quality standards?

2. Is the permit inconsistent with applicable law, including 33 U.S.C. § 1311(b)(1)(C), 40 C.F.R. § 122.44, RCW 90.48.520, WAC 173-201A-010, -260, and -510, and WAC 173-204, because the effluent limitations and other conditions pertaining to the discharge from outfall 002 are inadequate to ensure that discharges do not cause or contribute to violations of water quality and sediment quality standards?

3. Is the permit's authorization of discharge of PCBs inconsistent with applicable law, including WAC 173-201A-010, -260, and -510, and WAC 173-204, because it does not ensure that discharges will not cause or contribute to violations of applicable water quality and sediment standards?

4. Is the permit inconsistent with applicable law, including 40 C.F.R. § 122.44(d), requiring reasonable potential analysis?

6. Is the permit inconsistent with applicable law, including WAC 173-201A-400, in its authorization and sizing of mixing zones?

7. Is the permit inconsistent with applicable law, including 40 C.F.R. §§ 122.4 and 122.44 and 33 U.S.C. § 1308, because the laboratory analysis method specified for PCB discharge concentrations is inadequate to determine compliance with appropriate water quality-based effluent limitations?

10. Is the permit inconsistent with applicable law concerning AKART requirements, including RCW 90.52.040 and WAC 173-220-130, because it does not require the implementation of AKART?

11. Is the compliance schedule, including the provisions of condition S9, inconsistent with applicable law, including 40 C.F.R. § 122.62(a)(4), WAC 173-201A-510 and WAC 173-220-140, and WAC 173-220-190?

12. Are the following portions of the permit unreasonably vague and confusing:
    a. requirements concerning shoreline cleanup and barge loading, including conditions S8, S9, and S15?

A. Pursuant to existing regulations, Ecology is required to use Method 608 (Issue 7)

4.

The 2013 Permit requires the use of different analytical testing methods to detect the presence of PCBs in discharges from Outfall 001 and Outfall 002. For Outfall 001, Ecology requires the use of the Method 8082A, while Method 608 is required to be used for discharges from Outfall 002. As described above, Method 8082A is a more sensitive testing method than Method 608. EPA developed a third analytical test method, Method 1668, which is more sensitive than Methods 608 or 8082. The state Surface Water Quality Standards, ch. 173-201A WAC, identify the procedures Ecology is to use when applying the appropriate water quality criteria for a waterbody. With respect to analytical testing methods, the standards state:

> The analytical testing methods for these numeric criteria must be in accordance with the "*Guidelines Establishing Test Procedures for the Analysis of Pollutants*" (*40 C.F.R. Part 136*) or superseding methods published. The department may also approve other methods following consultation with adjacent states and with the approval of USEPA.

WAC 173-201A-260(3)(h). At this time, EPA has approved only Method 608 for use in NPDES Permits. Shervey Testimony, Bailey Testimony. Ecology may petition EPA for approval of an alternative test procedure. 40 C.F.R. §136.4; WAC 173-201A-260(3)(h).

5.

While acknowledging that EPA has designated Method 608 for compliance monitoring in NPDES permits, PSA asserts that Ecology should be required to seek EPA's approval to use Method 1668 in SIM's 2013 Permit. According to PSA, Ecology's failure to pursue that option constitutes a violation of the stated policies of the state Water Pollution Control Act (WPCA),

which direct the agency to use its powers to protect and preserve the quality of the state's waters. RCW 90.48.010. PSA requests that the Board remand the 2013 Permit and require Ecology to address this error.

6.

The Board reviews the terms of an NPDES permit to determine if it is "invalid in any respect," and whether it is consistent with applicable legal requirements. WAC 371-08-540(2); *Pierce County v.* Ecology, PCHB Nos. 12-093c and 12-097c (Order on Summary Judgment, Oct. 2, 2013); *Copper Development v. Ecology*, PCHB No. 09-135 through 09-141, (Order on Summary Judgment, Jan. 5, 2011). The policy declarations in the WPCA do not "control over the more specific statutory provisions adopted to implement those general declarations" and those declarations "have no operative force in and of themselves." *Puget Soundkeeper Alliance v. State of Washington, Department of Ecology*, 102 Wn. App. 783, 790, 9 P.3d 892 (2000).

7.

The Board concludes that the 2013 Permit is consistent with the provision of the state Surface Water Quality Standards requiring the use of the EPA-approved analytical test method published in the Code of Federal Regulations. WAC 173-201A-260(3)(h). The analytical test for PCBs currently approved by EPA for compliance monitoring in NPDES permits is Method 608. The evidence presented showed that Method 8082A is widely used in the Duwamish River and is more sensitive than Method 608. While Mr. Shervey testified that seeking EPA approval of Method 8082A for use in the Duwamish River would constitute a good proposal, the Board lacks the authority to require Ecology to petition EPA for approval to use Method 8082A.

B. Reasonable potential analysis performed for SIM's discharges and technology-based numeric effluent limits for Outfall 002 are appropriate (Issues 2, 3 and 4)

8.

As described above, when preparing an NPDES permit, the permit writer is to determine if the discharge has a reasonable potential to cause or contribute to a violation of water quality standards. 40 CFR §122.44(d)(1)(i); Exs. E-4 at VII-18-VII-15, P-108 at 50-51. If it is determined that the discharge contains a pollutant that has the reasonable potential to cause or contribute to a violation, then the permit must include an effluent limit for that pollutant. 40 CFR §122.44(d)(1)(iii). Where development of a numeric effluent limit is infeasible, the permit shall contain BMPs to control or abate the discharge of the pollutant. 40 CFR §122.44(k).

9.

In preparing the 2013 Permit, Mr. Abbasi performed a reasonable potential analysis on SIM's treated wastewater discharges from Outfall 001. Finding there was a reasonable potential the discharge would violate water quality standards, Mr. Abbasi calculated WQBELs for various pollutants and included numeric effluent limits for those parameters in the 2013 Permit. Abbasi Testimony; Ex. E-1 at 6. PSA presented no evidence controverting these facts.

10.

PSA asserted that Mr. Abbasi failed to conduct a reasonable potential analysis on SIM's untreated stormwater discharges from Outfall 002. Relying on EPA's guidance document, Mr. Chartrand opined that Ecology did not need effluent data to perform the analysis or to determine permit limits and, in his opinion, SIM's untreated stormwater discharge had the potential to

violate water quality standards. Chartrand Testimony; Ex. P-108 at 50-51. Mr. Abbasi testified that he evaluated the available sampling data for that discharge and concluded there were insufficient data points to perform a statistical calculation of reasonable potential. Mr. Abbasi also concluded that because SIM's untreated stormwater discharge was "not clean," he needed to impose numeric effluent limitations in the 2013 Permit. Abbasi Testimony; Ex. E-1 at 7. Mr. Abbasi's supervisor, Mr. Shervey, testified that while Mr. Abbasi did not conduct a statistical analysis of reasonable potential, his evaluation of the untreated stormwater discharge was the equivalent of a reasonable potential analysis. Ecology considers the effluent limits on Outfall 002 to be interim limits which will be modified based on the engineering report, the effectiveness of the BMPs, and the data collected by SIM under the terms of the 2013 Permit. Shervey Testimony.

11.

The Board concludes that Ecology performed a reasonable potential analysis on SIM's discharges from Outfall 001 and 002 as required by applicable law. *See* 40 C.F.R. § 122.44(d). Ecology found that SIM's discharges had the reasonable potential to exceed water quality standards and imposed numeric effluent limits on each discharge stream. Ex. E-1 at 6-7. The Board defers to Ecology's technical determination that it lacked sufficient monitoring data for SIM's untreated stormwater discharge to develop site-specific numeric effluent limits.

12.

Given the absence of sufficient monitoring data, Ecology could have imposed narrative effluent limits on the discharge from Outfall 002 in the form of BMPs but elected to impose

numeric limits instead. 40 C.F.R. 122.44(k)(3). Mr. Abbasi's decision to use the technology-based benchmark limits from the ISGP as numeric effluent limits for SIM's untreated stormwater was reasonable. The 2013 Permit represents the first time Ecology imposed numeric effluent limits on SIM's untreated stormwater. Ecology considers the limits interim in nature and the technology-based limits will be replaced with water quality-based limits derived from the monitoring data collected by SIM under the terms of the 2013 Permit. Shervey Testimony. With the exception of the effluent limit for PCBs, discussed below in Section E, the Board concludes that the numeric effluent limits imposed on SIM's untreated stormwater discharge from Outfall 002 are consistent with applicable law.

C. The 2013 Permit requires implementation of AKART and the extension of the compliance schedule for the engineering report was consistent with applicable law (Issues 10 and 11)

13.

The WPCA requires that all state and federal discharge permits incorporate permit conditions requiring AKART. RCW 90.48.520; 90.58.010; s*ee also* RCW 90.52.040 and RCW 90.54.020(3)(b). Ecology's rules define AKART as "the most current methodology that can be reasonably required for preventing, controlling, or abating the pollutants associated with a discharge." WAC 173-201A-020. The Washington Court of Appeals has further clarified that the "reasonableness" prong of AKART limits Ecology "to requiring a system that is both economically and technically feasible." *Puget Soundkeeper Alliance v. State of Washington*, 102 Wn. App. 783, 792-793, 9 P.3d 892, 897 (2000).

14.

Relying on the testimony of its expert, Dr. Horner, PSA claims that the 2013 Permit fails to implement AKART. According to Dr. Horner, enclosure of SIM's operations in a roofed building constitutes AKART for an auto shredding facility. Dr. Horner based his opinion regarding AKART on his determination that several auto shredding facilities in other states had enclosed all or part of their facilities. Dr. Horner did not evaluate whether enclosing SIM's operations would be technologically or economically feasible. Dr. Horner testified that he believed that SIM's treatment system was being overloaded by pollutants from the site and suggested the addition of sand filtration. However, he did not perform a specific evaluation of SIM's existing treatment system and could not opine whether that system required improvement. Horner Testimony.

15.

The Board concludes that PSA did not meet its burden on this issue. The evidence presented by PSA did not establish that that enclosure of all or part of SIM's operations constituted AKART. As stated above, AKART limits Ecology to requiring a system that is both technologically and economically feasible. PSA did not assess the technological or economic feasibility of enclosing SIM's operations. While PSA disagreed with the costs contained in SIM's engineering report, Ex. S-8, it did not provide contrary evidence. Nor did PSA present evidence demonstrating that Ecology erred in determining that SIM's use of a DAF treatment system constituted AKART.

16.

The Board also concludes that the 2013 Permit requires AKART for SIM's untreated stormwater discharged at Outfall 002. The 2013 Permit requires SIM to prepare a Stormwater Pollution Prevention Plan incorporating applicable BMPs from Ecology's stormwater manual and to implement those BMPs at its facility. Ex. E-1 at 22-27. Mr. Abbasi testified that the 2013 Permit's use of BMPs to address stormwater discharged to Outfall 002 constituted AKART. Abbasi Testimony. Under WAC 173-226-070(1)(d), AKART may be imposed through use of BMPs.

17.

Conditions S8 and S9 of the 2013 Permit require SIM to prepare an engineering report evaluating AKART for fugitive dust control and treatment of runoff from roofs and employee parking lots. SIM is required to complete construction of an approved treatment system by June 1, 2015. Ex. E-1 at 19-20. As provided by WAC 173-220-140, Ecology can impose a compliance schedule for AKART implementation that achieves compliance at the earliest possible date. Ecology initially required SIM to submit its engineering report by January 1, 2014, and complete construction of the selected treatment system by June 1, 2014. SIM requested that Ecology extend the compliance schedule because the company was unable to collect sufficient monitoring data to complete the engineering report. Abbasi Testimony. Under WAC 173-220-190(2):

> The department may, upon request of the permittee, modify a schedule of compliance or an operating condition in an issued permit if it determines good and valid cause exists for such revision (such as an act of God, strike, flood,

> materials shortage, or other event over which the permittee has little or no control and for which there is no other reasonably available remedy).

See also 40 C.F.R. § 122.62(a)(4). Ecology concluded that, under the circumstances, SIM's request was appropriate. Abbasi Testimony. Ecology modified the Permit in 2014 to extend the compliance schedule. Exs. E-1 at 20, E-2A at 1.

18.

PSA asserts that a compliance schedule can only be modified under the limited circumstances listed in the regulation. According to PSA, because SIM's inability to collect sufficient monitoring data did not result from an "act of God" or a similar event that SIM could not control, modification of the compliance schedule was not legally justified. The Board concludes that PSA reads the regulation too narrowly. The terms PSA relies on are preceded by the qualifying phrase "such as," which is a term of enlargement rather than restriction. *Cf. Pacific Topsoils, Inc. v. Ecology*, 157 Wn. App. 629, 642, 238 P.3d 1201 (2010), review denied, 171 Wn.2d 1009 (2011) ("includes" is a term of enlargement). The regulation provides Ecology with discretion to grant an extension where the agency finds that "good and valid cause exists." WAC 173-220-190(2). The evidence presented supports Ecology's granting of SIM's request to extend the compliance schedule. The Board concludes that modification was consistent with the requirements of applicable law.

D. Exclusion of critical conditions in mixing zone analysis was not supported by evidence (Issue 6)

19.

The 2013 Permit authorizes a mixing zone for treated wastewater discharged from Outfall

001. Ex. E-1 at 8. The term "mixing zone" refers to the use of the assimilative capacity of natural systems as part of an effective pollution control strategy. *Puget Soundkeeper Alliance v. Ecology*, PCHB Nos. 05-150, 05-151, 06-034 & 06-040 (Finding of Fact, Conclusions of Law, and Order, Jan. 26, 2007)(n. 10). EPA regulations provide that states may include in their state standards implementation policies that include mixing zones. 40 C.F.R. § 131.13. The authority to grant mixing zones in Washington NPDES permits is found in WAC 173-201A-400. The regulation provides that mixing zones may be granted "as appropriate" in discharge permits, but only *after* a discharge meets AKART, and only if "the supporting information clearly indicates a mixing zone would not have a reasonable potential to cause a loss of sensitive or important habitat, substantially interfere with the existing or characteristic uses of the water body, result in damage to the ecosystem or adversely affect public health as determined by [Ecology]." WAC 173-201A-400(2), (4). Mixing zones are meant to be exceptions to water quality standards and, as such, they must be carefully limited in their application. WAC 173-201A-400(7), (8).

20.

PSA asserts that SIM does not meet the regulatory requirements for obtaining a mixing zone and that the Mixing Zone Study which developed the dilution factors is flawed. With the exception of PCBs, discussed below in Section E., and the exclusion of critical discharge scenarios from the Mixing Zone Study, the Board concludes that PSA has not met its burden on this issue. The mixing zone applies to SIM's discharge of treated wastewater from Outfall 001. As discussed above, the Board finds that SIM has implemented AKART for its discharge from Outfall 001. The evidence also established that SIM's consultant used the appropriate version of

the CORMIX model for the site in the Mixing Zone Study. Responding to Mr. LaLiberte's criticism of various data inputs (*e.g.*, wind speed, water temperature), SIM's consultant reran the model using the current version, CORMIX 8, and concluded that use of revised data did not substantially change the dilution factors previously calculated. Geiselbrecht; Ex. S-2. SIM's consultant also rebutted Mr. LaLiberte's assertion that several physical characteristics of the outfall used in the model were incorrect. *Id.*

21.

The granting of a mixing zone, which allows the discharge of pollutants at a greater concentration than the calculated effluent limit, is an exception to the water quality standards and is to be granted sparingly. WAC 173-201A-400(7), (8). Exclusion of the three critical discharge scenarios resulted in a higher dilution factor, allowing SIM to discharge pollutants into the LDW at greater levels. EPA expressed concerns to Ecology about the exclusion of those scenarios. Ecology's own mixing zone expert, Dr. Ahmed, testified that he would have considered all of those critical conditions in the mixing zone analysis. Dr. Ahmed stated that he accepted the exclusion of those scenarios based on the Mixing Zone Study's recommendation that the SIM's Stormwater Treatment Engineering Report would evaluate the possibility of minimizing discharges when the outfall was partially submerged. Ahmed Testimony. The report, however, did not evaluate ways to minimize the occurrence of discharges when the outfall was partially submerged as Dr. Ahmed had anticipated. Instead, SIM's Stormwater Treatment Engineering Report's evaluation of this issue consisted of calculating the percentage of time the system was discharging to a submerged outfall and determining that it occurred less than one percent of the

time. Based on this analysis, the report summarily concluded that it is unfeasible to develop "system and logic controls to anticipate and adjust for these conditions[.]" Ex. S-8 at 6-5.

22.

The Board concludes that the evidence presented did not support Ecology's reliance on SIM's assertion that the three critical conditions were properly excluded from the mixing zone analysis. According to Ecology's Guidance for Conducting Mixing Zone Analyses, "each critical condition (by itself) has a low probability of occurrence." Ex. E-5 at 2. The evidence does not support exclusion of the three critical conditions on the basis that they are rare events.

23.

SIM calculated the likelihood that the omitted critical conditions would happen as less than one percent by predicting the number of instances in which the system would discharge to a submerged outfall and then dividing that number by the total hours in the time period that was measured. The calculation used precipitation information to predict discharges and then looked at tidal data to determine whether a predicted discharge event would occur when the water level at the discharge point was equal to or greater than ten feet. Ex. S-8, Appendix L. When questioned whether the SIM calculation should have included every hour of the time period in the estimate of how likely the critical conditions were to occur, Mr. Shervey testified that SIM's calculation was acceptable because Ecology bases discharge limits on a steady-state discharge. Shervey Testimony. It is unclear to the Board how an assumption of steady-state discharge is consistent with a calculation that is based on predicted discharges during limited predicted events. Dividing a limited number of predicted events by the total hours of the time period may

give an inaccurate representation as to the actual probability of occurrence for the omitted critical conditions.

24.

The Board remands the 2013 Permit to Ecology for reconsideration of the mixing zone analysis for all parameters, with the exception of PCBs, consistent with this opinion. WAC 371-08-540(2). According to Dr. Geiselbrecht, the latest version of the mixing zone model, CORMIX 8, is capable of modeling a partially submerged outfall. Whether the revised mixing zone analysis incorporates the three excluded critical discharge scenarios or the model is re-run using CORMIX 8 is left to Ecology's discretion.

E. SIM's discharge of PCBs does not satisfy requirements for regulatory mixing zone (Issues 3 and 6)

25.

PSA asserts that Ecology's granting of a mixing zone for SIM's discharge of PCBs is contrary to the requirements of WAC 173-201A-400. Based on the evidence presented at the hearing, the Board concludes that PSA has met its burden of proof on this question. The evidence established that elevated levels of PCBs can be found in LDW sediments and fish and shellfish tissue. Exs. E-8 at 22-31, P-89 (Tables 26, 28, 30), P-94 (Table A-1). A DOH Fish Advisory is in effect warning the public against eating resident fish, shellfish, and crab from the Duwamish River. Exs. P-95, P-97, P-98. EPA and Ecology are actively engaged in clean-up efforts in the LDW, which includes controlling sources of contamination to the waterway. Ex. E-8 at 1. EPA and City of Seattle sediment samples in catch basins on or in the vicinity of SIM's

facility showed elevated levels of PCBs. Exs. P-15, P-21. Those results led EPA and the City of Seattle to inform SIM of its need to implement effective source control measures to address the discharge of PCBs from its site. *Id.*; Ex. P-26. Because PCBs are found in the types of materials processed by SIM, it is recognized as a potential source of contaminants that may contribute to recontamination of sediments at or near its facility. McCrea Testimony, Horner Testimony, Geiselbrecht Testimony; Ex. P-88 at 23-31. Mr. Abbasi was aware of this information when drafting SIM's 2013 Permit. Abbasi Testimony.

26.

As discussed above, a mixing zone is an exception to the water quality standards that should only be granted in limited instances. WAC 173-201A-400(7), (8). Given their persistence and ability to bioaccumulate and biomagnify, a mixing zone for PCBs should rarely, if ever, be granted. EPA has expressed concerns regarding the appropriateness of mixing zones for PBTs such as PCBs. Exs. P-111 at Section 5.1.2, P-112 (63 Fed. Reg. 36791); P-115 at 11, P-131. When developing an NPDES permit, the permit writer "must consider the effect of the proposed discharge to surface water on the quality of aquatic sediments and limit the concentrations that cause an exceedance of the sediment quality standards[.]" Ex. E-4 at IX-1; WAC 173-204-400.

27.

As stated above, the Board finds that Mr. Abbasi's evaluation of the potential impacts of SIM's discharge on sediment quality in the LDW was inadequate. Ecology failed to present evidence clearly indicating that a mixing zone for SIM's discharge of PCBs into the LDW

"would not have a reasonable potential to cause a loss of sensitive or important habitat, substantially interfere with the existing or characteristic uses of the water body, result in damage to the ecosystem, or adversely affect public health as determined by the department." WAC 173-201A-400(4). The contaminated status of the LDW is undisputed. Ecology itself is engaged in significant source control efforts intended to stop the introduction of contaminants, including PCBs, into the LDW. The granting of a mixing zone to SIM for PCBs is counterproductive to that effort. The Board concludes that Ecology's granting of a mixing zone for PCBs is contrary to the requirements of WAC 173-201A-400.

28.

In addition to its contention that there should be no mixing zone for PCBs, PSA also asserts that the effluent limit for PCBs in both discharges should be the human health criteria of 0.00017 µg/. Chartrand Testimony. The 2013 Permit contains different numeric effluent limits for PCBs for each discharge stream. The effluent limit for discharges of PCBs from Outfall 001, absent application of the dilution factor from the mixing zone, is 0.00017 µg/L. Ex. E-1 at 6. For Outfall 002 the effluent limit for PCBs is 0.25 µg/L. *Id*. at 7. This limit is based on the method detection limit for Method 608, the test required by the 2013 Permit, and is not a WQBEL. Ecology provided no evidence supporting different effluent limits for PCBs based on their presence in one discharge stream as opposed to another. While the Board concluded that the technology-based limits from the ISGP were acceptable interim limits for Outfall 002, the effluent limit for PCBs for that discharge is not based on technology and does not warrant the same conclusion.

29.

The Board recognizes that different testing methods can detect PCBs at different levels of concentration. The Board is also aware that Method 608 is the only testing method currently approved by EPA for use in NPDES permits for compliance purposes. However, those facts in and of themselves do not support a higher effluent limit for PCBs in SIM's discharge to Outfall 002. Mr. Shervey testified that requesting approval from EPA to use the more sensitive Method 8082A throughout the Duwamish River would be a worthy proposal as it is currently being used by several government agencies. Although the Board lacks the authority to require Ecology to petition EPA to allow the use of Method 8082A, we encourage Ecology to consider making such a request. The Board remands the 2013 Permit to Ecology for revision of the effluent limits for PCBs consistent with this decision.

F. 2013 Permit Conditions S8, S9, and S15 (Issue 12(a))

30.

In Issue 12(a), PSA challenged Conditions S8, S9, and S15 of the 2013 Permit governing shoreline cleanup and barge loading. The only evidence presented by PSA that touched on Issue 12(a) was brief testimony stating that a PSA member observed scrap metal fall into LDW when being loaded onto a barge and two photographs of SIM's crane with scrap metal in the grabber. Fredrickson Testimony; Exs. P-64, P-65. The Board concludes that PSA did not meet its burden of proof on Issue 12(a).

31.

Any Finding of Fact deemed to be a Conclusion of Law is hereby adopted as such.

Having so found and concluded, the Board enters the following

ORDER

Having concluded that portions of NPDES Permit No. WA0031968 are invalid, the Board REMANDS the Permit to Ecology pursuant to WAC 371-08-540, for reissuance consistent with this opinion:

1. Ecology and SIM shall revise the mixing zone analysis for all parameters, with the exception of PCBs, consistent with this opinion.
2. Ecology shall modify Condition S1.A consistent with this opinion.
3. Ecology shall modify Condition S1.B consistent with opinion.

SO ORDERED this 23rd day of July, 2015.

POLLUTION CONTROL HEARINGS BOARD

JOAN M. MARCHIORO, Chair

THOMAS C. MORRILL, Member

KAY M. BROWN, Member

POLLUTION CONTROL HEARINGS BOARD
STATE OF WASHINGTON

PUGET SOUNDKEEPER ALLIANCE, Appellant, v. STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY; and SEATTLE IRON & METALS CORPORATION, Respondents.	PCHB No. 15-050 ORDER GRANTING RESPONDENTS' MOTION FOR SUMMARY JUDGMENT

Appellant Puget Soundkeeper Alliance (PSA) filed an appeal with the Pollution Control Hearings Board (Board) on April 8, 2015. The appeal challenges the Department of Ecology's (Ecology) March 12, 2015, modification of National Pollutant Discharge Elimination System (NPDES) Permit No. WA0031968 (Permit). The Permit was issued to Seattle Iron & Metals Corporation (SIM) for the discharge of wastewater and stormwater to the Lower Duwamish Waterway (LDW). The modification changed the method to be used by SIM to measure discharges of polychlorinated biphenyls (PCBs) in its outfalls for determining compliance with the Permit. PSA asserts that the modification does not meet the "for cause" standards governing NPDES permit modifications.

All parties moved for summary judgment. Administrative Appeals Judge Heather Francks presided for the Board. Attorney Richard A. Smith appeared on behalf of PSA. Attorneys Stephen Parkinson and Matthew J. Stock appeared on behalf of SIM. Assistant Attorney General Gordon Karg appeared on behalf of Ecology. The Board hearing this matter

was comprised of Board Chair Joan Marchioro and Board Members Tom Morrill, and Kay M. Brown. The Board reviewed the following pleadings submitted by the parties:

1. Soundkeeper's Motion for Summary Judgment with Exhibits 1-12;
2. Ecology's Response to Soundkeeper's Motion for Summary Judgment;
3. Soundkeeper's Reply Supporting Its Motion for Summary Judgment;
4. Respondent's Motion for Summary Judgment; Declaration of Gordon Karg with Exhibit A; Declaration of Gerald Shervey with Exhibit;
5. Soundkeeper's Response to Respondents' Motion for Summary Judgment;
6. Ecology's Reply to Soundkeeper's Response to Ecology's Motion for Summary Judgment.

Based on the record and evidence before the Board on the motions, the Board enters the following decision granting Respondents' Motion for Summary Judgment.

BACKGROUND

SIM's Permit was the subject of a previous appeal to the Board which concluded with a four day hearing in March of 2015 and a final decision with findings of facts and conclusions of law. *Puget Soundkeeper Alliance v. Ecology,* PCHB No. 13-137c (2015) ("*SIM* I"). The Board will cite to the Findings of Fact in *SIM* I to provide some of the factual background for the current motion for summary judgment.

SIM operates an auto shredding and metal recycling operation on multiple adjacent properties on the east bank of the LDW near River Mile 2.5 on the Duwamish River in Seattle, Washington. SIM has operated on the LDW since moving to this general location in 1999. Operations on-site include mechanical reduction and extraction of recoverable metal from auto

shredder residue. Recovered metals are stockpiled, handled, sorted, and sold for use by other processors, while the non-metallic portion of auto shredder residue is disposed of at a landfill. As part of these operations, SIM discharges wastewater and stormwater to the City of Seattle's storm drain system, which then discharges to the LDW. *SIM* I, at FF 1.

The Permit covers two separate effluent streams that originate from SIM's facility and which are physically combined prior to discharge. The first effluent stream, Outfall 001, is treated prior to discharge and includes stormwater and some processed wastewater from SIM's industrial areas and the roof of its maintenance building. The second effluent stream, Outfall 002, is not treated prior to discharge and includes stormwater from most facility roofs and a parking lot. *Id.*, at FF 15.

The Permit imposes effluent limits for multiple contaminants including PCBs. Although Outfall 001 and 002 are combined and thus discharge to the same point in the LDW, the effluent limits in the Permit for Outfall 001 and 002 are different. The effluent limit for PCBs in Outfall 001 (5.1ng/L) is based on the applicable ambient human health water quality criteria (WQBEL), whereas the effluent limit for Outfall 002 (.25 ug/L) is based on the detection limits of the analytical testing method used for compliance monitoring for Outfall 002. *Id.*, FF 18-21.

The Permit allows for a mixing zone for Outfall 001 with a dilution factor of 30.2. The effluent limit for PCBs at Outfall 001 is 5.1 ng/L, which is calculated by multiplying the WQBEL for PCBs (0.00017 ug/L) by the dilution factor. *Id.*, FF 19. In *SIM* I, the Board ruled that the use of a mixing zone for SIM's discharge of PCBs in Outfall 001 was inappropriate. *Id.*, COL 25-27. The Board also ruled that Ecology failed to present evidence to support the use of a

method detection effluent limit for discharges of PCBs in Outfall 002. *Id.*, COL 28.

In *SIM* I, the Board remanded the Permit to Ecology with instructions to modify permit conditions S1.A and S1.B, which are the conditions that set the effluent limits for Outfalls 001 and 002. *Id.*, at 49. When Ecology issued the modified permit on March 12, 2015, the Board had not issued the *SIM* I decision. Accordingly, the effluent limits for PCBs in Outfalls 001 and 002 were not changed in the modified Permit. Soundkeeper's Motion for SJ, Ex. 2 at pp. 6-7.

Although the Permit modification did not change the numeric effluent limits for PCBs, it did change the detection method that is used for determining compliance with the permit. The change in the detection method will impact the evaluation of whether the facility is in compliance with the Permit, because compliance with the Permit limits is actually determined by the sensitivity of the analytical testing method that is used to measure compliance. As stated in the Permit, "Ecology will use [Quantitation Limit] to determine compliance with the effluent limit." Soundkeeper's Motion for SJ, Ex. 2 at p. 6.

All testing methods have a detection level (DL), considered the lowest level at which the concentration of a substance can reliably be detected. Using the DL, the minimum Quantitation Limit (QL) is then statistically calculated. The QL represents the lowest level at which a concentration can be detected where the accuracy (precision and bias) of the detection achieves the objectives of the intended purpose. Soundkeeper's Motion for SJ, Ex. 1 at p. 51; Soundkeeper's Motion for SJ, Ex. 2 at pp. 51-52. If the effluent limit specified in the Permit is less than the QL, then the effluent limit effectively becomes the QL of the testing method. Soundkeeper's Motion for SJ, Ex. 2 at p. 6.

Prior to the March 12, 2015, modification, the Permit required that compliance testing for discharges of PCBs to Outfall 001 be done with Method 8082A. Soundkeeper's Motion for SJ, Ex. 1 at pp. 6, 10, 51. In the March 12, 2015, modification, Ecology changed the detection method used to determine compliance for discharges to Outfall 001 from Method 8082A to Method 608. Soundkeeper's Motion for SJ, Ex. 2 at pp. 6, 51. Because the WQBEL for PCBs (0.00017 ug/L) is less than the QL for either Method 8082A (0.1 ug/L) or Method 608 (0.25 ug/L), the change from Method 8082A to Method 608 resulted in a change of the QL that is used to determine compliance with the effluent limits in the Permit for Outfall 001. The modification of the Permit changed the QL from 0.1 μg/L to 0.25 ug/L. Soundkeeper's Motion for SJ, Ex. 1 at pp. 6, 10, 51; Ex. 2 at pp. 6, 51.

The Addendum to the Fact Sheet explaining the basis for modifying the Permit's testing method for PCBs stated that the change to Method 608 was being made because:

> The code of federal register, 40 CFR 136, does not recognize testing protocol 8082 that was used in the original permit. Inclusion of this protocol into an NPDES permit makes violations of PCB limits under NPDES permit uninforceable [sic] for compliance purposes. The correct protocol, as specified under 40 CFR 136, is method 608. The permit was rectified, and analytical testing protocol 608 replaced analytical testing protocol 8082.

Soundkeeper's Motion for SJ, Ex. 12, at p. 1.

In *SIM* I, PSA argued that Ecology should have required the use of Method 1668 in the Permit, because that quantitative method detects PCBs at lower concentrations than either Method 608 or Method 8082A. *SIM* I at FF 47. The Board acknowledged in *SIM* I that different testing methods can detect PCBs at different levels of concentration, but ruled that Ecology is

required under state regulations to apply testing methods approved by EPA and Method 608 is the only testing method currently approved by EPA for use in NPDES permits for compliance purposes. *Id.,* at COL 4. In addition, the Board held it lacks authority to require Ecology to request EPA approval of different testing methods. *Id.,* COL 4, 7.

Ecology originally included Method 8082A in the Permit because the agency felt that it needed to detect PCBs in SIM's effluent at lower levels than Method 608 would allow, and because SIM agreed to use Method 8082A for Outfall 001. Ecology's decision to apply Method 8082A was influenced, in part, by the fact that Method 8082A is used for source tracing in the cleanup efforts taking place in the LDW. *SIM* I at FF 51. There is no dispute that changing from Method 8082A to Method 608 for compliance testing in the Permit will result in the use of a testing method that has a higher QL for determining the presence of PCBs in SIM's discharges to Outfall 001.

As noted in Addendum No. 2 to the Fact Sheet for the Permit modification, Ecology later determined that it was legally incorrect to require SIM to use Method 8082A in the Permit because the agency had not obtained EPA approval for Method 8082A. Soundkeeper's Motion for SJ, Ex. 12 at p. 1.

ANALYSIS

A. Summary Judgment Standard

Summary judgment is a procedure available to avoid unnecessary trials where there is no genuine issue of material fact. *Jacobsen v. State*, 89 Wn.2d 104, 108, 569 P.2d 1152 (1977). The summary judgment procedure is designed to eliminate trial if only questions of law remain

for resolution, and neither party contests the facts relevant to a legal determination. *Rainier Nat'l Bank v. Security State Bank*, 59 Wn. App. 161, 164, 796 P.2d 443 (1990), *review denied*, 117 Wn.2d 1004 (1991).

The party moving for summary judgment must show there are no genuine issues of material fact and the moving party is entitled to judgment as a matter of law. *Magula v. Benton Franklin Title Co., Inc.*, 131 Wn.2d 171, 182, 930 P.2d 307 (1997). A material fact in a summary judgment proceeding is one affecting the outcome under the governing law. *Eriks v. Denver*, 118 Wn.2d 451, 456, 824 P.2d 1207 (1992). If the moving party satisfies its burden, then the non-moving party must present evidence demonstrating that material facts are in dispute. *Atherton Condo Ass'n v. Blume Dev. Co.*, 115 Wn.2d 506, 516, 799 P.2d 250 (1990), *reconsideration denied* (1991). In a summary judgment proceeding, all facts and reasonable inferences must be construed in favor of the non-moving party. *Jones v. Allstate Ins. Co.*, 146 Wn.2d 291, 300, 45 P.3d 1068 (2002).

B. Issue Remaining For Resolution

A pre-hearing conference was held on May 4, 2015. The parties agreed to five legal issues that would govern the case. By stipulation, the parties later agreed to dismiss four of the five legal issues. By Order dated October 27, 2015, the Board dismissed Issues 1, 3, 4 and 5. Issue 2 is the only remaining issue. The May 6, 2015, Prehearing Order set forth Issue 2 as follows:

> 2. Is the modification to condition S1.A of the permit, which changes the required laboratory method for effluent PCB monitoring, in compliance with the rules allowing modification only "for cause," including WAC 173-220-190 and 40 CFR 122.62?

All parties agree there are no material facts in dispute and have moved for summary judgment on Issue 2.

C. Did the Permit Modification Meet the "For Cause" Standard?

Pursuant to RCW 90.48.260, the legislature authorized Ecology to implement and enforce all programs necessary to comply with the Federal Water Pollution Control Act, 33 U.S.C. § 1251. Such powers include the authority to administer the NPDES permit program (ch. 173-220 WAC). One aspect of administering the NPDES permit program is determining whether an existing NPDES permit may be modified.

Washington regulations provide that an NPDES permit may be modified by Ecology for "cause." WAC 173-220-190(1). The federal regulations provide a list of factors that meet the "for cause" standard. 40 U. S.C. § 122.62(a). One of the factors is: "[t]o correct technical mistakes, such as error in calculation, or mistaken interpretations of law made in determining permit conditions." 40 U. S.C. § 122.62(a)(15).

The Permit previously required the use of test Method 8082A for discharges to Outfall 001, even though Method 608 was the only testing method approved by EPA for measuring compliance in NPDES permits. The state Surface Water Quality Standards, ch. 173-201A WAC, identify the procedures Ecology is to use concerning analytical testing methods:

> The analytical testing methods for these numeric criteria must be in accordance with the "*Guidelines Establishing Test Procedures for the Analysis of Pollutants*" (*40 C.F.R. Part 136*) or superseding methods published. The department may also approve other methods following consultation with adjacent states and with the approval of USEPA.

WAC 173-201A-260(3)(h). At this time, EPA has approved only Method 608 for use in NPDES Permits. Ecology may petition EPA for approval of an alternative test procedure. 40 C.F.R. §136.4; WAC 173-201A-260(3)(h). However, Ecology has not petitioned EPA for use of Method 8082A or any other test method.

Accordingly, although Method 8082A has a lower QL than Method 608, the testing method required for compliance monitoring of PCBs in discharges under NPDES permits is Method 608. PSA acknowledges that Method 608 is the required analytical testing method for compliance monitoring in NPDES permits, however, PSA asserts that Ecology has not met the "for cause" standard in this instance.

PSA claims that Ecology failed to demonstrate that a mistaken interpretation of law occurred in determining permit conditions. According to PSA, there was no mistaken interpretation of the law because Ecology did not make a mistake but rather knew the legal requirements and chose to ignore them. PSA cites to transcripts of the hearing before the Board in *SIM* I as evidence that Ecology was aware it did not have authority to require SIM to use Method 8082A when Ecology issued the permit. *See* Soundkeeper's Motion for SJ, Ex. 5 (Tr. at 646:14-647:13). At the hearing held in *SIM* I, Ecology employee Jerry Shervey testified that Ecology was aware that Method 8082A had not been approved by EPA but chose to include Method 8082A in the Permit because that testing method would detect PCBs at lower levels than Method 608, and SIM had agreed to use Method 8082A. *Id.*

PSA's argument that there was no mistaken interpretation of the law assumes that Ecology had discretion to impose Method 8082A in the Permit and that SIM could agree to the

imposition of the more stringent analytical testing method. PSA also asserts that SIM's failure to appeal the Permit ensures that there was no mistaken interpretation of the law because the Permit terms would be binding and not challengeable after the appeal period.

There is no dispute that Ecology staff understood that Method 608 was the only analytical testing method Ecology had authority to require in the Permit. *Id.* However, that does not determine whether there was a mistaken interpretation of the law in determining the Permit conditions. Ecology staff believed, when they were writing the Permit, that they had the discretion to apply a different testing method than was required by the applicable regulations if the permitted facility agreed to use the different testing method. *Id.*, at (Tr. 647:7-13). At a later date, Ecology staff determined that the decision to apply a testing method other than Method 608 was in error. They determined that Ecology was required to use Method 608 for tracking compliance with NPDES permits and did not have discretion to impose different testing methods. *Id.*, at (Tr. 647:14-24).

The applicable regulations governing modifications of NPDES permits provide that where there are "mistaken interpretations of law made in determining permit conditions", Ecology has "cause" for modifying an NPDES permit. 40 U. S.C. § 122.62(a)(15). In this instance, Ecology staff was mistaken in their belief that they had discretion to require a different analytical testing method as long as SIM agreed. The regulations provide that the analytical testing methods in the Permit **must** be in accordance with the guidelines set forth in 40 C.F.R. Part 136 unless approval is received from EPA for another method. WAC 173-201A-260(3)(h) (emphasis added). There is no discretion in the regulations for requiring a different testing

method because a permitted facility agrees to its use.

Moreover, the regulations do not say that the "cause" that is created by misinterpreting the law goes away if the Permit is not appealed within thirty days. PSA's argument that the mistake is no longer a mistake after the thirty-day appeal period is inconsistent with the language of the rules.

The Board reviews the terms of an NPDES permit to determine if it is "invalid in any respect," and whether it is consistent with applicable legal requirements. WAC 371-08-540(2); *Pierce County v. Ecology*, PCHB Nos. 12-093c and 12-097c (Order on Summary Judgment, Oct. 2, 2013); *Copper Development v. Ecology*, PCHB No. 09-135 through 09-141, (Order on Summary Judgment, Jan. 5, 2011). The policy declarations in the Washington Pollution Control Act do not have "control over the more specific statutory provisions adopted to implement those general declarations" and those declarations "have no operative force in and of themselves." *Puget Soundkeeper Alliance v. State of Washington, Department of Ecology*, 102 Wn. App. 783, 790, 9 P.3d 892 (2000).

The Board agrees with Ecology that the Permit, as written before the modification, was not consistent with the provision of the state Surface Water Quality Standards requiring the use of the EPA-approved analytical test method published in the Code of Federal Regulations. WAC 173-201A-260(3)(h). The analytical test for PCBs currently approved by EPA for compliance monitoring in NPDES permits is Method 608. Ecology can use other analytical testing methods with the approval of EPA, but when it originally issued the Permit, Ecology did not have approval from EPA to include Method 8082A in the Permit.

Accordingly, a mistaken interpretation of the law was made in determining the Permit conditions, and Ecology did have cause to modify the Permit.

ORDER

In accordance with the analysis above, Ecology and SIM's motion for summary judgment is GRANTED and PSA's motion for summary judgment is DENIED.

SO ORDERED this 6th day of January, 2016.

POLLUTION CONTROL HEARINGS BOARD

Joan M. Marchioro, Chair

Thomas C. Morrill, Member

Kay M. Brown, Member

Heather C. Francks, Presiding
Administrative Appeals Judge

APPENDIX 2

(3) AWARD OF FEES.—In any judicial proceeding under this subsection, the court may award costs of litigation (including reasonable attorney and expert witness fees) to any prevailing or substantially prevailing party whenever it determines that such award is appropriate.

(c) Additional evidence

In any judicial proceeding brought under subsection (b) of this section in which review is sought of a determination under this chapter required to be made on the record after notice and opportunity for hearing, if any party applies to the court for leave to adduce additional evidence, and shows to the satisfaction of the court that such additional evidence is material and that there were reasonable grounds for the failure to adduce such evidence in the proceeding before the Administrator, the court may order such additional evidence (and evidence in rebuttal thereof) to be taken before the Administrator, in such manner and upon such terms and conditions as the court may deem proper. The Administrator may modify his findings as to the facts, or make new findings, by reason of the additional evidence so taken and he shall file such modified or new findings, and his recommendation, if any, for the modification or setting aside of his original determination, with the return of such additional evidence.

(June 30, 1948, ch. 758, title V, § 509, as added Pub. L. 92–500, § 2, Oct. 18, 1972, 86 Stat. 891; amended Pub. L. 93–207, § 1(6), Dec. 28, 1973, 87 Stat. 906; Pub. L. 100–4, title III, § 308(b), title IV, § 406(d)(3), title V, § 505(a), (b), Feb. 4, 1987, 101 Stat. 39, 73, 75; Pub. L. 100–236, § 2, Jan. 8, 1988, 101 Stat. 1732.)

AMENDMENTS

1988—Subsec. (b)(3), (4). Pub. L. 100–236 redesignated par. (4) as (3) and struck out former par. (3) relating to venue, which provided for selection procedure in subpar. (A), administrative provisions in subpar. (B), and transfers in subpar. (C).

1987—Subsec. (b)(1). Pub. L. 100–4, §§ 308(b), 406(d)(3), 505(a), substituted ''transacts business which is directly affected by such action'' for ''transacts such business'', ''120'' for ''ninety'', and ''120th'' for ''ninetieth'', substituted ''1316, or 1345 of this title'' for ''or 1316 of this title'' in cl. (E), and added cl. (G).

Subsec. (b)(3), (4). Pub. L. 100–4, § 505(b), added pars. (3) and (4).

1973—Subsec. (b)(1)(C). Pub. L. 93–207 substituted ''pretreatment'' for ''treatment''.

EFFECTIVE DATE OF 1988 AMENDMENT

Amendment by Pub. L. 100–236 effective 180 days after Jan. 8, 1988, see section 3 of Pub. L. 100–236, set out as a note under section 2112 of Title 28, Judiciary and Judicial Procedure.

§ 1370. State authority

Except as expressly provided in this chapter, nothing in this chapter shall (1) preclude or deny the right of any State or political subdivision thereof or interstate agency to adopt or enforce (A) any standard or limitation respecting discharges of pollutants, or (B) any requirement respecting control or abatement of pollution; except that if an effluent limitation, or other limitation, effluent standard, prohibition, pretreatment standard, or standard of performance is in effect under this chapter, such State or political subdivision or interstate agency may not adopt or enforce any effluent limitation, or other limitation, effluent standard, prohibition, pretreatment standard, or standard of performance which is less stringent than the effluent limitation, or other limitation, effluent standard, prohibition, pretreatment standard, or standard of performance under this chapter; or (2) be construed as impairing or in any manner affecting any right or jurisdiction of the States with respect to the waters (including boundary waters) of such States.

(June 30, 1948, ch. 758, title V, § 510, as added Pub. L. 92–500, § 2, Oct. 18, 1972, 86 Stat. 893.)

§ 1371. Authority under other laws and regulations

(a) Impairment of authority or functions of officials and agencies; treaty provisions

This chapter shall not be construed as (1) limiting the authority or functions of any officer or agency of the United States under any other law or regulation not inconsistent with this chapter; (2) affecting or impairing the authority of the Secretary of the Army (A) to maintain navigation or (B) under the Act of March 3, 1899, (30 Stat. 1112); except that any permit issued under section 1344 of this title shall be conclusive as to the effect on water quality of any discharge resulting from any activity subject to section 403 of this title, or (3) affecting or impairing the provisions of any treaty of the United States.

(b) Discharges of pollutants into navigable waters

Discharges of pollutants into the navigable waters subject to the Rivers and Harbors Act of 1910 (36 Stat. 593; 33 U.S.C. 421) and the Supervisory Harbors Act of 1888 (25 Stat. 209; 33 U.S.C. 441–451b) shall be regulated pursuant to this chapter, and not subject to such Act of 1910 and the Act of 1888 except as to effect on navigation and anchorage.

(c) Action of the Administrator deemed major Federal action; construction of the National Environmental Policy Act of 1969

(1) Except for the provision of Federal financial assistance for the purpose of assisting the construction of publicly owned treatment works as authorized by section 1281 of this title, and the issuance of a permit under section 1342 of this title for the discharge of any pollutant by a new source as defined in section 1316 of this title, no action of the Administrator taken pursuant to this chapter shall be deemed a major Federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act of 1969 (83 Stat. 852) [42 U.S.C. 4321 et seq.]; and

(2) Nothing in the National Environmental Policy Act of 1969 (83 Stat. 852) shall be deemed to—

(A) authorize any Federal agency authorized to license or permit the conduct of any activity which may result in the discharge of a pollutant into the navigable waters to review any effluent limitation or other requirement established pursuant to this chapter or the adequacy of any certification under section 1341 of this title; or

RCW 43.21C.020

Legislative recognitions—Declaration—Responsibility.

(1) The legislature, recognizing that a human being depends on biological and physical surroundings for food, shelter, and other needs, and for cultural enrichment as well; and recognizing further the profound impact of a human being's activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high-density urbanization, industrial expansion, resource utilization and exploitation, and new and expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of human beings, declares that it is the continuing policy of the state of Washington, in cooperation with federal and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to: (a) Foster and promote the general welfare; (b) create and maintain conditions under which human beings and nature can exist in productive harmony; and (c) fulfill the social, economic, and other requirements of present and future generations of Washington citizens.

(2) In order to carry out the policy set forth in this chapter, it is the continuing responsibility of the state of Washington and all agencies of the state to use all practicable means, consistent with other essential considerations of state policy, to improve and coordinate plans, functions, programs, and resources to the end that the state and its citizens may:

(a) Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

(b) Assure for all people of Washington safe, healthful, productive, and aesthetically and culturally pleasing surroundings;

(c) Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;

(d) Preserve important historic, cultural, and natural aspects of our national heritage;

(e) Maintain, wherever possible, an environment which supports diversity and variety of individual choice;

(f) Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and

(g) Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

(3) The legislature recognizes that each person has a fundamental and inalienable right to a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment.

[**2009 c 549 § 5096; 1971 ex.s. c 109 § 2.**]

RCW 43.21C.030

Guidelines for state agencies, local governments—Statements—Reports—Advice—Information.

The legislature authorizes and directs that, to the fullest extent possible: (1) The policies, regulations, and laws of the state of Washington shall be interpreted and administered in accordance with the policies set forth in this chapter, and (2) all branches of government of this state, including state agencies, municipal and public corporations, and counties shall:

(a) Utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision making which may have an impact on the environment;

(b) Identify and develop methods and procedures, in consultation with the department of ecology and the ecological commission, which will insure that presently unquantified environmental amenities and values will be given appropriate consideration in decision making along with economic and technical considerations;

(c) Include in every recommendation or report on proposals for legislation and other major actions significantly affecting the quality of the environment, a detailed statement by the responsible official on:

(i) the environmental impact of the proposed action;

(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented;

(iii) alternatives to the proposed action;

(iv) the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity; and

(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented;

(d) Prior to making any detailed statement, the responsible official shall consult with and obtain the comments of any public agency which has jurisdiction by law or special expertise with respect to any environmental impact involved. Copies of such statement and the comments and views of the appropriate federal, province, state, and local agencies, which are authorized to develop and enforce environmental standards, shall be made available to the governor, the department of ecology, the ecological commission, and the public, and shall accompany the proposal through the existing agency review processes;

(e) Study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources;

(f) Recognize the worldwide and long-range character of environmental problems and, where consistent with state policy, lend appropriate support to initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline in the quality of the world environment;

(g) Make available to the federal government, other states, provinces of Canada, municipalities, institutions, and individuals, advice and information useful in restoring, maintaining, and enhancing the quality of the environment;

(h) Initiate and utilize ecological information in the planning and development of natural resource-oriented projects.

[**2010 c 8 § 7002; 1971 ex.s. c 109 § 3.**]

RCW 90.48.010

Policy enunciated.

It is declared to be the public policy of the state of Washington to maintain the highest possible standards to insure the purity of all waters of the state consistent with public health and public enjoyment thereof, the propagation and protection of wild life, birds, game, fish and other aquatic life, and the industrial development of the state, and to that end require the use of all known available and reasonable methods by industries and others to prevent and control the pollution of the waters of the state of Washington. Consistent with this policy, the state of Washington will exercise its powers, as fully and as effectively as possible, to retain and secure high quality for all waters of the state. The state of Washington in recognition of the federal government's interest in the quality of the navigable waters of the United States, of which certain portions thereof are within the jurisdictional limits of this state, proclaims a public policy of working cooperatively with the federal government in a joint effort to extinguish the sources of water quality degradation, while at the same time preserving and vigorously exercising state powers to insure that present and future standards of water quality within the state shall be determined by the citizenry, through and by the efforts of state government, of the state of Washington.

[**1973 c 155 § 1; 1945 c 216 § 1;** Rem. Supp. 1945 § 10964a.]

RCW 90.48.520

Review of operations before issuance or renewal of wastewater discharge permits—Incorporation of permit conditions.

In order to improve water quality by controlling toxicants in wastewater, the department of ecology shall in issuing and renewing state and federal wastewater discharge permits review the applicant's operations and incorporate permit conditions which require all known, available, and reasonable methods to control toxicants in the applicant's wastewater. Such conditions may include, but are not limited to: (1) Limits on the discharge of specific chemicals, and (2) limits on the overall toxicity of the effluent. The toxicity of the effluent shall be determined by techniques such as chronic or acute bioassays. Such conditions shall be required regardless of the quality of receiving water and regardless of the minimum water quality standards. In no event shall the discharge of toxicants be allowed that would violate any water quality standard, including toxicant standards, sediment criteria, and dilution zone criteria.

[**1987 c 500 § 1.**]

APPENDIX 3

SUBCHAPTER D—WATER PROGRAMS (CONTINUED)

PART 136—GUIDELINES ESTABLISHING TEST PROCEDURES FOR THE ANALYSIS OF POLLUTANTS

Sec.
136.1 Applicability.
136.2 Definitions.
136.3 Identification of test procedures.
136.4 Application for and approval of alternate test procedures for nationwide use.
136.5 Approval of alternate test procedures for limited use.
136.6 Method modifications and analytical requirements.
136.7 Quality assurance and quality control.
APPENDIX A TO PART 136—METHODS FOR ORGANIC CHEMICAL ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER
APPENDIX B TO PART 136—DEFINITION AND PROCEDURE FOR THE DETERMINATION OF THE METHOD DETECTION LIMIT—REVISION 1.11
APPENDIX C TO PART 136—DETERMINATION OF METALS AND TRACE ELEMENTS IN WATER AND WASTES BY INDUCTIVELY COUPLED PLASMA-ATOMIC EMISSION SPECTROMETRY METHOD 200.7
APPENDIX D TO PART 136—PRECISION AND RECOVERY STATEMENTS FOR METHODS FOR MEASURING METALS

AUTHORITY: Secs. 301, 304(h), 307 and 501(a), Pub. L. 95–217, 91 Stat. 1566, *et seq.* (33 U.S.C. 1251, *et seq.*) (the Federal Water Pollution Control Act Amendments of 1972 as amended by the Clean Water Act of 1977).

§ 136.1 Applicability.

(a) The procedures prescribed herein shall, except as noted in §§136.4, 136.5, and 136.6, be used to perform the measurements indicated whenever the waste constituent specified is required to be measured for:

(1) An application submitted to the Administrator, or to a State having an approved NPDES program for a permit under section 402 of the Clean Water Act of 1977, as amended (CWA), and/or to reports required to be submitted under NPDES permits or other requests for quantitative or qualitative effluent data under parts 122 to 125 of title 40; and

(2) Reports required to be submitted by dischargers under the NPDES established by parts 124 and 125 of this chapter; and

(3) Certifications issued by States pursuant to section 401 of the CWA, as amended.

(b) The procedure prescribed herein and in part 503 of title 40 shall be used to perform the measurements required for an application submitted to the Administrator or to a State for a sewage sludge permit under section 405(f) of the Clean Water Act and for recordkeeping and reporting requirements under part 503 of title 40.

(c) For the purposes of the NPDES program, when more than one test procedure is approved under this part for the analysis of a pollutant or pollutant parameter, the test procedure must be sufficiently sensitive as defined at 40 CFR 122.21(e)(3) and 122.44(i)(1)(iv).

[72 FR 14224, Mar. 26, 2007, as amended at 77 FR 29771, May 18, 2012; 79 FR 49013, Aug. 19, 2014]

§ 136.2 Definitions.

As used in this part, the term:

(a) *Act* means the Clean Water Act of 1977, Pub. L. 95–217, 91 Stat. 1566, *et seq.* (33 U.S.C. 1251 *et seq.*) (The Federal Water Pollution Control Act Amendments of 1972 as amended by the Clean Water Act of 1977).

(b) *Administrator* means the Administrator of the U.S. Environmental Protection Agency.

(c) *Regional Administrator* means one of the EPA Regional Administrators.

(d) *Director* means the Director of the State Agency authorized to carry out an approved National Pollutant Discharge Elimination System Program under section 402 of the Act.

(e) *National Pollutant Discharge Elimination System (NPDES)* means the national system for the issuance of permits under section 402 of the Act and includes any State or interstate program which has been approved by the Administrator, in whole or in part, pursuant to section 402 of the Act.

(f) *Detection limit* means the minimum concentration of an analyte (substance) that can be measured and reported with a 99% confidence that the analyte concentration is greater than

zero as determined by the procedure set forth at appendix B of this part.

[38 FR 28758, Oct. 16, 1973, as amended at 49 FR 43250, Oct. 26, 1984]

§ 136.3 Identification of test procedures.

(a) Parameters or pollutants, for which methods are approved, are listed together with test procedure descriptions and references in Tables IA, IB, IC, ID, IE, IF, IG, and IH. The methods listed in Tables IA, IB, IC, ID, IE, IF, IG, and IH are incorporated by reference, see paragraph (b) of this section, with the exception of EPA Methods 200.7, 601–613, 624, 625, 1613, 1624, and 1625. The full texts of Methods 601–613, 624, 625, 1613, 1624, and 1625 are printed in appendix A of this part 136, and the full text of Method 200.7 is printed in appendix C of this part 136. The full text for determining the method detection limit when using the test procedures is given in appendix B of this part 136. The full text of Method 200.7 is printed in appendix C of this part 136. In the event of a conflict between the reporting requirements of 40 CFR parts 122 and 125 and any reporting requirements associated with the methods listed in these tables, the provisions of 40 CFR parts 122 and 125 are controlling and will determine a permittee's reporting requirements. The full text of the referenced test procedures are incorporated by reference into Tables IA, IB, IC, ID, IE, IF, IG, and IH. The discharge parameter values for which reports are required must be determined by one of the standard analytical test procedures incorporated by reference and described in Tables IA, IB, IC, ID, IE, IF, IG, and IH or by any alternate test procedure which has been approved by the Administrator under the provisions of paragraph (d) of this section and §§ 136.4 and 136.5. Under certain circumstances paragraph (c) of this section, § 136.5(a) through (d) or 40 CFR 401.13, other additional or alternate test procedures may be used.

TABLE IA—LIST OF APPROVED BIOLOGICAL METHODS FOR WASTEWATER AND SEWAGE SLUDGE

Parameter and units	Method [1]	EPA	Standard methods	AOAC, ASTM, USGS	Other
Bacteria:					
1. Coliform (fecal), number per 100 mL or number per gram dry weight.	Most Probable Number (MPN), 5 tube, 3 dilution, or	p. 132 [3] ..... 1680. [11 15] 1681 [11 20]	9221 C E–2006.		
	Membrane filter (MF) [2], single step	p. 124 [3]	9222 D–1997	B–0050–85 [4].	
2. Coliform (fecal) in presence of chlorine, number per 100 mL.	MPN, 5 tube, 3 dilution, or	p. 132 [3]	9221 C E–2006.		
	MF [2], single step [5]	p. 124 [3]	9222 D–1997.		
3. Coliform (total), number per 100 mL.	MPN, 5 tube, 3 dilution, or.	p. 114 [3]	9221 B–2006.		
	MF [2], single step or two step.	p. 108 [3]	9222 B–1997	B–0025–85 [4]	
4. Coliform (total), in presence of chlorine, number per 100 mL.	MPN, 5 tube, 3 dilution, or	p. 114 [3]	9221 B–2006		
	MF [2] with enrichment [5].	p. 111 [3]	9222 (B + B.5c) − 1997.		
5. *E. coli*, number per 100 mL [21].	MPN [6 8 16] multiple tube, or.	.....	9221B.1–2006/ 9221F–2006 [12 14].		
	multiple tube/multiple well, or	.....	9223 B–200 4 [13] ...	991.15 [10]	Colilert® [13 18] Colilert-18® [13 17 18]

TABLE IA—LIST OF APPROVED BIOLOGICAL METHODS FOR WASTEWATER AND SEWAGE SLUDGE—Continued

Parameter and units	Method [1]	EPA	Standard methods	AOAC, ASTM, USGS	Other
	MF [2 6 7 8] single step.	1603 [22]			mColiBlue-24® [19]
6. Fecal streptococci, number per 100 mL.	MPN, 5 tube 3 dilution, or	p. 139 [3]	9230 B–2007.		
	MF [2], or	p. 136 [3]	9230 C–2007	B–0055–85 [4]	
	Plate count	p. 143 [3]			
7. Enterococci, number per 100 mL [22].	MPN [6 8], multiple tube/multiple well, or			D6503–99 [9]	Enterolert® [13 24]
	MF [2 6 7 8] single step or.	1600 [25]	9230 C–2007		
	Plate count	p. 143 [3]			
8. *Salmonella,* number per gram dry weight [11].	MPN multiple tube	1682 [23]			
Aquatic Toxicity:					
9. Toxicity, acute, fresh water organisms, LC_{50}, percent effluent.	*Ceriodaphnia dubia* acute.	2002.0.[26]			
	Daphnia puplex and *Daphnia magna* acute.	2021.0.[26]			
	Fathead Minnow, *Pimephales promelas,* and Bannerfin shiner, *Cyprinella leedsi,* acute.	2000.0.[26]			
	Rainbow Trout, *Oncorhynchus mykiss,* and brook trout, *Salvelinus fontinalis,* acute.	2019.0.[26]			
10. Toxicity, acute, estuarine and marine organisms of the Atlantic Ocean and Gulf of Mexico, LC_{50}, percent effluent.	Mysid, *Mysidopsis bahia,* acute.	2007.0.[26]			
	Sheepshead Minnow, *Cyprinodon variegatus,* acute.	2004.0 [26]			
	Silverside, *Menidia beryllina, Menidia menidia,* and *Menidia peninsulae,* acute.	2006.0 [26]			

TABLE IA—LIST OF APPROVED BIOLOGICAL METHODS FOR WASTEWATER AND SEWAGE SLUDGE—Continued

Parameter and units	Method [1]	EPA	Standard methods	AOAC, ASTM, USGS	Other
11. Toxicity, chronic, fresh water organisms, NOEC or IC_{25}, percent effluent.	Fathead minnow, *Pimephales promelas,* larval survival and growth.	1000.0.[27]			
	Fathead minnow, *Pimephales promelas,* embryo-larval survival and teratogenicity.	1001.0.[27]			
	Daphnia, *Ceriodaphnia dubia,* survival and reproduction.	1002.0.[27]			
	Green alga, *Selenastrum capricornutum,* growth.	1003.0.[27]			
12. Toxicity, chronic, estuarine and marine organisms of the Atlantic Ocean and Gulf of Mexico, NOEC or IC_{25}, percent effluent.	Sheepshead minnow, *Cyprinodon variegatus,* larval survival and growth.	1004.0.[28]			
	Sheepshead minnow, *Cyprinodon variegatus,* embryo-larval survival and teratogenicity.	1005.0.[28]			
	Inland silverside, *Menidia beryllina,* larval survival and growth.	1006.0.[28]			
	Mysid, *Mysidopsis bahia,* survival, growth, and fecundity.	1007.0.[28]			
	Sea urchin, *Arbacia punctulata,* fertilization.	1008.0.[28]			

Table IA notes:

[1] The method must be specified when results are reported.

[2] A 0.45-μm membrane filter (MF) or other pore size certified by the manufacturer to fully retain organisms to be cultivated and to be free of extractables which could interfere with their growth.

[3] Microbiological Methods for Monitoring the Environment, Water, and Wastes, EPA/600/8–78/017. 1978. US EPA.

[4] U.S. Geological Survey Techniques of Water-Resource Investigations, Book 5, Laboratory Analysis, Chapter A4, Methods for Collection and Analysis of Aquatic Biological and Microbiological Samples. 1989. USGS.

[5] Because the MF technique usually yields low and variable recovery from chlorinated wastewaters, the Most Probable Number method will be required to resolve any controversies.

[6] Tests must be conducted to provide organism enumeration (density). Select the appropriate configuration of tubes/filtrations and dilutions/volumes to account for the quality, character, consistency, and anticipated organism density of the water sample.

[7] When the MF method has been used previously to test waters with high turbidity, large numbers of noncoliform bacteria, or samples that may contain organisms stressed by chlorine, a parallel test should be conducted with a multiple-tube technique to demonstrate applicability and comparability of results.

[8] To assess the comparability of results obtained with individual methods, it is suggested that side-by-side tests be conducted across seasons of the year with the water samples routinely tested in accordance with the most current Standard Methods for the Examination of Water and Wastewater or EPA alternate test procedure (ATP) guidelines.

[9] Annual Book of ASTM Standards–Water and Environmental Technology, Section 11.02. 2000, 1999, 1996. ASTM International.

[10] Official Methods of Analysis of AOAC International. 16th Edition, 4th Revision, 1998. AOAC International.

[11] Recommended for enumeration of target organism in sewage sludge.

[12] The multiple-tube fermentation test is used in 9221B.1–2006. Lactose broth may be used in lieu of lauryl tryptose broth (LTB), if at least 25 parallel tests are conducted between this broth and LTB using the water samples normally tested, and this comparison demonstrates that the false-positive rate and false-negative rate for total coliform using lactose broth is less than 10 percent. No requirement exists to run the completed phase on 10 percent of all total coliform-positive tubes on a seasonal basis.

[13] These tests are collectively known as defined enzyme substrate tests, where, for example, a substrate is used to detect the enzyme β-glucuronidase produced by *E. coli.*

[14] After prior enrichment in a presumptive medium for total coliform using 9221B.1–2006, all presumptive tubes or bottles showing any amount of gas, growth or acidity within 48 h ±3 h of incubation shall be submitted to 9221F–2006. Commercially available EC–MUG media or EC media supplemented in the laboratory with 50 µg/mL of MUG may be used.

[15] Method 1680: Fecal Coliforms in Sewage Sludge (Biosolids) by Multiple-Tube Fermentation Using Lauryl-Tryptose Broth (LTB) and EC Medium, EPA–821–R–10–003. April 2010. U.S. EPA.

[16] Samples shall be enumerated by the multiple-tube or multiple-well procedure. Using multiple-tube procedures, employ an appropriate tube and dilution configuration of the sample as needed and report the Most Probable Number (MPN). Samples tested with Colilert® may be enumerated with the multiple-well procedures, Quanti-Tray®, Quanti-Tray®/2000, and the MPN calculated from the table provided by the manufacturer.

[17] Colilert-18® is an optimized formulation of the Colilert® for the determination of total coliforms and *E. coli* that provides results within 18 h of incubation at 35 °C rather than the 24 h required for the Colilert® test and is recommended for marine water samples.

[18] Descriptions of the Colilert®, Colilert-18®, Quanti-Tray®, and Quanti-Tray®/2000 may be obtained from IDEXX Laboratories, Inc.

[19] A description of the mColiBlue24® test, is available from Hach Company.

[20] Method 1681: Fecal Coliforms in Sewage Sludge (Biosolids) by Multiple-Tube Fermentation using A–1 Medium, EPA–821–R–06–013. July 2006. U.S. EPA.

[21] Recommended for enumeration of target organism in wastewater effluent.

[22] Method 1603: *Escherichia coli* (*E. coli*) in Water by Membrane Filtration Using Modified membrane-Thermotolerant *Escherichia coli* Agar (modified mTEC), EPA–821–R–09–007. December 2009. U.S. EPA.

[23] Method 1682: *Salmonella* in Sewage Sludge (Biosolids) by Modified Semisolid Rappaport-Vassiliadis (MSRV) Medium, EPA–821–R–06–014. July 2006. U.S. EPA.

[24] A description of the Enterolert® test may be obtained from IDEXX Laboratories Inc.

[25] Method 1600: Enterococci in Water by Membrane Filtration Using membrane-Enterococcus Indoxyl-β-D–Glucoside Agar (mEI), EPA–821–R–09–016. December 2009. U.S. EPA.

[26] Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms. EPA–821–R–02–012. Fifth Edition, October 2002. U.S. EPA.

[27] Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. EPA–821–R–02–013. Fourth Edition, October 2002. U.S. EPA.

[28] Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms. EPA–821–R–02–014. Third Edition, October 2002. U.S. EPA.

TABLE IB—LIST OF APPROVED INORGANIC TEST PROCEDURES

Parameter	Methodology [58]	EPA [52]	Standard methods	ASTM	USGS/AOAC/Other
1. Acidity, as $CaCO_3$, mg/L	Electrometric endpoint or phenolphthalein endpoint.	...	2310 B–1997	D1067–06	I–1020–85.[2]
2. Alkalinity, as $CaCO_3$, mg/L.	Electrometric or Colorimetric titration to pH 4.5, Manual.	...	2320 B–1997	D1067–06	973.43[3], I–1030–85.[2]
	Automatic	310.2 (Rev. 1974)[1]	...	...	I–2030–85.[2]
3. Aluminum—Total,[4] mg/L	Digestion,[4] followed by any of the following:				
	AA direct aspiration [36]	...	3111 D–1999 or 3111 E–1999.	...	I–3051–85.[2]
	AA furnace	...	3113 B–2004.		
	STGFAA	200.9, Rev. 2.2 (1994).			
	ICP/AES [36]	200.5, Rev 4.2 (2003) [68]; 200.7, Rev. 4.4 (1994).	3120 B–1999	D1976–07	I–4471–97.[50]
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14,[3] I–4471–97.[50]
	Direct Current Plasma (DCP) [36]	...	...	D4190–08	See footnote.[34]
	Colorimetric (Eriochrome cyanine R).	...	3500–Al B–2001.		
4. Ammonia (as N), mg/L	Manual distillation [6] or gas diffusion (pH >11), followed by any of the following:	350.1, Rev. 2.0 (1993)	4500–NH_3 B–1997	...	973.49[3].
	Nesslerization	...	...	D1426–08 (A)	973.49[3], I–3520–85.[2]
	Titration	...	4500–NH_3 C–1997.		
	Electrode	...	4500–NH_3 D–1997 or E–1997.	D1426–08 (B).	
	Manual phenate, salicylate, or other substituted phenols in Berthelot reaction based methods.	...	4500–NH_3 F–1997	...	See footnote.[60]
	Automated phenate, salicylate, or other substituted phenols in Berthelot reaction based methods.	350.1[30], Rev. 2.0 (1993)	4500–NH_3 G–1997 4500–NH_3 H–1997.	...	I–4523–85.[2]
	Automated electrode	Ion Chromatography	...	D6919–09	See footnote.[7]
5. Antimony—Total,[4] mg/L	Digestion,[4] followed by any of the following:				
	AA direct aspiration [36]	...	3111 B–1999.		
	AA furnace	...	3113 B–2004.		
	STGFAA	200.9, Rev. 2.2 (1994).			
	ICP/AES [36]	200.5, Rev 4.2 (2003) [68]; 200.7, Rev. 4.4 (1994).	3120 B–1999	D1976–07	I–4471–97.[50]
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14,[3] I–4471–97.[50]
6. Arsenic–Total,[4] mg/L	Digestion,[4] followed by any of the following:	206.5 (Issued 1978) [1].			
	AA gaseous hydride	...	3114 B–2009 or 3114 C–2009	D2972–08 (B)	I–3062–85.[2]
	AA furnace	...	3113 B–2004	D2972–08 (C)	I–4063–98.[49]

	STGFAA	200.9, Rev. 2.2 (1994).			
	ICP/AES [36]	200.5, Rev 4.2 (2003) [68]; 200.7, Rev. 4.4 (1994).	3120 B–1999	D1976–07.	
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14,[3] I–4020–05.[70]
	Colorimetric (SDDC)		3500–As B–1997	D2972–08 (A)	I–3060–85.[2]
7. Barium–Total,[4] mg/L	Digestion[4], followed by any of the following:				
	AA direct aspiration [36]		3111 D–1999		I–3084–85.[2]
	AA furnace		3113 B–2004	D4382–02(07).	
	ICP/AES [36]	200.5, Rev 4.2 (2003) [68]; 200.7, Rev. 4.4 (1994).	3120 B–1999		I–4471–97.[50]
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14,[3] I–4471–97.[50]
	DCP [36]				See footnote.[34]
8. Beryllium—Total,[4] mg/L	Digestion,[4] followed by any of the following:				
	AA direct aspiration		3111 D–1999 or 3111 E–1999	D3645–08 (A)	I–3095–85.[2]
	AA furnace		3113 B–2004	D3645–08 (B).	
	STGFAA	200.9, Rev. 2.2 (1994).			
	ICP/AES	200.5, Rev 4.2 (2003) [68]; 200.7, Rev. 4.4 (1994).	3120 B–1999	D1976–07	I–4471–97.[50]
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14,[3] I–4471–97.[50]
	DCP			D4190–08	See footnote.[34]
	Colorimetric (aluminon)		See footnote [61].		
9. Biochemical oxygen demand (BOD5), mg/L.	Dissolved Oxygen Depletion		5210 B–2001		973.44[3], p. 17.[9], I–1578–78,[8] See footnote.[10] [63]
10. Boron—Total,[37] mg/L	Colorimetric (curcumin)		4500–B B–2000		I–3112–85.[2]
	ICP/AES	200.5, Rev 4.2 (2003) [68]; 200.7, Rev. 4.4 (1994).	3120 B–1999	D1976–07	I–4471–97.[50]
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14,[3] I–4471–97.[50]
	DCP			D4190–08	See footnote.[34]
11. Bromide, mg/L	Electrode			D1246–05	I–1125–85.[2]
	Ion Chromatography	300.0, Rev 2.1 (1993) and 300.1–1, Rev 1.0 (1997).	4110 B–2000, C–2000, D–2000.	D4327–03	993.30.[3]
	CIE/UV		4140 B–1997	D6508–00(05)	D6508, Rev. 2.[54]
12. Cadmium—Total,[4] mg/L	Digestion,[4] followed by any of the following:				
	AA direct aspiration [36]		3111 B–1999 or 3111 C–1999	D3557–02(07) (A or B)	974.27,[3] p. 37.[9], I–3135–85[2] or I–3136–85.[2]
	AA furnace		3113 B–2004	D3557–02(07) (D)	I–4138–89.[51]
	STGFAA	200.9, Rev. 2.2 (1994).			
	ICP/AES [36]	200.5, Rev 4.2 (2003) [68]; 200.7, Rev. 4.4 (1994).	3120 B–1999	D1976–07	I–1472–85[2] or I–4471–97.[50]
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14,[3] I–4471–97.[50]
	DCP[36]			D4190–08	See footnote.[34]
	Voltametry[11]			D3557–02(07) (C).	
	Colorimetric (Dithizone)		3500–Cd-D–1990.		
13. Calcium—Total,[4] mg/L	Digestion,[4] followed by any of the following:				
	AA direct aspiration		3111 B–1999	D511–08(B)	I–3152–85.[2]

TABLE IB—LIST OF APPROVED INORGANIC TEST PROCEDURES—Continued

Parameter	Methodology [58]	EPA [52]	Standard methods	ASTM	USGS/AOAC/Other
	ICP/AES	200.5, Rev 4.2 (2003) [68]; 200.7, Rev. 4.4 (1994).	3120 B–1999		I–4471–97.[50]
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14.[3]
	DCP				See footnote.[34]
	Titrimetric (EDTA)		3500–Ca B–1997	D511–08 (A).	
	Ion Chromatography			D6919–09.	
14. Carbonaceous biochemical oxygen demand ($CBOD_5$), mg/L[12].	Dissolved Oxygen Depletion with nitrification inhibitor.		5210 B–2001		See footnote.[35 63]
15. Chemical oxygen demand (COD), mg/L.	Titrimetric	410.3 (Rev. 1978)[1]	5220 B–1997 or C–1997	D1252–06 (A)	973.46,[3] p. 17,[9] I–3560–85.[2]
	Spectrophotometric, manual or automatic.	410.4, Rev. 2.0 (1993)	5220 D–1997	D1252–06 (B)	See footnotes.[13 14] I–3561–85.[2]
16. Chloride, mg/L	Titrimetric: (silver nitrate)		4500–Cl^- B–1997	D512–04 (B)	I–1183–85.[2]
	(Mercuric nitrate)		4500–Cl^- C–1997	D512–04 (A)	973.51,[3] I–1184–85.[2]
	Colorimetric: manual				I–1187–85.[2]
	Automated (Ferricyanide)		4500–Cl^- E–1997		I–2187–85.[2]
	Potentiometric Titration		4500–Cl^- D–1997.		
	Ion Selective Electrode			D512–04 (C).	
	Ion Chromatography	300.0, Rev 2.1 (1993) and 300.1–1, Rev 1.0 (1997).	4110 B–2000 or 4110 C–2000	D4327–03	993.30[3] , I–2057–90.[51]
	CIE/UV		4140 B–1997	D6508–00(05)	D6508, Rev. 2.[54]
17. Chlorine–Total residual, mg/L.	Amperometric direct		4500–Cl D–2000	D1253–08.	
	Amperometric direct (low level)		4500–Cl E–2000.		
	Iodometric direct		4500–Cl B–2000.		
	Back titration ether end-point[15]		4500–Cl C–2000.		
	DPD–FAS		4500–Cl F–2000.		
	Spectrophotometric, DPD		4500–Cl G–2000.		
	Electrode				See footnote.[16]
17A. Chlorine–Free Available, mg/L.	Amperometric direct		4500–Cl D–2000	D1253–08.	
	Amperometric direct (low level)		4500–Cl E–2000.		
	DPD–FAS		4500–Cl F–2000.		
	Spectrophotometric, DPD		4500–Cl G–2000.		
18. Chromium VI dissolved, mg/L.	0.45-micron Filtration followed by any of the following:				
	AA chelation-extraction		3111 C–1999		I–1232–85.[2]
	Ion Chromatography	218.6, Rev. 3.3 (1994)	3500–Cr C–2009	D5257–03	993.23.
	Colorimetric (Diphenyl-carbazide)		3500–Cr B–2009	D1687–02(07) (A)	I–1230–85.[2]
19. Chromium—Total,[4] mg/L.	Digestion,[4] followed by any of the following:				
	AA direct aspiration [36]		3111 B–1999	D1687–02(07) (B)	974.27,[3] I–3236–85.[2]
	AA chelation-extraction		3111 C–1999.		
	AA furnace		3113 B–2004	D1687–02(07) (C)	I–3233–93.[46]
	STGFAA	200.9, Rev. 2.2 (1994).			

	ICP/AES [36]	200.5, Rev 4.2 (2003),[68] 200.7, Rev. 4.4 (1994).	3120 B–1999	D1976–07	I–4471–97.[50]
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14,[3] I–4020–05.[70]
	DCP [36]			D4190–08	See footnote.[34]
	Colorimetric (Diphenyl-carbazide)		3500–Cr B–2009.		
20. Cobalt—Total,[4] mg/L	Digestion,[4] followed by any of the following:				
	AA direct aspiration		3111 B–1999 or 3111 C–1999.	D3558–08 (A or B)	p. 37,[9] I–3239–85.[2]
	AA furnace		3113 B–2004	D3558–08 (C)	I–4243–89.[51]
	STGFAA	200.9, Rev. 2.2 (1994).			
	ICP/AES [36]	200.5, Rev 4.2 (2003) [68]; 200.7, Rev. 4.4 (1994).	3120 B–1999	D1976–07	I–4471–97.[50]
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14,[3] I–4020–05.[70]
	DCP			D4190–08	See footnote.[34]
21. Color, platinum cobalt units or dominant wavelength, hue, luminance purity.	Colorimetric (ADMI)				See footnote.[18]
	(Platinum cobalt)		2120 B–2001		I–1250–85.[2]
	Spectrophotometric.				
22. Copper—Total,[4] mg/L	Digestion,[4] followed by any of the following:				
	AA direct aspiration [36]		3111 B–1999 or 3111 C–1999	D1688–07 (A or B)	974.27,[3] p. 37,[9] I–3270–85 [2] or I–3271–85.[2]
	AA furnace		3113 B–2004	D1688–07 (C)	I–4274–89.[51]
	STGFAA	200.9, Rev. 2.2 (1994).			
	ICP/AES [36]	200.5, Rev 4.2 (2003) [68]; 200.7, Rev. 4.4 (1994).	3120 B–1999	D1976–07	I–4471–97.[50]
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14,[3] I–4020–05.[70]
	DCP [36]			D4190–08	See footnote.[34]
	Colorimetric (Neocuproine)		3500–Cu B–1999.		
	(Bathocuproine)		3500–Cu C–1999		See footnote.[19]
23. Cyanide—Total, mg/L	Automated UV digestion/distillation and Colorimetry.				Kelada–01.[55]
	Segmented Flow Injection, In-Line Ultraviolet Digestion, followed by gas diffusion amperometry.			D7511–09.	
	Manual distillation with $MgCl_2$, followed by any of the following:	335.4, Rev. 1.0 (1993) [57]	4500–CN^- B–1999 or C–1999.	D2036–09(A), D7284–08	10–204–00–1–X.[56]
	Flow Injection, gas diffusion amperometry.			D2036–09(A) D7284–08.	
	Titrimetric		4500–CN^- D–1999	D2036–09(A)	p. 22.[9]
	Spectrophotometric, manual		4500–CN^- E–1999	D2036–09(A)	I–3300–85.[2]
	Semi-Automated [20]	335.4, Rev. 1.0 (1993) [57]			10–204–00–1–X,[56] I–4302–85.[2]
	Ion Chromatography			D2036–09(A).	
	Ion Selective Electrode		4500–CN^- F–1999	D2036–09(A).	

TABLE IB—LIST OF APPROVED INORGANIC TEST PROCEDURES—Continued

Parameter	Methodology [58]	EPA [52]	Standard methods	ASTM	USGS/AOAC/Other
24. Cyanide–Available, mg/L.	Cyanide Amenable to Chlorination (CATC); Manual distillation with $MgCl_2$, followed by Titrimetric or Spectrophotometric.	.....	4500–CN^- G–1999	D2036–09(B).	
	Flow injection and ligand exchange, followed by gas diffusion amperometry [59].	.....	.....	D6888–09	OIA–1677–09.[44]
	Automated Distillation and Colorimetry (no UV digestion).	.....	.....	.....	Kelada–01.[55]
24.A Cyanide-Free, mg/L ...	Flow Injection, followed by gas diffusion amperometry.	.....	.....	D7237–10	OIA–1677–09.[44]
	Manual micro-diffusion and colorimetry	.....	.....	D4282–02.	
25. Fluoride—Total, mg/L ...	Manual distillation,[6] followed by any of the following:	.....	4500–F^- B–1997.		
	Electrode, manual	.....	4500–F^- C–1997	D1179–04 (B).	
	Electrode, automated	.....	.....	.....	I–4327–85.[2]
	Colorimetric, (SPADNS)	.....	4500–F^- D–1997	D1179–04 (A).	
	Automated complexone	.....	4500–F^- E–1997.		
	Ion Chromatography	300.0, Rev 2.1 (1993) and 300.1–1, Rev 1.0 (1997).	4110 B–2000 or C–2000 ...	D4327–03	993.30.[3]
	CIE/UV	.....	4140 B–1997	D6508–00(05)	D6508, Rev. 2.[54]
26. Gold—Total,[4] mg/L	Digestion,[4] followed by any of the following:				
	AA direct aspiration	.....	3111 B–1999.		
	AA furnace	231.2 (Issued 1978)[1]	3113 B–2004.		
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14.[3]
	DCP	.....	.....	.....	See footnote.[34]
27. Hardness—Total, as $CaCO_3$, mg/L.	Automated colorimetric	130.1 (Issued 1971)[1].			
	Titrimetric (EDTA)	.....	2340 C–1997	D1126–02(07)	973.52B,[3] I–1338–85.[2]
	Ca plus Mg as their carbonates, by inductively coupled plasma or AA direct aspiration. (See Parameters 13 and 33)..	.....	2340 B–1997.		
28. Hydrogen ion (pH), pH units.	Electrometric measurement	.....	4500–H^+ B–2000	D1293–99 (A or B)	973.41,[3] I–1586–85.[2]
	Automated electrode	150.2 (Dec. 1982)[1]	.....	.....	See footnote,[21] I–2587–85.[2]
29. Iridium—Total,[4] mg/L	Digestion,[4] followed by any of the following:				
	AA direct aspiration	.....	3111 B–1999.		
	AA furnace	235.2 (Issued 1978)[1].			
	ICP/MS	.....	3125 B–2009.		
30. Iron—Total,[4] mg/L	Digestion,[4] followed by any of the following:				

	AA direct aspiration[36]		3111 B–1999 or 3111 C–1999	D1068–05 (A or B)	974.27,[3] I–3381–85.[2]
	AA furnace		3113 B–2004	D1068–05 (C).	
	STGFAA	200.9, Rev. 2.2 (1994).			
	ICP/AES[36]	200.5, Rev 4.2 (2003)[68]; 200.7, Rev. 4.4 (1994).	3120 B–1999	D1976–07	I–4471–97.[50]
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14.[3]
	DCP[36]			D4190–08	See footnote.[34]
	Colorimetric (Phenanthroline)		3500–Fe-1997	D1068–05 (D)	See footnote.[22]
31. Kjeldahl Nitrogen[5]—Total, (as N), mg/L.	Manual digestion[20] and distillation or gas diffusion, followed by any of the following:		4500–N_{org} B–1997 or C–1997 and 4500–NH_3 B–1997.	D3590–02(06) (A)	I–4515–91.[45]
	Titration		4500–NH_3 C–1997		973.48.[3]
	Nesslerization			D1426–08 (A).	
	Electrode		4500–NH_3 D–1997 or E–1997.	D1426–08 (B).	
	Semi-automated phenate	350.1 Rev 2.0 1993	4500–NH_3 G–1997. 4500–NH_3 H–1997.		
	Manual phenate, salicylate, or other substituted phenols in Berthelot reaction based methods.		4500–NH_3 F–1997		See footnote.[60]
	Automated Methods for TKN that do not require manual distillation				
	Automated phenate, salicylate, or other substituted phenols in Berthelot reaction based methods colorimetric (auto digestion and distillation).	351.1 (Rev. 1978)[1]			I–4551–78.[8]
	Semi-automated block digestor colorimetric (distillation not required).	351.2, Rev. 2.0 (1993)	4500–N_{org} D–1997	D3590–02(06) (B)	I–4515–91.[45]
	Block digester, followed by Auto distillation and Titration.				See footnote.[39]
	Block digester, followed by Auto distillation and Nesslerization.				See footnote.[40]
	Block Digester, followed by Flow injection gas diffusion (distillation not required).				See footnote.[41]
32. Lead—Total,[4] mg/L	Digestion,[4] followed by any of the following:				
	AA direct aspiration[36]		3111 B–1999 or 3111 C–1999.	D3559–08 (A or B)	974.27,[3] I–3399–85.[2]
	AA furnace		3113 B–2004	D3559–08 (D)	I–4403–89.[51]
	STGFAA	200.9, Rev. 2.2 (1994).			
	ICP/AES[36]	200.5, Rev 4.2 (2003)[68]; 200.7, Rev. 4.4 (1994).	3120 B–1999	D1976–07	I–4471–97.[50]
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14,[3] I–4471–97.[50]
	DCP[36]			D4190–08	See footnote.[34]
	Voltametry[11]			D3559–08 (C).	

TABLE IB—LIST OF APPROVED INORGANIC TEST PROCEDURES—Continued

Parameter	Methodology [58]	EPA [52]	Standard methods	ASTM	USGS/AOAC/Other
	Colorimetric (Dithizone)		3500–Pb B–1997.		
33. Magnesium—Total,[4] mg/L.	Digestion,[4] followed by any of the following:				
	AA direct aspiration		3111 B–1999	D511–08 (B)	974.27,[3] I–3447–85.[2]
	ICP/AES	200.5, Rev 4.2 (2003) [68]; 200.7, Rev. 4.4 (1994).	3120 B–1999	D1976–07	I–4471–97.[50]
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14.[3]
	DCP				See footnote.[34]
	Gravimetric.				
	Ion Chromatography			D6919–09.	
34. Manganese—Total,[4] mg/L.	Digestion [4] followed by any of the following:				
	AA direct aspiration [36]		3111 B–1999	D858–07 (A or B)	974.27,[3] I–3454–85.[2]
	AA furnace		3113 B–2004	D858–07 (C).	
	STGFAA	200.9, Rev. 2.2 (1994).			
	ICP/AES [36]	200.5, Rev 4.2 (2003) [68]; 200.7, Rev. 4.4 (1994).	3120 B–1999	D1976–07	I–4471–97.[50]
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14,[3] I–4471–97.[50]
	DCP [36]			D4190–08	See footnote.[34]
	Colorimetric (Persulfate)		3500–Mn B–1999		920.203.[3]
	(Periodate)				See footnote.[23]
35. Mercury—Total,[4] mg/L	Cold vapor, Manual	245.1, Rev. 3.0 (1994)	3112 B–2009	D3223–02(07)	977.22,[3] I–3462–85.[2]
	Cold vapor, Automated	245.2 (Issued 1974)[1].			
	Cold vapor atomic fluorescence spectrometry (CVAFS).	245.7 Rev. 2.0 (2005) [17]			I–4464–01.[71]
	Purge and Trap CVAFS	1631E[43].			
36. Molybdenum—Total,[4] mg/L.	Digestion,[4] followed by any of the following:				
	AA direct aspiration		3111 D–1999		I–3490–85.[2]
	AA furnace		3113 B–2004		I–3492–96.[47]
	ICP/AES [36]	200.5, Rev 4.2 (2003) [68]; 200.7, Rev. 4.4 (1994).	3120 B–1999	D1976–07	I–4471–97.[50]
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14,[3] I–4471–97.[50]
	DCP				See footnote.[34]
37. Nickel—Total,[4] mg/L	Digestion [4] followed by any of the following:				
	AA direct aspiration [36]		3111 B–1999 or 3111 C–1999	D1886–08 (A or B)	I–3499–85.[2]
	AA furnace		3113 B–2004	D1886–08 (C)	I–4503–89.[51]
	STGFAA	200.9, Rev. 2.2 (1994).			
	ICP/AES [36]	200.5, Rev 4.2 (2003) [68]; 200.7, Rev. 4.4 (1994).	3120 B–1999	D1976–07	I–4471–97.[50]
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14,[3] I–4020–05.[70]
	DCP [36]			D4190–08	See footnote.[34]
38. Nitrate (as N), mg/L	Ion Chromatography	300.0, Rev 2.1 (1993) and 300.1–1, Rev 1.0 (1997).	4110 B–2000 or C–2000	D4327–03	993.30.[3]

	CIE/UV		4140 B–1997	D6508–00(05)	D6508, Rev. 2.[54]
	Ion Selective Electrode		4500–NO_3^- D–2000.		
	Colorimetric (Brucine sulfate)	352.1 (Issued 1971)[1]			973.50,[3] 419D[1 7], p. 28.[9]
	Nitrate-nitrite N minus Nitrite N (See parameters 39 and 40).				See footnote.[62]
39. Nitrate-nitrite (as N), mg/L.	Cadmium reduction, Manual		4500–NO_3^- E–2000	D3867–04 (B).	
	Cadmium reduction, Automated	353.2, Rev. 2.0 (1993)	4500–NO_3^- F–2000	D3867–04 (A)	I–2545–90.[51]
	Automated hydrazine		4500–NO_3^- H–2000.		
	Reduction/Colorimetric				See footnote.[62]
	Ion Chromatography	300.0, Rev 2.1 (1993) and 300.1–1, Rev 1.0 (1997).	4110 B–2000 or C–2000	D4327–03	993.30.[3]
	CIE/UV		4140 B–1997	D6508–00(05)	D6508, Rev. 2.[54]
40. Nitrite (as N), mg/L	Spectrophotometric: Manual		4500–NO_2^- B–2000		See footnote.[25]
	Automated (Diazotization)				I–4540–85[2], See footnote.[62]
	Automated (*bypass cadmium reduction).	353.2, Rev. 2.0 (1993)	4500–NO_3^- F–2000	D3867–04 (A)	I–4545–85.[2]
	Manual (*bypass cadmium reduction).		4500–NO_3^- E–2000	D3867–04 (B).	
	Ion Chromatography	300.0, Rev 2.1 (1993) and 300.1–1, Rev 1.0 (1997).	4110 B–2000 or C–2000	D4327–03	993.30.[3]
	CIE/UV		4140 B–1997	D6508–00(05)	D6508, Rev. 2.[54]
41. Oil and grease—Total recoverable, mg/L.	Hexane extractable material (HEM): n–Hexane extraction and gravimetry.	1664 Rev. A; 1664 Rev. B[42].	5520 B–2001[38].		
	Silica gel treated HEM (SGT–HEM): Silica gel treatment and gravimetry.	1664 Rev. A; 1664 Rev. B[42].	5520 B–2001[38] and 5520 F–2001[38].		
42. Organic carbon—Total (TOC), mg/L.	Combustion		5310 B–2000	D7573–09	973.47[3], p. 14.[24]
	Heated persulfate or UV persulfate oxidation.		5310 C 2000 5310 D 2000.	D4839–03	973.47[3], p. 14.[24]
43. Organic nitrogen (as N), mg/L.	Total Kjeldahl N (Parameter 31) minus ammonia N (Parameter 4).				
44. Ortho-phosphate (as P), mg/L.		Ascorbic acid method:			
	Automated	365.1, Rev. 2.0 (1993)	4500–P F–1999 or G–1999		973.56[3], I–4601–85.[2]
	Manual single reagent		4500–P E–1999	D515–88(A)	973.55.[3]
	Manual two reagent	365.3 (Issued 1978)[1].			
	Ion Chromatography	300.0, Rev 2.1 (1993) and 300.1–1, Rev 1.0 (1997).	4110 B–2000 or C–2000	D4327–03	993.30.[3]
	CIE/UV		4140 B–1997	D6508–00(05)	D6508, Rev. 2.[54]
45. Osmium—Total[4], mg/L	Digestion[4], followed by any of the following:				
	AA direct aspiration,		3111 D–1999.		
	AA furnace	252.2 (Issued 1978)[1].			
46. Oxygen, dissolved, mg/L.	Winkler (Azide modification)		4500–O B–2001, C–2001, D–2001, E–2001, F–2001.	D888–09 (A)	973.45B[3], I–1575–78.[8]
	Electrode		4500–O G–2001	D888–09 (B)	I–1576–78.[8]

TABLE IB—LIST OF APPROVED INORGANIC TEST PROCEDURES—Continued

Parameter	Methodology [58]	EPA [52]	Standard methods	ASTM	USGS/AOAC/Other
	Luminescence Based Sensor			D888–09 (C)	See footnote[63] See footnote.[64]
47. Palladium—Total,[4] mg/L	Digestion[4], followed by any of the following:				
	AA direct aspiration		3111 B–1999.		
	AA furnace	253.2[1](Issued 1978).			
	ICP/MS		3125 B–2009.		
	DCP				See footnote.[34]
48. Phenols, mg/L	Manual distillation[26], followed by any of the following:	420.1[1](Rev. 1978)	5530 B–2005	D1783–01.	
	Colorimetric (4AAP) manual	420.1[1](Rev. 1978)	5530 D–2005[27]	D1783–01 (A or B).	
	Automated colorimetric (4AAP)	420.4 Rev. 1.0 (1993).			
49. Phosphorus (elemental), mg/L.	Gas-liquid chromatography				See footnote.[28]
50. Phosphorus—Total, mg/L.	Digestion[20], followed by any of the following:		4500–P B(5)-1999		973.55.[3]
	Manual	365.3[1](Issued 1978)	4500–P E–1999	D515–88 (A).	
	Automated ascorbic acid reduction.	365.1 Rev. 2.0 (1993)	4500–P F–1999, G–1999, H–1999.		973.56[3], I–4600–85.[2]
	ICP/AES[4 36]	200.7, Rev. 4.4 (1994)	3120 B–1999		I–4471–97.[50]
	Semi-automated block digestor (TKP digestion).	365.4[1] (Issued 1974)		D515–88 (B)	I–4610–91.[48]
51. Platinum—Total,[4] mg/L	Digestion[4] followed by any of the following:				
	AA direct aspiration		3111 B–1999.		
	AA furnace	255.2 (Issued 1978)[1].			
	ICP/MS		3125 B–2009.		
	DCP				See footnote.[34]
52. Potassium—Total,[4] mg/L.	Digestion[4], followed by any of the following:				
	AA direct aspiration		3111 B–1999		973.53[3], I–3630–85.[2]
	ICP/AES	200.7, Rev. 4.4 (1994)	3120 B–1999.		
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14.[3]
	Flame photometric		3500–K B–1997.		
	Electrode		3500–K C–1997.		
	Ion Chromatography			D6919–09.	
53. Residue—Total, mg/L	Gravimetric, 103–105°		2540 B–1997		I–3750–85.[2]
54. Residue—filterable, mg/L.	Gravimetric, 180°		2540 C–1997	D5907–03	I–1750–85.[2]
55. Residue—non-filterable (TSS), mg/L.	Gravimetric, 103–105° post washing of residue.		2540 D–1997	D5907–03	I–3765–85.[2]
56. Residue—settleable, mg/L.	Volumetric, (Imhoff cone), or gravimetric.		2540 F–1997.		
57. Residue—Volatile, mg/L	Gravimetric, 550°	160.4 (Issued 1971)[1]	2540–E–1997		I–3753–85.[2]
58. Rhodium—Total,[4] mg/L	Digestion[4] followed by any of the following:				

	AA direct aspiration, or		3111 B–1999.		
	AA furnace	265.2 (Issued 1978)[1].			
	ICP/MS		3125 B–2009.		
59. Ruthenium—Total,[4] mg/L.	Digestion[4] followed by any of the following:				
	AA direct aspiration, or		3111 B–1999.		
	AA furnace	267.2[1].			
	ICP/MS		3125 B–2009.		
60. Selenium—Total,[4] mg/L	Digestion[4], followed by any of the following:				
	AA furnace		3113 B–2004	D3859–08 (B)	I–4668–98.[49]
	STGFAA	200.9, Rev. 2.2 (1994).			
	ICP/AES[36]	200.5, Rev 4.2 (2003)[68]; 200.7, Rev. 4.4 (1994).	3120 B–1999	D1976–07.	
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14[3], I–4020–05.[70]
	AA gaseous hydride		3114 B–2009, or 3111 C–2009.	D3859–08 (A)	I–3667–85.[2]
61. Silica—Dissolved,[37] mg/L.	0.45-micron filtration followed by any of the following:				
	Colorimetric, Manual		4500–SiO_2 C–1997	D859–05	I–1700–85.[2]
	Automated (Molybdosilicate)		4500–SiO_2 E–1997 or F–1997.		I–2700–85.[2]
	ICP/AES	200.5, Rev 4.2 (2003)[68]; 200.7, Rev. 4.4 (1994).	3120 B–1999		I–4471–97.[50]
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14.[3]
62. Silver—Total,[4 31] mg/L	Digestion[4, 29], followed by any of the following:				
	AA direct aspiration		3111 B–1999 or 3111 C–1999		974.27[3], p. 37[9], I–3720–85.[2]
	AA furnace		3113 B–2004		I–4724–89.[51]
	STGFAA	200.9, Rev. 2.2 (1994).			
	ICP/AES	200.5, Rev 4.2 (2003)[68]; 200.7, Rev. 4.4 (1994).	3120 B–1999	D1976–07	I–4471–97.[50]
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14[3], I–4471–97.[50]
	DCP				See footnote.[34]
63. Sodium—Total,[4] mg/L	Digestion[4], followed by any of the following:				
	AA direct aspiration		3111 B–1999		973.54[3], I–3735–85.[2]
	ICP/AES	200.5, Rev 4.2 (2003)[68]; 200.7, Rev. 4.4 (1994).	3120 B–1999		I–4471–97.[50]
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14.[3]
	DCP				See footnote.[34]
	Flame photometric		3500–Na B–1997.		
	Ion Chromatography			D6919–09.	
64. Specific conductance, micromhos/cm at 25 °C.	Wheatstone bridge	120.1[1](Rev. 1982)	2510 B–1997	D1125–95(99) (A)	973.40[3], I–2781–85.[2]
65. Sulfate (as SO_4), mg/L	Automated colorimetric	375.2, Rev. 2.0 (1993)	4500–SO_4^{2-} F–1997 or G–1997.		
	Gravimetric		4500–SO_4^{2-} C–1997 or D–1997.		925.54.[3]

TABLE IB—LIST OF APPROVED INORGANIC TEST PROCEDURES—Continued

Parameter	Methodology [58]	EPA [52]	Standard methods	ASTM	USGS/AOAC/Other
	Turbidimetric		4500–SO_4^{2-} E–1997	D516–07.	
	Ion Chromatography	300.0, Rev 2.1 (1993) and 300.1–1, Rev 1.0 (1997).	4110 B–2000 or C–2000	D4327–03	993.30[3], I–4020–05.[70]
	CIE/UV		4140 B–1997	D6508–00(05)	D6508, Rev. 2.[54]
66. Sulfide (as S), mg/L	Sample Pretreatment		4500–S^{2-} B, C–2000.		
	Titrimetric (iodine)		4500–S^{2-} F–2000		I–3840–85.[2]
	Colorimetric (methylene blue)		4500–S^{2-} D–2000.		
	Ion Selective Electrode		4500–S^{2-} G–2000	D4658–08.	
67. Sulfite (as SO_3), mg/L	Titrimetric (iodine-iodate)		4500–SO_3^{2-} B–2000.		
68. Surfactants, mg/L	Colorimetric (methylene blue)		5540 C–2000	D2330–02.	
69. Temperature, °C	Thermometric		2550 B–2000		See footnote.[32]
70. Thallium–Total,[4] mg/L	Digestion[4], followed by any of the following:				
	AA direct aspiration		3111 B–1999.		
	AA furnace	279.2[1](Issued 1978)	3113 B–2004.		
	STGFAA	200.9, Rev. 2.2 (1994).			
	ICP/AES	200.7, Rev. 4.4 (1994); 200.5 Rev. 4.2 (2003)[68].	3120 B–1999	D1976–07.	
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14[3], I–4471–97.[50]
71. Tin–Total,[4] mg/L	Digestion[4], followed by any of the following:.				
	AA direct aspiration		3111 B–1999		I–3850–78.[8]
	AA furnace		3113 B–2004.		
	STGFAA	200.9, Rev. 2.2 (1994).			
	ICP/AES	200.5, Rev 4.2 (2003)[68]; 200.7, Rev. 4.4 (1994).			
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14.[3]
72. Titanium–Total,[4] mg/L	Digestion[4] followed by any of the following:				
	AA direct aspiration		3111 D–1999.		
	AA furnace	283.2[1](Issued 1978).			
	ICP/AES	200.7, Rev. 4.4 (1994).			
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14.[3]
	DCP				See footnote.[34]
73. Turbidity, NTU[53]	Nephelometric	180.1, Rev. 2.0 (1993)	2130 B–2001	D1889–00	I–3860–85.[2]
					See footnote.[65]
					See footnote.[66]
					See footnote.[67]
74. Vanadium–Total,[4] mg/L	Digestion[4], followed by any of the following:				
	AA direct aspiration		3111 D–1999.		
	AA furnace		3113 B–2004	D3373–03(07).	
	ICP/AES	200.5, Rev 4.2 (2003)[68]; 200.7, Rev. 4.4 (1994).	3120 B–1999	D1976–07	I–4471–97.[50]
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14[3], I–4020–05.[70]
	DCP			D4190–08	See footnote.[34]

	Colorimetric (Gallic Acid)		3500–V B–1997.		
75. Zinc–Total[4], mg/L	Digestion[4], followed by any of the following:				
	AA direct aspiration[36]		3111 B–1999 or 3111 C–1999.	D1691–02(07) (A or B)	974.27[3], p. 37[9], I–3900–85.[2]
	AA furnace	289.2[1](Issued 1978).			
	ICP/AES[36]	200.5, Rev 4.2 (2003)[68]; 200.7, Rev. 4.4 (1994).	3120 B–1999	D1976–07	I–4471–97.[50]
	ICP/MS	200.8, Rev. 5.4 (1994)	3125 B–2009	D5673–05	993.14[3], I–4020–05.[70]
	DCP[36]			D4190–08	See footnote.[34]
	Colorimetric (Zincon)		3500 Zn B–1997		See footnote.[33]
76. Acid Mine Drainage		1627[69].			

Table IB Notes:

[1] Methods for Chemical Analysis of Water and Wastes, EPA–600/4–79–020. Revised March 1983 and 1979, where applicable. U.S. EPA.

[2] Methods for Analysis of Inorganic Substances in Water and Fluvial Sediments, Techniques of Water-Resource Investigations of the U.S. Geological Survey, Book 5, Chapter A1., unless otherwise stated. 1989. USGS.

[3] Official Methods of Analysis of the Association of Official Analytical Chemists, Methods Manual, Sixteenth Edition, 4th Revision, 1998. AOAC International.

[4] For the determination of total metals (which are equivalent to total recoverable metals) the sample is not filtered before processing. A digestion procedure is required to solubilize analytes in suspended material and to break down organic-metal complexes (to convert the analyte to a detectable form for colorimetric analysis). For non-platform graphite furnace atomic absorption determinations a digestion using nitric acid (as specified in Section 4.1.3 of Methods for the Chemical Analysis of Water and Wastes) is required prior to analysis. The procedure used should subject the sample to gentle, acid refluxing and at no time should the sample be taken to dryness. For direct aspiration flame atomic absorption determinations (FLAA) a combination acid (nitric and hydrochloric acids) digestion is preferred prior to analysis. The approved total recoverable digestion is described as Method 200.2 in Supplement I of ''Methods for the Determination of Metals in Environmental Samples'' EPA/600R–94/111, May, 1994, and is reproduced in EPA Methods 200.7, 200.8, and 200.9 from the same Supplement. However, when using the gaseous hydride technique or for the determination of certain elements such as antimony, arsenic, selenium, silver, and tin by non-EPA graphite furnace atomic absorption methods, mercury by cold vapor atomic absorption, the noble metals and titanium by FLAA, a specific or modified sample digestion procedure may be required and in all cases the referenced method write-up should be consulted for specific instruction and/or cautions. For analyses using inductively coupled plasma-atomic emission spectrometry (ICP–AES), the direct current plasma (DCP) technique or the EPA spectrochemical techniques (platform furnace AA, ICP–AES, and ICP–MS) use EPA Method 200.2 or an approved alternate procedure (e.g., CEM microwave digestion, which may be used with certain analytes as indicated in Table IB); the total recoverable digestion procedures in EPA Methods 200.7, 200.8, and 200.9 may be used for those respective methods. Regardless of the digestion procedure, the results of the analysis after digestion procedure are reported as ''total'' metals.

[5] Copper sulfate or other catalysts that have been found suitable may be used in place of mercuric sulfate.

[6] Manual distillation is not required if comparability data on representative effluent samples are on file to show that this preliminary distillation step is not necessary: however, manual distillation will be required to resolve any controversies. In general, the analytical method should be consulted regarding the need for distillation. If the method is not clear, the laboratory may compare a minimum of 9 different sample matrices to evaluate the need for distillation. For each matrix, a matrix spike and matrix spike duplicate are analyzed both with and without the distillation step. (A total of 36 samples, assuming 9 matrices). If results are comparable, the laboratory may dispense with the distillation step for future analysis. Comparable is defined as <20% RPD for all tested matrices). Alternatively the two populations of spike recovery percentages may be compared using a recognized statistical test.

[7] Industrial Method Number 379–75 WE Ammonia, Automated Electrode Method, Technicon Auto Analyzer II. February 19, 1976. Bran & Luebbe Analyzing Technologies Inc.

[8] The approved method is that cited in Methods for Determination of Inorganic Substances in Water and Fluvial Sediments, Techniques of Water-Resources Investigations of the U.S. Geological Survey, Book 5, Chapter A1. 1979. USGS.

[9] American National Standard on Photographic Processing Effluents. April 2, 1975. American National Standards Institute.

[10] In-Situ Method 1003–8–2009, Biochemical Oxygen Demand (BOD) Measurement by Optical Probe. 2009. In-Situ Incorporated.

[11] The use of normal and differential pulse voltage ramps to increase sensitivity and resolution is acceptable.

[12] Carbonaceous biochemical oxygen demand ($CBOD_5$) must not be confused with the traditional BOD_5 test method which measures ''total BOD.'' The addition of the nitrification inhibitor is not a procedural option, but must be included to report the $CBOD_5$ parameter. A discharger whose permit requires reporting the traditional BOD_5 may not use a nitrification inhibitor in the procedure for reporting the results. Only when a discharger's permit specifically states $CBOD_5$ is required can the permittee report data using a nitrification inhibitor.

[13] OIC Chemical Oxygen Demand Method. 1978. Oceanography International Corporation.

[14] Method 8000, Chemical Oxygen Demand, Hach Handbook of Water Analysis, 1979. Hach Company.

[15] The back titration method will be used to resolve controversy.

[16] Orion Research Instruction Manual, Residual Chlorine Electrode Model 97–70. 1977. Orion Research Incorporated. The calibration graph for the Orion residual chlorine method must be derived using a reagent blank and three standard solutions, containing 0.2, 1.0, and 5.0 mL 0.00281 N potassium iodate/100 mL solution, respectively.

[17] Method 245.7, Mercury in Water by Cold Vapor Atomic Fluorescence Spectrometry, EPA–821–R–05–001. Revision 2.0, February 2005. US EPA.

[18] National Council of the Paper Industry for Air and Stream Improvement (NCASI) Technical Bulletin 253, December 1971.

[19] Method 8506, Biocinchoninate Method for Copper, Hach Handbook of Water Analysis. 1979. Hach Company.

[20] When using a method with block digestion, this treatment is not required.

[21] Industrial Method Number 378–75WA, Hydrogen ion (pH) Automated Electrode Method, Bran & Luebbe (Technicon) Autoanalyzer II. October 1976. Bran & Luebbe Analyzing Technologies.

[22] Method 8008, 1,10–Phenanthroline Method using FerroVer Iron Reagent for Water. 1980. Hach Company.

[23] Method 8034, Periodate Oxidation Method for Manganese, Hach Handbook of Wastewater Analysis. 1979. Hach Company.

[24] Methods for Analysis of Organic Substances in Water and Fluvial Sediments, Techniques of Water-Resources Investigations of the U.S. Geological Survey, Book 5, Chapter A3, (1972 Revised 1987) p. 14. 1987. USGS.

[25] Method 8507, Nitrogen, Nitrite-Low Range, Diazotization Method for Water and Wastewater. 1979. Hach Company.

[26] Just prior to distillation, adjust the sulfuric-acid-preserved sample to pH 4 with 1 + 9 NaOH.

[27] The colorimetric reaction must be conducted at a pH of 10.0 ±0.2.

[28] Addison, R.F., and R.G. Ackman. 1970. Direct Determination of Elemental Phosphorus by Gas–Liquid Chromatography, *Journal of Chromatography*, 47(3):421–426.

[29] Approved methods for the analysis of silver in industrial wastewaters at concentrations of 1 mg/L and above are inadequate where silver exists as an inorganic halide. Silver halides such as the bromide and chloride are relatively insoluble in reagents such as nitric acid but are readily soluble in an aqueous buffer of sodium thiosulfate and sodium hydroxide to pH of 12. Therefore, for levels of silver above 1 mg/L, 20 mL of sample should be diluted to 100 mL by adding 40 mL each of 2 M $Na_2S_2O_3$ and NaOH. Standards should be prepared in the same manner. For levels of silver below 1 mg/L the approved method is satisfactory.

[30] The use of EDTA decreases method sensitivity. Analysts may omit EDTA or replace with another suitable complexing reagent provided that all method specified quality control acceptance criteria are met.

[31] For samples known or suspected to contain high levels of silver (e.g., in excess of 4 mg/L), cyanogen iodide should be used to keep the silver in solution for analysis. Prepare a cyanogen iodide solution by adding 4.0 mL of concentrated NH_4OH, 6.5 g of KCN, and 5.0 mL of a 1.0 N solution of I2 to 50 mL of reagent water in a volumetric flask and dilute to 100.0 mL. After digestion of the sample, adjust the pH of the digestate to >7 to prevent the formation of HCN under acidic conditions. Add 1 mL of the cyanogen iodide solution to the sample digestate and adjust the volume to 100 mL with reagent water (NOT acid). If cyanogen iodide is added to sample digestates, then silver standards must be prepared that contain cyanogen iodide as well. Prepare working standards by diluting a small volume of a silver stock solution with water and adjusting the pH≤7 with NH_4OH. Add 1 mL of the cyanogen iodide solution and let stand 1 hour. Transfer to a 100-mL volumetric flask and dilute to volume with water.

[32] "Water Temperature–Influential Factors, Field Measurement and Data Presentation," Techniques of Water-Resources Investigations of the U.S. Geological Survey, Book 1, Chapter D1. 1975. USGS.

[33] Method 8009, Zincon Method for Zinc, Hach Handbook of Water Analysis, 1979. Hach Company.

[34] Method AES0029, Direct Current Plasma (DCP) Optical Emission Spectrometric Method for Trace Elemental Analysis of Water and Wastes. 1986–Revised 1991. Thermo Jarrell Ash Corporation.

[35] In-Situ Method 1004–8–2009, Carbonaceous Biochemical Oxygen Demand (CBOD) Measurement by Optical Probe. 2009. In-Situ Incorporated.

[36] Microwave-assisted digestion may be employed for this metal, when analyzed by this methodology. Closed Vessel Microwave Digestion of Wastewater Samples for Determination of Metals. April 16, 1992. CEM Corporation

[37] When determining boron and silica, only plastic, PTFE, or quartz laboratory ware may be used from start until completion of analysis.

[38] Only use n-hexane (n-Hexane—85% minimum purity, 99.0% min. saturated C6 isomers, residue less than 1 mg/L) extraction solvent when determining Oil and Grease parameters—Hexane Extractable Material (HEM), or Silica Gel Treated HEM (analogous to EPA Methods 1664 Rev. A and 1664 Rev. B). Use of other extraction solvents is prohibited.

[39] Method PAI–DK01, Nitrogen, Total Kjeldahl, Block Digestion, Steam Distillation, Titrimetric Detection. Revised December 22, 1994. OI Analytical.

[40] Method PAI–DK02, Nitrogen, Total Kjeldahl, Block Digestion, Steam Distillation, Colorimetric Detection. Revised December 22, 1994. OI Analytical.

[41] Method PAI–DK03, Nitrogen, Total Kjeldahl, Block Digestion, Automated FIA Gas Diffusion. Revised December 22, 1994. OI Analytical.

[42] Method 1664 Rev. B is the revised version of EPA Method 1664 Rev. A. U.S. EPA. February 1999, Revision A. Method 1664, n-Hexane Extractable Material (HEM; Oil and Grease) and Silica Gel Treated n-Hexane Extractable Material (SGT–HEM; Non-polar Material) by Extraction and Gravimetry. EPA–821–R–98–002. U.S. EPA. February 2010, Revision B. Method 1664, n-Hexane Extractable Material (HEM; Oil and Grease) and Silica Gel Treated n-Hexane Extractable Material (SGT–HEM; Non-polar Material) by Extraction and Gravimetry. EPA–821–R–10–001.

[43] Method 1631, Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry, EPA–821–R–02–019. Revision E. August 2002, U.S. EPA. The application of clean techniques described in EPA's Method 1669: *Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels,* EPA–821–R–96–011, are recommended to preclude contamination at low-level, trace metal determinations.

[44] Method OIA–1677–09, Available Cyanide by Ligand Exchange and Flow Injection Analysis (FIA). 2010. OI Analytical.

[45] Open File Report 00–170, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Ammonium Plus Organic Nitrogen by a Kjeldahl Digestion Method and an Automated Photometric Finish that Includes Digest Cleanup by Gas Diffusion. 2000. USGS.

[46] Open File Report 93–449, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Chromium in Water by Graphite Furnace Atomic Absorption Spectrophotometry. 1993. USGS.

[47] Open File Report 97–198, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Molybdenum by Graphite Furnace Atomic Absorption Spectrophotometry. 1997.. USGS.

[48] Open File Report 92–146, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Total Phosphorus by Kjeldahl Digestion Method and an Automated Colorimetric Finish That Includes Dialysis. 1992. USGS.

[49] Open File Report 98–639, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Arsenic and Selenium in Water and Sediment by Graphite Furnace-Atomic Absorption Spectrometry. 1999. USGS.

[50] Open File Report 98–165, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Elements in Whole-water Digests Using Inductively Coupled Plasma-Optical Emission Spectrometry and Inductively Coupled Plasma-Mass Spectrometry. 1998. USGS.

[51] Open File Report 93–125, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Inorganic and Organic Constituents in Water and Fluvial Sediments. 1993.. USGS.

[52] Unless otherwise indicated, all EPA methods, excluding EPA Method 300.1–1, are published in U.S. EPA. May 1994. Methods for the Determination of Metals in Environmental Samples, Supplement I, EPA/600/R–94/111; or U.S. EPA. August 1993. Methods for the Determination of Inorganic Substances in Environmental Samples, EPA/600/R–93/100. EPA Method 300.1 is US EPA. Revision 1.0, 1997, including errata cover sheet April 27, 1999. Determination of Inorganic Ions in Drinking Water by Ion Chromatography.

[53] Styrene divinyl benzene beads (e.g., AMCO–AEPA–1 or equivalent) and stabilized formazin (e.g., Hach StablCal™ or equivalent) are acceptable substitutes for formazin.

[54] Method D6508, Test Method for Determination of Dissolved Inorganic Anions in Aqueous Matrices Using Capillary Ion Electrophoresis and Chromate Electrolyte. December 2000. Waters Corp.

[55] Kelada-01, Kelada Automated Test Methods for Total Cyanide, Acid Dissociable Cyanide, and Thiocyanate, EPA 821–B–01–009, Revision 1.2, August 2001. US EPA. Note: A 450–W UV lamp may be used in this method instead of the 550–W lamp specified if it provides performance within the quality control (QC) acceptance criteria of the method in a given instrument. Similarly, modified flow cell configurations and flow conditions may be used in the method, provided that the QC acceptance criteria are met.

[56] QuikChem Method 10–204–00–1–X, Digestion and Distillation of Total Cyanide in Drinking and Wastewaters using MICRO DIST and Determination of Cyanide by Flow Injection Analysis. Revision 2.2, March 2005. Lachat Instruments.

[57] When using sulfide removal test procedures described in EPA Method 335.4–1, reconstitute particulate that is filtered with the sample prior to distillation.

[58] Unless otherwise stated, if the language of this table specifies a sample digestion and/or distillation ''followed by'' analysis with a method, approved digestion and/or distillation are required prior to analysis.

[59] Samples analyzed for available cyanide using OI Analytical method OIA–1677–09 or ASTM method D6888–09 that contain particulate matter may be filtered only after the ligand exchange reagents have been added to the samples, because the ligand exchange process converts complexes containing available cyanide to free cyanide, which is not removed by filtration. Analysts are further cautioned to limit the time between the addition of the ligand exchange reagents and sample filtration to no more than 30 minutes to preclude settling of materials in samples.

[60] Analysts should be aware that pH optima and chromophore absorption maxima might differ when phenol is replaced by a substituted phenol as the color reagent in Berthelot Reaction (''phenol-hypochlorite reaction'') colorimetric ammonium determination methods. For example when phenol is used as the color reagent, pH optimum and wavelength of maximum absorbance are about 11.5 and 635 nm, respectively—see, Patton, C.J. and S.R. Crouch. March 1977. Anal. Chem. 49:464–469. These reaction parameters increase to pH >12.6 and 665 nm when salicylate is used as the color reagent—see, Krom, M.D. April 1980. The Analyst 105:305–316.

[61] If atomic absorption or ICP instrumentation is not available, the aluminon colorimetric method detailed in the 19th Edition of *Standard Methods* may be used. This method has poorer precision and bias than the methods of choice.

[62] Easy (1–Reagent) Nitrate Method, Revision November 12, 2011. Craig Chinchilla.

[63] Hach Method 10360, Luminescence Measurement of Dissolved Oxygen in Water and Wastewater and for Use in the Determination of BOD_5 and $cBOD_5$. Revision 1.2, October 2011. Hach Company. This method may be used to measure dissolved oxygen when performing the methods approved in Table IB for measurement of biochemical oxygen demand (BOD) and carbonaceous biochemical oxygen demand (CBOD).

[64] In-Situ Method 1002–8–2009, Dissolved Oxygen (DO) Measurement by Optical Probe. 2009. In-Situ Incorporated.

[65] Mitchell Method M5331, Determination of Turbidity by Nephelometry. Revision 1.0, July 31, 2008. Leck Mitchell.

[66] Mitchell Method M5271, Determination of Turbidity by Nephelometry. Revision 1.0, July 31, 2008. Leck Mitchell.

[67] Orion Method AQ4500, Determination of Turbidity by Nephelometry. Revision 5, March 12, 2009. Thermo Scientific.

[68] EPA Method 200.5, Determination of Trace Elements in Drinking Water by Axially Viewed Inductively Coupled Plasma-Atomic Emission Spectrometry, EPA/600/R–06/115. Revision 4.2, October 2003. US EPA.

[69] Method 1627, Kinetic Test Method for the Prediction of Mine Drainage Quality, EPA–821–R–09–002. December 2011. US EPA.

[70] Techniques and Methods Book 5–B1, Determination of Elements in Natural-Water, Biota, Sediment and Soil Samples Using Collision/Reaction Cell Inductively Coupled Plasma-Mass Spectrometry, Chapter 1, Section B, Methods of the National Water Quality Laboratory, Book 5, Laboratory Analysis, 2006. USGS.

[71] Water-Resources Investigations Report 01–4132, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Organic Plus Inorganic Mercury in Filtered and Unfiltered Natural Water With Cold Vapor-Atomic Fluorescence Spectrometry, 2001. USGS.

TABLE IC—LIST OF APPROVED TEST PROCEDURES FOR NON-PESTICIDE ORGANIC COMPOUNDS

Parameter [1]	Method	EPA [2 7]	Standard methods	ASTM	Other
1. Acenaphthene	GC	610.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
	HPLC	610	6440 B–2000	D4657–92 (98).	
2. Acenaphthylene	GC	610.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
	HPLC	610	6440 B–2000	D4657–92 (98)..	
3. Acrolein	GC	603.			
	GC/MS	624 [4], 1624B.			
4. Acrylonitrile	GC	603.			
	GC/MS	624 [4], 1624B.			
5. Anthracene	GC	610.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
	HPLC	610	6440B–2000	D4657–92 (98)..	
6. Benzene	GC	602	6200 C–1997.		
	GC/MS	624, 1624B	6200 B–1997.		
7. Benzidine	Spectro-photometric.				See footnote [3], p.1.
	GC/MS	625 [5], 1625B	6410 B–2000.		
	HPLC	605.			
8. Benzo(a)anthracene	GC	610.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
	HPLC	610	6440 B–2000	D4657–92 (98)..	
9. Benzo(a)pyrene	GC	610.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
	HPLC	610	6440 B–2000	D4657–92 (98)..	
10. Benzo(b)fluoranthene	GC	610.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
	HPLC	610	6440 B–2000	D4657–92 (98)..	
11. Benzo(g,h,i)perylene	GC	610.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
	HPLC	610	6440 B–2000	D4657–92 (98)..	
12. Benzo(k)fluoranthene	GC	610.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
	HPLC	610	6440 B–2000	D4657–92 (98)..	
13. Benzyl chloride	GC				See footnote [3], p. 130.
	GC/MS				See footnote [6], p. S102.
14. Butyl benzyl phthalate	GC	606.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
15. bis(2-Chloroethoxy) methane	GC	611.			

TABLE IC—LIST OF APPROVED TEST PROCEDURES FOR NON-PESTICIDE ORGANIC COMPOUNDS—Continued

Parameter [1]	Method	EPA [2 7]	Standard methods	ASTM	Other
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
16. bis(2-Chloroethyl) ether	GC	611.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
17. bis(2-Ethylhexyl) phthalate	GC	606.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
18. Bromodichloromethane	GC	601	6200 C–1997.		
	GC/MS	624, 1624B	6200 B–1997.		
19. Bromoform	GC	601	6200 C–1997.		
	GC/MS	624, 1624B	6200 B–1997.		
20. Bromomethane	GC	601	6200 C–1997.		
	GC/MS	624, 1624B	6200 B–1997.		
21. 4-Bromophenyl phenyl ether	GC	611.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
22. Carbon tetrachloride	GC	601	6200 C–1997		See footnote [3], p. 130.
	GC/MS	624, 1624B	6200 B–1997.		
23. 4-Chloro-3-methyl phenol	GC	604	6420 B–2000.		
	GC/MS	625, 1625B	6410 B–2000.		See footnote [9], p. 27.
24. Chlorobenzene	GC	601, 602	6200 C–1997		See footnote [3], p. 130.
	GC/MS	624, 1624B	6200 B–1997.		
25. Chloroethane	GC	601	6200 C–1997.		
	GC/MS	624, 1624B	6200 B–1997.		
26. 2-Chloroethylvinyl ether	GC	601.			
	GC/MS	624, 1624B.			
27. Chloroform	GC	601	6200 C–1997		See footnote [3], p. 130.
	GC/MS	624, 1624B	6200 B–1997.		
28. Chloromethane	GC	601	6200 C–1997.		
	GC/MS	624, 1624B	6200 B–1997.		
29. 2-Chloronaphthalene	GC	612.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
30. 2-Chlorophenol	GC	604	6420 B–2000.		
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
31. 4-Chlorophenyl phenyl ether	GC	611.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
32. Chrysene	GC	610.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
	HPLC	610	6440 B–2000	D4657–92 (98)..	
33. Dibenzo(a,h)anthracene	GC	610.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
	HPLC	610	6440 B–2000	D4657–92 (98)..	
34. Dibromochloromethane	GC	601	6200 C–1997.		
	GC/MS	624, 1624B	6200 B–1997.		
35. 1,2-Dichlorobenzene	GC	601, 602	6200 C–1997.		

TABLE IC—LIST OF APPROVED TEST PROCEDURES FOR NON-PESTICIDE ORGANIC COMPOUNDS—Continued

Parameter [1]	Method	EPA [2 7]	Standard methods	ASTM	Other
	GC/MS	624, 1625B	6200 B–1997		See footnote [9], p. 27.
36. 1,3-Dichlorobenzene	GC	601, 602	6200 C–1997.		
	GC/MS	624, 1625B	6200 B–1997		See footnote [9], p. 27.
37. 1,4-Dichlorobenzene	GC	601, 602	6200 C–1997.		
	GC/MS	624, 1625B	6200 B–1997		See footnote [9], p. 27.
38. 3,3'-Dichlorobenzidine	GC/MS	625, 1625B	6410 B–2000.		
	HPLC	605.			
39. Dichlorodifluoromethane	GC	601.			
	GC/MS		6200 C–1997.		
40. 1,1-Dichloroethane	GC	601	6200 C–1997.		
	GC/MS	624, 1624B	6200 B–1997.		
41. 1,2-Dichloroethane	GC	601	6200 C–1997.		
	GC/MS	624, 1624B	6200 B–1997.		
42. 1,1-Dichloroethene	GC	601	6200 C–1997.		
	GC/MS	624, 1624B	6200 B–1997.		
43. trans-1,2-Dichloroethene	GC	601	6200 C–1997.		
	GC/MS	624, 1624B	6200 B–1997.		
44. 2,4-Dichlorophenol	GC	604	6420 B–2000.		
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
45. 1,2-Dichloropropane	GC	601	6200 C–1997.		
	GC/MS	624, 1624B	6200 B–1997.		
46. cis-1,3-Dichloropropene	GC	601	6200 C–1997.		
	GC/MS	624, 1624B	6200 B–1997.		
47. trans-1,3-Dichloropropene	GC	601	6200 C–1997.		
	GC/MS	624, 1624B	6200 B–1997.		
48. Diethyl phthalate	GC	606.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
49. 2,4-Dimethylphenol	GC	604	6420 B–2000.		
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
50. Dimethyl phthalate	GC	606.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
51. Di-n-butyl phthalate	GC	606.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
52. Di-n-octyl phthalate	GC	606.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
53. 2, 4-Dinitrophenol	GC	604	6420 B–2000		See footnote [9], p. 27.
	GC/MS	625, 1625B	6410 B–2000.		
54. 2,4-Dinitrotoluene	GC	609.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
55. 2,6-Dinitrotoluene	GC	609.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
56. Epichlorohydrin	GC				See footnote [3], p. 130.

TABLE IC—LIST OF APPROVED TEST PROCEDURES FOR NON-PESTICIDE ORGANIC COMPOUNDS—Continued

Parameter [1]	Method	EPA [2 7]	Standard methods	ASTM	Other
	GC/MS				See footnote [6], p. S102.
57. Ethylbenzene	GC	602	6200 C–1997.		
	GC/MS	624, 1624B	6200 B–1997.		
58. Fluoranthene	GC	610.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
	HPLC	610	6440 B–2000	D4657–92 (98)..	
59. Fluorene	GC	610.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
	HPLC	610	6440 B–2000	D4657–92 (98)..	
60. 1,2,3,4,6,7,8-Heptachloro-dibenzofuran	GC/MS	1613B.			
61. 1,2,3,4,7,8,9-Heptachloro-dibenzofuran	GC/MS	1613B.			
62. 1,2,3,4,6,7,8- Heptachloro-dibenzo-p-dioxin.	GC/MS	1613B.			
63. Hexachlorobenzene	GC	612.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
64. Hexachlorobutadiene	GC	612.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
65. Hexachlorocyclopentadiene	GC	612.			
	GC/MS	625 [5], 1625B	6410 B–2000		See footnote [9], p. 27.
66. 1,2,3,4,7,8-Hexachloro-dibenzofuran	GC/MS	1613B.			
67. 1,2,3,6,7,8-Hexachloro-dibenzofuran	GC/MS	1613B.			
68. 1,2,3,7,8,9-Hexachloro-dibenzofuran	GC/MS	1613B.			
69. 2,3,4,6,7,8-Hexachloro-dibenzofuran	GC/MS	1613B.			
70. 1,2,3,4,7,8-Hexachloro-dibenzo-p-dioxin	GC/MS	1613B.			
71. 1,2,3,6,7,8-Hexachloro-dibenzo-p-dioxin	GC/MS	1613B.			
72. 1,2,3,7,8,9-Hexachloro-dibenzo-p-dioxin	GC/MS	1613B.			
73. Hexachloroethane	GC	612.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
74. Indeno(1,2,3-c,d) pyrene	GC	610.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
	HPLC	610	6440 B–2000	D4657–92 (98)..	
75. Isophorone	GC	609.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
76. Methylene chloride	GC	601	6200 C–1997.		See footnote [3], p. 130.
	GC/MS	624, 1624B	6200 B–1997.		
77. 2-Methyl-4,6-dinitrophenol	GC	604	6420 B–2000.		
	GC/MS	625, 1625B	6410 B–2000.		See footnote [9], p. 27.
78. Naphthalene	GC	610.			
	GC/MS	625, 1625B	6410 B–2000.		See footnote [9], p. 27
	HPLC	610	6440 B–2000.		
79. Nitrobenzene	GC	609.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.

TABLE IC—LIST OF APPROVED TEST PROCEDURES FOR NON-PESTICIDE ORGANIC COMPOUNDS—Continued

Parameter [1]	Method	EPA [2 7]	Standard methods	ASTM	Other
	HPLC			D4657–92 (98)..	
80. 2-Nitrophenol	GC	604	6420 B–2000.		
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
81. 4-Nitrophenol	GC	604	6420 B–2000.		
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
82. N-Nitrosodimethylamine	GC	607.			
	GC/MS	625 [5], 1625B	6410 B–2000		See footnote [9], p. 27.
83. N-Nitrosodi-n-propylamine	GC	607.			
	GC/MS	625 [5], 1625B	6410 B–2000		See footnote [9], p. 27.
84. N-Nitrosodiphenylamine	GC	607.			
	GC/MS	625 [5], 1625B	6410 B–2000		See footnote [9], p. 27.
85. Octachlorodibenzofuran	GC/MS	1613B. [10]			
86. Octachlorodibenzo-p-dioxin	GC/MS	1613B. [10]			
87. 2,2'-Oxybis(2-chloro-propane) [also known as bis(2-Chloroisopropyl) ether].	GC	611.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
88. PCB–1016	GC	608			See footnote [3], p. 43; See footnote. [8]
	GC/MS	625	6410 B–2000.		
89. PCB–1221	GC	608			See footnote [3], p. 43; See footnote. [8]
	GC/MS	625	6410 B–2000.		
90. PCB–1232	GC	608			See footnote [3], p. 43; See footnote. [8]
	GC/MS	625	6410 B–2000.		
91. PCB–1242	GC	608			See footnote [3], p. 43; See footnote. [8]
	GC/MS	625	6410 B–2000.		
92. PCB–1248	GC	608.			
	GC/MS	625	6410 B–2000.		
93. PCB–1254	GC	608			See footnote [3], p. 43; See footnote. [8]
	GC/MS	625	6410 B–2000.		
94. PCB–1260	GC	608			See footnote [3], p. 43; See footnote. [8]
	GC/MS	625	6410 B–2000.		
95. 1,2,3,7,8-Pentachloro-dibenzofuran	GC/MS	1613B.			
96. 2,3,4,7,8-Pentachloro-dibenzofuran	GC/MS	1613B.			
97. 1,2,3,7,8,-Pentachloro-dibenzo-p-dioxin	GC/MS	1613B.			
98. Pentachlorophenol	GC	604	6420 B–2000		See footnote [3], p. 140.
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.

TABLE IC—LIST OF APPROVED TEST PROCEDURES FOR NON-PESTICIDE ORGANIC COMPOUNDS—Continued

Parameter [1]	Method	EPA [2 7]	Standard methods	ASTM	Other
99. Phenanthrene	GC	610.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
	HPLC	610	6440 B–2000	D4657–92 (98)..	
100. Phenol	GC	604	6420 B–2000.		
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
101. Pyrene	GC	610.			
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
	HPLC	610	6440 B–2000	D4657–92 (98)..	
102. 2,3,7,8-Tetrachloro-dibenzofuran	GC/MS	1613B.[10]			
103. 2,3,7,8-Tetrachloro-dibenzo-p-dioxin	GC/MS	613, 625 [5a], 1613B.			
104. 1,1,2,2-Tetrachloroethane	GC	601	6200 C–1997		See footnote [3], p. 130.
	GC/MS	624, 1624B	6200 B–1997.		
105. Tetrachloroethene	GC	601	6200 C–1997		See footnote [3], p. 130.
	GC/MS	624, 1624B	6200 B–1997.		
106. Toluene	GC	602	6200 C–1997.		
	GC/MS	624, 1624B	6200 B–1997.		
107. 1,2,4-Trichlorobenzene	GC	612			See footnote [3], p. 130.
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
108. 1,1,1-Trichloroethane	GC	601	6200 C–1997.		
	GC/MS	624, 1624B	6200 B–1997.		
109. 1,1,2-Trichloroethane	GC	601	6200 C–1997.		See footnote [3], p. 130.
	GC/MS	624, 1624B	6200 B–1997.		
110. Trichloroethene	GC	601	6200 C–1997.		
	GC/MS	624, 1624B	6200 B–1997.		
111. Trichlorofluoromethane	GC	601	6200 C–1997.		
	GC/MS	624	6200 B–1997.		
112. 2,4,6-Trichlorophenol	GC	604	6420 B–2000.		
	GC/MS	625, 1625B	6410 B–2000		See footnote [9], p. 27.
113. Vinyl chloride	GC	601	6200 C–1997.		
	GC/MS	624, 1624B	6200 B–1997.		
114. Nonylphenol	GC/MS			D7065–06.	
115. Bisphenol A (BPA)	GC/MS			D7065–06.	
116. p-tert-Octylphenol (OP)	GC/MS			D7065–06.	
117. Nonylphenol Monoethoxylate (NP1EO)	GC/MS			D7065–06.	
118. Nonylphenol Diethoxylate (NP2EO)	GC/MS			D7065–06.	
119. Adsorbable Organic Halides (AOX)	Adsorption and Coulometric Titration.	1650.[11]			
120. Chlorinated Phenolics	In Situ Acetylation and GC/MS.	1653.[11]			

Table IC notes:

[1] All parameters are expressed in micrograms per liter (μg/L) except for Method 1613B, in which the parameters are expressed in picograms per liter (pg/L).

[2] The full text of Methods 601–613, 624, 625, 1613B, 1624B, and 1625B are provided at Appendix A, Test Procedures for Analysis of Organic Pollutants, of this Part 136. The standardized test procedure to be used to determine the method detection limit (MDL) for these test procedures is given at Appendix B, Definition and Procedure for the Determination of the Method Detection Limit, of this Part 136.

[3] Methods for Benzidine: Chlorinated Organic Compounds, Pentachlorophenol and Pesticides in Water and Wastewater. September 1978. U.S. EPA.

[4] Method 624 may be used for quantitative determination of acrolein and acrylonitrile, provided that the laboratory has documentation to substantiate the ability to detect and quantify these analytes at levels necessary to comply with any associated regulations. In addition, the use of sample introduction techniques other than simple purge-and-trap may be required. QC acceptance criteria from Method 603 should be used when analyzing samples for acrolein and acrylonitrile in the absence of such criteria in Method 624.

[5] Method 625 may be extended to include benzidine, hexachlorocyclopentadiene, N-nitrosodimethylamine, N-nitrosodi-n-propylamine, and N-nitrosodiphenylamine. However, when they are known to be present, Methods 605, 607, and 612, or Method 1625B, are preferred methods for these compounds.

[5a] Method 625, screening only.

[6] Selected Analytical Methods Approved and Cited by the United States Environmental Protection Agency, Supplement to the 15th Edition of *Standard Methods for the Examination of Water and Wastewater.* 1981. American Public Health Association (APHA).

[7] Each analyst must make an initial, one-time demonstration of their ability to generate acceptable precision and accuracy with Methods 601–603, 624, 625, 1624B, and 1625B in accordance with procedures each in Section 8.2 of each of these Methods. Additionally, each laboratory, on an on-going basis must spike and analyze 10% (5% for Methods 624 and 625 and 100% for methods 1624B and 1625B) of all samples to monitor and evaluate laboratory data quality in accordance with Sections 8.3 and 8.4 of these methods. When the recovery of any parameter falls outside the warning limits, the analytical results for that parameter in the unspiked sample are suspect. The results should be reported, but cannot be used to demonstrate regulatory compliance. These quality control requirements also apply to the Standard Methods, ASTM Methods, and other methods cited.

[8] Organochlorine Pesticides and PCBs in Wastewater Using Empore™ Disk. Revised October 28, 1994. 3M Corporation.

[9] Method O–3116–87 is in Open File Report 93–125, Methods of Analysis by U.S. Geological Survey National Water Quality Laboratory—Determination of Inorganic and Organic Constituents in Water and Fluvial Sediments. 1993. USGS.

[10] Analysts may use Fluid Management Systems, Inc. Power-Prep system in place of manual cleanup provided the analyst meets the requirements of Method 1613B (as specified in Section 9 of the method) and permitting authorities. Method 1613, Revision B, Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution HRGC/HRMS. Revision B, 1994. U.S. EPA. The full text of this method is provided in Appendix A to 40 CFR Part 136 and at *http://water.epa.gov/scitech/methods/cwa/index.cfm*

[11] Method 1650, Adsorbable Organic Halides by Adsorption and Coulometric Titration. Revision C, 1997. U.S. EPA. Method 1653, Chlorinated Phenolics in Wastewater by In Situ Acetylation and GCMS. Revision A, 1997. U.S. EPA. The full text for both of these methods is provided at appendix A in part 430, The Pulp, Paper, and Paperboard Point Source Category.

TABLE ID—LIST OF APPROVED TEST PROCEDURES FOR PESTICIDES [1]

Parameter	Method	EPA [2 7 10]	Standard methods	ASTM	Other
1. Aldrin	GC	608, 617	6630 B–2000 & C–2000.	D3086–90, D5812–96 (02).	See footnote [3], p. 7; See footnote [4], O–3104–83; See footnote [8], 3M0222.
	GC/MS	625	6410 B–2000.		
2. Ametryn	GC	507, 619			See footnote [3], p. 83; See footnote [9], O–3106–93; See footnote [6], p. S68.
	GC/MS	525.2			See footnote [14], O–1121–91.
3. Aminocarb	TLC				See footnote [3], p. 94; See footnote [6], p. S60.
	HPLC	632.			
4. Atraton	GC	619			See footnote [3], p. 83; See footnote [6], p. S68.
5. Atrazine	GC	507, 619			See footnote [3], p. 83; See footnote [6], p. S68; See footnote [9], O–3106–93.
	HPLC/MS				See footnote [12], O–2060–01.
	GC/MS	525.1, 525.2			See footnote [11], O–1126–95.
6. Azinphos methyl	GC	614, 622, 1657			See footnote [3], p. 25; See footnote [6], p. S51.
	GC-MS				See footnote [11], O–1126–95.
7. Barban	TLC				See footnote [3], p. 104; See footnote [6], p. S64.
	HPLC	632.			
8. α-BHC	GC	608, 617	6630 B–2000 & C–2000.	D3086–90, D5812–96(02).	See footnote [3], p. 7; See footnote [8], 3M0222.
	GC/MS	625 [5]	6410 B–2000.		See footnote [11], O–1126–95.
9. β–BHC	GC	608, 617	6630 B–2000 & C–2000.	D3086–90, D5812–96(02).	See footnote [8], 3M0222.
	GC/MS	625	6410 B–2000.		
10. δ-BHC	GC	608, 617	6630 B–2000 & C–2000.	D3086–90, D5812–96(02).	See footnote [8], 3M0222.

TABLE ID—LIST OF APPROVED TEST PROCEDURES FOR PESTICIDES [1]—Continued

Parameter	Method	EPA [2 7 10]	Standard methods	ASTM	Other
	GC/MS	625	6410 B–2000.		
11. γ-BHC (Lindane).	GC	608, 617	6630 B–2000 & C–2000.	D3086–90, D5812–96(02).	See footnote [3], p. 7; See footnote [4], O–3104–83; See footnote [8], 3M0222.
	GC/MS	625 [5]	6410 B–2000.		See footnote [11], O–1126–95.
12. Captan	GC	617	6630 B–2000.	D3086–90, D5812–96(02).	See footnote [3], p. 7.
13. Carbaryl	TLC				See footnote [3], p. 94, See footnote [6], p. S60.
	HPLC	531.1, 632.			
	HPLC/MS	553			See footnote [12], O–2060–01.
	GC/MS				See footnote [11], O–1126–95.
14. Carbophenothion.	GC	617	6630 B–2000.		See footnote [4], page 27; See footnote [6], p. S73.
15. Chlordane	GC	608, 617	6630 B–2000 & C–2000.	D3086–90, D5812–96(02).	See footnote [3], p. 7; See footnote [4], O–3104–83; See footnote [8], 3M0222.
	GC/MS	625	6410 B–2000.		
16. Chloropropham	TLC				See footnote [3], p. 104; See footnote [6], p. S64.
	HPLC	632.			
17. 2,4-D	GC	615	6640 B–2001.		See footnote [3], p. 115; See footnote [4], O–3105–83.
	HPLC/MS				See footnote [12], O–2060–01.
18. 4,4'-DDD	GC	608, 617	6630 B–2000 & C–2000.	D3086–90, D5812–96(02).	See footnote [3], p. 7; See footnote [4], O–3105–83; See footnote [8], 3M0222.
	GC/MS	625	6410 B–2000.		
19. 4,4'-DDE	GC	608, 617	6630 B–2000 & C–2000.	D3086–90, D5812–96(02).	See footnote [3], p. 7; See footnote [4], O–3104–83; See footnote [8], 3M0222.
	GC/MS	625	6410 B–2000.		See footnote [11], O–1126–95.
20. 4,4'-DDT	GC	608, 617	6630 B–2000 & C–2000.	D3086–90, D5812–96(02).	See footnote [3], p. 7; See footnote [4], O–3104–83; See footnote [8], 3M0222.
	GC/MS	625	6410 B–2000.		
21. Demeton-O	GC	614, 622			See footnote [3], p. 25; See footnote [6], p. S51.
22. Demeton-S	GC	614, 622			See footnote [3], p. 25; See footnote [6], p. S51.
23. Diazinon	GC	507, 614, 622, 1657			See footnote [3], p. 25; See footnote [4], O–3104–83; See footnote [6], p. S51.
	GC/MS	525.2			See footnote [11], O–1126–95.
24. Dicamba	GC	615			See footnote [3], p. 115.
	HPLC/MS				See footnote [12], O–2060–01.
25. Dichlofenthion	GC	622.1			See footnote [4], page 27; See footnote [6], p. S73.
26. Dichloran	GC	608.2, 617	6630 B–2000.		See footnote [3], p. 7;
27. Dicofol	GC	617			See footnote [4], O–3104–83.
28. Dieldrin	GC	608, 617	6630 B–2000 & C–2000.	D3086–90, D5812–96(02).	See footnote [3], p. 7; See footnote [4], O–3104–83; See footnote [8], 3M0222.
	GC/MS	625	6410 B–2000.		See footnote [11], O–1126–95.
29. Dioxathion	GC	614.1, 1657			See footnote [4], page 27; See footnote [6], p. S73.

TABLE ID—LIST OF APPROVED TEST PROCEDURES FOR PESTICIDES [1]—Continued

Parameter	Method	EPA [2 7 10]	Standard methods	ASTM	Other
30. Disulfoton	GC	507, 614, 622, 1657			See footnote [3], p. 25; See footnote [6] p. S51.
	GC/MS	525.2			See footnote [11], O–1126–95.
31. Diuron	TLC				See footnote [3], p. 104; See footnote [6], p. S64.
	HPLC	632.			
	HPLC/MS	553			See footnote [12], O–2060–01.
32. Endosulfan I	GC	608, 617	6630 B–2000 & C–2000.	D3086–90, D5812–96(02).	See footnote [3], p. 7; See footnote [4], O–3104–83; See footnote [8], 3M022).
	GC/MS	625 [5]	6410 B–2000.		See footnote [13], O–2002–01.
33. Endosulfan II	GC	608, 617	6630 B–2000 & C–2000.	D3086–90, D5812–96(02).	See footnote [3], p. 7; See footnote [8], 3M0222.
	GC/MS	625 [5]	6410 B–2000.		See footnote [13], O–2002–01.
34. Endosulfan Sulfate.	GC	608, 617	6630 C–2000.		See footnote [8], 3M0222.
	GC/MS	625	6410 B–2000.		
35. Endrin	GC	505, 508, 608, 617, 1656.	6630 B–2000 & C–2000.	D3086–90, D5812–96(02).	See footnote [3], p. 7; See footnote [4], O–3104–83; See footnote [8], 3M0222.
	GC/MS	525.1, 525.2, 625 [5]	6410 B–2000.		
36. Endrin aldehyde.	GC	608, 617	6630 C–2000.		See footnote [8], 3M0222.
	GC/MS	625.			
37. Ethion	GC	614, 614.1,1657			See footnote [4], page 27; See footnote [6], p. S73.
	GC/MS				See footnote [13], O–2002–01.
38. Fenuron	TLC				See footnote [3], p. 104; See footnote [6], p. S64.
	HPLC	632.			
	HPLC/MS				See footnote [12], O–2060–01.
39. Fenuron-TCA	TLC				See footnote [3], p. 104; See footnote [6], p. S64.
	HPLC	632.			
40. Heptachlor	GC	505, 508, 608, 617, 1656.	6630 B–2000 & C–2000.	D3086–90, D5812–96(02).	See footnote [3], p. 7; See footnote [4], O–3104–83; See footnote [8], 3M0222.
	GC/MS	525.1, 525.2, 625	6410 B–2000.		
41. Heptachlor epoxide.	GC	608, 617	6630 B–2000 & C–2000.	D3086–90, D5812–96(02).	See footnote [3], p. 7; See footnote [4], O–3104–83; See footnote [6], p. S73; See footnote [8], 3M0222.
	GC/MS	625	6410 B–2000.		
42. Isodrin	GC	617	6630 B–2000 & C–2000.		See footnote [4], O–3104–83; See footnote [6], p. S73.
43. Linuron	GC				See footnote [3], p. 104; See footnote [6], p. S64.
	HPLC	632.			
	HPLC/MS	553			See footnote [12], O–2060–01.
	GC/MS				See footnote [11], O–1126–95.
44. Malathion	GC	614, 1657	6630 B–2000.		See footnote [3], p. 25; See footnote [6], p. S51.
	GC/MS				See footnote [11], O–1126–95.
45. Methiocarb	TLC				See footnote [3], p. 94; See footnote [6], p. S60.
	HPLC	632.			

TABLE ID—LIST OF APPROVED TEST PROCEDURES FOR PESTICIDES [1]—Continued

Parameter	Method	EPA [2 7 10]	Standard methods	ASTM	Other
	HPLC/MS				See footnote [12], O–2060–01.
46. Methoxychlor	GC	505, 508, 608.2, 617, 1656.	6630 B–2000 & C–2000.	D3086–90, D5812–96(02).	See footnote [3], p. 7; See footnote [4], O–3104–83; See footnote [8], 3M0222.
	GC/MS	525.1, 525.2			See footnote [11], O–1126–95.
47. Mexacarbate	TLC				See footnote [3], p. 94; See footnote [6], p.S60.
	HPLC	632.			
48. Mirex	GC	617	6630 B–2000 & C–2000.	D3086–90, D5812–96(02).	See footnote [3], p. 7; See footnote [4], O–3104–83.
49. Monuron	TLC				See footnote [3], p. 104; See footnote [6], p. S64.
	HPLC	632.			
50. Monuron-TCA	TLC				See footnote [3], p. 104; See footnote [6], p. S64.
	HPLC	632.			
51. Neburon	TLC				See footnote [3], p. 104; See footnote [6], p. S64.
	HPLC	632.			
	HPLC/MS				See footnote [12], O–2060–01.
52. Parathion methyl.	GC	614, 622, 1657	6630 B–2000.		See footnote [4], page 27; See footnote [3], p. 25.
	GC/MS				See footnote [11], O–1126–95.
53. Parathion ethyl	GC	614	6630 B–2000.		See footnote [4], page 27; See footnote [3], p. 25.
	GC/MS				See footnote [11], O–1126–95.
54. PCNB	GC	608.1, 617	6630 B–2000 & C–2000.	D3086–90, D5812–96(02).	See footnote [3], p. 7.
55. Perthane	GC	617		D3086–90, D5812–96(02).	See footnote [4], O–3104–83.
56. Prometon	GC	507, 619			See footnote [3], p. 83; See footnote [6], p. S68; See footnote [9], O–3106–93.
	GC/MS	525.2			See footnote [11], O–1126–95.
57. Prometryn	GC	507, 619			See footnote [3], p. 83; See footnote [6], p. S68; See footnote [9],O–3106–93.
	GC/MS	525.1, 525.2			See footnote [13], O–2002–01.
58. Propazine	GC	507, 619, 1656			See footnote [3], p. 83; See footnote [6], p. S68; See footnote [9], O–3106–93.
	GC/MS	525.1, 525.2.			
59. Propham	TLC				See footnote [3], p. 104; See footnote [6], p. S64.
	HPLC	632.			
	HPLC/MS				See footnote [12], O–2060–01.
60. Propoxur	TLC				See footnote [3], p. 94; See footnote [6], p. S60.
	HPLC	632.			
61. Secbumeton	TLC				See footnote [3], p. 83; See footnote [6], p. S68.
	GC	619.			
62. Siduron	TLC				See footnote [3], p. 104; See footnote [6], p. S64.
	HPLC	632.			
	HPLC/MS				See footnote [12], O–2060–01.
63. Simazine	GC	505, 507, 619, 1656			See footnote [3], p. 83; See footnote [6], p. S68; See footnote [9], O–3106–93.

TABLE ID—LIST OF APPROVED TEST PROCEDURES FOR PESTICIDES [1]—Continued

Parameter	Method	EPA [2 7 10]	Standard methods	ASTM	Other
	GC/MS	525.1, 525.2			See footnote [11], O–1126–95.
64. Strobane	GC	617	6630 B–2000 & C–2000.		See footnote [3], p. 7.
65. Swep	TLC				See footnote [3], p. 104; See footnote [6], p. S64.
	HPLC	632.			
66. 2,4,5-T	GC	615	6640 B–2001.		See footnote [3], p. 115; See footnote [4], O–3105–83.
67. 2,4,5-TP (Silvex).	GC	615	6640 B–2001.		See footnote [3], p. 115; See footnote [4], O–3105–83.
68. Terbuthylazine	GC	619, 1656			See footnote [3], p. 83; See footnote [6], p. S68.
	GC/MS				See footnote [13], O–2002–01.
69. Toxaphene	GC	505, 508, 608, 617, 1656.	6630 B–2000 & C–2000.	D3086–90, D5812–96(02).	See footnote [3], p. 7; See footnote [8]; See footnote [4], O–3105–83.
	GC/MS	525.1, 525.2, 625	6410 B–2000.		
70. Trifluralin	GC	508, 617, 627, 1656	6630 B–2000.		See footnote [3], p. 7; See footnote [9], O–3106–93.
	GC/MS	525.2			See footnote [11], O–1126–95.

Table ID notes:

[1] Pesticides are listed in this table by common name for the convenience of the reader. Additional pesticides may be found under Table IC, where entries are listed by chemical name.

[2] The standardized test procedure to be used to determine the method detection limit (MDL) for these test procedures is given at Appendix B, Definition and Procedure for the Determination of the Method Detection Limit, of this Part 136.

[3] Methods for Benzidine, Chlorinated Organic Compounds, Pentachlorophenol and Pesticides in Water and Wastewater. September 1978. U.S. EPA. This EPA publication includes thin-layer chromatography (TLC) methods.

[4] Methods for the Determination of Organic Substances in Water and Fluvial Sediments, Techniques of Water-Resources Investigations of the U.S. Geological Survey, Book 5, Chapter A3. 1987. USGS.

[5] The method may be extended to include α-BHC, γ-BHC, endosulfan I, endosulfan II, and endrin. However, when they are known to exist, Method 608 is the preferred method.

[6] Selected Analytical Methods Approved and Cited by the United States Environmental Protection Agency, Supplement to the 15th Edition of *Standard Methods for the Examination of Water and Wastewater.* 1981. American Public Health Association (APHA).

[7] Each analyst must make an initial, one-time, demonstration of their ability to generate acceptable precision and accuracy with Methods 608 and 625 in accordance with procedures given in Section 8.2 of each of these methods. Additionally, each laboratory, on an on-going basis, must spike and analyze 10% of all samples analyzed with Method 608 or 5% of all samples analyzed with Method 625 to monitor and evaluate laboratory data quality in accordance with Sections 8.3 and 8.4 of these methods. When the recovery of any parameter falls outside the warning limits, the analytical results for that parameter in the unspiked sample are suspect. The results should be reported, but cannot be used to demonstrate regulatory compliance. These quality control requirements also apply to the Standard Methods, ASTM Methods, and other methods cited.

[8] Organochlorine Pesticides and PCBs in Wastewater Using Empore™ Disk. Revised October 28, 1994. 3M Corporation.

[9] Method O–3106–93 is in Open File Report 94–37, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Triazine and Other Nitrogen-Containing Compounds by Gas Chromatography With Nitrogen Phosphorus Detectors. 1994. USGS.

[10] EPA Methods 608.1, 608.2, 614, 614.1, 615, 617, 619, 622, 622.1, 627, and 632 are found in Methods for the Determination of Nonconventional Pesticides in Municipal and Industrial Wastewater, EPA 821–R–92–002, April 1992, U.S. EPA. The full text of Methods 608 and 625 are provided at Appendix A, Test Procedures for Analysis of Organic Pollutants, of this Part 136. EPA Methods 505, 507, 508, 525.1, 531.1 and 553 are in Methods for the Determination of Nonconventional Pesticides in Municipal and Industrial Wastewater, Volume II, EPA 821–R–93–010B, 1993, U.S. EPA. EPA Method 525.2 is in Determination of Organic Compounds in Drinking Water by Liquid-Solid Extraction and Capillary Column Gas Chromatography/Mass Spectrometry, Revision 2.0, 1995, U.S. EPA. EPA methods 1656 and 1657 are in Methods For The Determination of Nonconventional Pesticides In Municipal and Industrial Wastewater, Volume I, EPA 821–R–93–010A, 1993, U.S. EPA.

[11] Method O–1126–95 is in Open-File Report 95–181, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of pesticides in water by C–18 solid-phase extraction and capillary-column gas chromatography/mass spectrometry with selected-ion monitoring. 1995. USGS.

[12] Method O–2060–01 is in Water-Resources Investigations Report 01–4134, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Pesticides in Water by Graphitized Carbon-Based Solid-Phase Extraction and High-Performance Liquid Chromatography/Mass Spectrometry. 2001. USGS.

[13] Method O–2002–01 is in Water-Resources Investigations Report 01–4098, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of moderate-use pesticides in water by C–18 solid-phase extraction and capillary-column gas chromatography/mass spectrometry. 2001. USGS.

[14] Method O–1121–91 is in Open-File Report 91–519, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of organonitrogen herbicides in water by solid-phase extraction and capillary-column gas chromatography/mass spectrometry with selected-ion monitoring. 1992. USGS.

TABLE IE—LIST OF APPROVED RADIOLOGIC TEST TEST PROCEDURES

Parameter and units	Method	Reference (method number or page)				
		EPA [1]	Standard Methods 18th, 19th, 20th Ed.	Standard Methods On-line	ASTM	USGS [2]
1. Alpha-Total, pCi per liter	Proportional or scintillation counter.	900.0	7110 B	7110 B–00	D1943–90, 96	pp. 75 and 78 [3]
2. Alpha-Counting error, pCi per liter.	Proportional or scintillation counter.	Appendix B	7110 B	7110 B–00	D1943–90, 96	p. 79
3. Beta-Total, pCi per liter	Proportional counter	900.0	7110 B	7110 B–00	D1890–90, 96	pp. 75 and 78 [3]
4. Beta-Counting error, pCi	Proportional counter	Appendix B	7110 B	7110 B–00	D1890–90, 96	p. 79
5. (a) Radium Total pCi per liter.	Proportional counter	903.0	7500-Ra B	7500-Ra B–01	D2460–90, 97.	
(b) Ra, pCi per liter	Scintillation counter	903.1	7500-Ra C	7500-Ra C–01	D3454–91, 97	p. 81

[1] Prescribed Procedures for Measurement of Radioactivity in Drinking Water, EPA–600/4–80–032 (1980), U.S. Environmental Protection Agency, August 1980.
[2] Fishman, M. J. and Brown, Eugene, ''Selected Methods of the U.S. Geological Survey of Analysis of Wastewaters,'' U.S. Geological Survey, Open-File Report 76–177 (1976).
[3] The method found on p. 75 measures only the dissolved portion while the method on p. 78 measures only the suspended portion. Therefore, the two results must be added to obtain the ''total.''

TABLE IF—LIST OF APPROVED METHODS FOR PHARMACEUTICAL POLLUTANTS

Pharmaceuticals pollutants	CAS registry No.	Analytical method number
acetonitrile	75–05–8	1666/1671/D3371/D3695.
n-amyl acetate	628–63–7	1666/D3695.
n-amyl alcohol	71–41–0	1666/D3695
benzene	71–43–2	D4763/D3695/502.2/524.2.
n-butyl-acetate	123–86–4	1666/D3695.
tert-butyl alcohol	75–65–0	1666.
chlorobenzene	108–90–7	502.2/524.2.
chloroform	67–66–3	502.2/524.2/551.
o-dichlorobenzene	95–50–1	1625C/502.2/524.2.
1,2-dichloroethane	107–06–2	D3695/502.2/524.2.
diethylamine	109–89–7	1666/1671.
dimethyl sulfoxide	67–68–5	1666/1671.
ethanol	64–17–5	1666/1671/D3695.
ethyl acetate	141–78–6	1666/D3695.
n-heptane	142–82–5	1666/D3695.
n-hexane	110–54–3	1666/D3695.
isobutyraldehyde	78–84–2	1666/1667.
isopropanol	67–63–0	1666/D3695.
isopropyl acetate	108–21–4	1666/D3695.
isopropyl ether	108–20–3	1666/D3695.
methanol	67–56–1	1666/1671/D3695.
Methyl Cellosolve Δ	109–86–4	1666/1671
methylene chloride	75–09–2	502.2/524.2
methyl formate	107–31–3	1666.
4-methyl-2-pentanone (MIBK)	108–10–1	1624C/1666/D3695/D4763/524.2.
phenol	108–95–2	D4763.
n-propanol	71–23–8	1666/1671/D3695.
2-propanone (acetone)	67–64–1	D3695/D4763/524.2.
tetrahydrofuran	109–99–9	1666/524.2.
toluene	108–88–3	D3695/D4763/502.2/524.2.
triethlyamine	121–44–8	1666/1671.
xylenes	(Note 1)	1624C/1666.

Table 1F note:

1. 1624C: m-xylene 108–38–3, o,p-xylene E–14095 (Not a CAS number; this is the number provided in the Environmental Monitoring Methods Index (EMMI) database.); 1666: m,p-xylene 136777–61–2, o-xylene 95–47–6.

TABLE IG—TEST METHODS FOR PESTICIDE ACTIVE INGREDIENTS (40 CFR PART 455)

EPA survey code	Pesticide name	CAS No.	EPA analytical method No.(s)[3]
8	Triadimefon	43121–43–3	507/633/525.1/525.2/1656
12	Dichlorvos	62–73–7	1657/507/622/525.1/525.2
16	2,4-D; 2,4-D Salts and Esters [2,4-Dichlorophenoxyacetic acid].	94–75–7	1658/515.1/615/515.2/555
17	2,4-DB; 2,4-DB Salts and Esters [2,4-Dichlorophenoxybutyric acid].	94–82–6	1658/515.1/615/515.2/555
22	Mevinphos	7786–34–7	1657/507/622/525.1/525.2
25	Cyanazine	21725–46–2	629/507
26	Propachlor	1918–16–7	1656/508/608.1/525.1/525.2
27	MCPA; MCPA Salts and Esters [2-Methyl-4-chlorophenoxyacetic acid].	94–74–6	1658/615/555
30	Dichlorprop; Dichlorprop Salts and Esters [2-(2,4-Dichlorophenoxy) propionic acid].	120–36–5	1658/515.1/615/515.2/555
31	MCPP; MCPP Salts and Esters [2-(2-Methyl-4-chlorophenoxy) propionic acid].	93–65–2	1658/615/555
35	TCMTB [2-(Thiocyanomethylthio) benzo-thiazole].	21564–17–0	637
39	Pronamide	23950–58–5	525.1/525.2/507/633.1
41	Propanil	709–98–8	632.1/1656
45	Metribuzin	21087–64–9	507/633/525.1/525.2/1656
52	Acephate	30560–19–1	1656/1657
53	Acifluorfen	50594–66–6	515.1/515.2/555
54	Alachlor	15972–60–8	505/507/645/525.1/525.2/1656
55	Aldicarb	116–06–3	531.1
58	Ametryn	834–12–8	507/619/525.2
60	Atrazine	1912–24–9	505/507/619/525.1/525.2/1656
62	Benomyl	17804–35–2	631
68	Bromacil; Bromacil Salts and Esters	314–40–9	507/633/525.1/525.2/1656
69	Bromoxynil	1689–84–5	1625/1661
69	Bromoxynil octanoate	1689–99–2	1656
70	Butachlor	23184–66–9	507/645/525.1/525.2/1656
73	Captafol	2425–06–1	1656

TABLE IG—TEST METHODS FOR PESTICIDE ACTIVE INGREDIENTS (40 CFR PART 455)—Continued

EPA survey code	Pesticide name	CAS No.	EPA analytical method No.(s) [3]
75	Carbaryl [Sevin]	63–25–2	531.1/632/553
76	Carbofuran	1563–66–2	531.1/632
80	Chloroneb	2675–77–6	1656/508/608.1/525.1/525.2
82	Chlorothalonil	1897–45–6	508/608.2/525.1/525.2/1656
84	Stirofos	961–11–5	1657/507/622/525.1/525.2
86	Chlorpyrifos	2921–88–2	1657/508/622
90	Fenvalerate	51630–58–1	1660
103	Diazinon	333–41–5	1657/507/614/622/525.2
107	Parathion methyl	298–00–0	1657/614/622
110	DCPA [Dimethyl 2,3,5,6-tetrachloroterephthalate].	1861–32–1	508/608.2/525.1/525.2/515.1 [2]/515.2 [2]/1656
112	Dinoseb	88–85–7	1658/515.1/615/515.2/555
113	Dioxathion	78–34–2	1657/614.1
118	Nabonate [Disodium cyanodithioimidocarbonate].	138–93–2	630.1
119	Diuron	330–54–1	632/553
123	Endothall	145–73–3	548/548.1
124	Endrin	72–20–8	1656/505/508/608/617/525.1/525.2
125	Ethalfluralin	55283–68–6	1656/627 See footnote 1
126	Ethion	563–12–2	1657/614/614.1
127	Ethoprop	13194–48–4	1657/507/622/525.1/525.2
132	Fenarimol	60168–88–9	507/633.1/525.1/525.2/1656
133	Fenthion	55–38–9	1657/622
138	Glyphosate [N-(Phosphonomethyl) glycine]	1071–83–6	547
140	Heptachlor	76–44–8	1656/505/508/608/617/525.1/525.2
144	Isopropalin	33820–53–0	1656/627
148	Linuron	330–55–2	553/632
150	Malathion	121–75–5	1657/614
154	Methamidophos	10265–92–6	1657
156	Methomyl	16752–77–5	531.1/632
158	Methoxychlor	72–43–5	1656/505/508/608.2/617/525.1/525.2
172	Nabam	142–59–6	630/630.1
173	Naled	300–76–5	1657/622
175	Norflurazon	27314–13–2	507/645/525.1/525.2/1656
178	Benfluralin	1861–40–1	1656/627 See footnote 1
182	Fensulfothion	115–90–2	1657/622
183	Disulfoton	298–04–4	1657/507/614/622/525.2
185	Phosmet	732–11–6	1657/622.1
186	Azinphos Methyl	86–50–0	1657/614/622
192	Organo-tin pesticides	12379–54–3	Ind-01/200.7/200.9
197	Bolstar	35400–43–2	1657/622
203	Parathion	56–38–2	1657/614
204	Pendimethalin	40487–42–1	1656
205	Pentachloronitrobenzene	82–68–8	1656/608.1/617
206	Pentachlorophenol	87–86–5	625/1625/515.2/555/515.1/525.1/525.2
208	Permethrin	52645–53–1	608.2/508/525.1/525.2/1656/1660
212	Phorate	298–02–2	1657/622
218	Busan 85 [Potassium dimethyldithiocarbamate].	128–03–0	630/630.1
219	Busan 40 [Potassium N-hydroxymethyl-N-methyldithiocarbamate].	51026–28–9	630/630.1
220	KN Methyl [Potassium N-methyldithiocarbamate].	137–41–7	630/630.1
223	Prometon	1610–18–0	507/619/525.2
224	Prometryn	7287–19–6	507/619/525.1/525.2
226	Propazine	139–40–2	507/619/525.1/525.2/1656
230	Pyrethrin I	121–21–1	1660
232	Pyrethrin II	121–29–9	1660
236	DEF [S,S,S-Tributyl phosphorotrithioate]	78–48–8	1657
239	Simazine	122–34–9	505/507/619/525.1/525.2/1656
241	Carbam-S [Sodium dimethyldithio-carbamate].	128–04–1	630/630.1
243	Vapam [Sodium methyldithiocarbamate]	137–42–8	630/630.1
252	Tebuthiuron	34014–18–1	507/525.1/525.2
254	Terbacil	5902–51–2	507/633/525.1/525.2/1656
255	Terbufos	13071–79–9	1657/507/614.1/525.1/525.2
256	Terbuthylazine	5915–41–3	619/1656
257	Terbutryn	886–50–0	507/619/525.1/525.2
259	Dazomet	533–74–4	630/630.1/1659
262	Toxaphene	8001–35–2	1656/505/508/608/617/525.1/525.2
263	Merphos [Tributyl phosphorotrithioate]	150–50–5	1657/507/525.1/525.2/622
264	Trifluralin [1]	1582–09–8	1656/508/617/627/525.2

TABLE IG—TEST METHODS FOR PESTICIDE ACTIVE INGREDIENTS (40 CFR PART 455)—Continued

EPA survey code	Pesticide name	CAS No.	EPA analytical method No.(s) [3]
268	Ziram [Zinc dimethyldithiocarbamate]	137–30–4	630/630.1

Table 1G notes:
[1] Monitor and report as total Trifluralin.
[2] Applicable to the analysis of DCPA degradates.
[3] EPA Methods 608.1 through 645, 1645 through 1661, and Ind-01 are available in Methods For The Determination of Nonconventional Pesticides In Municipal and Industrial Wastewater, Volume I, EPA 821–R–93–010A, Revision I, August 1993, U.S. EPA. EPA Methods 200.9 and 505 through 555 are available in Methods For The Determination of Nonconventional Pesticides In Municipal and Industrial Wastewater, Volume II, EPA 821–R–93–010B, August 1993, U.S. EPA. The full text of Methods 608, 625 and 1625 are provided at Appendix A of this Part 136. The full text of Method 200.7 is provided at appendix C of this part 136.

TABLE IH—LIST OF APPROVED MICROBIOLOGICAL METHODS FOR AMBIENT WATER

Parameter and units	Method [1]	EPA	Standard methods	AOAC, ASTM, USGS	Other
Bacteria:					
1. Coliform (fecal), number per 100 mL or number per gram dry weight.	Most Probable Number (MPN), 5 tube, 3 dilution, or.	p. 132 [3]	9221 C E–2006.		
	Membrane filter (MF) [2], single step.	p. 124 [3]	9222 D–1997	B–0050–85 [4]	
2. Coliform (fecal) in presence of chlorine, number per 100 mL.	MPN, 5 tube, 3 dilution, or	p. 132 [3]	9221 C E–2006.		
	MF [2], single step [5]	p. 124 [3]	9222 D–1997.		
3. Coliform (total), number per 100 mL.	MPN, 5 tube, 3 dilution, or	p. 114 [3]	9221 B–2006.		
	MF [2], single step or two step	p. 108 [3]	9222 B–1997	B–0025–85 [4]	
4. Coliform (total), in presence of chlorine, number per 100 mL.	MPN, 5 tube, 3 dilution, or	p. 114 [3]	9221 B–2006.		
	MF [2] with enrichment	p. 111 [3]	9222 (B + B.5c)–1997.		
5. *E. coli,* number per 100 mL.	MPN [6 8 14], multiple tube, or		9221 B.1–2006/9221 F–2006 [11 13].		
	Multiple tube/multiple well, or		9223 B–2004 [12]	991.15 [10]	Colilert® [12 16], Colilert-18® [12 15 16].
	MF [2 5 6 7 8], two step, or	1103.1 [19]	9222 B–1997/9222 G–1997 [18], 9213 D–2007.	D5392–93 [9].	
	Single step	1603 [20], 1604 [21]			mColiBlue-24® [17].
6. Fecal streptococci, number per 100 mL.	MPN, 5 tube, 3 dilution, or	p. 139 [3]	9230 B–2007.		
	MF [2], or	p. 136 [3]	9230 C–2007	B–0055–85 [4].	
	Plate count	p. 143 [3].			
7. Enterococci, number per 100 mL.	MPN [6 8], multiple tube/multiple well, or.			D6503–99 [9]	Enterolert® [12 22].
	MF [2 5 6 7 8] two step, or	1106.1 [23]	9230 C–2007	D5259–92 [9].	
	Single step, or	1600 [24]	9230 C–2007.		
	Plate count	p. 143 [3].			
Protozoa:					
8. *Cryptosporidium*	Filtration/IMS/FA	1622 [25], 1623 [26].			
9. *Giardia*	Filtration/IMS/FA	1623 [26]			

Table 1H notes:

[1] The method must be specified when results are reported.

[2] A 0.45-µm membrane filter (MF) or other pore size certified by the manufacturer to fully retain organisms to be cultivated and to be free of extractables which could interfere with their growth.

[3] Microbiological Methods for Monitoring the Environment, Water, and Wastes. EPA/600/8–78/017. 1978. US EPA.

[4] U.S. Geological Survey Techniques of Water-Resource Investigations, Book 5, Laboratory Analysis, Chapter A4, Methods for Collection and Analysis of Aquatic Biological and Microbiological Samples. 1989. USGS.

[5] Because the MF technique usually yields low and variable recovery from chlorinated wastewaters, the Most Probable Number method will be required to resolve any controversies.

[6] Tests must be conducted to provide organism enumeration (density). Select the appropriate configuration of tubes/filtrations and dilutions/volumes to account for the quality, character, consistency, and anticipated organism density of the water sample.

[7] When the MF method has not been used previously to test waters with high turbidity, large numbers of noncoliform bacteria, or samples that may contain organisms stressed by chlorine, a parallel test should be conducted with a multiple-tube technique to demonstrate applicability and comparability of results.

[8] To assess the comparability of results obtained with individual methods, it is suggested that side-by-side tests be conducted across seasons of the year with the water samples routinely tested in accordance with the most current Standard Methods for the Examination of Water and Wastewater or EPA alternate test procedure (ATP) guidelines.

[9] Annual Book of ASTM Standards—Water and Environmental Technology. Section 11.02. 2000, 1999, 1996. ASTM International.

[10] Official Methods of Analysis of AOAC International, 16th Edition, Volume I, Chapter 17. 1995. AOAC International.

[11] The multiple-tube fermentation test is used in 9221B.1–2006. Lactose broth may be used in lieu of lauryl tryptose broth (LTB), if at least 25 parallel tests are conducted between this broth and LTB using the water samples normally tested, and this comparison demonstrates that the false-positive rate and false-negative rate for total coliform using lactose broth is less than 10 percent. No requirement exists to run the completed phase on 10 percent of all total coliform-positive tubes on a seasonal basis.

[12] These tests are collectively known as defined enzyme substrate tests, where, for example, a substrate is used to detect the enzyme β-glucuronidase produced by *E. coli.*

[13] After prior enrichment in a presumptive medium for total coliform using 9221B.1–2006, all presumptive tubes or bottles showing any amount of gas, growth or acidity within 48 h ±3 h of incubation shall be submitted to 9221F–2006. Commercially available EC–MUG media or EC media supplemented in the laboratory with 50 μg/mL of MUG may be used.

[14] Samples shall be enumerated by the multiple-tube or multiple-well procedure. Using multiple-tube procedures, employ an appropriate tube and dilution configuration of the sample as needed and report the Most Probable Number (MPN). Samples tested with Colilert® may be enumerated with the multiple-well procedures, Quanti-Tray® or Quanti-Tray®/2000, and the MPN calculated from the table provided by the manufacturer.

[15] Colilert-18® is an optimized formulation of the Colilert® for the determination of total coliforms and *E. coli* that provides results within 18 h of incubation at 35 °C, rather than the 24 h required for the Colilert® test, and is recommended for marine water samples.

[16] Descriptions of the Colilert®, Colilert-18®, Quanti-Tray®, and Quanti-Tray®/2000 may be obtained from IDEXX Laboratories Inc.

[17] A description of the mColiBlue24® test may be obtained from Hach Company.

[18] Subject total coliform positive samples determined by 9222B–1997 or other membrane filter procedure to 9222G–1997 using NA–MUG media.

[19] Method 1103.1: *Escherichia coli* (*E. coli*) in Water by Membrane Filtration Using membrane-Thermotolerant *Escherichia coli* Agar (mTEC), EPA–821–R–10–002. March 2010. US EPA.

[20] Method 1603: *Escherichia coli* (*E. coli*) in Water by Membrane Filtration Using Modified membrane-Thermotolerant *Escherichia coli* Agar (Modified mTEC), EPA–821–R–09–007. December 2009. US EPA.

[21] Preparation and use of MI agar with a standard membrane filter procedure is set forth in the article, Brenner et al. 1993. New Medium for the Simultaneous Detection of Total Coliform and *Escherichia coli* in Water. Appl. Environ. Microbiol. 59:3534–3544 and in Method 1604: Total Coliforms and *Escherichia coli* (*E. coli*) in Water by Membrane Filtration by Using a Simultaneous Detection Technique (MI Medium), EPA 821–R–02–024, September 2002, US EPA.

[22] A description of the Enterolert® test may be obtained from IDEXX Laboratories Inc.

[23] Method 1106.1: Enterococci in Water by Membrane Filtration Using membrane-Enterococcus-Esculin Iron Agar (mE–EIA), EPA–821–R–09–015. December 2009. US EPA.

[24] Method 1600: Enterococci in Water by Membrane Filtration Using membrane-Enterococcus Indoxyl-β-D-Glucoside Agar (mEI), EPA–821–R–09–016. December 2009. US EPA.

[25] Method 1622 uses a filtration, concentration, immunomagnetic separation of oocysts from captured material, immunofluorescence assay to determine concentrations, and confirmation through vital dye staining and differential interference contrast microscopy for the detection of *Cryptosporidium.* Method 1622: *Cryptosporidium* in Water by Filtration/IMS/FA, EPA–821–R–05–001. December 2005. US EPA.

[26] Method 1623 uses a filtration, concentration, immunomagnetic separation of oocysts and cysts from captured material, immunofluorescence assay to determine concentrations, and confirmation through vital dye staining and differential interference contrast microscopy for the simultaneous detection of *Cryptosporidium* and *Giardia* oocysts and cysts. Method 1623. *Cryptosporidium* and *Giardia* in Water by Filtration/IMS/FA. EPA–821–R–05–002. December 2005. US EPA.

(b) The documents required in this section are incorporated by reference into this section with approval of the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of the documents may be obtained from the sources listed in paragraph (b) of this section. Documents may be inspected at EPA's Water Docket, EPA West, 1301 Constitution Avenue NW., Room B102, Washington, DC (Telephone: 202–566–2426); or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html*. These test procedures are incorporated as they exist on the day of approval and a notice of any change in these test procedures will be published in the FEDERAL REGISTER. The full texts of the methods from the following references which are cited in Tables IA, IB, IC, ID, IE, IF, IG and IH are incorporated by reference into this regulation and may be obtained from the source identified. All costs cited are subject to change and must be verified from the indicated source.

(1) Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati OH (US EPA). Available at *http://water.epa.gov/scitech/methods/cwa/index.cfm* or from: National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161

(i) Microbiological Methods for Monitoring the Environment, Water, and Wastes. 1978. EPA/600/8–78/017, Pub. No. PB–290329/A.S.

(A) Part III Analytical Methodology, Section B Total Coliform Methods, page 108. Table IA, Note 3; Table IH, Note 3.

(B) Part III Analytical Methodology, Section B Total Coliform Methods, 2.6.2 Two-Step Enrichment Procedure, page 111. Table IA, Note 3; Table IH, Note 3.

(C) Part III Analytical Methodology, Section B Total Coliform Methods, 4 Most Probable Number (MPN) Method, page 114. Table IA, Note 3; Table IH, Note 3.

(D) Part III Analytical Methodology, Section C Fecal Coliform Methods, 2 Direct Membrane Filter (MF) Method, page 124. Table IA, Note 3; Table IH, Note 3.

(E) Part III, Analytical Methodology, Section C Fecal Coliform Methods, 5 Most Probable Number (MPN) Method, page 132. Table IA, Note 3; Table IH, Note 3.

(F) Part III Analytical Methodology, Section D Fecal Streptococci, 2 Membrane Filter (MF) Method, page 136. Table IA, Note 3; Table IH, Note 3.

(G) Part III Analytical Methodology, Section D Fecal Streptococci, 4 Most Probable Number Method, page 139. Table IA, Note 3; Table IH, Note 3.

(H) Part III Analytical Methodology, Section D Fecal Streptococci, 5 Pour Plate Method, page 143. Table IA, Note 3; Table IH, Note 3.

(ii) [Reserved]

(2) Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati OH (US EPA). Available at *http://water.epa.gov/scitech/methods/cwa/index.cfm*.

(i) Method 300.1 (including Errata Cover Sheet, April 27, 1999), Determination of Inorganic Ions in Drinking Water by Ion Chromatography, Revision 1.0, 1997. Table IB, Note 52.

(ii) Method 551, Determination of Chlorination Disinfection Byproducts and Chlorinated Solvents in Drinking Water by Liquid-Liquid Extraction and Gas Chromatography With Electron-Capture Detection. 1990. Table IF.

(3) National Exposure Risk Laboratory-Cincinnati, U.S. Environmental Protection Agency, Cincinnati OH (US EPA). Available from *http://water.epa.gov/scitech/methods/cwa/index.cfm* or from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161. Telephone: 800–553–6847.

(i) Methods for the Determination of Inorganic Substances in Environmental Samples. August 1993. EPA/600/R–93/100, Pub. No. PB 94120821. Table IB, Note 52.

(A) Method 180.1, Determination of Turbidity by Nephelometry. Revision 2.0. Table IB, Note 52.

(B) Method 300.0, Determination of Inorganic Anions by Ion Chromatography. Revision 2.1. Table IB, Note 52.

(C) Method 335.4, Determination of Total Cyanide by Semi-Automated Colorimetry. Revision 1.0. Table IB, Notes 52 and 57.

(D) Method 350.1, Determination of Ammonium Nitrogen by Semi-Automated Colorimetry. Revision 2.0. Table IB, Notes 30 and 52.

(E) Method 351.2, Determination of Total Kjeldahl Nitrogen by Semi-Automated Colorimetry. Revision 2.0. Table IB, Note 52.

(F) Method 353.2, Determination of Nitrate-Nitrite Automated Colorimetry. Revision 2.0. Table IB, Note 52.

(G) Method 365.1, Determination of Phosphorus by Automated Colorimetry. Revision 2.0. Table IB, Note 52.

(H) Method 375.2, Determination of Sulfate by Automated Colorimetry. Revision 2.0. Table IB, Note 52.

(I) Method 410.4, Determination of Chemical Oxygen Demand by Semi-Automated Colorimetry. Revision 2.0. Table IB, Note 52.

(ii) Methods for the Determination of Metals in Environmental Samples, Supplement I. May 1994. EPA/600/R–94/111, Pub. No. PB 95125472. Table IB, Note 52.

(A) Method 200.7, Determination of Metals and Trace Elements in Water and Wastes by Inductively Coupled Plasma-Atomic Emission Spectrometry. Revision 4.4. Table IB, Note 52.

(B) Method 200.8, Determination of Trace Elements in Water and Wastes by Inductively Coupled Plasma Mass Spectrometry. Revision 5.3. Table IB, Note 52.

(C) Method 200.9, Determination of Trace Elements by Stabilized Temperature Graphite Furnace Atomic Absorption Spectrometry. Revision 2.2. Table IB, Note 52.

(D) Method 218.6, Determination of Dissolved Hexavalent Chromium in Drinking Water, Groundwater, and Industrial Wastewater Effluents by Ion Chromatography. Revision 3.3. Table IB, Note 52.

(E) Method 245.1, Determination of Mercury in Water by Cold Vapor Atomic Absorption Spectrometry. Revision 3.0. Table IB, Note 52.

(4) National Exposure Risk Laboratory-Cincinnati, U.S. Environmental Protection Agency, Cincinnati OH (US EPA). Available at *http://water.epa.gov/scitech/methods/cwa/index.cfm*.

(i) EPA Method 200.5, Determination of Trace Elements in Drinking Water by Axially Viewed Inductively Coupled Plasma-Atomic Emission Spectrometry. Revision 4.2, October 2003. EPA/600/R–06/115. Table IB, Note 68.

(ii) EPA Method 525.2, Determination of Organic Compounds in Drinking Water by Liquid-Solid Extraction and Capillary Column Gas Chromatography/Mass Spectrometry. Revision 2.0, 1995. Table ID, Note 10.

(5) Office of Research and Development, Cincinnati OH. U.S. Environmental Protection Agency, Cincinnati OH (US EPA). Available at *http://water.epa.gov/scitech/methods/cwa/index.cfm* or from ORD Publications, CERI, U.S. Environmental Protection Agency, Cincinnati OH 45268.

(i) Methods for Benzidine, Chlorinated Organic Compounds, Pentachlorophenol, and Pesticides in Water and Wastewater. 1978. Table IC, Note 3; Table ID, Note 3.

(ii) Methods for Chemical Analysis of Water and Wastes. March 1979. EPA–600/4–79–020. Table IB, Note 1.

(iii) Methods for Chemical Analysis of Water and Wastes. Revised March 1983. EPA–600/4–79–020. Table IB, Note 1.

(A) Method 120.1, Conductance, Specific Conductance, µmhos at 25 °C. Revision 1982. Table IB, Note 1.

(B) Method 130.1, Hardness, Total (mg/L as $CaCO_3$), Colorimetric, Automated EDTA. Issued 1971. Table IB, Note 1.

(C) Method 150.2, pH, Continuous Monitoring (Electrometric). December 1982. Table IB, Note 1.

(D) Method 160.4, Residue, Volatile, Gravimetric, Ignition at 550 °C. Issued 1971. Table IB, Note 1.

(E) Method 206.5, Arsenic, Sample Digestion Prior to Total Arsenic Analysis by Silver Diethyldithiocarbamate or Hydride Procedures. Issued 1978. Table IB, Note 1.

(F) Method 231.2, Gold, Atomic Absorption, Furnace Technique. Issued 1978. Table IB, Note 1.

(G) Method 245.2, Mercury, Automated Cold Vapor Technique. Issued 1974. Table IB, Note 1.

(H) Method 252.2, Osmium, Atomic Absorption, Furnace Technique. Issued 1978. Table IB, Note 1.

(I) Method 253.2, Palladium, Atomic Absorption, Furnace Technique. Issued 1978. Table IB, Note 1.

(J) Method 255.2, Platinum, Atomic Absorption, Furnace Technique. Issued 1978. Table IB, Note 1.

(K) Method 265.2, Rhodium, Atomic Absorption, Furnace Technique. Issued 1978. Table IB, Note 1.

(L) Method 279.2, Thallium, Atomic Absorption, Furnace Technique. Issued 1978. Table IB, Note 1.

(M) Method 283.2, Titanium, Atomic Absorption, Furnace Technique. Issued 1978. Table IB, Note 1.

(N) Method 289.2, Zinc, Atomic Absorption, Furnace Technique. Issued 1978. Table IB, Note 1.

(O) Method 310.2, Alkalinity, Colorimetric, Automated, Methyl Orange. Revision 1974. Table IB, Note 1.

(P) Method 351.1, Nitrogen, Kjeldahl, Total, Colorimetric, Automated Phenate. Revision 1978. Table IB, Note 1.

(Q) Method 352.1, Nitrogen, Nitrate, Colorimetric, Brucine. Issued 1971. Table IB, Note 1.

(R) Method 365.3, Phosphorus, All Forms, Colorimetric, Ascorbic Acid, Two Reagent. Issued 1978. Table IB, Note 1.

(S) Method 365.4, Phosphorus, Total, Colorimetric, Automated, Block Digestor AA II. Issued 1974. Table IB, Note 1.

(T) Method 410.3, Chemical Oxygen Demand, Titrimetric, High Level for Saline Waters. Revision 1978. Table IB, Note 1.

(U) Method 420.1, Phenolics, Total Recoverable, Spectrophotometric, Manual 4–AAP With Distillation. Revision 1978. Table IB, Note 1.

(iv) Prescribed Procedures for Measurement of Radioactivity in Drinking Water. 1980. EPA–600/4–80–032. Table IE.

(A) Method 900.0, Gross Alpha and Gross Beta Radioactivity. Table IE.

(B) Method 903.0, Alpha-Emitting iRadio Isotopes. Table IE.

(C) Method 903.1, Radium-226, Radon Emanation Technique. Table IE.

(D) Appendix B, Error and Statistical Calculations. Table IE.

(6) Office of Science and Technology, U.S. Environmental Protection Agency, Washington DC (US EPA). Available at *http://water.epa.gov/scitech/methods/cwa/index.cfm*.

(i) Method 1625C, Semivolatile Organic Compounds by Isotope Dilution GCMS. 1989. Table IF.

(ii) [Reserved]

(7) Office of Water, U.S. Environmental Protection Agency, Washington DC (US EPA). Available at *http://water.epa.gov/scitech/methods/cwa/index.cfm* or from National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161.

(i) Method 1631, Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry. Revision E, August 2002. EPA–821–R–02–019, Pub. No. PB2002–108220. Table IB, Note 43.

(ii) Kelada-01, Kelada Automated Test Methods for Total Cyanide, Acid Dissociable Cyanide, and Thiocyanate. Revision 1.2, August 2001. EPA 821–B–01–009, Pub. No. PB 2001–108275. Table IB, Note 55.

(iii) In the compendium *Analytical Methods for the Determination of Pollutants in Pharmaceutical Manufacturing Industry Wastewaters*. July 1998. EPA 821–B–98–016, Pub. No. PB95201679. Table IF, Note 1.

(A) EPA Method 1666, Volatile Organic Compounds Specific to the Pharmaceutical Industry by Isotope Dilution GC/MS. Table IF, Note 1.

(B) EPA Method 1667, Formaldehyde, Isobutyraldehyde, and Furfural by Derivatization Followed by High Performance Liquid Chromatography. Table IF.

(C) Method 1671, Volatile Organic Compounds Specific to the Pharmaceutical Manufacturing Industry by GC/FID. Table IF.

(iv) Methods For The Determination of Nonconventional Pesticides In Municipal and Industrial Wastewater, Volume I. Revision I, August 1993. EPA 821–R–93–010A, Pub. No. PB 94121654. Tables ID, IG.

(A) Method 608.1, Organochlorine Pesticides. Table ID, Note 10; Table IG, Note 3.

(B) Method 608.2, Certain Organochlorine Pesticides. Table ID, Note 10; Table IG, Note 3.

(C) Method 614, Organophosphorus Pesticides. Table ID, Note 10; Table IG, Note 3.

(D) Method 614.1, Organophosphorus Pesticides. Table ID, Note 10; Table IG, Note 3.

(E) Method 615, Chlorinated Herbicides. Table ID, Note 10; Table IG, Note 3.

(F) Method 617, Organohalide Pesticides and PCBs. Table ID, Note 10; Table IG, Note 3.

(G) Method 619, Triazine Pesticides. Table ID, Note 10; Table IG, Note 3.

(H) Method 622, Organophosphorus Pesticides. Table ID, Note 10; Table IG, Note 3.

(I) Method 622.1, Thiophosphate Pesticides. Table ID, Note 10; Table IG, Note 3.

(J) Method 627, Dinitroaniline Pesticides. Table ID, Note 10; Table IG, Notes 1 and 3.

(K) Method 629, Cyanazine. Table IG, Note 3.

(L) Method 630, Dithiocarbamate Pesticides. Table IG, Note 3.

(M) Method 630.1, Dithiocarbamate Pesticides. Table IG, Note 3.

(N) Method 631, Benomyl and Carbendazim. Table IG, Note 3.

(O) Method 632, Carbamate and Urea Pesticides. Table ID, Note 10; Table IG, Note 3.

(P) Method 632.1, Carbamate and Amide Pesticides. Table IG, Note 3.

(Q) Method 633, Organonitrogen Pesticides. Table IG, Note 3.

(R) Method 633.1, Neutral Nitrogen-Containing Pesticides. Table IG, Note 3.

(S) Method 637, MBTS and TCMTB. Table IG, Note 3.

(T) Method 644, Picloram. Table IG, Note 3.

(U) Method 645, Certain Amine Pesticides and Lethane. Table IG, Note 3.

(V) Method 1656, Organohalide Pesticides. Table ID, Note 10; Table IG, Notes 1 and 3.

(W) Method 1657, Organophosphorus Pesticides. Table ID, Note 10; Table IG, Note 3.

(X) Method 1658, Phenoxy-Acid Herbicides. Table IG, Note 3.

(Y) Method 1659, Dazomet. Table IG, Note 3.

(Z) Method 1660, Pyrethrins and Pyrethroids. Table IG, Note 3.

(AA) Method 1661, Bromoxynil. Table IG, Note 3.

(BB) Ind-01. Methods EV–024 and EV–025, Analytical Procedures for Determining Total Tin and Triorganotin in Wastewater. Table IG, Note 3.

(v) Methods For The Determination of Nonconventional Pesticides In Municipal and Industrial Wastewater, Volume II. August 1993. EPA 821–R–93–010B, Pub. No. PB 94166311. Table IG.

(A) Method 200.9, Determination of Trace Elements by Stabilized Temperature Graphite Furnace Atomic Absorption Spectrometry. Table IG, Note 3.

(B) Method 505, Analysis of Organohalide Pesticides and Commercial Polychlorinated Biphenyl (PCB) Products in Water by Microextraction and Gas Chromatography. Table ID, Note 10; Table IG, Note 3.

(C) Method 507, The Determination of Nitrogen- and Phosphorus-Containing Pesticides in Water by Gas Chromatography with a Nitrogen-Phosphorus Detector. Table ID, Note 10; Table IG, Note 3.

(D) Method 508, Determination of Chlorinated Pesticides in Water by Gas Chromatography with an Electron Capture Detector. Table ID, Note 10; Table IG, Note 3.

(E) Method 515.1, Determination of Chlorinated Acids in Water by Gas Chromatography with an Electron Capture Detector. Table IG, Notes 2 and 3.

(F) Method 515.2, Determination of Chlorinated Acids in Water Using Liquid-Solid Extraction and Gas Chromatography with an Electron Capture Detector. Table IG, Notes 2 and 3.

(G) Method 525.1, Determination of Organic Compounds in Drinking Water by Liquids-Solid Extraction and Capillary Column Gas Chromatography/Mass Spectrometry. Table ID, Note 10; Table IG, Note 3.

(H) Method 531.1, Measurement of N-Methylcarbamoyloximes and N-Methylcarbamates in Water by Direct Aqueous Injection HPLC with Post-Column Derivatization. Table ID, Note 10; Table IG, Note 3.

(I) Method 547, Determination of Glyphosate in Drinking Water by Direct-Aqueous-Injection HPLC, Post-Column Derivatization, and Fluorescence Detection. Table IG, Note 3.

(J) Method 548, Determination of Endothall in Drinking Water by Aqueous Derivatization, Liquid-Solid Extraction, and Gas Chromatography with Electron-Capture Detector. Table IG, Note 3.

(K) Method 548.1, Determination of Endothall in Drinking Water by Ion-Exchange Extraction, Acidic Methanol Methylation and Gas Chromatography/Mass Spectrometry. Table IG, Note 3.

(L) Method 553, Determination of Benzidines and Nitrogen-Containing Pesticides in Water by Liquid-Liquid Extraction or Liquid-Solid Extraction and Reverse Phase High Performance Liquid Chromatography/Particle Beam/Mass Spectrometry Table ID, Note 10; Table IG, Note 3.

(M) Method 555, Determination of Chlorinated Acids in Water by High Performance Liquid Chromatography With a Photodiode Array Ultraviolet Detector. Table IG, Note 3.

(vi) In the compendium *Methods for the Determination of Organic Compounds in Drinking Water*. Revised July 1991, December 1998. EPA–600/4–88–039, Pub. No. PB92–207703. Table IF.

(A) EPA Method 502.2, Volatile Organic Compounds in Water by Purge and Trap Capillary Column Gas Chromatography with Photoionization and Electrolytic Conductivity Detectors in Series. Table IF.

(B) [Reserved]

(vii) In the compendium *Methods for the Determination of Organic Compounds in Drinking Water-Supplement II*. August 1992. EPA–600/R–92–129, Pub. No. PB92–207703. Table IF.

(A) EPA Method 524.2, Measurement of Purgeable Organic Compounds in Water by Capillary Column Gas Chromatography/Mass Spectrometry. Table IF.

(B) [Reserved]

(viii) Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. October 2002. EPA 821–R–02–012, Pub. No. PB2002–108488. Table IA, Note 26.

(ix) Short-Term Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition. October 2002. EPA 821–R–02–013, Pub. No. PB2002–108489. Table IA, Note 27.

(x) Short-Term Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms, Third Edition. October 2002. EPA 821–R–02–014, Pub. No. PB2002–108490. Table IA, Note 28.

(8) Office of Water, U.S. Environmental Protection Agency, Washington DC (US EPA). Available at *http://water.epa.gov/scitech/methods/cwa/index.cfm*.

(i) Method 245.7, Mercury in Water by Cold Vapor Atomic Fluorescence Spectrometry. Revision 2.0, February 2005. EPA–821–R–05–001. Table IB, Note 17.

(ii) Method 1103.1: *Escherichia coli* (*E. coli*) in Water by Membrane Filtration Using membrane-Thermotolerant *Escherichia coli* Agar (mTEC). March 2010. EPA–621–R–10–002. Table IH, Note 19.

(iii) Method 1106.1: Enterococci in Water by Membrane Filtration Using membrane-Enterococcus-Esculin Iron Agar (mE–EIA). December 2009. EPA–621–R–09–015. Table IH, Note 23.

(iv) Method 1600: Enterococci in Water by Membrane Filtration Using membrane-Enterococcus Indoxyl-β-D-Glucoside Agar (mEI). December 2009. EPA–821–R–09–016. Table IA, Note 25; Table IH, Note 24.

(v) Method 1603: *Escherichia coli* (*E. coli*) in Water by Membrane Filtration Using Modified membrane-Thermotolerant *Escherichia coli* Agar (Modified mTEC). December 2009. EPA–821–R–09–007. Table IA, Note 22; Table IH, Note 20.

(vi) Method 1604: Total Coliforms and *Escherichia coli* (*E. coli*) in Water by Membrane Filtration Using a Simultaneous Detection Technique (MI Medium). September 2002. EPA–821–R–02–024. Table IH, Note 21.

(vii) Method 1622: *Cryptosporidium* in Water by Filtration/IMS/FA. December 2005. EPA–821–R–05–001. Table IH, Note 25.

(viii) Method 1623: *Cryptosporidium* and *Giardia* in Water by Filtration/IMS/FA. December 2005. EPA–821–R–05–002. Table IH, Note 26.

(ix) Method 1627, Kinetic Test Method for the Prediction of Mine Drainage Quality. December 2011. EPA–821–R–09–002. Table IB, Note 69.

(x) Method 1664, n-Hexane Extractable Material (HEM; Oil and Grease)

and Silica Gel Treated n-Hexane Extractable Material (SGT-HEM; Nonpolar Material) by Extraction and Gravimetry. Revision A, February 1999. EPA–821–R–98–002. Table IB, Notes 38 and 42.

(xi) Method 1664, n-Hexane Extractable Material (HEM; Oil and Grease) and Silica Gel Treated n-Hexane Extractable Material (SGT-HEM; Nonpolar Material) by Extraction and Gravimetry. Revision B, February 2010. EPA–821–R–10–001. Table IB, Notes 38 and 42.

(xii) Method 1669, Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels. July 1996. Table IB, Note 43.

(xiii) Method 1680: Fecal Coliforms in Sewage Sludge (Biosolids) by Multiple-Tube Fermentation using Lauryl Tryptose Broth (LTB) and EC Medium. April 2010. EPA–821–R–10–003. Table IA, Note 15.

(xiv) Method 1681: Fecal Coliforms in Sewage Sludge (Biosolids) by Multiple-Tube Fermentation using A–1 Medium. July 2006. EPA 821–R–06–013. Table IA, Note 20.

(xv) Method 1682: *Salmonella* in Sewage Sludge (Biosolids) by Modified Semisolid Rappaport-Vassiliadis (MSRV) Medium. July 2006. EPA 821–R–06–014. Table IA, Note 23.

(9) American National Standards Institute, 1430 Broadway, New York NY 10018.

(i) ANSI. American National Standard on Photographic Processing Effluents. April 2, 1975. Table IB, Note 9.

(ii) [Reserved]

(10) American Public Health Association, 1015 15th Street NW., Washington, DC 20005. Standard Methods Online is available through the Standard Methods Web site (*http://www.standardmethods.org*).

(i) Standard Methods for the Examination of Water and Wastewater. 14th Edition, 1975. Table IB, Notes 17 and 27.

(ii) Standard Methods for the Examination of Water and Wastewater. 15th Edition, 1980, Table IB, Note 30; Table ID.

(iii) Selected Analytical Methods Approved and Cited by the United States Environmental Protection Agency, Supplement to the 15th Edition of Standard Methods for the Examination of Water and Wastewater. 1981. Table IC, Note 6; Table ID, Note 6.

(iv) Standard Methods for the Examination of Water and Wastewater. 18th Edition, 1992. Tables IA, IB, IC, ID, IE, and IH.

(v) Standard Methods for the Examination of Water and Wastewater. 19th Edition, 1995. Tables IA, IB, IC, ID, IE, and IH.

(vi) Standard Methods for the Examination of Water and Wastewater. 20th Edition, 1998. Tables IA, IB, IC, ID, IE, and IH.

(vii) Standard Methods for the Examination of Water and Wastewater. 21st Edition, 2005. Table IB, Notes 17 and 27.

(viii) 2120, Color. 2001. Table IB.

(ix) 2130, Turbidity. 2001. Table IB.

(x) 2310, Acidity. 1997. Table IB.

(xi) 2320, Alkalinity. 1997. Table IB.

(xii) 2340, Hardness. 1997. Table IB.

(xiii) 2510, Conductivity. 1997. Table IB.

(xiv) 2540, Solids. 1997. Table IB.

(xv) 2550, Temperature. 2000. Table IB.

(xvi) 3111, Metals by Flame Atomic Absorption Spectrometry. 1999. Table IB.

(xvii) 3112, Metals by Cold-Vapor Atomic Absorption Spectrometry. 2009. Table IB.

(xviii) 3113, Metals by Electrothermal Atomic Absorption Spectrometry. 2004. Table IB.

(xix) 3114, Arsenic and Selenium by Hydride Generation/Atomic Absorption Spectrometry. 2009. Table IB.

(xx) 3120, Metals by Plasma Emission. 1999. Table IB.

(xxi) 3125, Metals by Inductively Coupled Plasma-Mass Spectrometry. 2009. Table IB.

(xxii) 3500-Al, Aluminum. 2001. Table IB.

(xxiii) 3500-As, Arsenic. 1997. Table IB.

(xxiv) 3500-Ca, Calcium. 1997. Table IB.

(xxv) 3500-Cr, Chromium. 2009. Table IB.

(xxvi) 3500-Cu, Copper. 1999. Table IB.

(xxvii) 3500-Fe, Iron. 1997. Table IB.

(xxviii) 3500-Pb, Lead. 1997. Table IB.

(xxix) 3500-Mn, Manganese. 1999. Table IB.

(xxx) 3500-K, Potassium. 1997. Table IB.

(xxxi) 3500-Na, Sodium. 1997. Table IB.

(xxxii) 3500-V, Vanadium. 1997. Table IB.

(xxxiii) 3500-Zn, Zinc. 1997. Table IB.

(xxxiv) 4110, Determination of Anions by Ion Chromatography. 2000. Table IB.

(xxxv) 4140, Inorganic Anions by Capillary Ion Electrophoresis. 1997. Table IB.

(xxxvi) 4500-B, Boron. 2000. Table IB.

(xxxvii) 4500-Cl^-, Chloride. 1997. Table IB.

(xxxviii) 4500-Cl, Chlorine (Residual). 2000. Table IB.

(xxxix) 4500-CN^-, Cyanide. 1999. Table IB.

(xl) 4500-F^-, Fluoride. 1997. Table IB.

(xli) 4500-H^+, pH Value. 2000. Table IB.

(xlii) 4500-NH_3, Nitrogen (Ammonia). 1997. Table IB.

(xliii) 4500-NO_2^-, Nitrogen (Nitrite). 2000. Table IB.

(xliv) 4500-NO_3^-, Nitrogen (Nitrate). 2000. Table IB.

(xlv) 4500-N_{org}, Nitrogen (Organic). 1997. Table IB.

(xlvi) 4500-O, Oxygen (Dissolved). 2001. Table IB.

(xlvii) 4500-P, Phosphorus. 1999. Table IB.

(xlviii) 4500-SiO_2, Silica. 1997. Table IB.

(xlix) 4500-S^{2-}, Sulfide. 2000. Table IB.

(l) 4500-SO_3^{2-}, Sulfite. 2000. Table IB.

(li) 4500-SO_4^{2-}, Sulfate. 1997. Table IB.

(lii) 5210, Biochemical Oxygen Demand (BOD). 2001. Table IB.

(liii) 5220, Chemical Oxygen Demand (COD). 1997. Table IB.

(liv) 5310, Total Organic Carbon (TOC). 2000. Table IB.

(lv) 5520, Oil and Grease. 2001. Table IB.

(lvi) 5530, Phenols. 2005. Table IB.

(lvii) 5540, Surfactants. 2000. Table IB.

(lviii) 6200, Volatile Organic Compounds. 1997. Table IC.

(lix) 6410, Extractable Base/Neutrals and Acids. 2000. Tables IC, ID.

(lx) 6420, Phenols. 2000. Table IC.

(lxi) 6440, Polynuclear Aromatic Hydrocarbons. 2000. Table IC.

(lxii) 6630, Organochlorine Pesticides. 2000. Table ID.

(lxiii) 6640, Acidic Herbicide Compounds. 2001. Table ID.

(lxiv) 7110, Gross Alpha and Gross Beta Radioactivity (Total, Suspended, and Dissolved). 2000. Table IE.

(lxv) 7500, Radium. 2001. Table IE.

(lxvi) 9213, Recreational Waters. 2007. Table IH.

(lxvii) 9221, Multiple-Tube Fermentation Technique for Members of the Coliform Group. 2006. Table IA, Notes 12 and 14; Table IH, Notes 11 and 13.

(lxviii) 9222, Membrane Filter Technique for Members of the Coliform Group. 1997. Table IA; Table IH, Note 18.

(lxix) 9223, Enzyme Substrate Coliform Test. 2004. Table IA; Table IH.

(lxx) 9230, Fecal *Enterococcus/Streptococcus* Groups. 2007. Table IA; Table IH.

(11) The Analyst, The Royal Society of Chemistry, RSC Publishing, Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge CB4 0WF, United Kingdom. (Also available from most public libraries.)

(i) Spectrophotometric Determination of Ammonia: A Study of a Modified Berthelot Reaction Using Salicylate and Dichloroisocyanurate. Krom, M.D. 105:305–316, April 1980. Table IB, Note 60.

(ii) [Reserved]

(12) Analytical Chemistry, ACS Publications, 1155 Sixteenth St. NW., Washington DC 20036. (Also available from most public libraries.)

(i) Spectrophotometric and Kinetics Investigation of the Berthelot Reaction for the Determination of Ammonia. Patton, C.J. and S.R. Crouch. 49(3):464–469, March 1977. Table IB, Note 60.

(ii) [Reserved]

(13) AOAC International, 481 North Frederick Avenue, Suite 500, Gaithersburg, MD 20877–2417.

(i) Official Methods of Analysis of AOAC International. 16th Edition, 4th Revision, 1998.

(A) 920.203, Manganese in Water, Persulfate Method. Table IB, Note 3.

(B) 925.54, Sulfate in Water, Gravimetric Method. Table IB, Note 3.

(C) 973.40, Specific Conductance of Water. Table IB, Note 3.

(D) 973.41, pH of Water. Table IB, Note 3.

(E) 973.43, Alkalinity of Water, Titrimetric Method. Table IB, Note 3.

(F) 973.44, Biochemical Oxygen Demand (BOD) of Water, Incubation Method. Table IB, Note 3.

(G) 973.45, Oxygen (Dissolved) in Water, Titrimetric Methods. Table IB, Note 3.

(H) 973.46, Chemical Oxygen Demand (COD) of Water, Titrimetric Methods. Table IB, Note 3.

(I) 973.47, Organic Carbon in Water, Infrared Analyzer Method. Table IB, Note 3.

(J) 973.48, Nitrogen (Total) in Water, Kjeldahl Method. Table IB, Note 3.

(K) 973.49, Nitrogen (Ammonia) in Water, Colorimetric Method. Table IB, Note 3.

(L) 973.50, Nitrogen (Nitrate) in Water, Brucine Colorimetric Method. Table IB, Note 3.

(M) 973.51, Chloride in Water, Mercuric Nitrate Method. Table IB, Note 3.

(N) 973.52, Hardness of Water. Table IB, Note 3.

(O) 973.53, Potassium in Water, Atomic Absorption Spectrophotometric Method. Table IB, Note 3.

(P) 973.54, Sodium in Water, Atomic Absorption Spectrophotometric Method. Table IB, Note 3.

(Q) 973.55, Phosphorus in Water, Photometric Method. Table IB, Note 3.

(R) 973.56, Phosphorus in Water, Automated Method. Table IB, Note 3.

(S) 974.27, Cadmium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Silver, Zinc in Water, Atomic Absorption Spectrophotometric Method. Table IB, Note 3.

(T) 977.22, Mercury in Water, Flameless Atomic Absorption Spectrophotometric Method. Table IB, Note 3.

(U) 991.15. Total Coliforms and *Escherichia coli* in Water Defined Substrate Technology (Colilert) Method. Table IA, Note 10; Table IH, Note 10.

(V) 993.14, Trace Elements in Waters and Wastewaters, Inductively Coupled Plasma-Mass Spectrometric Method. Table IB, Note 3.

(W) 993.23, Dissolved Hexavalent Chromium in Drinking Water, Ground Water, and Industrial Wastewater Effluents, Ion Chromatographic Method. Table IB, Note 3.

(X) 993.30, Inorganic Anions in Water, Ion Chromatographic Method. Table IB, Note 3.

(ii) [Reserved]

(14) Applied and Environmental Microbiology, American Society for Microbiology, 1752 N Street NW., Washington DC 20036. (Also available from most public libraries.)

(i) New Medium for the Simultaneous Detection of Total Coliforms and *Escherichia coli* in Water. Brenner, K.P., C.C. Rankin, Y.R. Roybal, G.N. Stelma, Jr., P.V. Scarpino, and A.P. Dufour. 59:3534–3544, November 1993. Table IH, Note 21.

(ii) [Reserved]

(15) ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428–2959, or online at *http://www.astm.org*.

(i) Annual Book of ASTM Standards, Water, and Environmental Technology, Section 11, Volumes 11.01 and 11.02. 1994. Tables IA, IB, IC, ID, IE, and IH.

(ii) Annual Book of ASTM Standards, Water, and Environmental Technology, Section 11, Volumes 11.01 and 11.02. 1996. Tables IA, IB, IC, ID, IE, and IH.

(iii) Annual Book of ASTM Standards, Water, and Environmental Technology, Section 11, Volumes 11.01 and 11.02. 1999. Tables IA, IB, IC, ID, IE, and IH.

(iv) Annual Book of ASTM Standards, Water, and Environmental Technology, Section 11, Volumes 11.01 and 11.02. 2000. Tables IA, IB, IC, ID, IE, and IH.

(v) ASTM D511–08, Standard Test Methods for Calcium and Magnesium in Water. November 2008. Table IB.

(vi) ASTM D512–04, Standard Test Methods for Chloride Ion in Water. July 2004. Table IB.

(vii) ASTM D515–88, Test Methods for Phosphorus in Water, March 1989. Table IB.

(viii) ASTM D516–07, Standard Test Method for Sulfate Ion in Water, September 2007. Table IB.

(ix) ASTM D858–07, Standard Test Methods for Manganese in Water. August 2007. Table IB.

(x) ASTM D859–05, Standard Test Method for Silica in Water. February 2005. Table IB.

(xi) ASTM D888–09, Standard Test Methods for Dissolved Oxygen in Water. December 2009. Table IB.

(xii) ASTM D1067–06, Standard Test Methods for Acidity or Alkalinity of Water. January 2007. Table IB.

(xiii) ASTM D1068–05^{e1}, Standard Test Methods for Iron in Water. July 2005. Table IB.

(xiv) ASTM D1125–95 (Reapproved 1999), Standard Test Methods for Electrical Conductivity and Resistivity of Water. December 1995. Table IB.

(xv) ASTM D1126–02 (Reapproved 2007)^{e1}, Standard Test Method for Hardness in Water. August 2007. Table IB.

(xvi) ASTM D1179–04, Standard Test Methods for Fluoride Ion in Water. July 2004. Table IB.

(xvii) ASTM D1246–05, Standard Test Method for Bromide Ion in Water. February 2005. Table IB.

(xviii) ASTM D1252–06, Standard Test Methods for Chemical Oxygen Demand (Dichromate Oxygen Demand) of Water. February 2006. Table IB.

(xix) ASTM D1253–08, Standard Test Method for Residual Chlorine in Water. October 2008. Table IB.

(xx) ASTM D1293–99, Standard Test Methods for pH of Water. March 2000. Table IB.

(xxi) ASTM D1426–08, Standard Test Methods for Ammonia Nitrogen in Water. September 2008. Table IB.

(xxii) ASTM D1687–02 (Reapproved 2007)^{e1}, Standard Test Methods for Chromium in Water. August 2007. Table IB.

(xxiii) ASTM D1688–07, Standard Test Methods for Copper in Water. August 2007. Table IB.

(xxiv) ASTM D1691–02 (Reapproved 2007)^{e1}, Standard Test Methods for Zinc in Water. August 2007. Table IB.

(xxv) ASTM D1783–01 (Reapproved 2007), Standard Test Methods for Phenolic Compounds in Water. January 2008). Table IB.

(xxvi) ASTM D1886–08, Standard Test Methods for Nickel in Water. October 2008. Table IB.

(xxvii) ASTM D1889–00, Standard Test Method for Turbidity of Water. October 2000. Table IB.

(xxviii) ASTM D1890–96, Standard Test Method for Beta Particle Radioactivity of Water. April 1996. Table IE.

(xxix) ASTM D1943–96, Standard Test Method for Alpha Particle Radioactivity of Water. April 1996. Table IE.

(xxx) ASTM D1976–07, Standard Test Method for Elements in Water by Inductively-Coupled Argon Plasma Atomic Emission Spectroscopy. August 2007. Table IB.

(xxxi) ASTM D2036–09, Standard Test Methods for Cyanides in Water. October 2009. Table IB.

(xxxii) ASTM D2330–02, Standard Test Method for Methylene Blue Active Substances. August 2002. Table IB.

(xxxiii) ASTM D2460–97, Standard Test Method for Alpha-Particle-Emitting Isotopes of Radium in Water. October 1997. Table IE.

(xxxiv) ASTM D2972–08, Standard Tests Method for Arsenic in Water. October 2008. Table IB.

(xxxv) ASTM D3223–02 (Reapproved 2007)^{e1}, Standard Test Method for Total Mercury in Water. August 2007. Table IB.

(xxxvi) ASTM D3371–95, Standard Test Method for Nitriles in Aqueous Solution by Gas-Liquid Chromatography, February 1996. Table IF.

(xxxvii) ASTM D3373–03 (Reapproved 2007)^{e1}, Standard Test Method for Vanadium in Water. September 2007. Table IB.

(xxxviii) ASTM D3454–97, Standard Test Method for Radium-226 in Water. February 1998. Table IE.

(xxxix) ASTM D3557–02 (Reapproved 2007)^{e1}, Standard Test Method for Cadmium in Water. September 2007. Table IB.

(xl) ASTM D3558–08, Standard Test Method for Cobalt in Water. November 2008. Table IB.

(xli) ASTM D3559–08, Standard Test Methods for Lead in Water. October 2008. Table IB.

(xlii) ASTM D3590–02 (Reapproved 2006), Standard Test Methods for Total Kjeldahl Nitrogen in Water. February 2007. Table IB.

(xliii) ASTM D3645–08, Standard Test Methods for Beryllium in Water. October 2008. Table IB.

(xliv) ASTM D3695–95, Standard Test Method for Volatile Alcohols in Water by Direct Aqueous-Injection Gas Chromatography. April 1995. Table IF.

(xlv) ASTM D3859–08, Standard Test Methods for Selenium in Water. October 2008. Table IB.

(xlvi) ASTM D3867–04, Standard Test Method for Nitrite-Nitrate in Water. July 2004. Table IB.

(xlvii) ASTM D4190–08, Standard Test Method for Elements in Water by Direct-Current Plasma Atomic Emission Spectroscopy. October 2008. Table IB.

(xlviii) ASTM D4282–02, Standard Test Method for Determination of Free Cyanide in Water and Wastewater by Microdiffusion. August 2002. Table IB.

(xlix) ASTM D4327–03, Standard Test Method for Anions in Water by Chemically Suppressed Ion Chromatography. January 2003. Table IB.

(l) ASTM D4382–02 (Reapproved 2007)[e1], Standard Test Method for Barium in Water, Atomic Absorption Spectrophotometry, Graphite Furnace. September 2007. Table IB.

(li) ASTM D4657–92 (Reapproved 1998), Standard Test Method for Polynuclear Aromatic Hydrocarbons in Water. January 1993. Table IC.

(lii) ASTM D4658–08, Standard Test Method for Sulfide Ion in Water. August 2008. Table IB.

(liii) ASTM D4763–88 (Reapproved 2001), Standard Practice for Identification of Chemicals in Water by Fluorescence Spectroscopy. September 1988. Table IF.

(liv) ASTM D4839–03, Standard Test Method for Total Carbon and Organic Carbon in Water by Ultraviolet, or Persulfate Oxidation, or Both, and Infrared Detection. January 2003. Table IB.

(lv) ASTM D5257–03, Standard Test Method for Dissolved Hexavalent Chromium in Water by Ion Chromatography. January 2003. Table IB.

(lvi) ASTM D5259–92, Standard Test Method for Isolation and Enumeration of Enterococci from Water by the Membrane Filter Procedure. October 1992. Table IH, Note 9.

(lvii) ASTM D5392–93, Standard Test Method for Isolation and Enumeration of *Escherichia coli* in Water by the Two-Step Membrane Filter Procedure. September 1993. Table IH, Note 9.

(lviii) ASTM D5673–05, Standard Test Method for Elements in Water by Inductively Coupled Plasma—Mass Spectrometry. July 2005. Table IB.

(lix) ASTM D5907–03, Standard Test Method for Filterable and Nonfilterable Matter in Water. July 2003. Table IB.

(lx) ASTM D6503–99, Standard Test Method for Enterococci in Water Using Enterolert. April 2000. Table IA Note 9, Table IH, Note 9.

(lxi) ASTM. D6508–00 (Reapproved 2005)[E2], Standard Test Method for Determination of Dissolved Inorganic Anions in Aqueous Matrices Using Capillary Ion Electrophoresis and Chromate Electrolyte. April 2005. Table IB.

(lxii) ASTM. D6888–09, Standard Test Method for Available Cyanide with Ligand Displacement and Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection. October 2009. Table IB, Note 59.

(lxiii) ASTM. D6919–09, Standard Test Method for Determination of Dissolved Alkali and Alkaline Earth Cations and Ammonium in Water and Wastewater by Ion Chromatography. May 2009. Table IB.

(lxiv) ASTM. D7065–06, Standard Test Method for Determination of Nonylphenol, Bisphenol A, p-tert-Octylphenol, Nonylphenol Monoethoxylate and Nonylphenol Diethoxylate in Environmental Waters by Gas Chromatography Mass Spectrometry. January 2007. Table IC.

(lxv) ASTM. D7237–10, Standard Test Method for Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection. June 2010. Table IB.

(lxvi) ASTM. D7284–08, Standard Test Method for Total Cyanide in Water by Micro Distillation followed by Flow Injection Analysis with Gas Diffusion Separation and Amperometric Detection. April 2008). Table IB.

(lxvii) ASTM. D7365–09a, Standard Practice for Sampling, Preservation, and Mitigating Interferences in Water Samples for Analysis of Cyanide. October 2009. Table II, Notes 5 and 6.

(lxviii) ASTM. D7511–09[E2], Standard Test Method for Total Cyanide by Segmented Flow Injection Analysis, In-Line Ultraviolet Digestion and Amperometric Detection. March 2009. Table IB.

(lxix) ASTM. D7573–09, Standard Test Method for Total Carbon and Organic Carbon in Water by High Temperature

Catalytic Combustion and Infrared Detection. November 2009. Table IB.

(16) Bran & Luebbe Analyzing Technologies, Inc., Elmsford NY 10523.

(i) Industrial Method Number 378–75WA, Hydrogen Ion (pH) Automated Electrode Method, Bran & Luebbe (Technicon) Auto Analyzer II. October 1976. Table IB, Note 21.

(ii) [Reserved]

(17) CEM Corporation, P.O. Box 200, Matthews NC 28106–0200.

(i) Closed Vessel Microwave Digestion of Wastewater Samples for Determination of Metals. April 16, 1992. Table IB, Note 36.

(ii) [Reserved]

(18) Craig R. Chinchilla, 900 Jorie Blvd., Suite 35, Oak Brook IL 60523. Telephone: 630–645–0600.

(i) Nitrate by Discrete Analysis Easy (1-Reagent) Nitrate Method, (Colorimetric, Automated, 1 Reagent). Revision 1, November 12, 2011. Table IB, Note 62.

(ii) [Reserved]

(19) Hach Company, P.O. Box 389, Loveland CO 80537.

(i) Method 8000, Chemical Oxygen Demand. Hach Handbook of Water Analysis. 1979. Table IB, Note 14.

(ii) Method 8008, 1,10-Phenanthroline Method using FerroVer Iron Reagent for Water. 1980. Table IB, Note 22.

(iii) Method 8009, Zincon Method for Zinc. Hach Handbook for Water Analysis. 1979. Table IB, Note 33.

(iv) Method 8034, Periodate Oxidation Method for Manganese. Hach Handbook for Water Analysis. 1979. Table IB, Note 23.

(v) Method 8506, Bicinchoninate Method for Copper. Hach Handbook of Water Analysis. 1979. Table IB, Note 19.

(vi) Method 8507, Nitrogen, Nitrite—Low Range, Diazotization Method for Water and Wastewater. 1979. Table IB, Note 25.

(vii) Hach Method 10360, Luminescence Measurement of Dissolved Oxygen in Water and Wastewater and for Use in the Determination of BOD_5 and $cBOD_5$. Revision 1.2, October 2011. Table IB, Note 63.

(viii) m-ColiBlue24® Method, for total Coliforms and *E. coli*. Revision 2, 1999. Table IA, Note 18; Table IH, Note 17.

(20) IDEXX Laboratories Inc., One Idexx Drive, Westbrook ME 04092.

(i) Colilert® Method. 2002. Table IA, Notes 17 and 18; Table IH, Notes 14, 15 and 16.

(ii) Colilert-18® Method. 2002. Table IA, Notes 17 and 18; Table IH, Notes 14, 15 and 16.

(iii) Enterolert® Method. 2002. Table IA, Note 24; Table IH, Note 12.

(iv) Quanti-Tray® Method. 2002. Table IA, Note 18; Table IH, Notes 14 and 16.

(v) Quanti-Tray®/2000 Method. 2002. Table IA, Note 18; Table IH, Notes 14 and 16.

(21) In-Situ Incorporated, 221 E. Lincoln Ave., Ft. Collins CO 80524. Telephone: 970–498–1500.

(i) In-Situ Inc. Method 1002–8–2009, Dissolved Oxygen Measurement by Optical Probe. 2009. Table IB, Note 64.

(ii) In-Situ Inc. Method 1003–8–2009, Biochemical Oxygen Demand (BOD) Measurement by Optical Probe. 2009. Table IB, Note 10.

(iii) In-Situ Inc. Method 1004–8–2009, Carbonaceous Biochemical Oxygen Demand (CBOD) Measurement by Optical Probe. 2009. Table IB, Note 35.

(22) Journal of Chromatography, Elsevier/North-Holland, Inc., Journal Information Centre, 52 Vanderbilt Avenue, New York NY 10164. (Also available from most public libraries.

(i) Direct Determination of Elemental Phosphorus by Gas-Liquid Chromatography. Addison, R.F. and R.G. Ackman. 47(3): 421–426, 1970. Table IB, Note 28.

(ii) [Reserved]

(23) Lachat Instruments, 6645 W. Mill Road, Milwaukee WI 53218, Telephone: 414–358–4200.

(i) QuikChem Method 10–204–00–1–X, Digestion and Distillation of Total Cyanide in Drinking and Wastewaters using MICRO DIST and Determination of Cyanide by Flow Injection Analysis. Revision 2.2, March 2005. Table IB, Note 56.

(ii) [Reserved]

(24) Leck Mitchell, Ph.D., P.E., 656 Independence Valley Dr., Grand Junction CO 81507. Telephone: 970–244–8661.

(i) Mitchell Method M5271, Determination of Turbidity by Nephelometry. Revision 1.0, July 31, 2008. Table IB, Note 66.

(ii) Mitchell Method M5331, Determination of Turbidity by

Nephelometry. Revision 1.0, July 31, 2008. Table IB, Note 65.

(25) National Council of the Paper Industry for Air and Stream Improvements, Inc. (NCASI), 260 Madison Avenue, New York NY 10016.

(i) NCASI Technical Bulletin No. 253, An Investigation of Improved Procedures for Measurement of Mill Effluent and Receiving Water Color. December 1971. Table IB, Note 18.

(ii) [Reserved]

(26) Oceanography International Corporation, 512 West Loop, P.O. Box 2980, College Station TX 77840.

(i) OIC Chemical Oxygen Demand Method. 1978. Table IB, Note 13.

(ii) [Reserved]

(27) OI Analytical, Box 9010, College Station TX 77820–9010.

(i) Method OIA–1677–09, Available Cyanide by Ligand Exchange and Flow Injection Analysis (FIA). Copyright 2010. Table IB, Note 59.

(ii) Method PAI–DK01, Nitrogen, Total Kjeldahl, Block Digestion, Steam Distillation, Titrimetric Detection. Revised December 22, 1994. Table IB, Note 39.

(iii) Method PAI–DK02, Nitrogen, Total Kjeldahl, Block Digestion, Steam Distillation, Colorimetric Detection. Revised December 22, 1994. Table IB, Note 40.

(iv) Method PAI–DK03, Nitrogen, Total Kjeldahl, Block Digestion, Automated FIA Gas Diffusion. Revised December 22, 1994. Table IB, Note 41.

(28) ORION Research Corporation, 840 Memorial Drive, Cambridge, Massachusetts 02138.

(i) ORION Research Instruction Manual, Residual Chlorine Electrode Model 97–70. 1977. Table IB, Note 16.

(ii) [Reserved]

(29) Technicon Industrial Systems, Tarrytown NY 10591.

(i) Industrial Method Number 379–75WE Ammonia, Automated Electrode Method, Technicon Auto Analyzer II. February 19, 1976. Table IB, Note 7.

(ii) [Reserved]

(30) Thermo Jarrell Ash Corporation, 27 Forge Parkway, Franklin MA 02038.

(i) Method AES0029. Direct Current Plasma (DCP) Optical Emission Spectrometric Method for Trace Elemental Analysis of Water and Wastes. 1986, Revised 1991. Table IB, Note 34.

(ii) [Reserved]

(31) Thermo Scientific, 166 Cummings Center, Beverly MA 01915. Telephone: 1–800–225–1480. *www.thermoscientific.com.*

(i) Thermo Scientific Orion Method AQ4500, Determination of Turbidity by Nephelometry. Revision 5, March 12, 2009. Table IB, Note 67.

(ii) [Reserved]

(32) 3M Corporation, 3M Center Building 220–9E–10, St. Paul MN 55144–1000.

(i) Organochlorine Pesticides and PCBs in Wastewater Using Empore™ Disk'' Test Method 3M 0222. Revised October 28, 1994. Table IC, Note 8; Table ID, Note 8.

(ii) [Reserved]

(33) U.S. Geological Survey (USGS), U.S. Department of the Interior, Reston, Virginia. Available from USGS Books and Open-File Reports (OFR) Section, Federal Center, Box 25425, Denver, CO 80225.

(i) OFR 76–177, Selected Methods of the U.S. Geological Survey of Analysis of Wastewaters. 1976. Table IE, Note 2.

(ii) OFR 91–519, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Organonitrogen Herbicides in Water by Solid-Phase Extraction and Capillary-Column Gas Chromatography/Mass Spectrometry With Selected-Ion Monitoring. 1992. Table ID, Note 14.

(iii) OFR 92–146, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Total Phosphorus by a Kjeldahl Digestion Method and an Automated Colorimetric Finish That Includes Dialysis. 1992. Table IB, Note 48.

(iv) OFR 93–125, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Inorganic and Organic Constituents in Water and Fluvial Sediments. 1993. Table IB, Note 51; Table IC, Note 9.

(v) OFR 93–449, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Chromium in Water by Graphite Furnace Atomic Absorption Spectrophotometry. 1993. Table IB, Note 46.

(vi) OFR 94–37, Methods of Analysis by the U.S. Geological Survey National

Water Quality Laboratory—Determination of Triazine and Other Nitrogen-containing Compounds by Gas Chromatography with Nitrogen Phosphorus Detectors. 1994. Table ID, Note 9.

(vii) OFR 95–181, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Pesticides in Water by C-18 Solid-Phase Extraction and Capillary-Column Gas Chromatography/Mass Spectrometry With Selected-Ion Monitoring. 1995. Table ID, Note 11.

(viii) OFR 97–198, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Molybdenum in Water by Graphite Furnace Atomic Absorption Spectrophotometry. 1997. Table IB, Note 47.

(ix) OFR 98–165, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Elements in Whole-Water Digests Using Inductively Coupled Plasma-Optical Emission Spectrometry and Inductively Coupled Plasma-Mass Spectrometry. 1998. Table IB, Note 50.

(x) OFR 98–639, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Arsenic and Selenium in Water and Sediment by Graphite Furnace—Atomic Absorption Spectrometry. 1999. Table IB, Note 49.

(xi) OFR 00–170, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Ammonium Plus Organic Nitrogen by a Kjeldahl Digestion Method and an Automated Photometric Finish that Includes Digest Cleanup by Gas Diffusion. 2000. Table IB, Note 45.

(xii) Water-Resources Investigation Report 01–4098, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Moderate-Use Pesticides and Selected Degradates in Water by C-18 Solid-Phase Extraction and Gas Chromatography/Mass Spectrometry. 2001. Table ID, Note 13.

(xiii) Water-Resources Investigations Report 01–4132, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Organic Plus Inorganic Mercury in Filtered and Unfiltered Natural Water With Cold Vapor-Atomic Fluorescence Spectrometry. 2001. Table IB, Note 71.

(xiv) Water-Resources Investigation Report 01–4134, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Pesticides in Water by Graphitized Carbon-Based Solid-Phase Extraction and High-Performance Liquid Chormatography/Mass Spectrometry. 2001. Table ID, Note 12.

(xv) Methods for Determination of Inorganic Substances in Water and Fluvial Sediments, editors, Techniques of Water-Resources Investigations of the U.S. Geological Survey, Book 5, Chapter A1. 1979. Table IB, Note 8.

(xvi) Methods for Determination of Inorganic Substances in Water and Fluvial Sediments, Techniques of Water-Resources Investigations of the U.S. Geological Survey, Book 5, Chapter A1. 1989. Table IB, Note 2.

(xvii) Methods for the Determination of Organic Substances in Water and Fluvial Sediments. Techniques of Water-Resources Investigations of the U.S. Geological Survey, Book 5, Chapter A3. 1987. Table IB, Note 24; Table ID, Note 4.

(xviii) Techniques and Methods Book 5–B1, Determination of Elements in Natural-Water, Biota, Sediment and Soil Samples Using Collision/Reaction Cell Inductively Coupled Plasma-Mass Spectrometry. Chapter 1, Section B, Methods of the National Water Quality Laboratory, Book 5, Laboratory Analysis. 2006. Table IB, Note 70.

(xix) U.S. Geological Survey Techniques of Water-Resources Investigations, Book 5, Laboratory Analysis, Chapter A4, Methods for Collection and Analysis of Aquatic Biological and Microbiological Samples. 1989. Table IA, Note 4; Table IH, Note 4.

(xx) Water Temperature—Influential Factors, Field Measurement and Data Presentation, Techniques of Water-Resources Investigations of the U.S. Geological Survey, Book 1, Chapter D1. 1975. Table IB, Note 32.

(34) Waters Corporation, 34 Maple Street, Milford MA 01757, Telephone: 508–482–2131, Fax: 508–482–3625.

(i) Method D6508, Test Method for Determination of Dissolved Inorganic

Anions in Aqueous Matrices Using Capillary Ion Electrophoresis and Chromate Electrolyte. Revision 2, December 2000. Table IB, Note 54.

(ii) [Reserved]

(c) Under certain circumstances, the Regional Administrator or the Director in the Region or State where the discharge will occur may determine for a particular discharge that additional parameters or pollutants must be reported. Under such circumstances, additional test procedures for analysis of pollutants may be specified by the Regional Administrator, or the Director upon recommendation of the Alternate Test Procedure Program Coordinator, Washington, DC.

(d) Under certain circumstances, the Administrator may approve additional alternate test procedures for nationwide use, upon recommendation by the Alternate Test Procedure Program Coordinator, Washington, DC.

(e) Sample preservation procedures, container materials, and maximum allowable holding times for parameters are cited in Tables IA, IB, IC, ID, IE, IF, IG, and IH are prescribed in Table II. Information in the table takes precedence over information in specific methods or elsewhere. Any person may apply for a change from the prescribed preservation techniques, container materials, and maximum holding times applicable to samples taken from a specific discharge. Applications for such limited use changes may be made by letters to the Regional Alternative Test Procedure (ATP) Program Coordinator or the permitting authority in the Region in which the discharge will occur. Sufficient data should be provided to assure such changes in sample preservation, containers or holding times do not adversely affect the integrity of the sample. The Regional ATP Coordinator or permitting authority will review the application and then notify the applicant and the appropriate State agency of approval or rejection of the use of the alternate test procedure. A decision to approve or deny any request on deviations from the prescribed Table II requirements will be made within 90 days of receipt of the application by the Regional Administrator. An analyst may not modify any sample preservation and/or holding time requirements of an approved method unless the requirements of this section are met.

TABLE II—REQUIRED CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES

Parameter number/name	Container [1]	Preservation [2 3]	Maximum holding time [4]
Table IA—Bacterial Tests:			
1–5. Coliform, total, fecal, and *E. coli*	PA, G	Cool, <10 °C, 0.0008% $Na_2S_2O_3$ [5].	8 hours. [22 23]
6. Fecal streptococci	PA, G	Cool, <10 °C, 0.0008% $Na_2S_2O_3$ [5].	8 hours.[22]
7. Enterococci	PA, G	Cool, <10 °C, 0.0008% $Na_2S_2O_3$ [5].	8 hours.[22]
8. *Salmonella*	PA, G	Cool, <10 °C, 0.0008% $Na_2S_2O_3$ [5].	8 hours.[22]
Table IA—Aquatic Toxicity Tests:			
9–12. Toxicity, acute and chronic	P, FP, G	Cool, ≤6 °C [16]	36 hours.
Table IB—Inorganic Tests:			
1. Acidity	P, FP, G	Cool, ≤6 °C [18]	14 days.
2. Alkalinity	P, FP, G	Cool, ≤6 °C [18]	14 days.
4. Ammonia	P, FP, G	Cool, ≤6 °C [18], H_2SO_4 to pH <2.	28 days.
9. Biochemical oxygen demand	P, FP, G	Cool, ≤6 °C [18]	48 hours.
10. Boron	P, FP, or Quartz	HNO_3 to pH <2	6 months.
11. Bromide	P, FP, G	None required	28 days.
14. Biochemical oxygen demand, carbonaceous.	P, FP G	Cool, ≤6 °C [18]	48 hours.
15. Chemical oxygen demand	P, FP, G	Cool, ≤6 °C [18], H_2SO_4 to pH <2.	28 days.
16. Chloride	P, FP, G	None required	28 days.
17. Chlorine, total residual	P, G	None required	Analyze within 15 minutes.
21. Color	P, FP, G	Cool, ≤6 °C [18]	48 hours.
23–24. Cyanide, total or available (or CATC) and free.	P, FP, G	Cool, ≤6 °C [18], NaOH to pH >10 [5 6], reducing agent if oxidizer present.	14 days.

TABLE II—REQUIRED CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES—Continued

Parameter number/name	Container [1]	Preservation [2 3]	Maximum holding time [4]
25. Fluoride	P	None required	28 days.
27. Hardness	P, FP, G	HNO_3 or H_2SO_4 to pH <2.	6 months.
28. Hydrogen ion (pH)	P, FP, G	None required	Analyze within 15 minutes.
31, 43. Kjeldahl and organic N	P, FP, G	Cool, ≤6 °C [18], H_2SO_4 to pH <2.	28 days.
Table IB—Metals: [7]			
18. Chromium VI	P, FP, G	Cool, ≤6 °C [18], pH = 9.3–9.7 [20].	28 days.
35. Mercury (CVAA)	P, FP, G	HNO_3 to pH <2	28 days.
35. Mercury (CVAFS)	FP, G; and FP-lined cap [17].	5 mL/L 12N HCl or 5 mL/L BrCl [17].	90 days.[17]
3, 5–8, 12, 13, 19, 20, 22, 26, 29, 30, 32–34, 36, 37, 45, 47, 51, 52, 58–60, 62, 63, 70–72, 74, 75. Metals, except boron, chromium VI, and mercury.	P, FP, G	HNO_3 to pH <2, or at least 24 hours prior to analysis [19].	6 months.
38. Nitrate	P, FP, G	Cool, ≤6 °C [18]	48 hours.
39. Nitrate-nitrite	P, FP, G	Cool, ≤6 °C [18], H_2SO_4 to pH <2.	28 days.
40. Nitrite	P, FP, G	Cool, ≤6 °C [18]	48 hours.
41. Oil and grease	G	Cool to ≤6 °C [18], HCl or H_2SO_4 to pH <2.	28 days.
42. Organic Carbon	P, FP, G	Cool to ≤6 °C [18], HCl, H_2SO_4, or H_3PO_4 to pH <2.	28 days.
44. Orthophosphate	P, FP, G	Cool, to ≤6 °C [18 24]	Filter within 15 minutes; Analyze within 48 hours.
46. Oxygen, Dissolved Probe	G, Bottle and top	None required	Analyze within 15 minutes.
47. Winkler	G, Bottle and top	Fix on site and store in dark.	8 hours.
48. Phenols	G	Cool, ≤6 °C [18], H_2SO_4 to pH <2.	28 days.
49. Phosphorous (elemental)	G	Cool, ≤6 °C [18]	48 hours.
50. Phosphorous, total	P, FP, G	Cool, ≤6 °C [18], H_2SO_4 to pH <2.	28 days.
53. Residue, total	P, FP, G	Cool, ≤6 °C [18]	7 days.
54. Residue, Filterable	P, FP, G	Cool, ≤6 °C [18]	7 days.
55. Residue, Nonfilterable (TSS)	P, FP, G	Cool, ≤6 °C [18]	7 days.
56. Residue, Settleable	P, FP, G	Cool, ≤6 °C [18]	48 hours.
57. Residue, Volatile	P, FP, G	Cool, ≤6 °C [18]	7 days.
61. Silica	P or Quartz	Cool, ≤6 °C [18]	28 days.
64. Specific conductance	P, FP, G	Cool, ≤6 °C [18]	28 days.
65. Sulfate	P, FP, G	Cool, ≤6 °C [18]	28 days.
66. Sulfide	P, FP, G	Cool, ≤6 °C [18], add zinc acetate plus sodium hydroxide to pH >9.	7 days.
67. Sulfite	P, FP, G	None required	Analyze within 15 minutes.
68. Surfactants	P, FP, G	Cool, ≤6 °C [18]	48 hours.
69. Temperature	P, FP, G	None required	Analyze.
73. Turbidity	P, FP, G	Cool, ≤6 °C [18]	48 hours.
Table IC—Organic Tests: [8]			
13, 18–20, 22, 24–28, 34–37, 39–43, 45–47, 56, 76, 104, 105, 108–111, 113. Purgeable Halocarbons.	G, FP-lined septum	Cool, ≤6 °C [18], 0.008% $Na_2S_2O_3$ [5].	14 days.
6, 57, 106. Purgeable aromatic hydrocarbons.	G, FP-lined septum	Cool, ≤6 °C [18], 0.008% $Na_2S_2O_3$ [5], HCl to pH 2 [9].	14 days.[9]
3, 4. Acrolein and acrylonitrile	G, FP-lined septum	Cool, ≤6 °C [18], 0.008% $Na_2S_2O_3$, pH to 4–5 [10].	14 days.[10]
23, 30, 44, 49, 53, 77, 80, 81, 98, 100, 112. Phenols [11].	G, FP-lined cap	Cool, ≤6 °C [18], 0.008% $Na_2S_2O_3$.	7 days until extraction, 40 days after extraction.
7, 38. Benzidines [11 12]	G, FP-lined cap	Cool, ≤6 °C [18], 0.008% $Na_2S_2O_3$ [5].	7 days until extraction.[13]
14, 17, 48, 50–52. Phthalate esters [11]	G, FP-lined cap	Cool, ≤6 °C [18]	7 days until extraction, 40 days after extraction.

TABLE II—REQUIRED CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES—Continued

Parameter number/name	Container [1]	Preservation [2 3]	Maximum holding time [4]
82–84. Nitrosamines [11 14]	G, FP-lined cap	Cool, ≤6 °C [18], store in dark, 0.008% $Na_2S_2O_3$ [5].	7 days until extraction, 40 days after extraction.
88–94. PCBs [11]	G, FP-lined cap	Cool, ≤6 °C [18]	1 year until extraction, 1 year after extraction.
54, 55, 75, 79. Nitroaromatics and isophorone [11].	G, FP-lined cap	Cool, ≤6 °C [18], store in dark, 0.008% $Na_2S_2O_3$ [5].	7 days until extraction, 40 days after extraction.
1, 2, 5, 8–12, 32, 33, 58, 59, 74, 78, 99, 101. Polynuclear aromatic hydrocarbons [11].	G, FP-lined cap	Cool, ≤6 °C [18], store in dark, 0.008% $Na_2S_2O_3$ [5].	7 days until extraction, 40 days after extraction.
15, 16, 21, 31, 87. Haloethers [11]	G, FP-lined cap	Cool, ≤6 °C [18], 0.008% $Na_2S_2O_3$ [5].	7 days until extraction, 40 days after extraction.
29, 35–37, 63–65, 107. Chlorinated hydrocarbons [11].	G, FP-lined cap	Cool, ≤6 °C [18]	7 days until extraction, 40 days after extraction.
60–62, 66–72, 85, 86, 95–97, 102, 103. CDDs/CDFs [11].			
Aqueous Samples: Field and Lab Preservation.	G	Cool, ≤6 °C [18], 0.008% $Na_2S_2O_3$ [5], pH <9.	1 year.
Solids and Mixed-Phase Samples: Field Preservation.	G	Cool, ≤6 °C [18]	7 days.
Tissue Samples: Field Preservation	G	Cool, ≤6 °C [18]	24 hours.
Solids, Mixed-Phase, and Tissue Samples: Lab Preservation.	G	Freeze, ≤−10 °C	1 year.
114–118. Alkylated phenols	G	Cool, <6 °C, H_2SO_4 to pH <2.	28 days until extraction, 40 days after extraction.
119. Adsorbable Organic Halides (AOX)	G	Cool, <6 °C, 0.008% $Na_2S_2O_3$ HNO_3 to pH <2.	Hold *at least* 3 days, but not more than 6 months.
120. Chlorinated Phenolics		Cool, <6 °C, 0.008% $Na_2S_2O_3$ H_2SO_4 to pH <2.	30 days until acetylation, 30 days after acetylation.
Table ID—Pesticides Tests:			
1–70. Pesticides [11]	G, FP-lined cap	Cool, ≤6 °C [18], pH 5–9– [15].	7 days until extraction, 40 days after extraction.
Table IE—Radiological Tests:			
1–5. Alpha, beta, and radium	P, FP, G	HNO_3 to pH <2	6 months.
Table IH—Bacterial Tests:			
1. *E. coli*	PA, G	Cool, <10 °C, 0.0008% $Na_2S_2O_3$ [5].	8 hours.[22]
2. Enterococci	PA, G	Cool, <10 °C, 0.0008% $Na_2S_2O_3$ [5].	8 hours.[22]
Table IH—Protozoan Tests:			
8. *Cryptosporidium*	LDPE; field filtration	1–10 °C	96 hours.[21]
9. *Giardia*	LDPE; field filtration	1–10 °C	96 hours.[21]

[1] "P" is for polyethylene; "FP" is fluoropolymer (polytetrafluoroethylene (PTFE); Teflon®), or other fluoropolymer, unless stated otherwise in this Table II; "G" is glass; "PA" is any plastic that is made of a sterilizable material (polypropylene or other autoclavable plastic); "LDPE" is low density polyethylene.

[2] Except where noted in this Table II and the method for the parameter, preserve each grab sample within 15 minutes of collection. For a composite sample collected with an automated sample (e.g., using a 24-hour composite sample; see 40 CFR 122.21(g)(7)(i) or 40 CFR Part 403, Appendix E), refrigerate the sample at ≤6 °C during collection unless specified otherwise in this Table II or in the method(s). For a composite sample to be split into separate aliquots for preservation and/or analysis, maintain the sample at ≤6 °C, unless specified otherwise in this Table II or in the method(s), until collection, splitting, and preservation is completed. Add the preservative to the sample container prior to sample collection when the preservative will not compromise the integrity of a grab sample, a composite sample, or aliquot split from a composite sample within 15 minutes of collection. If a composite measurement is required but a composite sample would compromise sample integrity, individual grab samples must be collected at prescribed time intervals (e.g., 4 samples over the course of a day, at 6-hour intervals). Grab samples must be analyzed separately and the concentrations averaged. Alternatively, grab samples may be collected in the field and composited in the laboratory if the compositing procedure produces results equivalent to results produced by arithmetic averaging of results of analysis of individual grab samples. For examples of laboratory compositing procedures, see EPA Method 1664 Rev. A (oil and grease) and the procedures at 40 CFR 141.34(f)(14)(iv) and (v) (volatile organics).

[3] When any sample is to be shipped by common carrier or sent via the U.S. Postal Service, it must comply with the Department of Transportation Hazardous Materials Regulations (49 CFR part 172). The person offering such material for transportation is responsible for ensuring such compliance. For the preservation requirement of Table II, the Office of Hazardous Materials, Materials Transportation Bureau, Department of Transportation has determined that the Hazardous Materials Regulations do not apply to the following materials: Hydrochloric acid (HCl) in water solutions at concentrations of 0.04% by weight or less (pH about 1.96 or greater; Nitric acid (HNO_3) in water solutions at concentrations of 0.15% by weight or less (pH about 1.62 or greater); Sulfuric acid (H_2SO_4) in water solutions at concentrations of 0.35% by weight or less (pH about 1.15 or greater); and Sodium hydroxide (NaOH) in water solutions at concentrations of 0.080% by weight or less (pH about 12.30 or less).

[4] Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before the start of analysis and still be considered valid. Samples may be held for longer periods only if the permittee or monitoring laboratory has data on file to show that, for the specific types of samples under study, the analytes are stable for the longer time, and has received a variance from the Regional Administrator under Sec. 136.3(e). For a grab sample, the holding time begins at the time of collection. For a composite sample collected with an automated sampler (e.g., using a 24-hour composite sampler; see 40 CFR 122.21(g)(7)(i) or 40 CFR part 403, Appendix E), the holding time begins at the time of the end of collection of the composite sample. For a set of grab samples composited in the field or laboratory, the holding time begins at the time of collection of the last grab sample in the set. Some samples may not be stable for the maximum time period given in the table. A permittee or monitoring laboratory is obligated to hold the sample for a shorter time if it knows that a shorter time is necessary to maintain sample stability. See 136.3(e) for details. The date and time of collection of an individual grab sample is the date and time at which the sample is collected. For a set of grab samples to be composited, and that are all collected on the same calendar date, the date of collection is the date on which the samples are collected. For a set of grab samples to be composited, and that are collected across two calendar dates, the date of collection is the dates of the two days; e.g., November 14–15. For a composite sample collected automatically on a given date, the date of collection is the date on which the sample is collected. For a composite sample collected automatically, and that is collected across two calendar dates, the date of collection is the dates of the two days; e.g., November 14–15. For static-renewal toxicity tests, each grab or composite sample may also be used to prepare test solutions for renewal at 24 h, 48 h, and/or 72 h after first use, if stored at 0–6 °C, with minimum head space.

[5] ASTM D7365–09a specifies treatment options for samples containing oxidants (e.g., chlorine). Also, Section 9060A of Standard Methods for the Examination of Water and Wastewater (20th and 21st editions) addresses dechlorination procedures.

[6] Sampling, preservation and mitigating interferences in water samples for analysis of cyanide are described in ASTM D7365–09a. There may be interferences that are not mitigated by the analytical test methods or D7365–09a. Any technique for removal or suppression of interference may be employed, provided the laboratory demonstrates that it more accurately measures cyanide through quality control measures described in the analytical test method. Any removal or suppression technique not described in D7365–09a or the analytical test method must be documented along with supporting data.

[7] For dissolved metals, filter grab samples within 15 minutes of collection and before adding preservatives. For a composite sample collected with an automated sampler (e.g., using a 24-hour composite sampler; see 40 CFR 122.21(g)(7)(i) or 40 CFR Part 403, Appendix E), filter the sample within 15 minutes after completion of collection and before adding preservatives. If it is known or suspected that dissolved sample integrity will be compromised during collection of a composite sample collected automatically over time (e.g., by interchange of a metal between dissolved and suspended forms), collect and filter grab samples to be composited (footnote 2) in place of a composite sample collected automatically.

[8] Guidance applies to samples to be analyzed by GC, LC, or GC/MS for specific compounds.

[9] If the sample is not adjusted to pH 2, then the sample must be analyzed within seven days of sampling.

[10] The pH adjustment is not required if acrolein will not be measured. Samples for acrolein receiving no pH adjustment must be analyzed within 3 days of sampling.

[11] When the extractable analytes of concern fall within a single chemical category, the specified preservative and maximum holding times should be observed for optimum safeguard of sample integrity (*i.e.,* use all necessary preservatives and hold for the shortest time listed). When the analytes of concern fall within two or more chemical categories, the sample may be preserved by cooling to ≤6 °C, reducing residual chlorine with 0.008% sodium thiosulfate, storing in the dark, and adjusting the pH to 6–9; samples preserved in this manner may be held for seven days before extraction and for forty days after extraction. Exceptions to this optional preservation and holding time procedure are noted in footnote 5 (regarding the requirement for thiosulfate reduction), and footnotes 12, 13 (regarding the analysis of benzidine).

[12] If 1,2-diphenylhydrazine is likely to be present, adjust the pH of the sample to 4.0 ±0.2 to prevent rearrangement to benzidine.

[13] Extracts may be stored up to 30 days at <0 °C.

[14] For the analysis of diphenylnitrosamine, add 0.008% $Na_2S_2O_3$ and adjust pH to 7–10 with NaOH within 24 hours of sampling.

[15] The pH adjustment may be performed upon receipt at the laboratory and may be omitted if the samples are extracted within 72 hours of collection. For the analysis of aldrin, add 0.008% $Na_2S_2O_3$.

[16] Place sufficient ice with the samples in the shipping container to ensure that ice is still present when the samples arrive at the laboratory. However, even if ice is present when the samples arrive, immediately measure the temperature of the samples and confirm that the preservation temperature maximum has not been exceeded. In the isolated cases where it can be documented that this holding temperature cannot be met, the permittee can be given the option of on-site testing or can request a variance. The request for a variance should include supportive data which show that the toxicity of the effluent samples is not reduced because of the increased holding temperature. Aqueous samples must not be frozen. Hand-delivered samples used on the day of collection do not need to be cooled to 0 to 6 °C prior to test initiation.

[17] Samples collected for the determination of trace level mercury (<100 ng/L) using EPA Method 1631 must be collected in tightly-capped fluoropolymer or glass bottles and preserved with BrCl or HCl solution within 48 hours of sample collection. The time to preservation may be extended to 28 days if a sample is oxidized in the sample bottle. A sample collected for dissolved trace level mercury should be filtered in the laboratory within 24 hours of the time of collection. However, if circumstances preclude overnight shipment, the sample should be filtered in a designated clean area in the field in accordance with procedures given in Method 1669. If sample integrity will not be maintained by shipment to and filtration in the laboratory, the sample must be filtered in a designated clean area in the field within the time period necessary to maintain sample integrity. A sample that has been collected for determination of total or dissolved trace level mercury must be analyzed within 90 days of sample collection.

[18] Aqueous samples must be preserved at ≤6 °C, and should not be frozen unless data demonstrating that sample freezing does not adversely impact sample integrity is maintained on file and accepted as valid by the regulatory authority. Also, for purposes of NPDES monitoring, the specification of "≤°C" is used in place of the "4 °C" and "<4 °C" sample temperature requirements listed in some methods. It is not necessary to measure the sample temperature to three significant figures (1/100th of 1 degree); rather, three significant figures are specified so that rounding down to 6 °C may not be used to meet the ≤6 °C requirement. The preservation temperature does not apply to samples that are analyzed immediately (less than 15 minutes).

[19] An aqueous sample may be collected and shipped without acid preservation. However, acid must be added at least 24 hours before analysis to dissolve any metals that adsorb to the container walls. If the sample must be analyzed within 24 hours of collection, add the acid immediately (see footnote 2). Soil and sediment samples do not need to be preserved with acid. The allowances in this footnote supersede the preservation and holding time requirements in the approved metals methods.

[20] To achieve the 28-day holding time, use the ammonium sulfate buffer solution specified in EPA Method 218.6. The allowance in this footnote supersedes preservation and holding time requirements in the approved hexavalent chromium methods, unless this supersession would compromise the measurement, in which case requirements in the method must be followed.

[21] Holding time is calculated from time of sample collection to elution for samples shipped to the laboratory in bulk and calculated from the time of sample filtration to elution for samples filtered in the field.

[22] Sample analysis should begin as soon as possible after receipt; sample incubation must be started no later than 8 hours from time of collection.

[23] For fecal coliform samples for sewage sludge (biosolids) only, the holding time is extended to 24 hours for the following sample types using either EPA Method 1680 (LTB–EC) or 1681 (A–1): Class A composted, Class B aerobically digested, and Class B anaerobically digested.

[24] The immediate filtration requirement in orthophosphate measurement is to assess the dissolved or bio-available form of orthophosphorus (*i.e.,* that which passes through a 0.45-micron filter), hence the requirement to filter the sample immediately upon collection (*i.e.,* within 15 minutes of collection).

[38 FR 28758, Oct. 16, 1973]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 136.3, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.fdsys.gov*.

§ 136.4 Application for and approval of alternate test procedures for nationwide use.

(a) A written application for review of an alternate test procedure (alternate method) for nationwide use may be made by letter via email or by hard copy in triplicate to the National Alternate Test Procedure (ATP) Program Coordinator (National Coordinator), Office of Science and Technology (4303T), Office of Water, U.S. Environmental Protection Agency, 1200 Pennsylvania Ave. NW., Washington, DC 20460. Any application for an alternate test procedure (ATP) under this paragraph (a) shall:

(1) Provide the name and address of the responsible person or firm making the application.

(2) Identify the pollutant(s) or parameter(s) for which nationwide approval of an alternate test procedure is being requested.

(3) Provide a detailed description of the proposed alternate test procedure, together with references to published or other studies confirming the general applicability of the alternate test procedure for the analysis of the pollutant(s) or parameter(s) in wastewater discharges from representative and specified industrial or other categories.

(4) Provide comparability data for the performance of the proposed alternative test procedure compared to the performance of the reference method.

(b) The National Coordinator may request additional information and analyses from the applicant in order to determine whether the alternate test procedure satisfies the applicable requirements of this part.

(c) *Approval for nationwide use.* (1) After a review of the application and any additional analyses requested from the applicant, the National Coordinator will notify the applicant, in writing, of acceptance or rejection of the alternate test procedure for nationwide use in CWA programs. If the application is not approved, the National Coordinator will specify what additional information might lead to a reconsideration of the application, and notify the Regional Alternate Test Procedure Coordinators of such rejection. Based on the National Coordinator's rejection of a proposed alternate test procedure and an assessment of any approvals for limited uses for the unapproved method, the Regional ATP Coordinator or permitting authority may decide to withdraw approval of the method for limited use in the Region.

(2) Where the National Coordinator approved an applicant's request for nationwide use of an alternate test procedure, the National Coordinator will notify the applicant that the National Coordinator will recommend rulemaking to approve the alternate test procedure. The National Coordinator will notify the Regional ATP Coordinator or permitting authorities that they may consider approval of this alternate test procedure for limited use in their Regions based on the information and data provided in the applicant's application. The Regional ATP Coordinator or permitting authority will grant approval on a case-by-case basis prior to use of the alternate test procedure for compliance analyses until the alternate test procedure is approved by publication in a final rule in the FEDERAL REGISTER.

(3) EPA will propose to amend 40 CFR part 136 to include the alternate test procedure in § 136.3. EPA shall make available for review all the factual bases for its proposal, including any performance data submitted by the applicant and any available EPA analysis of those data.

(4) Following public comment, EPA shall publish in the FEDERAL REGISTER a final decision on whether to amend 40 CFR part 136 to include the alternate test procedure as an approved analytical method.

(5) Whenever the National Coordinator has approved an applicant's request for nationwide use of an alternate test procedure, any person may request an approval of the method for

limited use under § 136.5 from the EPA Region.

[77 FR 29809, May 18, 2012]

§ 136.5 Approval of alternate test procedures for limited use.

(a) Any person may request the Regional Alternate Test Procedure (ATP) Coordinator or permitting authority to approve the use of an alternate test procedure in the Region.

(b) When the request for the use of an alternate test procedure concerns use in a State with an NPDES permit program approved pursuant to section 402 of the Act, the requestor shall first submit an application for limited use to the Director of the State agency having responsibility for issuance of NPDES permits within such State (*i.e.*, permitting authority). The Director will forward the application to the Regional ATP Coordinator or permitting authority with a recommendation for or against approval.

(c) Any application for approval of an alternate test procedure for limited use may be made by letter, email or by hard copy. The application shall include the following:

(1) Provide the name and address of the applicant and the applicable ID number of the existing or pending permit and issuing agency for which use of the alternate test procedure is requested, and the discharge serial number.

(2) Identify the pollutant or parameter for which approval of an alternate test procedure is being requested.

(3) Provide justification for using testing procedures other than those specified in Tables IA through IH of § 136.3, or in the NPDES permit.

(4) Provide a detailed description of the proposed alternate test procedure, together with references to published studies of the applicability of the alternate test procedure to the effluents in question.

(5) Provide comparability data for the performance of the proposed alternate test procedure compared to the performance of the reference method.

(d) *Approval for limited use.* (1) After a review of the application by the Alternate Test Procedure Regional ATP Coordinator or permitting authority, the Regional ATP Coordinator or permitting authority notifies the applicant and the appropriate State agency of approval or rejection of the use of the alternate test procedure. The approval may be restricted to use only with respect to a specific discharge or facility (and its laboratory) or, at the discretion of the Regional ATP Coordinator or permitting authority, to all discharger or facilities (and their associated laboratories) specified in the approval for the Region. If the application is not approved, the Regional ATP Coordinator or permitting authority shall specify what additional information might lead to a reconsideration of the application.

(2) The Regional ATP Coordinator or permitting authority will forward a copy of every approval and rejection notification to the National Alternate Test Procedure Coordinator.

[77 FR 29809, May 18, 2012]

§ 136.6 Method modifications and analytical requirements.

(a) *Definitions of terms used in this section*—(1) *Analyst* means the person or laboratory using a test procedure (analytical method) in this part.

(2) *Chemistry of the method* means the reagents and reactions used in a test procedure that allow determination of the analyte(s) of interest in an environmental sample.

(3) *Determinative technique* means the way in which an analyte is identified and quantified (e.g., colorimetry, mass spectrometry).

(4) *Equivalent performance* means that the modified method produces results that meet or exceed the QC acceptance criteria of the approved method.

(5) *Method-defined analyte* means an analyte defined solely by the method used to determine the analyte. Such an analyte may be a physical parameter, a parameter that is not a specific chemical, or a parameter that may be comprised of a number of substances. Examples of such analytes include temperature, oil and grease, total suspended solids, total phenolics, turbidity, chemical oxygen demand, and biochemical oxygen demand.

(6) *QC* means ''quality control.''

(b) *Method modifications.* (1) If the underlying chemistry and determinative

technique in a modified method are essentially the same as an approved part 136 method, then the modified method is an equivalent and acceptable alternative to the approved method provided the requirements of this section are met. However, those who develop or use a modification to an approved (part 136) method must document that the performance of the modified method, in the matrix to which the modified method will be applied, is equivalent to the performance of the approved method. If such a demonstration cannot be made and documented, then the modified method is not an acceptable alternative to the approved method. Supporting documentation must, if applicable, include the routine initial demonstration of capability and ongoing QC including determination of precision and accuracy, detection limits, and matrix spike recoveries. Initial demonstration of capability typically includes analysis of four replicates of a mid-level standard and a method detection limit study. Ongoing quality control typically includes method blanks, mid-level laboratory control samples, and matrix spikes (QC is as specified in the method). The method is considered equivalent if the quality control requirements in the reference method are achieved. The method user's Standard Operating Procedure (SOP) must clearly document the modifications made to the reference method. Examples of allowed method modifications are listed in this section. The user must notify their permitting authority of the intent to use a modified method. Such notification should be of the form ''Method xxx has been modified within the flexibility allowed in 40 CFR 136.6.'' The user may indicate the specific paragraph of §136.6 allowing the method modification. However, specific details of the modification need not be provided, but must be documented in the Standard Operating Procedure (SOP). If the method user is uncertain whether a method modification is allowed, the Regional ATP Coordinator or permitting authority should be contacted for approval *prior* to implementing the modification. The method user should also complete necessary performance checks to verify that acceptable performance is achieved with the method modification *prior* to analyses of compliance samples.

(2) *Requirements*. The modified method must be sufficiently sensitive and meet or exceed performance of the approved method(s) for the analyte(s) of interest, as documented by meeting the initial and ongoing quality control requirements in the method.

(i) *Requirements for establishing equivalent performance*. If the approved method contains QC tests and QC acceptance criteria, the modified method must use these QC tests and the modified method must meet the QC acceptance criteria with the following conditions:

(A) The analyst may only rely on QC tests and QC acceptance criteria in a method if it includes wastewater matrix QC tests and QC acceptance criteria (e.g., matrix spikes) and both initial (start-up) and ongoing QC tests and QC acceptance criteria.

(B) If the approved method does not contain QC tests and QC acceptance criteria or if the QC tests and QC acceptance criteria in the method do not meet the requirements of this section, then the analyst must employ QC tests published in the ''equivalent'' of a Part 136 method that has such QC, or the essential QC requirements specified at 136.7, as applicable. If the approved method is from a compendium or VCSB and the QA/QC requirements are published in other parts of that organization's compendium rather than within the Part 136 method then that part of the organization's compendium must be used for the QC tests.

(C) In addition, the analyst must perform ongoing QC tests, including assessment of performance of the modified method on the sample matrix (e.g., analysis of a matrix spike/matrix spike duplicate pair for every twenty samples), and analysis of an ongoing precision and recovery sample (e.g., laboratory fortified blank or blank spike) and a blank with each batch of 20 or fewer samples.

(D) If the performance of the modified method in the wastewater matrix or reagent water does not meet or exceed the QC acceptance criteria, the method modification may not be used.

(ii) *Requirements for documentation.* The modified method must be documented in a method write-up or an addendum that describes the modification(s) to the approved method prior to the use of the method for compliance purposes. The write-up or addendum must include a reference number (e.g., method number), revision number, and revision date so that it may be referenced accurately. In addition, the organization that uses the modified method must document the results of QC tests and keep these records, along with a copy of the method write-up or addendum, for review by an auditor.

(3) *Restrictions.* An analyst may not modify an approved Clean Water Act analytical method for a method-defined analyte. In addition, an analyst may not modify an approved method if the modification would result in measurement of a different form or species of an analyte. Changes in method procedures are not allowed if such changes would alter the defined chemistry (*i.e.,* method principle) of the unmodified method. For example, phenol method 420.1 or 420.4 defines phenolics as ferric iron oxidized compounds that react with 4-aminoantipyrine (4-AAP) at pH 10 after being distilled from acid solution. Because total phenolics represents a group of compounds that all react at different efficiencies with 4-AAP, changing test conditions likely would change the behavior of these different phenolic compounds. An analyst may not modify any sample collection, preservation, or holding time requirements of an approved method. Such modifications to sample collection, preservation, and holding time requirements do not fall within the scope of the flexibility allowed at § 136.6. Method flexibility refers to modifications of the analytical procedures used for identification and measurement of the analyte only and does not apply to sample collection, preservation, or holding time procedures, which may only be modified as specified in § 136.3(e).

(4) *Allowable changes.* Except as noted under paragraph (b)(3) of this section, an analyst may modify an approved test procedure (analytical method) provided that the underlying reactions and principles used in the approved method remain essentially the same, and provided that the requirements of this section are met. If equal or better performance can be obtained with an alternative reagent, then it is allowed. A laboratory wishing to use these modifications must demonstrate acceptable method performance by performing and documenting all applicable initial demonstration of capability and ongoing QC tests and meeting all applicable QC acceptance criteria as described in § 136.7. Some examples of the allowed types of changes, provided the requirements of this section are met include:

(i) Changes between manual method, flow analyzer, and discrete instrumentation.

(ii) Changes in chromatographic columns or temperature programs.

(iii) Changes between automated and manual sample preparation, such as digestions, distillations, and extractions; in-line sample preparation is an acceptable form of automated sample preparation for CWA methods.

(iv) In general, ICP–MS is a sensitive and selective detector for metal analysis; however isobaric interference can cause problems for quantitative determination, as well as identification based on the isotope pattern. Interference reduction technologies, such as collision cells or reaction cells, are designed to reduce the effect of spectroscopic interferences that may bias results for the element of interest. The use of interference reduction technologies is allowed, provided the method performance specifications relevant to ICP–MS measurements are met.

(v) The use of EPA Method 200.2 or the sample preparation steps from EPA Method 1638, including the use of closed-vessel digestion, is allowed for EPA Method 200.8, provided the method performance specifications relevant to the ICP–MS are met.

(vi) Changes in pH adjustment reagents. Changes in compounds used to adjust pH are acceptable as long as they do not produce interference. For example, using a different acid to adjust pH in colorimetric methods.

(vii) Changes in buffer reagents are acceptable provided that the changes do not produce interferences.

(viii) Changes in the order of reagent addition are acceptable provided that the change does not alter the chemistry and does not produce an interference. For example, using the same reagents, but adding them in different order, or preparing them in combined or separate solutions (so they can be added separately), is allowed, provided reagent stability or method performance is equivalent or improved.

(ix) Changes in calibration range (provided that the modified range covers any relevant regulatory limit and the method performance specifications for calibration are met).

(x) Changes in calibration model. (A) Linear calibration models do not adequately fit calibration data with one or two inflection points. For example, vendor-supplied data acquisition and processing software on some instruments may provide quadratic fitting functions to handle such situations. If the calibration data for a particular analytical method routinely display quadratic character, using quadratic fitting functions may be acceptable. In such cases, the minimum number of calibrators for second order fits should be six, and in no case should concentrations be extrapolated for instrument responses that exceed that of the most concentrated calibrator. Examples of methods with nonlinear calibration functions include chloride by SM4500–Cl–E–1997, hardness by EPA Method 130.1, cyanide by ASTM D6888 or OIA1677, Kjeldahl nitrogen by PAI–DK03, and anions by EPA Method 300.0.

(B) As an alternative to using the average response factor, the quality of the calibration may be evaluated using the Relative Standard Error (RSE). The acceptance criterion for the RSE is the same as the acceptance criterion for Relative Standard Deviation (RSD), in the method. RSE is calculated as:

$$\%\,RSE = 100 x \sqrt{\frac{\sum_{i=1}^{n}\left[\frac{x_i' - x_i}{x_i}\right]^2}{(n-p)}}$$

Where:

x'_i = Calculated concentration at level i

x_i = Actual concentration of the calibration level i

n = Number of calibration points

p = Number of terms in the fitting equation (average = 1, linear = 2, quadratic = 3)

(C) Using the RSE as a metric has the added advantage of allowing the same numerical standard to be applied to the calibration model, regardless of the form of the model. Thus, if a method states that the RSD should be ≤20% for the traditional linear model through the origin, then the RSE acceptance limit can remain ≤20% as well. Similarly, if a method provides an RSD acceptance limit of ≤15%, then that same figure can be used as the acceptance limit for the RSE. The RSE may be used as an alternative to correlation coefficients and coefficients of determination for evaluating calibration curves for any of the methods at part 136. If the method includes a numerical criterion for the RSD, then the same numerical value is used for the RSE. Some older methods do not include any criterion for the calibration curve—for these methods, if RSE is used the value should be ≤20%. Note that the use of the RSE is included as an alternative to the use of the correlation coefficient as a measure of the suitability of a calibration curve. It is not necessary to evaluate both the RSE and the correlation coefficient.

(xi) Changes in equipment such as equipment from a vendor different from the one specified in the method.

(xii) The use of micro or midi distillation apparatus in place of macro distillation apparatus.

(xiii) The use of prepackaged reagents.

(xiv) The use of digital titrators and methods where the underlying chemistry used for the determination is similar to that used in the approved method.

(xv) Use of selected ion monitoring (SIM) mode for analytes that cannot be effectively analyzed in full-scan mode and reach the required sensitivity. False positives are more of a concern when using SIM analysis, so at a minimum, one quantitation and two qualifying ions must be monitored for each analyte (unless fewer than three ions with intensity greater than 15% of the base peak are available). The ratio of each of the two qualifying ions to the quantitation ion must be evaluated and should agree with the ratio observed in an authentic standard within ±20 percent. Analyst judgment must be applied to the evaluation of ion ratios because the ratios can be affected by coeluting compounds present in the sample matrix. The signal-to-noise ratio of the least sensitive ion should be at least 3:1. Retention time in the sample should match within 0.05 minute of an authentic standard analyzed under identical conditions. Matrix interferences can cause minor shifts in retention time and may be evident as shifts in the retention times of the internal standards. The total scan time should be such that a minimum of eight scans are obtained per chromatographic peak.

(xvi) Changes are allowed in purge-and-trap sample volumes or operating conditions. Some examples are:

(A) Changes in purge time and purge-gas flow rate. A change in purge time and purge-gas flow rate is allowed provided that sufficient total purge volume is used to achieve the required minimum detectible concentration and calibration range for all compounds. In general, a purge rate in the range 20–200 mL/min and a total purge volume in the range 240–880 mL are recommended.

(B) Use of nitrogen or helium as a purge gas, provided that the required sensitivities for all compounds are met.

(C) Sample temperature during the purge state. Gentle heating of the sample during purging (e.g., 40 °C) increases purging efficiency of hydrophilic compounds and may improve sample-to-sample repeatability because all samples are purged under precisely the same conditions.

(D) Trap sorbent. Any trap design is acceptable, provided that the data acquired meet all QC criteria.

(E) Changes to the desorb time. Shortening the desorb time (e.g., from4 minutes to 1 minute) may not affect compound recoveries, and can shorten overall cycle time and significantly reduce the amount of water introduced to the analytical system, thus improving the precision of analysis, especially for water-soluble analytes. A desorb time of four minutes is recommended, however a shorter desorb time may be used, provided that all QC specifications in the method are met.

(F) Use of water management techniques is allowed. Water is always collected on the trap along with the analytes and is a significant interference for analytical systems (GC and GC/MS). Modern water management techniques (e.g., dry purge or condensation points) can remove moisture from the sample stream and improve analytical performance.

(xvii) The following modifications are allowable when performing EPA Method 625: The base/neutral and acid fractions may be added together and analyzed as one extract, provided that the analytes can be reliably identified and quantified in the combined extracts; the pH extraction sequence may be reversed to better separate acid and neutral components; neutral components may be extracted with either acid or base components; a smaller sample volume may be used to minimize matrix interferences provided matrix interferences are demonstrated and documented; alternative surrogate and internal standard concentrations other than those specified in the method are acceptable, provided that method performance is not degraded; an alternative concentration range may be used for the calibration other than the range specified in the method; the solvent for the calibration standards may be changed to match the solvent of the final sample extract.

(xviii) If the characteristics of a wastewater matrix prevent efficient recovery of organic pollutants and prevent the method from meeting QC requirements, the analyst may attempt to resolve the issue by adding salts to the sample, provided that such salts do not react with or introduce the target pollutant into the sample (as evidenced by the analysis of method blanks, laboratory control samples, and spiked samples that also contain such salts), and that all requirements of paragraph (b)(2) of this section are met. Samples having residual chlorine or other halogen must be dechlorinated prior to the addition of such salts.

(xix) If the characteristics of a wastewater matrix result in poor sample dispersion or reagent deposition on equipment and prevent the analyst from meeting QC requirements, the analyst may attempt to resolve the issue by adding a inert surfactant that does not affect the chemistry of the method, such as Brij-35 or sodium dodecyl sulfate (SDS), provided that such surfactant does not react with or introduce the target pollutant into the sample (as evidenced by the analysis of method blanks, laboratory control samples, and spiked samples that also contain such surfactant) and that all requirements of paragraph (b)(1) and (b)(2) of this section are met. Samples having residual chlorine or other halogen must be dechlorinated prior to the addition of such surfactant.

(xx) The use of gas diffusion (using pH change to convert the analyte to gaseous form and/or heat to separate an analyte contained in steam from the sample matrix) across a hydrophobic semi-permeable membrane to separate the analyte of interest from the sample matrix may be used in place of manual or automated distillation in methods for analysis such as ammonia, total cyanide, total Kjeldahl nitrogen, and total phenols. These procedures do not replace the digestion procedures specified in the approved methods and must be used in conjunction with those procedures.

(xxi) Changes in equipment operating parameters such as the monitoring wavelength of a colorimeter or the reaction time and temperature as needed to achieve the chemical reactions defined in the unmodified CWA method. For example, molybdenum blue phosphate methods have two absorbance maxima, one at about 660 nm and another at about 880 nm. The former is about 2.5 times less sensitive than the latter. Wavelength choice provides a cost-effective, dilution-free means to increase sensitivity of molybdenum blue phosphate methods.

(xxii) Interchange of oxidants, such as the use of titanium oxide in UV-assisted automated digestion of TOC and total phosphorus, as long as complete oxidation can be demonstrated.

(xxii) Use of an axially viewed torch with Method 200.7.

[77 FR 29810, May 18, 2012]

EDITORIAL NOTE: At 77 FR 29810, May 18, 2012, § 136.6 was revised to include two paragraphs designated (b)(4)(xxii).

§ 136.7 Quality assurance and quality control.

The permittee/laboratory shall use suitable QA/QC procedures when conducting compliance analyses with any part 136 chemical method or an alternative method specified by the permitting authority. These QA/QC procedures are generally included in the analytical method or may be part of the methods compendium for approved Part 136 methods from a consensus organization. For example, Standard Methods contains QA/QC procedures in the Part 1000 section of the Standard Methods Compendium. The permittee/laboratory shall follow these QA/QC procedures, as described in the method or methods compendium. If the method lacks QA/QC procedures, the permittee/laboratory has the following options to comply with the QA/QC requirements:

(a) Refer to and follow the QA/QC published in the ''equivalent'' EPA method for that parameter that has such QA/QC procedures;

(b) Refer to the appropriate QA/QC section(s) of an approved part 136 method from a consensus organization compendium;

(c)(1) Incorporate the following twelve quality control elements, where applicable, into the laboratory's documented standard operating procedure (SOP) for performing compliance analyses when using an approved part 136 method when the method lacks such

QA/QC procedures. One or more of the twelve QC elements may not apply to a given method and may be omitted if a written rationale is provided indicating why the element(s) is/are inappropriate for a specific method.

(i) Demonstration of Capability (DOC);

(ii) Method Detection Limit (MDL);

(iii) Laboratory reagent blank (LRB), also referred to as method blank (MB);

(iv) Laboratory fortified blank (LFB), also referred to as a spiked blank, or laboratory control sample (LCS);

(v) Matrix spike (MS) and matrix spike duplicate (MSD), or laboratory fortified matrix (LFM) and LFM duplicate, may be used for suspected matrix interference problems to assess precision;

(vi) Internal standards (for GC/MS analyses), surrogate standards (for organic analysis) or tracers (for radiochemistry);

(vii) Calibration (initial and continuing), also referred to as initial calibration verification (ICV) and continuing calibration verification (CCV);

(viii) Control charts (or other trend analyses of quality control results);

(ix) Corrective action (root cause analysis);

(x) QC acceptance criteria;

(xi) Definitions of preparation and analytical batches that may drive QC frequencies; and

(xii) Minimum frequency for conducting all QC elements.

(2) These twelve quality control elements must be clearly documented in the written standard operating procedure for each analytical method not containing QA/QC procedures, where applicable.

[77 FR 29813, May 18, 2012]

APPENDIX A TO PART 136—METHODS FOR ORGANIC CHEMICAL ANALYSIS OF MUNICIPAL AND INDUSTRIAL WASTEWATER

METHOD 601—PURGEABLE HALOCARBONS

1. Scope and Application

1.1 This method covers the determination of 29 purgeable halocarbons.

The following parameters may be determined by this method:

Parameter	STORET No.	CAS No.
Bromodichloromethane	32101	75–27–4
Bromoform	32104	75–25–2
Bromomethane	34413	74–83–9
Carbon tetrachloride	32102	56–23–5
Chlorobenzene	34301	108–90–7
Chloroethane	34311	75–00–3
2-Chloroethylvinyl ether	34576	100–75–8
Chloroform	32106	67–66–3
Chloromethane	34418	74–87–3
Dibromochloromethane	32105	124–48–1
1,2-Dichlorobenzene	34536	95–50–1
1,3-Dichlorobenzene	34566	541–73–1
1,4-Dichlorobenzene	34571	106–46–7
Dichlorodifluoromethane	34668	75–71–8
1,1-Dichloroethane	34496	75–34–3
1,2-Dichloroethane	34531	107–06–2
1,1-Dichloroethane	34501	75–35–4
trans-1,2-Dichloroethene	34546	156–60–5
1,2-Dichloropropane	34541	78–87–5
cis-1,3-Dichloropropene	34704	10061–01–5
trans-1,3-Dichloropropene	34699	10061–02–6
Methylene chloride	34423	75–09–2
1,1,2,2-Tetrachloroethane	34516	79–34–5
Tetrachloroethene	34475	127–18–4
1,1,1-Trichloroethane	34506	71–55–6
1,1,2-Trichloroethane	34511	79–00–5
Tetrachloroethene	39180	79–01–6
Trichlorofluoromethane	34488	75–69–4
Vinyl chloride	39715	75–01–4

1.2 This is a purge and trap gas chromatographic (GC) method applicable to the determination of the compounds listed above in municipal and industrial discharges as provided under 40 CFR 136.1. When this method is used to analyze unfamiliar samples for any or all of the compounds above, compound identifications should be supported by at least one additional qualitative technique. This method describes analytical conditions for a second gas chromatographic column that can be used to confirm measurements made with the primary column. Method 624 provides gas chromatograph/mass spectrometer (GC/MS) conditions appropriate for the qualitative and quantitative confirmation of results for most of the parameters listed above.

1.3 The method detection limit (MDL, defined in Section 12.1)[1] for each parameter is listed in Table 1. The MDL for a specific wastewater may differ from those listed, depending upon the nature of interferences in the sample matrix.

1.4 Any modification of this method, beyond those expressly permitted, shall be considered as a major modification subject to application and approval of alternate test procedures under 40 CFR 136.4 and 136.5.

1.5 This method is restricted to use by or under the supervision of analysts experienced in the operation of a purge and trap system and a gas chromatograph and in the interpretation of gas chromatograms. Each analyst must demonstrate the ability to generate acceptable results with this method using the procedure described in Section 8.2.

WAC 173-201A-240

Toxic substances.

(1) Toxic substances shall not be introduced above natural background levels in waters of the state which have the potential either singularly or cumulatively to adversely affect characteristic water uses, cause acute or chronic toxicity to the most sensitive biota dependent upon those waters, or adversely affect public health, as determined by the department.

(2) The department shall employ or require chemical testing, acute and chronic toxicity testing, and biological assessments, as appropriate, to evaluate compliance with subsection (1) of this section and to ensure that aquatic communities and the existing and designated uses of waters are being fully protected.

(3) USEPA Quality Criteria for Water, 1986, as revised, shall be used in the use and interpretation of the values listed in subsection (5) of this section.

(4) Concentrations of toxic, and other substances with toxic propensities not listed in Table 240 of this section shall be determined in consideration of USEPA Quality Criteria for Water, 1986, and as revised, and other relevant information as appropriate.

(5) The following criteria, found in Table 240, shall be applied to all surface waters of the state of Washington. Values are µg/L for all substances except ammonia and chloride which are mg/L, and asbestos which is million fibers/L. The department shall formally adopt any appropriate revised criteria as part of this chapter in accordance with the provisions established in chapter **34.05** RCW, the Administrative Procedure Act. The department shall ensure there are early opportunities for public review and comment on proposals to develop revised criteria.

(a) **Aquatic life protection**. The department may revise the criteria in Table 240 for aquatic life on a statewide or water body-specific basis as needed to protect aquatic life occurring in waters of the state and to increase the technical accuracy of the criteria being applied. The department shall formally adopt any appropriate revised criteria as part of this chapter in accordance with the provisions established in chapter **34.05** RCW, the Administrative Procedure Act.

(b) **Human health protection.** The following provisions apply to the human health criteria in Table 240. All waters shall maintain a level of water quality when entering downstream waters that provides for the attainment and maintenance of the water quality standards of those downstream waters, including the waters of another state. The human health criteria in the tables were calculated using a fish consumption rate of 175 g/day. Criteria for carcinogenic substances were calculated using a cancer risk level equal to one-in-one-million, or as otherwise specified in this chapter. The human health criteria calculations and variables include chronic durations of exposure up to seventy years. All human health criteria for metals are for total metal concentrations, unless otherwise noted. Dischargers have the obligation to reduce toxics in discharges through the use of AKART.

Table 240
Toxics Substances Criteria

Compound/Chemical	Chemical Abstracts Service (CAS)#	Category	Aquatic Life Criteria - Freshwater		Aquatic Life Criteria - Marine Water		Human Health Criteria for Consumption of:	
			Acute	Chronic	Acute	Chronic	Water & Organisms	Organisms Only
Metals:								
Antimony	7440360	Metals, cyanide, and total phenols	-	-	-	-	12	180
Arsenic	7440382	Metals, cyanide, and total phenols	360.0 (c,dd)	190.0 (d,dd)	69.0 (c,ll,dd)	36.0 (d,cc,ll,dd)	10 (A)	10 (A)
Asbestos	1332214	Toxic pollutants and hazardous substances	-	-	-	-	7,000,000 fibers/L (C)	-
Beryllium	7440417	Metals, cyanide, and total phenols	-	-	-	-	-	-
Cadmium	7440439	Metals, cyanide, and total phenols	(i,c,dd)	(j,d,dd)	42.0 (c,dd)	9.3 (d,dd)	-	-
Chromium (III)	16065831	Metals, cyanide, and total phenols	(m,c,gg)	(n,d,gg)	-	-	-	-
Chromium (VI)	18540299	Metals, cyanide, and total phenols	15.0 (c,l,ii,dd)	10.0 (d,jj,dd)	1,100.0 (c,l,ll,dd)	50.0 (d,ll,dd)	-	-
Copper	7440508	Metals, cyanide, and total phenols	(o,c,dd)	(p,d,dd)	4.8 (c,ll,dd)	3.1 (d,ll,dd)	1,300 (C)	-

Compound/Chemical	Chemical Abstracts Service (CAS)#	Category	Aquatic Life Criteria - Freshwater		Aquatic Life Criteria - Marine Water		Human Health Criteria for Consumption of:	
			Acute	Chronic	Acute	Chronic	Water & Organisms	Organisms Only
Lead	7439921	Metals, cyanide, and total phenols	(q,c,dd)	(r,d,dd)	210.0 (c,ll,dd)	8.1 (d,ll,dd)	-	-
Mercury	7439976	Metals, cyanide, and total phenols	2.1 (c,kk,dd)	0.012 (d,ff,s)	1.8 (c,ll,dd)	0.025 (d,ff,s)	(G)	(G)
Methylmercury	22967926	Nonconventional	-	-	-	-	-	-
Nickel	7440020	Metals, cyanide, and total phenols	(t,c,dd)	(u,d,dd)	74.0 (c,ll,dd)	8.2 (d,ll,dd)	150	190
Selenium	7782492	Metals, cyanide, and total phenols	20.0 (c,ff)	5.0 (d,ff)	290 (c,ll,dd)	71.0 (d,x,ll,dd)	120	480
Silver	7440224	Metals, cyanide, and total phenols	(y,a,dd)	-	1.9 (a,ll,dd)	-	-	-
Thallium	7440280	Metals, cyanide, and total phenols	-	-	-	-	0.24	0.27
Zinc	7440666	Metals, cyanide, and total phenols	(aa,c,dd)	(bb,d,dd)	90.0 (c,ll,dd)	81.0 (d,ll,dd)	2,300	2,900
Other chemicals:								
1,1,1-Trichloroethane	71556	Volatile	-	-	-	-	47,000	160,000
1,1,2,2-Tetrachloroethane	79345	Volatile	-	-	-	-	0.12 (B)	0.46 (B)
1,1,2-Trichloroethane	79005	Volatile	-	-	-	-	0.44 (B)	1.8 (B)
1,1-Dichloroethane	75343	Volatile	-	-	-	-	-	-
1,1-Dichloroethylene	75354	Volatile	-	-	-	-	1200	4100
1,2,4-Trichlorobenzene	120821	Base/neutral compounds	-	-	-	-	0.12 (B)	0.14 (B)
1,2-Dichlorobenzene	95501	Volatile	-	-	-	-	2000	2500
1,2-Dichloroethane	107062	Volatile	-	-	-	-	9.3 (B)	120 (B)
1,2-Dichloropropane	78875	Volatile	-	-	-	-	0.71 (B)	3.1 (B)
1,3-Dichloropropene	542756	Volatile	-	-	-	-	0.24 (B)	2 (B)
1,2-Diphenylhydrazine	122667	Base/neutral compounds	-	-	-	-	0.015 (B)	0.023 (B)
1,2-Trans-Dichloroethylene	156605	Volatile	-	-	-	-	600	5,800
1,3-Dichlorobenzene	541731	Volatile	-	-	-	-	13	16
1,4-Dichlorobenzene	106467	Volatile	-	-	-	-	460	580
2,3,7,8-TCDD (Dioxin)	1746016	Dioxin	-	-	-	-	0.000000064	0.000000064
2,4,6-Trichlorophenol	88062	Acid compounds	-	-	-	-	0.25 (B)	0.28 (B)
2,4-Dichlorophenol	120832	Acid compounds	-	-	-	-	25	34
2,4-Dimethylphenol	105679	Acid compounds	-	-	-	-	85	97
2,4-Dinitrophenol	51285	Acid compounds	-	-	-	-	60	610
2,4-Dinitrotoluene	121142	Base/neutral compounds	-	-	-	-	0.039 (B)	0.18 (B)

Compound/Chemical	Chemical Abstracts Service (CAS)#	Category	Aquatic Life Criteria - Freshwater		Aquatic Life Criteria - Marine Water		Human Health Criteria for Consumption of:	
			Acute	Chronic	Acute	Chronic	Water & Organisms	Organisms Only
2,6-Dinitrotoluene	606202	Base/neutral compounds	-	-	-	-	-	-
2-Chloroethyvinyl Ether	110758	Volatile	-	-	-	-	-	-
2-Chloronaphthalene	91587	Base/neutral compounds	-	-	-	-	170	180
2-Chlorophenol	95578	Acid compounds	-	-	-	-	15	17
2-Methyl-4,6-Dinitrophenol (4,6-dinitro-o-cresol)	534521	Acid compounds	-	-	-	-	7.1	25
2-Nitrophenol	88755	Acid compounds	-	-	-	-	-	-
3,3'-Dichlorobenzidine	91941	Base/neutral compounds	-	-	-	-	0.0031 (B)	0.0033 (B)
3-Methyl-4-Chlorophenol (parachlorometa cresol)	59507	Acid compounds	-	-	-	-	36	36
4,4'-DDD	72548	Pesticides/PCBs	-	-	-	-	0.000036 (B)	0.000036 (B)
4,4'-DDE	72559	Pesticides/PCBs	-	-	-	-	0.000051 (B)	0.000051 (B)
4,4'-DDT	50293	Pesticides/PCBs	-	-	-	-	0.000025 (B)	0.000025 (B)
4,4'-DDT(and metabolites)		Pesticides/PCBs	1.1 (a)	0.001 (b)	0.13 (a)	0.001 (b)	-	-
4-Bromophenyl Phenyl Ether	101553	Base/neutral compounds	-	-	-	-	-	-
4-Chorophenyl Phenyl Ether	7005723	Base/neutral compounds	-	-	-	-	-	-
4-Nitrophenol	100027	Acid compounds	-	-	-	-	-	-
Acenaphthene	83329	Base/neutral compounds	-	-	-	-	110	110
Acenaphthylene	208968	Base/neutral compounds	-	-	-	-	-	-
Acrolein	107028	Volatile	-	-	-	-	1.0	1.1
Acrylonitrile	107131	Volatile	-	-	-	-	0.019 (B)	0.028 (B)
Aldrin	309002	Pesticides/PCBs	2.5 (a,e)	0.0019 (b,e)	0.71 (a,e)	0.0019 (b,e)	0.0000057 (B)	0.0000058 (B)
alpha-BHC	319846	Pesticides/PCBs	-	-	-	-	0.0005 (B)	0.00056 (B)
alpha-Endosulfan	959988	Pesticides/PCBs	-	-	-	-	9.7	10
Anthracene	120127	Base/neutral compounds	-	-	-	-	3,100	4,600
Benzene	71432	Volatile	-	-	-	-	0.44 (B)	1.6 (B)
Benzidine	92875	Base/neutral compounds	-	-	-	-	0.00002 (B)	0.000023 (B)
Benzo(a) Anthracene	56553	Base/neutral compounds	-	-	-	-	0.014 (B)	0.021 (B)
Benzo(a) Pyrene	50328	Base/neutral compounds	-	-	-	-	0.0014 (B)	0.0021 (B)
Benzo(b) Fluoranthene	205992	Base/neutral compounds	-	-	-	-	0.014 (B)	0.021 (B)
Benzo(ghi) Perylene	191242	Base/neutral compounds	-	-	-	-	-	-

Compound/Chemical	Chemical Abstracts Service (CAS)#	Category	Aquatic Life Criteria - Freshwater		Aquatic Life Criteria - Marine Water		Human Health Criteria for Consumption of:	
			Acute	Chronic	Acute	Chronic	Water & Organisms	Organisms Only
Benzo(k) Fluoranthene	207089	Base/neutral compounds	-	-	-	-	0.014 (B)	0.21 (B)
beta-BHC	319857	Pesticides/PCBs	-	-	-	-	0.0018 (B)	0.002 (B)
beta-Endosulfan	33213659	Pesticides/PCBs	-	-	-	-	9.7	10
Bis(2-Chloroethoxy) Methane	111911	Base/neutral compounds	-	-	-	-	-	-
Bis(2-Chloroethyl) Ether	111444	Base/neutral compounds	-	-	-	-	0.02 (B)	0.06 (B)
Bis(2-Chloroisopropyl) Ether	39638329	Base/neutral compounds	-	-	-	-	-	-
Bis(2-Ethylhexyl) Phthalate	117817	Base/neutral compounds	-	-	-	-	0.23 (B)	0.25 (B)
Bromoform	75252	Volatile	-	-	-	-	5.8 (B)	27 (B)
Butylbenzyl Phthalate	85687	Base/neutral compounds	-	-	-	-	0.56 (B)	0.58 (B)
Carbon Tetrachloride	56235	Volatile	-	-	-	-	0.2 (B)	0.35 (B)
Chlordane	57749	Pesticides/PCBs	2.4 (a)	0.0043 (b)	0.09 (a)	0.004 (b)	0.000093 (B)	0.000093 (B)
Chlorobenzene	108907	Volatile	-	-	-	-	380	890
Chlorodibromomethane	124481	Volatile	-	-	-	-	0.65 (B)	3 (B)
Chloroethane	75003	Volatile	-	-	-	-	-	-
Chloroform	67663	Volatile	-	-	-	-	260	1200
Chrysene	218019	Base/neutral compounds	-	-	-	-	1.4 (B)	2.1 (B)
Cyanide	57125	Metals, cyanide, and total phenols	22.0 (c,ee)	5.2 (d,ee)	1.0 (c,mm,ee)	(d,mm,ee)	19 (D)	270 (D)
delta-BHC	319868	Pesticides/PCBs	-	-	-	-	-	-
Dibenzo(a,h) Anthracene	53703	Base/neutral compounds	-	-	-	-	0.0014 (B)	0.0021 (B)
Dichlorobromomethane	75274	Volatile	-	-	-	-	0.77 (B)	3.6 (B)
Dieldrin	60571	Pesticides/PCBs	2.5 (a,e)	0.0019 (b,e)	0.71 (a,e)	0.0019 (b,e)	0.0000061 (B)	0.0000061 (B)
Diethyl Phthalate	84662	Base/neutral compounds	-	-	-	-	4,200	5,000
Dimethyl Phthalate	131113	Base/neutral compounds	-	-	-	-	92,000	130,000
Di-n-Butyl Phthalate	84742	Base/neutral compounds	-	-	-	-	450	510
Di-n-Octyl Phthalate	117840	Base/neutral compounds	-	-	-	-	-	-
Endosulfan		Pesticides/PCBs	0.22 (a)	0.056 (b)	0.034 (a)	0.0087 (b)	-	-
Endosulfan Sulfate	1031078	Pesticides/PCBs	-	-	-	-	9.7	10
Endrin	72208	Pesticides/PCBs	0.18 (a)	0.0023 (b)	0.037 (a)	0.0023 (b)	0.034	0.035
Endrin Aldehyde	7421934	Pesticides/PCBs	-	-	-	-	0.034	0.035

Compound/Chemical	Chemical Abstracts Service (CAS)#	Category	Aquatic Life Criteria - Freshwater		Aquatic Life Criteria - Marine Water		Human Health Criteria for Consumption of:	
			Acute	Chronic	Acute	Chronic	Water & Organisms	Organisms Only
Ethylbenzene	100414	Volatile	-	-	-	-	200	270
Fluoranthene	206440	Base/neutral compounds	-	-	-	-	16	16
Fluorene	86737	Base/neutral compounds	-	-	-	-	420	610
Hexachlorocyclohexane (gamma-BHC; Lindane)	58899	Pesticides/PCBs	2.0 (a)	0.08 (b)	0.16 (a)	-	15	17
Heptachlor	76448	Pesticides/PCBs	0.52 (a)	0.0038 (b)	0.053 (a)	0.0036 (b)	0.0000099 (B)	0.00001 (B)
Heptachlor Epoxide	1024573	Pesticides/PCBs	-	-	-	-	0.0000074 (B)	0.0000074 (B)
Hexachlorobenzene	118741	Base/neutral compounds	-	-	-	-	0.000051 (B)	0.000052 (B)
Hexachlorobutadiene	87683	Base/neutral compounds	-	-	-	-	0.69 (B)	4.1 (B)
Hexachlorocyclopentadiene	77474	Base/neutral compounds	-	-	-	-	150	630
Hexachloroethane	67721	Base/neutral compounds	-	-	-	-	0.11 (B)	0.13 (B)
Indeno(1,2,3-cd) Pyrene	193395	Base/neutral compounds	-	-	-	-	0.014 (B)	0.021 (B)
Isophorone	78591	Base/neutral compounds	-	-	-	-	27 (B)	110 (B)
Methyl Bromide	74839	Volatile	-	-	-	-	520	2,400
Methyl Chloride	74873	Volatile	-	-	-	-	-	-
Methylene Chloride	75092	Volatile	-	-	-	-	16 (B)	250 (B)
Napthalene	91203	Base/neutral compounds	-	-	-	-	-	-
Nitrobenzene	98953	Base/neutral compounds	-	-	-	-	55	320
N-Nitrosodimethylamine	62759	Base/neutral compounds	-	-	-	-	0.00065 (B)	0.34 (B)
N-Nitrosodi-n-Propylamine	621647	Base/neutral compounds	-	-	-	-	0.0044 (B)	0.058 (B)
N-Nitrosodiphenylamine	86306	Base/neutral compounds	-	-	-	-	0.62 (B)	0.69 (B)
Pentachlorophenol (PCP)	87865	Acid compounds	(w,c)	(v,d)	13.0 (c)	7.9 (d)	0.046 (B)	0.1 (B)
Phenanthrene	85018	Base/neutral compounds	-	-	-	-	-	-
Phenol	108952	Acid compounds	-	-	-	-	18,000	200,000
Polychlorinated Biphenyls (PCBs)		Pesticides/PCBs	2.0 (b)	0.014 (b)	10.0 (b)	0.030 (b)	0.00017 (E)	0.00017 (E)
Pyrene	129000	Base/neutral compounds	-	-	-	-	310	460
Tetrachloroethylene	127184	Volatile	-	-	-	-	4.9 (B)	7.1 (B)
Toluene	108883	Volatile	-	-	-	-	180	410
Toxaphene	8001352	Pesticides/PCBs	0.73 (c,z)	0.0002 (d)	0.21 (c,z)	0.0002 (d)	0.000032 (B)	0.000032 (B)

Compound/Chemical	Chemical Abstracts Service (CAS)#	Category	Aquatic Life Criteria - Freshwater		Aquatic Life Criteria - Marine Water		Human Health Criteria for Consumption of:	
			Acute	Chronic	Acute	Chronic	Water & Organisms	Organisms Only
Trichloroethylene	79016	Volatile	-	-	-	-	0.38 (B)	0.86 (B)
Vinyl Chloride	75014	Volatile	-	-	-	-	0.02 (B, F)	0.26 (B, F)
Ammonia (hh)		Nonconventional	(f,c)	(g,d)	0.233 (h,c)	0.035 (h,d)	-	-
Chloride (dissolved) (k)		Nonconventional	860.0 (h,c)	230.0 (h,d)	-	-	-	-
Chlorine (total residual)		Nonconventional	19.0 (c)	11.0 (d)	13.0 (c)	7.5 (d)	-	-
Chlorpyrifos		Toxic pollutants and hazardous substances	0.083 (c)	0.041 (d)	0.011 (c)	0.0056 (d)	-	-
Parathion		Toxic pollutants and hazardous substances	0.065 (c)	0.013 (d)	-	-	-	-

Footnotes for aquatic life criteria in Table 240:

a. An instantaneous concentration not to be exceeded at any time.
b. A 24-hour average not to be exceeded.
c. A 1-hour average concentration not to be exceeded more than once every three years on the average.
d. A 4-day average concentration not to be exceeded more than once every three years on the average.
e. Aldrin is metabolically converted to Dieldrin. Therefore, the sum of the Aldrin and Dieldrin concentrations are compared with the Dieldrin criteria.
f. Shall not exceed the numerical value in total ammonia nitrogen (mg N/L) given by:

For salmonids present:

$$\frac{0.275}{1 + 10^{7.204-pH}} + \frac{39.0}{1 + 10^{pH-7.204}}$$

For salmonids absent:

$$\frac{0.411}{1 + 10^{7.204-pH}} + \frac{58.4}{1 + 10^{pH-7.204}}$$

g. Shall not exceed the numerical concentration calculated as follows:
Unionized ammonia concentration for waters where salmonid habitat is an existing or designated use:

$$0.80 \div (FT)(FPH)(RATIO)$$

where: RATIO = $13.5;\ 7.7 \le pH \le 9$

RATIO = $(20.25 \times 10^{(7.7-pH)}) \div (1 + 10^{(7.4-pH)});\ 6.5 \le pH \le 7.7$

FT = $1.4;\ 15 \le T \le 30$

FT = $10^{[0.03(20-T)]};\ 0 \le T \le 15$

FPH = $1;\ 8 \le pH \le 9$

FPH = $(1 + 10^{(7.4-pH)}) \div 1.25;\ 6.5 \le pH \le 8.0$

Total ammonia concentrations for waters where salmonid habitat is not an existing or designated use and other fish early life stages are absent:

$$Chronic\ Criterion = \left(\frac{0.0577}{1 + 10^{7.688-pH}} + \frac{2.487}{1 + 10^{pH-7.688}}\right) \times \left(1.45 \times 10^{0.028(25-A)}\right)$$

where: A = the greater of either T (temperature in degrees Celsius) or 7.

Applied as a thirty-day average concentration of total ammonia nitrogen (in mg N/L) not to be exceeded more than once every three years on average. The highest four-day average within the thirty-day period should not exceed 2.5 times the chronic criterion.

Total ammonia concentration for waters where salmonid habitat is not an existing or designated use and other fish early life stages are present:

$$Chronic\ Criterion = \left(\frac{0.0577}{1 + 10^{7.688-pH}} + \frac{2.487}{1 + 10^{pH-7.688}}\right) \times B$$

where: B = the lower of either 2.85, or $1.45 \times 10^{0.028 \times (25-T)}$. T = temperature in degrees Celsius.

Applied as a thirty-day average concentration of total ammonia nitrogen (in mg N/L) not to be exceeded more than once every three years on the average. The highest four-day average within the thirty-day period should not exceed 2.5 times the chronic criterion.

h. Measured in milligrams per liter rather than micrograms per liter.

i. ≤ (0.944)(e(1.128[ln(hardness)]-3.828)) at hardness = 100. Conversion factor (CF) of 0.944 is hardness dependent. CF is calculated for other hardnesses as follows: CF = 1.136672 - [(ln hardness)(0.041838)].

j. ≤ (0.909)(e(0.7852[ln(hardness)]-3.490)) at hardness = 100. Conversions factor (CF) of 0.909 is hardness dependent. CF is calculated for other hardnesses as follows: CF = 1.101672 - [(ln hardness)(0.041838)].

k. Criterion based on dissolved chloride in association with sodium. This criterion probably will not be adequately protective when the chloride is associated with potassium, calcium, or magnesium, rather than sodium.

l. Salinity dependent effects. At low salinity the 1-hour average may not be sufficiently protective.

m. $\leq (0.316)(e^{(0.8190[\ln(\text{hardness})] + 3.688)})$

n. $\leq (0.860)(e^{(0.8190[\ln(\text{hardness})] + 1.561)})$

o. $\leq (0.960)(e^{(0.9422[\ln(\text{hardness})] - 1.464)})$

p. $\leq (0.960)(e^{(0.8545[\ln(\text{hardness})] - 1.465)})$

q. $\leq (0.791)(e^{(1.273[\ln(\text{hardness})] - 1.460)})$ at hardness = 100. Conversion factor (CF) of 0.791 is hardness dependent. CF is calculated for other hardnesses as follows: CF = 1.46203 - [(ln hardness)(0.145712)].

r. $\leq (0.791)(e^{(1.273[\ln(\text{hardness})] - 4.705)})$ at hardness = 100. Conversion factor (CF) of 0.791 is hardness dependent. CF is calculated for other hardnesses as follows: CF = 1.46203 - [(ln hardness)(0.145712)].

s. If the four-day average chronic concentration is exceeded more than once in a three-year period, the edible portion of the consumed species should be analyzed. Said edible tissue concentrations shall not be allowed to exceed 1.0 mg/kg of methylmercury.

t. $\leq (0.998)(e^{(0.8460[\ln(\text{hardness})] + 3.3612)})$

u. $\leq (0.997)(e^{(0.8460[\ln(\text{hardness})] + 1.1645)})$

v. $\leq e^{[1.005(\text{pH}) - 5.290]}$

w. $\leq e^{[1.005(\text{pH}) - 4.830]}$

x. The status of the fish community should be monitored whenever the concentration of selenium exceeds 5.0 ug/ l in salt water.

y. $\leq (0.85)(e^{(1.72[\ln(\text{hardness})] - 6.52)})$

z. Channel Catfish may be more acutely sensitive.

aa. $\leq (0.978)(e^{(0.8473[\ln(\text{hardness})] + 0.8604)})$

bb. $\leq (0.986)(e^{(0.8473[\ln(\text{hardness})] + 0.7614)})$

cc. Nonlethal effects (growth, C-14 uptake, and chlorophyll production) to diatoms (*Thalassiosira aestivalis* and *Skeletonema costatum*) which are common to Washington's waters have been noted at levels below the established criteria. The importance of these effects to the diatom populations and the aquatic system is sufficiently in question to persuade the state to adopt the USEPA National Criteria value (36 µg/L) as the state threshold criteria, however, wherever practical the ambient concentrations should not be allowed to exceed a chronic marine concentration of 21 µg/L.

dd. These ambient criteria in the table are for the dissolved fraction. The cyanide criteria are based on the weak acid dissociable method. The metals criteria may not be used to calculate total recoverable effluent limits unless the seasonal partitioning of the dissolved to total metals in the ambient water are known. When this information is absent, these metals criteria shall be applied as total recoverable values, determined by back-calculation, using the conversion factors incorporated in the criterion equations. Metals criteria may be adjusted on a site-specific basis when data are made available to the department clearly demonstrating the effective use of the water effects ratio approach established by USEPA, as generally guided by the procedures in USEPA Water Quality Standards Handbook, December 1983, as supplemented or replaced by USEPA or ecology. Information which is used to develop effluent limits based on applying metals partitioning studies or the water effects ratio approach shall be identified in the permit fact sheet developed pursuant to WAC **173-220-060** or **173-226-110** , as appropriate, and shall be made available for the public comment period required pursuant to WAC **173-220-050** or **173-226-130** (3), as appropriate. Ecology has developed supplemental guidance for conducting water effect ratio studies.

ee. The criteria for cyanide is based on the weak acid dissociable method in the 19th Ed. Standard Methods for the Examination of Water and Wastewater, 4500-CN I, and as revised (see footnote dd, above).

ff. These criteria are based on the total-recoverable fraction of the metal.

gg. Where methods to measure trivalent chromium are unavailable, these criteria are to be represented by total-recoverable chromium.

hh. The listed fresh water criteria are based on un-ionized or total ammonia concentrations, while those for marine water are based on un-ionized ammonia concentrations. Tables for the conversion of total ammonia to un-ionized ammonia for freshwater can be found in the USEPA's Quality Criteria for Water, 1986. Criteria concentrations based on total ammonia for marine water can be found in USEPA Ambient Water Quality Criteria for Ammonia (Saltwater)-1989, EPA440/ **5-88-004** , April 1989.

ii. The conversion factor used to calculate the dissolved metal concentration was 0.982.

jj. The conversion factor used to calculate the dissolved metal concentration was 0.962.

kk. The conversion factor used to calculate the dissolved metal concentration was 0.85.

ll. Marine conversion factors (CF) which were used for calculating dissolved metals concentrations are given below. Conversion factors are applicable to both acute and chronic criteria for all metals except mercury. The CF for mercury was applied to the acute criterion only and is not applicable to the chronic criterion. Conversion factors are already incorporated into the criteria in the table. Dissolved criterion = criterion x CF

Metal	CF
Arsenic	1.000
Cadmium	0.994
Chromium (VI)	0.993
Copper	0.83
Lead	0.951
Mercury	0.85
Nickel	0.990
Selenium	0.998
Silver	0.85
Zinc	0.946

mm. The cyanide criteria are: 2.8µg/l chronic and 9.1µg/l acute and are applicable only to waters which are east of a line from Point Roberts to Lawrence Point, to Green Point to Deception Pass; and south from Deception Pass and of a line from Partridge Point to Point Wilson. The chronic criterion applicable to the remainder of the marine waters is l µg/L.

Footnotes for human health criteria in Table 240:

A. This criterion for total arsenic is the maximum contaminant level (MCL) developed under the Safe Drinking Water Act. The MCL for total arsenic is applied to surface waters where consumption of organisms-only and where consumption of water + organisms reflect the designated uses. When the department determines that a direct or indirect industrial discharge to surface waters designated for domestic water supply may be adding arsenic to its wastewater, the department will require the

discharger to develop and implement a pollution prevention plan to reduce arsenic through the use of AKART. Industrial wastewater discharges to a privately or publicly owned wastewater treatment facility are considered indirect discharges.

B. This criterion was calculated based on an additional lifetime cancer risk of one-in-one-million (1×10^{-6} risk level).
C. This criterion is based on a regulatory level developed under the Safe Drinking Water Act.
D. This recommended water quality criterion is expressed as total cyanide, even though the integrated risk information system RfD used to derive the criterion is based on free cyanide. The multiple forms of cyanide that are present in ambient water have significant differences in toxicity due to their differing abilities to liberate the CN-moiety. Some complex cyanides require even more extreme conditions than refluxing with sulfuric acid to liberate the CN-moiety. Thus, these complex cyanides are expected to have little or no "bioavailability" to humans. If a substantial fraction of the cyanide present in a water body is present in a complexed form (e.g., Fe4[Fe(CN)6]3), this criterion may be overly conservative.
E. This criterion applies to total PCBs, (e.g., the sum of all congener or all isomer or homolog or Aroclor analyses). The PCBs criteria were calculated using a chemical-specific risk level of 4×10^{-5}. Because that calculation resulted in a higher (less protective) concentration than the current criterion concentration (40 C.F.R. 131.36) the state made a chemical-specific decision to stay at the current criterion concentration.
F. This criterion was derived using the cancer slope factor of 1.4 (linearized multistage model with a twofold increase to 1.4 per mg/kg-day to account for continuous lifetime exposure from birth).
G. The human health criteria for mercury are contained in 40 C.F.R. 131.36.

[Statutory Authority: RCW **90.48.035**, **90.48.605** and section 303(c) of the Federal Water Pollution Control Act (Clean Water Act), C.F.R. 40, C.F.R. 131. WSR 16-16-095 (Order 12-03), § 173-201A-240, filed 8/1/16, effective 9/1/16. Statutory Authority: RCW **90.48.035**. WSR 11-09-090 (Order 10-10), § 173-201A-240, filed 4/20/11, effective 5/21/11; WSR 06-23-117 (Order 06-04), § 173-201A-240, filed 11/20/06, effective 12/21/06. Statutory Authority: Chapters **90.48** and **90.54** RCW. WSR 03-14-129 (Order 02-14), amended and recodified as § 173-201A-240, filed 7/1/03, effective 8/1/03. Statutory Authority: Chapter **90.48** RCW and 40 C.F.R. 131. WSR 97-23-064 (Order 94-19), § 173-201A-040, filed 11/18/97, effective 12/19/97. Statutory Authority: Chapter **90.48** RCW. WSR 92-24-037 (Order 92-29), § 173-201A-040, filed 11/25/92, effective 12/26/92.]

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency.

WAC 173-201A-260

Natural conditions and other water quality criteria and applications.

(1) **Natural and irreversible human conditions.**

(a) It is recognized that portions of many water bodies cannot meet the assigned criteria due to the natural conditions of the water body. When a water body does not meet its assigned criteria due to natural climatic or landscape attributes, the natural conditions constitute the water quality criteria.

(b) When a water body does not meet its assigned criteria due to human structural changes that cannot be effectively remedied (as determined consistent with the federal regulations at 40 C.F.R. 131.10), then alternative estimates of the attainable water quality conditions, plus any further allowances for human effects specified in this chapter for when natural conditions exceed the criteria, may be used to establish an alternative criteria for the water body (see WAC **173-201A-430** and **173-201A-440**).

(2) **Toxics and aesthetics criteria.** The following narrative criteria apply to all existing and designated uses for fresh and marine water:

(a) Toxic, radioactive, or deleterious material concentrations must be below those which have the potential, either singularly or cumulatively, to adversely affect characteristic water uses, cause acute or chronic conditions to the most sensitive biota dependent upon those waters, or adversely affect public health (see WAC **173-201A-240**, toxic substances, and **173-201A-250**, radioactive substances).

(b) Aesthetic values must not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste (see WAC **173-201A-230** for guidance on establishing lake nutrient standards to protect aesthetics).

(3) **Procedures for applying water quality criteria.** In applying the appropriate water quality criteria for a water body, the department will use the following procedure:

(a) The department will establish water quality requirements for water bodies, in addition to those specifically listed in this chapter, on a case-specific basis where determined necessary to provide full support for designated and existing uses.

(b) Upstream actions must be conducted in manners that meet downstream water body criteria. Except where and to the extent described otherwise in this chapter, the criteria associated with the most upstream uses designated for a water body are to be applied to headwaters to protect nonfish aquatic species and the designated downstream uses.

(c) Where multiple criteria for the same water quality parameter are assigned to a water body to protect different uses, the most stringent criterion for each parameter is to be applied.

(d) At the boundary between water bodies protected for different uses, the more stringent criteria apply.

(e) In brackish waters of estuaries, where different criteria for the same use occurs for fresh and marine waters, the decision to use the fresh water or the marine water criteria must be selected and applied on the basis of vertically averaged daily maximum salinity, referred to below as "salinity."

(i) The fresh water criteria must be applied at any point where ninety-five percent of the salinity values are less than or equal to one part per thousand, except that the fresh water criteria for bacteria applies when the salinity is less than ten parts per thousand; and

(ii) The marine water criteria must apply at all other locations where the salinity values are greater than one part per thousand, except that the marine criteria for bacteria applies when the salinity is ten parts per thousand or greater.

(f) Numeric criteria established in this chapter are not intended for application to human created waters managed primarily for the removal or containment of pollution. This special provision also includes private farm ponds created from upland sites that did not incorporate natural water bodies.

(i) Waters covered under this provision must be managed so that:

(A) They do not create unreasonable risks to human health or uses of the water; and

(B) Discharges from these systems meet down gradient surface and ground water quality standards.

(ii) This provision does not apply to waterways designed and managed primarily to convey or transport water from one location to another, rather than to remove pollution en route.

(g) When applying the numeric criteria established in this chapter, the department will give consideration to the precision and accuracy of the sampling and analytical methods used, as well as the existing conditions at the time.

(h) The analytical testing methods for these numeric criteria must be in accordance with the "*Guidelines Establishing Test Procedures for the Analysis of Pollutants*" (*40 C.F.R. Part 136*) or superseding methods published. The department may also approve other methods following consultation with adjacent states and with the approval of the USEPA.

(i) The primary means for protecting water quality in wetlands is through implementing the antidegradation procedures described in Part III of this chapter.

(i) In addition to designated uses, wetlands may have existing beneficial uses that are to be protected that include ground water exchange, shoreline stabilization, and stormwater attenuation.

(ii) Water quality in wetlands is maintained and protected by maintaining the hydrologic conditions, hydrophytic vegetation, and substrate characteristics necessary to support existing and designated uses.

(iii) Wetlands must be delineated using the *Washington State Wetlands Identification and Delineation Manual*, in accordance with WAC **173-22-035**.

[Statutory Authority: RCW **90.48.035**. WSR 11-09-090 (Order 10-10), § 173-201A-260, filed 4/20/11, effective 5/21/11. Statutory Authority: Chapters **90.48** and **90.54** RCW. WSR 03-14-129 (Order 02-14), § 173-201A-260, filed 7/1/03, effective 8/1/03.]

WAC 173-201A-510

Means of implementation.

(1) **Permitting.** The primary means to be used for controlling municipal, commercial, and industrial waste discharges shall be through the issuance of waste discharge permits, as provided for in RCW **90.48.160**, **90.48.162**, and **90.48.260**. Waste discharge permits, whether issued pursuant to the National Pollutant Discharge Elimination System or otherwise, must be conditioned so the discharges authorized will meet the water quality standards. No waste discharge permit can be issued that causes or contributes to a violation of water quality criteria, except as provided for in this chapter.

(a) Persons discharging wastes in compliance with the terms and conditions of permits are not subject to civil and criminal penalties on the basis that the discharge violates water quality standards.

(b) Permits must be modified by the department when it is determined that the discharge causes or contributes to a violation of water quality standards. Major modification of permits is subject to review in the same manner as the originally issued permits.

(2) **Miscellaneous waste discharge or water quality effect sources.** The director shall, through the issuance of regulatory permits, directives, and orders, as are appropriate, control miscellaneous waste discharges and water quality effect sources not covered by subsection (1) of this section.

(3) **Nonpoint source and stormwater pollution.**

(a) Activities which generate nonpoint source pollution shall be conducted so as to comply with the water quality standards. The primary means to be used for requiring compliance with the standards shall be through best management practices required in waste discharge permits, rules, orders, and directives issued by the department for activities which generate nonpoint source pollution.

(b) Best management practices shall be applied so that when all appropriate combinations of individual best management practices are utilized, violation of water quality criteria shall be prevented. If a discharger is applying all best management practices appropriate or required by the department and a violation of water quality criteria occurs, the discharger shall modify existing practices or apply further water pollution control measures, selected or approved by the department, to achieve compliance with water quality criteria. Best management practices established in permits, orders, rules, or directives of the department shall be reviewed and modified, as appropriate, so as to achieve compliance with water quality criteria.

(c) Activities which contribute to nonpoint source pollution shall be conducted utilizing best management practices to prevent violation of water quality criteria. When applicable best management practices are not being implemented, the department may conclude individual activities are causing pollution in violation of RCW **90.48.080**. In these situations, the department may pursue orders, directives, permits, or civil or criminal sanctions to gain compliance with the standards.

(d) Activities which cause pollution of stormwater shall be conducted so as to comply with the water quality standards. The primary means to be used for requiring compliance with the standards shall be through best management practices required in waste discharge permits, rules, orders, and directives issued by the department for activities which generate stormwater pollution. The consideration and control procedures in (b) and (c) of this subsection apply to the control of pollutants in stormwater.

(4) **General allowance for compliance schedules.**

(a) Permits and orders issued by the department for existing discharges may include a schedule for achieving compliance with effluent limits and water quality standards that apply to:

(i) Aquatic life uses; and

(ii) Uses other than aquatic life.

(b) Schedules of compliance shall be developed to ensure final compliance with all water quality-based effluent limits and the water quality standards as soon as possible. The department will decide whether to issue schedules of compliance on a case-by-case basis. Schedules of compliance may not be issued for new discharges. Examples of schedules of compliance that may be issued include:

(i) Construction of necessary treatment capability;

(ii) Implementation of necessary best management practices;

(iii) Implementation of additional stormwater best management practices for discharges determined not to meet water quality standards following implementation of an initial set of best management practices; and

(iv) Completion of necessary water quality studies related to implementation of permit requirements to meet effluent limits.

(c) For the period of time during which compliance with water quality standards is deferred, interim effluent limits shall be formally established, based on the best professional judgment of the department. Interim effluent limits may be numeric or nonnumeric (e.g., construction of necessary facilities by a specified date as contained in an order or permit), or both.

(d) Prior to establishing a schedule of compliance, the department shall require the discharger to evaluate the possibility of achieving water quality standards via nonconstruction changes (e.g., facility operation, pollution prevention). Schedules of compliance shall require compliance with the specified requirements as soon as possible. Compliance schedules shall generally not exceed the term of any permit unless the department determines that a longer time period is needed to come into compliance with the applicable water quality standards.

(e) When an approved total maximum daily load has established waste load allocations for permitted dischargers, the department may authorize a compliance schedule longer than ten years if:

(i) The permittee is not able to meet its waste load allocation in the TMDL solely by controlling and treating its own effluent;

(ii) The permittee has made significant progress to reduce pollutant loading during the term of the permit;

(iii) The permittee is meeting all of its requirements under the TMDL as soon as possible; and

(iv) Actions specified in the compliance schedule are sufficient to achieve water quality standards as soon as possible.

(5) **Compliance schedules for dams:**

(a) All dams in the state of Washington must comply with the provisions of this chapter.

(b) For dams that cause or contribute to a violation of the water quality standards, the dam owner must develop a water quality attainment plan that provides a detailed strategy for achieving compliance. The plan must include:

(i) A compliance schedule that does not exceed ten years;

(ii) Identification of all reasonable and feasible improvements that could be used to meet standards, or if meeting the standards is not attainable, then to achieve the highest attainable level of improvement;

(iii) Any department-approved gas abatement plan as described in WAC **173-201A-200** (1)(f)(ii);

(iv) Analytical methods that will be used to evaluate all reasonable and feasible improvements;

(v) Water quality monitoring, which will be used by the department to track the progress in achieving compliance with the state water quality standards; and

(vi) Benchmarks and reporting sufficient for the department to track the applicant's progress toward implementing the plan within the designated time period.

(c) The plan must ensure compliance with all applicable water quality criteria, as well as any other requirements established by the department (such as through a total maximum daily load, or TMDL, analysis).

(d) If the department is acting on an application for a water quality certification, the approved water quality attainment plan may be used by the department in its determination that there is reasonable assurance that the dam will not cause or contribute to a violation of the water quality standards.

(e) When evaluating compliance with the plan, the department will allow the use of models and engineering estimates to approximate design success in meeting the standards.

(f) If reasonable progress toward implementing the plan is not occurring in accordance with the designated time frame, the department may declare the project in violation of the water quality standards and any associated water quality certification.

(g) If an applicable water quality standard is not met by the end of the time provided in the attainment plan, or after completion of all reasonable and feasible improvements, the owner must take the following

steps:

(i) Evaluate any new reasonable and feasible technologies that have been developed (such as new operational or structural modifications) to achieve compliance with the standards, and develop a new compliance schedule to evaluate and incorporate the new technology;

(ii) After this evaluation, if no new reasonable and feasible improvements have been identified, then propose an alternative to achieve compliance with the standards, such as site specific criteria (WAC **173-201A-430**), a use attainability analysis (WAC **173-201A-440**), or a water quality offset (WAC **173-201A-450**).

(h) New dams, and any modifications to existing facilities that do not comply with a gas abatement or other pollution control plan established to meet criteria for the water body, must comply with the water quality standards at the time of project completion.

(i) Structural changes made as a part of a department approved gas abatement plan to aid fish passage, described in WAC **173-201A-200** (1)(f)(ii), may result in system performance limitations in meeting water quality criteria for that parameter at other times of the year.

(6) **Combined sewer overflow treatment plant.** The influent to these facilities is highly variable in frequency, volume, duration, and pollutant concentration. The primary means to be used for requiring compliance with the human health criteria shall be through the application of narrative limitations which include, but are not limited to, best management practices required in waste discharge permits, rules, orders and directives issued by the department.

[Statutory Authority: RCW **90.48.035**, **90.48.605** and section 303(c) of the Federal Water Pollution Control Act (Clean Water Act), C.F.R. 40, C.F.R. 131. WSR 16-16-095 (Order 12-03), § 173-201A-510, filed 8/1/16, effective 9/1/16. Statutory Authority: Chapters **90.48** and **90.54** RCW. WSR 03-14-129 (Order 02-14), amended and recodified as § 173-201A-510, filed 7/1/03, effective 8/1/03. Statutory Authority: Chapter **90.48** RCW and 40 C.F.R. 131. WSR 97-23-064 (Order 94-19), § 173-201A-160, filed 11/18/97, effective 12/19/97. Statutory Authority: Chapter **90.48** RCW. WSR 92-24-037 (Order 92-29), § 173-201A-160, filed 11/25/92, effective 12/26/92.]

WAC 173-220-130

Effluent limitations, water quality standards and other requirements for permits.

(1) Any permit issued by the department shall apply and insure compliance with all of the following, whenever applicable:

(a) All known, available, and reasonable methods of treatment required under RCW **90.52.040**, **90.54.020** (3)(b), and **90.48.520**; including effluent limitations established under sections 301, 302, 306, and 307 of the FWPCA. The effluent limitations shall not be less stringent than those based upon the treatment facility design efficiency contained in approved engineering plans and reports or approved revisions thereto. The effluent limitations shall reflect any seasonal variation in industrial loading. Modifications to technology-based effluent limitations for specific discharge categories are as follows:

(i) For combined waste treatment facilities, the effluent limitations for biochemical oxygen demand or suspended solids may be adjusted upwards to a maximum allowed by applying effluent limitations pursuant to sections 301 (b)(1)(B) of the FWPCA to the domestic portion of the influent and effluent limitations pursuant to sections 301 (b)(1)(A)(i), 301 (b)(2)(A), and 301 (b)(2)(E) of the FWPCA or standards of performance pursuant to section 306 of the FWPCA to the industrial portion of the influent: Provided, That the following additional condition is met:

Fecal coliform levels shall not exceed a monthly geometric mean of 200 organisms per 100 ml with a maximum weekly geometric mean of 400 organisms per 100 ml;

(ii) For municipal water treatment plants located on the Chehalis, Columbia, Cowlitz, Lewis, or Skagit river, the effluent limitations shall be adjusted, in accordance with RCW **90.54.020** (3)(b), to reflect credit for substances removed from the plant intake water if:

(A) The municipality demonstrates that the intake water is drawn from the same body of water into which the discharge is made; and

(B) The municipality demonstrates that no violation of receiving water quality standards or appreciable environmental degradation will result.

(b) Any more stringent limitation, including those necessary to:

(i) Meet water quality standards, treatment standards or schedules of compliance established pursuant to any state law or regulation under authority preserved to the state by section 510 of the FWPCA; or

(ii) Meet any federal law or regulation other than the FWPCA or regulations thereunder; or

(iii) Implement any applicable water quality standards; such limitations to include any legally applicable requirements necessary to implement total maximum daily loads established pursuant to section 303(d) and incorporated in the continuing planning process approved under section 303(e) of the FWPCA and any regulations and guidelines issued pursuant thereto;

(iv) Prevent or control pollutant discharges from plant site runoff, spillage or leaks, sludge or waste disposal, or materials handling or storage; and

(v) Meet the permit by rule provisions of the state dangerous waste regulation, WAC **173-303-802** (4) or (5).

(c) Any more stringent legal applicable requirements necessary to comply with a plan approved pursuant to section 208(b) of the FWPCA; and

(d) Prior to promulgation by the administrator of applicable effluent standards and limitations pursuant to sections 301, 302, 306, and 307 of the FWPCA, such conditions as the department determines are necessary to carry out the provisions of the FWPCA.

(2) In any case where an issued permit applies the effluent standards and limitations described in subsection (1)(a) of this section, the department shall make a finding that any discharge authorized by the permit will not violate applicable water quality standards.

(3) In the application of effluent standards and limitations, water quality standards and other legally applicable requirements pursuant to subsections (1) and (2) of this section, each issued permit shall specify:

(a) For industrial wastewater facilities, average monthly and maximum daily quantitative mass and/or concentration limitations, or other such appropriate limitations for the level of pollutants and the authorized discharge;

(b) For domestic wastewater facilities, average weekly and monthly quantitative concentration and mass limitations, or other such appropriate limitations for the level of pollutants and the authorized discharge; and

(c) If a dilution zone is authorized within which water quality standards are modified, the dimensions of such dilution zone.

[Statutory Authority: RCW **90.54.020** and chapter **90.48** RCW. WSR 88-22-059 (Order 88-9), § 173-220-130, filed 11/1/88. Statutory Authority: RCW **90.48.035** and **90.48.260**. WSR 82-24-078 (Order DE 82-39), § 173-220-130, filed 12/1/82; Order DE 74-1, § 173-220-130, filed 2/15/74.]

WAC 173-220-150

Other terms and conditions.

(1) In addition to the requirements of WAC **173-220-130** and **173-220-140**, each issued permit shall require that:

(a) All discharges authorized by the permit shall be consistent with the terms and conditions of the permit;

(b) Any facility expansions, production increases or process modifications which would result in new or increased discharges of pollutants causing effluent limitations in the permit to be exceeded must be reported to the department by submission of a new application or supplement thereto; or, if such discharge does not violate effluent limitations specified in the permit, by submission to the department of notice of such new or increased discharges of pollutants;

(c) Any discharge of any pollutant more frequent than or at a level in excess of that identified and authorized by the permit shall constitute a violation of the terms and conditions of the permit;

(d) The permit may be modified or revoked in whole or in part during its terms for cause including, but not limited to, the following:

(i) Violation of any term or condition of the permit;

(ii) Obtaining a permit by misrepresentation or failure to disclose fully all relevant facts;

(iii) A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge;

(iv) A determination that the permitted activity endangers human health or the environment, or contributes to water quality standards violations;

(v) Incorporation of an approved local pretreatment program into a municipality's permit;

(vi) Establishment of a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) under section 307(a) of the FWPCA for a toxic pollutant which is more stringent than any limitation upon such pollutant in the permit;

(vii) Failure or refusal of the permittee to allow entry as required in RCW **90.48.090**; and

(viii) Nonpayment of permit fees assessed pursuant to RCW **90.48.610**.

(e) The permittee shall allow the department or its authorized representative upon the presentation of credentials and at reasonable times:

(i) To enter upon permittee's premises in which an effluent source is located or in which any records are required to be kept under terms and conditions of the permit, subject to any access restrictions due to the nature of the project;

(ii) To have access to, and copy at reasonable cost, any records required to be kept under terms and conditions of the permit;

(iii) To inspect any monitoring equipment or method required in the permit; and

(iv) To sample any discharge of pollutants.

(f) If the permit is for a discharge from a publicly owned treatment works, the permittee shall provide notice to the department of the following:

(i) Any new introduction of pollutants into such treatment works from a source which would be a new source as defined in section 306 of the FWPCA if such source were discharging pollutants;

(ii) Except as to such categories and classes of point sources or discharges specified by the department, any new introduction of pollutants into such treatment works from a source which would be subject to section 301 of the FWPCA if such source were discharging pollutants;

(iii) Any substantial change in volume or character of pollutants being introduced into such treatment works by a source existing at the time of issuance of the permit.

Such notice shall include information on:

(A) The quality and quantity of effluent to be introduced into such treatment works; and

(B) Any anticipated impact of such change in the quantity or quality of effluent to be discharged from such publicly owned treatment works.

(g) The permittee shall at all times properly operate and maintain any facilities or systems of control installed by the permittee to achieve compliance with the terms and conditions of the permit. Where design criteria have been established, the permittee shall not allow flows or waste loadings to exceed approved design criteria, or approved revisions thereto.

(2) Every permit shall be conditioned to insure that any industrial user of any publicly owned treatment works will comply with sections 204(b), 307, and 308 of the FWPCA.

(3) When deemed necessary by the department, any publicly owned treatment works shall be required to develop a full or partial local pretreatment program as specified in 40 C.F.R. Part 403. Permit conditions for a municipality which has received full local pretreatment program approval shall include:

(a) Granting of authority to issue permits under chapter **173-208** WAC;

(b) A requirement to develop, adopt, and enforce a program that is at least as stringent as the department's program under chapter **173-216** WAC; and

(c) A requirement to report to the department at a specified frequency on the status of its implementation.

(4) Permits for domestic wastewater facilities shall be issued only to a public entity, except in the following circumstances:

(a) Facilities existing or approved for construction with private operation on or before the effective date of this chapter, until such time as the facility is expanded; or

(b) Facilities that serve a single nonresidential, industrial, or commercial establishment. Commercial/industrial complexes serving multiple owners or tenants and multiple residential dwelling facilities such as mobile home parks, apartments, and condominiums are not considered single commercial establishments for the purpose of the preceding sentence.

(5) For facilities that are owned by nonpublic entities and under contract to a public entity, the permit shall be issued to the public entity.

[Statutory Authority: RCW **90.54.020** and chapter **90.48** RCW. WSR 88-22-059 (Order 88-9), § 173-220-150, filed 11/1/88. Statutory Authority: Chapter **43.21A** RCW. WSR 88-12-035 (Order 88-8), § 173-220-150, filed 5/26/88, effective 7/1/88; WSR 86-06-040 (Order 86-03), § 173-220-150, filed 3/4/86. Statutory Authority: Chapter **90.48** RCW. WSR 84-11-024 (Order DE 84-19), § 173-220-150, filed 5/11/84. Statutory Authority: RCW **90.48.035** and **90.48.260**. WSR 82-24-078 (Order DE 82-39), § 173-220-150, filed 12/1/82; Order DE 74-1, § 173-220-150, filed 2/15/74.]

DECLARATION OF SERVICE

I declare under penalty of perjury of the laws of the State of Washington that on August 28, 2017, I served a true and correct copy of the foregoing *Puget Soundkeeper Alliance's Supplemental Brief* on the following via email:

Attorneys for State of Washington, Department of Ecology, and Pollution Control Hearings Board
Anne E. Egler, Deputy Solicitor General
Office of the Attorney General
P.O. Box 40100
Olympia, WA 98504-0100
AnnE1@atg.wa.gov

Attorneys for Respondent Department of Ecology
Phyllis J. Barney, Assistant Attorney General
P.O. Box 40117
Olympia, WA 98504-0117
PhyllisB@atg.wa.gov

Attorneys for Pollution Control Hearings Board
Dionne M. Padilla-Huddleston, Assistant Attorney General
P.O. Box 40110
Olympia, WA 98504-0110
DionneP@atg.wa.gov

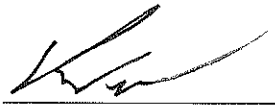
Attorneys for Seattle Iron & Metals, Corp.
Stephen R. Parkinson
Joyce Ziker Parkinson, PLLC
1601 5th Ave., Ste. 2040
Seattle, WA 98101-1627
sparkinson@jzplaw.com, jstevens@jzplaw.com

Attorneys for Amicus Curiae Spokane Riverkeeper
Richard K. Eichstaedt
University Legal Assistance
P.O. Box 3528
Spokane, WA 99220-3528
ricke@cforjustice.org

Attorneys for Amici Curiae Squaxin Island Tribe
Janette K. Brimmer
Earthjustice
705 Second Avenue, Suite 203
Seattle, WA 98104-1711
Jbrimmer@earthjustice.org

Amicus Curiae Duwamish River Cleanup Coalition/Technical Advisory Group
DRCC/TAG
210 S. Hudson St., Suite 332
Seattle, WA 98134-2417
james@duwamishcleanup.org

Executed this 28th day of August, 2017, at Seattle, Washington.



Kai McDavid, Litigation Assistant

SMITH & LOWNEY

August 28, 2017 - 3:36 PM

Transmittal Information

Filed with Court:	Supreme Court
Appellate Court Case Number:	94293-5
Appellate Court Case Title:	Puget Soundkeeper Alliance v. State of Washington, Dept. of Ecology, et al.
Superior Court Case Number:	15-2-01575-1

The following documents have been uploaded:

- 942935_Briefs_20170828130351SC316519_2105.pdf
  This File Contains:
  Briefs - Petitioners Supplemental
  The Original File Name was No 94293-5 Soundkeeper Supplemental Brief - WA Supreme Court - 170828.pdf

A copy of the uploaded files will be sent to:

- AnneE1@atg.wa.gov
- DionneP@atg.wa.gov
- ECYOlyEF@atg.wa.gov
- chendrickson@earthjustice.org
- jbrimmer@earthjustice.org
- lalseaef@atg.wa.gov
- phyllisb@atg.wa.gov
- rasmithwa@igc.org
- richard@smithandlowney.com
- ricke@cforjustice.org

Comments:

Sender Name: Kai McDavid - Email: kai@smithandlowney.com
Filing on Behalf of: Claire Elizabeth Tonry - Email: claire@smithandlowney.com (Alternate Email:)

Address:
2317 E John St
Seattle, WA, 98112
Phone: (206) 860-1570

Note: The Filing Id is 20170828130351SC316519