



ARARs Q's & A's:

Compliance with New SDWA National Primary Drinking Water Regulations for Organic and Inorganic Chemicals

Office of Emergency and Remedial Response
Office of Program Management OS-240

Quick Reference Fact Sheet

Section 121(d) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the 1986 Superfund Amendments and Reauthorization Act (SARA), requires that on-site remedial actions must attain or waive Federal or more stringent State applicable or relevant and appropriate requirements (ARARs) upon completion of the remedial action. The 1990 National Oil and Hazardous Substances Pollution Contingency Plan (NCP) requires compliance with ARARs during remedial actions as well as at their completion, and compels attainment of ARARs during removal actions to the extent practicable, considering the exigencies of the situation. (See NCP, 55 FR 8666, 8852 (March 8, 1990)(codified at 40 CFR 300.435(b)(2)), and 55 FR 8666, 8843 (March 8, 1990)(codified at 40 CFR 300.415(i)).

To implement the ARARs provision, EPA developed guidance, CERCLA Compliance With Other Laws Manual: Parts I and II (Publications 9234.1-01 and 9234.1-02), and has provided training to Regions and the States on the identification of and compliance with ARARs. EPA also is preparing a series of short fact sheets to provide guidance on a number of questions that arose in developing ARAR policies, and in identifying and complying with ARARs at specific sites. This particular fact sheet addresses compliance with new Safe Drinking Water Act (SDWA) National Primary Drinking Water Regulations for organic and inorganic chemicals, which were promulgated on January 30, 1991. (See 56 FR 3526 January 30, 1991, to be codified at 40 CFR Parts 141, 142, and 143.)

Q1. What are these National Primary Drinking Water Regulations?

A. These National Primary Drinking Water Regulations (NPDWRs) establish Maximum Contaminant Level Goals (MCLGs) and Maximum Contaminant Levels (MCLs) for 31 organic and inorganic contaminants, which are effective July 30, 1992. They also repropose MCLGs and MCLs for 5 additional contaminants (aldicarb, aldicarb sulfoxide, aldicarb sulfone, pentachlorophenol, and barium) that were originally promulgated on July 8, 1987 and will become effective January 1, 1993. Finally, these regulations promulgate MCLGs and treatment technique requirements for acrylamide and epichlorohydrin. See **Highlight 1** for the definitions of MCLs and MCLGs. For the full text of these SDWA regulations, see 56 FR 3526 (January 30, 1991). See **Highlight 3** for a list of the contaminants and their corresponding MCLs and MCLGs.

Q2. Are MCLs potential ARARs for CERCLA sites?

A. Yes. CERCLA section 121(d)(2)(A)(i) requires on-site CERCLA remedial actions to attain or waive the "standards" or "levels of control" issued under the SDWA (i.e., MCLs) where they are applicable or relevant and appropriate. (Note: As mentioned in the introduction to this fact sheet, the NCP extends the statutory ARARs requirement to removals, to the extent practicable considering the exigencies of the situation, as well as remedial actions. (See section 300.415(i)(1) and (2) of the NCP, 55 FR 8843.)

MCLs are potentially relevant and appropriate during a CERCLA cleanup for ground or surface waters that are current or potential sources of drinking water. Since ground water contamination sites account for approximately 70 percent of all sites on the National Priorities List, these potentially

relevant and appropriate requirements are triggered frequently at CERCLA sites.

In addition, MCLs also may be applicable where water at a CERCLA site is delivered through a public water supply system, if that system has at least 15 service connections or serves at least 25 year-round residents. Since CERCLA projects only rarely treat tap water, however, there will be few instances in which MCLs are applicable for groundwater cleanup at a CERCLA site. (See NCP Preamble, 55 FR 8750 and CERCLA Compliance With Other Laws Manual, Part I, Publication 9234.1-01, August 1988, page 4-8.)

REMINDER: It makes a difference whether a requirement is applicable or relevant and appropriate. The "applicability" determination is a legal one, and it provides the Agency with very little flexibility. The "relevant and appropriate" determination is a site-specific determination, which provides the Agency with much greater flexibility since the Agency may determine that a requirement is not "appropriate", given site circumstances. (Therefore it would not be an ARAR for that site.) Waivers are also available if the requirement is relevant and appropriate but cannot be met for one of the reasons set out in CERCLA section 121(d)(4) (e.g., the ground water is a potential drinking water source and thus the MCL is relevant and appropriate, but attainment of the MCL is technically impracticable).

In contrast, an applicable requirement, once triggered at a site, must simply be met or waived. (For additional information on this issue, see "ARARs Q's and A's: General Policy, RCRA, CWA, SDWA & Administrative Record," Publication 9234.2-01/FS-A, July 1991.)

- Q3. Are MCLGs potential ARARs for CERCLA sites?
- A. Yes. Section 121(d)(2)(A) of CERCLA also requires on-site remedial actions to attain MCLGs under the SDWA "where they are relevant and appropriate under the circumstances" of the release or threatened release. Under the NCP, EPA requires that MCLGs set at levels above zero (i.e.,

non-zero MCLGs) be attained during a CERCLA cleanup where they are relevant and appropriate (i.e., generally for ground or surface waters that are current or potential sources of drinking water). If the MCLG is equal to zero, EPA determined under the NCP that the MCLG is not appropriate for setting cleanup levels. In those circumstances, the corresponding MCL will be the potentially relevant and appropriate requirement. (See section 300.430(e)(2)(i) (B) and (C) of the NCP, 55 FR 8848.)

REMINDER: Although MCLGs are potentially relevant and appropriate, they are never applicable requirements at a CERCLA response action because they are not enforceable "standards" or "levels of control."

Highlight 1:
Definitions of MCLs and MCLGs

Maximum Contaminant Levels (MCLs) are enforceable standards that apply to specified contaminants which EPA has determined to have an adverse effect on human health above certain levels. MCLs are set as close as feasible to MCLGs. Feasibility takes into account both technology and cost considerations.

Maximum Contaminant Level Goals (MCLGs) are non-enforceable health-based goals that have been established at levels at which no known or anticipated adverse effects on the health of persons occur and which will allow an adequate margin of safety.

See NCP Preamble, 55 FR 8750-8752.

- Q4. What is the status of these regulations as potential ARARs for CERCLA projects?
- A. These regulations were promulgated on January 30, 1991. The final MCLs and

Highlight 2: Status of Potential TBCs, RARs, and ARARs

Number of Final/ Reproposed MCLGs/MCLs	Potential To Be Considered (TBC)	Potential Relevant and Appropriate (RAR)	Potential Applicable, or Relevant and Appropriate (ARAR)
22 Final Non-Zero MCLGs	(Not Pertinent)	1/30/91 & Beyond	Not Applicable
31 Final MCLs	(Not Pertinent)	1/30/91 - 7/29/92	7/30/92 and Beyond
2 Treatment Techniques	(Not Pertinent)	1/30/91 - 7/29/92	7/30/92 and Beyond
4 Reproposed Non-Zero MCLGs	1/31/91 - 7/91 ¹	7/91 ¹ & Beyond	Not Applicable
5 Reproposed MCLs	1/31/91 - 7/91 ¹	7/91 ¹ - 1/93 ²	1/93 ² and Beyond

¹Anticipated promulgation date

²Anticipated effective date

non-zero MCLGs for the 31 contaminants became potential relevant and appropriate requirements for all decision documents (i.e., Records of Decision (RODs) and Action Memoranda) signed on or after January 30, 1991. Because of the delayed effective date, the final MCLs for the 31 contaminants may be relevant and appropriate, but not applicable, for response actions carried out during the interim period prior to the effective date (i.e., between January 30, 1991 and July 29, 1992). In addition, the final non-zero MCLGs may be relevant and appropriate. For decision documents signed on July 30, 1992 and beyond, the MCLs for the 31 contaminants may be applicable or relevant and appropriate to the cleanup of ground water. See **Highlight 2** for the status of these regulations, outlining the critical dates for final and reproposed MCLGs and MCLs.

In contrast, the reproposed MCLs and non-zero MCLGs for the 5 additional contaminants are on a different regulatory track. They became potential criteria "to be considered" (TBCs) for all decision documents signed after January 30, 1991 and up to promulgation (on July 1, 1991). Because of the delayed effective date, for all decision documents signed between the date of promulgation (July 1, 1991) and the effective date (expected in January 1993), these MCLGs and MCLs may be relevant

and appropriate, but not applicable. On their effective date (scheduled for January 1993) and beyond, the MCLs for the 5 additional contaminants may be applicable, or relevant and appropriate.

Q5. Are treatment techniques for drinking water contaminants in these regulations potential ARARs for CERCLA cleanups?

A. Generally, no. These NPDWRs have established treatment techniques for acrylamide and epichlorohydrin. These treatment techniques limit the amounts of acrylamide and epichlorohydrin that drinking water suppliers may add to treat contaminated drinking water. Since CERCLA projects generally do not supply drinking water as part of response actions, and often would be cleaning up contaminated ground water through methods (e.g., air stripping or natural attenuation) which do not involve the addition of these substances to treat contaminated ground water, these treatment techniques generally would not be relevant and appropriate requirements for the treatment of acrylamide and epichlorohydrin already found in the ground water. However, if a CERCLA project is supplying drinking water as part of the response action and is adding these substances as part of the treatment process, the treatment techniques would be potential ARARs.

Highlight 3: Jan. 30, 1991 National Primary Drinking Water Regulations

	1/91 Final MCLGs ^a	1/91 Final MCLs ^a	1/91 Reproposed MCLGs	1/91 Reproposed MCLs ^a
Inorganics				
Asbestos	7.0 MFL	7.0 MFL	—	—
<i>Barium</i>	—	—	2	2
Cadmium	0.005	0.005	—	—
Chromium	0.1	0.1	—	—
Mercury	0.002	0.002	—	—
Nitrate	10.0 (as N)	10.0 (as N)	—	—
Nitrite	1.0 (as N)	1.0 (as N)	—	—
Total Nitrate and Nitrite	10.0 (as N)	10.0 (as N)	—	—
Selenium	0.05	0.05	—	—
Organics				
o-Dichlorobenzene	0.6	0.6	—	—
cis-1, 2-Dichloroethylene	0.07	0.07	—	—
trans-1, 2-Dichloroethylene	0.1	0.1	—	—
1, 2-Dichloropropane	0	0.005	—	—
Ethylbenzene	0.7	0.7	—	—
Monochlorobenzene	0.1	0.1	—	—
Styrene	0.1	0.1	—	—
Tetrachloroethylene	0	0.005	—	—
Toluene	1.0	1.0	—	—
Xylenes (total)	10.0	10.0	—	—
Pesticides/PCBs				
Alachlor	0	0.002	—	—
<i>Aldicarb</i>	—	—	0.001	0.003
<i>Aldicarb sulfoxide</i>	—	—	0.001	0.004
<i>Aldicarb sulfone</i>	—	—	0.001	0.002
Atrazine	0.003	0.003	—	—
Carbofuran	0.04	0.04	—	—
Chlordane	0	0.002	—	—
Dibromochloropropane (DBCP)	0	0.0002	—	—
2, 4-D	0.07	0.07	—	—
Ethylene dibromide (EDB)	0	0.00005	—	—
Heptachlor	0	0.0004	—	—
Heptachlor epoxide	0	0.0002	—	—
Lindane	0.0002	0.0002	—	—
Methoxychlor	0.04	0.04	—	—
Polychlorinated biphenyls (PCBs) (as decachlorobiphenyl)	0	0.0005	—	—
<i>Pentachlorophenol</i>	—	—	0	0.001
Toxaphene	0	0.003	—	—
2, 4, 5-TP (Silvex)	0.05	0.05	—	—

Q6. How will these regulations affect CERCLA RODs that were signed prior to January 30, 1991?

A. These MCLGs and MCLs should not affect CERCLA RODs that were signed prior to January 30, 1991. The NCP states that ARARs "freeze" at the time of ROD signature, and newly promulgated requirements need only be met where necessary for protectiveness. See section 300.430(f)(1)(ii)(B)(1) of the NCP, 55 FR 8850. This means that only requirements which are promulgated (i.e., published as final regulations) prior to the date of ROD signature are potential ARARs for those RODs. Since these SDWA requirements were not promulgated until January 30, 1991, they would not be ARARs for RODs signed before that date.

While these requirements would constitute "newly promulgated requirements" for pre-1/30/91 RODs, they are not expected to require changes to existing RODs during the five-year protectiveness review of the remedy. These new SDWA requirements are not replacing any MCLGs or MCLs that were outside the CERCLA risk range, with standards inside that risk range. Therefore, they should not require any remedy revisions to maintain protectiveness during the five-year review. (See also NCP Preamble, 55 FR 8757.)

Q7. Are there other requirements in these regulations that may be ARARs or TBCs for CERCLA cleanups?

A. Yes. These regulations also contain monitoring requirements which may be ARARs when a CERCLA project supplies drinking water to affected communities as part of the response action. (See NCP Preamble, 55 FR 8757.) The regulations also contain administrative recordkeeping and reporting requirements. Although such requirements are neither ARARs nor TBCs, the Regions are strongly encouraged to consult with other agencies, as appropriate, to ensure coordination. (See NCP Preamble, 55 FR 8757.)

Q8. Are there other proposed or promulgated SDWA regulations that are potential ARARs or TBCs for CERCLA actions?

A. Yes. On June 7, 1991, EPA promulgated final MCLGs for lead and copper (see 56 FR 26461, June 7, 1991). Copper now has an MCLG of 1.3 parts per million. This is a potential relevant and appropriate requirement for CERCLA ground and surface water remediation. However, the MCLG for lead was set at zero, which is not considered to be an "appropriate" standard for CERCLA cleanups. (See NCP Preamble, 55 FR 8751-8752.) This SDWA regulation did not set any MCLs for either contaminant, but it did set a treatment technique for lead which is a potential ARAR. (Note: EPA is planning to provide additional ARARs guidance on lead in the near future.)

In addition, NPDWRs for 24 contaminants were proposed on July 25, 1990 (see 55 FR 30370, July 25, 1990). From July 25, 1990 until their expected promulgation (expected in March 1992), the MCLs and non-zero MCLGs found in these proposed regulations constitute TBCs for the cleanup of ground water and may be considered for decision documents signed during that period. See **Highlight 4** for a chart of the 24 contaminants and their corresponding proposed MCLs and MCLGs.

This fact sheet does not address two other SDWA regulations: Final, for 8 volatile organic compounds, on July 8, 1987 (see 52 FR 25690), and, proposed, for the radionuclides radon, uranium, and radium, on July 18, 1991 (see 56 FR 33050).

NOTICE: The policies set out in this fact sheet are not final Agency action, but are intended solely as guidance. They are not intended, nor can they be relied upon, to create any rights enforceable by any party in litigation with the United States. Response personnel may decide to follow the guidance provided in this fact sheet, or to act at variance with the guidance, based on an analysis of site-specific circumstances. The Agency reserves the right to change this guidance at any time without public notice.

Highlight 4: Proposed National Primary Drinking Water Regulations

TBCs until Promulgation Date (Expected in March 1992)

Inorganics	MCLGs	MCLs
Antimony	0.03	0.01/0.005
Beryllium	00.001	0.001
Cyanide	0.2	0.2
Nickel	0.1	0.1
Sulfate	400/500	400/500
Thallium	0.0005	0.002/0.001
Organics		
Andipates	0.5	0.5
[Di(ethylhexyl)adipate]		
Dalapon	0.2	0.2
Dichloromethane (methylene chloride)	0	0.005
Dinoseb	0.007	0.007
Diguat	0.02	0.02
Endothall	0.1	0.1
Endrin	0.002	0.002
Glyphosate	0.7	0.7
Hexachlorobenzene	0	0.001
Hexachlorocyclopentadine (HEX)	0.05	0.05
Oxamyl (Vydate)	0.02	0.02
PAHs [Benzo(a)pyrene]	0	0.0002
Phthalates	0	0.004
[Di(ethylhexyl)phthalate]		
Picloram	0.5	0.5
Simazine	0.001	0.001
1,2,4-Trichlorobenzene	0.009	0.009
1,1+2Trichlorethane	0.003	0.005
2,3,7,8-TCDD (Dioxin)	0	5x10(-8)

because FWQC recommended at zero are not ARARs, the three alternative values are TBCs.

Q9. What other factors should be considered in determining whether FWQC are relevant and appropriate requirements?

A. CERCLA requires that in determining whether a FWQC constitutes a relevant and appropriate requirement, EPA must consider the designated or potential use of the surface or ground water, the environmental media affected, the purposes for which such criteria were developed, and the latest available scientific information available (see CERCLA section 121(d)(2)(B)(i)). With regard to this last factor, OWRS periodically publishes FWQC for additional constituents and occasionally updates existing ones. Prior to using an FWQC for a particular constituent, RPMs should consult the IRIS data base maintained by the EPA Office of Research and Development and

contact their Regional Water Office for the most recent listing, to ensure consideration of the latest available scientific information. See Attachment 1 for a list of the FWQC, current as of June 15, 1990. [Note: the FWQC chart issued by the EPA Office of Water Regulations and Standards, dated January 2, 1987, is no longer current and should not be used as a reference.]

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ATTACHMENT 1
FEDERAL WATER QUALITY CRITERIA

A		B		C		D		
		FRESHWATER		SALTWATER		HUMAN HEALTH (10 ⁻⁶ risk for carcinogens)		
(N) COMPOUND	CAS Number	Criterion Maximum Conc. (ug/L)	Criterion Continuous Conc. (ug/L)	Criterion Maximum Conc. (ug/L)	Criterion Continuous Conc. (ug/L)	For Consumption of:		
		81	82	C1	C2	Water & Organisms (ug/L)	Organisms Only (ug/L)	
						D1	D2	
1	Antimony	7440360				14 *	4300 *	
2	Arsenic	7440382	360	190	69	36	0.018 *†	0.14 *†
3	Beryllium	7440417					0.0076 †	0.131 †
4	Cadmium	7440439	3.9 **	1.1 **	43	9.3	10 *	170 *
5a	Chromium (III)	7440473	1700 **	210 **			33000 *	670000 *
b	Chromium (VI)	7440473	16	11	1100	50	170 *	3400 *
6	Copper	7440508	18 **	12 **	2.9	2.9	1300 *	
7	Lead	7439921	82 **	3.2 **	220	8.5	50	
8	Mercury	7439976	2.4	0.012	2.1	0.025	0.14	0.15
9	Nickel	7440020	1400 **	160 **	75	8.3	510 *	3800 *
10	Selenium	7782492	20	5	300	71	104 *	6800 *
11	Silver	7440224	4.1 **		2.3		91 *	
12	Thallium	7440280					2.0 *	7.2 *
13	Zinc	7440666	120 **	110 **	95	86		
14	Cyanide	57125	22	5.2	1	1	700 *	215000 *
15	Asbestos	1332214					30000 fibers/L	
16	2,3,7,8-TCDD (Dioxin)	1746016					0.00000013 †	0.00000014 †
17	Acrolein	107028					320	780
18	Acrylonitrile	107131					0.059 *†	0.67 *†
19	Benzene	71432					1.2 *†	71 *†
20	Bromoform	75252					5.7 *†	470 *†
21	Carbon Tetrachloride	56235					0.25 *†	4.5 *†
22	Chlorobenzene	108907					488	
23	Chlorodibromomethane	124481					5.7 *†	470 *†
24	Chloroethane	75003						
25	2-Chloroethylvinyl Ether	110758					0.032 *†	18 *†
26	Chloroform	67663					5.70 *†	470 *†
27	Dichlorobromomethane	75274					5.70 *†	470 *†
28	1,1-Dichloroethane	75343						
29	1,2-Dichloroethane	107062					0.38 *†	99 *†
30	1,1-Dichloroethylene	75354					0.057 *†	3.2 *†
31	1,2-Dichloropropane	78875						
32	1,3-Dichloropropylene	542756					10 *	1700 *
33	Ethylbenzene	100414					3100 *	29000 *
34	Methyl Bromide	74839					48 *	4000 *
35	Methyl Chloride	74873					5.7 *†	470 *†
36	Methylene Chloride	75092					4.7 *†	1600 *†
37	1,1,2,2-Tetrachloroethane	79345					0.17 *†	11 *†
38	Tetrachloroethylene	127184					0.8	8.85
39	Toluene	108883					10000 *	300000 *
40	1,2-Trans-Dichloroethylene	156605					700 *	140000 *
41	1,1,1-Trichloroethane	71556					3100 *	170000 *
42	1,1,2-Trichloroethane	79005					0.60 *†	42 *†
43	Trichloroethylene	79016					2.7 †	81 †
44	Vinyl Chloride	75014					2 †	525 †

#	COMPOUND	CAS Number	B FRESHWATER		C SALTWATER		D HUMAN HEALTH (10 ⁻⁴ risk for carcinogens)	
			Criterion Maximum Conc. (ug/L)	Criterion Continuous Conc. (ug/L)	Criterion Maximum Conc. (ug/L)	Criterion Continuous Conc. (ug/L)	For Consumption of:	
			B1	B2	C1	C2	Water & Organisms (ug/L)	Organisms Only (ug/L)
			B1	B2	C1	C2	D1	D2
45	2-Chlorophenol	95578					120 *	
46	2,4-Dichlorophenol	120832					93 *	790 *
47	2,4-Dimethylphenol	105679						
48	2-Methyl-4,6-Dinitrophenol	534521					13.4	765
49	2,4-Dinitrophenol	51285					70 *	14000 *
50	2-Nitrophenol	88755						
51	4-Nitrophenol	100027						
52	3-Methyl-4-Chlorophenol	59507	-					
53	Pentachlorophenol	87865	20 ***	13 ***	13	7.9	1000 *	29000 *
54	Phenol	108952					21 *	4600 *
55	2,4,6-Trichlorophenol	88062					1.2 †	3.6 †
56	Acenaphthene	83329					1200 *	2700 *
57	Acenaphthylene	208968					0.0028 †	0.0311 †
58	Anthracene	120127					0.0028 †	0.0311 †
59	Benzidine	92875					0.00012 *†	0.00054 *†
60	Benzo(a)Anthracene	56553					0.0028 †	0.0311 †
61	Benzo(a)Pyrene	50328					0.0028 †	0.0311 †
62	3,4-Benzofluoranthene	205992					0.0028 †	0.0311 †
63	Benzo(ghi)Perylene	191242					0.0028 †	0.0311 †
64	Benzo(k)Fluoranthene	207089					0.0028 †	0.0311 †
65	Bis(2-Chloroethoxy)Methane	111911						
66	Bis(2-Chloroethyl)Ether	111444					0.031 *†	1.4 *†
67	Bis(2-Chloroisopropyl)Ether	108601					1400 *	170000 *
68	Bis(2-Ethylhexyl)Phthalate	117817					1.8 *†	5.9 *†
69	4-Bromophenyl Phenyl Ether	101553						
70	Butylbenzyl Phthalate	85687					3000 *	5200 *
71	2-Chloronaphthalene	91587						
72	4-Chlorophenyl Phenyl Ether	7005723						
73	Chrysene	218019					0.0028 †	0.0311 †
74	Dibenz(a,h)Anthracene	53703					0.0028 †	0.0311 †
75	1,2-Dichlorobenzene	95501					2700 *	17000 *
76	1,3-Dichlorobenzene	541731					400	2600
77	1,4-Dichlorobenzene	106467					400	2600
78	3,3'-Dichlorobenzidine	91941					0.04 *†	0.077 *†
79	Diethyl Phthalate	84662					23000 *	120000 *
80	Dimethyl Phthalate	131113					313000	2900000
81	Di-n-Butyl Phthalate	84742					2700 *	12000 *
82	2,4-Dinitrotoluene	121142					0.11 †	9.1 †
83	2,6-Dinitrotoluene	606202						
84	Di-n-Octyl Phthalate	117840						
85	1,2-Diphenylhydrazine	122667					0.041 *†	0.54 *†
86	Fluoranthene	206440					42	54
87	Fluorene	86737					0.0028 †	0.031 †
88	Hexachlorobenzene	118741					0.00072 †	0.00074 †
89	Hexachlorobutadiene	87683					0.44 *†	50 *†

A		B		C		D	
		FRESHWATER		SALTWATER		HUMAN HEALTH (10 ⁻⁴ risk for carcinogens)	
(*) COMPOUND	CAS Number	Criterion	Criterion	Criterion	Criterion	For Consumption of:	
		Maximum	Continuous	Maximum	Continuous	Water &	Organisms
		Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Organisms (ug/L)	Only (ug/L)
		B1	B2	C1	C2	D1	D2
90	Hexachlorocyclopentadiene	77474				242 *	17400 *
91	Hexachloroethane	67721				2.0 *†	8.9 *†
92	Indeno(1,2,3-cd)Pyrene	193395				0.0028 †	0.0311 †
93	Isophorone	78591				6900 *	490000 *
94	Naphthalene	91203					
95	Nitrobenzene	98953				17 *	1900 *
96	N-Nitrosodimethylamine	62759				0.00069 *†	8.1 *†
97	N-Nitrosodi-n-Propylamine	621647				0.005 *†	8.5 *†
98	N-Nitrosodiphenylamine	86306				5.0 *†	16 *†
99	Phenanthrene	85018				0.0028 †	0.0311 †
100	Pyrene	129000				0.0028 †	0.0311 †
101	1,2,4-Trichlorobenzene	120821					
102	Aldrin	309002	3 †		1.3 †	0.00013 *†	0.00014 *†
103	alpha-BHC	319846				0.0039 *†	0.013 *†
104	beta-BHC	319857				0.014 *†	0.046 *†
105	gamma-BHC	58899	2 †	0.08 †	0.16 †	0.019 †	0.063 †
106	delta-BHC	319868					
107	Chlordane	57749	2.4 †	0.0043 †	0.09 †	0.004 †	0.00058 *†
108	4,4'-DDT	50293	1.1 †	0.001 †	0.13 †	0.001 †	0.00059 *†
109	4,4'-DDE	72559					0.00059 *†
110	4,4'-DDD	72548					0.00083 *†
111	Dieldrin	60571	2.5 †	0.0019 †	0.71 †	0.0019 †	0.00014 *†
112	alpha-Endosulfan	959988	0.22 †	0.056 †	0.034 †	0.0087 †	0.93 *
113	beta-Endosulfan	33213659	0.22 †	0.056 †	0.034 †	0.0087 †	2.0 *
114	Endosulfan Sulfate	1031078					0.93 *
115	Endrin	72208	0.18 †	0.0023 †	0.037 †	0.0023 †	0.76 *
116	Endrin Aldehyde	7421934					0.81 *
117	Heptachlor	76448	0.52 †	0.0038 †	0.053 †	0.0036 †	0.00021 *†
118	Heptachlor Epoxide	1024573	0.52 †	0.0038 †	0.053 †	0.0036 †	0.00011 *†
119	PCB-1242	1336363		0.014 †		0.03 †	0.000044 *†
120	PCB-1254	11097691		0.014 †		0.03 †	0.000044 *†
121	PCB-1221	11104282		0.014 †		0.03 †	0.000044 *†
122	PCB-1232	11141165		0.014 †		0.03 †	0.000044 *†
123	PCB-1248	12672296		0.014 †		0.03 †	0.000044 *†
124	PCB-1260	11096825		0.014 †		0.03 †	0.000044 *†
125	PCB-1016	12674112		0.014 †		0.03 †	0.000044 *†
126	Toxaphene	8001352	0.73	0.0002	0.21	0.0002	0.00073 *†

- * Criteria revised to reflect current agency q_1^* or RfD, as contained in the Integrated Risk Information System (IRIS).
- ** Freshwater aquatic life criteria for these metals are expressed as a function of total hardness (mg/L), as follows (where exp represents the base e exponential function). (Values displayed above correspond to a total hardness of 100 mg/L.)

	CMC = $\exp(n_a \ln(\text{hardness}) + b_a)$		CCC = $\exp(n_c \ln(\text{hardness}) + b_c)$	
	n_a	b_a	n_c	b_c
Cadmium	1.128	-3.828	0.7852	-3.490
Copper	0.9422	-1.464	0.8545	-1.465
Chromium (III)	0.8190	3.688	0.8190	1.561
Lead	1.273	-1.460	1.273	-4.705
Nickel	0.8460	3.3612	0.8460	1.1645
Silver	1.72	-6.52		
Zinc	0.8473	0.8604	0.8473	0.7614

*** Freshwater aquatic life criteria for pentachlorophenol are expressed as a function of pH, and are calculated as follows. (Values displayed above correspond to a pH of 7.8.)

$$\text{CMC} = \exp(1.005(\text{pH}) - 4.830) \quad \text{CCC} = \exp(1.005(\text{pH}) - 5.290)$$

† Criteria based on carcinogenicity (10^{-4} risk).

‡ Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development. The acute values shown are final acute values (fav) and according to the 1980 Guidelines the Acute values were intended to be interpreted as instantaneous maximum values, and the chronic values shown were interpreted as 24 - hour average values. EPA has not updated these criteria pursuant to the 1985 Guidelines. However, as an approximation, dividing the final acute values in columns B1 and C1 by 2 yields a Criterion Maximum Concentration. No numeric changes are required for columns B2 and C2, and EPA suggests using these values directly as Criterion Continuous Concentration.

GENERAL NOTES:

- 1) This chart lists all of EPA's priority toxic pollutants whether or not criteria recommendations are available. Blank spaces indicate the absence of criteria recommendations.
- 2) The following chemicals have organoleptic based criteria recommendations that are not included on this chart (for reasons which are discussed in the preamble):

Copper	2,4-Dimethylphenol
Zinc	3-Methyl-4-Chlorophenol

3) For purposes of this rulemaking, freshwater criteria apply at salinity levels equal to or less than 5 parts per thousand (ppt); saltwater criteria apply at salinity levels greater than 5 ppt (0/00).

1/15/90