

OHIO EPA SURFACE WATER QUALITY CRITERION FACT SHEET

Page 1 of 20

Chemical Name: Phenol Developed by: Chris SkalskiCAS # 108-95-2 Reviewed by: Bob HeitzmanInternal Code # 110 Fact Sheet Preparation Date: 4-17-01Data Retrieval Date: 3-01-06ACUTE DATA

<u>SPECIES</u>	<u>EC₅₀/LC₅₀</u> <u>(µg/l)</u>	<u>TEST TYPE^a</u>	<u>DURATION</u> <u>(HOURS)</u>	<u>SMAV^b</u> <u>(µg/l)</u>	<u>GMAV^b</u> <u>(µg/l)</u>	<u>REFERENCE</u> <u>NUMBER</u>
Cladoceran	4,200	S,M	48	12,600	22,205	1
<i>Daphnia magna</i>	4,240	S,M	48			1
	5,500	S,U	48			2
	6,600	S,M	48			3
	7,000	S,U	48			23
	8,600	S,U	48			5
	9,592	R,U	48			6
	9,600	S,U	48			7
	9,600 ^c	S,U	48			8
	9,600 ^c	S,U	48			9
	10,000	S,U	48			10
	11,200	S,U	48			5
	11,200 ^c	S,U	48			14
	11,500	S,U	48			5
	11,800	S,U	48			30
	12,000 ^c	S,U	48			11
	12,600	F,M	48			12
	12,800	S,U	48			13
	13,000 ^d	S,U	48			13
	13,300	S,U	48			5
	13,300 ^c	S,U	48			14
	14,500	S,U	48			5
	14,500 ^c	S,U	48			14
	15,000	S,U	48			15
	19,800	S,M	48			16
	21,000	S,U	48			23
	21,300	S,U	48			5
	23,000	S,M	48			17
	23,500	S,U	48			18
	30,100	R,M	48			20
	32,000	S,U	48			21
	88,000	S,M	48			22
	91,000	S,M	48			22
	91,200	S,M	48			22
	92,000	S,M	48			22
	100,000	S,M	48			22
	100,000	S,U	48			23

^a S = static; R = renewal; F = flow through; M = measured; U = unmeasured.^b SMAV = Species Mean Acute Value; GMAV = Genus Mean Acute Value.^c Duplicate data not used to calculate the SMAV.^d Data not used to calculate the SMAV since the organisms were fed during testing.

OHIO EPA SURFACE WATER QUALITY CRITERION FACT SHEET

Page 2 of 20

Chemical Name: Phenol Developed by: Chris SkalskiCAS # 108-95-2 Reviewed by: Bob HeitzmanInternal Code # 110 Fact Sheet Preparation Date: 4-17-01Data Retrieval Date: 3-01-06ACUTE DATA

<u>SPECIES</u>	<u>EC₅₀/LC₅₀ (μg/l)</u>	<u>TEST TYPE^a</u>	<u>DURATION (HOURS)</u>	<u>SMAV^b (μg/l)</u>	<u>GMAV^b (μg/l)</u>	<u>REFERENCE NUMBER</u>
Cladoceran	14,000	R,U	48	15,875		74
<i>Daphnia longispina</i>	18,000	S,U	48			24
Cladoceran	>109,000	F,M	48	>109,000		25
<i>Daphnia pulicaria</i>	>109,000 ^c	F,M	48			26
Cladoceran	18,000	R,U	48	54,737		74
<i>Daphnia pulex</i>	28,000	S,U	48			75
	36,000	S,U	48			24
	79,000	S,M	48			22
	81,000	S,M	48			22
	85,000	S,M	48			22
	87,800	S,M	48			22
	93,000	S,M	48			22
Cladoceran	47,000	S,U	48	47,000	47,000	24
<i>Lynceus brachyurus</i>						

^a S = static; R = renewal; F = flow through; M = measured; U = unmeasured.^b SMAV = Species Mean Acute Value; GMAV = Genus Mean Acute Value.^c Duplicate data not used to calculate the SMAV.

OHIO EPA SURFACE WATER QUALITY CRITERION FACT SHEET

Page 3 of 20

Chemical Name: Phenol Developed by: Chris SkalskiCAS # 108-95-2 Reviewed by: Bob HeitzmanInternal Code # 110 Fact Sheet Preparation Date: 4-17-01Data Retrieval Date: 3-01-06ACUTE DATA

<u>SPECIES</u>	<u>EC₅₀/LC₅₀</u> <u>(µg/l)</u>	<u>TEST TYPE^a</u>	<u>DURATION</u> <u>(HOURS)</u>	<u>SMAV^b</u> <u>(µg/l)</u>	<u>GMAV^b</u> <u>(µg/l)</u>	<u>REFERENCE</u> <u>NUMBER</u>
Cladoceran <i>Bosmina coregoni</i>	36,000	S,U	48	36,000	36,000	24
Cladoceran <i>Chydorus sphaericus</i>	20,000	S,U	48	20,000	20,000	24
Cladoceran <i>Sida crystallina</i>	6,000	S,U	48	6,000	6,000	24
Cladoceran <i>Polyphemus pediculus</i>	57,000	R,U	48	57,000	57,000	74
Cladoceran <i>Ceriodaphnia dubia</i>	3,000	S,M	48	6,855	16,968	4
	3,100	S,M	48			27
	3,810	S,U	48			5
	4,300	S,U	48			13
	4,300 ^c	S,U	48			5
	4,470	S,U	48			5
	4,650	S,U	48			5
	7,800	S,U	48			5
	12,100 ^c	S,U	48			5
	13,200	S,U	48			5
	14,000	S,U	48			28
	17,200	S,U	48			5
	20,000 ^d	S,U	48			13
	20,000	S,U	48			14
Cladoceran <i>Ceriodaphnia pulchella</i>	42,000	S,U	48	42,000		24

^a S = static; R = renewal; F = flow through; M = measured; U = unmeasured.^b SMAV = Species Mean Acute Value; GMAV = Genus Mean Acute Value.^c Duplicate data not used to calculate the SMAV.^d Data not used to calculate the SMAV since the organisms were fed during testing.

OHIO EPA SURFACE WATER QUALITY CRITERION FACT SHEET

Page 4 of 20

Chemical Name: Phenol Developed by: Chris SkalskiCAS # 108-95-2 Reviewed by: Bob HeitzmanInternal Code # 110 Fact Sheet Preparation Date: 4-17-01Data Retrieval Date: 3-01-06ACUTE DATA

<u>SPECIES</u>	<u>EC₅₀/LC₅₀</u> <u>(µg/l)</u>	<u>TEST TYPE^a</u>	<u>DURATION</u> <u>(HOURS)</u>	<u>SMAV^b</u> <u>(µg/l)</u>	<u>GMAV^b</u> <u>(µg/l)</u>	<u>REFERENCE</u> <u>NUMBER</u>
Copepod <i>Cyclops vernalis</i>	122,000	S,U		122,000	122,000	30
Copepod <i>Mesocyclops leukarti</i>	108,000	S,U		108,000	108,000	30
Copepod <i>Diaptomus forbesi</i>	39,700	S,U	96	39,700	39,700	31
Ostracod ^c <i>Cypris subglobosa</i>	71,780	S,U	96			32
Rotifer <i>Philodina acuticornis</i>	248,000	S,U	96	243,967	243,967	33
	240,000	S,U	96			64
	260,000 ^d	S,U	96			33
Oligochaete Worm <i>Lumbriculus variegatus</i>	35,600	S,U	96	70,873	70,873	34
	100,000	S,U	96			35
	100,000	S,U	96			35
Tubificid Worm <i>Limnodrilus hoffmeisteri</i>	780,000	F,M	96	780,000	780,000	36
Flatworm <i>Dugesia tigrina</i>	157,000	S,U	96	66,676	66,676	37
	32,000	S,U	96			35
	59,000	S,U	96			35
Tubellarian Worm <i>Polycelis tenuis</i>	88,000	F,M	96	88,000	88,000	36
Mayfly <i>Baetis rhodani</i>	15,500	F,M	96	15,500	15,500	36
Midge <i>Tanytarsus dissimilis</i>	>51,100	F,M	48	>51,100	>51,100	12
Midge <i>Einfeldia natchitochae</i>	69,800	S,U	48	69,800	69,800	38

^a S = static; R = renewal; F = flow through; M = measured; U = unmeasured.^b SMAV = Species Mean Acute Value; GMAV = Genus Mean Acute Value.^c Nonresident species; data not used to calculate a SMAV.^d Duplicate data not used to calculate the SMAV.

OHIO EPA SURFACE WATER QUALITY CRITERION FACT SHEET

Page 5 of 20

Chemical Name: Phenol Developed by: Chris SkalskiCAS # 108-95-2 Reviewed by: Bob HeitzmanInternal Code # 110 Fact Sheet Preparation Date: 4-17-01Data Retrieval Date: 3-01-06ACUTE DATA

<u>SPECIES</u>	<u>EC₅₀/LC₅₀</u> <u>(µg/l)</u>	<u>TEST TYPE^a</u>	<u>DURATION</u> <u>(HOURS)</u>	<u>SMAV^b</u> <u>(µg/l)</u>	<u>GMAV^b</u> <u>(µg/l)</u>	<u>REFERENCE</u> <u>NUMBER</u>
Midge	187,100	S,U	48	140,162	456,376	38
<i>Chironomus tentans</i>	187,200 ^c	S,U	48			38
	105,000	S,M	48			16
Midge	530,000	S,U	48	1,356,337		24
<i>Chironomus plumosus</i>	530,000 ^c	S,U	48			81
	1,320,000	S,U	48			39
	1,320,000 ^c	S,U	48			63
	2,150,000	S,U	48			39
	2,150,000 ^c	S,U	48			63
	2,250,000	S,U	48			63
Midge	500,000	F,M	48	500,000		36
<i>Chironomus riparius</i>						
Midge	830,000 ^c	S,U	48	1,222,293	1,222,293	24
<i>Psectrocladius psilopterus</i>	830,000	S,U	48			39
	1,800,000	S,U	48			39
Midge	70,000	S,U	48	70,000	70,000	38
<i>Tanytus neopunctipennis</i>	72,700 ^c	S,U	48			38
Midge	80,500	S,U	48	80,500	80,500	38
<i>Clinotanypus pinguis</i>	80,500 ^c	S,U	48			38
Midge	400,000	S,U	48	400,000	400,000	24
<i>Pentaneura monilus</i>						
Midge	50,000	S,U	48	50,000	50,000	24
<i>Mochlonyx culiciformis</i>						
Midge	100,000	S,U	48	100,000	100,000	24
<i>Orthocladus sp.</i>						
Midge	50,000	S,U	48	50,000	50,000	24
<i>Cryophila lapponica</i>						
Midge	240,000	S,U	48	240,000	240,000	24
<i>Chaoborus crystallinus</i>						

^a S = static; R = renewal; F = flow through; M = measured; U = unmeasured.^b SMAV = Species Mean Acute Value; GMAV = Genus Mean Acute Value.^c Duplicate data not used to calculate the SMAV.

OHIO EPA SURFACE WATER QUALITY CRITERION FACT SHEET

Page 6 of 20

Chemical Name: Phenol Developed by: Chris SkalskiCAS # 108-95-2 Reviewed by: Bob HeitzmanInternal Code # 110 Fact Sheet Preparation Date: 4-17-01Data Retrieval Date: 3-01-06ACUTE DATA

<u>SPECIES</u>	<u>EC₅₀/LC₅₀ (µg/l)</u>	<u>TEST TYPE^a</u>	<u>DURATION (HOURS)</u>	<u>SMAV^b (µg/l)</u>	<u>GMAV^b (µg/l)</u>	<u>REFERENCE NUMBER</u>
Snail 100,000 <i>Helisoma trivolvis</i>	S,U 100,000	96 S,U	100,000 96	100,000	35	35
Snail ^c <i>Indoplanorbis exustus</i>	125,750	S,U	96			40
Snail ^c <i>Lymnaea acuminata</i>	128.75	R,U	96			41
Snail ^c <i>Lymnaea luteola</i>	102,600	S,U	96			42
Snail 94,000 <i>Physella heterostrophra</i>	S,U	96	94,000	94,000	43	
Snail >51,100 <i>Aplexa hypnorum</i>	F,M	96	>51,100	>51,100	12	
Snail ^c <i>Viviparus bengalensis</i>	69,000	S,U	96			44
Caddisfly <i>Hydropsyche angustipennis</i>	260,000	F,M	96	260,000	260,000	36
Isopod ^c <i>Asellus aquaticus</i>	180,000	F,M	96			36
Isopod <i>Asellus intermedius</i>	25,000 100,000	S,U S,U	96 96	50,000	50,000	35 35
Amphipod <i>Gammarus fasciatus</i>	21,000 25,000	S,U S,U	96 96	22,913	34,524	35 35
Amphipod <i>Gammarus pulex</i>	40,000 51,000 69,000	R,U R,U F,M	96 96 96	69,000		47 47 36

^a S = static; R = renewal; F = flow through; M = measured; U = unmeasured.^b SMAV = Species Mean Acute Value; GMAV = Genus Mean Acute Value.^c Nonresident species; data not used to calculate a SMAV.

OHIO EPA SURFACE WATER QUALITY CRITERION FACT SHEET

Page 7 of 20

Chemical Name: Phenol Developed by: Chris SkalskiCAS # 108-95-2 Reviewed by: Bob HeitzmanInternal Code # 110 Fact Sheet Preparation Date: 4-17-01Data Retrieval Date: 3-01-06ACUTE DATA

<u>SPECIES</u>	<u>EC₅₀/LC₅₀ (µg/l)</u>	<u>TEST TYPE^a</u>	<u>DURATION (HOURS)</u>	<u>SMAV^b (µg/l)</u>	<u>GMAV^b (µg/l)</u>	<u>REFERENCE NUMBER</u>
Zebra Danio ^c	29,000	F,M	96			48
<i>Brachydanio rerio</i>	27,800	S,U	96			65
Bengal Danio ^c	28,100	F,U	96			49
<i>Danio devario</i>	29,200	F,U	96			49
Flying Barb ^c	30,400	F,U	96			49
<i>Esomus danricus</i>	30,600	F,U	96			49
Mosquitofish	15,100	F,U	96	24,122	24,122	49
<i>Gambusia affinis</i>	15,400	F,U	96			49
	26,000	S,M	96			50
	56,000	S,U	96			51
Goldfish	44,490	S,U	96	44,490	44,490	52
<i>Carassius auratus</i>						
White Sucker	10,600	F,M	96	10,600	10,600	12
<i>Catostomus commersoni</i>						
Minnow ^c	12,100	F,U	96			49
<i>Chela atpar</i>	13,200	F,U	96			49
Giant Gourami ^c	9,100	R,U	96			53
<i>Colisa fasciata</i>	28,930	R,U	96			53
	32,700	S,U	96			53
	49,180	R,U	96			53
Channel Catfish	16,700	S,U	96	16,700	16,700	55
<i>Ictalurus punctatus</i>						
Flagfish	36,300	F,M	96	36,300	36,300	48
<i>Jordanella floridae</i>						
Japanese Medaka ^c	29,300	S,U	96			56
<i>Oryzias latipes</i>	38,300	F,M	96			57

^a S = static; F = flow through; R = renewal; U = unmeasured; M = measured.^b SMAV = Species Mean Acute Value; GMAV = Genus Mean Acute Value.^c Nonresident species; data not used to calculate a SMAV.

OHIO EPA SURFACE WATER QUALITY CRITERION FACT SHEET

Page 8 of 20

Chemical Name: Phenol Developed by: Chris SkalskiCAS # 108-95-2 Reviewed by: Bob HeitzmanInternal Code # 110 Fact Sheet Preparation Date: 4-17-01Data Retrieval Date: 3-01-06ACUTE DATA

<u>SPECIES</u>	<u>EC₅₀/LC₅₀</u> <u>(µg/l)</u>	<u>TEST TYPE^a</u>	<u>DURATION</u> <u>(HOURS)</u>	<u>SMAV^b</u> <u>(µg/l)</u>	<u>GMAV^b</u> <u>(µg/l)</u>	<u>REFERENCE</u> <u>NUMBER</u>
Pool Barb ^c	13,700	F,U	96			49
<i>Puntius sofore</i>	14,500	F,U	96			49
Ticto Barb ^c	15,400	F,U	96			49
<i>Puntius ticto</i>	15,600	F,U	96			49
Medaka ^c	9,300	F,U	96			49
<i>Oryzias melanostigma</i>	9,900	F,U	96			49
Bald Glassy ^c	5,600	F,U	96			49
<i>Ambassis gymnocephalus</i>	8,100	F,U	96			49
Blue Panchax ^c	9,400	F,U	96			49
<i>Aplocheilus panchax</i>	9,600	F,U	96			49
Tilapia	19,000	S,M	96	19,000	19,000	50
<i>Tilapia mossambica</i>						
Stinging Catfish ^c	12,970	R,U	96			53
<i>Saccobranchus fossilis</i>	37,400	R,U	96			53
	39,400	R,U	96			53
	54,080	R,U	96			53
Freshwater Prawn ^c	16,660	F,M	96			46
<i>Macrobrachium rosenbergii</i>	22,030	F,M	96			46
	22,040	F,M	96			46
Frog	>51,000	F,M	96	>51,000	>51,000	12
<i>Xenopus laevis</i>						

^a S = static; F= flow through; R = renewal; U = unmeasured; M = measured.^b SMAV = Species Mean Acute Value; GMAV = Genus Mean Acute Value.^c Nonresident species; data not used to calculate a SMAV.

OHIO EPA SURFACE WATER QUALITY CRITERION FACT SHEET

Page 9 of 20

Chemical Name: Phenol Developed by: Chris SkalskiCAS # 108-95-2 Reviewed by: Bob HeitzmanInternal Code # 110 Fact Sheet Preparation Date: 4-17-01Data Retrieval Date: 3-01-06ACUTE DATA

<u>SPECIES</u>	<u>EC₅₀/LC₅₀</u> <u>(µg/l)</u>	<u>TEST TYPE^a</u>	<u>DURATION</u> <u>(HOURS)</u>	<u>SMAV^b</u> <u>(µg/l)</u>	<u>GMAV^b</u> <u>(µg/l)</u>	<u>REFERENCE</u> <u>NUMBER</u>
Bluegill	11,500	R,U	96	17,400	17,400	60
<i>Lepomis macrochirus</i>	13,500	R,U	96			60
	13,500	S,U	96			43
	17,400	F,M	96			12
	19,300	R,M	96			61
	20,000	R,U	96			60
	23,880	S,U	96			52
Fathead Minnow	23,000	S,U	96	31,115	31,115	67
<i>Pimephales promelas</i>	24,000	F,M	96			68
	24,000	F,M	96			69
	24,600 ^d	F,M	96			69
	24,800	F,M	96			70
	24,900	F,M	96			25
	25,300	F,M	96			12
	25,600	S,M	96			16
	27,300 ^d	F,M	96			69
	28,000	F,M	96			71
	28,780 ^c	F,M	96			30
	28,800	F,M	96			72
	29,000	F,M	96			71
	31,200	S,U	96			67
	32,000	S,U	96			73
	32,000	S,U	96			35
	32,000	S,U	96			52
	32,400	F,M	96			72
	34,270	S,U	96			52
	36,000	F,M	96			68
	40,000	S,U	96			35
	43,700	S,U	96			67
	49,700	F,M	96			72
	67,500 ^c	F,M	96			26
	67,500	F,M	96			25

^a S = static; F = flow through; R = renewal; U = unmeasured; M = measured.^b SMAV = Species Mean Acute Value; GMAV = Genus Mean Acute Value.^c Indicates duplicate data not used to calculate the SMAV.^d Toxicity test was conducted using a phenol mixture and therefore this datum was not included in the SMAV calculation.

OHIO EPA SURFACE WATER QUALITY CRITERION FACT SHEET

Page 10 of 20

Chemical Name: Phenol Developed by: Chris SkalskiCAS # 108-95-2 Reviewed by: Bob HeitzmanInternal Code # 110 Fact Sheet Preparation Date: 4-17-01Data Retrieval Date: 3-01-06ACUTE DATA

<u>SPECIES</u>	<u>EC₅₀/LC₅₀</u> <u>(µg/l)</u>	<u>TEST TYPE^a</u>	<u>DURATION</u> <u>(HOURS)</u>	<u>SMAV^b</u> <u>(µg/l)</u>	<u>GMAV^b</u> <u>(µg/l)</u>	<u>REFERENCE</u> <u>NUMBER</u>
Rainbow Trout	5,020	R,U	96	9,144	9,144	62
<i>Oncorhynchus mykiss</i>	6,082	F,M	96			29
	8,900	F,M	96			25
	8,900 ^c	F,M	96			26
	9,694	F,M	96			66
	9,900	S,U	96			22
	10,500	F,M	96			12
	11,600	F,M	96			48
Indian Catfish ^d	12,970	R,U	96			53
<i>Heteropneustes fossilis</i>	30,500	S,U	96			76
	37,400	R,U	96			53
	39,400 ^c	S,U	96			54
	39,400	R,U	96			53
	54,080	R,U	96			53
Featherback ^d	2,480	R,U	96			53
<i>Notopterus notopterus</i>	6,650	S,U	96			77
	6,850	S,U	96			80
	8,150	S,U	96			79
	8,150 ^c	S,U	96			45
	11,500	R,U	96			53
	12,530	R,U	96			53
	12,530 ^c	S,U	96			54
	12,530 ^c	S,U	96			77
	12,530 ^c	S,U	96			78
	12,530 ^c	S,U	96			79
	13,050	S,U	96			79
	13,400	S,U	96			79
	13,600	S,U	96			79
	18,150	S,U	96			77
	29,200	R,U	96			53
Guppy	31,000	S,M	96	38,644	38,644	50
<i>Poecilia reticulata</i>	39,190	S,U	96			52
	40,000 ^e	R,M	96			58
	44,000 ^e	R,M	96			58
	47,500	R,U	96			59

^a S = static; F= flow through; R = renewal; U = unmeasured; M = measured.^b SMAV = Species Mean Acute Value; GMAV = Genus Mean Acute Value.^c Indicates duplicate data not used to calculate the SMAV.^d Nonresident species; data not used to calculate a SMAV.^e Data not used to calculate the SMAV because the test organisms were fed during the toxicity test.

OHIO EPA SURFACE WATER QUALITY CRITERION FACT SHEET

Page 11 of 20

Chemical Name: Phenol Developed by: Chris SkalskiCAS # 108-95-2 Reviewed by: Bob HeitzmanInternal Code # 110 Fact Sheet Preparation Date: 4-17-01Data Retrieval Date: 3-01-06CHRONIC DATA

<u>SPECIES</u>	<u>CHRONIC VALUE</u> <u>(µg/l)</u>	<u>SMCV^a</u> <u>METHOD</u>	<u>GMCV^a</u> <u>(µg/l)</u>	<u>REFERENCE</u> <u>(µg/l)</u>	<u>NUMBER</u>
Fathead Minnow <i>Pimephales promelas</i>	2,556 (1,830-3,570)	Early Life Stage	1,758	1,758	19
Fathead Minnow <i>Pimephales promelas</i>	1,369 (750-2,500)	Early Life Stage	-----	-----	25
Cladoceran <i>Ceriodaphnia dubia</i>	4,456 (3,630-5,470)	3-Brood Test	4,456	4,456	4
Japanese Medaka ^b <i>Oryzias latipes</i>	3,939 (2,630-5,900)	Early Life Stage	-----	-----	57
Rainbow Trout <i>Oncorhynchus mykiss</i>	157 (118-209)	Early Life Stage	157	157	29
Rainbow Trout <i>Oncorhynchus mykiss</i>	<200 ^c	Early Life Stage	-----	-----	25

^a SMCV = Species Mean Chronic Value; GMCV = Genus Mean Chronic Value.^b Nonresident species; data not used to calculate a SMCV.^c This value was not used in determining the SMCV since it was not a definitive value and other definitive chronic data are available for this species.

OHIO EPA SURFACE WATER QUALITY CRITERION FACT SHEET

Page 12 of 20

Chemical Name: Phenol Developed by: Chris Skalski

CAS # 108-95-2 Reviewed by: Bob Heitzman

Internal Code # 110 Fact Sheet Preparation Date: 4-17-01

Data Retrieval Date: 3-01-06

REFERENCES

1. Lewis, M.A. 1983. Effect of Loading Density on the Acute Toxicities of Surfactants, Copper, and Phenol to *Daphnia magna* Straus. Arch. Environ. Contam. Toxicol. 12(1):51-55.
2. Crisinel, A., L. Delaunay, D. Rossel, J. Tarradellas, H. Meyer, H. Saiah, P. Vogel, C. Delisle and C. Blaise. 1994. Cyst-Based Ecotoxicological Tests Using Anostracans: Comparison of Two Species of Streptocephalus. Environ. Toxicol. Water Qual. 9(4):317-326.
3. Keen, R. And C.R. Baillod. 1985. Toxicity to *Daphnia* of the End Products of Wet Oxidation of Phenol and Substituted Phenols. Water Res. 19(6):767-772.
4. Winner, R. 1988. Results of Phenol *Ceriodaphnia dubia* Acute Test Conducted by R. Winner (Cooperative Agreement). Sept. 1987, Oct. 1987, and Feb 1988 memos to R. Spehar, U.S. EPA, Duluth, MN.
5. Cowgill, U.M., I.T. Takahashi and S.L. Applegath. 1985. A Comparison of the Effect of Four Benchmark Chemicals on *Daphnia magna* and *Ceriodaphnia dubia affinis* Tested at Two Different Temperatures. Environ. Toxicol. Chem. 4(3):415-422.
6. Arambasic, M.B., S. Bjelic and G. Subakov. 1995. Acute Toxicity of Heavy Metals (Copper, Lead, Zinc), Phenol, and Sodium on *Allium cepa* L., *Lepidium sativum* L. and *Daphnia magna* St.: Comparative Investigations and the Practical Applications. Water Res. 29(2):497-503.
7. Kopperman, H.L., R.M. Carlson and R. Caple. 1974. Aqueous Chlorination and Ozonation Studies. I. Structure-Toxicity Correlations of Phenolic Compounds to *Daphnia magna*. Chem.-Biol. Interact. 9(4):245-251.
8. Carlson, R.M., H.L. Kopperman, R. Caple and R.E. Carlson. 1975. Structure-Activity Relationships Applied. In: International Joint Commission Symposium. Structure-Activity Correlations in Studies of Toxicity and Bioconcentration with Aquatic Organisms. March 11-13, 1975, Canada Center for Inland Waters, Burlington, Ontario, Canada: 57-72.
9. Carlson, R.M. and R. Caple. 1977. Chemical/Biological Implications of Using Chlorine and Ozone for Disinfection. EPA-600/3-77-066, U.S. EPA, Duluth, MN:88 p.
10. Kuhn, R., M. Pattard, K. Pernak and A. Winter. 1989. Results of the Harmful Effects of Selected Water Pollutants (Anilines, Phenols, Aliphatic Compounds) to *Daphnia magna*. Water Res. 23(4):495-499.
11. LeBlanc, G.A. 1980. Acute Toxicity of Priority Pollutants to Water Flea (*Daphnia magna*). Bull. Environ. Contam. Toxicol. 24(5):684-691.
12. Holcombe, G.W., G.L. Phipps, A.H. Sulaiman and A.D. Hoffman. 1987. Simultaneous Multiple Species Testing: Acute Toxicity of 13 Chemicals to 12 Diverse Freshwater Amphibian, Fish, and Invertebrate Families. Arch. Environ. Contam. Toxicol. 16:697-710.
13. Cowgill, U.M. and D.P. Milazzo. 1991. The Sensitivity of *Ceriodaphnia dubia* and *Daphnia magna* to Seven Chemicals Utilizing the Three-Brood Test. Arch. Environ. Contam. Toxicol. 20(2):211-217.
14. Gersich, F.M., F.A. Blanchard, S.L. Applegath and C.N. Park. 1986. The Precision of Daphnid (*Daphnia magna* Straus, 1820) Static Acute Toxicity Tests. Arch. Environ. Contam. Toxicol. 15(6):741-749.

OHIO EPA SURFACE WATER QUALITY CRITERION FACT SHEET

Page 13 of 20

Chemical Name: Phenol Developed by: Chris Skalski

CAS # 108-95-2 Reviewed by: Bob Heitzman

Internal Code # 110 Fact Sheet Preparation Date: 4-17-01

Data Retrieval Date: 3-01-06

REFERENCES

15. Janssen, C.R. and G. Persoone. 1993. Rapid Toxicity Screening Tests for Aquatic Biota. 1. Methodology and Experiments with *Daphnia magna*. Environ. Toxicol. Chem. 12:711-717.
16. Millemann, R.E., W.J. Birge, J.A. Black, R.M. Cushman, K.L. Daniels, P.J. Franco, J.M. Giddings, J.F. McCarthy and A.J. Stewart. 1984. Comparative Acute Toxicity to Aquatic Organisms of Components of Coal-Derived Synthetic Fuels. Trans. Am. Fish. Soc. 113(1):74-85.
17. Hermens, J., H. Canton, N. Steyger and R. Wegman. 1984. Joint Effects of a Mixture of 14 Chemicals on Mortality and Inhibition of Reproduction of *Daphnia magna*. Aquat. Toxicol. 5(4):315-322.
18. Randall, T.L. and P.V. Knopp. 1980. Detoxification of Specific Organic Substances by Wet Oxidation. J. Water Pollut. Control Fed. 52(8):2117-2130.
19. Holcombe, G.W., G.L. Phipps and J.T. Fiandt. 1982. Effects of Phenol, 2,4-Dimethylphenol, 2,4-Dichlorophenol, and Pentachlorophenol on Embryo, Larval, and Early-Juvenile Fathead Minnows (*Pimephales promelas*). Arch. Environm. Contam. Toxicol. 11:73-78.
20. Parkhurst, B.R., A.S. Bradshaw, J.L. Forte and G.P. Wright. 1979. An Evaluation of the Acute Toxicity to Aquatic Biota of a Coal Conversion Effluent and its Major Components. Bull. Environ. Contam. Toxicol. 23(3):349-356.
21. Qureshi, A.A., K.W. Flood, S.R. Thompson, S.M. Janhurst, C.S. Inniss and D.A. Rokosh. 1982. Comparison of a Luminescent Bacterial Test with Other Bioassays for Determining Toxicity of Pure Compounds and Complex Effluents. In: J.G. Pearson, R.B. Foster and W.E. Bishop (Eds.), Aquatic Toxicology and Hazard Assessment, 5th Conference, ASTM STP 766, Philadelphia, PA:179-195.
22. Cairns, J., A.L. Buikema, Jr., A.G. Heath and B.C. Parker. 1978. Effects of Temperature on Aquatic Organism Sensitivity to Selected Chemicals. Va. Water Resour. Res. Center, Bull. 106, Office of Water Res. And Technol., OWRT Project B-084-VA, Virginia Polytechnic Institute State University, Blacksburg, VA:88 p.
23. Dowden, B.F. and H.J. Bennett. 1965. Toxicity of Selected Chemicals to Certain Animals. J. Water Pollut. Control Fed. 37(9):1308-1316.
24. Kamshilov, M.M. and B.A. Flerov. 1976. Experimental Research on Phenol Intoxication of Aquatic Organisms and Destruction of Phenol in Model Communities. In: D.I. Mount, W.R. Swain, N.K. Ivanikiw (Eds.), Proc. 1st and 2nd USA-USSR Symp. On Effects of Polutants Upon Aquatic Ecosystems, Duluth, MN:181-192.
25. DeGraeve, G.M., D.L. Geiger, J.S. Meyer and H.L. Bergman. 1980. Acute and Embryo-Larval Toxicity of Phenolic Compounds to Aquatic Biota. Arch. Environ. Contam. Toxicol. 9(5):557-568.
26. DeGraeve, G.M., R.L. Overcast and H.L. Bergman. 1980. Toxicity of Underground Coal Gasification Condenser Water and Selected Constituents to Aquatic Biota. Arch. Environ. Contam. Toxicol. 9(5):543-555.
27. Oris, J.T., R.W. Winner and M.V. Moore. 1991. A Four-Day Survival and Reproduction Toxicity Test for *Ceriodaphnia dubia*. Environ. Toxicol. Chem. 10(2):217-224.

OHIO EPA SURFACE WATER QUALITY CRITERION FACT SHEET

Page 14 of 20

Chemical Name: Phenol Developed by: Chris Skalski

CAS # 108-95-2 Reviewed by: Bob Heitzman

Internal Code # 110 Fact Sheet Preparation Date: 4-17-01

Data Retrieval Date: 3-01-06

REFERENCES

28. Jung, K., G. Bitton and B. Koopman. 1996. Selective Assay for Heavy Metal Toxicity Using a Fluorogenic Substrate. *Environ. Toxicol. Chem.* 15(5):711-714.
29. Spehar, R. 1989. Aquatic Toxicity Test Information on Phenol with Rainbow Trout (*Salmo gairdneri*). U.S. EPA, Duluth, MN: 3p. May 26 memo to D. Call, Center for Lake Superior Environmental Studies, Univ. of Wisconsin, Superior, WI.
30. U.S. EPA. 1980. Ambient Water Quality Criteria for Phenol. EPA 440/5-80-066.
31. Saha, M.K. and S.K. Konar. 1983. Acute Toxicity of Some Petroleum Pollutants to Plankton and Fish. *Environ. Ecol.* 1(1):117-119.
32. Rao, P.S., V.S. Durve, B.S. Khangarot and S.S. Shekhawat. 1983. Acute Toxicity of Phenol, Pentachlorophenol and Sodium Pentachlorophenate to a Freshwater Ostracod *Cypris subglobosa* (Sowerby). *Acta. Hydrochim. Hydrobiol.* 11(4):457-465.
33. Buikema, A.L. Jr., J. Cairns, Jr. and G.W. Sullivan. 1974. Evaluation of *Philodina acuticornis* (Rotifera) as Bioassay Organism for Heavy Metals. *Water Resour. Bull. Am. Water Res. Assoc.* 10(4):648-661.
34. Hickey, C.W. and M.L. Martin. 1995. Relative Sensitivity of Five Benthic Invertebrate Species to Reference Toxicants and Resin-Acid Contaminated Sediments. *Environ. Toxicol. Chem.* 14(8):1401-1409.
35. Ewell, W.S., J.W. Gorsuch, R.O. Kringle, K.A. Robillard and R.C. Spiegel. 1986. Simultaneous Evaluation of the Acute Effects of Chemicals on Seven Aquatic Species. *Environ. Toxicol. Chem.* 5(9):831-840.
36. Green, D.W.J., K.A. Williams and D. Pascoe. 1985. Studies on the Acute Toxicity of Pollutants to Freshwater Macroinvertebrates 2. Phenol. *Arch. Hydrobiol.* 103(1):75-82.
37. See, C.L., A.L. Buikema, Jr. and J. Cairns, Jr. 1974. The Effects of Selected Toxicants on Survival of *Dugesia tigrina* (Tubellaria). *Assoc. Southeast. Biol. Bull.* 21(2):82.
38. Franco, P.J., K.L. Daniels, R.M. Cushman and G.A. Kazlow. 1984. Acute Toxicity of a Synthetic Oil, Aniline and Phenol to Laboratory and Natural Populations of Chironomid (Diptera) Larvae. *Environ. Pollut. Ser. A Ecol. Biol.* 34(4):321-331.
39. Alekseyev, V.A. 1970. Study of Acute Phenolic Intoxication of Certain Species of Aquatic Insects and Arachnids. *Hydrobiol. J.* 6(5):22-30.
40. Agrawal, H.P. 1987. Evaluation of the Toxicity of Phenol and Sodium Pentachlorophenate to the Snail *Indoplanorbis exustus* (Deshayes). *J. Anim. Morphol. Physiol.* 34(1-2):107-112.
41. Gupta, P.K. and P.S. Rao. 1982. Toxicity of Phenol, Pentachlorophenol and Sodium Pentachlorophenate to a Freshwater Pulmonate Snail *Lymnaea acuminata* (Lamarck). *Arch. Hydrobiol.* 94(2):210-217.
42. Gupta, P.K., P.S. Rao and V.S. Mujumdar. 1984. Studies on the Toxicity of Pentachlorophenol, Sodium Pentachlorophenate and Phenol to a Pulmonate Snail *Lymnaea luteola* (Lamarck). *Arch. Hydrobiol.* 102(1):123-130.

OHIO EPA SURFACE WATER QUALITY CRITERION FACT SHEET

Page 15 of 20

Chemical Name: Phenol Developed by: Chris Skalski

CAS # 108-95-2 Reviewed by: Bob Heitzman

Internal Code # 110 Fact Sheet Preparation Date: 4-17-01

Data Retrieval Date: 3-01-06

REFERENCES

43. Patrick, R., J. Cairns, Jr., and A. Scheier. 1968. The Relative Sensitivity of Diatoms, Snails, and Fish to Twenty Common Constituents of Industrial Wastes. *Prog. Fish-Cult.* 30(3):137-140.
44. Gupta, P.K. and V.S. Durve. 1984. Evaluation of the Toxicity of Sodium Pentachlorophenate, Pentachlorophenol and Phenol to the Snail *Viviparus bengalensis* (L.). *Arch. Hydrobiol.* 101(3):469-475.
45. Gupta, S. 1990. Short-Term Toxicity Tests with Phenolic Compounds on *Notopterus notopterus* for Predicting the Application Factor. *Ann. Biol.* 6(1):75-79.
46. Law, A.T. and M.E. Yeo. 1997. Toxicity of Phenol on *Macrobrachium rosenbergii* (de man) Eggs, Larvae, and Post-Larvae. *Bull. Environ. Contam. Toxicol.* 58(3):469-474.
47. Stephenson, R.R. 1983. Effects of Water Hardness, Water Temperature, and Size of the Test Organism on the Susceptibility of the Freshwater Shrimp, *Gammarus pulex* (L.) to Toxicants. *Bull. Environ. Contam. Toxicol.* 31(4):459-466.
48. Fogels, A. and J.B. Sprague. 1977. Comparative Short-Term Tolerance of Zebrafish, Flagfish, and Rainbow Trout to Five Poisons Including Potential Reference Toxicants. *Water Res.* 11(9):811-817.
49. Kondaiah, K. and A.S. Murty. 1994. Avoidance Behavior Test as an Alternative to Acute Toxicity Test. *Bull. Environ. Contam. Toxicol.* 53(6):836-843.
50. Nunogawa, J.H., N.C. Burbank Jr., R.H.F. Young and L.S. Lau. 1970. Relative Toxicities of Selected Chemicals to Several Species of Tropical Fish. *Water Resour. Res. Center, University of Hawaii, Honolulu, HI*:38 p.
51. Wallen, I.E., W.C. Greer and R. LaSater. 1957. Toxicity to *Gambusia affinis* of Certain Pure Chemicals in Turbid Waters. *Sewage Ind. Wastes* 29(6):695-711.
52. Pickering, Q.H. and C. Henderson. 1966. Acute Toxicity of Some Important Petrochemicals to Fish. *J. Water Pollut. Control Fed.* 38(9):1419-1429.
53. Dalela, R.C., S. Rani, S. Rani and S.R. Verma. 1980. Influence of pH on the Toxicity of Phenol and its Two Derivatives Pentachlorophenol and Dinitrophenol to Some Fresh Water Teleosts. *Acta. Hydrochim. Hydrobiol.* 8(6):623-629.
54. Verma, S.R., S. Rani, A.K. Tyagi and R.C. Dalela. 1980. Evaluation of Acute Toxicity of Phenol and Its Chloro- and Nitro-Derivatives to Certain Teleosts. *Water Air Soil Pollut.* 14:95-102.
55. Clemens, H.P. and K.E. Sneed. 1959. Lethal Doses of Several Commercial Chemicals for Fingerling Channel Catfish. *U.S. Fish Wildl. Serv. Sci. Rep. Fish. No. 316, U.S.D.I., Washington, D.C.*:10 p.
56. Shigeoka, T., T. Yamagata, T. Minoda and F. Yamauchi. 1988. Acute Toxicity and Hatching Inhibition of Chlorophenols to Japanese Medaka, *Oryzias latipes* and Structure-Activity Relationships. *J. Hyg. Chem./Eisei Kagaku* 34(4):343-349.

OHIO EPA SURFACE WATER QUALITY CRITERION FACT SHEET

Page 16 of 20

Chemical Name: Phenol Developed by: Chris Skalski

CAS # 108-95-2 Reviewed by: Bob Heitzman

Internal Code # 110 Fact Sheet Preparation Date: 4-17-01

Data Retrieval Date: 3-01-06

REFERENCES

57. Holcombe, G.W., D.A. Benoit, D.E. Hammermeister, E.N. Leonard and R.D. Johnson. 1995. Acute and Long-Term Effects of Nine Chemicals on the Japanese Medaka (*Oryzias latipes*). Arch. Environ. Contam. Toxicol. 28(3):287-297.
58. Colgan, P.W., J.A. Cross and P.H. Johansen. 1982. Guppy Behavior During Exposure to a Sub-lethal Concentration of Phenol. Bull. Environ. Contam. Toxicol. 28:20-27.
59. Gupta, P.K., V.S. Mujumdar, P.S. Rao and V.S. Durve. 1982. Toxicity of Phenol, Pentachlorophenol and Sodium Pentachlorophenate to a Freshwater Teleost *Lebistes reticulatus* (Peters). Acta. Hydrochim. Hydrobiol. 10(2):177-181.
60. Cairns, J.C. Jr. and A. Scheier. 1959. The Relationship of Bluegill Sunfish Body Size to its Tolerance for Some Common Chemicals. Proc. 13th Ind. Waste Conf., Purdue Univ. Eng. Bull. 96:243-252.
61. Trama, F.B. 1955. The Acute Toxicity of Phenol to the Common Bluegill (*Lepomis macrochirus* Rafinesque). Not. Nat. (Phila) 269:1-10.
62. McLeay, D.J. 1976. A Rapid Method for Measuring the Acute Toxicity of Pulpmill Effluents and Other Toxicants to Salmonid Fish at Ambient Room Temperature. J. Fish. Res. Board Can. 33(6):1303-1311.
63. Alekseyev, V.A. 1971. A Study of Acute Phenol Poisoning in Some Species of Insects and Arachnids (Part II). Hydrobiol. J. 7(3):35-39.
64. Buikema, A.L., Jr., J. Cairns Jr. and G.W. Sullivan. Rotifers as Monitors of Heavy Metal Pollution in Water. Virginia Water Resources Research Center, Bulletin 71, Blacksburg, VA: 74pp.
65. Wellens, H. 1982. Comparison of the Sensitivity of *Brachydanio rerio* and *Leuciscus idus* by Testing the Fish Toxicity of Chemicals and Wastewaters. Z. Wasser-Abwasser-Forsch 15(2):49-52.
66. Hodson, P.V., D.G. Dixon and K.L.E. Kaiser. 1984. Measurement of Median Lethal Dose as a Rapid Indication of Contaminant Toxicity to Fish. Environ. Toxicol. Chem. 3(2):243-254.
67. Mayes, M.A., H.C. Alexander and D.C. Dill. 1983. A Study to Assess the Influence of Age on the Response of Fathead Minnows in Static Acute Toxicity Tests. Bull. Environ. Contam. Toxicol. 31(2):139-147.
68. Ruesink, R.G. and L.L. Smith, Jr. 1975. The Relationship of the 96-Hr LC50 to the Lethal Threshold Concentration of Hexavalent Chromium, Phenol, and Sodium Pentachlorophenate for Fathead Minnows (*Pimephales promelas* Rafinesque). Trans. Am. Fish. Soc. 104(3):567-570.
69. Broderius, S.J., M.D. Kahl and M.D. Hoglund. 1995. Use of Joint Toxic Response to Define the Primary Mode of Toxic Action for Diverse Industrial Chemicals. Environ. Toxicol. Chem. 14(9):1591-1605.
70. Geiger, D.L., L.T. Brooke and D.J. Call. 1990. Acute Toxicities of Organic Chemicals to Fathead Minnows (*Pimephales promelas*), Vol. 5. Center for Lake Superior Environmental Studies, Univ. of Wisconsin, Superior, WI:332 p.

OHIO EPA SURFACE WATER QUALITY CRITERION FACT SHEET

Page 17 of 20

Chemical Name: Phenol Developed by: Chris Skalski

CAS # 108-95-2 Reviewed by: Bob Heitzman

Internal Code # 110 Fact Sheet Preparation Date: 4-17-01

Data Retrieval Date: 3-01-06

REFERENCES

71. Phipps, G.L., G.W. Holcombe and J.T. Fiandt. 1981. Acute Toxicity of Phenol and Substituted Phenols to the Fathead Minnow. *Bull. Environ. Contam. Toxicol.* 26(5):585-593.
72. Geiger, D.L., C.E. Northcott, D.J. Call and L.T. Brooke. 1985. Acute Toxicities of Organic Chemicals to Fathead Minnows (*Pimephales promelas*), Vol. 2. Center for Lake Superior Environmental Studies, Univ. of Wisconsin, Superior, WI:326 p.
73. Mattson, V.R., J.W. Arthur and C.T. Walbridge. 1976. Acute Toxicity of Selected Organic Compounds to Fathead Minnows. *Ecol. Res. Ser. EPA-600/3-76-097*, Environ. Res. Lab., U.S. EPA, Duluth, MN:12 p.
74. Alekseyev, V.A. and B.N. Antipin. 1976. Toxicological Characteristics and Symptoms of Acute Phenol Poisoning in Some Freshwater Crustaceans and Mollusks. *Hydrobiol. Jour.* 12:27.
75. Lee, D.R. 1976. Development of an Invertebrate Bioassay to Screen Petroleum Refinery Effluents Discharged into Fresh Water. Ph.D. Thesis. Virginia Polytechnic Institute and State University, Blacksburg, Virginia.
76. Gupta, A.B. and A.K. Srivastava. 1984. Phenol Induced Changes in the Carbohydrate Metabolism of the Indian Catfish *Heteropneustes fossilis*. *Environ. Biol. Fishes* 10(3):221-224.
77. Gupta, S., R.C. Dalela and P.K. Saxena. 1983. Influence of Dissolved Oxygen Levels on Acute Toxicity of Phenolic Compounds to Fresh Water Teleost, *Notopterus notopterus* (Pallas). *Water, Air, Soil Pollut.* 19(3):223-228.
78. Verma, S.R., S. Rani and R.C. Dalela. 1981. Synergism, Antagonism, and Additivity of Phenol, Pentachlorophenol, and Dinitrophenol to a Fish (*Nitropterus nitropterus*). *Arch. Environ. Contam. Toxicol.* 10(3):365-370.
79. Gupta, S., S.R. Verma and P.K. Saxena. 1982. Toxicity of Phenolic Compounds in Relation to the Size of a Freshwater Fish, *Notopterus notopterus* (Pallas). *Ecotoxicol. Environ. Saf.* 6(5):433-438.
80. Gupta, S., R.C. Dalela and P.K. Saxena. 1983. Influence of Temperature on the Toxicity of Phenol and its Chloro- and Nitro-Derivatives to the Fish *Notopterus notopterus* (Pallas). *Acta. Hydrochim. Hydrobiol.* 11(2):187-192.

OHIO EPA SURFACE WATER QUALITY CRITERION FACT SHEET

Page 18 of 20

Chemical Name: Phenol Developed by: Chris SkalskiCAS # 108-95-2 Reviewed by: Bob HeitzmanInternal Code # 110 Fact Sheet Preparation Date: 4-17-01Data Retrieval Date: 3-01-06CALCULATION OF ACUTE AQUATIC CRITERION (AAC)^a

Species	SMAV ($\mu\text{g/l}$)	Genus	GMAV ($\mu\text{g/l}$)	Data Set Requirement
Midge	1,222,293	<i>Psectrocladius</i>	1,222,293	
Tubificid	780,000	<i>Limnodrilus</i>	780,000	
Midge	1,356,337	<i>Chironomus</i>	-----	
Midge	500,000	<i>Chironomus</i>	456,376	
Midge	400,000	<i>Pentaneura</i>	400,000	
Caddisfly	260,000	<i>Hydropsyche</i>	260,000	
Rotifer	243,967	<i>Philodina</i>	243,967	
Midge	240,000	<i>Chaoborus</i>	240,000	
Midge	140,162	<i>Chironomus</i>	-----	
Copepod	122,000	<i>Cyclops</i>	122,000	
Cladoceran	>109,000	<i>Daphnia</i>	-----	
Copepod	108,000	<i>Mesocyclops</i>	108,000	
Midge	100,000	<i>Orthocladus</i>	100,000	
Snail	100,000	<i>Helisoma</i>	100,000	Snail
94,000 <i>Physella</i>	94,000			
Worm	88,000	<i>Polycelis</i>	88,000	
Midge	80,500	<i>Clintotanypus</i>	80,500	
Oligochaete	70,873	<i>Lumbriculus</i>	70,873	
Midge	70,000	<i>Tanypus</i>	70,000	
Midge	69,800	<i>Einfeldia</i>	69,800	
Amphipod	69,000	<i>Gammarus</i>	-----	
Flatworm	66,676	<i>Dugesia</i>	66,676	h
Cladoceran	57,000	<i>Polyphemus</i>	57,000	
Cladoceran	54,737	<i>Daphnia</i>	-----	
Midge	>51,100	<i>Tanytarsus</i>	>51,100	
Snail	>51,100	<i>Aplexa</i>	>51,100	g
Frog	>51,000	<i>Xenopus</i>	>51,000	
Midge	50,000	<i>Mochlonyx</i>	50,000	
Midge	50,000	<i>Cryophila</i>	50,000	
Isopod	50,000	<i>Asellus</i>	50,000	
Cladoceran	47,000	<i>Lynceus</i>	47,000	
Goldfish	44,490	<i>Carassius</i>	44,490	
Cladoceran	42,000	<i>Ceriodaphnia</i>	-----	
Guppy	38,644	<i>Poecilia</i>	38,644	
Amphipod	22,913	<i>Gammarus</i>	39,762	e
Copepod	39,700	<i>Diaptomus</i>	39,700	
Flagfish	36,300	<i>Jordanella</i>	36,300	
Cladoceran	36,000	<i>Bosmina</i>	36,000	
Fathead Minnow	31,115	<i>Pimephales</i>	31,115	
Mosquitofish	24,122	<i>Gambusia</i>	24,122	
Cladoceran	12,600	<i>Daphnia</i>	-----	
Cladoceran	20,000	<i>Chydorus</i>	20,000	

OHIO EPA SURFACE WATER QUALITY CRITERION FACT SHEET

Page 19 of 20

Chemical Name: Phenol Developed by: Chris SkalskiCAS # 108-95-2 Reviewed by: Bob HeitzmanInternal Code # 110 Fact Sheet Preparation Date: 4-17-01Data Retrieval Date: 3-01-06^aSee Ohio Administrative Code 3745-1-36 effective July 31, 1999.CALCULATION OF ACUTE AQUATIC CRITERION (AAC)^a

<u>Species</u>	<u>SMAV</u> (<u>µg/l</u>)	<u>Genus</u>	<u>GMAV</u> (<u>µg/l</u>)	<u>Data Set</u> <u>Requirement</u>
Tilapia	19,000	<i>Tilapia</i>	19,000	
Bluegill	17,400	<i>Lepomis</i>	17,400	
Cladoceran	6,855	<i>Ceriodaphnia</i>	16,968	
Channel Catfish	16,700	<i>Ictalurus</i>	16,700	b
Cladoceran	15,875	<i>Daphnia</i>	22,205	
Mayfly	15,500	<i>Baetis</i>	15,500	f
White Sucker	10,600	<i>Catostomus</i>	10,600	c
Rainbow Trout	9,144	<i>Oncorhynchus</i>	9,144	a
Cladoceran	6,000	<i>Sida</i>	6,000	d

<u>Genus</u>	<u>GMAV</u>	<u>ln(GMAV)</u>	<u>ln(GMAV)²</u>	<u>RANK</u>	<u>P=R/45</u>	<u>√P</u>
<i>Sida</i>	6,000	8.700	75.682	1	0.0222	0.1491
<i>Oncorhynchus</i>	9,144	9.121	83.189	2	0.0444	0.2108
<i>Catostomus</i>	10,600	9.269	85.907	3	0.0667	0.2582
<i>Baetis</i>	15,500	<u>9.649</u>	<u>93.095</u>	4	<u>0.0888</u>	<u>0.2981</u>
TOTALS		36.738	337.873		0.2222	0.9162

$$S^2 = \frac{337.873 - (36.738)^2/4}{4} = \frac{0.4617}{4} = 37.38$$

$$S = 6.1139$$

$$0.2222 - (0.9162)^2/4 = 0.0124$$

$$A = 6.1139(\sqrt{0.05}) + (7.7839) = 9.15105$$

$$L = [36.738 - ((6.1139)(0.9162))/4] = 7.7839$$

$$\text{Final Acute Value (FAV)} = e^{9.15105} = 9,424 = 9,400 \mu\text{g/l}$$

$$\text{AAC} = \text{FAV} \div 2 = 9,424 \mu\text{g/l} \div 2 = 4,712 = 4,700 \mu\text{g/l}$$

Note: The Coldwater Habitat FAV was lowered to 9,100 µg/l (Rainbow Trout SMAV rounded to two significant figures) and Coldwater Habitat AAC was lowered to 4,600 µg/l ($9,144 \div 2 = 4,572$ or 4,600) to be protective of Rainbow Trout.

^aSee Ohio Administrative Code 3745-1-36 effective February 22, 2002.

OHIO EPA SURFACE WATER QUALITY CRITERION FACT SHEET

Page 20 of 20

Chemical Name: Phenol Developed by: Chris SkalskiCAS # 108-95-2 Reviewed by: Bob HeitzmanInternal Code # 110 Fact Sheet Preparation Date: 4-17-01Data Retrieval Date: 3-01-06

Experimentally determined Acute-Chronic Ratios (ACRs):

<u>SPECIES</u>	<u>ACUTE VALUE</u> <u>(µg/l)</u>	<u>CHRONIC VALUE</u> <u>(µg/l)</u>	<u>ACUTE-CHRONIC</u> <u>RATIO</u>	<u>SPECIES MEAN</u> <u>ACR</u>
Fathead Minnow <i>Pimephales promelas</i>	28,496	2,556	12.63	18.27
Fathead Minnow <i>Pimephales promelas</i>	40,997	1,369	29.94	-----
Cladoceran <i>Ceriodaphnia dubia</i>	3,000	4,456	0.67	0.67 ^b
Rainbow Trout <i>Oncorhynchus mykiss</i>	6,082	157	38.73	38.73

CALCULATION OF
AQUATIC VALUE (CAV)^aCHRONIC

$$\sqrt[3]{(18.27)(18)(38.73)} = 23.35$$

Secondary Acute-Chronic Ratio (SACR) =

$$\begin{aligned}\text{Chronic Aquatic Value (CAV)} &= \text{FAV} \div \text{SACR} \\ &= 9,424 \div 23.35 \\ &= 403.55 = 400 \mu\text{g/l}\end{aligned}$$

Note: The Coldwater Habitat CAV was lowered to 160 ug/l to be protective of Rainbow Trout.

^aSee Ohio Administrative Code 3745-1-36 effective February 22, 2002.^bThis value was not used in the determination of the SACR because it varies by more than a factor of 10 from the other acute-chronic ratios.