

A. Chemical: Benzene CAS# 71432 Date Jan. 1990

B. Minnesota Criterion: ug/l (unless noted otherwise)

Water Class	Use	CC	MC	FAV	Basis*
1,2A	DW, Salmonid	9.7	4487	8974	PCA Hc
1,2B,2C	DW, NonSalmonid	11	4487	8974	PCA Hc
2B,2C	NonSalmonid	114	4487	8974	PCA T1
	Other				

Toxicity related to water quality: No
If yes, above criteria values determined for: _____
Slope: Acute: _____ Chronic: _____

Formulas: EPA:CC: N/A
MPCA: N/A MC: _____
FAV: _____

Notes: _____

C. EPA Criterion: ug/l CCC: _____ Basis: _____
Date: none MC: _____ Basis: _____
FAV: _____ Basis: _____

Notes: _____

D. Other Criteria:	value	Source
ug/l	<u>none</u>	<u>IJC</u>
	_____	_____
	_____	_____

E. Notes: _____

*Criteria basis codes for part B:
 EPA = From EPA criterion
 PCA = Criterion developed by Minnesota Pollution Control Agency staff
 T1 = Direct aquatic life toxicity, EPA national criteria procedures used
 T2 = Direct aquatic life toxicity, EPA advisory procedures used
 Hs = Human health systemic effects
 Hc = Human health carcinogenic effects
 R = Tissue residue (bioaccumulation)
 W = Wildlife effects
 O = Organoleptic (taste and odor)
 Other = Criterion based on other end point

A. Chemical: Benzene CAS#: 71432 Date: Jan. 1990

B. EPA National Method

1. Data requirements: Salmonid (2A water only): Oncorhynchus kisutch
 Family in Phylum Chordata: Pimephales promelas
 Second Family in Phylum Chordata: Xenopus laevis
 Fresh or Saltwater Crustacean: Daphnia pulex
 Freshwater Cladoceran: Crangon, Cancer
 Phylum other than Arthropoda or Chordata: Aedes, Cloen
 Family not in Phylum Chordata: Annelida
 Second Family not in Phylum Chordata: Platyhelminthes
Mollusca

2. GMAVs Lowest 4:	<u>Thymallus</u>	<u>12,925</u>
ug/l	<u>Ischnura</u>	<u>10,000</u>
N: <u>30</u>	<u>Morone</u>	<u>9,580</u>
	<u>Salvelinus</u>	<u>8,473</u>

3. FAV: 8974

4. Adjustments to FAVs:

5. Chronic data:	<u>478</u>	No. <u>1</u>	Species: <u>Ambystoma gracile</u>
mean values	<u>>1200-<6.5</u>	<u>1</u>	<u>Cancer magister</u>
ug/l	<u>>9800</u>	<u>1</u>	<u>Daphnia magna</u>
	<u>4053</u>	<u>2</u>	<u>Morone saxatilis</u>
	<u>76</u>	<u>1</u>	<u>Rana pipiens</u>

6. ACR Measured:	Acute value	Chronic value	ACR
	<u>108000</u>	<u>>1200-<6.5</u>	<u>1223</u>
Generic: <u>20, 20</u>			
Final: <u>79</u>			

7. Notes: Log P = 2.14

C. EPA Advisory Method

1. Data requirements: Fish: _____
 Crustacean: _____
 No. SMAVs: _____
 No. GMAVs: _____
 Factor: _____
 Third animal: _____
 Plant for herbicide: _____
 Insect for pesticide: _____

2. Lowest GMAV: _____ Species: _____

3. FAV: _____ MC: _____

4. Chronic data: See B.5.

D. Criteria

1. FAV: 8974 MC: 4487 CC: 114

2. Citation for lowest GMAV: 5622, 15131, 10688, 13142, 15788,

E. Notes: No change to toxicity-based criterion, Feb. 1993.

A. Chemical: Benzene CAS#: 71432 Date: 11-14-89

B. EPA Human Health Criterion: df: 6.6 f: 400 d: N/A
ug/l

ADI/Ref.dose: _____ mg/kg/day slope: 0.024

Final BCF: 5.21 %lipid: 3.0

K: _____

Potency based on inhalation

C. Minnesota Human Health Criterion

1. Ref.dose: N/A mg/kg/day Source: _____
K: N/A Source: _____

2. Potency slope: 0.029 Source: MDH, IRIS

3. Measured BAFs:	Species/Tissue	BAF	%lipid	Norm. BAF
1.	<u>none</u>	_____	_____	_____
2.	_____	_____	_____	_____
3.	_____	_____	_____	_____
4.	_____	_____	_____	_____
Geo mean:	_____	_____	_____	_____

4. Measured BCFs	Species/Tissue	BCF	%lipid	Norm. BCF
1.	<u>none</u>	_____	_____	_____
2.	_____	_____	_____	_____
3.	_____	_____	_____	_____
4.	_____	_____	_____	_____
5.	_____	_____	_____	_____
6.	_____	_____	_____	_____
Geo mean:	_____	_____	_____	_____

5. Edible portion BAF or BCF
Cold water: 6.0 % lipid BAF _____ BCF _____
Warm water: 1.5 % lipid BAF _____ BCF _____

6. Geo mean unadjusted for lipid: BAF: _____ BCF: _____

7. log Kow: 2.14 meas. _____ QSAR x Est. BCF: 20
adjust. for % lipid: 20 x 6/7.6 = 16; 20 x 1.5/7.6 = 4

8. Parachor: 206

9. BCF to BAF conversion factor: none

10. Final BAF: 2A: 16 2B,2C: 4

11. Criteria: 2A: 9.7 2Bd: 11.4 2B/2C: 186 RAL: 10.0 List No. 3
ug/l Jan. 1991

D. Organoleptic: N/A Source: _____
ug/l

F. Notes:

Page 1 SUMMARY

A. Chemical: Benzene CAS# 71432 Date Jan. 1990

B. Minnesota Criterion: ug/l (unless noted otherwise)

Water Class	Use	CC	MC	FAV	Basis*
1,2A	DW, Salmonid	5.9	4487	8974	PCA Hc
1,2B,2C	DW, NonSalmonid	6.9	4487	8974	PCA Hc
2B,2C	NonSalmonid	11.7	4487	8974	PCA T1
	Other				

Toxicity related to water quality: No
If yes, above criteria values determined for: _____
Slope: Acute: _____ Chronic: _____

Formulas: _____ EPA:CC: NA
MPCA: NA _____ MC: _____
FAV: _____

Notes:

C. EPA Criterion: ug/l CCC: _____ Basis: _____
Date: None MC: _____ Basis: _____
FAV: _____ Basis: _____

Notes:

EPA human health criterion, see page 4.

D. Other Criteria:	value	Source
ug/l	<u>None</u>	<u>IJC</u>
	_____	_____
	_____	_____
	_____	_____

E. Notes:

*Criteria basis codes for part B:

- EPA = From EPA criterion
- PCA = Criterion developed by Minnesota Pollution Control Agency staff
- T1 = Direct aquatic life toxicity, EPA national criteria procedures used
- T2 = Direct aquatic life toxicity, EPA advisory procedures used
- Hs = Human health systemic effects
- Hc = Human health carcinogenic effects
- R = Tissue residue (bioaccumulation)
- W = Wildlife effects
- O = Organoleptic (taste and odor)
- Other = Criterion based on other end point

A. Chemical: Benzene CAS#: 71432 Date: Jan. 1990

B. EPA Criteria Method

1. Data requirements: Salmonid: Oncorhynchus kisutch
 Family in Phylum Chordata: Pimephales promelas
 Second Family in Phylum Chordata: Xenopus laevis
 Fresh or Saltwater Crustacean: Daphnia pulex
 Freshwater Cladoceran: Crangon, Cancer
 Phylum other than Arthropoda or Chordata: Aedes, Cloen
 Family not in Phylum Chordata: Annelida
 Second Family not in Phylum Chordata: Platyhelminthes
Mollusca

2. GMAVs Lowest 4:	<u>Thymallus</u>	<u>12,925</u>
ug/l	<u>Ischnura</u>	<u>10,000</u>
N: <u>30</u>	<u>Morone</u>	<u>9,580</u>
	<u>Salvelinus</u>	<u>8,473</u>

3. FAV: 8974

4. Adjustments to FAVs:

5. Chronic data:	<u>478</u>	No. <u>1</u>	Species: <u>Ambystoma gracile</u>
mean values	<u>>1200-<6.5</u>	<u>1</u>	<u>Cancer magister</u>
ug/l	<u>>9800</u>	<u>1</u>	<u>Daphnia magna</u>
	<u>4053</u>	<u>2</u>	<u>Morone saxatilis</u>
	<u>76</u>	<u>1</u>	<u>Rana pipiens</u>

6. ACR Measured:	Acute value	Chronic value	ACR
	<u>108000</u>	<u>>1200-<6.5</u>	<u>1223</u>
Generic: <u>20, 20</u>			
Final: <u>79</u>			

7. Notes: Log P = 2.14

C. EPA Advisory Method

1. Data requirements: Fish: _____
 Crustacean: _____
 No. SMAVs: _____ Third animal: _____
 No. GMAVs: _____ Plant for herbicide: _____
 Factor: _____ Insect for pesticide: _____

2. Lowest GMAV: _____ Species: _____

3. FAV: _____ MC: _____

4. Chronic data: See B.5. 5. ACR: See B.6.

D. Criteria

1. FAV: 8802 MC: 4401 CC: 111
 2. Citation for lowest GMAV: 5622, 15131, 10688, 13142, 15788,

3. Notes:

Page 4 HUMAN HEALTH

A. Chemical: Benzene CAS#: 71432 Date: 11-14-89

B. EPA Human Health Criterion: df: 6.6 f: 400 d: NA ug/l

ADI/Ref.dose: mg/kg/day slope: 0.024

Final BCF: 5.21 %lipid: 3.0

K:

Potency based on inhalation

C. Minnesota Human Health Criterion

1. Ref.dose: NA mg/kg/day Source:

K: NA Source:

2. Potency slope: 0.0241 Source: MDH

3. Measured BAFs: Species/Tissue BAF %lipid Norm. BAF

1.

2.

3.

4.

5.

6.

Geo mean:

4. Measured BCFs Species/Tissue BCF %lipid Norm. BCF

1.

2.

3.

4.

5.

6.

7.

8.

Geo mean:

5. Edible portion BAF or BCF BAF BCF

Cold water: 6.0 % lipid

Warm water: 1.5 % lipid

6. Geo mean unadjusted for lipid: BAF: BCF:

7. log Kow: 2.14 meas. QSAR x Est. BCF: 20

adjust. for % lipid: 20 x 6/7.6 = 16; 20 x 1.5/7.6 = 4

8. Parachor: 206

9. BCF to BAF conversion factor: None

10. Final BAF: 2A: 16 2B,2C: 4

11. Criteria: df(2A): 11.7/2 df(2B,2C): 13.7/2 f: 224/2 RAL: 7.0

ug/l

D. Organoleptic: NA Source:

ug/l

F. Notes: Human health-based criteria divided by 2 based on MDH calculation of RAL.

TABLE I. ACUTE AND CHRONIC VALUES: 71432 BENZENE

Species Latin Name Species Common Name	Effect	FW/SW	Dur (days)	Ex Ty	R C	Con Typ	Concentration (ug/l) Range	Md	Ref No.
<i>Aedes aegypti</i> Mosquito	LC50	FRESH	2	NR	2	F	200000	U	10574
<i>Ambystoma gracile</i> Salamander	LC10	FRESH	EL	F	1	F	478.1	M	15418
<i>Ambystoma mexicanum</i> Salamander	LC50	FRESH	2	S	2	F	370000	U	9740
<i>Amphidinium carterae</i> Dinoflagellate	GRO	SALT	2 - 3	S	2	F	10000	U	2214
<i>Anacystis aeruginosa</i> Blue-green algae	MOR	NR	NR	S	4	F	>1400000	U	2463
<i>Artemia salina</i> Brine shrimp	LC50	SALT	1	S	2	F	1630 MM/M3	U	11926
<i>Artemia salina</i> Brine shrimp	LC50*	SALT	1	S	2	F	66000	U	2408
<i>Artemia salina</i> Brine shrimp	LC50*	SALT	2	S	2	F	21000	U	2408
<i>Asellus aquaticus</i> Aquatic sowbug	LC50	FRESH	2	S	2	F	120000	U	15788
<i>Cancer magister</i> Dungeness or edible crab	GRO	SALT	NR	F	2	F	>1200 - <6.5	M	5035
<i>Cancer magister</i> Dungeness or edible crab	LC50	SALT	2	S	2	F	>347000	M	5035
<i>Cancer magister</i> Dungeness or edible crab	LC50	SALT	4	S	2	F	108000	M	5035
<i>Carassius auratus</i> Goldfish	LC50	FRESH	1	S	2	F	34420	U	728
<i>Carassius auratus</i> Goldfish	LC50	FRESH	1	S	2	F	46000	M	623
<i>Carassius auratus</i> Goldfish	LC50	FRESH	2	S	2	F	34420	U	728
<i>Carassius auratus</i> Goldfish	LC50	FRESH	4	S	2	F	34420	U	728
<i>Champia parvula</i> Red algae	GRO	SALT	11 - 14	R	2	F	34260	U	11452
<i>Champia parvula</i> Red algae	GRO	SALT	11 - 14	R	2	F	57100	U	11452
<i>Champia parvula</i> Red algae	REP	SALT	11 - 14	R	2	F	57100	U	11452
<i>Champia parvula</i> Red algae	REP	SALT	11 - 14	R	2	F	34260	U	11452
<i>Chilomonas paramecium</i> Cryptomonad	PGR	NR	2	NR	4	F	439000	U	5719

TABLE 1. BENZENE (CONTINUED)

Species Latin Name Species Common Name	Effect	FW/SW	Dur (days)	Ex Ty	R C	Con Typ	Concentration (ug/l) Range	Md	Ref No.
Chironomus thummi Midge	LC50	FRESH	2	S	2	F	100000	U	15788
Chlorella vulgaris Green algae	EC50GR	FRESH	1	S	2	F	525000	U	2215
Chlorella vulgaris Green algae	PGR	NR	1	S	2	F	25000	U	8877
Cloeon dipterum Mayfly	LC50	FRESH	2	S	2	F	34000	U	15788
Clupea harengus pallasii Pacific herring	GRO	SALT	5	S	2	F	1840*	M	7651
Clupea harengus pallasii Pacific herring	GRO	SALT	6	S	2	F	50 - 490*	M	7651
Clupea harengus pallasii Pacific herring	GRO	SALT	7	S	2	F	490*	M	7651
Clupea harengus pallasii Pacific herring	MOR	SALT	5	S	2	F	460*	M	7651
Clupea harengus pallasii Pacific herring	MOR	SALT	6	F	2	F	0.8 UL/L	U	7693
Clupea harengus pallasii Pacific herring	MOR	SALT	7	S	2	F	490*	M	7651
Corixa punctata Water boatman	LC50	FRESH	2	S	2	F	48000	U	15788
Cottus cognatus Slimy sculpin	LC50	FRESH	4	S	2	F	15.41 UL/L	M	5622
Crangon franciscorum Bay shrimp	LC50	SALT	1	S	2	F	22000 UL/L	M	558
Crangon franciscorum Bay shrimp	LC50	SALT	4	S	2	F	20000 UL/L	M	558
Crassostrea gigas Pacific oyster	LC50*	SALT	2	S	2	F	377000*	U	8621
Cricosphaera carterae Coccolithophorid	GRO	SALT	2 - 3	S	2	F	10000	U	2214
Culex pipiens Mosquito	LC50	FRESH	2	NR	2	F	71000	U	10574
Cyprinus carpio Common, mirror, colored, carp	MOR	FRESH	7	NR	4	F	1500000	U	6124

TABLE 1. BENZENE (CONTINUED)

Species Latin Name Species Common Name	Effect	FW/SW	Dur (days)	Ex Ty	R C	Con Typ	Concentration (ug/l) Range	Md	Ref No.
Daphnia cucullata Water flea	LC50	FRESH	2	S	2	F	356000	U	2017
Daphnia cucullata Water flea	LC50	FRESH	2	S	2	F	390000	U	2017
Daphnia magna Water flea	LC50	FRESH	1	S	2	F	250000	U	5184
Daphnia magna Water flea	EC50IM	FRESH	1	S	2	F	18000	M	13142
Daphnia magna Water flea	EC50IM	FRESH	2	S	2	F	400 MM/M3	U	11936
Daphnia magna Water flea	LC50	FRESH	1	S	2	F	1130000	U	5718
Daphnia magna Water flea	LC50	FRESH	2	S	2	F	200000	U	5184
Daphnia magna Water flea	LC50	FRESH	2	S	2	F	400000	U	2017
Daphnia magna Water flea	LC50	FRESH	2	S	2	F	620000	U	2017
Daphnia magna Water flea	LC50	FRESH	2	S	2	F	412000	U	2017
Daphnia magna Water flea	LC50	FRESH	2	S	2	F	356000	U	2017
Daphnia magna Water flea	LC50	FRESH	2	S	2	F	682000	U	10060
Daphnia magna Water flea	LC50	FRESH	2	S	2	F	412000	U	2017
Daphnia magna Water flea	LC50	FRESH	2	S	2	F	356000	U	2017
Daphnia magna Water flea	MOR	FRESH	2	S	2	F	<13000	U	5184
Daphnia magna Water flea	CHRONIC	FRESH	LC				>98000		EPA
Daphnia pulex Water flea	LC50	FRESH	2	S	2	F	345000	U	2017
Daphnia pulex Water flea	LC50	FRESH	2	S	2	F	265000	U	2017
Daphnia pulex Water flea	LC50	FRESH	4	S	2	F	15000	M	15337
Diaptomus forbesi Calanoid copepod	LC50	FRESH	4	S	2	F	710000	U	11282
Dugesia lugubris Turbellarian, planarian	LC50	FRESH	2	S	2	F	74000	U	15788
Dunaliella tertiolecta Green algae	GRO	SALT	2 - 3	S	2	F	100000	U	2214

TABLE 1. BENZENE (CONTINUED)

Species Latin Name Species Common Name	Effect	FW/SW	Dur (days)	Ex Ty	R C	Con Typ (ug/l)	Concentration Range	Md	Ref No.
<i>Engraulis mordax</i> Northern anchovy	LC50	SALT					20000		EPA Advisory
<i>Entosiphon sulcatum</i> Flagellate euglenoid	PGR	NR	3	S	2	F	>700000	U	5303
<i>Eryobdella octoculata</i> Leech	LC50	FRESH	2	S	2	F	>320000	U	15788
<i>Gambusia affinis</i> Mosquitofish	LC50*	FRESH	1	S	2	F	395000	U	508
<i>Gambusia affinis</i> Mosquitofish	LC50*	FRESH	2	S	2	F	395000	U	508
<i>Gambusia affinis</i> Mosquitofish	LC50*	FRESH	4	S	2	F	386000	U	508
<i>Gambusia affinis</i> Mosquitofish	MOR	FRESH	4	S	2	F	300000	U	508
<i>Gammarus pulex</i> Scud	LC50	FRESH	2	S	2	F	42000	U	15788
<i>Gasterosteus aculeatus</i> Three spine stickleback	LC50	FRESH	4	S	2	F	24.83 UL/L	M	5622
<i>Hydra oligactis</i> Hydra	LC50	FRESH	2	NR	2	F	34000	U	10574
<i>Hydra oligactis</i> Hydra	LC50	FRESH	2	S	2	F	34000	U	15788
<i>Ictalurus punctatus</i> Channel catfish	LC50	FRESH	4	S	2	F	425000	U	666
<i>Ischnura elegans</i> Dragonfly	LC50	FRESH	2	S	2	F	10000	U	15788
<i>Lepomis macrochirus</i> Bluegill	LC50	FRESH	1	S	2	F	22490	U	728
<i>Lepomis macrochirus</i> Bluegill	LC50	FRESH	1	S	2	F	20000	U	922
<i>Lepomis macrochirus</i> Bluegill	LC50	FRESH	2	S	2	F	22490	U	728
<i>Lepomis macrochirus</i> Bluegill	LC50	FRESH	2	S	2	F	20000	U	922
<i>Lepomis macrochirus</i> Bluegill	LC50	FRESH	4	S	2	F	22490	U	728
<i>Lepomis macrochirus</i> Bluegill	LC50	FRESH	4	S	2	F	100000	U	666

TABLE 1. BENZENE (CONTINUED)

Species Latin Name Species Common Name	Effect	FW/SW	Dur (days)	Ex Ty	R C	Con Typ (ug/l)	Concentration Range	Md	Ref No.
<i>Lymnaea stagnalis</i> Great pond snail	LC50	FRESH	2	NR	2	F	230000	U	10574
<i>Lymnaea stagnalis</i> Great pond snail	LC50	FRESH	2	S	2	F	230000	U	15788
<i>Morone saxatilis</i> Striped bass	GR0	SALT	28	F	1	F	3100*	M	7832
<i>Morone saxatilis</i> Striped bass	GR0	SALT	28	F	1	F	5300*	M	7832
<i>Morone saxatilis</i> Striped bass	LC50	SALT	1	S	2	F	6900 UL/L	M	558
<i>Morone saxatilis</i> Striped bass	LC50	SALT	3	F	1	F	9580*	M	5812
<i>Morone saxatilis</i> Striped bass	LC50	SALT	4	S	2	F	5800 UL/L	M	558
<i>Morone saxatilis</i> Striped bass	LC50	SALT	4	F	1	F	9580*	M	5812
<i>Morone saxatilis</i> Striped bass	LC50	SALT		S			5100	M	Benville and Korn, 1977
<i>Nemoura cinerea</i> Stonefly	LC50	FRESH	2	S	2	F	130000	U	15788
<i>Oncorhynchus gorbuscha</i> Pink salmon	LC50	FRESH	4	S	2	F	17.09 UL/L	M	5622
<i>Oncorhynchus gorbuscha</i> Pink salmon	LC50	FRESH	4	S	2	F	339 UL/L	M	5622
<i>Oncorhynchus gorbuscha</i> Pink salmon	LC50	FRESH	4	S	2	F	5.28 UL/L	M	5622
<i>Oncorhynchus gorbuscha</i> Pink salmon	LC50	SALT	4	S	2	F	8.47 UL/L	M	5622
<i>Oncorhynchus kisutch</i> Coho salmon, silver salmon	LC50	FRESH	4	S	2	F	14.09 UL/L	M	5622
<i>Oncorhynchus kisutch</i> Coho salmon, silver salmon	LC50	FRESH	4	S	2	F	542 UL/L	M	5622
<i>Oncorhynchus kisutch</i> Coho salmon, silver salmon	LC50	FRESH	4	S	2	F	9.8 UL/L	M	5622
<i>Oncorhynchus nerka</i> Sockeye salmon	LC50	FRESH	4	S	2	F	10.76 UL/L	M	5622
<i>Oncorhynchus nerka</i> Sockeye salmon	LC50	SALT	4	S	2	F	5.55 UL/L	M	5622
<i>Oncorhynchus tshawytscha</i> Chinook salmon	LC50	FRESH	4	S	2	F	11.73 UL/L	M	5622

TABLE 1. BENZENE (CONTINUED)

Species Latin Name Species Common Name	Effect	FW/SW	Dur (days)	Ex Ty	R C	Con Typ	Concentration (ug/l) Range	Md	Ref No.
<i>Oryzias latipes</i> Medaka, high-eyes	LC50	FRESH	2		NR 2	F	25000	U	10574
<i>Palaemonetes pugio</i> Grass shrimp, freshwater prawn	LC50	SALT	1	S	2	F	43500	U	420
<i>Palaemonetes pugio</i> Grass shrimp, freshwater prawn	LC50	SALT	2	S	2	F	35000	U	420
<i>Palaemonetes pugio</i> Grass shrimp, freshwater prawn	LC50	SALT	4	S	2	F	27000	U	420
<i>Palaemonetes pugio</i> Grass shrimp, freshwater prawn	LC50*	NR	2		NR 4	F	33000	U	9002
<i>Pimephales promelas</i> Fathead minnow	LC50	FRESH	1	S	2	F	35560	U	728
<i>Pimephales promelas</i> Fathead minnow	LC50	FRESH	1	S	2	F	34420	U	728
<i>Pimephales promelas</i> Fathead minnow	LC50	FRESH	2	S	2	F	35080	U	728
<i>Pimephales promelas</i> Fathead minnow	LC50	FRESH	2	S	2	F	32000	U	728
<i>Pimephales promelas</i> Fathead minnow	LC50	FRESH	2	NR	2	F	84000	U	10574
<i>Pimephales promelas</i> Fathead minnow	LC50	FRESH	4	S	2	F	33470	U	728
<i>Pimephales promelas</i> Fathead minnow	LC50	FRESH	4	S	2	F	32000	U	728
<i>Pimephales promelas</i> Fathead minnow	MOR	FRESH	4	F	2	F	15100	M	15131
<i>Poecilia reticulata</i> Guppy	LC50	FRESH	1	S	2	F	36600	U	728
<i>Poecilia reticulata</i> Guppy	LC50	FRESH	2	S	2	F	36600	U	728
<i>Poecilia reticulata</i> Guppy	LC50	FRESH	4	S	2	F	36600	U	728
<i>Poecilia reticulata</i> Guppy	LC50	FRESH	4	R	2	F	28600	M	13142
<i>Rana pipiens</i> Leopard frog	LC10	FRESH	EL	F	1	F	75.6	M	15418
<i>Salmo gairdneri</i> Rainbow trout, donaldson trout	LC50	FRESH	2		NR 2	F	56000	U	10574
<i>Salmo gairdneri</i> Rainbow trout, donaldson trout	LC50	FRESH	4	F	2	F	5300	M	15131
<i>Salmo gairdneri</i> Rainbow trout, donaldson trout	LC50	FRESH	4	S	2	F	9200	U	666

TABLE 1. BENZENE (CONTINUED)

Species Latin Name Species Common Name	Effect	FW/SW	Dur (days)	Ex Ty	R C	Con Typ (ug/l)	Concentration Range	Md	Ref No.
<i>Salmo gairdneri</i> Rainbow trout,donaldson trout	LC50	FRESH	4	F	1	F	21600*	M	10688
<i>Salmo gairdneri</i> Rainbow trout,donaldson trout	LC50	FRESH	4	R	2	F	5900	M	13142
<i>Salmo trutta</i> Brown trout	LC50	FRESH	0.04	S	2	F	12000	U	448
<i>Salvelinus malma</i> Dolly varden	LC50	FRESH	4	S	2	F	11.90 UL/L	M	5622
<i>Salvelinus malma</i> Dolly varden	LC50	FRESH	4	S	2	F	11.96 UL/L	M	5622
<i>Salvelinus malma</i> Dolly varden	LC50	SALT	4	S	2	F	6.30 UL/L	M	5622
<i>Scenedesmus quadricauda</i> Green algae	MOR	NR	NR	S	4	F	>1400000	U	2463
<i>Scenedesmus quadricauda</i> Green algae	PGR	NR	NR	S	4	F	>1400000	U	7453
<i>Scenedesmus quadricauda</i> Green algae	PGR	NR	7	S	2	F	>1400000	U	5303
<i>Scenedesmus subspicatus</i> Algae	EC50		4				1360000		11677
<i>Selenastrum capricornutum</i> Green algae	EC50GR	FRESH	3	S	2	F	29000	M	13142
<i>Selenastrum capricornutum</i> Green algae	GRO	FRESH	4	NR	2	F	600000	U	10574
<i>Selenastrum capricornutum</i> Green algae	PSE	NR	0.17	S	2	F	1000000	U	5218
<i>Skeletonema costatum</i> Diatom	GRO	SALT	2 - 3	S	2	F	10000	U	2214
<i>Tapes semidecussata</i> Manilla clam	MOR	SALT	1	F	2	F	228000	M	5698
<i>Tapes semidecussata</i> Manilla clam	MOR	SALT	1	F	2	F	228000	M	5698
<i>Tapes semidecussata</i> Manilla clam	MOR	SALT	2	F	2	F	193000	M	5698
<i>Tapes semidecussata</i> Manilla clam	MOR	SALT	2	F	2	F	193000	M	5698
<i>Tapes semidecussata</i> Manilla clam	MOR	SALT	3	F	2	F	196000	M	5698

TABLE 1. BENZENE (CONTINUED)

Species Latin Name Species Common Name	Effect	FW/SW	Dur (days)	Ex Ty	R C	Con Typ	Concentration (ug/l) Range	Md	Ref No.
<i>Tapes semidecussata</i> Manilla clam	MOR	SALT	3	F	2	F	196000	M	5698
<i>Tapes semidecussata</i> Manilla clam	MOR	SALT	4	F	2	F	165000	M	5698
<i>Tapes semidecussata</i> Manilla clam	MOR	SALT	4	F	2	F	165000	M	5698
<i>Thymallus arcticus</i> Arctic grayling	LC50	FRESH	4	S	2	F	14.71 UL/L	M	5622
<i>Tigriopus californicus</i> Copepod	LC50	SALT		S			450000	M	Korn, et al., 1976
Tubificidae Oligochaete family	LC50	FRESH	2	S	2	F	>320000	U	15788
<i>Xenopus laevis</i> Clawed toad	LC50	FRESH	2	S	2	F	190000	U	9740

TABLE 2. CHRONIC VALUES: 71432 BENZENE

Species Latin Name	Effect	FW/SW	Dur (days)	Ex Ty	R C	Con Typ	Chronic Value (ug/l)	Md	Ref No.
Ambystoma gracile	LC10	FRESH		EL	1	F		478	M 15418
Cancer magister	GRO	SALT	NR	F	2	F	>1200 - <6.5	M	5035
Daphnia magna	CHRONIC	FRESH	LC				>98000	EPA	
Morone saxatilis	GRO	SALT	28	F	1	F	3100*	M	7832
Morone saxatilis	GRO	SALT	28	F	1	F	5300*	M	7832
Rana pipiens	LC10	FRESH	EL		1	F		76	M 15418

TABLE 2. ACUTE-CHRONIC RATIO: 71432 BENZENE

Species Latin Name	Acute Value (ug/l)	Chronic Value (ug/l)	Ratio	Ref
Cancer magister	108000	>1200 - <6.5	1223	5035

Table 3A Genus Mean Acute Values:

TABLE 1. ACUTE AND CHRONIC VALUES: 71432 BENZENE

Species Latin Name	Effect	FW/SW	Dur (days)	Ex Ty	R C	Con Typ	Concentration (ug/l) Range	SMAV (ug/l)	GMAV (ug/l)	Md	Ref No.
Xenopus laevis	LC50	FRESH	2	S	2	F	190000	190000	190000	U	9740
Tubificidae	LC50	FRESH	2	S	2	F	> 320000	>320000	>320000	U	15788
Tigriopus californicus	LC50	SALT		S			450000	450000	450000	M	Korn, et al., 1976
Thymallus arcticus	LC50	FRESH	4	S	2	F	12925	12925	12925	M	5622
Salvelinus malma	LC50	SALT	4	S	2	F	5535	8473	8473	M	5622
Salvelinus malma	LC50	FRESH	4	S	2	F	10509			M	5622
Salvelinus malma	LC50	FRESH	4	S	2	F	10456			M	5622
Poecilia reticulata	LC50	FRESH	4	R	2	F	28600	32354	32354	M	13142
Poecilia reticulata	LC50	FRESH	4	S	2	F	36600			U	728
Pimephales promelas	LC50	FRESH	4	S	2	F	32000	32727	32727	U	728
Pimephales promelas	LC50	FRESH	4	S	2	F	33470			U	728
Palaemonetes pugio	LC50	SALT	4	S	2	F	27000	27000	27000	U	420
Oncorhynchus mykiss	LC50	FRESH	4	F	2	F	5300	8774	13516	M	15131
Oncorhynchus mykiss	LC50	FRESH	4	F	1	F	21600*			M	10688
Oncorhynchus mykiss	LC50	FRESH	4	R	2	F	5900			M	13142
Oncorhynchus tshawytscha	LC50	FRESH	4	S	2	F	10307	10307		M	5622
Oncorhynchus nerka	LC50	SALT	4	S	2	F	4876.5	6790		M	5622
Oncorhynchus nerka	LC50	FRESH	4	S	2	F	9454.3			M	5622
Oncorhynchus kisutch	LC50	FRESH	4	S	2	F	8611	37028		M	5622
Oncorhynchus kisutch	LC50	FRESH	4	S	2	F	12380			M	5622
Oncorhynchus kisutch	LC50	FRESH	4	S	2	F	476228			M	5622
Oncorhynchus gorbuscha	LC50	SALT	4	S	2	F	7442	19838		M	5622
Oncorhynchus gorbuscha	LC50	FRESH	4	S	2	F	4639			M	5622
Oncorhynchus gorbuscha	LC50	FRESH	4	S	2	F	15016			M	5622
Oncorhynchus gorbuscha	LC50	FRESH	4	S	2	F	298762			M	5622

TABLE 3a. GENUS MEAN ACUTE VALUES: 71432 BENZENE (continued)

Species Latin Name	Effect	FW/SW	Dur (days)	Ex Ty	R C	Con Typ	Concentration (ug/l)	Range	SMAV (ug/l)	GMAV (ug/l)	Md	Ref No.
<i>Morone saxatilis</i>	LC50	SALT	4	F	1	F	>9580*		>9580	>9580	M	5812
<i>Lymnaea stagnalis</i>	LC50	FRESH	2	NR	2	F	230000		230000	230000	U	10574
<i>Lymnaea stagnalis</i>	LC50	FRESH	2	S	2	F	230000				U	15788
<i>Lepomis macrochirus</i>	LC50	FRESH	4	S	2	F	100000		47424	47424	U	666
<i>Lepomis macrochirus</i>	LC50	FRESH	4	S	2	F	22490				U	728
<i>Ischnura elegans</i>	LC50	FRESH	2	S	2	F	10000		10000	10000	U	15788
<i>Ictalurus punctatus</i>	LC50	FRESH	4	S	2	F	425000		425000	425000	U	666
<i>Hydra oligactis</i>	LC50	FRESH	2	NR	2	F	34000		34000	34000	U	10574
<i>Hydra oligactis</i>	LC50	FRESH	2	S	2	F	34000				U	15788
<i>Gasterosteus aculeatus</i>	LC50	FRESH	4	S	2	F	21817		21817	21817	M	5622
<i>Gambusia affinis</i>	LC50*	FRESH	4	S	2	F	386000		386000	386000	U	508
<i>Engraulis mordax</i>	LC50	SALT					20000		20000	20000		EPA Advisory
<i>Dugesia lugubris</i>	LC50	FRESH	2	S	2	F	74000		74000	74000	U	15788
<i>Diaptomus forbesi</i>	LC50	FRESH	4	S	2	F	710000		710000	710000	U	11282
<i>Daphnia pulex</i>	LC50	FRESH	2	S	2	F	345000		302366	303603	U	2017
<i>Daphnia pulex</i>	LC50	FRESH	2	S	2	F	265000				U	2017
<i>Daphnia magna</i>	LC50	FRESH	2	S	2	F	682000		304846		U	10060
<i>Daphnia magna</i>	LC50	FRESH	2	S	2	F	200000				U	5184
<i>Daphnia magna</i>	LC50	FRESH	2	S	2	F	400000				U	2017
<i>Daphnia magna</i>	LC50	FRESH	2	S	2	F	412000				U	2017
<i>Daphnia magna</i>	LC50	FRESH	2	S	2	F	412000				U	2017
<i>Daphnia magna</i>	LC50	FRESH	2	S	2	F	356000				U	2017

TABLE 3a. GENUS MEAN ACUTE VALUES: 71432 BENZENE (continued)

Species Latin Name	Effect	FW/SW	Dur (days)	Ex Ty	R C	Con Typ	Concentration (ug/l)	Range	SMAV (ug/l)	GMAV (ug/l)	Md	Ref No.
<i>Daphnia magna</i>	LC50	FRESH	2	S	2	F	356000				U	2017
<i>Daphnia magna</i>	LC50	FRESH	2	S	2	F	620000				U	2017
<i>Daphnia magna</i>	EC50IM	FRESH	2	S	2	F	31244				U	11936
<i>Culex pipiens</i>	LC50	FRESH	2	NR	2	F	71000		71000	71000	U	10574
<i>Crassostrea gigas</i>	LC50*	SALT	2	S	2	F	377000*		377000	377000	U	8621
<i>Crangon franciscorum</i>	LC50	SALT	4	S	2	F	17573000		17573000	17573000	M	558
<i>Cottus cognatus</i>	LC50	FRESH	4	S	2	F	13540		13540	13540	M	5622
<i>Corixa punctata</i>	LC50	FRESH	2	S	2	F	48000		48000	48000	U	15788
<i>Cloeon dipterum</i>	LC50	FRESH	2	S	2	F	34000		34000	34000	U	15788
<i>Carassius auratus</i>	LC50	FRESH	4	S	2	F	34420		34420	34420	U	728
<i>Cancer magister</i>	LC50	SALT	4	S	2	F	108000		108000	108000	M	5035
<i>Aedes aegypti</i>	LC50	FRESH	2	NR	2	F	200000		200000	200000	U	10574

TABLE 3b. RANKED GENUS MEAN ACUTE VALUES: 71432 BENZENE

Species Latin Name	Effect	FW/SW	Dur (days)	Ex Ty	GMAY (ug/l)
<i>Crangon franciscorum</i>	LC50	SALT	4	S	17573000
<i>Diaptomus forbesi</i>	LC50	FRESH	4	S	710000
<i>Tigriopus californicus</i>	LC50	SALT		S	450000
<i>Ictalurus punctatus</i>	LC50	FRESH	4	S	425000
<i>Gambusia affinis</i>	LC50*	FRESH	4	S	386000
<i>Crassostrea gigas</i>	LC50*	SALT	2	S	377000
Tubificidae	LC50	FRESH	2	S	>320000
<i>Daphnia</i> sp	LC50	FRESH	2	S	303603
<i>Lymnaea stagnalis</i>	LC50	FRESH	2	NR	230000
<i>Aedes aegypti</i>	LC50	FRESH	2	NR	200000
<i>Xenopus laevis</i>	LC50	FRESH	2	S	190000
<i>Cancer magister</i>	LC50	SALT	4	S	108000
<i>Dugesia lugubris</i>	LC50	FRESH	2	S	74000
<i>Culex pipiens</i>	LC50	FRESH	2	NR	71000
<i>Corixa punctata</i>	LC50	FRESH	2	S	48000
<i>Lepomis macrochirus</i>	LC50	FRESH	4	S	47424
<i>Carassius auratus</i>	LC50	FRESH	4	S	34420
<i>Hydra oligactis</i>	LC50	FRESH	2	NR	34000
<i>Cloeon dipterum</i>	LC50	FRESH	2	S	34000
<i>Pimephales promelas</i>	LC50	FRESH	4	S	32727
<i>Poecilia reticulata</i>	LC50	FRESH	4	R	32354
<i>Palaemonetes pugio</i>	LC50	SALT	4	S	27000
<i>Gasterosteus aculeatus</i>	LC50	FRESH	4	S	21817

TABLE 3b. RANKED GENUS MEAN ACUTE VALUES: BENZENE (continued)

Species Latin Name	Effect	FW/SW	Dur (days)	Ex Ty	GMAV (ug/l)
<i>Engraulis mordax</i>	LC50	SALT			20000
<i>Cottus cognatus</i>	LC50	FRESH	4	S	13540
<i>Oncorhynchus sp.</i>	LC50	FRESH	4	F	13516
<i>Thymallus arcticus</i>	LC50	FRESH	4	S	12925
<i>Ischnura elegans</i>	LC50	FRESH	2	S	10000
<i>Morone saxatilis</i>	LC50	SALT	4	F	>9580
<i>Salvelinus malma</i>	LC50	SALT	4	S	8473

N: 30
 FAV: 8774-
 2974

TABLE 4. PLANT VALUES: 71432 BENZENE

Species Latin Name Species Common Name	Effect	FW/SW	Dur (days)	Ex R Ty C	Con Concentration Typ (ug/l) Range	Md	Ref No.
<i>Amphidinium carterae</i>	GRO	SALT	2 - 3	S 2 F		10000	U 2214
<i>Anacystis aeruginosa</i>	MOR	NR	NR	S 4 F		>1400000	U 2463
<i>Champia parvula</i>	REP	SALT	11 - 14	R 2 F		34260	U 11452
<i>Champia parvula</i>	REP	SALT	11 - 14	R 2 F		57100	U 11452
<i>Champia parvula</i>	GRO	SALT	11 - 14	R 2 F		57100	U 11452
<i>Champia parvula</i>	GRO	SALT	11 - 14	R 2 F		34260	U 11452
<i>Chlorella vulgaris</i>	PGR	NR	1	S 2 F		25000	U 8877
<i>Chlorella vulgaris</i>	EC5OGR	FRESH	1	S 2 F		525000	U 2215
<i>Cricosphaera carterae</i>	GRO	SALT	2 - 3	S 2 F		10000	U 2214
<i>Dunaliella tertiolecta</i>	GRO	SALT	2 - 3	S 2 F		100000	U 2214
<i>Scenedesmus quadricauda</i>	PGR	NR	7	S 2 F >		1400000	U 5303
<i>Scenedesmus quadricauda</i>	MOR	NR	NR	S 4 F		>1400000	U 2463
<i>Scenedesmus quadricauda</i>	PGR	NR	NR	S 4 F		>1400000	U 7453
<i>Scenedesmus subspicatus</i>	EC5OGR	FRESH	4	S 2 F		1360000	U 11677
<i>Selenastrum capricornutum</i>	PSE	NR	0.17	S 2 F		1000000	U 5218
<i>Selenastrum capricornutum</i>	EC5OGR	FRESH	3	S 2 F		29000	M 13142
<i>Selenastrum capricornutum</i>	GRO	FRESH	4	NR 2 F		600000	U 10574
<i>Skeletonema costatum</i>	GRO	SALT	2 - 3	S 2 F		10000	U 2214

Table 5a. BIOCONCENTRATION DATA: 71432 BENZENE

Species Latin Name Species Common Name	Effect	FW/SW	Dur (days)	Ex Ty	R C	BCF	Percent Tissue Lipid Type	M d.	Ref No.
Clupea harengus pallasii Pacific herring	BCF	SALT	0.25	S	2	83*		M	7078
Clupea harengus pallasii Pacific herring	BCF	SALT	0.25	S	2	6.7*		M	7078
Clupea harengus pallasii Pacific herring	BCF	SALT	0.25	S	2	0.25*		M	7078
Clupea harengus pallasii Pacific herring	BCF	SALT	0.25	S	2	4.01*		M	7078
Clupea harengus pallasii Pacific herring	BCF	SALT	0.25	S	2	3.10*		M	7078
Clupea harengus pallasii Pacific herring	BCF	SALT	0.5	S	2	210*		M	7078
Clupea harengus pallasii Pacific herring	BCF	SALT	0.5	S	2	6.5*			7078
Clupea harengus pallasii Pacific herring	BCF	SALT	1	S	2	5.0*		M	7078
Clupea harengus pallasii Pacific herring	BCF	SALT	1	S	2	8.83*		M	7078
Clupea harengus pallasii Pacific herring	BCF	SALT	1	S	2	3.10*		M	7078
Engraulis mordax Northern anchovy	BCF	SALT	0.25	S	2	54.6		M	7831
Engraulis mordax Northern anchovy	BCF	SALT	0.25	S	2	7.5		M	7831
Engraulis mordax Northern anchovy	BCF	SALT	0.25	S	2	7.1		M	7831
Engraulis mordax Northern anchovy	BCF	SALT	0.25	S	2	7.5		M	7831
Engraulis mordax Northern anchovy	BCF	SALT	1	S	2	22.7		M	7831
Engraulis mordax Northern anchovy	BCF	SALT	1	S	2	45.1			
Engraulis mordax Northern anchovy	BCF	SALT	1	S	2	41.8		M	7831
Engraulis mordax Northern anchovy	BCF	SALT	1	S	2	41.8		M	7831
Engraulis mordax Northern anchovy	BCF	SALT	1	S	2	10		M	7831
Engraulis mordax Northern anchovy	BCF	SALT	1	S	2	4360		M	7831
Engraulis mordax Northern anchovy	BCF	SALT	1	S	2	113		M	7831
Engraulis mordax Northern anchovy	BCF	SALT	1	S	2	1			
Engraulis mordax Northern anchovy	BCF	SALT	2	S	2	30		M	7831
Engraulis mordax Northern anchovy	BCF	SALT	2	S	2	309			
Engraulis mordax Northern anchovy	BCF	SALT	2	S	2	8450		M	7831
Engraulis mordax Northern anchovy	BCF	SALT	2	S	2	505		M	7831
Engraulis mordax Northern anchovy	BCF					229		M	7831

