N00217.003036
HUNTERS POINT
SSIC NO. 5090.3

CLEAN

Contract No. N62474-88-D-5086

Contract Task Order 0254

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# NAVAL STATION TREASURE ISLAND
# HUNTERS POINT ANNEX
# SAN FRANCISCO, CALIFORNIA

# PHASE 1A ECOLOGICAL RISK ASSESSMENT
# VOLUME 3A

# TASK 4.0 SUMMARY REPORT
# APPENDICES AND REFERENCES

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N00217.003036
HUNTERS POINT
SSIC NO. 5090.3

# PHASE 1A ECOLOIGCAL RISK ASSESSMENT (ERA) VOLUME 3A

DATED 15 JULY 1994

THIS RECORD CONTAINS MULTIPLE VOLUMES WHICH HAVE BEEN ENTERED SEPARATELY

VOLUME 1 OF 3 IS ENTERED IN THE DATABASE AND FILED AT ADMINISTRATIVE RECORD NO. **N00217.003022**

VOLUME 2 OF 3 IS ENTERED IN THE DATABASE AND FILED AT ADMINISTRATIVE RECORD NO. **N00217.003023**

VOLUME 3 OF 3 IS ENTERED IN THE DATABASE AND FILED AT ADMINISTRATIVE RECORD NO. **N00217.003024**

# APPENDICES AND REFERENCES ACCOMPANYING TASK 4.0 SUMMARY REPORT

# APPENDIX A

# TOXICITY DATA FOR TERRESTRIAL PLANTS AND ANIMALS

TABLE A-1

AVIAN AND MAMMALIAN TOXICITY DATA FOR INORGANICs

| Element[a] | Organism | Exposure Route[b] | Effects | Reported Results | | | Reference |
|---|---|---|---|---|---|---|---|
| | | | | Endpoint[c] | Value | Units[d] | |
| **ARSENIC** | | | | | | | |
| | Mallard | Feed | Lethality | LD50 | 2.5 | mg/kg/day | NAS 1980 |
| | Mouse | Feed | Reduced litter size | LOAEL | 5 | mg/kg diet | Eisler 1988a |
| | Hamster | Oral-gest | Maternal death | LOAEL | 5 | mg/kg/day | Eisler 1988a |
| | Mouse | Water | Reduced litter size after three generations, no other toxicity | LOAEL | 1 | mg/kg/day | ATSDR 1993b |
| **BERYLLIUM** | | | | | | | |
| | Mouse | Water | Various; no toxicity | NOAEL | 0.95 | mg/kg/day | ATSDR 1993d |
| **CADMIUM** | | | | | | | |
| | Mallard | Feed | Reduced egg production | LOAEL | 200 | mg/kg diet | Scheuhammer 1987 |
| | Chicken | Feed | Reduced egg production | LOAEL | 48 | mg/kg diet | Scheuhammer 1987 |
| | Mallard | Feed | Testicular atrophy | LOAEL | 200 | mg/kg diet | Scheuhammer 1987 |
| | Japanese quail | Feed | Delayed testes maturation | LOAEL | 75 | mg/kg diet | Scheuhammer 1987 |
| | Rat | Oral | Neurobehavior development | LOAEL | 1 | mg/kg/day | ATSDR 1993e |
| | Rat | Water | Decreased fetal wt | LOAEL | 5.5 | mg/kg/day | ATSDR 1993e |
| | Rat | Water | Decreased fetal wt | LOAEL | 8.4 | mg/kg/day | ATSDR 1993e |
| | Rat | Feed | Reduced birth wt | LOAEL | 19.7 | mg/kg/day | ATSDR 1993e |
| | Mouse | Water | Congenital abnormalities; reproductive failure | LOAEL | 1.9 | mg/kg/day | ATSDR 1993e |

TABLE A-1 (continued)

AVIAN AND MAMMALIAN TOXICITY DATA FOR INORGANICs

| Element[a] | Organism | Exposure Route[b] | Effects | Reported Results | | | Reference |
|---|---|---|---|---|---|---|---|
| | | | | Endpoint[c] | Value | Units[d] | |
| | Rat | Water | Testicular necrosis | LOAEL | 14 | mg/kg/day | ATSDR 1993e |
| | Rat | Feed | Developmental effects | NOAEL | 12.5 | mg/kg/day | ATSDR 1993e |
| **CHROMIUM** | | | | | | | |
| Anionic | Black duck | Feed | Normal survival, reproduction | NOAEL | 10 | mg/kg diet | Eisler 1986a |
| Anionic | Bk-ducklings | Feed | Reduced growth & survival | LOAEL | 10 | mg/kg diet | Eisler 1986a |
| +6 | Rat | Water | Kidney, liver lesions | LOAEL | 134 | mg/kg water | Eisler 1986a |
| +3 | Rat | Feed | Reproductive sterility | LOAEL | 32 | mg/kg/day | EPA 1990 |
| +6 | Rat | Feed | No reproductive effects | NOAEL | 32 | mg/kg/day | Ivanokovic & Preussman 1975 |
| **COPPER** | | | | | | | |
| | Chicken | Feed | No growth retardation | NOAEL | 40.5 | mg/kg/day | NAS 1980 |
| | Rat | Feed | Decrease body wt | LOAEL | 150 | mg/kg/day | ATSDR 1990a |
| | Rat | Feed | Decreased growth, testes wt | LOAEL | 130 | mg/kg/day | ATSDR 1990a |
| | Rat | Feed | No decreased wt gain | NOAEL | 89 | mg/kg/day | ATSDR 1990a |
| | Rat | Feed | Decreased wt gain | LOAEL | 144 | mg/kg/day | ATSDR 1990a |
| | Pig | Feed | Decreased wt gain | LOAEL | 14.6 | mg/kg/day | ATSDr 1990a |
| | Mouse | Feed-gest | No fetal mortality | NOAEL | 78 | mg/kg/day | ATSDR 1990a |
| | Mouse | Feed-gest | Fetal mortality | LOAEL | 104 | mg/kg/day | ATSDR 1990a |
| | Mouse | Water | Survival | LOAEL | 42.5 | mg/kg/day | ATSDR 1990a |
| | Mink | Feed | Reproductive success normal | NOAEL | 12.9 | mg/kg/day | ATSDR 1990a |

TABLE A-1 (continued)

AVIAN AND MAMMALIAN TOXICITY DATA FOR INORGANICs

| Element[a] | Organism | Exposure Route[b] | Effects | Reported Results | | | Reference |
|---|---|---|---|---|---|---|---|
| | | | | Endpoint[c] | Value | Units[d] | |
| **LEAD** | | | | | | | |
| | Japanese quail | Feed | Reduced egg production | LOAEL | 1.25 | mg/kg/day | Edens and Gerlich 1983 |
| | Am. kestrel | Feed | Normal BW and histopath; reduced blood ALAD | LOAEL | 50 | mg/kg diet | Franson and others 1983 |
| | Kestrel chicks | Feed | Reduced growth | LOAEL | 125 | mg/kg diet | Hoffman and others 1985 |
| | Quail | Feed | Reduced egg production | LOAEL | 1 | mg/kg diet | Pattee 1984 |
| | Quail | Feed | Reduced hatching, growth | LOAEL | 1,000 | mg/kg diet | Pattee 1984 |
| | Rat | Water | Growth retardation | LOAEL | 50 | mg/kg/day | Kimmel and others 1980 |
| | Rat | Water | Testicular atrophy | LOAEL | 90 | mg/kg/day | Chowdhury and others 1984 |
| | Mouse | Feed | Decrease live births | LOAEL | 3.2 | mg/kg/day | Al-Hakkak and others 1988 |
| | Mouse | Feed | Decreased fertility | LAOEL | 830 | mg/kg/day | Maisin and others 1978 |
| **MERCURY** | | | | | | | |
| Inorganic | Chicken | Water | Decreased growth rate | LOAEL | 500 | mg/L | Eisler 1987a |
| | Starlings | Feed | Kidney lesions | LOAEL | 1.1 | mg/kg diet | Eisler 1987a |
| Methyl | Black duck | Feed | Reproductive defifiencies | LOAEL | 3 | mg/kg diet | Eisler 1987a |
| Inorganic | Quail | Feed | Delayed testis development | LOAEL | 2 | mg/kg diet | Hill and Soares 1984 |
| Methyl | Mallard | Feed | Reduced egg production | LOAEL | 0.5 | mg/kg diet | Eisler 1987a |
| Inorganic | Quail | Feed | Decreased egg fertility | LOAEL | 8 | mg/kg diet | Hill and Shafner 1976 |
| Methyl | Pheasant | Feed | Reduced hatching success | LOAEL | 20 | mg/kg diet | Hill and Shafner 1976 |
| | Quail | Water | Gonadal atresia | LOAEL | 125 | mg/L | Scheuhammer 1987 |
| | Chickens | Water | Depressed growth | LOAEL | 125 | mg/L | Scheuhammer 1987 |

TABLE A-1 (continued)

AVIAN AND MAMMALIAN TOXICITY DATA FOR INORGANICs

| Element[a] | Organism | Exposure Route[b] | Effects | Reported Results | | | Reference |
|---|---|---|---|---|---|---|---|
| | | | | Endpoint[c] | Value | Units[d] | |
| Inorganic | Hamster | Gavage | Fetal resorption | NOAEL | 15.7 | mg/kg/day | ATSDR 1992b |
| Inorganic | Hamster | Gavage | Fetal resorption | LOAEL | 31.4 | mg/kg/day | ATSDR 1992b |
| Inorganic | Rat | Gavage | Decreased body wt | LOAEL | 0.8 | mg/kg/day | ATSDR 1993b |
| Organic | Mouse | Gavage | Decreased body wt | NOAEL | 0.2 | mg/kg/day | ATSDR 1992b |
| Organic | Mouse | Gavage | Decreased body wt | LOAEL | 0.8 | mg/kg/day | ATSDR 1992b |
| **MOLYBDENUM** | | | | | | | |
| | Chicken-chicks | Feed | Minor growth inhibition | LOAEL | 200 | mg/kg diet | Eisler 1989 |
| | Turkey | Feed | Reduced growth | LOAEL | 300 | mg/kg diet | Eisler 1989 |
| | Chicken-chicks | Feed | Decreased growth | LOAEL | 500 | mg/kg diet | Eisler 1989 |
| | Chicken-hens | Feed | Egg production | LOAEL | 500 | mg/kg diet | Eisler 1989 |
| | Rabbit | Feed | No obvious effects at 12 wks | NOAEL | 500 | mg/kg diet | Eisler 1989 |
| | Rabbit | Feed | Reduced growth, skeletal deformations aver lifetime | LOAEL | 100 | mg/kg diet | Eisler 1989 |
| **SELENIUM** | | | | | | | |
| Selenite | Mallard | Feed | Egg hatchability normal | NOAEL | 10 | mg/kg diet | Heinz 1985 |
| Selenite | Mallard | Feed | Egg hatchability reduced | LOAEL | 50 | mg/kg diet | Heinz 1985 |
| Selenite | Quail | Feed | Reduced egg hatching | LOAEL | 1 | mg/kg/day | El-Bergearmi and others 1977 |
| Selenate | Rat | Feed | Reduced pup survival | LOAEL | 0.12 | mg/kg/day | Rosenfeld and Beath 1954 |
| Selenite | Mouse | Water | No effects on reproduction, skeleton, gross anatomy | NOAEL | 0.78 | mg/kg/day | Patrias 1969 |
| Selenite | Mouse | Water | Fetal body wt | LOAEL | 0.78 | mg/kg/day | Patrais 1969 |
| +4 | Mouse | Water | Decreased fetal growth | NOAEL | 0.17 | mg/kg/day | ATSDR 1988 |

TABLE A-1 (continued)

AVIAN AND MAMMALIAN TOXICITY DATA FOR INORGANICs

| Element[a] | Organism | Exposure Route[b] | Effects | Reported Results | | | Reference |
|---|---|---|---|---|---|---|---|
| | | | | Endpoint[c] | Value | Units[d] | |
| +4 | Mouse | Water | Decreased fetal growth | LOAEL | 0.34 | mg/kg/day | ATSDR 1988 |
| +4 | Hamster | Feed | Decreased body wt | LOAEL | 0.42 | mg/kg/day | ATSDR 1988 |
| +6 | Mouse | Water | Decreased breeding success | LOAEL | 0.42 | mg/kg/day | ATSDR 1988 |
| ZINC | | | | | | | |
| | Japanese quail | Feed | Decreased wt gain | LOAEL | 270 | mg/kg diet | NAS 1980 |
| | Chicken | Feed | Decreased wt gain | LOAEL | 800 | mg/kg diet | NAS 1980 |
| | Turkey | Feed | Decreased wt gain | LOAEL | 4,000 | mg/kg diet | NAS 1980 |
| | Chicken-chicks | Feed | Decreased growth | LOAEL | 1,500 | mg/kg diet | NAS 1980 |
| | Ducks | Feed | Reduced survival | LOAEL | 2,500 | mg/kg diet | Eisler 1993 |
| | Chicken-chicks | Feed | Immunosuppression | LOAEl | 178 | mg/kg diet | Eisler 1993 |
| | Rat | Feed | Fetal resorption | LOAEL | 200 | mg/kg/day | ATSDR 1989 |
| | Rat | Feed | Reproductive dysfunction | LOAEL | 500 | mg/kg/day | ATSDR 1989 |

aElement: Form of element indicated when reported
bExposure route: Gavage = introduced into stomach by tube; -gest = dose administered to female during gestation; Oral = means of administration not known
cEndpoint: LD50, LD100 = dose lethal to 50 or 100%, respectively; LOAEL = Lowest observable adverse effect level; NOAEL = no observable adverse effect level.
dUnits: mg/kg/day = daily dose per kilogram body weight; mg/kg diet = concentration in diet; NOTE - doses and dietary concentrations cannot be directly compared

**TABLE A-2**
**ORAL DOSES OF CYANIDE LETHAL TO BIRDS**

| Species | Dose (single oral dose of sodium cyanide) | Effect | Reference[a] |
|---|---|---|---|
| Mallard<br>*Anas platyrhinchos* | 0.53 mg Cn/kg bw<br>1.1 mg Cn/kg bw<br>1.27 mg Cn/kg bw<br>1.47 mg Cn/kg bw | no deaths<br>6% dead<br>33% dead<br>LD50 | 1 |
| Turkey vulture<br>*Cathartes aura* | 19.1 mg Cn/kg bw | average time to death was 19 minutes | 2 |
| Japanese quail<br>*Coturnix japonica* | 4.5 mg Cn/kg bw<br>5.5 mg Cn/kg bw | acute LD50 for adult females<br>acute LD50 for adult males | 2 |
| American kestrel<br>*Falco spaverius* | 2.12 mg Cn/kg bw | acute LD50 | 2 |
| Eastern screech-owl<br>*Otus asio* | 4.6 mg Cn/kg bw | acute LD50 | 2 |
| European starling<br>*Sturnus vulgaris* | 9.0 mg Cn/kg bw | acute LD50 | 2 |

Notes: Modified from Eisler (1991).

a Both references appear as cited by Eisler (1991): 1 = Personal communication (to R. Eisler), E. F. Hill, Patuxent Wildlife Research Center; 2 = Wiemeyer and others 1986

Cn cyanide
bw
LD50

TABLE A-3

LETHAL AND SUBLETHAL DOSES OF CYANIDE IN MAMMALS

| Species | Dose | Exposure Time | Effect | Reference[a] |
|---|---|---|---|---|
| Domestic mouse *Mus* spp. | 3.4 mg Cn/kg bw as KCN | single oral dose | LD50 | 1,2 |
| Domestic mouse *Mus* spp. | 1,000 mg KCn/L in drinking water | 40 days | marked inhibition of cytochrome oxidase activity in liver, brain, and blood; increased cyanide concentrations in all tissues; inhibition of rhodanese activity; diminished labile sulfur tissue levels | 3 |
| Rabbit *Oryctolagus* spp. | 2.5 mg HCn/kg bw<br>5.1 mg NaCn/kg bw<br>5.8 mg KCn/kg bw | single oral dose | LD50<br>LD50<br>LD50 | 4 |
| White rat *Rattus* spp. | 3.4 mg KCn/kg bw | single oral dose | LD25 | 5 |
| White rat *Rattus* spp. | 12 mg Cn/kg-day bw in diet | 2 years | no measurable adverse effects on blood chemistry, growth, survival, or histology; elevated thiocyanate levels in liver and kidneys | 1 |
| White rat *Rattus* spp. | 750 mg Cn/kg diet<br><br>750 mg Cn/kg diet, with protein-deficient diet | 8 weeks<br><br>8 weeks | no measurable effect on food consumption or growth rate; significantly increased serum and urinary thiocyanate concentrations.<br>reduction in body weight gain, reduction in serum thiocyanate concentration. | 6 |

Notes: Modified from Eisler (1991).

a All references appear as cited by Eisler (1991). 1 = EPA 1980, 2 = Sterner 1979, 3 = Buzaleh and others 1989, 4 = Ballantyne 1987a, 5 = Keniston and others 1987, 6 = Tewe and Maner 1985.

Cn cyanide
KCn potassium cyanide
LD50
NaCn sodium cyanide

TABLE A-4

AVIAN AND MAMMALIAN TOXICITY DATA FOR PCBs

| Class | Organism | Exposure Route | Effects | Reported Results | | | Reference |
|---|---|---|---|---|---|---|---|
| | | | | Endpoint[a] | Value | Units | |
| **BIRD** | | | | | | | |
| | Pheasant | Oral | Mortality | LD100 | 20 | mg/day dose | E&E 1986 |
| | Finch-Bengalese | Oral | Mortality | LD50 | 256 | mg/kg/day | E&E 1986 |
| | Chicken | Oral | Reproductive Impairment | LOAEL | 5 | mg/kg diet | Eisler 1987b |
| | Turtle Dove | Oral | Reproductive Impairment | LOAEL | 10 | mg/kg diet | Eisler 1987b |
| | Chicken | Oral | Hatchability of eggs | LOAEL | 20 | mg/kg diet | Eisler 1987b |
| | Duck-Mallard | Oral | Reproduction | NOAEL | 26.3 | mg/kg diet | E&E 1986 |
| | Chicken | Oral | Reproduction | NOAEL | 40 | mg/kg diet | E&E 1986 |
| | Northern bobwhite | Oral | Reproduction | NOAEL | 50 | mg/kg diet | Eisler 1987b |
| | Japanese quail | Oral | Reproduction | NOAEL | 50 | mg/kg diet | Eisler 1987b |
| | Duck-Mallard | Oral | Reproduction | NOAEL | 150 | mg/kg diet | E&E 1986 |
| | Chicken | Oral | Body, liver, spleen wts | LOAEL | 400 | mg/kg diet | CESARS |
| | Owl-Screech | Oral | Reproduction | NOAEL | 3 | mg/kg diet | Eisler 1987b |
| | Hawk-Am. Kestrel | Oral | Reproduction | LOAEL | 33 | mg/kg diet | Eisler 1987b |
| **MAMMAL-SMALL** | | | | | | | |
| | Mouse | Oral | Mortality | LD50 | 1900 | mg/kg/day | RTECS |
| | Mink | Oral | Reproductive failure | LOAEL | 2 | mg/kg diet | Eisler 1987b |
| | Rat | Oral | Liver wt, body wt | NOAEL | 5 | mg/kg diet | CESARS |
| | Rat | Oral | Mortality | LD50 | 1315 | mg/kg/day | CESARS |
| | Rat | Oral | Liver wt, body wt | LOAEL | 20 | mg/kg diet | CESARS |

TABLE A-4 (continued)

AVIAN AND MAMMALIAN TOXICITY DATA FOR PCBs

| Class | Organism | Exposure Route | Effects | Reported Results | | | Reference |
|---|---|---|---|---|---|---|---|
| | | | | Endpoint[a] | Value | Units | |
| | Rat | Oral | Body, liver wts; liver pathology | LOAEL | 20 | mg/kg diet | CESARS |
| | Guinea Pig | Oral | Humoral response | NOAEL | 50 | mg/kg diet | CESARS |
| | Rat | Oral | Reproduction | NOAEL | 100 | mg/kg diet | CESARS |
| | Rat | Oral | Liver wt, blood pathology | LOAEL | 100 | mg/kg diet | CESARS |
| | Rat | Oral | Liver wt, liver neoplasm/carcinomas | LOAEL | 100 | mg/kg diet | CESARS |
| | Rat | Oral | Reduced liter size/survival | LOAEL | 500 | mg/kg diet | CESARS |
| | Rabbit | Dermal | Skin, liver, kidney, lymphoid tissue damage | LOAEL | 118 | mg/kg/day | CESARS |
| | Rabbit | Dermal | Skin, liver, blood chemistry | LOAEL | 120 | mg/kg/day | CESARS |

a Endpoint: LD50, LD100 = dose lethal to 50 or 100%, respectively; LOAEL = Lowest observable adverse effect level; NOAEL = no observable adverse effect level.

b Units: mg/kg/day = daily dose per kilogram body weight, mg/kg diet = concentration in diet; NOTE - doses and dietary concentrations cannot be directly compared.

TABLE A-5

AVIAN AND MAMMALIAN TOXICITY DATA FOR ORGANOCHLORINE COMPOUNDS

| Compound | Organism | Exposure Route | Effects | Reported Results | | | Reference |
|---|---|---|---|---|---|---|---|
| | | | | Endpoint[a] | Value | Units | |
| **CHLORDANE** | | | | | | | |
| | Rat | Feed | Decreased body wt gain | LOAEL | 12.1 | mg/kg/day | ATSDR 1992a |
| | Rat | Feed | Decreased body wt gain | LOAEL | 20.4 | mg/kg/day | ATSDR 1992a |
| | Rat | Feed | Testis degeneration | LOAEL | 3.2 | mg/kg/day | ATSDR 1992a |
| | Rat | Feed | Decreased survival-female | LOAEL | 40 | mg/kg/day | ATSDR 1992a |
| | Rat | Feed | Decreased survival-male | LOAEL | 80 | mg/kg/day | ATSDR 1992a |
| **DDT** | | | | | | | |
| | Rat | Feed | Decreased growth | NOAEL | 1 | mg/kg/day | ATSDR 1992c |
| | Rat | Feed | Decreased growth | LOAEL | 10 | mg/kg/day | ATSDR 1992c |
| | Rat | Feed | Decreased fertility | LOAEL | 0.35 | mg/kg/day | ATSDR 1992c |
| | Mouse | Feed | Smaller litter size | LOAEL | 0.91 | mg/kg/day | ATSDR 1992c |
| | Mouse | Feed | Increase estrus | LOAEL | 1.67 | mg/kg/day | ATSDR 1992c |
| **DIELDRIN** | | | | | | | |
| | | | | | | | |
| **ENDRIN** | | | | | | | |
| | Mouse | Oral | Decreased fetal wt | LOAEL | 1 | mg/kg/day | ATSDR 1991 |

TABLE A-5 (continued)

AVIAN AND MAMMALIAN TOXICITY DATA FOR ORGANOCHLORINE COMPOUNDS

| Compound | Organism | Exposure Route | Effects | Reported Results | | | Reference |
|---|---|---|---|---|---|---|---|
| | | | | Endpoint[a] | Value | Units | |
| LINDANE<br>HEXACHLOROCYCLOHEXANE | | | | | | | |
| | Rat | Feed | Ovarian atrophy | LOAEL | 12.5 | mg/kg/day | ATSDR 1990d |
| | Mouse | Feed | Degeneration seminif. tubules | LOAEL | 64.6 | mg/kg/day | ATSDR 1990d |
| | Mouse | Feed | Liver carcinoma | LOAEL | 32.5 | mg/kg/day | ATSDR 1990d |

a Endpoint: LOAEL = Lowest observable adverse effect level; NOAEL = no observable adverse effect level.

TABLE A-6

AVIAN AND MAMMALIAN TOXICITY DATA FOR VOLATILE AND SEMIVOLATILE ORGANC CHEMICALS

| Chemical | Organism | Exposure Route | Effects | Reported Results | | | Reference |
|---|---|---|---|---|---|---|---|
| | | | | Endpoint[a] | Value | Units | |
| **BENZENE** | | | | | | | |
| | Mouse | Gavage | Decreased fetal wt | LOAEL | 1300 | mg/kg/day | ATSDR 1993c |
| **PAHs** | | | | | | | |
| Mixed | Mallard | Feed | Increased liver wt | LOAEL | 4,000 | mg/kg diet | Eisler 1987b |
| Chrysene | Mallard-eggs | Eggshell | Embryo mortality, development defects | LOAEL | 0.015 | mg/kg | Eisler 1987b |
| Benzo(a)pyrene | Mallard-eggs | Eggshell | Chick mortality | LOAEL | 0.01 | mg/kg | Eisler 1987b |
| Benzo(a)pyrene | Mouse | Feed | Fetal resorption | LOAEL | 120 | mg/kg/day | ATSDR 1991b |
| Benzo(a)pyrene | Mouse | Gavage | Decreased pup wt | NOAEL | 10 | mg/kg/day | ATSDR 1991b |
| Benzo(a)pyrene | Mouse | Gavage | Decreased pup wt | LOAEL | 40 | mg/kg/day | ATSDR 1991b |
| Benzo(a)pyrene | Mouse | Feed | Cancer effect level | LOAEL | 33.3 | mg/kg/day | ATSDR 1991b |
| Benzo(a)pyrene | Mouse | Oral | Cancer (15-365 days) | LOAEL | 5 | mg/kg/day | Eisler 1987b |
| Benzo(a)pyrene | Mouse | Oral-gest | Reduced pup wt | LOAEL | 10 | mg/kg/day | MacKenzie and Aggevine 1981 |
| Benzo(b)fluoranthene | Mouse | Dermal | Skin tumors | LOAEL | 1.2 | mg/kg-BW | Wynder and Hoffman 1959 |
| Benzo(k)fluoranthene | Rat | Oral | Cancer | LOAEL | 72 | mg/kg/day | Eisler 1987b |
| Chrysene | Rodent | Oral | Cancer | LOAEL | 99 | mg/kg/day | Eisler 1987b |

a Endpoint: LOAEL = Lowest observable adverse effect level; NOAEL = no observable adverse effect level

## TABLE A-7

## EFFECTS OF INORGANICS ON TERRESTRIAL PLANTS

| Element[a] | Organism[b] | Effect | Value (mg/kg) | pH | Reference[c] |
|---|---|---|---|---|---|
| **ARSENIC** | | | | | |
| soluble | Alfalfa, barley | "Marked change" in crops | 2 | | 1 |
| soluble | Alfalfa, barley | "Poor condition" of young in fields | 3.4-9.5 | | 1 |
| total (soluble) | Crops | Reduction in yield | 25-85 (3-28) | | 2 |
| **CADMIUM** | | | | | |
| | Pine, choke cherry | Reduction in growth | 100 | | 5 |
| | Spinach | 25% reduction in yield | 4 | | 5 |
| | Rice | 25% reduction in yield | 640 | | 5 |
| | Agronomic & grassland spp | Threshold based on yield | 100 | | 6 |
| **CHROMIUM** | | | | | |
| potassium dichromate | Barley | Reduced growth | 50 | 7.8 | 3 |
| potassium dichromate | Barley | Delayed germination, reduction in height | 200 | 5.6-6.4 | 3 |
| chromium dichloride | n.s. | Unspecified "toxic effects | 100 | | 3 |
| chrome alum | Barley | No adverse effects | 200 | 5.6-7.8 | 3 |
| with zinc as sulfate | n.s. | Growth inhibition | 500 | 5.5-7+ | 3 |
| with zinc as sulfate | Field bean | 25% reduction in yield | 200 | | 4 |
| potassium chromate | Barley | 100% mortality | 500-1,000 | | 1 |
| potassium chromate | Barley | Production of only a few small plants | 50 | | 1 |

TABLE A-7 (continued)

EFFECTS OF INORGANICS ON TERRESTRIAL PLANTS

| Element[a] | Organism[b] | Effect | Value (mg/kg) | pH | Reference[c] |
|---|---|---|---|---|---|
| COPPER | | | | | |
| | n.s. | Suggested toxicity threshold | 150 | | 3 |
| | Oats | <15% reduction in yield | 100 | 5.7 | 3 |
| | Mustard | >70% reduction in yield | 200 | 5.7 | 3 |
| | Oats, mustard | No effect on yield | 200 | 6.4 | 3 |
| | Oats | >60% reduction in yield | 500 | 5.7 | 3 |
| | Mustard | >90% reduction in yield | | 5.7 | 3 |
| | Oats | <20% reduction in yield | 500 | 6.4 | 3 |
| | Mustard | >70% reduction in yield | 500 | 6.4 | 3 |
| | Maize | "Slight toxic symptoms" | 360 | | 3 |
| | All crops | "Severe toxicity" | 800 | | 3 |
| | Barley | Slight stunting | 200 | 5.2 | 3 |
| | Barley | Root knotting | 200 | 6.8 | 3 |
| | Barley | Failure to form ears | 600 | 5.2 | 3 |
| | Barley | Slight stunting | 600 | 6.8 | 3 |
| | Barley | No adverse effects | 1200 | 8.3 | 3 |
| | Citrus seedlings | "Appreciable" chlorosis | 150 | <5.0 | 1 |
| | Citrus seedlings | Reduction in yield, twig dieback | 150-200 | | 1 |
| extractable Cu | Spinach, gladiolus | "Toxicity symptoms" | 98-130 | 4.5-4.7 | 1 |
| | Agronomic & grassland spp | Threshold based on yield | 100 | | 6 |

TABLE A-7 (continued)

EFFECTS OF INORGANICS ON TERRESTRIAL PLANTS

| Element[a] | Organism[b] | Effect | Value (mg/kg) | pH | Reference[c] |
|---|---|---|---|---|---|
| LEAD | | | | | |
| | Roadside weed | Reduced pollen, seed germination | 500 | | 5 |
| | Roadside weed | Normal pollen, seed germination | 46 | | 5 |
| NICKEL | | | | | |
| | Various | Suggested threshold | 20 | 5.5 | 3 |
| | Oats | <20% reduction in yield | 50 | 5.7-6.4 | 3 |
| | Mustard | >30% reduction in yield | 50 | 5.7 | 3 |
| | Mustard | No effect on yield | 50 | 6.4 | 3 |
| | Oats | >70% reduction in yield | 100 | 5.7 | 3 |
| | Mustard | >95% reduction in yield | 100 | 5.7 | 3 |
| | Oats | >20% reduction in yield | 100 | 6.4 | 3 |
| | Mustard | No effect on yield | 100 | 6.4 | 3 |
| | Oats | >80% reduction in yield | 250 | 5.7 | 3 |
| | Mustard | >95% reduction in yield | 250 | 5.7 | 3 |
| | Oats | >30% reduction in yield | 250 | 6.4 | 3 |
| | Mustard | >70% reduction in yield | 250 | 6.4 | 3 |
| | Wheat | "Slightly toxic" | 20 | 5.1 | 3 |
| | Wheat | "Moderately toxic" | 40 | 5.1 | 3 |
| | Wheat | "Severely toxic" | 80 | 5.1 | 3 |
| | Wheat | No visible effects | 320-2,560 | 7.5 | 3 |
| | Wheat | Reduced yield | 1,920 | | 3 |

TABLE A-7 (continued)

EFFECTS OF INORGANICS ON TERRESTRIAL PLANTS

| Element[a] | Organism[b] | Effect | Value (mg/kg) | pH | Reference[c] |
|---|---|---|---|---|---|
| extractable Ni | Potato | "Satisfactory" | 5 | | 3 |
| extractable Ni | Potato | "Damaging" | 20 | | 3 |
| SELENIUM | | | | | |
| sodium selenate | Wheat | Chlorosis, extreme stunting | 30 | | 1 |
| sodium selenite | Wheat | Decreased growth rate | 1-4 | | 1 |
| sodium selenite | Wheat | Extreme chlorosis, death | 8-64 | | 1 |
| ZINC | | | | | |
| | Wheat | No adverse effects | 3,000 | 7.5 | 3 |
| | Wheat | Slight chlorosis | 4,000 | 7.5 | 3 |
| extractable | Corn | "Toxicity" | 450 | acidic | 5 |
| extractable | Cowpea | "Toxicity" | 180 | acidic | 5 |
| extractable | Raspberry, maize, pea, tomato | Diminished yields | 100-150 (1,000 total) | 7.5 | 3 |
| extractable | Chrysanthemum | "Poor growth" | 93 | | 3 |
| extractable | Wall flower | "Poor growth" | 154 | | 3 |
| extractable | Sugar beet | "Poor growth" | 96 | | 3 |
| extractable | Bedding plants | "Poor growth" | 150 | | 3 |

a Element: form of element indicated when known; total concentration measured unless noted (e.g., "extractable")
b Organism: N.S. = not stated
c Reference: 1 = Chapman 1966, 2 = Eisler 1988a, 3 = Patterson 1971, 4 = CAST 1976, 5 = Adriano 1986, 6 = EPA 1987

**TABLE A-8**
**TOXIC EFFECTS OF INORGANICS ON SOIL FAUNA**

| Element | Species | Effect | Value (mg/kg) | Reference |
|---|---|---|---|---|
| **ARSENIC** | | | | |
| | Microbiota | Reduced growth & metabolism | 375 | Eisler 1988a |
| | Earthworms | None present | 150 | Eisler 1988a |
| **CADMIUM** | | | | |
| | *Eisenia fetida* earthworm | 2 wk LC50 in artificial soil | 1,843 | Neuhauser 1985 |
| | *Lumbricus rubellis* earthworm | 6 wk LC50 | 500 | Ma and others 1983 |
| | L. Rubellis | Threshold for growth, sexual develop. | 20 | Ma and others 1983 |
| | L. Rubellis | 50% reduction in growth, sexual develop. | 60 | Ma and others 1983 |
| | E. fetida | Reduction in growth, reproduction | 100 | Neuhauser and others 1984 |
| **COPPER** | | | | |
| | L. rubellis | 42% reduction in number cocoons | 131 | Ma 1984 |
| | L. rubellis | 19% reduction in litter breakdown activity | 131 | Ma 1984 |
| | L. rubellis | 95% reduction in number cocoons | 372 | Ma 1984 |
| | L. rubellis | 60% reduction in litter breakdown activity | 372 | Ma 1984 |
| | L. rubellis | 19% reduction in body mass gain | 372 | Ma 1984 |
| | E. fetida | 2 wk LC50 in artificial soil | 643 | Neuhauser and others 1985 |
| | L. rubellis | 6 wk LC50 | 1,000 | Ma 1982 |
| | L. rubellis | 50% reduction in growth, sexual develop. | 150 | Ma 1982 |
| | E. fetida | Reduction in growth, reproduction | 2,000 | Neuhauser and others 1984 |
| | Earthworms | No effect on population density | 5-60 | Ma 1982 |

TABLE A-8 (continued)

TOXIC EFFECTS OF INORGANICS ON SOIL FAUNA

| Element | Species | Effect | Value (mg/kg) | Reference |
|---|---|---|---|---|
| | Earthworms | 50% reduction in density | 88 | Ma 1982 |
| | Earthworms | 75% reduction in density | 116 | Ma 1982 |
| LEAD | | | | |
| | E. fetida | 2 wk LC50 | 5,491 | Neuhauser and others 1984 |
| | E. fetida | Reduction in reproduction (6 wk) | 5,000 | Neuhauser 1985 |
| | E. fetida | Reduction in growth (6 wk) | 40,000 | Neuhauser 1985 |
| | Inverterbrates | No decrease in abundance | 0-95 | Williamson and Evans 1972 |
| MERCURY | | | | |
| methyl | E. fetida | Fatal to all in 12 wks | 25 | Eisler 1987a |
| methyl | E. fetida | 21% mortality | 5 | Eisler 1987a |
| inorganic | Earthworm | $LC_{50}$ | 0.79 | Eisler 1987a |
| | Earthworm | $LC_{100}$ | 5 | Eisler 1987a |
| ZINC | | | | |
| | Earthworms | Criterion for protection | 97 | Eisler 1993 |
| | Earthworms | Threshold for adverse effects | 400 | Eisler 1993 |
| | E. fetida | 2 wk LC50 in artificial soil | 662 | Neuhauser 1985 |
| | E. fetida | Reduction in reproduction (6 wk) | 2,500 | Neuhauser 1984 |
| | E. fetida | Reduction in growth (6 wk) | 5,000 | Neuhauser and others 1984 |

## TABLE A-9

## PROPOSED PCB CRITERIA FOR PROTECTION OF NATURAL RESOURCES

| Resource | PCB Concentration | Reference[a] |
|---|---|---|
| Aquatic life | | |
| Salt water concentration | <0.030 μg/L, 24 h average | 1 |
| Fish: diet | <0.5 mg/kg fresh weight | 1 |
| Fish: whole body residue | <.4 mg/kg tissue, fresh weight | |
| Fish: egg residues | <0.33 mg/kg tissue, fresh weight | 2 |
| Birds | | |
| Diet | <3.0 mg/kg, fresh weight | 3 |
| Residue: egg | <16.0 mg/kg, fresh weight | 4 |
| Residue: brain | <54.0 mg/kg, fresh weight | 5 |

Notes: Modified from Eisler (1986).

a 1 = EPA 1980, as cited in Eisler 1986; 2 = Nimi 1983, as cited in Eisler 1986; 3 = McLane and Huges 1980, as cited in Eisler 1986; 4 = Peakall and others 1972, as cited in Eisler 1986; 5 = Stickel and others 1984, as cited in Eisler 1986.

**TABLE A-10**

**PROPOSED CHLORDANE CRITERIA FOR THE PROTECTION OF NATURAL RESOURCES**

| Resource | Chlordane Concentration | Reference[a] |
|---|---|---|
| Aquatic life | | |
| Salt water concentration | <0.004 μg/L, 24 h average, not to exceed 0.09 μg/L at any time | 1 |
| Tissue concentration | | |
| Fish: reduced survival | >300 mg/kg tissue, lipid weight | 2 |
| Fish: NOEL | <.01 mg/kg tissue, fresh weight | 3 |
| Lethal: estuarine invertebrates | >106 mg/kg tissue, lipid weight | 2 |
| Birds | | |
| Diet, acceptable range, but producing slight elevation in tissue concentrations | 0.1 - 0.3 mg/kg diet | 4 |
| Mammals | | |
| Rat (*Rattus* spp.): NOEL | <5 mg/kg diet, equivalent to 0.25 mg/kg body weight daily | 5 |

Notes: Modified from Eisler (1990).

All references appear as cited by Eisler (1990). 1 = EPA 1980; 2 = Zitco 1978; 3 = Arruda and others 1987; 4 = NRCC 1975; 5 = WHO 1984

# APPENDIX B

# BIOCONCENTRATION FOR AQUATIC AND TERRESTRIAL ORGANISMS

## TABLE B-1

## LEAD BCFs FOR MARINE ORGANISMS

| Organism | BCF | Exposure Time (concentration, when available) | Reference[a] |
|---|---|---|---|
| Diatom<br>*Phaeodactylum tricornutum* | 582,000 | < 1 hour (20 $\mu$g $Pb^{2+}$/L) | 1 |
| American oyster (soft parts)<br>*Crassostrea virginica* | 6,000 | 140 days (1.0 $\mu$g Pb/L) | 2 |
| American oyster (soft parts)<br>*Crassostrea virginica* | 3,454 | 140 days (3.3 $\mu$g Pb/L) | 2 |
| Blue mussel (kidney)<br>*Mylitus edulis* | 12,580 | 63 days (10 $\mu$g $Pb^{2+}$/L) | 3 |
| Blue mussel (soft parts)<br>*Mylitus edulis* | 1,580 | 63 days (10 $\mu$g $Pb^{2+}$/L) | 3 |
| Blue mussel (soft parts)<br>*Mylitus edulis* | 25,670 | 150 days (500 $\mu$g $Pb^{2+}$/L) | 4 |
| Soft shell clam (soft parts)<br>*Mya arenaria* | 158 - 351 | 7 - 42 days (14 or 70 $\mu$g Pb/L) | 5 |

Notes: Modified from Eisler (1988b).

a All references appear as cited by Eisler (1988b). 1 = Schulz-Baldes and Lewin 1976; 2 = Zaroogian and others 1979; 3 = Schulz-Baldes 1974; 4 = Schulz-Baldes 1972; 5 = Eisler 1977

BCF Bioconcentration factor

TABLE B-2

REPORTED PAH BCFs FOR AQUATIC ORGANISMS

| Organism by compound | BCF | Exposure Time | Reference[a] |
|---|---|---|---|
| BENZO(A)ANTHRACENE | | | |
| Cladoceran<br>*Daphnia pulex* | 10,109 | 24 hours | 1 |
| BENZO(A)PYRENE | | | |
| Teleost (muscle)<br>3 species | 0.02 - 0.1 | 1 - 96 hours | 2 |
| Clam<br>*Rangia cuneata* | 9 - 236 | 24 hours | 3 |
| Bluegill<br>*Lepomis macrochirus* | 12 | 4 hours | 4 |
| Atlantic salmon (egg)<br>*Salmo salar* | 71 | 168 hours | 5 |
| Midge (larvae)<br>*Chironomus riparius* | 166 | 8 hours | 4 |
| Rainbow trout (liver)<br>*Salmo gairdneri* | 182 - 920 | 10 days | 6 |
| Oyster<br>*Cassostrea virginica* | 242 | 14 days | 2 |
| Northern pike (bile and gall bladder)<br>*Esox lucius* | 3,974<br>36,656<br>82,916<br>53,014 | 3.3 hours<br>19.2 hours<br>8.5 days<br>23 days | 7 |
| Northern pike (liver)<br>*Esox lucius* | 259<br>578<br>1,379<br>619 | 3.3 hours<br>19.2 hours<br>8.5 days<br>23 days | 7 |
| Northern pike (gills)<br>*Esox lucius* | 283<br>382<br>372<br>213 | 3.3 hours<br>19.2 hours<br>8.5 days<br>23 days | 7 |
| Northern pike (kidney)<br>*Esox lucius* | 192<br>872<br>1,603 | 3.3 hours<br>19.2 hours<br>8.5 days | 7 |
| Northern pike (other tissues)<br>*Esox lucius* | <55 | 3.3 hour to 23 days | 7 |

TABLE B-2 (continued)

REPORTED PAH BCFs FOR AQUATIC ORGANISMS

| Organism by compound | BCF | Exposure Time | Reference[a] |
|---|---|---|---|
| Mosquito fish<br>*Gambusia affinis* | 930 | 3 days | 8 |
| Bluegill (no dissolved humic material [DHM])<br>*Lepomis macrochirus* | 2,657 | 48 hours | 10 |
| Bluegill (20 mg/L DHM)<br>*Lepomis macrochirus* | 225 | 48 hours | 10 |
| Cladoceran<br>*Daphnia magna* | 2,837 | 6 hours | 4 |
| Alga<br>*Oedogonium cardium* | 5,258 | 3 days | 8 |
| Periphyton, mostly diatoms | 9,600 | 24 hours | 4 |
| Mosquito<br>*Culex pipeiens quinquefasciatus* | 11,536 | 3 days | 8 |
| Sand sole (egg)<br>*Psettichthys melanostictus* | 21,000 | 6 days | 11 |
| Snail<br>*Physa sp.* | 82,231 | 3 days | 8 |
| Cladoceran<br>*Daphnia pulex* | 134,248 | 3 days | 8 |
| CHRYSENE | | | |
| Clam<br>*Rangia cuneata* | 8 | 24 hours | 12 |
| Mangrove snapper (liver)<br>*Lutjanus griseus* | 83 - 104<br>258 - 367 | 4 days<br>20 days | 13 |
| Pink shrimp (cephalothorax)<br>*Penaeus duorarum* | 248 - 361<br>21 - 48 | 28 days<br>28 days + 28 days depuration | 13 |
| Pink shrimp (abdomen)<br>*Penaeus duorarum* | 84 - 199<br>22 - 91 | 28 days<br>28 days + 28 days depuration | 13 |
| FLUORANTHENE | | | |
| Rainbow trout (liver)<br>*Salmo gairdneri* | 379 | 21 days | 6 |

TABLE B-2 (continued)

REPORTED PAH BCFs FOR AQUATIC ORGANISMS

| Organism by compound | BCF | Exposure Time | Reference[a] |
|---|---|---|---|
| PHENANTHRENE | | | |
| Clam<br>*Rangia cuneata* | 32 | 24 hours | 12 |
| Cladoceran<br>*Daphnia pulex* | 325 | 24 hours | 14 |
| PYRENE | | | |
| Cladoceran<br>*Daphnia pulex* | 2,709 | 24 hours | 6 |
| Rainbow trout (liver)<br>*Salmo gairdneri* | 69 | 21 days | 6 |

Notes: Modified from Eisler (1987b).

a All references appear as cited by Eisler (1987b). 1 = Southworth and others 1978; 2 = EPA 1980; 3 = Neff 1979, EPA 1980; 4 = Leversee and others 1981; 5 = Kuhnhold and Busch 1978; 6 = Gerhart and Carlson 1978; 7 = Balk and others 1984; 8 = Lu and others 1977; 10 = McCarthy and Jimenez 1985; 11 = Hose and others 1982; 12 = Neff 1979; 13 = Miller and others 1982; 14 = Neff 1985

## TABLE B-3

## REPORTED BCFs FOR PCBs IN AQUATIC ORGANISMS

| Organism<br>Tissue | Aroclor 1254<br>Concentration (μg/L) | BCF | Exposure<br>Time | Reference |
|---|---|---|---|---|
| American oyster<br>*Cassostrea virginica*<br>soft parts | 5.0 | 85,000 | 168 days | 1 |
| Rotifer<br>*Brachionus plicatilis*<br>lipid<br>dry tissue | no concentrations given | 340,000<br>51,000 | 45 days<br>45 days | 2 |
| Pinfish<br>*Lagodon rhomboides*<br>whole | 5.0 | 21,800 | 35 days | 1 |
| Spot<br>*Leiostomus xanthrus*<br>whole | 1.0 | 27,800 | 56 days | 1 |
| Cape stumpnose<br>*Rhabdosarqus holubi*<br>whole | no concentration given | 24,000 | 90 days | 3 |

Notes:

a 1 = Ernest 1984, as cited in Eister 1986b; 2 = EPA 1980, as cited in Eisler 1986b; 3 = Dekock and others 1988, as cited in HSDB 1994

TABLE B-4

REPORTED BCFs FOR DDT RESIDUES IN AQUATIC AND TERRESTRIAL ORGANISMS

| Environment and Organism | BCF | | Reference[a] |
|---|---|---|---|
| | Max BCF | Min BCF | |
| **Terrestrial-Aquatic Microcosm** | | | |
| Snail | $3.4 \times 10^4$ | | 1 |
| Mosquito larvae | $8.2 \times 10^3$ | | 1 |
| Mosquito fish | $8.5 \times 10^4$ | | 1 |
| Snail | $1.1 \times 10^5$ | | 2 |
| Mosquito larvae | 930 | | 2 |
| Mosquito fish | $2.6 \times 10^4$ | | 2 |
| Daphnia | $6.2 \times 10^3$ | | 2 |
| Algae | $5.9 \times 10^3$ | | 2 |
| **Soil** | | | |
| Earthworm | 73 | 0.67 | 3 |
| Beetle | 2.81 | 0.31 | 3 |
| Slug | 3.70 | 2.33 | 3 |
| Crop root | 0.13 | 0.04 | 3 |
| Crop foliage | 0.08 | | 3 |
| **Water** | | | |
| Sea squirt | $1 \times 10^6$ | 200 | 3 |
| Sea hare | $1.78 \times 10^5$ | | 3 |
| Eastern oyster, clam | $7.0 \times 10^4$ | 60 | 3 |
| Shrimp | $2.8 \times 10^3$ | 280 | 3 |
| Crab | 144 | | 3 |
| Crayfish | 97 | 17 | 3 |
| Snail | $1.48 \times 10^3$ | | 3 |
| Plankton | 16,666 | 250 | 3 |

TABLE B-4 (continued)

REPORTED BCFs FOR DDT RESIDUES IN AQUATIC AND TERRESTRIAL ORGANISMS

| Environment and Organism | BCF | | Reference[a] |
|---|---|---|---|
| | Max BCF | Min BCF | |
| Fish | 829,300 | 5 - 1450 | 3 |
| Fish (DDD) | 9,214 | 417 | 3 |
| Algae | 33 | 0.34 | 3 |
| Aquatic plants | $1.0 \times 10^5$ | 0.45 | 3 |
| **Diet** | | | |
| Pheasant | 2.91 | | 3 |
| Woodcock | 4.5 | 2.6 | 3 |
| Bald eagle (brain) | 0.1 | | 3 |
| Bald eagle (liver) | 1.9 | | 3 |
| Bald eagle (fat) | 35.7 | | 3 |

Notes:

a 1 = Metcalf and others 1973, as cited in EPA 1976; 2 = Booth 1975, as cited in EPA 1976; 3 = Casarett and Doull 1991

DDT
DDD
BCF

## TABLE B-5

## REPORTED BCFs FOR DIELDRIN

| Organism | BCF | Reference[a] |
|---|---|---|
| Fish | 2,700 | 1 |
| Snail | 61,657 | 1 |
| Fish | 6,145 | 2 |
| Algae | 7,480 | 2 |
| Crab<br>*Uca minax* | 247 | 2 |
| Clam<br>*Corbicula manilensis* | 1,015 | 2 |
| Water plant<br>*Elodea* | 1,280 | 2 |
| Snail | 114,935 | 2 |
| Ciliate<br>*Tetrahymena pyroformis* | 2,095 (in 1 μg/L for 12 hours) | 3 |
| Vegetables | 0.098 | 4 |
| Rainbow trout<br>*Salmo gairdneri* | 2.3 (fw) | 5 |

Notes:

a All references appear as cited by ATSDR 1993a. 1 = Metcalf and others 1973; 2 = Sanborn and others 1983; 3 = Bhatnagar and others 1988; 4 = Travis and others 1988; 5 = Connell 1989

BCF

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To be provided = complete reference will be provided in final report.