COPC: **Mercury (Organic)** CAS 7439-97-6

Test Organisms: Bovine (Herbivore, Order-Artiodactyla)
Exposure Medium: Oral in diet
Test Endpoint: NOAEL
Reference: Herigstad, R.R., et al., 1972, "Chronic methylmercury toxicosis in calves." J. Am. Vet. Med. Assoc. 160:173-182. (cited in National Academy of Sciences, 1980. Mineral Tolerance of Domestic Animals. Washington, DC).
QCE: 0.1 mg/kg. body weight-day (Hg as methylmercury)

Adjustment Factors (AF)				Justification for adjustment factor
R	1	2	3	R = 1 is AF for same order and trophic level R = 2 is AF for different order and same trophic level R = 3 is AF for different order and trophic level
I	3	3	3	Discussion found that the results were similar to other reported studies. However, limited number of animals, impossible to evaluate variability, only one animal per dose.
Q_1	1	1	1	Clinical signs, lesions, and tissue residues determined (associated with methyl mercury toxicity (MMT) in calves). Endpoint relevant.
Q_2	1	1	1	Chronic exposure (96 days)
Q_3	1	1	1	NOAEL
U	3	3	3	Small number of animals, 5 male Holstein-Friesian calves. No reproductive endpoint or sensitive life stage examined. Test chemical is methylmercury. NOAEL & LOAEL established. However only 1 animal per level tested.
Total AF	9	18	27	$R * I * Q_1 * Q_2 * Q_3 * U$ = Total AF
QCE (mg/kg-day)	0.1	0.1	0.1	QCE = quantified critical endpoint
TRV	0.01	0.006	0.004	Toxicity Reference Value = QCE/Total AF

R Value	TRV (mg/kg-day)	Justification	Appropriate Functional Group
1	0.01	Test organism is in the same order and trophic level as the functional group members	none
2	0.006	Test organism is in a different order and same trophic level from the functional group members	M121, M122, M122A, M123, M132
3	0.004	Test organism is in a different order and trophic level from the functional group members	M210, M210A, M222, M322, M422, M422A

COPC: **Mercury (Inorganic)** CAS 7439-97-6

Test Organisms: Japanese quail (Omnivore, Order-Galliformes)
Exposure Medium: Oral in diet
Test Endpoint: NOAEL
Reference: Hill and Shaffner, 1976. *Sexual maturation and productivity of Japanese quail fed graded concentrations of mercuric chloride.* Poultry Science, 55:1449-1459 (cited in National Academy of Sciences, 1980. Mineral Tolerance of Domestic Animals. Washington, DC).

QCE: 0.47 mg/kg-day 4 ppm as mercury chloride in food, 4 mg/kg*(0.015kg/day**)/0.13 kg BW***

Factors (AF)				Justification for adjustment factor
R	1	2	3	R = 1 is AF for same order and trophic level R = 2 is AF for different order and same trophic level R = 3 is AF for different order and trophic level
I	1	1	1	Adequate numbers of males and females tested. Experiment 1 used 10 groups of 10 hatchlings of P.W.R.C. Japanese quail, Experiment 2 used 10 groups of 10 hatchlings U.M.D. Japanese quail. Both experiments had comparable results.
Q_1	1	1	1	Ecologically relevant endpoint. Reproductive endpoints such as, hatchability, egg size, fertility and egg shell thinning assessed, neurotoxicity not studied.
Q_2	1	1	1	Chronic exposure (28 weeks)
Q_3	1	1	1	NOAEL
U	1	1	1	Well designed study. Multiple dose levels (0, 2, 4, 8,16,& 32 ppm) with both NOAELS and LOAELS established. 4 ppm Hg as $HgCl_2$, but no neuro.
Total AF	1	2	3	$R * I * Q_1 * Q_2 * Q_3 * U$ = Total AF
QCE (mg/kg-day)	0.47	0.47	0.47	QCE = quantified critical endpoint
TRV	0.47	0.24	0.16	Toxicity Reference Value = QCE/Total AF

R Value	TRV (mg/kg-day)	Justification	Appropriate Functional Group
1	0.47	Test organism is in the same order and trophic level as the functional group members	none
2	0.24	Test organism is in a different order and same trophic level from the functional group members	AV422, AV432, AV433, AV442
3	0.16	Test organism is in a different order and trophic level from the functional group members	AV121, AV122, AV132, AV142, AV143, AV210, AV210A, AV221, AV222, AV222A, AV232, AV233, AV241, AV242, AV310, AV322, AV333, AV342

* Specified as 4 ppm in feed (turkey mash) in study

** Ingestion rate estimated by Nagy (1987) allometric equation, $0.0582(BW)^{0.651}$

***BW estimated by Weimeyer article (0.13 kg)

COPC: **Mercury (Inorganic)** CAS 7439-97-6

Test Organisms: Chickens (Omnivore, Order-Galliformes)
Exposure Medium: Oral in drinking water
Test Endpoint: NOAEL
Reference: Thaxton, P., L.A. Cogburn, and C.R. Parkhurst, 1973. *Dietary mercury as related to the blood chemistry in young chickens.* Poultry Science 52:1212-1214 (cited in National Academy of Sciences, 1980. Mineral Tolerance of Domestic Animals. Washington, DC).

QCE: 12.1 mg/kg-day (125mg/L)*(0.097 kg diet/kg bw/day)*

Adjustment Factors (AF)				Justification for adjustment factor
R	1	2	3	R = 1 is AF for same order and trophic level R = 2 is AF for different order and same trophic level R = 3 is AF for different order and trophic level
I	2	2	2	Results were inconsistent, however a similar study by Parkhurst and Thaxton, 1973[a] reported toxic effects in young boilers at 250 ppm (similar study) including growth reduction, decreased feed and water efficiencies, alterations in the sizes of certain organs, immunosuppression, & mortality at 250 ppm as LOAEL.
Q_1	0.5	0.5	0.5	Study determined minor effects of dietary Hg on plasma levels of glucose, total protein, total lipids and other blood chemistry. Endpoint is possible in receptor in the field.
Q_2	2	2	2	Subchronic exposure (6 weeks)
Q_3	1	1	1	NOAEL (125 ppm see discussion above)
U	2	2	2	Adequate numbers of test animals, 120 young chickens at each 5 dose levels. Reasonable design. Multiple doses assessed (0, 5, 25, 125, 250 ppm) and NOAEL established but no LOAEL and results were inconsistent..
M	0.5	0.5	0.5	Administered as $HgCl_2$ in drinking water.
Total AF	2	4	6	R * I * Q_1 * Q_2 * Q_3 * U = Total AF
QCE (mg/kg-day)	12.1	12.1	12.1	QCE = quantified critical endpoint
TRV	6.05	3.03	2.02	Toxicity Reference Value = QCE/Total AF

R Value	TRV (mg/kg-day)	Justification	Appropriate Functional Group
1	6.05	Test organism is in the same order and trophic level as the functional group members	none
2	3.03	Test organism is in a different order and same trophic level from the functional group members	AV422, AV432, AV433, AV442
3	2.02	Test organism is in a different order and trophic level from the functional group members	AV121, AV122, AV132, AV142, AV143, AV210, AV210A, AV221, AV222, AV222A, AV232, AV233, AV241, AV242, AV310, AV322, AV333, AV342

Parkhurst, C.R., and P. Thaxton, 1973. *Toxicity of mercury to young chickens. 1. Effect on growth and mortality.* Poultry Science 52:273-276.

* Wiseman, 1987

COPC: **Mercury (organic)** CAS 7439-97-6

Test Organisms: American black duck (Herbivore, Order-Anseriformes, *Anas rubripes*)
Exposure Medium: Oral in diet (mash)
Test Endpoint: Adverse effect level
Reference: Finley, M.T. and R.C. Stendell, 1978. "*Survival and reproductive success of black ducks fed methylmercury*", Environmental Pollution, 16:51-64.
QCE: 0.169 mg/kg-day (3 ppm Hg fed as methylmercury dicyandiamide)
(3mg/kg food * 0.062 kg food/day)/(1.1 kg BW)

Adjustment Factors (AF)				Justification for adjustment factor
R	1	2	3	R = 1 is AF for same order and trophic level R = 2 is AF for different order and same trophic level R = 3 is AF for different order and trophic level
I	2	2	2	Variability appears average.
Q_1	1	1	1	Clutch size, egg production, # of eggs incubated, hatchability and survival of ducklings.
Q_2	1	1	1	Chronic exposure (28 weeks)
Q_3	3	3	3	Adverse effect level (reduced reproduction success)
U	3	3	3	No NOAEL established and only 1 dose level and control. 13 pairs of 1 year old ducks in each group, juveniles also tested.
Total AF	18	36	54	$R * I * Q_1 * Q_2 * Q_3 * U$ = Total AF
QCE (mg/kg-day)	0.169	0.169	0.169	QCE = quantified critical endpoint
TRV	0.0094	0.0047	0.0031	Toxicity Reference Value = QCE/Total AF

R Value	TRV (mg/kg-day)	Justification	Appropriate Functional Group
1	0.0094	Test organism is in the same order and trophic level as the functional group members	AV142, AV143
2	0.0047	Test organism is in a different order and same trophic level from the functional group members	AV121, AV122, AV132
3	0.0031	Test organism is in a different order and trophic level from the functional group members	AV210, AV210A, AV221, AV222, AV222A, AV232, AV233, AV241, AV242, AV310, AV322, AV333, AV342, AV422, AV432, AV433, AV442

BW is taken as the mean for females (1.1 kg) from the CRC Handbook of Avian Body Masses (Dunning, 1993)
allometric equations from Nagy (1987) FI = 0.648 $BW^{0.651}$ = 0.062 kg/day

COPC: **Mercury (Organic)** CAS 7439-97-6

Test Organisms: Mallard Duck (Herbivore, Order-Anseriformes, *Anas platyrhynchos*)
Exposure Medium: Oral in diet
Test Endpoint: LOAEL
Reference: Heinz, G. H. 1979. Methyl mercury: reproductive and behavioral effects on three generations of mallard ducks. J. Wildl. Mgmt. 43:394-401.
QCE: 0.189 mg/kg-day 3 ppm methylmercury in diet. (3 ppm * 0.063 kg/kg bw/d)*

Adjustment Factors (AF)				Justification for adjustment factor
R	1	2	3	R = 1 is AF for same order and trophic level R = 2 is AF for different order and same trophic level R = 3 is AF for different order and trophic level
I	2	2	2	Only one dose level, however, this was a three generation study that showed significant effects from control.
Q_1	1	1	1	Endpoints include reproductive endpoints (i.e. # of eggs and hatchlings). Ecologically relevant endpoint
Q_2	1	1	1	Chronic
Q_3	2	2	2	LOAEL - one dose only
U	2	2	2	3 generations (>1 yr. and during a critical life stage) and reproductive endpoints examined. However, only 1 dose considered.
Total AF	8	16	24	R * I * Q_1 * Q_2 * Q_3 * U = Total AF
QCE (mg/kg-day)	0.189	0.189	0.189	QCE = quantified critical endpoint
TRV	0.024	0.012	0.008	Toxicity Reference Value = QCE/Total AF

R Value	TRV (mg/kg-day)	Justification	Appropriate Functional Group
1	0.024	Test organism is in the same order and trophic level as the functional group members	AV142, AV143
2	0.012	Test organism is in a different order and same trophic level from the functional group members	AV121, AV122, AV132
3	0.008	Test organism is in a different order and trophic level from the functional group members	AV210, AV210A, AV221, AV222, AV222A, AV232, AV233, AV241, AV242, AV310, AV322, AV333, AV342, AV422, AV432, AV433, AV442

* EPA, 1993

COPC: **Mercury (Organic)** CAS 7439-97-6

Test Organisms: Pheasants (Omnivore, Order-Galliformes)
Exposure Medium: Gelatin capsule
Test Endpoint: AEL
Reference: McEwen, L.C., et al., 1973. "Mercury-Wildlife Studies by the Denver Wildlife Research Center", In *Mercury in the Western Environment*, D.R. Buhler, Ed., Oregon State University, Corvallis, OR, p. 146-156.
QCE: 0.64 mg/kg-day 20 mg/kg Ceresan M^R (mercury fungicide) the 0.64 mg/kg-day was specified by article for a 1 kg bird

Adjustment Factors (AF)				Justification for adjustment factor
R	1	2	3	R = 1 is AF for same order and trophic level R = 2 is AF for different order and same trophic level R = 3 is AF for different order and trophic level
I	3	3	3	Not a large sample, three male and female pheasant pairs.
Q_1	1	1	1	Endpoints included the # of eggs laid, fertile, hatched and alive chicks. Ecologically relevant endpoint.
Q_2	2	2	2	Subchronic exposure (30 days)
Q_3	3	3	3	Adverse effect level
U	3	3	3	Only 1 dosage and control in a pesticide formulation, small number of samples, and NOAEL not established. Author mentions that the capsule dosage is lower that what a wild bird would be estimated to ingest feeding on seeds.
Total AF	54	108	162	$R * I * Q_1 * Q_2 * Q_3 * U$ = Total AF
QCE (mg/kg-day)	0.64	0.64	0.64	QCE = quantified critical endpoint
TRV	0.012	0.0059	0.0040	Toxicity Reference Value = QCE/Total AF

R Value	TRV (mg/kg-day)	Justification	Appropriate Functional Group
1	0.012	Test organism is in the same order and trophic level as the functional group members	none
2	0.0059	Test organism is in a different order and same trophic level from the functional group members	AV422, AV432, AV433,AV442
3	0.0040	Test organism is in a different order and trophic level from the functional group members	AV121, AV122, AV132, AV142, AV143, AV210, AV210A, AV221, AV222, AV222A, AV232, AV233, AV241, AV242, AV310, AV322, AV333, AV342

COPC: **Mercury (Organic)** CAS 7439-97-6

Test Organisms: Mouse (Omnivore, Order-Rodentia)
Exposure Medium: Oral in drinking water
Test Endpoint: NOAEL
Reference: Schroeder and Mitchner, 1975. "Life-term effects of mercury, methylmercury and nine other trace metals on mice" *J. Nutr.* 105:452.
QCE: 0.14 mg/kg-day Calculated, 1 ppm Hg as methylmercury acetate *

Adjustment Factors (AF)				Justification for adjustment factor
R	1	2	3	R = 1 is AF for same order and trophic level R = 2 is AF for different order and same trophic level R = 3 is AF for different order and trophic level
I	2	2	2	Groups of 36 to 54 mice of each sex were exposed. One control group. 5 ppm Hg as methylmercury acetate for 70 days and 1 ppm subsequently in the drinking water. 5 ppm was toxic but 1 ppm appears to have beneficial effects, with the mice that survived gaining weight and living longer than litter mates given 1 ppm from time of weaning.
Q_1	1	1	1	Body weight, tumors, edema, blanching of incisor teeth, life-spans and longevities.
Q_2	1	1	1	Lifetime exposure
Q_3	1	1	1	NOAEL
U	2	2	2	Average study design with limited number of doses, and no reproductive endpoint or sensitive life stage examined. Random-bred white Swiss mice of Charles River CD strain. Both a NOAEL and LOAEL established.
M	0.5	0.5	0.5	Methylmercury acetate placed in drinking water.
Total AF	2	4	6	$R * I * Q_1 * Q_2 * Q_3 * U$ = Total AF
QCE (mg/kg-day)	0.14	0.14	0.14	QCE = quantified critical endpoint
TRV	0.07	0.04	0.02	Toxicity Reference Value = QCE/Total AF

R Value	TRV (mg/kg-day)	Justification	Appropriate Functional Group
1	0.07	Test organism is in the same order and trophic level as the functional group members	none
2	0.04	Test organism is in a different order and same trophic level from the functional group members	M422, M422A
3	0.02	Test organism is in a different order and trophic level from the functional group members	M121, M122, M122A, M132, M210, M210A, M222, M322

[(1 mg Hg_2/ L)(0.0051 L water/day**)/0.0373 kg BW]=0.14 mg/kg BW-day

**Ingestion rate of water calculated using allometric equation from the Wildlife Factors Handbook (EPA 1993)
$WI=0.099BW^{0.9}$

COPC: **Mercury (Inorganic)** CAS 7439-97-6

Test Organisms: Mouse (Omnivore, Order-Rodentia)
Exposure Medium: Oral in drinking water
Test Endpoint: NOAEL
Reference: Schroeder and Mitchner, 1975. "Life-term effects of mercury, methylmercury and nine other trace metals on mice" *J. Nutr.* 105:452.
QCE: 0.68 mg/kg-day Calculated 5 ppm Hg as mercuric chloride*.

Adjustment Factors (AF)				Justification for adjustment factor
R	1	2	3	R = 1 is AF for same order and trophic level R = 2 is AF for different order and same trophic level R = 3 is AF for different order and trophic level
I	2	2	2	Groups of 36 to 54 mice of each sex were exposed. One control group. At 5 ppm longevity tended to decrease in males and increase in females.
Q_1	1	1	1	Body weight, tumors, edema, blanching of incisor teeth, life-spans and longevities
Q_2	1	1	1	Lifetime exposure
Q_3	1	1	1	NOAEL
U	2	2	2	No reproductive endpoint or sensitive life stage examined. Random-bred white Swiss mice of Charles River CD strain. 5 ppm Hg as mercuric chloride in the basal drinking water. Only one dose tested and no LOAEL established.
M	0.5	0.5	0.5	Placed in drinking water.
Total AF	2	4	6	$R * I * Q_1 * Q_2 * Q_3 * U$ = Total AF
QCE (mg/kg-day)	0.68	0.68	0.68	QCE = quantified critical endpoint
TRV	0.34	0.17	0.11	Toxicity Reference Value = QCE/Total AF

R Value	TRV (mg/kg-day)	Justification	Appropriate Functional Group
1	0.34	Test organism is in the same order and trophic level as the functional group members	none
2	0.17	Test organism is in a different order and same trophic level from the functional group members	M422, M422A
3	0.11	Test organism is in a different order and trophic level from the functional group members	M121, M122, M122A, M132, M210, M210A, M222, M322

* [(5 mg Hg_2/L water)*((0.0051 L water/day**)/0.0373 kg BW]

Ingestion rate of water calculated using allometric equation from the Wildlife Factors Handbook (EPA 1993)
$WI=0.099BW^{0.9}$

COPC: **Mercury (Organic)** CAS 7439-97-6

Test Organisms: Swine (Omnivore, Order-Artiodactyla)
Exposure Medium: Oral in diet (organic form methylmercuric chloride CH_3HgCL)
Test Endpoint: NOAEL
Reference: Chang C.W.J., R.M. Nakamura, and C.C. Brooks, 1977. "Effect of varied dietary levels and forms of mercury on swine" J. Anim. Sci. 45:279-285.
QCE: 0.025 mg/kg-day specified 0.5 ppm [(0.5 mg/kg)x(2.5kg/day)/50 kg BW*

Adjustment Factors (AF)				Justification for adjustment factor
R	1	2	3	R = 1 is AF for same order and trophic level R = 2 is AF for different order and same trophic level R = 3 is AF for different order and trophic level
I	2	2	2	Thirty-two, three-way crossed pigs (Yorkshire, Duroc x Hampshire). Hg was mixed in feed at .5, 5.0, and 50.0 ppm. A control and group fed naturally contaminated fed was included. Feeding was controlled so that each pig received the same amount. Great variation existed between the level of Hg that accumulated in different tissue.
Q_1	1	1	1	Endpoints were designed to measure the Hg accumulations in swine tissues (One gilt and one barrow from each group was removed for slaughter and examined at necrospy for fatty livers, lesions, enlarged lymph nodes, etc.), as well as determine teratogenic or behavioral effects on piglets born to exposure animals.
Q_2	2	2	2	Subchronic exposure (exposure through breeding and birthing, however estimated at less than 50% of the total life span of a pig)
Q_3	1	1	1	NOAEL
U	1	1	1	Good design, reproductive endpoint examined. LOAEL was established, however, different between NOAEL and LOAEL levels is great.
Total AF	4	8	12	$R * I * Q_1 * Q_2 * Q_3 * U$ = Total AF
QCE (mg/kg-day)	0.025	0.025	0.025	QCE = quantified critical endpoint
TRV	0.0063	0.0031	0.0021	Toxicity Reference Value = QCE/Total AF

R Value	TRV (mg/kg-day)	Justification	Appropriate Functional Group
1	0.0063	Test organism is in the same order and trophic level as the functional group members	None
2	0.0031	Test organism is in a different order and same trophic level from the functional group members	M422, M422A
3	0.0021	Test organism is in a different order and trophic level from the functional group members	M121, M122, M122A, M123, M210, M210A, M222, M322

*Ingestion rate from allometric equation , BW from study.

COPC: **Mercury (Inorganic)** CAS 7439-97-6

Test Organisms: Swine (Omnivore, Order-Artiodactyla)
Exposure Medium: Oral in diet (as mercuric chloride-$HgCl_2$)
Test Endpoint: NOAEL
Reference: Chang C.W.J., R.M. Nakamura, and C.C. Brooks, 1977. "Effect of varied dietary levels and forms of mercury on swine" J. Anim. Sci. 45:279-285.
QCE: 0.25 mg/kg-day ($HgCl_2$) specified 5 ppm (5 mg/kg)x(2.5kg/day)/50 kg BW*

Adjustment Factors (AF)				Justification for adjustment factor
R	1	2	3	R = 1 is AF for same order and trophic level R = 2 is AF for different order and same trophic level R = 3 is AF for different order and trophic level
I	2	2	2	Thirty-two, three-way crossed pigs (Yorkshire, Duroc x Hampshire). Hg was mixed in feed at .5, 5.0, and 50.0 ppm. A control and group fed naturally contaminated fed was included. Feeding was controlled so that each pig received the same amount. Great variation existed between the level of Hg that accumulated in different tissue.
Q_1	1	1	1	Endpoints were designed to measure the Hg accumulations in swine tissues (One gilt and one barrow from each group was removed for slaughter and examined at necrospy for fatty livers, lesions, enlarged lymph nodes, etc.), as well as determine teratogenic or behavioral effects on piglets born to exposure animals.
Q_2	2	2	2	Subchronic exposure (exposure through breeding and birthing, however estimated at less than 50% of the total life span of a pig)
Q_3	1	1	1	NOAEL
U	1	1	1	Good design, reproductive endpoint examined, however no LOAEL established.
Total AF	4	8	12	R * I * Q_1 * Q_2 * Q_3 * U = Total AF
QCE (mg/kg-day)	0.25	0.25	0.25	QCE = quantified critical endpoint
TRV	0.063	0.031	0.021	Toxicity Reference Value = QCE/Total AF

R Value	TRV (mg/kg-day)	Justification	Appropriate Functional Group
1	0.063	Test organism is in the same order and trophic level as the functional group members	None
2	0.031	Test organism is in a different order and same trophic level from the functional group members	M422, M422A
3	0.021	Test organism is in a different order and trophic level from the functional group members	M121, M122, M122A, M123, M210, M210A, M222, M322

*Ingestion rate from allometric equation , BW from study

COPC: **Mercury (Organic)** CAS 7439-97-6

Test Organisms: Cat (Carnivore, Order-Carnivora)
Exposure Medium: Diet
Test Endpoint: NOAEL
Reference: Charbornneau. S.M., et al., 1976. *Chronic Toxicity of Methylmercury in the Adult Cat*, Interim Report, Toxicology, 5(1976):337-349.
QCE: 0.02 mg/kg-day Specified -either in naturally contaminated fish (methylmercury) or added to diet as methylmercuric chloride.

Adjustment Factors (AF)				Justification for adjustment factor
R	1	2	3	R = 1 is AF for same order and trophic level R = 2 is AF for different order and same trophic level R = 3 is AF for different order and trophic level
I	2	2	2	Each test group consisted of 8 random-bred domestic cats, 4 males and 4 females. Not rigorously examined, but no large variations within groups were evident
Q_1	1	1	1	Food consumption, body weight, blood and urine changes and neurological status were examined. Ecologically relevant endpoint
Q_2	1	1	1	Chronic duration (2 years)
Q_3	1	1	1	NOAEL
U	2	2	2	Doses of 3, 8.4, 20, 46, 74 or 176 µg Hg/kg/day both in fish and as corn oil supplement. Older study, but thoroughly performed. Dose-response well-characterized for neurological effects, but reproductive effects not considered.
Total AF	4	8	12	R * I * Q_1 * Q_2 * Q_3 * U = Total AF
QCE (mg/kg-day)	.02	.02	.02	QCE = quantified critical endpoint
TRV	0.005	0.003	0.002	Toxicity Reference Value = QCE/Total AF

R Value	TRV (mg/kg-day)	Justification	Appropriate Functional Group
1	.005	Test organism is in the same order and trophic level as the functional group members	M322
2	.003	Test organism is in a different order and same trophic level from the functional group members	M422A
3	.002	Test organism is in a different order and trophic level from the functional group members	M121, M122, M122A, M123,M132, M210, M210A, M222, M422

COPC: **Mercury (Organic)** CAS 7439-97-6

Test Organisms: Mule Deer (Herbivore, Order-Artiodactyla)
Exposure Medium: Single dose
Test Endpoint: FEL (LD_{50})
Reference: Eisler, R., 1987, *Mercury Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review*, U.S. Fish and Wildlife Service Biological Report, 85(1.10).
QCE: 18 mg/kg-day

Adjustment Factors (AF)				Justification for adjustment factor
R	1	2	3	R = 1 is AF for same order and trophic level R = 2 is AF for different order and same trophic level R = 3 is AF for different order and trophic level
I	3	3	3	From secondary source, no other information
Q_1	1	1	1	Ecologically relevant endpoint (lethality)
Q_2	3	3	3	Acute study
Q_3	3	3	3	LD_{50}
U	3	3	3	Secondary source, little supporting information
Total AF	81	162	243	R * I * Q_1 * Q_2 * Q_3 * U = Total AF
QCE (mg/kg-day)	18	18	18	QCE = quantified critical endpoint
TRV	0.22	0.11	0.07	Toxicity Reference Value = QCE/Total AF

R Value	TRV (mg/kg-day)	Justification	Appropriate Functional Group
1	0.22	Test organism is in the same order and trophic level as the functional group members	None
2	0.11	Test organism is in a different order and same trophic level from the functional group members	M121, M122, M122A, M123, M132
3	0.07	Test organism is in a different order and trophic level from the functional group members	M210, M210A, M222, M322, M422, M422A

COPC: **Mercury (Organic)** CAS 7439-97-6

Test Organisms: Mink (Carnivore, Order-Carnivora)
Exposure Medium: Oral in diet as methyl mercury chloride
Test Endpoint: NOAEL
Reference: Wobeser, G., N.O. Nielson, and B. Schiefer. 1976. "Mercury and mink II. Experimental methyl mercury intoxication." Can. J. Comp. Med. 34-45.
QCE: 0.15 mg/kg-day (1.1 mg Hg/kg food * 0.137 kg food /day)/(1 kg BW)

Adjustment Factors (AF)				Justification for adjustment factor
R	1	2	3	R = 1 is AF for same order and trophic level R = 2 is AF for different order and same trophic level R = 3 is AF for different order and trophic level
I	2	2	2	Five adult female mink per treatment group were sampled at 1.1, 1.8. 4.8, 8.3 and 15 ppm Hg in diet. Study for 93 days and not during a critical life stage.
Q_1	1	1	1	Mortality, weight loss and ataxia. Ecologically relevant endpoint
Q_2	1	1	1	Chronic study, 93 days
Q_3	1	1	1	NOAEL
U	2	2	2	Mercury doses of 1.8 ppm or greater produced significant adverse effects as a LOAEL. Mercury level s in tissue were evident at 1.1 ppm however, no significant effects observed. However, endpoint not based on reproduction.
M	1	1	1	Appropriate exposure medium for INEL
Total AF	4	8	12	$R * I * Q_1 * Q_2 * Q_3 * U$ = Total AF
QCE (mg/kg-day)	0.15	0.15	0.15	QCE = quantified critical endpoint
TRV	0.038	0.019	0.013	Toxicity Reference Value = QCE/Total AF

R Value	TRV (mg/kg-day)	Justification	Appropriate Functional Group
1	0.038	Test organism is in the same order and trophic level as the functional group members	none
2	0.019	Test organism is in a different order and same trophic level from the functional group members	M121, M122, M122A, M123, M132
3	0.013	Test organism is in a different order and trophic level from the functional group members	M210, M210A, M222, M322, M422, M422A

COPC: **Mercury (Organic)** CAS 7439-97-6

Test Organisms: Pheasant (Omnivore, Order-Galliformes)
Exposure Medium: Diet
Test Endpoint: LOAEL
Reference: Fimreite, N., 1979, *Accumulation and Effects of Mercury on Birds,* Chapter 22 in *The biogeochemistry of Mercury in the Environment,* J.O. Nriaqu, (ed.), Elsevier/North Holland Biomedical Press, New York.
QCE: 0.18 mg/kg-day Specified

Adjustment Factors (AF)				Justification for adjustment factor
R	1	2	3	R = 1 is AF for same order and trophic level R = 2 is AF for different order and same trophic level R = 3 is AF for different order and trophic level
I	3	3	3	From secondary source, no other information, cited in EPA, 1993, Wildlife Exposure Factors Handbook
Q_1	1	1	1	Ecologically relevant endpoint (egg production, shell thickness, hatchability)
Q_2	1	1	1	Chronic duration (12 weeks)
Q_3	2	2	2	LOAEL endpoint
U	2	2	2	Old study, secondary source, no NOAEL identified
Total AF	12	24	36	$R * I * Q_1 * Q_2 * Q_3 * U$ = Total AF
QCE (mg/kg-day)	0.18	0.18	0.18	QCE = quantified critical endpoint
TRV	0.015	0.008	0.005	Toxicity Reference Value = QCE/Total AF

R Value	TRV (mg/kg-day)	Justification	Appropriate Functional Group
1	0.015	Test organism is in the same order and trophic level as the functional group members	none
2	0.008	Test organism is in a different order and same trophic level from the functional group members	AV422, AV432, AV433,AV442
3	0.005	Test organism is in a different order and trophic level from the functional group members	AV121, AV122, AV132, AV142, AV143, AV210, AV210A, AV221, AV222, AV222A, AV232, AV233, AV241, AV242, AV310, AV322, AV333, AV342

COPC: **Mercury (Organic)** CAS 7439-97-6

Test Organisms: Rat (Omnivore, Order-Rodentia)
Exposure Medium: Oral (methylmercuric chloride in diet)
Test Endpoint: NOAEL
Reference: Khera and Tabacova, 1973, *Effects of Methylmercuric Chloride on the Progeny of Mice and Rats Treated Before or During Gestation*, Food and Cosmetic Toxicology, 11:245-254.
QCE: 0.05 mg/kg-day (Specified)

Adjustment Factors (AF)				Justification for adjustment factor
R	1	2	3	R = 1 is AF for same order and trophic level R = 2 is AF for different order and same trophic level R = 3 is AF for different order and trophic level
I	2	2	2	No prenatal effects were seen at 0.25 mg/kg-day however, an increased incidence of eye defects was seen. The study suggests that mercury was a contributory factor, in some unexplained way. This paper provides documentation of studies providing similar results.
Q_1	1	1	1	Reproductive success measured, by #of pregnant mice, # of young per litter, weight of young, and postnatal survival. Ecologically relevant endpoint.
Q_2	1	1	1	Chronic duration
Q_3	1	1	1	NOAEL
U	1	1	1	Immature females of the Wistar strain were randomized into 5 groups each consisting of 35 rats. Doses included 0, 0.002, 0.01, 0.05, or 0.25 mg Hg/kg/day as CH_3HgCl. The exposure was continued for sub-groups up to 192 days. Highest dose level was NOAEL for sensitive and relevant endpoint and LOAEL was not established.
Total AF	2	4	6	R * I * Q_1 * Q_2 * Q_3 * U = Total AF
QCE (mg/kg-day)	0.05	0.05	0.05	QCE = quantified critical endpoint
TRV	0.03	0.01	0.008	Toxicity Reference Value = QCE/Total AF

R Value	TRV (mg/kg-day)	Justification	Appropriate Functional Group
1	0.03	Test organism is in the same order and trophic level as the functional group members	none
2	0.01	Test organism is in a different order and same trophic level from the functional group members	M422, M422A
3	0.008	Test organism is in a different order and trophic level from the functional group members	M121, M122, M122A, M132, M210, M210A, M222, M322

COPC: **Mercury (Organic)** CAS 7439-97-6

Test Organisms: Rat (Omnivore, Order-Rodentia)
Exposure Medium: Oral in diet
Test Endpoint: NOAEL
Reference: Verschuuren, H.G., et al., 1976, *Toxicity of methyl mercury chloride in rats. II. Reproduction study.* Toxicol. 6:97-106.
QCE: 0.025 mg/kg-day Calculated

Adjustment Factors (AF)				Justification for adjustment factor
R	1	2	3	R = 1 is AF for same order and trophic level R = 2 is AF for different order and same trophic level R = 3 is AF for different order and trophic level
I	1	1	1	3 generation (> 1 yr. and during a critical life stage = chronic)
Q_1	1	1	1	Ecologically relevant endpoint (reproduction)
Q_2	1	1	1	Chronic duration
Q_3	1	1	1	NOAEL
U	1	1	1	
Total AF	1	2	3	$R * I * Q_1 * Q_2 * Q_3 * U$ = Total AF
QCE (mg/kg-day)	0.025	0.025	0.025	QCE = quantified critical endpoint
TRV	0.025	0.013	0.0083	Toxicity Reference Value = QCE/Total AF

R Value	TRV (mg/kg-day)	Justification	Appropriate Functional Group
1	0.025	Test organism is in the same order and trophic level as the functional group members	none
2	0.013	Test organism is in a different order and same trophic level from the functional group members	M422, M422A
3	0.0083	Test organism is in a different order and trophic level from the functional group members	M121, M122, M122A, M132, M210, M210A, M222, M322