Rule 57 Aquatic Values Data Sheet

11/10/2009

Chemical or product name: Dichloromethane
Manufacturer (WTAs): -----
C.A.S #: 75-09-2

Developed by: Christopher Hull
Approved by: D. Bush
Approval date: 11/16/09
CAS, AQUIRE: 11/05/09
Clearinghouse search date: 12/14/95

FAV: 17,000 ug/l* *(Tier: II)*
AMV: 8,500 ug/l* *(Tier: II)*
FCV: 1,500 ug/l* *(Tier: II)*
Acute CF: ---- *Chronic CF: ----*

ACUTE DATA

Species	Endpoint (EC or LC50)	Duration (hours)	Test Type (FT,M, etc.)	Hardness mg/L	Test Chemical	LC50/EC50 ug/L	SMAV ug/L	GMAV ug/L	Rank	Reference
Water Flea (*Daphnia magna*)	LC50	48	S,U	173	-----	220,000	220,000	220,000	1	1
Fathead Minnow	EC50	96	FT,M	43.8	99%; no cosolvent	330,000	412,650	412,650	2	2
(*Pimephales promelas*)	LC50	96	FT,M	43.8	99%; no cosolvent	330,000 [1]				2
	LC50	96	FT,M	73-82	>99.9%; no cosolvent	516,000 [2]				3

(cont'd.)

CHRONIC DATA

Species	Test type (ELS, etc.)	Duration (days)	Study Conditions (FT,M etc.)	Hardness mg/L	Test Chemical	MATC ug/L	SMCV ug/L	GMCV ug/L	Rank	Reference
Fathead Minnow (*Pimephales promelas*)	ELS	32	FT,M	73-82	>99.9%; no cosolvent	108,236 [3]	108,236	108,236	1	3

*Value rounded to 2 significant figures.

[1] Value not used to calculate SMAV, because EC50 preferred over LC50 from the same test.

[2] Recalculated value, using more appropriate statistical method (Trimmed Spearman-Karber).

[3] See Table 1 for MATC and ACR calculations.

Table 1. MATC and ACR calculations for Fathead Minnows from Ref. #3 (11/09):

96-hr. LC50 (recalculated, using Trimmed Spearman-Karber method) = 576,000 ng/l.

32-day Growth NOEC = 82,000 ng/l; LOEC = 142,000 ng/l; MATC =

X_0 = 107,907.37 ng/l.

$$ACR = \frac{\text{96-hr. LC50}}{\text{32-day MATC}} = \frac{576{,}000 \text{ ng/l}}{107{,}907.37 \text{ ng/l}} = 4.78187791.$$

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Min. data req. met	Acute Factor
2	13
3	8
4	7
5	6.1
6	5.2
7	4.3

Rule 57 Aquatic Values Work Sheet

Chemical Name: DICHLOROMETHANE
C.A.S. #: 75-09-2

AQUATIC MAXIMUM VALUE CALCULATIONS / 11/09

A. Minimum 8 species requirement is **not** met (Tier II). Minimum requirements met = 2
Minimum requirements missing for Tier I = 6 (i, ii, v, vi, vii, viii).
Acute factor = 13

1. Toxicity **is not** dependent on a water characteristic

a. FAV calculation: $FAV = \frac{\text{lowest HMAV}}{\text{Acute Factor}} = \frac{220{,}000 \text{ ug/L}}{13}$

$= 16{,}923 \text{ ug/L}$.

~~2. Toxicity is dependent on a water characteristic~~

~~a. Slope = (Table)~~

~~b. FAV equation:~~

3. Go to C.

~~B. Minimum 8 species requirement is met (Tier I)~~

~~1. Toxicity is not dependent on a water characteristic~~

~~a. FAV calculation: Att.~~

~~2. Toxicity is dependent on a water characteristic~~

~~a. Slope = (Table)~~

~~b. Ranked genus mean acute intercepts: Table~~

~~c. Final acute intercept = (Att.)~~

~~ln of final acute intercept =~~

~~d. FAV equation =~~

C. Aquatic Maximum Value (AMV) calculation: $AMV = \frac{FAV}{2} = \frac{16{,}923 \text{ ug/L}}{2} = 8{,}462 \text{ ug/L}$.

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DICHLOROMETHANE

FINAL CHRONIC VALUE CALCULATIONS , 11/09

A. Minimum 8 species requirement is **not** met (Tier II). Minimum requirements met = 1 (iii).
Minimum requirements missing for Tier I = 2 (ACR route)
7 (GMCV route): i, ii, iv, v, vi, vii, viii.

1. Acute to chronic ratio

   a. Number ACRs meeting minimum data requirements = 1 (Table 1)

   b. Acute to chronic ratio = $\bar{X}_g$ (FHM ACR, 18, 18) = $\bar{X}_g$ (4.7818791, 18, 18)
   = 11.571275

2. Toxicity **is not** dependent on a water characteristic

   FCV = $\frac{FAV}{ACR} = \frac{16,923 \text{ ug/L}}{11.571275} =$ 1,462.5009 ug/L.

3. ~~Toxicity is~~ dependent on a water characteristic

   a. Slope = (Table _)

   b. Aquatic chronic intercept = (Table _)

   ln of aquatic chronic intercept =

   c. FCV equation =

B. ~~Minimum 8~~ species requirement is met (Tier I)

1. Toxicity **is not** dependent on a water characteristic

   a. FCV = ___ (Att.)

2. Toxicity is dependent on a water characteristic

   a. Slope = (Table _)

   b. Ranked genus mean chronic intercepts: Table ___

   c. Final chronic intercept = ____ (Att. ___); ln of final chronic intercept =

   d. FCV equation =

DICHLOROMETHANE REFERENCES, 11/09

References Used:

1. #007906 : LeBlanc, G. A. 1980. Acute toxicity of priority pollutants to water flea (*Daphnia magna*). Bull. Environ. Contam. Toxicol. 24(5): 684-91 .
2. #QL 638 .C94 A27: Geiger, D. L., Poirier, S. H., Brooke, L. T., and Call, D. J., 1986. Acute toxicities of organic chemicals to Fathead Minnows (*Pimephales promelas*), Vol. 3 . Center for Lake Superior Environmental Studies, University of Wisconsin.
3. #013596: Dill, D. C., P. G. Murphy, and M. A. Mayes. 1987. Toxicity of methylene chloride to life stages of the Fathead Minnow, *Pimephales promelas* Rafinesque. Bull.Environ.Contam.Toxicol. 39(5): 869-876.

References Reviewed, but Not Used*:

#003175: Abernethy, S., A. M. Bobra, W. Y. Shiu, P. G. Wells, and D. MacKay. 1986. Acute lethal toxicity of hydrocarbons and chlorinated hydrocarbons to two planktonic crustaceans: the key role of organism-water partitioning. Aquat.Toxicol. 8(3): 163-174.
-Numerous ASTM violations.
#013562: Abernethy, S. G., D. Mackay, and L. S. McCarty. 1988. Volume fraction correlation for narcosis in aquatic organisms: the key role of partitioning. Environ. Toxicol. Chem. 7(6): 469-81.
-SDO.
#004066: Alexander, H. C., W. M. McCarty, and E. A. Bartlett. 1978. Toxicity of perchloroethylene, trichloroethylene, 1,1,1-trichloroethane, and methylene chloride to Fathead Minnows. Bull.Environ.Contam.Toxicol. 20(3): 344-352.
-TM/CU; TATO (minor consideration); test temp (12 degC) too cold; Same study as #OTS0517162.
#PB 80 147523 (Fiche): Birge, W. J., J. A. Black, and R. Kuhn. 1980. Effects of organic compounds on amphibian reproduction. Res.Rep.No.121, Water Resourc.Res.Inst., University of Kentucky, Lexington, KY:39 P.(U.S.NTIS PB80-147523) .
-TDI; some are TONNA
#017541: Botsford, J. L. 2002. A comparison of ecotoxicological tests. Altern Lab Anim 30(5): 539-50.
-TONS; TMCU; or SDO.
#V1004: Brandao, J. C., H. H. L. Bohets, I. E. Van de Vyver, and P. J. Dierickx. 1992. Correlation between the *in vitro* cytotoxicity to cultured Fathead Minnow fish cells and fish lethality data for 50 chemicals. Chemosphere 25(4): 553-62.
-NUE; TONS.
#V1006: Bringmann, G. and R. Kuhn. 1981. Comparison of the effect of toxic substances on the flagellate organisms such as ciliates and the holozoic bacteria-devouring organisms such as ... GWF-Wasser Abwasser 122(7): 308-313.
-NUE; TONS.
#V1005: Bringmann, G. and R. Kuhn. 1980. Determination of the harmful biological effect of water pollutants to bacteria, algae, and protozoa in the Cell Multiplication Inhibition Test. Z. Wasser-Abwasser-Forsch. 13(1): 26-31.
-NUE: TONS.
#005672: Bringmann, G. and R. Kuhn. 1977. The effects of water pollutants on *Daphnia magna*. Z. Wasser-Abwasser-Forsch. 10(5): 161-166.
-TDI.
#017922: Bringmann, G. and F. Meinck. 1964. Wassertoxikologische Beurteilung von Industrieabwassern. Gesundheits-Ingenieur 85: 229-260 .
-NA.
#005672: Bringmann, G. and R. Kuhn. 1977. Results of the damaging effect of water pollutants on *Daphnia magna*. Z. Wasser Abwasser Forsch. 10(5): 161-6.
-TDI.
#011330: Bringmann, G. and R. Kuhn. 1982. Results of toxic action of water pollutants on *Daphnia magna* Straus tested by an improved standardized procedure. Z. Wasser Abwasser Forsch. 15(1): 1-6.
-TDI; test volume loading violate ASTM standards
#007905: Buccafusco, R. J., S. J. Ells, and G. A. Leblanc. 1981. Acute toxicity of Priority Pollutants to Bluegill (*Lepomis macrochirus*). Bull Environ Contam Toxicol 26(4): 446-452.

-Low D.O. in undetermined test runs; also, solubility problems coupled with unmeasured concentrations in some tests.

#V1007: Burton, D. T. and D. J. Fisher. 1990. Acute toxicity of cadmium, copper, zinc, ammonia, 3,3'-dichlorobenzidine, 2,6-dichloro-4-nitroaniline, methylene chloride, and 2,4,6-trichlorophenol. Bull.Environ.Contam.Toxicol. 44(5): 776-783.

-NUE.

#V1117: Calleja, M. C., P. Geladi, and G. Persoone. 1994. QSAR models for predicting the acute toxicity of selected organic chemicals with diverse structures to aquatic non-vertebrates and humans. SAR QSAR Environ. Res. 2(3): 193-234.

-QSAR / SDO.

#V1118: Calleja, M. C., G. Persoone, and P. Galadi. 1995. Comparative acute toxicity of the first 50 multicenter evaluation of in vitro cytotoxicity chemicals to aquatic non-vertebrates. [Erratum to document cited in CA120:47626]. Arch. Environ. Contam. Toxicol. 28(3): 396.

-NUE; TONS.

#015653: Calleja, M. C., G. Persoone, and P. Geladi. 1994. Comparative acute toxicity of the first 50 multicenter evaluation of in vitro cytotoxicity chemicals to aquatic non-vertebrates. Arch. Environ. Contam. Toxicol. 26(1): 69-78.

-NUE: brine shrimp:SW, rotifer: IITM/C, daphnia:TDI (24hr data only), fairy shrimp:TDI (24hr data only), photobacterium phosphoreum: TONS.

#E00723: Calleja, M. C., G. Persoone, and P. Geladi. 1994. Human acute toxicity prediction of the first 50 MEIC chemicals by a battery of ecotoxicological tests and physicochemical properties. Food Chem. Toxicol. 32(2): 173-87.

-NUE; IITM/C; TDI; TONS.

#V3094: Colombo, A., E. Benfenati, M. Karelson, and U. Maran. 2008. The proposal of architecture for chemical splitting to optimize QSAR models for aquatic toxicity. Chemosphere 72(5): 772-780.

-NUE: MOD/QSAR/SDO.

#V1169: DeJongh, J., H. J. M. Verhaar, and J. L. M. Hermens. 1998. Role of kinetics in acute lethality of nonreactive volatile organic compounds (VOCs). Toxicol. Sci. 45(1): 26-32.

-NUE; SD.

#015330: Deneer, J. W., T. L. Sinnige, W. Seinen, and J. L. M. Hermens. 1988. The joint acute toxicity to *Daphnia magna* of industrial organic chemicals at low concentrations. Aquat. Toxicol. 12(1): 33-8.

-All data are either QSAR, SDO, MDO, or IITM/C.

#V1170: Devillers, J. and P. Chambon. 1988. A methodological framework for the early detection of drinking water pollutants. Chemosphere 17(9): 1647-54.

-NUE; TDI.

#006950: Devillers, J., P. Chambon, D. Zakarya, M. Chastrette, and R. Chambon. 1987. A predictive structure-toxicity model with *Daphnia magna*. Chemosphere 16(6): 1149-63.

-QSAR/SDO.

#V1171: Devillers, J. , D. Zakarya, and M. Chastrette. 1988. A predictive correlation for the acute toxicity of organic pollutants to *Pimephales promelas*. Chemosphere 17(8): 1531-7.

-NUE; QSAR / SDO.

#V1172: Devillers, J. , P. Chambon, D. Zakarya, and M. Chastrette. 1986. Quantitative structure-activity relations of lethal effects of 38 halogenated compounds on *Lepomis macrochirus*. C. R. Acad. Sci., Ser. 3 303(14): 613-16.

-NUE; QSAR / SDO.

#V1173: Dierickx, P. J. 1993. Comparison between fish lethality data and the in vitro cytotoxicity of lipophilic solvents to cultured fish cells in a two-compartment model. Chemosphere 27(8): 1511-18.

-NUE; SD.

#V3095: Dyer, S. D., D. J. Versteeg, S. E. Belanger, J. G. Chaney, S. Raimondo, and M. G. Barron. 2008. Comparison of species sensitivity distributions derived from interspecies correlation models to distributions used to derive water quality criteria. Environ Sci Technol 42(8): 3076-83.

-NUE; MOD.

#V1236: Eldred, D. V. , C. L. Weikel, P. C. Jurs, and K. L. E. Kaiser. 1999. Prediction of Fathead Minnow acute toxicity of organic compounds from molecular structure. Chem. Res. Toxicol. 12(7): 670-678.

-NUE; QSAR / SDO.

#014615: Enslein, K., T. M. Tuzzeo, H. H. Borgstedt, B. W. Blake, and J. B. Hart. 1987. Prediction of rat oral LD50 from *Daphnia magna* LC50 and chemical structure. QSAR Environ. Toxicol., Proc. Int. Workshop, 2nd

Meeting Date 1986, 91-106. Editor(s): Kaiser, Klaus L. E. Publisher: Reidel, Dordrecht, Neth..
-QSAR/SDO.
#V1237: Espinosa, G., A. Arenas, and F. Giralt. 2002. An Integrated SOM-Fuzzy ARTMAP Neural System for the evaluation of toxicity. Journal of Chemical Information and Computer Sciences 42(2): 343-359.
-NUE; SDO.
#V3096: François, B., R. Marie-Eve, L. Lucie, P. éLisabeth, and B. Nathalie. 2006. Combined use of photosynthetic enzyme complexes and microalgal photosynthetic systems for rapid screening of wastewater toxicity. Environmental Toxicology 21(5): 445-449.
-NUE; PDO.
#V1284: Gruber, D. and W. J. Rasnake. 1997. The use of a biological early warning system to minimize risks associated with drinking water sources and wastewater discharges. Hazard. Ind. Wastes 29: 253-262 .
-MDO.
#V3097: Hahin, R., J. Larsen, and K. Gasser. 2008-. Predictions of the EC50 for action potential block for aliphatic solutes. Journal of Membrane Biology 221(2): 73-85.
-NUE: MOD, SDO.
#V1340: Hall, L. W., W. S. Hall, S. J. Bushong, and R. L. Herman. 1987. *In situ* Striped Bass (*Morone saxatilis*) contaminant and water quality studies in the Potomac River. Aquat. Toxicol. 10(2-3): 73-99.
-ISDO.
#007904: Heitmuller, P. T., T. A. Hollister, and P. R. Parrish. 1981. Acute toxicity of 54 industrial chemicals to Sheepshead Minnows (*Cyprinodon variegatus*). Bull. Environ. Contam. Toxicol. 27(5): 596-604.
-SWDO, with no accompanying chronic data for calculation of ACR.
#009663: Hermens, J., H. Canton, P. Janssen, and R. De Jong. 1984. Quantitative structure-activity relationships and toxicity studies of mixtures of chemicals with anesthetic potency: acute lethal and sublethal toxicity to *Daphnia magna*. Aquat. Toxicol. 5(2): 143-54.
-TATO; test conditions not described.
#013167: Holcombe, G. W., G. L. Phipps, andG. D. Veith. 1988. In: Use of aquatic lethality tests to estimate safe toxicant concentrations for initial ecological risk assessments . ASTM Aquat. Toxicol. Environ. Fate STP 1007, pp. 442-58.
-SDO.
#V1414: Jensen, R. A. 1978. A simplified bioassay using finfish for estimating potential spill damage. In: Proc. Control of Hazardous Material Spills, Rockville, MD. pp. 104-108.
-NUE.
#008079: Juhnke, I. and D. Luedemann. 1978. Results of the investigation of 200 chemical compounds for acute fish toxicity with the Golden Orfe Test. Z.Wasser-Abwasser-Forsch. 11(5): 161-164.
-SDO; TONNA; TDI. Methods for this study are in Mann (1976), attached to this paper under the same library number.
#017386: Kahl, M. D., C. L. Russom, D. L. DeFoe, and D. E. Hammermeister. 1999. Saturation units for use in aquatic bioassays. Chemosphere 39(3): 539-51.
-NUE.
#V1428: Kaiser, K. L. E., S. P. Niculescu, K. L. E. Kaiser, and S. P. Niculescu. 2001. Modeling acute toxicity of chemicals to *Daphnia magna*: a probabilistic neural network approach. Environ. Toxicol. Chem 20(2): 420-431.
-NUE; SDO.
#V1417: Kaiser, K. L. E., S. P. Niculescu, and G. Schuurmann. 1997. Feed forward back-propagation neural networks and their use in predicting the acute toxicity of chemicals to the Fathead Minnow. [Erratum to document cited in CA127:132092]. Water Qual. Res. J. Can. 32(4): 855.
-NUE.
#V1418: Kaiser, K. L. E., S. P. Niculescu, and G. Schuurmann. 1997. Feed forward backpropagation neural networks and their use in predicting the acute toxicity of chemicals to the Fathead Minnow. Water Qual. Res. J. Can. 32(3): 637-657.
-NUE; SDO.
#000816: Koch, R. 1982. Molecular connectivity and acute toxicity of environmental pollutants. Chemosphere 11(9): 925-31.
-Theoretical discussion/SDO.
#006060: Konemann, H. 1981. Quantitative structure-activity relationships (QSARs) in fish toxicity studies. Part 1: Relationship for industrial pollutants. Toxicology 19(3): 209-21.
-TM/CU.

#010251: Kramer, V. C., D. J. Schnell, and K. W. Nickerson. 1983. Relative toxicity of organic solvents to *Aedes aegypti* Larvae. Journal of Invertebrate Pathology 42: 285-287.
-TDI.
#012430: Kuhn, R., M. Pattard, K. Pernak, and A. Winter. 1989. Results of the harmful effects of selected water pollutants (anilines, phenols, aliphatic compounds) to *Daphnia magna*. Water Res 23(4): 495-499.
-TM/CU.
#009664: LeBlanc, G. A. 1984. Interspecies relationships in acute toxicity of chemicals to aquatic organisms. Environ. Toxicol. Chem. 3(1): 47-60.
-SW; IITM/C. Possibly the same tests described in #OTS0517186
#013741: Lilius, H., B. Isomaa, and T. Holmstroem. 1994. A comparison of the toxicity of 50 reference chemicals to freshly isolated Rainbow Trout hepatocytes and *Daphnia magna*. Aquat. Toxicol. 30(1): 47-60.
-Rainbow Trout: NUE; Daphnia: TDI.
#V1535: Martin, T. M. and D. M. Young. 2001 . Prediction of the acute toxicity (96-h LC50) of organic compounds to the Fathead Minnow (*Pimephales promelas*) using a group contribution method. Chem Res Toxicol 14(10): 1378-85.
-NUE; QSAR / SDO.
#V1545: McCarthy, L. H., R. L. Thomas, and C. I. Mayfield. 2004. Assessing the toxicity of chemically fractionated Hamilton Harbour (Lake Ontario) sediment using selected aquatic organisms. Lakes & Reservoirs: Research and Management 9(1): 89-102.
-SED.
#013104: McGowan, J. C. and A. Mellors. 1986. Molecular volumes and the toxicities of chemicals to fish. Bull. Environ. Contam. Toxicol. 36(6): 881-7.
-SDO.
#V1554: Merlin, G., H. Thiebaud, G. Blake, S. Sembiring, and J. Alary. 1992. Mesocosms' and microcosms' utilization for the ecotoxicity evaluation of dichloromethane, a chlorinated solvent. Chemosphere 24(1): 37-50.
-NUE.
#V1614: Nalecz-Jawecki, G. and J. Sawicki. 2002. A comparison of sensitivity of spirotox biotest with standard toxicity tests. Arch Environ Contam Toxicol 42(4): 389-95.
-TONS.
#V1615: Nicola, R. M. , R. Branchflower, and D. Pierce. 1987. Chemical contaminants in bottomfish. J. Environ. Health 49(6): 342-7.
-SW.
#V1616: Niculescu, S. P., A. Atkinson, G. Hammond, and M. Lewis. 2004. Using fragment chemistry data mining and probabilistic neural networks in screening chemicals for acute toxicity to the Fathead Minnow. SAR QSAR Environ Res 15(4): 293-309.
-NUE; QSAR / SDO.
#V3098: Niculescu, S. P., M. A. Lewis, and J. Tigner. 2008. Probabilistic neural networks modeling of the 48-h LC50 acute toxicity endpoint to *Daphnia magna*. SAR QSAR Environ Res 19(7-8): 735-50.
-NUE: MOD/QSAR/SDO.
#V2801: Papa, E., F. Villa, and P. Gramatica. 2005. Statistically validated QSARs, based on theoretical descriptors, for modeling aquatic toxicity of organic chemicals in *Pimephales promelas* (Fathead Minnow). Journal of Chemical Information and Modeling 45(5): 1256-66.
-QSAR/SDO.
#V2857: Pavan, M., T. I. Netzeva, and A. P. Worth. 2006. Validation of a QSAR model for acute toxicity. SAR and QSAR in Environmental Research 17(2): 147-171.
-QSAR/SDO.
#V3100: Raevskii, O. A., A. N. Razdol'skii, V. D. Tonkopii, I. V. Iofina, and A. O. Zagrebin. 2008. Classificatory and quantitative models of the relationship between the structures of chemical compounds and their toxicity for *Daphnia magna*. Pharmaceutical Chemistry Journal 42(6): 329-334.
-QSAR/SDO.
#015771: Ramos, E. U. , W. H. J. Vaes, H. J. M. Verhaar, and J. L. M. Hermens. 1998. Quantitative Structure-Activity Relationships for the aquatic toxicity of polar and nonpolar narcotic pollutants. Journal of Chemical Information and Computer Sciences 38(5): 845-852.
-QSAR/SDO.
#V2826: Robinson, P. W. 1999. The toxicity of pesticides and organics to mysid shrimps can be predicted from *Daphnia* spp. Toxicity Data. Water Research 33(6): 1545-1549.

-SD; SW.
#V1687: Roderer, G., 1990. Testung Wassergefahrdender Stoffe als Grundlage fur Wasserqualitatsstandards Testbericht: Wassergefahrdende Stoffe. Fraunhofer-Institut fur Umweltchemie und Okotoxikologie, Schmallenberg.
- NA.
#V1688: Rozman, K. K. 2000. The role of time in toxicology or Haber's c x t product. Toxicology 149(1): 35-42.
-NUE.
#V1689: Rozman, K. K. and J. Doull. 2001. The role of time as a quantifiable variable of toxicity and the experimental conditions when Haber's c x t product can be observed: implications for therapeutics. J Pharmacol Exp Ther 296(3): 663-8.
-NUE.
#V1738: Sanchez-Fortun, S., F. Sanz, A. Santa-Maria, J. M. Ros, M. L. De Vicente, M. T. Encinas, and E. Vinagre. 1997. Acute sensitivity of three age classes of *Artemia salina* larvae to seven chlorinated solvents. Bull.Environ.Contam.Toxicol. 59: 445-451.
-SW.
#V3101: Schirmer, K., K. Tanneberger, N. I. Kramer, D. V÷lker, S. Scholz, C. Hafner, L. E. J. Lee, N. C. Bols, and J. L. M. Hermens. 2008. Developing a list of reference chemicals for testing alternatives to whole fish toxicity tests. Aquatic Toxicology 90(2): 128-137.
-NUE: MOD/QSAR/SDO.
#V1739: Solari, P. and P. J. Dierickx. 1994 . Correlation between fish lethality data and the cytotoxicity to cultured fish cells of lipophilic solvents emulsified by ultrasonication. Chemosphere 28(8): 1495-501.
-NUE; TONNA; SD.
#007901: Stephan, C. E. 1978. In-depth studies on health and environmental impacts of selected water pollutants. Contract No.68-01-4646, U.S.EPA :9 P.
-NUE; SW; IITM/C; SDO. Chemical also reported in #015446
#V2858: Sánchez-Bayo, F. 2006. Comparative acute toxicity of organic pollutants and reference values for crustaceans. I. Branchiopoda, Copepoda and Ostracoda. Environmental Pollution 139(3): 385-420.
-QSAR / SDO.
#015390: Tanaka, A., H. Masago, K. Kanou, and A. Ujiie. 1984. Studies on the simplified assay for the trace amounts of agricultural chemicals in water and its acute toxicity to fishes. (3). 2. Simplified and rapid assay for organophosphorus pesticides and the acute toxicity to the tropical fish, guppy. Yosui to Haisui 26(5): 529-37.
-TDI.
#W00194: Thiebaud, H. , G. Merlin, M. P. Capovilla, and G. Blake. 1994. Fate of a volatile chlorinated solvent in indoor aquatic microcosms: sublethal and static exposure to (14C) dichloromethane. Ecotoxicol.Environ.Saf. 28(1): 71-81.
-NUE; MCD.
#009990: Tonogai, Y., Y. Ito, M. Iwaida, M. Tati, Y. Ose, and M. Hori. 1980. Studies on the toxicity of coal-tar dyes. III. Reason of acute toxicity to fish caused by coal-tar dyes and their industrial effluents. J Toxicol Sci 5(1): 23-33.
-NUE; MDO; ND for methylene chloride.
#V1831: Tsuji, S., Y. Tonogai, Y. Ito, and S. Kanoh. 1986. The influence of rearing temperatures on the toxicity of various environmental pollutants for Killifish (*Oryzias latipes*). J. Hyg. Chem. /Eisei Kagaku 32(1): 46-53.
-SW; TONNA.
#V1831: Tsuji, S., Y. Tonogai, Y. Ito, and S. Kanoh. 1986. Effect of rearing temperatures on the toxicity of various environmental pollutants for killifish (*Oryzias latipes*). Eisei Kagaku 32(1): 46-53.
-SW; TONNA.
#V1874: Verhaar, H. J. M., E. U. Ramos, and J. L. M. Hermens. 1996. Classifying environmental pollutants. 2: separation of class 1 (baseline toxicity) and class 2 ('polar narcosis') type compounds based on chemical descriptors. J. Chemom. 10(2): 149-62.
-NUE; QSAR / SDO.
#V1875: Verhaar, H. J. M., J. Solbe, J. Speksnijder, C. J. Van Leeuwen, and J. L. M. Hermens. 2000. Classifying environmental pollutants: Part 3. External validation of the classification system. Chemosphere 40(8): 875-883.
-NUE; QSAR / SDO.
#V1953: von der Ohe, P. C., R. Kühne, R. U. Ebert, R. Altenburger, M. Liess, and G. Schüürmann. 2005. Structural alerts--a new classification model to discriminate excess toxicity from narcotic effect levels of organic compounds in the acute daphnid assay. Chem Res Toxicol 18(3): 536-55.
-NUE; MOD.

#V1876: Wang, G. and N. Bai. 1997. Study on QSAR for general pollutants in organic industrial waste. Toxic Subst. Mech. 16(4): 315-326.
-QSAR / SDO.
#016611: Wei, L., W. Zhang, S. Han, L. Wang, and Y. Zhao. 1999. Acute/chronic ratios to estimate chronic toxicity from acute data. Toxicol. Environ. Chem. 69(3-4): 395-401.
-TDI; QSAR/SDO.
#V1910: Zaroogian, G. , J. F. Heltshe, and M. Johnson. 1985. Estimation of toxicity to marine species with structure-activity models developed to estimate toxicity to freshwater fish. Aquat. Toxicol. 6(4): 251-70.
-QSAR / SDO; SW.
#013103: Zhao, Y., L. Wang, H. Gao, and Z. Zhang. 1993. Quantitative structure-activity relationships-relationship between toxicity of organic chemicals to fish and to *Photobacterium phosphoreum*. Chemosphere 26(11): 1971-9.
-TDI; SDO; IITM/C.
#V1878: Zholdakova, Z. I. and R. Kokh. 1986. Molecular connectiveness and acute chemical toxicity. Gig. Sanit. (7): 18-19.
-QSAR / SDO.

* For abbreviations used, see Appendix, attached.

APPENDIX: REFERENCE ABBREVIATIONS USED, 11/09

AMD = ambient monitoring data.
BCF = bioconcentration factor.
D = data (as a suffix to other abbreviations listed here).
DEP = depuration data.
DO = data only (as a suffix to other abbreviations listed here).
EF = environmental fate.
GWD = groundwater data.
IITM/C = insufficient information on test methods / conditions.
ISD = *in situ* data.
LD = leachate data.
LSER = Linear Solvation Energy Relationship.
MCD = microcosm data.
MIX = mixture (not chemical-specific) test data.
MED = model ecosystem data.
MET = metabolism
MOD = model (theoretical) data / analysis.
NA = not available at this time.
ND = no data (on this chemical).
NIL = not in (MDEQ) Library.
NR = not reviewed.
NUE = no useable endpoint.
O = only (as a suffix to other abbreviations listed here).
PD = phytotoxicity data.
PHYS = physiological data.
QSAR = Quantitative Structure-Activity Relationship.
RWD = receiving water data.
SD = secondary data.
SED = sediment data or testing.
SW = saltwater.
TATO = test animals too old.
TDI = test duration inappropriate.
TM/CU = test methods / conditions unacceptable.
TONNA = test organisms not North American.
TONS = test organisms not suitable.
UD or UP = uptake data.
WET = whole-effluent testing.