



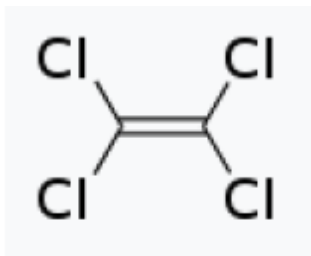
United States
Environmental Protection Agency

Office of Chemical Safety and
Pollution Prevention

Draft Risk Evaluation for Perchloroethylene (Ethene, 1,1,2,2-Tetrachloro)

CASRN: 127-18-4

Systematic Review Supplemental File: Data Quality Evaluation of Ecological Hazard Studies



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April 2020, DRAFT

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HERO ID	Data Type	Reference	1
7508	Acute (0-96 hour); Aquatic; Invertebrates	Leblanc, G. A.. 1980. Acute toxicity of priority pollutants to water flea (<i>Daphnia magna</i>). Bulletin of Environmental Contamination and Toxicology 24:684-691	1
12017	Acute (0-96 hour); Aquatic; Fish	Broderius, S.,Kahl, M.. 1985. Acute toxicity of organic chemical mixtures to the fathead minnow. Aquatic Toxicology 6:307-322	4
12017	Chronic (>21 days); Aquatic; Fish	Broderius, S.,Kahl, M.. 1985. Acute toxicity of organic chemical mixtures to the fathead minnow. Aquatic Toxicology 6:307-322	6
18050	Chronic (>21 days); Aquatic; Fish	Barrows, M. E.,Petrocelli, S. R.,Macek, K. J.,Carroll, J. J.. 1980. Bioconcentration and elimination of selected water pollutants by bluegill sunfish (<i>Lepomis macrochirus</i>).	8
18064	Acute (0-96 hour); Aquatic; Fish	Buccafusco, R. J.,Ells, S. J.,Leblanc, G. A.. 1981. Acute toxicity of priority pollutants to bluegill (<i>Lepomis macrochirus</i>). Bulletin of Environmental Contamination and Toxicology 26:446-452	11
18110	Acute (0-96 hour); Aquatic; Fish	Heitmuller, P. T.,Hollister, T. A.,Parrish, P. R.. 1981. Acute toxicity of 54 industrial chemicals to sheepshead minnows (<i>Cyprinodon variegatus</i>). Bulletin of Environmental Contamination and Toxicology 27:596-604	14
32169	Acute (0-96 hour); Aquatic; Fish	Geiger, D. L.,Northcott, C. E.,Call, D. J.,Brooke, L. T. eds. 1985. Acute toxicities of organic chemicals to fathead minnows (<i>Pimephales promelas</i>): volume II.	16
42313	Other; Terrestrial;	Dietz, A. C.,Schnoor, J. L.. 2001. Phytotoxicity of chlorinated aliphatics to hybrid poplar (<i>Populus deltoides</i> x <i>nigra</i> DN34). Environmental Toxicology and Chemistry 20:389-393	19
48608	Acute (0-96 hour); Terrestrial;	Sandhu, S. S.,Ma, T. H.,Peng, Y.,Zhou, X.. 1989. Clastogenicity evaluation of seven chemicals commonly found at hazardous industrial waste sites. DNA Repair 224:437-445	21
58126	Acute (0-96 hour); Aquatic; Fish	Alexander, H. C.,McCarty, W. M.,Bartlett, E. A.. 1978. Toxicity of perchloroethylene, trichloroethylene, 1,1,1-trichloroethane, and methylene chloride to fathead minnows. Bulletin of Environmental Contamination and Toxicology 20:344-352	23
64580	Other; Terrestrial;	Bernard, A. M.,de Russis, R.,Normand, J. C.,Lauwerys, R. R.. 1989. Evaluation of the subacute nephrotoxicity of cyclohexane and other industrial solvents in the female Sprague-Dawley rat. Toxicology Letters 45:271-280	25

76052	Chronic (>21 days); Terrestrial;	Narotsky, M. G.,Kavlock, R. J.. 1995. A multidisciplinary approach to toxicological screening: II. Developmental toxicity. <i>Journal of Toxicology and Environmental Health</i> 45:145-171	27
94468	Other; Terrestrial;	Elovaara, E.,Hemminki, K.,Vainio, H.. 1979. Effects of methylene chloride, trichloroethane, trichloroethylene, tetrachloroethylene and toluene on the development of chick embryos. <i>Toxicology</i> 12:111-119	29
95201	Acute (0-96 hour); Aquatic; Fish	Smith, A. D.,Bharath, A.,Mallard, C.,Orr, D.,Smith, K.,Sutton, J. A.,Vukmanich, J.,McCarty, L. S.,Ozburn, G. W.. 1991. The acute and chronic toxicity of ten chlorinated organic compounds to the American flagfish (<i>Jordanella floridae</i>). <i>Archives of Environmental Contamination and Toxicology</i> 20:94-102	31
200570	Acute (0-96 hour); Aquatic; Invertebrates	Sanchez-Fortun, S.,Sanz, F.,Santa-Maria, A.,Ros, J. M.,De Vicente, M. L.,Encinas, M. T.,Vinagre, E.,Barahona, M. V.. 1997. Acute sensitivity of three age classes of <i>Artemia salina</i> larvae to seven chlorinated solvents. <i>Bulletin of Environmental Contamination and Toxicology</i> 59:445-451	33
629907	Acute (0-96 hour); Terrestrial;	Valencia, R.,Mason, J. M.,Woodruff, R. C.,Zimmering, S.. 1985. Chemical mutagenesis testing in <i>Drosophila</i> . III. Results of 48 coded compounds tested for the National Toxicology Program. <i>Environmental Mutagenesis</i> 7:325-348	36
632863	Other; Aquatic; Fish	Spencer, H. B.,Hussein, W. R.,Tchounwou, P. B.. 2002. Effects of tetrachloroethylene on the viability and development of embryos of the Japanese medaka, <i>Oryzias latipes</i> . <i>Archives of Environmental Contamination and Toxicology</i> 42:463-469	38
632863	Acute (0-96 hour); Aquatic; Fish	Spencer, H. B.,Hussein, W. R.,Tchounwou, P. B.. 2002. Effects of tetrachloroethylene on the viability and development of embryos of the Japanese medaka, <i>Oryzias latipes</i> . <i>Archives of Environmental Contamination and Toxicology</i> 42:463-469	40
632864	Other; Aquatic; Fish	Spencer, H. B.,Hussein, W. R.,Tchounwou, P. B.. 2006. Growth inhibition in Japanese medaka (<i>Oryzias latipes</i>) fish exposed to tetrachloroethylene. <i>Journal of Environmental Biology</i> 27	42
632864	Acute (0-96 hour); Aquatic; Fish	Spencer, H. B.,Hussein, W. R.,Tchounwou, P. B.. 2006. Growth inhibition in Japanese medaka (<i>Oryzias latipes</i>) fish exposed to tetrachloroethylene. <i>Journal of Environmental Biology</i> 27	45
657898	Acute (0-96 hour); Terrestrial;	Crebelli, R.,Andreoli, C.,Carere, A.,Conti, L.,Crochi, B.,Cotta-Ramusino, M.,Benigni, R.. 1995. Toxicology of halogenated aliphatic hydrocarbons: Structural and molecular determinants for the disturbance of chromosome segregation and the induction of lipid peroxidation. <i>Chemico-Biological Interactions</i> 98:113-129	47

660091	Other; Terrestrial;	Hulzebos, E. M.,Adema, D. M.,Dirven-Van Breemen, E. M.,Henzen, L.,Van Dis, W. A.,Herbold, H. A.,Hoekstra, J. A.,Baerselman, R.,Van Gestel, C. A.. 1993. Phytotoxicity studies with <i>Lactuca sativa</i> in soil and nutrient solution. <i>Environmental Toxicology and Chemistry</i> 12:1079-1094	49
660790	Acute (0-96 hour); Aquatic; Plants	Brack, W.,Frank, H.. 1998. Chlorophyll a fluorescence: A tool for the investigation of toxic effects in the photosynthetic apparatus. <i>Ecotoxicology and Environmental Safety</i> 40:34-41	51
661061	Acute (0-96 hour); Aquatic; Plants	Brack, W.,Rottler, H.. 1994. Toxicity testing of highly volatile chemicals with green algae: A new assay. 1:223-228	54
661834	Acute (0-96 hour); Terrestrial;	Miyagawa, M.,Takasawa, H.,Sugiyama, A.,Inoue, Y.,Murata, T.,Uno, Y.,Yoshikawa, K.. 1995. The in vivo-in vitro replicative DNA synthesis (RDS) test with hepatocytes prepared from male B6C3F1 mice as an early prediction assay for putative nongenotoxic (Ames-negative) mouse hepatocarcinogens. <i>Mutation Research: Genetic Toxicology</i> 343:157-183	57
676758	Acute (0-96 hour); Aquatic; Invertebrates	Yoshioka, Y.,Ose, Y.,Sato, T.. 1985. Testing for the toxicity of chemicals with <i>Tetrahymena pyriformis</i> . <i>Science of the Total Environment</i> 43:149-157	59
700434	Other; Aquatic; other amphibian - wood frog and green frog	McDaniel, T.,Martin, P.,Ross, N.,Brown, S.,Lesage, S.,Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. <i>Archives of Environmental Contamination and Toxicology</i> 47:101-109	62
700434	Other; Aquatic; other amphibian - american toad	McDaniel, T.,Martin, P.,Ross, N.,Brown, S.,Lesage, S.,Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. <i>Archives of Environmental Contamination and Toxicology</i> 47:101-109	67
700434	Other; Aquatic; other amphibian - spotted salamander	McDaniel, T.,Martin, P.,Ross, N.,Brown, S.,Lesage, S.,Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. <i>Archives of Environmental Contamination and Toxicology</i> 47:101-109	72
700434	Acute (0-96 hour); Aquatic; other Amphibian	McDaniel, T.,Martin, P.,Ross, N.,Brown, S.,Lesage, S.,Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. <i>Archives of Environmental Contamination and Toxicology</i> 47:101-109	78
707209	Acute (0-96 hour); Aquatic; Invertebrates	Niederlehner, B.,Cairns, J.,Smith, E.. 1998. Modeling acute and chronic toxicity of nonpolar narcotic chemicals and mixtures to <i>Ceriodaphnia dubia</i> . <i>Ecotoxicology and Environmental Safety</i> 39:136-146	80
707209	Other; Aquatic; Invertebrates	Niederlehner, B.,Cairns, J.,Smith, E.. 1998. Modeling acute and chronic toxicity of nonpolar narcotic chemicals and mixtures to <i>Ceriodaphnia dubia</i> . <i>Ecotoxicology and Environmental Safety</i> 39:136-146	83
1059985	Acute (0-96 hour); Aquatic; Plants	Labra, M.,Mattia, F.,Bernasconi, M.,Bertacchi, D.,Grassi, F.,Brumi, I.,Citterio, S.. 2010. The Combined Toxic and Genotoxic Effects of Chromium and Volatile Organic Contaminants to <i>Pseudokirchneriella subcapitata</i> . <i>Water, Air, and Soil Pollution</i> 213:57-70	86

1916722	Other; Terrestrial;	Specht, W. L., Klaine, S. J., Hook, D. D.. 1996. Rapid bioassessment methods for assessing vegetation toxicity at the Savannah River Site - germination tests and root elongation trials.	88
2127844	Acute (0-96 hour); Aquatic; Plants	Bacsi, I., Toeroek, T., B-Beres, V., Toeroek, P., Tothmeresz, B., Nagy, A. S., Vasas, G.. 2013. Laboratory and microcosm experiments testing the toxicity of chlorinated hydrocarbons on a cyanobacterium strain (<i>Synechococcus</i> PCC 6301) and on natural phytoplankton assemblages. <i>Hydrobiologia</i> 710:189-203	90
2298399	Acute (0-96 hour); Aquatic; Fish	Smith, A. D., Bharath, A., Mallard, C., Orr, D., Smith, K., Sutton, J. A., Vukmanich, J., McCarty, L. S., Ozburn, G. W.. 1991. The acute and chronic toxicity of 10 chlorinated organic-compounds to the american flagfish (<i>Jordanella-floridae</i>). <i>Archives of Environmental Contamination and Toxicology</i> 20:94-102	93
2298399	Chronic (>21 days); Aquatic; Fish	Smith, A. D., Bharath, A., Mallard, C., Orr, D., Smith, K., Sutton, J. A., Vukmanich, J., McCarty, L. S., Ozburn, G. W.. 1991. The acute and chronic toxicity of 10 chlorinated organic-compounds to the american flagfish (<i>Jordanella-floridae</i>). <i>Archives of Environmental Contamination and Toxicology</i> 20:94-102	96
3298076	Acute (0-96 hour); Aquatic; Plants	Bacsi, I., Gonda, S., B-Beres, V., Novak, Z., Nagy, S. A., Vasas, G.. 2015. Alterations of phytoplankton assemblages treated with chlorinated hydrocarbons: effects of dominant species sensitivity and initial diversity. <i>Ecotoxicology</i> 24:823-834	99
3559784	Acute (0-96 hour); Aquatic; other soil fungi	Steiman, R., Seiglemurandi, F., Guiraud, P., Benoitguyod, J. L.. 1995. TESTING OF CHLORINATED SOLVENTS ON MICROFUNGI. <i>Environmental Toxicology and Water Quality</i> 10:283-285	102
3559784	Acute (0-96 hour); Aquatic; other fungi	Steiman, R., Seiglemurandi, F., Guiraud, P., Benoitguyod, J. L.. 1995. TESTING OF CHLORINATED SOLVENTS ON MICROFUNGI. <i>Environmental Toxicology and Water Quality</i> 10:283-285	104
3616526	Chronic (>21 days); Aquatic; Fish	Loekle, D. M., Schechter, A. J., Christian, J. J.. 1983. Effects of Chloroform, Tetrachloroethylene, and Trichloroethylene on Survival, Growth, and Liver of <i>Poecilia sphenops</i> . 30:199-205	106
3617731	Acute (0-96 hour); Aquatic; Fish	Horne, J. D., Swirsky, M. A., Hollister, T. A., Oblad, B. R., Kennedy, J. H.. 1983. Aquatic Toxicity Studies of Five Priority Pollutants.	108
3617731	Acute (0-96 hour); Aquatic; Invertebrates	Horne, J. D., Swirsky, M. A., Hollister, T. A., Oblad, B. R., Kennedy, J. H.. 1983. Aquatic Toxicity Studies of Five Priority Pollutants.	110
3617735	Acute (0-96 hour); Aquatic;	Hollister, T. A., Parker, A. H., Jr., Parrish, P. R.. 1968. Acute and Chronic Toxicity of Five Chemicals to Mysid Shrimp (<i>Mysidopsis bahia</i>).	112
3617735	Chronic (>21 days); Aquatic; Invertebrates	Hollister, T. A., Parker, A. H., Jr., Parrish, P. R.. 1968. Acute and Chronic Toxicity of Five Chemicals to Mysid Shrimp (<i>Mysidopsis bahia</i>).	114

3617735	Other; Aquatic; Invertebrates	Hollister, T. A., Parker, A. H., Jr., Parrish, P. R.. 1968. Acute and Chronic Toxicity of Five Chemicals to Mysid Shrimp (<i>Mysidopsis bahia</i>).	116
3617749	Acute (0-96 hour); Aquatic; Invertebrates	Yoshioka, Y., Ose, Y., Sato, T.. 1986. Correlation of the Five Test Methods to Assess Chemical Toxicity and Relation to Physical Properties. 12:15-21	118
3617749	Other; Aquatic; Invertebrates	Yoshioka, Y., Ose, Y., Sato, T.. 1986. Correlation of the Five Test Methods to Assess Chemical Toxicity and Relation to Physical Properties. 12:15-21	121
3617749	Acute (0-96 hour); Aquatic; Fish	Yoshioka, Y., Ose, Y., Sato, T.. 1986. Correlation of the Five Test Methods to Assess Chemical Toxicity and Relation to Physical Properties. 12:15-21	125
3617867	Acute (0-96 hour); Aquatic; Plants	Tsai, K. P., Chen, C. Y.. 2007. An Algal Toxicity Database of Organic Toxicants Derived by a Closed-System Technique. Environmental Toxicology and Chemistry 26:1931-1939	128
3625336	Acute (0-96 hour); Aquatic; Fish	Shubat, P. J., Poirier, S. H., Knuth, M. L., Brooke, L. T.. 1982. Acute Toxicity of Tetrachloroethylene and Tetrachloroethylene with Dimethylformamide to Rainbow Trout (<i>Salmo gairdneri</i>). 28	131
3625489	Other; Aquatic; Fish	Schell, J. D. J.. 1987. Interactions of Halogenated Hydrocarbon Mixtures in the Embryo of the Japanese Medaka (<i>Oryzias latipes</i>).	134
3625621	Chronic (>21 days); Aquatic; Fish	De Foe, D. L.. 1980. Tetrachloroethylene Bioassay Results.	136
3634174	Chronic (>21 days); Aquatic; Invertebrates	Richter, J. E., Peterson, S. F., Kleiner, C. F.. 1983. Acute and Chronic Toxicity of some Chlorinated Benzenes, Chlorinated Ethanes, and Tetrachloroethylene to <i>Daphnia magna</i> . 12:679-684 (OECDG Data File)	138
3634174	Acute (0-96 hour); Aquatic; Invertebrates	Richter, J. E., Peterson, S. F., Kleiner, C. F.. 1983. Acute and Chronic Toxicity of some Chlorinated Benzenes, Chlorinated Ethanes, and Tetrachloroethylene to <i>Daphnia magna</i> . 12:679-684 (OECDG Data File)	141
3634370	Acute (0-96 hour); Aquatic; Fish	Call, D. J., Brooke, L. T., Ahmad, N., Richter, J. E.. 1983. Toxicity and Metabolism Studies with EPA (Environmental Protection Agency) Priority Pollutants and Related Chemicals in Freshwater Organisms.	144
3634370	Acute (0-96 hour); Aquatic; Invertebrates	Call, D. J., Brooke, L. T., Ahmad, N., Richter, J. E.. 1983. Toxicity and Metabolism Studies with EPA (Environmental Protection Agency) Priority Pollutants and Related Chemicals in Freshwater Organisms.	146
3634370	Acute (0-96 hour); Aquatic; other fish and invert	Call, D. J., Brooke, L. T., Ahmad, N., Richter, J. E.. 1983. Toxicity and Metabolism Studies with EPA (Environmental Protection Agency) Priority Pollutants and Related Chemicals in Freshwater Organisms.	148
3634375	Chronic (>21 days); Aquatic; Invertebrates	Call, D. J., Brooke, L. T., Ahmad, N.. 1980. Toxicity, Bioconcentration, and Metabolism of Selected Chemicals in Aquatic Organisms.	150

3634375	Acute (0-96 hour); Aquatic; Invertebrates	Call, D. J.,Brooke, L. T.,Ahmad, N.. 1980. Toxicity, Bioconcentration, and Metabolism of Selected Chemicals in Aquatic Organisms.	152
3634375	Other; Aquatic; Invertebrates	Call, D. J.,Brooke, L. T.,Ahmad, N.. 1980. Toxicity, Bioconcentration, and Metabolism of Selected Chemicals in Aquatic Organisms.	154
3634391	Acute (0-96 hour); Aquatic; Fish	Call, D. J.,Brooke, L. T.,Ahmad, N.. 1979. Toxicity, Bioconcentration and Metabolism of Selected Chemicals in Aquatic Organisms.	156
3634391	Acute (0-96 hour); Aquatic; Invertebrates	Call, D. J.,Brooke, L. T.,Ahmad, N.. 1979. Toxicity, Bioconcentration and Metabolism of Selected Chemicals in Aquatic Organisms.	158
3634391	Acute (0-96 hour); Aquatic; other invert,fish,algae	Call, D. J.,Brooke, L. T.,Ahmad, N.. 1979. Toxicity, Bioconcentration and Metabolism of Selected Chemicals in Aquatic Organisms.	160
3634436	Acute (0-96 hour); Aquatic; Fish	Brooke, L.. 1987. Report of the Flow-Through and Static Acute Test Comparisons with Fathead Minnows and Acute Tests with an Amphipod and a Cladoceran.	162
3689695	Acute (0-96 hour); Aquatic; Fish	Ahmad, N.,Benoit, D.,Brooke, L.,Call, D.,Carlson, A.,Defoe, D.,Huot, J.,Moriarty, A.,Richter, J.,Shubat, P.,Veith, G.,Wallbridge, C.. 1984. Aquatic Toxicity Tests to Characterize the Hazard of Volatile Organic Chemicals in Water: A Toxicity Data Summary-Parts I and II.	164
3689695	Chronic (>21 days); Aquatic; Fish	Ahmad, N.,Benoit, D.,Brooke, L.,Call, D.,Carlson, A.,Defoe, D.,Huot, J.,Moriarty, A.,Richter, J.,Shubat, P.,Veith, G.,Wallbridge, C.. 1984. Aquatic Toxicity Tests to Characterize the Hazard of Volatile Organic Chemicals in Water: A Toxicity Data Summary-Parts I and II.	166
3689695	; Aquatic; Fish	Ahmad, N.,Benoit, D.,Brooke, L.,Call, D.,Carlson, A.,Defoe, D.,Huot, J.,Moriarty, A.,Richter, J.,Shubat, P.,Veith, G.,Wallbridge, C.. 1984. Aquatic Toxicity Tests to Characterize the Hazard of Volatile Organic Chemicals in Water: A Toxicity Data Summary-Parts I and II.	168
4214225	Acute (0-96 hour); Aquatic; Invertebrates	Dow Chem Co. 1979. TOXICITY OF PERCHLOROETHYLENE TO DAPHNIDS.	170
4214249	Acute (0-96 hour); Aquatic; Fish	Ciba-Geigy Corp. 1980. 96 HOUR STATIC FISH BIOASSAY TEST WITH ATTACHMENTS (ATTACHMENT 59).	172

Study Citation: Leblanc, G. A.. 1980. Acute toxicity of priority pollutants to water flea (*Daphnia magna*). Bulletin of Environmental Contamination and Toxicology 24:684-691
Data Type: Acute (0-96 hour); Aquatic; Invertebrates
Hero ID: 7508

Domain	Metric	Rating [†]	MWF* [‡]	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	study says all chemicals tested were purchased from commercial chemical suppliers, but does not specify where tetrachloroethylene came from. Study reports a minimum purity of 80 percent for all chemicals tested, but does not specify what the purity is for tetrachloroethylene.
Metric 2:	Test Substance Source	Low	× 1	3	
Metric 3:	Test Substance Purity	Low	× 1	3	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	Low	× 2	6	It appears the volatility of tetrachloroethylene was taken into account in the test methods, but it's unclear as the study reports generally." The tests were also conducted in unreplicated 500 mL solutions containing 15 daphnids if dividing the solution into triplicate test vessels presented a risk of the loss of the test substance through volatilization or if vapors of the substance posed a high health risk to the investigators. In addition, these vessels were covered with plastic wrap secured with an elastic band." only minor uncertainties measurements were not reported and the test substance is volatile 5-8 exposure groups were used for each chemical. no range finding was conducted to determine an appropriate exposure, but it appears they were appropriate enough to establish an LD50.
Metric 8:	Consistency of Exposure Administration	Medium	× 1	2	
Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Medium	× 1	2	

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Study Citation:	Leblanc, G. A., 1980. Acute toxicity of priority pollutants to water flea (<i>Daphnia magna</i>). Bulletin of Environmental Contamination and Toxicology 24:684-691				
Data Type:	Acute (0-96 hour); Aquatic; Invertebrates				
Hero ID:	7508				
Domain	Metric	Rating [†]	MWP*	Score	Comments ^{††}
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	study didn't report whether test organisms were acclimatized.
Metric 14:	Acclimatization and Pretreatment Conditions	Low	× 1	3	
Metric 15:	Number of Organisms and Replicates per Group	Low	× 1	3	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	It appears there were 15 daphnia in each test concentration for tetrachloroethylene and no replicates to avoid losing tetrachloroethylene to vitalization. OECD recommends at least 20 and separated into 4 different vessels.
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2	
Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					
Metric 21:	Statistical Methods	High	× 1	1	Data for most but not all outcomes by study group were reported but these minor uncertainties or limitations are unlikely to have a substantial impact on results.
Metric 22:	Reporting of Data	Medium	× 2	4	
Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.6	
Extracted		Yes			
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Study Citation: Leblanc, G. A., 1980. Acute toxicity of priority pollutants to water flea (*Daphnia magna*). Bulletin of Environmental Contamination and Toxicology 24:684-691
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 7508

Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
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* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

if any metric is Unacceptable

$$\text{Overall rating} = \begin{cases} 4 \\ \left[\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j \right]_{0.1} \end{cases} \quad (\text{round to the nearest tenth) otherwise}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Broderius, S., Kahl, M., 1985. Acute toxicity of organic chemical mixtures to the fathead minnow. Aquatic Toxicology 6:307-322
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 12017

Domain	Metric	Rating ⁱ	MWF* [*]	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	

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Study Citation: Broderius, S., Kahl, M., 1985. Acute toxicity of organic chemical mixtures to the fathead minnow. *Aquatic Toxicology* 6:307-322
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 12017

Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
Domain 6: Confounding / Variable Control				
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2
Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1
Domain 7: Data Presentation and Analysis				
Metric 21:	Statistical Methods	High	× 1	1
Metric 22:	Reporting of Data	High	× 2	2
Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1

Overall Quality Determination[‡]

Extracted Yes

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Broderius, S., Kahl, M., 1985. Acute toxicity of organic chemical mixtures to the fathead minnow. Aquatic Toxicology 6:307-322
 Data Type: Chronic (>21 days); Aquatic; Fish
 Hero ID: 12017

Domain	Metric	Rating ⁱ	MWF* [*]	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	

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Study Citation: Broderius, S., Kahl, M., 1985. Acute toxicity of organic chemical mixtures to the fathead minnow. Aquatic Toxicology 6:307-322
 Data Type: Chronic (>21 days); Aquatic; Fish
 Hero ID: 12017

Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
Domain 6: Confounding / Variable Control				
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2
Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1
Domain 7: Data Presentation and Analysis				
Metric 21:	Statistical Methods	High	× 1	1
Metric 22:	Reporting of Data	High	× 2	2
Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1

Overall Quality Determination[‡]

Extracted No

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Barrows, M. E., Petrocelli, S. R., Macek, K. J., Carroll, J. J., 1980. Bioconcentration and elimination of selected water pollutants by bluegill sunfish (*Lepomis macrochirus*).
 Data Type: Chronic (>21 days); Aquatic; Fish
 Hero ID: 18050

Domain	Metric	Rating [†]	MWF* [‡]	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	Low	× 1	3	no purity of test chemical was reported, but liquid gas chromatography was performed during the experiment and purity of the chemical could be determined then although it wasn't reported in the paper.
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	Low	× 1	3	method for allocation was not reported.
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	Medium	× 2	4	Minor reservations about the source of fish. Three populations of bluegill sunfish (<i>Lepomis macrochirus</i>) were obtained from a commercial fish farmer in Connecticut. May not all be the same age, but length and weight was documented, and age may not be a big factor in determining BCF.

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<p>Study Citation: Barrows, M. E., Petrocelli, S. R., Macek, K. J., Carroll, J. J., 1980. Bioconcentration and elimination of selected water pollutants by bluegill sunfish (<i>Lepomis macrochirus</i>).</p> <p>Data Type: Chronic (>21 days); Aquatic; Fish</p> <p>Hero ID: 18050</p>					
Domain	Metric	Rating [†]	MWF* [‡]	Score	Comments ^{††}
	Metric 14: Acclimatization and Pretreatment Conditions	Medium	× 1	2	Fish were maintained in the holding facilities for a minimum of 30 days prior to the initiation of the study. Minor uncertainties in the details provided.
	Metric 15: Number of Organisms and Replicates per Group	Medium	× 1	2	study started with 100 organisms per exposure group, and took fish out 5 fish on each sampling day. OECD recommends having enough to remove at least 4. Unsure the number of replicates.
	Metric 16: Adequacy of Test Conditions	Low	× 1	3	recommended temp for blue gill is 20-25 degrees C and this study was conducted at 16 degrees C which could have lowered metabolism in fish.
Domain 5: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	Low	× 2	6	BCFs and half-lives were reported for each of the chemicals. Assessment was not as sensitive as it should be for calculating a BCF - OECD recommends noting if both sexes are used, differences in growth and lipid content between sexes should be documented to be non-significant before the start of the exposure, in particular if it is anticipated that pooling of male and female fish will be necessary to ensure detectable substance concentrations and/or lipid content. This was not noted.
	Metric 18: Consistency of Outcome Assessment	Medium	× 1	2	incomplete reporting of minor details of outcome assessment protocol execution
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	Low	× 2	6	OECD recommends noting if both sexes are used, differences in growth and lipid content between sexes should be documented to be non-significant before the start of the exposure, in particular if it is anticipated that pooling of male and female fish will be necessary to ensure detectable substance concentrations and/or lipid content. This was not noted.
	Metric 20: Outcomes Unrelated to Exposure	Medium	× 1	2	data on attrition and health outcomes unrelated to exposure were not reported for each study group.
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	
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Study Citation: Barrows, M. E., Petrocelli, S. R., Macek, K. J., Carroll, J. J., 1980. Bioconcentration and elimination of selected water pollutants by bluegill sunfish (*Lepomis macrochirus*).
 Data Type: Chronic (>21 days); Aquatic; Fish
 Hero ID: 18050

Domain	Metric	Rating†	MWF*	Score	Comments††
Metric 22:	Reporting of Data	Medium	× 2	4	Not all regressions, lipid content, and weights were reported, but BCFs and half lives were reported for all chemicals.
Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination‡		Medium		1.7	
Extracted		No			

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Buccafusco, R. J., Ells, S. J., Leblanc, G. A., 1981. Acute toxicity of priority pollutants to bluegill (*Lepomis macrochirus*). Bulletin of Environmental Contamination and Toxicology 26:446-452
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 18064

Domain	Metric	Rating [†]	MWF*	Score
Domain 1: Test Substance				
Metric 1:	Test Substance Identity	High	× 2	2
Metric 2:	Test Substance Source	Low	× 1	3
Metric 3:	Test Substance Purity	Low	× 1	3
Domain 2: Test Design				
Metric 4:	Negative Controls	High	× 2	2
Metric 5:	Negative Control Response	N/A	many chemicals tested and do not give details about negative control response, although	
Metric 6:	Randomized Allocation	High	× 1	1
Domain 3: Exposure Characterization				
Metric 7:	Experimental System/Test Media Preparation	Medium	× 2	4
Metric 8:	Consistency of Exposure Administration	High	× 1	1
Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3
Metric 10:	Exposure Duration and Frequency	High	× 2	2
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3
Metric 12:	Testing at or Below Solubility Limit	Low	× 1	3

Domain 4: Test Organism

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INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation: Buccafusco, R. J.,Ells, S. J.,Leblanc, G. A.. 1981. Acute toxicity of priority pollutants to bluegill (*Lepomis macrochirus*). Bulletin of Environmental Contamination and Toxicology 26:446-452
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 18064

Domain	Metric	Rating [†]	MWF*	Score
	Metric 13: Test Organism Characteristics	Medium	× 2	4
	Metric 14: Acclimitization and Pretreatment Conditions	Medium	× 1	2
	Metric 15: Number of Organisms and Replicates per Group	Medium	× 1	2
	Metric 16: Adequacy of Test Conditions	Medium	× 1	2
Domain 5: Outcome Assessment				
	Metric 17: Outcome Assessment Methodology	High	× 2	2
	Metric 18: Consistency of Outcome Assessment	High	× 1	1
Domain 6: Confounding / Variable Control				
	Metric 19: Confounding Variables in Test Design and Procedures	Low	× 2	6
	Metric 20: Outcomes Unrelated to Exposure	Low	× 1	3
Domain 7: Data Presentation and Analysis				
	Metric 21: Statistical Methods	Medium	× 1	2

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation: Buccafusco, R. J., Ells, S. J., Leblanc, G. A., 1981. Acute toxicity of priority pollutants to bluegill (*Lepomis macrochirus*). Bulletin of Environmental Contamination and Toxicology 26:446-452
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 18064

Domain	Metric	Rating [†]	MWF*	Score
	Metric 22: Reporting of Data	Low	× 2	6
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1
Overall Quality Determination [‡]				2.0
Extracted				Yes

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{otherwise (round to the nearest tenth)} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the adjusted rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Heitmuller, P. T., Hollister, T. A., Parrish, P. R.. 1981. Acute toxicity of 54 industrial chemicals to sheepshead minnows (*Cyprinodon variegatus*). Bulletin of Environmental Contamination and Toxicology 27:596-604
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 18110

Domain	Metric	Rating ^f	MWF* ^g	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	Medium	× 1	2	Unspecified chemical supply companies, analytical grade with >=80 percent purity.
Metric 3:	Test Substance Purity	Medium	× 1	2	>=80 percent purity.
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	Indicated test not acceptable if control mortality exceeded 10 percent
Metric 6:	Randomized Allocation	Low	× 1	3	Randomized allocation not indicated.
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	Unacceptable	× 2	8	Static system, did not take measures to control volatilization of Perc and no analytical monitoring.
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Unacceptable	× 1	4	No analytical monitoring; Nominal concentrations used and Perc is volatile.
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	Test concentrations determined after range-finding test were not reported.
Metric 12:	Testing at or Below Solubility Limit	Low	× 1	3	Not specified so uncertain.
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					

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Study Citation: Heitmuller, P. T., Hollister, T. A., Parrish, P. R., 1981. Acute toxicity of 54 industrial chemicals to sheepshead minnows (*Cyprinodon variegatus*). Bulletin of Environmental Contamination and Toxicology 27:596-604
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 18110

Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
Domain 6: Confounding / Variable Control	Metric 17: Outcome Assessment Methodology	High	× 2	2
	Metric 18: Consistency of Outcome Assessment	High	× 1	1
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2
Domain 7: Data Presentation and Analysis	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1
Domain 7: Data Presentation and Analysis	Metric 21: Statistical Methods	High	× 1	1
	Metric 22: Reporting of Data	Medium	× 2	4
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1

Overall Quality Determination[‡] Unacceptable 4.0 Metric mean score^{**}: 1.6.
 Extracted No

** Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, two of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

<p>Study Citation: Geiger, D. L., Northcott, C. E., Call, D. J., Brooke, L. T. eds. 1985. Acute toxicities of organic chemicals to fathead minnows (Pimephales promelas): volume II.</p> <p>Data Type: Acute (0-96 hour); Aquatic; Fish</p> <p>Hero ID: 32169</p>					
Domain	Metric	Rating [†]	MWF* [†]	Score	Comments ^{††}
<p>Domain 1: Test Substance</p>					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
<p>Domain 2: Test Design</p>					
Metric 4:	Negative Controls	Medium	× 2	4	2 controls reported. Unsure what kind (water, solvent?)
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	High	× 1	1	
<p>Domain 3: Exposure Characterization</p>					
Metric 7:	Experimental System/Test Media Preparation	Medium	× 2	4	flow through system used using cycling proportional diluters with duplicate tanks for each test conc. It's unclear exactly what system was used for Perc because the description at the beginning of the paper is non-specific. It seems like the following system was used: The electronic diluter was used for expensive and volatile chemicals or when acute toxicity was very close to water solubility. Another form of a liquid diluider was constructed from a 2.8 L culture flask atop a magnetic stirrer. A pump forced lake water into this closed system which contained a layer of the chemical.
Metric 8:	Consistency of Exposure Administration	Medium	× 1	2	details of exposure administration was reported but it's unclear what type of administration applies to what chemicals
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
<p>Continued on next page . . .</p>					

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Study Citation: Geiger, D. L., Northcott, C. E., Call, D. J., Brooke, L. T. eds. 1985. Acute toxicities of organic chemicals to fathead minnows (Pimephales promelas): volume II.
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 32169

Domain	Metric	Rating [†]	MWP* [‡]	Score	Comments ^{††}
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	only minor uncertainties. Study reports, "Fat-head minnows used in the tests were cultured at the U.S. EPA Environmental Research Laboratory-Duluth and the University of Wisconsin-Superior campus. Adults were held at 25°C in flowing water with a 16 hr light-controlled photo-period and fed frozen adult brine shrimp (Artemia sp.). They were provided with asbestos pipes (cut in half longitudinally) as spawning substrates, where naturally spawned and fertilized embryos attached to the underside. The substrates, with intact embryos, were removed daily and placed in another 25C bath where hatching occurred; however the spawning substrates were removed just prior to hatching at the UW-Superior culture unit, then placed in a rearing bath. For tests conducted in 1977-1982, newly hatched larvae from the stock culture unit were reared in a system similar to the exposure systems at a temperature of 25C. Tests conducted following 1982 used fish that had been reared in flow-through tanks in the lab 1s culture unit. Larvae were fed 40-48 hr old brine shrimp nauplii (Bio-Marine Research, Inc., Hawthorne, CA) in excess two times daily (once on week-end days). Embryos and larvae were cultured in water from the same source as used in the exposures to the test chemicals. Fish that were approximately 28-34 days old were used in the toxicity tests." It's ok to have asbestos pipes for spawning purposes. number of test organisms was not reported for studies prior to 1982. the Perc test was in 1979. Only minor uncertainties. the temperature is appropriate for fathead minnows according to OECD guidelines.
Metric 14:	Acclimatization and Pretreatment Conditions	Medium	× 1	2	
Metric 15:	Number of Organisms and Replicates per Group	Medium	× 1	2	
Metric 16:	Adequacy of Test Conditions	Medium	× 1	2	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	

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Study Citation: Geiger, D. L., Northcott, C. E., Call, D. J., Brooke, L. T. eds. 1985. Acute toxicities of organic chemicals to fathead minnows (Pimephales promelas): volume II.
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 32169

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 6: Confounding / Variable Control					
Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2		
Metric 20: Outcomes Unrelated to Exposure	Medium	× 1	2		data on attrition or health impacts unrelated to exposure were not reported for each study group, because only substantial differences among groups were noted.

Domain 7: Data Presentation and Analysis					
Metric 21: Statistical Methods	High	× 1	1		
Metric 22: Reporting of Data	High	× 2	2		
Metric 23: Explanation of Unexpected Outcomes	High	× 1	1		

Overall Quality Determination[‡] High 1.3

Extracted Yes

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† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right] & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:	Dietz, A. C., Schnoor, J. L.. 2001. Phytotoxicity of chlorinated aliphatics to hybrid poplar (<i>Populus deltoides</i> x <i>nigra</i> DN34). Environmental Toxicology and Chemistry 20:389-393				
Data Type:	Other; Terrestrial;				
Hero ID:	42313				
Domain	Metric	Rating ^f	MWF*	Score	Comments ^{f†}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	Low	× 1	3	Allocation not reported
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Analysis discussed, but measured values not reported
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
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Study Citation:	Dietz, A. C., Schnoor, J. L.. 2001. Phytotoxicity of chlorinated aliphatics to hybrid poplar (<i>Populus deltoides</i> x <i>nigra</i> DN34). Environmental Toxicology and Chemistry 20:389-393				
Data Type:	Other; Terrestrial;				
Hero ID:	42313				
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 6: Confounding / Variable Control	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Metric 19: Confounding Variables in Test Design and Procedures		High	× 2	2	
Metric 20: Outcomes Unrelated to Exposure		High	× 1	1	
Domain 7: Data Presentation and Analysis					
Metric 21: Statistical Methods		Low	× 1	3	method not reported
Metric 22: Reporting of Data		High	× 2	2	
Metric 23: Explanation of Unexpected Outcomes		High	× 1	1	
Overall Quality Determination [‡]		High		1.3	
Extracted		Yes			

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:	Sandhu, S. S., Ma, T. H., Peng, Y., Zhou, X., 1989. Clastogenicity evaluation of seven chemicals commonly found at hazardous industrial waste sites. DNA Repair 224:437-445				
Data Type:	Acute (0-96 hour); Terrestrial;				
Hero ID:	48608				
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	Low	× 1	3	Allocation not reported
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	Low	× 2	6	Refer to other publication
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Not measured
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimitization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	Low	× 1	3	Not reported
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	

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Study Citation: Sandhu, S. S., Ma, T. H., Peng, Y., Zhou, X., 1989. Clastogenicity evaluation of seven chemicals commonly found at hazardous industrial waste sites. DNA Repair 224:437-445
 Data Type: Acute (0-96 hour); Terrestrial;
 Hero ID: 48608

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Metric 18:	Consistency of Outcome Assessment	High × 1		1	
Domain 6: Confounding / Variable Control					
Metric 19:	Confounding Variables in Test Design and Procedures	High × 2		2	
Metric 20:	Outcomes Unrelated to Exposure	High × 1		1	
Domain 7: Data Presentation and Analysis					
Metric 21:	Statistical Methods	High × 1		1	
Metric 22:	Reporting of Data	High × 2		2	
Metric 23:	Explanation of Unexpected Outcomes	High × 1		1	
Overall Quality Determination [‡]		High → Unacceptable		1.4	Tetrachloroethylene is tested with the Tradescantia-Micronucleus(Trad- MCN) assay to evaluate their clastogenic potential.
Extracted		No			

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Domain	Metric	Rating†	MWF* Score	Comments††
Study Citation: Alexander, H. C., McCarty, W. M., Bartlett, E. A.. 1978. Toxicity of perchloroethylene, trichloroethylene, 1,1,1-trichloroethane, and methylene chloride to fathead minnows. Bulletin of Environmental Contamination and Toxicology 20:344-352 Data Type: Acute (0-96 hour); Aquatic; Fish Hero ID: 58126				
Domain 1: Test Substance				
Metric 1:	Test Substance Identity	High	× 2	2
Metric 2:	Test Substance Source	High	× 1	1
Metric 3:	Test Substance Purity	Low	× 1	3
PERC and TCE are DOW commercial products; no info on DCM				
Domain 2: Test Design				
Metric 4:	Negative Controls	High	× 2	2
Metric 5:	Negative Control Response	High	× 1	1
Metric 6:	Randomized Allocation	High	× 1	1
Domain 3: Exposure Characterization				
Metric 7:	Experimental System/Test Media Preparation	Medium	× 2	4
Metric 8:	Consistency of Exposure Administration	High	× 1	1
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1
Metric 10:	Exposure Duration and Frequency	High	× 2	2
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1
Domain 4: Test Organism				
Metric 13:	Test Organism Characteristics	High	× 2	2
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1
Metric 16:	Adequacy of Test Conditions	High	× 1	1
Domain 5: Outcome Assessment				
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Study Citation:	Alexander, H. C., McCarty, W. M., Bartlett, E. A., 1978. Toxicity of perchloroethylene, trichloroethylene, 1,1,1-trichloroethane, and methylene chloride to fathead minnows. Bulletin of Environmental Contamination and Toxicology 20:344-352			
Data Type:	Acute (0-96 hour); Aquatic; Fish			
Hero ID:	58126			
Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
Metric 17:	Outcome Assessment Methodology	High	× 2	2
Metric 18:	Consistency of Outcome Assessment	High	× 1	1
Domain 6: Confounding / Variable Control				
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2
Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1
Domain 7: Data Presentation and Analysis				
Metric 21:	Statistical Methods	High	× 1	1
Metric 22:	Reporting of Data	High	× 2	2
Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1
Overall Quality Determination [‡]		High		1.1
Extracted		Yes		

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Domain	Metric	Rating [†]	MWF* [‡]	Score	Comments ^{††}
Study Citation: Bernard, A. M., de Russis, R., Normand, J. C., Lauwerys, R. R., 1989. Evaluation of the subacute nephrotoxicity of cyclohexane and other industrial solvents in the female Sprague-Dawley rat. <i>Toxicology Letters</i> 45:271-280					
Data Type: Other; Terrestrial;					
Hero ID: 64580					
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	Low	× 1	3	source and lot numbers not reported
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	Low	× 1	3	allocation not reported
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	measured
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	one concentration
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	Medium	× 2	4	source not reported
Metric 14:	Acclimatization and Pretreatment Conditions	Low	× 1	3	acclimation not reported
Metric 15:	Number of Organisms and Replicates per Group	Medium	× 1	2	number organisms reported, replicates not reported
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	

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Study Citation: Bernard, A. M., de Russis, R., Normand, J. C., Lauweyrs, R. R., 1989. Evaluation of the subacute nephrotoxicity of cyclohexane and other industrial solvents in the female Sprague-Dawley rat. Toxicology Letters 45:271-280
 Data Type: Other; Terrestrial;
 Hero ID: 64580

Domain	Metric	Rating†	MWF*	Score	Comments††
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	High	× 2	2	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination‡		High		1.5	

Extracted

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Domain	Metric	Rating [†]	MWF* [‡]	Score	Comments ^{††}
Study Citation: Narotsky, M. G., Kavlock, R. J., 1995. A multidisciplinary approach to toxicological screening: II. Developmental toxicity. Journal of Toxicology and Environmental Health 45:145-171					
Data Type: Chronic (>21 days); Terrestrial;					
Hero ID: 76052					
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	Medium	× 1	2	Lot numbers not reported
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	not measured
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	Low	× 1	3	Acclimation not reported
Metric 15:	Number of Organisms and Replicates per Group	Medium	× 1	2	Number of organisms reported, replicated not reported
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	

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Study Citation: Narotsky, M. G., Kavlock, R. J., 1995. A multidisciplinary approach to toxicological screening: II. Developmental toxicity. Journal of Toxicology and Environmental Health 45:145-171
 Data Type: Chronic (>21 days); Terrestrial;
 Hero ID: 76052

Domain	Metric	Rating†	MWF*	Score	Comments††
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	High	× 2	2	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination‡		High		1.3	

Extracted

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Domain	Metric	Rating [†]	MWF* [‡]	Score	Comments ^{††}
Study Citation: Elovaara, E., Hemminki, K., Vainio, H., 1979. Effects of methylene chloride, trichloroethane, trichloroethylene, tetrachloroethylene and toluene on the development of chick embryos. Toxicology 12:111-119 Data Type: Other; Terrestrial; Hero ID: 94468					
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Medium	× 1	2	Unmeasured, egg injection 14 d study
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	Medium	× 1	2	Unmeasured, egg injection, 14 day study
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	

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Study Citation: Elovaara, E., Hemminki, K., Vainio, H., 1979. Effects of methylene chloride, trichloroethane, trichloroethylene, tetrachloroethylene and toluene on the development of chick embryos. Toxicology 12:111-119
Data Type: Other; Terrestrial;
Hero ID: 94468

Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
Metric 18:	Consistency of Outcome Assessment	High	× 1	1
Domain 6: Confounding / Variable Control				
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2
Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1
Domain 7: Data Presentation and Analysis				
Metric 21:	Statistical Methods	Low	× 1	3 Authors estimate LD50 values
Metric 22:	Reporting of Data	High	× 2	2
Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1
Overall Quality Determination [‡]		High	→	1.2
Extracted		Yes		

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:	Smith, A. D., Bharath, A., Mallard, C., Orr, D., Smith, K., Sutton, J. A., Vukmanich, J., McCarty, L. S., Ozburn, G. W.. 1991. The acute and chronic toxicity of ten chlorinated organic compounds to the American flagfish (<i>Jordanella floridae</i>). Archives of Environmental Contamination and Toxicology 20:94-102			
Data Type:	Acute (0-96 hour); Aquatic; Fish			
Hero ID:	95201			
Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
Domain 1: Test Substance				
Metric 1:	Test Substance Identity	High	× 2	2
Metric 2:	Test Substance Source	High	× 1	1
Metric 3:	Test Substance Purity	Low	× 1	3 purity not reported
Domain 2: Test Design				
Metric 4:	Negative Controls	High	× 2	2
Metric 5:	Negative Control Response	High	× 1	1
Metric 6:	Randomized Allocation	Low	× 1	3 Allocation not reported for Acute study
Domain 3: Exposure Characterization				
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2
Metric 8:	Consistency of Exposure Administration	High	× 1	1
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1
Metric 10:	Exposure Duration and Frequency	High	× 2	2
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1
Domain 4: Test Organism				
Metric 13:	Test Organism Characteristics	High	× 2	2
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1
Metric 16:	Adequacy of Test Conditions	High	× 1	1
Domain 5: Outcome Assessment				
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Study Citation: Smith, A. D., Bharath, A., Mallard, C., Orr, D., Smith, K., Sutton, J. A., Vukmanich, J., McCarty, L. S., Ozburn, G. W., 1991. The acute and chronic toxicity of ten chlorinated organic compounds to the American flagfish (*Jordanella floridae*). Archives of Environmental Contamination and Toxicology 20:94-102
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 95201

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 6: Confounding / Variable Control	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
	Domain 7: Data Presentation and Analysis				
Metric 21: Statistical Methods	High	× 1	1		
Metric 22: Reporting of Data	High	× 2	2		
Metric 23: Explanation of Unexpected Outcomes	High	× 1	1		

Overall Quality Determination[‡]

High 1.1

Extracted

Yes

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0,1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:	Sanchez-Fortun, S., Sanz, F., Santa-Maria, A., Ros, J. M., De Vicente, M. L., Encinas, M. T., Vinagre, E., Barahona, M. V., 1997. Acute sensitivity of three age classes of <i>Artemia salina</i> larvae to seven chlorinated solvents. <i>Bulletin of Environmental Contamination and Toxicology</i> 59:445-451				
Data Type:	Acute (0-96 hour); Aquatic; Invertebrates				
Hero ID:	200570				
Domain	Metric	Rating†	MWP*	Score	Comments††
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	Medium	× 1	2	Control response not reported but not expected to affect results. Typically multi-chemical tests will only report control results if significant (i.e. > 10 percent mortality)
Metric 6:	Randomized Allocation	Medium	× 1	2	Randomized allocation not explicitly stated, but method of allocation of organisms to study groups implies randomized selection: "For toxicity testing, samples of 10 larvae each were added to 1 mL of synthetic seawater in plastic 16-mm petri dishes containing..."
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	Low	× 2	6	Nominal concentrations used without steps to reduce volatilization of methylene chloride.
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Nominal concentrations with no analytical monitoring reduces confidence in study results for methylene chloride, but a trend is apparent when compared across the solvents tested that informs the relative toxicity of methylene chloride.
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	Study does not provide exposure concentrations, but paper indicates that "Each solvent concentration was set in sextuplicate" suggesting six exposure concentrations were used for methylene chloride. LC50/EC50s were determined indicating exposure concentrations sufficiently spaced.
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Study Citation:	Sanchez-Fortun, S., Sanz, F., Santa-Maria, A., Ros, J. M., De Vicente, M. L., Encinas, M. T., Vinagre, E., Barahona, M. V.. 1997. Acute sensitivity of three age classes of <i>Artemia salina</i> larvae to seven chlorinated solvents. Bulletin of Environmental Contamination and Toxicology 59:445-451			
Data Type:	Acute (0-96 hour); Aquatic; Invertebrates			
Hero ID:	200570			
Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
Domain 4: Test Organism	Metric 12: Testing at or Below Solubility Limit	High	× 1	1
Metric 13: Test Organism Characteristics		High	× 2	2
Metric 14: Acclimatization and Pretreatment Conditions		High	× 1	1
Metric 15: Number of Organisms and Replicates per Group		High	× 1	1
Metric 16: Adequacy of Test Conditions		High	× 1	1
Domain 5: Outcome Assessment	Metric 17: Outcome Assessment Methodology	High	× 2	2
Metric 18: Consistency of Outcome Assessment		High	× 1	1
Domain 6: Confounding / Variable Control	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2
Metric 20: Outcomes Unrelated to Exposure		Medium	× 1	2
				Health outcomes unrelated to exposure (i.e. controls) not reported, but not expected to affect interpretation of results.
Domain 7: Data Presentation and Analysis	Metric 21: Statistical Methods	High	× 1	1
Metric 22: Reporting of Data		Medium	× 2	4
Metric 23: Explanation of Unexpected Outcomes		High	× 1	1
Overall Quality Determination [‡]		High	→ Low	1.5
				Nominal concentrations without analytical measurement or measures to reduce volatilization of methylene chloride during testing.
Extracted		Yes		
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Study Citation: Sanchez-Fortun, S., Sanz, F., Santa-Maria, A., Ros, J. M., De Vicente, M. L., Encinas, M. T., Vinagre, E., Barahona, M. V., 1997. Acute sensitivity of three age classes of *Artemia salina* larvae to seven chlorinated solvents. Bulletin of Environmental Contamination and Toxicology 59:445-451

Data Type: Acute (0-96 hour); Aquatic; Invertebrates

Hero ID: 200570

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
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* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Domain	Metric	Rating [†]	MWF* [‡]	Score	Comments ^{††}
Study Citation: Valencia, R., Mason, J. M., Woodruff, R. C., Zimmering, S., 1985. Chemical mutagenesis testing in <i>Drosophila</i> . III. Results of 48 coded compounds tested for the National Toxicology Program. Environmental Mutagenesis 7:325-348 Data Type: Acute (0-96 hour); Terrestrial; Hero ID: 629907					
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	N/A			
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	Low	× 2	6	Allocation not reported
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Not measured
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	1 Concentration
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	Medium	× 1	2	Number of organisms reported but not the number of replicates.
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	

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Study Citation:	Valencia, R., Mason, J. M., Woodruff, R. C., Zimmering, S., 1985. Chemical mutagenesis testing in Drosophila. III. Results of 48 coded compounds tested for the National Toxicology Program. Environmental Mutagenesis 7:325-348			
Data Type:	Acute (0-96 hour); Terrestrial;			
Hero ID:	629907			
Domain	Metric	Rating[†]	MWF* Score	Comments^{††}
Domain 6: Confounding / Variable Control	Metric 18: Consistency of Outcome Assessment	High	× 1	1
Metric 19: Confounding Variables in Test Design and Procedures		High	× 2	2
Metric 20: Outcomes Unrelated to Exposure		High	× 1	1
Domain 7: Data Presentation and Analysis	Metric 21: Statistical Methods	High	× 1	1
Metric 22: Reporting of Data		High	× 2	2
Metric 23: Explanation of Unexpected Outcomes		High	× 1	1
Overall Quality Determination [‡]		High		1.4
Extracted		Yes		

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Spencer, H. B., Hussein, W. R., Tchounwou, P. B., 2002. Effects of tetrachloroethylene on the viability and development of embryos of the Japanese medaka, *Oryzias latipes*. Archives of Environmental Contamination and Toxicology 42:463-469
 Data Type: Other; Aquatic; Fish
 Hero ID: 632863

Domain	Metric	Rating†	MWF*
Domain 1: Test Substance			
Metric 1:	Test Substance Identity	High	× 2
Metric 2:	Test Substance Source	High	× 1
Metric 3:	Test Substance Purity	High	× 1
Domain 2: Test Design			
Metric 4:	Negative Controls	High	× 2
Metric 5:	Negative Control Response	N/A	
Metric 6:	Randomized Allocation	High	× 1
Domain 3: Exposure Characterization			
Metric 7:	Experimental System/Test Media Preparation	High	× 2
Metric 8:	Consistency of Exposure Administration	High	× 1
Metric 9:	Measurement of Test Substance Concentration	High	× 1
Metric 10:	Exposure Duration and Frequency	High	× 2
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1
Metric 12:	Testing at or Below Solubility Limit	N/A	
Domain 4: Test Organism			
Metric 13:	Test Organism Characteristics	N/A	
Metric 14:	Acclimatization and Pretreatment Conditions	N/A	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1
Metric 16:	Adequacy of Test Conditions	N/A	

In this study, static renewal bioassays were performed to assess the acute toxicity of tetrachloroethylene in zebrafish embryos. Twenty embryos (three replicates) were used per treatment group.

† High (three replicates)

* MWF* (three replicates)

Continued on next page . . .

Study Citation: Spencer, H. B., Hussein, W. R., Tchounwou, P. B., 2002. Effects of tetrachloroethylene on the viability and development of embryos of the Japanese medaka, *Oryzias latipes*. Archives of Environmental Contamination and Toxicology 42:463-469

Data Type: Other; Aquatic; Fish
 Hero ID: 632863

Domain	Metric	Rating [†]	MWF*
Domain 5: Outcome Assessment			
Metric 17:	Outcome Assessment Methodology	N/A	In this study, static renewal bioassays were performed to assess the acute toxicity
Metric 18:	Consistency of Outcome Assessment	N/A	In this study, static renewal bioassays were performed to assess the acute toxicity
Domain 6: Confounding / Variable Control			
Metric 19:	Confounding Variables in Test Design and Procedures	N/A	In this study, static renewal bioassays were performed to assess the acute toxicity
Metric 20:	Outcomes Unrelated to Exposure	N/A	In this study, static renewal bioassays were performed to assess the acute toxicity
Domain 7: Data Presentation and Analysis			
Metric 21:	Statistical Methods	N/A	In this study, static renewal bioassays were performed to assess the acute toxicity
Metric 22:	Reporting of Data	N/A	In this study, static renewal bioassays were performed to assess the acute toxicity
Metric 23:	Explanation of Unexpected Outcomes	N/A	In this study, static renewal bioassays were performed to assess the acute toxicity

Overall Quality Determination[‡]

High → Unacceptable

Extracted

No

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \left\{ \sum_i^4 (\text{Metric Score}_i \times M_i) \right.$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the adjusted rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

<p>Study Citation: Spencer, H. B., Hussein, W. R., Tchounwou, P. B., 2002. Effects of tetrachloroethylene on the viability and development of embryos of the Japanese medaka, <i>Oryzias latipes</i>. Archives of Environmental Contamination and Toxicology 42:463-469</p> <p>Data Type: Acute (0-96 hour); Aquatic; Fish</p> <p>Hero ID: 632863</p>					
Domain	Metric	Rating ^f	MWF*	Score	Comments ^{f†}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
<p>Continued on next page ...</p>					

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Study Citation:	Spencer, H. B., Hussein, W. R., Tchounwou, P. B., 2002. Effects of tetrachloroethylene on the viability and development of embryos of the Japanese medaka, <i>Oryzias latipes</i> . Archives of Environmental Contamination and Toxicology 42:463-469				
Data Type:	Acute (0-96 hour); Aquatic; Fish				
Hero ID:	632863				
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 6: Confounding / Variable Control	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Metric 19: Confounding Variables in Test Design and Procedures		High	× 2	2	
Metric 20: Outcomes Unrelated to Exposure		High	× 1	1	
Domain 7: Data Presentation and Analysis	Metric 21: Statistical Methods	High	× 1	1	
Metric 22: Reporting of Data		High	× 2	2	
Metric 23: Explanation of Unexpected Outcomes		High	× 1	1	
Overall Quality Determination [‡]		High		1.0	
Extracted		Yes			

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Spencer, H. B., Hussein, W. R., Tchounwou, P. B., 2006. Growth inhibition in Japanese medaka (*Oryzias latipes*) fish exposed to tetrachloroethylene. *Journal of Environmental Biology* 27
 Data Type: Other; Aquatic; Fish
 Hero ID: 632864

Domain	Metric	Rating ^f	MWF* Score	Comments ^{††}
Domain 1: Test Substance				
Metric 1:	Test Substance Identity	High	× 2 2	
Metric 2:	Test Substance Source	High	× 1 1	
Metric 3:	Test Substance Purity	High	× 1 1	
Domain 2: Test Design				
Metric 4:	Negative Controls	High	× 2 2	
Metric 5:	Negative Control Response	High	× 1 1	
Metric 6:	Randomized Allocation	N/A	N/A	No information
Domain 3: Exposure Characterization				
Metric 7:	Experimental System/Test Media Preparation	High	× 2 2	
Metric 8:	Consistency of Exposure Administration	High	× 1 1	
Metric 9:	Measurement of Test Substance Concentration	High	× 1 1	
Metric 10:	Exposure Duration and Frequency	High	× 2 2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Unacceptable	× 1 4	Larvae were exposed for a time period of 96 hrs at a concentration of 1 Oppm to determine tetrachloroethylene effects on growth rate and total protein in different age groups.. Weight and length of medaka larva at 7, 14, 21, and 28 days old were measured to determine the effects of tetrachloroethylene on larval growth.
Metric 12:	Testing at or Below Solubility Limit	N/A	N/A	No information
Domain 4: Test Organism				
Metric 13:	Test Organism Characteristics	High	× 2 2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1 1	
Metric 15:	Number of Organisms and Replicates per Group	N/A	N/A	No information

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Study Citation:	Spencer, H. B., Hussein, W. R., Tchounwou, P. B., 2006. Growth inhibition in Japanese medaka (<i>Oryzias latipes</i>) fish exposed to tetrachloroethylene. <i>Journal of Environmental Biology</i> 27				
Data Type:	Other; Aquatic; Fish				
Hero ID:	632864				
Domain	Metric	Rating [†]	MWP* [‡]	Score	Comments ^{††}
Metric 16:	Adequacy of Test Conditions	N/A		N/A	No information
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	N/A		N/A	Study was conducted to determine tetrachloroethylene effects on growth and age specific sensitivity of medaka larvae at ages 7, 14, 21, and 28 day-old.
Metric 18:	Consistency of Outcome Assessment	N/A		N/A	Study was conducted to determine tetrachloroethylene effects on growth and age specific sensitivity of medaka larvae at ages 7, 14, 21, and 28 day-old.
Domain 6: Confounding / Variable Control					
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2	
Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					
Metric 21:	Statistical Methods	N/A		N/A	Study was conducted to determine tetrachloroethylene effects on growth and age specific sensitivity of medaka larvae at ages 7, 14, 21, and 28 day-old.
Metric 22:	Reporting of Data	N/A		N/A	Study was conducted to determine tetrachloroethylene effects on growth and age specific sensitivity of medaka larvae at ages 7, 14, 21, and 28 day-old.
Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		Unacceptable		4.0	Metric mean score ^{**} : 1.1.
Extracted		No			
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Study Citation: Spencer, H. B., Hussein, W. R., Tchounwou, P. B., 2006. Growth inhibition in Japanese medaka (*Oryzias latipes*) fish exposed to tetrachloroethylene. *Journal of Environmental Biology* 27
 Data Type: Other; Aquatic; Fish
 Hero ID: 632864

Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
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** Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

†† The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

<p>Study Citation: Spencer, H. B., Hussein, W. R., Tchounwou, P. B., 2006. Growth inhibition in Japanese medaka (<i>Oryzias latipes</i>) fish exposed to tetrachloroethylene. <i>Journal of Environmental Biology</i> 27</p> <p>Data Type: Acute (0-96 hour); Aquatic; Fish</p> <p>Hero ID: 632864</p>					
Domain	Metric	Rating ^f	MWF*	Score	Comments ^{f†}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
<p>Continued on next page ...</p>					

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Study Citation:	Spencer, H. B., Hussein, W. R., Tchounwou, P. B.. 2006. Growth inhibition in Japanese medaka (<i>Oryzias latipes</i>) fish exposed to tetrachloroethylene. <i>Journal of Environmental Biology</i> 27				
Data Type:	Acute (0-96 hour); Aquatic; Fish				
Hero ID:	632864				
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 6: Confounding / Variable Control	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Metric 19: Confounding Variables in Test Design and Procedures		High	× 2	2	
Metric 20: Outcomes Unrelated to Exposure		High	× 1	1	
Domain 7: Data Presentation and Analysis	Metric 21: Statistical Methods	High	× 1	1	
Metric 22: Reporting of Data		High	× 2	2	
Metric 23: Explanation of Unexpected Outcomes		High	× 1	1	
Overall Quality Determination [‡]		High		1.0	
Extracted		Yes			

* MWF = Metric Weighting Factor

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where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

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<p>Study Citation: Crebelli, R., Andreoli, C., Carere, A., Conti, L., Crochi, B., Cotta-Ramusino, M., Benigni, R., 1995. Toxicology of halogenated aliphatic hydrocarbons: Structural and molecular determinants for the disturbance of chromosome segregation and the induction of lipid peroxidation. <i>Chemico-Biological Interactions</i> 98:113-129</p> <p>Data Type: Acute (0-96 hour); Terrestrial;</p> <p>Hero ID: 657898</p>					
Domain	Metric	Rating [†]	MWF* [‡]	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	Low	× 1	3	Allocation not reported
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Not measured
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	Low	× 1	3	Acclimation not reported
Metric 15:	Number of Organisms and Replicates per Group	Low	× 1	3	Not reported
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Continued on next page ...					

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<p>Study Citation: Crebelli, R., Andreoli, C., Carere, A., Conti, L., Crochi, B., Cotta-Ramusino, M., Benigni, R.. 1995. Toxicology of halogenated aliphatic hydrocarbons: Structural and molecular determinants for the disturbance of chromosome segregation and the induction of lipid peroxidation. <i>Chemico-Biological Interactions</i> 98:113-129</p> <p>Data Type: Acute (0-96 hour); Terrestrial;</p> <p>Hero ID: 657898</p>	<table border="1"> <thead> <tr> <th>Domain</th> <th>Metric</th> <th>Rating[†]</th> <th>MWF*</th> <th>Score</th> <th>Comments^{††}</th> </tr> </thead> <tbody> <tr> <td rowspan="3">Domain 6: Confounding / Variable Control</td> <td>Metric 17: Outcome Assessment Methodology</td> <td>High</td> <td>× 2</td> <td>2</td> <td></td> </tr> <tr> <td>Metric 18: Consistency of Outcome Assessment</td> <td>High</td> <td>× 1</td> <td>1</td> <td></td> </tr> <tr> <td>Metric 19: Confounding Variables in Test Design and Procedures</td> <td>High</td> <td>× 2</td> <td>2</td> <td></td> </tr> <tr> <td rowspan="3">Domain 7: Data Presentation and Analysis</td> <td>Metric 20: Outcomes Unrelated to Exposure</td> <td>High</td> <td>× 1</td> <td>1</td> <td></td> </tr> <tr> <td>Metric 21: Statistical Methods</td> <td>High</td> <td>× 1</td> <td>1</td> <td></td> </tr> <tr> <td>Metric 22: Reporting of Data</td> <td>High</td> <td>× 2</td> <td>2</td> <td></td> </tr> <tr> <td></td> <td>Metric 23: Explanation of Unexpected Outcomes</td> <td>High</td> <td>× 1</td> <td>1</td> <td></td> </tr> <tr> <td colspan="5">Overall Quality Determination[‡]</td> <td>High</td> <td>1.3</td> </tr> <tr> <td colspan="5">Extracted</td> <td>Yes</td> <td></td> </tr> </tbody> </table>	Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}	Domain 6: Confounding / Variable Control	Metric 17: Outcome Assessment Methodology	High	× 2	2		Metric 18: Consistency of Outcome Assessment	High	× 1	1		Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2		Domain 7: Data Presentation and Analysis	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1		Metric 21: Statistical Methods	High	× 1	1		Metric 22: Reporting of Data	High	× 2	2			Metric 23: Explanation of Unexpected Outcomes	High	× 1	1		Overall Quality Determination [‡]					High	1.3	Extracted					Yes	
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}																																																						
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Study Citation:	Hulzebos, E. M., Adema, D. M., Dirven-Van Breemen, E. M., Henzen, L., Van Dis, W. A., Herbold, H. A., Hoekstra, J. A., Baerselman, R., Van Gestel, C. A. 1993. Phytotoxicity studies with <i>Lactuca sativa</i> in soil and nutrient solution. Environmental Toxicology and Chemistry 12:1079-1094				
Data Type:	Other; Terrestrial;				
Hero ID:	660091				
Domain	Metric	Rating†	MWP*	Score	Comments††
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	Low	× 1	3	Allocation not reported
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Not measured
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	Low	× 1	3	Acclimation/Pretreatment not reported
Metric 15:	Number of Organisms and Replicates per Group	Medium	× 1	2	Number of organisms reported but not replicates.
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
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Study Citation:	Hulzebos, E. M., Adema, D. M., Dirven-Van Breemen, E. M., Henzen, L., Van Dis, W. A., Herbold, H. A., Hoekstra, J. A., Baerselman, R., Van Gestel, C. A.. 1993. Phytotoxicity studies with <i>Lactuca sativa</i> in soil and nutrient solution. Environmental Toxicology and Chemistry 12:1079-1094			
Data Type:	Other; Terrestrial;			
Hero ID:	660091			
Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
	Metric 17: Outcome Assessment Methodology	High	× 2	2
	Metric 18: Consistency of Outcome Assessment	High	× 1	1
Domain 6: Confounding / Variable Control				
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1
Domain 7: Data Presentation and Analysis				
	Metric 21: Statistical Methods	High	× 1	1
	Metric 22: Reporting of Data	High	× 2	2
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1
Overall Quality Determination [‡]		High		1.3
Extracted		Yes		

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‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right]_{0,1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Brack, W., Frank, H.. 1998. Chlorophyll a fluorescence: A tool for the investigation of toxic effects in the photosynthetic apparatus. *Ecotoxicology and Environmental Safety* 40:34-41
 Data Type: Acute (0-96 hour); Aquatic; Plants
 Hero ID: 660790

Domain	Metric	Rating [†]	MWF* [‡]	Score	Comments ^{††}
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	Low	× 1	3	source not identified
	Metric 3: Test Substance Purity	Low	× 1	3	purity not reported
Domain 2: Test Design	Metric 4: Negative Controls	High	× 2	2	
	Metric 5: Negative Control Response	Low	× 1	3	control response for each test group not reported.
	Metric 6: Randomized Allocation	Low	× 1	3	it was not reported whether there was random allocation to test groups
Domain 3: Exposure Characterization	Metric 7: Experimental System/Test Media Preparation	High	× 2	2	
	Metric 8: Consistency of Exposure Administration	Low	× 1	3	details of exposure for each study group were not reported. the study did say that "Aliquots of 5mL of the cell suspension were taken from the turbidostat and diluted in 10-mL brown glass tubes with the same volume of an aqueous solution of the chemical being tested. The tubes were gas-tight sealed by using screw caps with Teflon-lined butyl rubber septa and continuously shaken for 2 h at a temperature of 20° C. With this procedure, nonvolatile and volatile compounds could be tested. During incubation, light was excluded to prevent CO2 consumption by the algae and to avoid CO2 deficiency during incubation."
	Metric 9: Measurement of Test Substance Concentration	Low	× 1	3	it was not reported whether exposure concentration were measured or not.
Metric 10:	Exposure Duration and Frequency	Medium	× 2	4	exposure duration is not standard (600 seconds), but could be acceptable for what is being measured (fluorescence).
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	Unacceptable	× 1	4	unclear how many exposure groups or what the exposure levels were for Perc.

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Study Citation: Brack, W., Frank, H.. 1998. Chlorophyll a fluorescence: A tool for the investigation of toxic effects in the photosynthetic apparatus. Ecotoxicology and Environmental Safety 40:34-41

Data Type: Acute (0-96 hour); Aquatic; Plants

Hero ID: 660790

Domain	Metric	Rating [†]	MWP* [‡]	Score	Comments ^{††}
	Metric 12: Testing at or Below Solubility Limit	Low	× 1	3	unknown exactly what conc were tested but the toxicity threshold is well below the high solubility of Perc.
Domain 4: Test Organism					
	Metric 13: Test Organism Characteristics	High	× 2	2	
	Metric 14: Acclimatization and Pretreatment Conditions	Medium	× 1	2	Some acclimatization conducted with some minor uncertainties about pretreatment. The study says, "Green algae of the species Chlamydomonas reinhardtii [strain 11-32a SAG(#)], according to Schlosser (1982)] were cultivated in a nutrient solution for unicellular algae (Kuhl and Lorenzen, 1964) in a turbidostat; use of the turbidostat provides experimentally growing cell suspensions of a constant density and physiological state by dilution with fresh medium controlled by a photoelectric cell. The algae were illuminated continuously by four cool white fluorescent tubes (4)10 W aerated, and maintained at a temperature of 20°C. The cultures were kept at a density of 2]106 cells/mL for 2 weeks. The doubling time in the turbidostat was about 13 h."
	Metric 15: Number of Organisms and Replicates per Group	Low	× 1	3	not reported
	Metric 16: Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	Medium	× 2	4	for Perc a 600 second EC5 was reported of 13 (F0/F0)
	Metric 18: Consistency of Outcome Assessment	Low	× 1	3	details of the assessment protocol were not reported for each study group
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	Low	× 2	6	not enough information provided to allow a comparison of env conditions between study groups for Perc.

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Study Citation: Brack, W., Frank, H.. 1998. Chlorophyll a fluorescence: A tool for the investigation of toxic effects in the photosynthetic apparatus. *Ecotoxicology and Environmental Safety* 40:34-41

Data Type: Acute (0-96 hour); Aquatic; Plants

Hero ID: 660790

Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
Metric 20:	Outcomes Unrelated to Exposure	Medium	× 1	2
				Data on attrition from controls were not reported for each chemical explicitly but it was mentioned that the test concentrations were cored to the controls. *Toxicity thresholds (TTs) are defined as concentrations that reduce or increase at least one of the Fluorescence parameters for more than the three-fold value of the maximum of standard deviations of the controls. A TT is attained when the measurement deviates by 3, 5, 10, or 20 percent from the respective control value, depending on the reproducibility of the particular parameter. The TTs of the tested chemicals, calculated by linear extrapolation between the highest concentration without significant effect and the lowest concentration with it, are presented in Table 3."

Domain 7: Data Presentation and Analysis

Metric 21: Statistical Methods

Metric 22: Reporting of Data

Metric 23: Explanation of Unexpected Outcomes

High	× 1	1
Low	× 2	6
High	× 1	1

the EC5 was reported to Perc but not much other detail was reported.

Overall Quality Determination[†]

Unacceptable 4.0 Metric mean score**: 2.1.

Extracted

No

** Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Brack, W., Rottler, H.. 1994. Toxicity testing of highly volatile chemicals with green algae: A new assay. 1:223-228
 Data Type: Acute (0-96 hour); Aquatic; Plants
 Hero ID: 661061

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	High	× 1	1	
	Metric 3: Test Substance Purity	High	× 1	1	
Domain 2: Test Design	Metric 4: Negative Controls	High	× 2	2	
	Metric 5: Negative Control Response	Low	× 1	3	The biological responses of the negative control groups were not reported
	Metric 6: Randomized Allocation	Low	× 1	3	Was not reported.
Domain 3: Exposure Characterization	Metric 7: Experimental System/Test Media Preparation	High	× 2	2	
	Metric 8: Consistency of Exposure Administration	High	× 1	1	
	Metric 9: Measurement of Test Substance Concentration	High	× 1	1	
	Metric 10: Exposure Duration and Frequency	High	× 2	2	
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
	Metric 12: Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism	Metric 13: Test Organism Characteristics	Medium	× 2	4	This is not a commonly used algal species. Not a TG species. Test used unicellular freshwater green alga Chlamydomonas rethardtii (strain number 11 -32a SAG} from the University of Gottingen, Germany.
	Metric 14: Acclimatization and Pretreatment Conditions	High	× 1	1	

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Study Citation: Brack, W., Rottler, H.. 1994. Toxicity testing of highly volatile chemicals with green algae: A new assay. 1:223-228
 Data Type: Acute (0-96 hour); Aquatic; Plants
 Hero ID: 661061

Domain	Metric	Rating [†]	MWF* [‡]	Score	Comments ^{††}
	Metric 15: Number of Organisms and Replicates per Group	Medium	× 1	2	Two replicates per test concentration were reported. OECD Guideline 201 states the test should include three replicates, but if determination of a NOEC is not required, the test may be altered to increase the number of concentrations and reduce the number of replicates per conc. There were more than 5 test conc (the recommended number) used for TCE. The cell density in the test cultures amounted to 5 " 10 ³ cells/ml at the beginning of the assays.
	Metric 16: Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	Medium	× 2	4	Figure 3 shows the results of the tests at each conc for each chemical but it's difficult to determine the exact concentrations from the figure, so some minor uncertainties remain.
	Metric 23: Explanation of Unexpected Outcomes	Medium	× 1	2	SDs were provided, but it was unclear whether or not there were any unexpected outcomes.
Overall Quality Determination [†]		High		1.3	
Extracted		Yes			

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Study Citation: Brack, W., Rottler, H.. 1994. Toxicity testing of highly volatile chemicals with green algae: A new assay. 1:223-228
 Data Type: Acute (0-96 hour); Aquatic; Plants
 Hero ID: 661061

Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
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* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

if any metric is Unacceptable

$$\text{Overall rating} = \begin{cases} 4 & \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

<p>Study Citation: Miyagawa, M., Takasawa, H., Sugiyama, A., Inoue, Y., Murata, T., Uno, Y., Yoshikawa, K.. 1995. The in vivo-in vitro replicative DNA synthesis (RDS) test with hepatocytes prepared from male B6C3F1 mice as an early prediction assay for putative nongenotoxic (Ames-negative) mouse hepatocarcinogens. Mutation Research: Genetic Toxicology 343:157-183</p> <p>Data Type: Acute (0-96 hour); Terrestrial;</p> <p>Hero ID: 661834</p>					
Domain	Metric	Rating†	MWP*	Score	Comments††
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	Medium	× 1	2	Purity not provided
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Medium	× 1	2	Nominal oral dose
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
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Study Citation:	Miyagawa, M., Takasawa, H., Sugiyama, A., Inoue, Y., Murata, T., Uno, Y., Yoshikawa, K., 1995. The in vivo-in vitro replicative DNA synthesis (RDS) test with hepatocytes prepared from male B6C3F1 mice as an early prediction assay for putative nongenotoxic (Ames-negative) mouse hepatocarcinogens. Mutation Research: Genetic Toxicology 343:157-183			
Data Type:	Acute (0-96 hour); Terrestrial;			
Hero ID:	661834			
Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
Domain 6: Confounding / Variable Control	Metric 17: Outcome Assessment Methodology	High	× 2	2
	Metric 18: Consistency of Outcome Assessment	High	× 1	1
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2
Domain 7: Data Presentation and Analysis	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1
Domain 7: Data Presentation and Analysis	Metric 21: Statistical Methods	High	× 1	1
	Metric 22: Reporting of Data	High	× 2	2
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1
Overall Quality Determination [‡]		High		1.1
Extracted		Yes		

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0,1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Yoshioka, Y., Ose, Y., Sato, T., 1985. Testing for the toxicity of chemicals with *Tetrahymena pyriformis*. Science of the Total Environment 43:149-157
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 676758

Domain	Metric	Rating†	MWF*	Score
Domain 1: Test Substance				
Metric 1:	Test Substance Identity	High	× 2	2
Metric 2:	Test Substance Source	Low	× 1	3
Metric 3:	Test Substance Purity	Low	× 1	3
Domain 2: Test Design				
Metric 4:	Negative Controls	Low	× 2	6
Metric 5:	Negative Control Response		N/A	
Metric 6:	Randomized Allocation	Low	× 1	3
Domain 3: Exposure Characterization				
Metric 7:	Experimental System/Test Media Preparation	Medium	× 2	4
Metric 8:	Consistency of Exposure Administration	Low	× 1	3
Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3
Metric 10:	Exposure Duration and Frequency	Medium	× 2	4
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Unacceptable	× 1	4
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1
Domain 4: Test Organism				

INTERAGENCY DRAFT DO NOT CITE OR QUOTE

Study Citation: Yoshioka, Y., Ose, Y., Sato, T., 1985. Testing for the toxicity of chemicals with Tetrahymena pyriformis. Science of the Total Environment 43:149-157
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 676758

Domain	Metric	Rating [†]	MWF*	Score
	Metric 13: Test Organism Characteristics	Medium	× 2	4
	Metric 14: Acclimatization and Pretreatment Conditions	High	× 1	1
	Metric 15: Number of Organisms and Replicates per Group	Low	× 1	3
	Metric 16: Adequacy of Test Conditions	Medium	× 1	2
Domain 5: Outcome Assessment				
	Metric 17: Outcome Assessment Methodology	Medium	× 2	4
	Metric 18: Consistency of Outcome Assessment	Medium	× 1	2
Domain 6: Confounding / Variable Control				

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Study Citation: Yoshioka, Y., Ose, Y., Sato, T.. 1985. Testing for the toxicity of chemicals with Tetrahymena pyriformis. Science of the Total Environment 43:149-157
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 676758

Domain	Metric	Rating [†]	MWF*	Score
	Metric 19: Confounding Variables in Test Design and Procedures	Low	× 2	6
	Metric 20: Outcomes Unrelated to Exposure	Medium	× 1	2
Domain 7: Data Presentation and Analysis				
	Metric 21: Statistical Methods	High	× 1	1
	Metric 22: Reporting of Data	Low	× 2	6
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1
Overall Quality Determination [‡]		Unacceptable		4.0
Extracted		No		

** Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the overall rating as Unacceptable and the score is presented solely to increase transparency.

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{otherwise (round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the adjusted rating. Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B., 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109
 Data Type: Other; Aquatic; other amphibian - wood frog and green frog
 Hero ID: 700434

Domain	Metric	Rating [†]	MWF* [‡]	Score	Comments ^{††}
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	High	× 1	1	
	Metric 3: Test Substance Purity	Medium	× 1	2	"Stock solutions were made from 95 percent pure, analytical-grade PCE, TCE, and cis- and trans-DCE (Sigma-Aldridge)." Only minor uncertainties about the purity being at 95 percent, analytical-grade.
Domain 2: Test Design	Metric 4: Negative Controls	High	× 2	2	
	Metric 5: Negative Control Response	High	× 1	1	
	Metric 6: Randomized Allocation	Low	× 1	3	For the acute study it was not reported whether the animals were distributed randomly.
Domain 3: Exposure Characterization	Metric 7: Experimental System/Test Media Preparation	High	× 2	2	

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Study Citation: McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109
 Data Type: Other; Aquatic; other amphibian - wood frog and green frog
 Hero ID: 700434

Domain	Metric	Rating†	MWP*	Score	Comments††
	Metric 8: Consistency of Exposure Administration	Medium	× 1	2	Authors indicate that there may have been some losses of test chemical during decanting test solutions and during the placing of eggs in test chambers, and while testing a subsample at 1 hour of exposure TCE conc were only within 70 percent of nominal. The authors report, "Stock solutions of TCE, PCE, and DCE were dissolved in local groundwater in a dilution series. Groundwater was used as the medium for acute tests to emulate conditions in surface waters fed by chloroethylene- contaminated groundwater. Nominal test concentrations were as follows: PCE-2.5, 7.5, 12.5, and 20 mg/L; TCE-12.5, 20, 40, and 60 mg/L; and cis- and trans-DCE-12.5, 60, and 100 mg/L. Based on the results of initial exposures of American toad embryos, a second exposure was conducted with elevated concentrations of PCE and TCE as follows: PCE-15, 30, and 45 mg/L; and TCE-35, 55, and 85 mg/L. Maximum exposure concentrations of PCE and TCE were limited by the compounds' solubility in groundwater. Concentrations of test solutions, including controls, were measured at 24 h (just prior to solution renewal, see below). Concentrations at t = 0 h were based on dilutions of measured stock solutions. Some losses occurred while decanting test solutions and during the placing of eggs in test chambers. In a subsample of test solutions measured at 1 h of exposure, concentrations of PCE were within 99 percent of nominal, while cis- and trans-DCE were within 90 percent. However, levels of TCE were only within 70 percent of nominal."
	Metric 9: Measurement of Test Substance Concentration	High	× 1	1	
	Metric 10: Exposure Duration and Frequency	High	× 2	2	
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	Medium	× 1	2	This study had four exposure groups for TCE and ASTM FETAX Guidelines suggests the following "At a minimum, five concentrations for each endpoint are used. However, additional concentrations between the EC16 and EC84 are highly recommended to ensure obtaining accurate 96-hour LC50 and EC50 values."
	Metric 12: Testing at or Below Solubility Limit	High	× 1	1	

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Study Citation: McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B., 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109
 Data Type: Other; Aquatic; other amphibian - wood frog and green frog
 Hero ID: 700434

Domain	Metric	Rating†	MWPF*	Score	Comments††
Domain 4: Test Organism					
Metric 13: Test Organism Characteristics		Medium	× 2	4	Test organisms seem to be sufficiently sensitive to the exposures administered to derive an EC50, but are not a suggested species in the ASTM guideline or OECD and EPA guidelines for amphibian growth and development which suggest African clawed frog. This study instead used these species to test sensitivity for North American species. Only minor uncertainties because they are not suggested species from a guideline.
Metric 14: Acclimatization and Pretreatment Conditions		Low	× 1	3	Study authors did not report whether animals were acclimatized or whether pretreatment conditions were the same for treatment and controls. They authors do report, " In 2001 and 2002, egg masses of wood frogs, spotted salamanders," American toads, and green frogs were collected from a wetland not contaminated with chloroethylenes in F1amborough Township (Ontario,Canada). Water from wetlands were tested for chloroethylenes in 2001 from each site where eggs were collected. No chloroethylenes were detected; the minimum detection limit for this analysis was 1 ppb. Egg masses were less than 24 h old when exposures were initiated. For each species, three egg masses were used (with the exception of the second exposure of American toads, where only one egg mass was used). Each egg mass was from a different female and represented a replicate. Thus, there were three replicate jars for each chemical by concentration combination, for a total of 45 jars per species. Eggs were not dejellied prior to exposure to more accurately imitateneatural exposure conditions. Each egg mass was gently divided into clusters of approximately 30 eggs (with the exception of spotted salamanders with 5 to 10 eggs) and placed in a 1-L glass Mason jar containing 300 ml of test solution."
Metric 15: Number of Organisms and Replicates per Group		High	× 1	1	

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Study Citation:	McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109				
Data Type:	Other; Aquatic; other amphibian - wood frog and green frog				
Hero ID:	700434				
Domain	Metric	Rating [†]	MWP* [‡]	Score	Comments ^{††}
	Metric 16: Adequacy of Test Conditions	Medium	× 1	2	Animals were held in 1 L glass mason jars containing 300 ml of test solution. Jars were sealed and temperature was maintained at 23±1 degree C using a water bath. All tests were conducted under 14L/10D light regime. The ASTM guidelines recommend glass, and this temperature is appropriate for african clawed frog but unsure if this temperature is also appropriate for these north american species. Additionally the photoperiod is longer than the one recommended in the ASTM Guidelines.
Domain 5: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	Medium	× 1	2	All animals were assessed at the end of the 96 hour period with minor uncertainties due to incomplete reporting.
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	Medium	× 1	2	Controls for the wood frogs and green frogs were under 10 percent mortality and deformities. Details on attrition unrelated to exposure for each exposure concentration were also reported as the average with a range. There is a wide range of portailities between the replicates.
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	Medium	× 2	4	Data was reported for each exposure group in either table or graphical form. It's hard to tell the exact numbers from the graphical representation of the EC50 values for each exposure level, resulting in minor uncertainties.
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.5	
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Study Citation: McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B., 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109
 Data Type: Other; Aquatic; other amphibian - wood frog and green frog
 Hero ID: 700434

Domain	Metric	Rating†	MWF*	Score	Comments††
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Extracted Yes

* MWF = Metric Weighting Factor
 † High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.
 ‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$
 where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.
 †† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B., 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109
 Data Type: Other; Aquatic; other amphibian - american toad
 Hero ID: 700434

Domain	Metric	Rating†	MWF*	Score	Comments††
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	Medium	× 1	2	"Stock solutions were made from 95 percent pure, analytical-grade PCE, TCE, and cis- and trans-DCE (Sigma-Aldridge)." Only minor uncertainties about the purity being at 95 percent, analytical-grade.
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	Medium	× 1	2	Control mortality was reported in table 2 for each species, and deformities in controls were reported in figure 1. Control response for mortality for wood frogs, green frogs and spotted salamanders were all below 10 percent; for American toads it was about 10.1 percent with one of the replicates having a very high 26 percent mortality rate, so there are uncertainties for this species for this metric. Authors threw those numbers out and indicated that the high mortality rate for that replicate could have been due to damage the eggs received in transit. Figure 1 shows that the negative control response for all species for percent mortality is below 10 percent. ASTM guidelines indicate "An acceptable clutch of eggs has the capability of developing into Developmental Stage 46 tadpoles with less than 10 percent gross abnormalities and less than 10 percent mortality."
Metric 6:	Randomized Allocation	Low	× 1	3	For the acute study it was not reported whether the animals were distributed randomly.
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	

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Study Citation: McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109
 Data Type: Other; Aquatic; other amphibian - american toad
 Hero ID: 700434

Domain	Metric	Rating†	MWP*	Score	Comments††
	Metric 8: Consistency of Exposure Administration	Medium	× 1	2	Authors indicate that there may have been some losses of test chemical during decanting test solutions and during the placing of eggs in test chambers, and while testing a subsample at 1 hour of exposure TCE conc were only within 70 percent of nominal. The authors report, "Stock solutions of TCE, PCE, and DCE were dissolved in local groundwater in a dilution series. Groundwater was used as the medium for acute tests to emulate conditions in surface waters fed by chloroethylene- contaminated groundwater. Nominal test concentrations were as follows: PCE-2.5, 7.5, 12.5, and 20 mg/L; TCE-12.5, 20, 40, and 60 mg/L; and cis- and trans-DCE-12.5, 60, and 100 mg/L. Based on the results of initial exposures of American toad embryos, a second exposure was conducted with elevated concentrations of PCE and TCE as follows: PCE-15, 30, and 45 mg/L; and TCE-35, 55, and 85 mg/L. Maximum exposure concentrations of PCE and TCE were limited by the compounds' solubility in groundwater. Concentrations of test solutions, including controls, were measured at 24 h (just prior to solution renewal, see below). Concentrations at t = 0 h were based on dilutions of measured stock solutions. Some losses occurred while decanting test solutions and during the placing of eggs in test chambers. In a subsample of test solutions measured at 1 h of exposure, concentrations of PCE were within 99 percent of nominal, while cis- and trans-DCE were within 90 percent. However, levels of TCE were only within 70 percent of nominal."
	Metric 9: Measurement of Test Substance Concentration	High	× 1	1	
	Metric 10: Exposure Duration and Frequency	High	× 2	2	
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	This study had four exposure groups for TCE and ASTM FETAX Guidelines suggests the following "At a minimum, five concentrations for each endpoint are used. However, additional concentrations between the EC16 and EC84 are highly recommended to ensure obtaining accurate 96-hour LC50 and EC50 values." For American toads the concentrations were too low to generate either an LC50 or an EC50.

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Study Citation: McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B., 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109
 Data Type: Other; Aquatic; other amphibian - american toad
 Hero ID: 700434

Domain	Metric	Rating†	MWP*	Score	Comments††
	Metric 12: Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism	Metric 13: Test Organism Characteristics	Medium	× 2	4	Test organisms seem to be sufficiently sensitive to the exposures administered to derive an EC50, but are not a suggested species in the ASTM guideline or OECD and EPA guidelines for amphibian growth and development which suggest African clawed frog. This study instead used these species to test sensitivity for North American species. Only minor uncertainties because they are not suggested species from a guideline.
	Metric 14: Acclimitization and Pretreatment Conditions	Low	× 1	3	Study authors did not report whether animals were acclimatized or whether pretreatment conditions were the same for treatment and controls. They authors do report, " In 2001 and 2002, egg masses of wood frogs, spotted salamanders," American toads, and green frogs were collected from a wetland not contaminated with chloroethylenes in Flamborough Township (Ontario, Canada). Water from wetlands were tested for chloroethylenes in 2001 from each site where eggs were collected. No chloroethylenes were detected; the minimum detection limit for this analysis was 1 ppb. Egg masses were less than 24 h old when exposures were initiated. For each species, three egg masses were used (with the exception of the second exposure of American toads, where only one egg mass was used). Each egg mass was from a different female and represented a replicate. Thus, there were three replicate jars for each chemical by concentration combination, for a total of 45 jars per species. Eggs were not dejelled prior to exposure to more accurately imitatenatural exposure conditions. Each egg mass was gently divided into clusters of approximately 30 eggs (with the exception of spotted salamanders with 5 to 10 eggs) and placed in a 1-L glass Mason Jar containing 300 ml of test solution."
	Metric 15: Number of Organisms and Replicates per Group	High	× 1	1	

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Study Citation:	McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109				
Data Type:	Other; Aquatic; other amphibian - american toad				
Hero ID:	700434				
Domain	Metric	Rating [†]	MWP* [‡]	Score	Comments ^{††}
	Metric 16: Adequacy of Test Conditions	Medium	× 1	2	Animals were held in 1 L glass mason jars containing 300 ml of test solution. Jars were sealed and temperature was maintained at 23±1 degree C using a water bath. All tests were conducted under 14L/10D light regime. The ASTM guidelines recommend glass, and this temperature is appropriate for african clawed frog but unsure if this temperature is also appropriate for these north american species. Additionally the photoperiod is longer than the one recommended in the ASTM Guidelines.
Domain 5: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	Medium	× 1	2	All animals were assessed at the end of the 96 hour period with minor uncertainties due to incomplete reporting.
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	Medium	× 1	2	One of the controls for the American toads had very high mortality 26 percent, results from that clutch were removed. authors suggest the egg mass may have been damaged in transit. Details on attrition unrelated to exposure for each exposure concentration were also reported as the average with a range. There is a wide range of mortalities between the replicates, and zero mortality at the highest concentration.
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	Medium	× 2	4	Data was reported for each exposure group in either table or graphical form. It's hard to tell the exact numbers from the graphical representation of the EC50 values for each exposure level, resulting in minor uncertainties.
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	

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Study Citation: McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109
 Data Type: Other; Aquatic; other amphibian - american toad
 Hero ID: 700434

Domain	Metric	Rating†	MWF* Score	Comments††
Overall Quality Determination‡		High	1.5	
Extracted		Yes		

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

if any metric is Unacceptable

$$\text{Overall rating} = \begin{cases} 4 \\ \left[\frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right]_{0.1} \end{cases} \quad (\text{round to the nearest tenth) otherwise '}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B., 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109
 Data Type: Other; Aquatic; other amphibian - spotted salamander
 Hero ID: 700434

Domain	Metric	Rating†	MWF*	Score	Comments††
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	× 2	2	"Stock solutions were made from 95 percent pure, analytical-grade PCE, TCE, and cis- and trans-DCE (Sigma-Aldridge)." Only minor uncertainties about the purity being at 95 percent, analytical-grade.
	Metric 2: Test Substance Source	High	× 1	1	
	Metric 3: Test Substance Purity	Medium	× 1	2	
Domain 2: Test Design	Metric 4: Negative Controls	High	× 2	2	For the acute study it was not reported whether the animals were distributed randomly.
	Metric 5: Negative Control Response	High	× 1	1	
	Metric 6: Randomized Allocation	Low	× 1	3	
Domain 3: Exposure Characterization	Metric 7: Experimental System/Test Media Preparation	Low	× 2	6	Containers were covered and sealed but here was no mention of minimizing head space, and authors mentioned that TCE solutions declined by 50 to 80 percent over the 24 hour period between renewals. Authors also mentioned, "Each egg mass was gently divided into clusters of approximately 30 eggs (with the exception of spotted salamanders with 5 to 10 eggs) and placed in a 1-L glass Mason jar containing 300 ml of test solution. The lids on the jars were sealed to reduce volatilization. Dissolved oxygen levels never fell below 80 percent saturation. Three replicates of embryos were also raised in uncontaminated groundwater as controls. Temperature was maintained at 23 ± 1°C using a water bath. All tests were conducted under a 14L/10D light regime. An exhaust hood over the water bath ensured the removal of accidental gaseous PCE, TCE, and DCE volatilized from the exposure vessels."

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Study Citation: McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109
 Data Type: Other; Aquatic; other amphibian - spotted salamander
 Hero ID: 700434

Domain	Metric	Rating†	MWP*	Score	Comments††
	Metric 8: Consistency of Exposure Administration	Medium	× 1	2	Authors indicate that there may have been some losses of test chemical during decanting test solutions and during the placing of eggs in test chambers, and while testing a subsample at 1 hour of exposure TCE conc were only within 70 percent of nominal. The authors report, "Stock solutions of TCE, PCE, and DCE were dissolved in local groundwater in a dilution series. Groundwater was used as the medium for acute tests to emulate conditions in surface waters fed by chloroethylene- contaminated groundwater. Nominal test concentrations were as follows: PCE-2.5, 7.5, 12.5, and 20 mg/L; TCE-12.5, 20, 40, and 60 mg/L; and cis- and trans-DCE-12.5, 60, and 100 mg/L. Based on the results of initial exposures of American toad embryos, a second exposure was conducted with elevated concentrations of PCE and TCE as follows: PCE-15, 30, and 45 mg/L; and TCE-35, 55, and 85 mg/L. Maximum exposure concentrations of PCE and TCE were limited by the compounds' solubility in groundwater. Concentrations of test solutions, including controls, were measured at 24 h (just prior to solution renewal, see below). Concentrations at t = 0 h were based on dilutions of measured stock solutions. Some losses occurred while decanting test solutions and during the placing of eggs in test chambers. In a subsample of test solutions measured at 1 h of exposure, concentrations of PCE were within 99 percent of nominal, while cis- and trans-DCE were within 90 percent. However, levels of TCE were only within 70 percent of nominal. ²⁾
	Metric 9: Measurement of Test Substance Concentration	High	× 1	1	

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Study Citation: McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109
 Data Type: Other; Aquatic; other amphibian - spotted salamander
 Hero ID: 700434

Domain	Metric	Rating†	MWP* ×	Score	Comments††
	Metric 10: Exposure Duration and Frequency	Low	× 2	6	ASTM guidelines for FETAX on American clawed frog suggest 96 hours and a static renewal set up, renewed every 24 hours, which this study does for the acute test. However, it appears that 96 hours is not enough time for salamanders. Authors state, "Exposures followed a 96-h static renewal process with test solutions refreshed daily. Most eggs hatched during the 96-h exposure period with the exception of spotted salamanders. After 96 h, survivorship was assessed; larvae were then euthanized with a solution of clove oil. Spotted salamanders had not hatched by the end of the 96-h period since they take up to a week longer to develop to hatching than the anuran species chosen. The developing salamander embryos were placed in clean groundwater until hatching was complete. Anuran embryos were staged at 96 h according to Gosner (1960) to test for effects of exposures on developmental rates. Salamander larvae were staged at 192 h according to Harrison (1969). Larvae were examined for developmental deformities according to the Atlas of Abnormalities (Bantle et al. 1998) for <i>Xenopus laevis</i> tadpoles.
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	Medium	× 1	2	This study had four exposure groups for TCE and ASTM FETAX Guidelines suggests the following "At a minimum, five concentrations for each endpoint are used. However, additional concentrations between the EC16 and EC84 are highly recommended to ensure obtaining accurate 96-hour LC50 and EC50 values."
	Metric 12: Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism	Metric 13: Test Organism Characteristics	Medium	× 2	4	Test organisms seem to be sufficiently sensitive to the exposures administered to derive an EC50, but are not a suggested species in the ASTM guideline or OECD and EPA guidelines for amphibian growth and development which suggest African clawed frog. This study instead used these species to test sensitivity for North American species. Only minor uncertainties because they are not suggested species from a guideline.

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Study Citation: McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109
 Data Type: Other; Aquatic; other amphibian - spotted salamander
 Hero ID: 700434

Domain	Metric	Rating†	MWPF*	Score	Comments††
	Metric 14: Acclimitization and Pretreatment Conditions	Low	× 1	3	Study authors did not report whether animals were acclimatized or whether pretreatment conditions were the same for treatment and controls. They authors do report, " In 2001 and 2002, egg masses of wood frogs, spotted salamanders," American toads, and green frogs were collected from a wetland not contaminated with chloroethylenes in F1amborough Township (Ontario, Canada). Water from wetlands were tested for chloroethylenes in 2001 from each site where eggs were collected. No chloroethylenes were detected; the minimum detection limit for this analysis was 1 ppb. Egg masses were less than 24 h old when exposures were initiated. For each species, three egg masses were used (with the exception of the second exposure of American toads, where only one egg mass was used). Each egg mass was from a different female and represented a replicate. Thus, there were three replicate jars for each chemical by concentration combination, for a total of 45 jars per species. Eggs were not dejelled prior to exposure to more accurately imitatenaatural exposure conditions. Each egg mass was gently divided into clusters of approximately 30 eggs (with the exception of spotted salamanders with 5 to 10 eggs) and placed in a 1-L glass Mason Jar containing 300 ml of test solution."
	Metric 15: Number of Organisms and Replicates per Group	Low	× 1	3	ASTM guidelines suggest 20-25 and two replicates, and the study authors reported, "there were three replicate jars for each chemical" and, "Each egg mass was gently divided into clusters of approximately 30 eggs (with the exception of spotted salamanders with 5 to 10 eggs) and placed in a 1-L glass Mason jar containing 300 ml of test solution." This resulted in the nominal and measured conc for TCE not having an adequate sample size to generate confidence intervals. Because salamanders are difficult to rear in the lab in high numbers, this was taken into consideration in the scoring for this metric (given a low instead of an unacceptable). Additionally the number of organisms suggested in the ASTM guidelines are based on another species.

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Study Citation:	McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109				
Data Type:	Other; Aquatic; other amphibian - spotted salamander				
Hero ID:	700434				
Domain	Metric	Rating [†]	MWP* [‡]	Score	Comments ^{††}
	Metric 16: Adequacy of Test Conditions	Medium	× 1	2	Animals were held in 1 L glass mason jars containing 300 ml of test solution. Jars were sealed and temperature was maintained at 23±1 degree C using a water bath. All tests were conducted under 14L/10D light regime. The ASTM guidelines recommend glass, and this temperature is appropriate for african clawed frog but unsure if this temperature is also appropriate for these north american species. Additionally the photoperiod is longer than the one recommended in the ASTM Guidelines.
Domain 5: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	Medium	× 1	2	All animals were assessed at the end of the 96 hour period with minor uncertainties due to incomplete reporting.
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	Medium	× 1	2	Controls for the spotted salamanders were under 10 percent mortality and deformities. Details on attrition unrelated to exposure for each exposure concentration were also reported as the average with a range. There is a wide range of portailities between the replicates.
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	Medium	× 1	2	A two-factor ANOVA was used. ASTM FETAX Guidelines suggests either probit analysis, trimmed Spearman-Kärber analysis, or the two-point graphical method to estimate LC50 and EC50 values. However due to sample size authors were not able to generate confidence intervals.
	Metric 22: Reporting of Data	Medium	× 2	4	Data was reported for each exposure group in either table or graphical form. It's hard to tell the exact numbers from the graphical representation of the EC50 values for each exposure level, resulting in minor uncertainties.
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Study Citation: McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109
 Data Type: Other; Aquatic; other amphibian - spotted salamander
 Hero ID: 700434

Domain	Metric	Rating†	MWF*	Score	Comments††
Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]	Medium			1.7	
Extracted	Yes				

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Domain	Metric	Rating†	MWF* Score	Comments††
Study Citation: McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B., 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109 Data Type: Acute (0-96 hr); Aquatic; other Amphibian Hero ID: 700434				
Domain 1: Test Substance				
Metric 1:	Test Substance Identity	High	× 2	2
Metric 2:	Test Substance Source	High	× 1	1
Metric 3:	Test Substance Purity	High	× 1	1
Domain 2: Test Design				
Metric 4:	Negative Controls	High	× 2	2
Metric 5:	Negative Control Response	High	× 1	1
Metric 6:	Randomized Allocation	High	× 1	1
Domain 3: Exposure Characterization				
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2
Metric 8:	Consistency of Exposure Administration	High	× 1	1
Metric 9:	Measurement of Test Substance Concentration	Medium	× 1	2 Measured stock solutions and 24 hr exposure dose; nominal for 96 hr exposure
Metric 10:	Exposure Duration and Frequency	High	× 2	2
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1
Metric 12:	Testing at or Below Solubility Limit	Medium	× 1	2 Measured stock solutions and 24 hr exposure; nominal for 96 hr exposure
Domain 4: Test Organism				
Metric 13:	Test Organism Characteristics	High	× 2	2
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1
Metric 16:	Adequacy of Test Conditions	High	× 1	1
Domain 5: Outcome Assessment				

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Study Citation: McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B., 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109
 Data Type: Acute (0-96 hour); Aquatic; other Amphibian
 Hero ID: 700434

Domain	Metric	Rating†	MWF*	Score	Comments††
Domain 6: Confounding / Variable Control	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
Domain 6:	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	High	× 2	2	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination‡		High		1.1	
Extracted		Yes			

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Niederlehner, B., Cairns, J., Smith, E., 1998. Modeling acute and chronic toxicity of nonpolar narcotic chemicals and mixtures to Ceriodaphnia dubia. Ecotoxicology and Environmental Safety 39:136-146					
Data Type: Acute (0-96 hour); Aquatic; Invertebrates					
Hero ID: 707209					
Domain	Metric	Rating [†]	MWF* [‡]	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	Medium	× 1	2	Test substance purity is reported as 99.5 percent as labeled but not independently verified.
Domain 2: Test Design					
Metric 4:	Negative Controls	Low	× 2	6	Authors reported using negative controls but did not report details of the negative control group.
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	Low	× 1	3	Not randomly allocated
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	Medium	× 1	2	Only minor uncertainties about exposure administration
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	Low	× 1	3	The study not report how long test organisms were acclimatized
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Study Citation: Niederlehner, B., Cairns, J., Smith, E., 1998. Modeling acute and chronic toxicity of nonpolar narcotic chemicals and mixtures to *Ceriodaphnia dubia*. *Ecotoxicology and Environmental Safety* 39:136-146
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 707209

Domain	Metric	Rating†	MWPF*	Score	Comments††
	Metric 15: Number of Organisms and Replicates per Group	Low	× 1	3	The study says that "Responses are based on a sample size of 10" but it's unclear if that means 10 individuals or 10 brood cups (10 brood cups is recommended in the EPA effluent guidelines for <i>C. dubia</i> .) Elsewhere in the study it states "Newly prepared test solution and 24-h-old test solution composed from three replicates from each treatment level were analyzed." The methods say they follow the guidelines, but the description isn't explicit about how many animals were actually used.
	Metric 16: Adequacy of Test Conditions	Medium	× 1	2	Only minor uncertainties about housing. "The standard, short-term, chronic toxicity test method developed for U.S. EPA's Whole Effluent Testing Program (U.S. EPA, 1994) was followed with modifications to minimize volatilization of test chemicals. Instead of 30-ml beakers, individual organisms were tested in 25-ml borosilicate glass vials filled to capacity and closed tightly using teflon PTFE-lined silicon septa held in place by polypropylene screw-on caps. These vials are sold by scientific suppliers as "EPA vials" for storage of water samples. Masten et al. (1994) found that static-renewal tests with these vials maintained concentrations of volatile chemicals more successfully than flowthrough test designs. Tests were conducted in artificial moderately hard water (U.S. EPA, 1994; Table 2). Light was provided by full spectrum fluorescent bulbs with a color rendering index >90 at an intensity of 20 mE/m ² /S and a photoperiod of 16L: 8D. Daphnids were fed an algae and cereal leaf mix containing equal numbers of cells of <i>Scenedesmus capricornutum</i> and <i>Chlorella</i> (1994). This mixture was added to diluted stock solutions to yield a final concentration of 3 x 10 ⁵ algal cells/ml and 0.03 mg/ml solids from cereal grass in each test vial. Component algae were cultured individually in modified Bold's basal medium (ASTM, 1994). Solutions were renewed daily. Dissolved oxygen was monitored on 24-h-old solutions and always remained above 7.0 ppm."

Domain 5: Outcome Assessment

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Study Citation:	Niederlehner, B., Cairns, J., Smith, E., 1998. Modeling acute and chronic toxicity of nonpolar narcotic chemicals and mixtures to <i>Ceriodaphnia dubia</i> . <i>Ecotoxicology and Environmental Safety</i> 39:136-146			
Data Type:	Acute (0-96 hour); Aquatic; Invertebrates			
Hero ID:	707209			
Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
Domain 6: Confounding / Variable Control	Metric 17: Outcome Assessment Methodology	High	× 2	2
	Metric 18: Consistency of Outcome Assessment	High	× 1	1
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2
Domain 6:	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1
Domain 7: Data Presentation and Analysis	Metric 21: Statistical Methods	High	× 1	1
	Metric 22: Reporting of Data	High	× 2	2
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1
Overall Quality Determination [‡]		High		1.4
Extracted		Yes		

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

<p>Study Citation: Niederlehner, B., Cairns, J., Smith, E., 1998. Modeling acute and chronic toxicity of nonpolar narcotic chemicals and mixtures to Ceriodaphnia dubia. <i>Ecotoxicology and Environmental Safety</i> 39:136-146</p> <p>Data Type: Other; Aquatic; Invertebrates</p> <p>Hero ID: 707209</p>					
Domain	Metric	Rating†	MWF* [‡]	Score	Comments††
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	Medium	× 1	2	Test substance purity is reported as 99.5 percent as labeled but not independently verified.
Domain 2: Test Design					
Metric 4:	Negative Controls	Low	× 2	6	Authors reported using negative controls but did not report details of the negative control group.
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	Low	× 1	3	Not randomly allocated
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	Medium	× 1	2	Only minor uncertainties about exposure administration
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
Metric 10:	Exposure Duration and Frequency	High	× 2	2	7 days recommended for EPA effluent guidelines for C. dubia. https://www.epa.gov/sites/production/files/2015-12/documents/method_1002_2002.pdf
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	Low	× 1	3	The study not report how long test organisms were acclimatized
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Study Citation: Niederlehner, B., Cairns, J., Smith, E., 1998. Modeling acute and chronic toxicity of nonpolar narcotic chemicals and mixtures to *Ceriodaphnia dubia*. *Ecotoxicology and Environmental Safety* 39:136-146
 Data Type: Other; Aquatic; Invertebrates
 Hero ID: 707209

Domain	Metric	Rating†	MWPF*	Score	Comments††
	Metric 15: Number of Organisms and Replicates per Group	Low	× 1	3	The study says that "Responses are based on a sample size of 10" but it's unclear if that means 10 individuals or 10 brood cups (10 brood cups is recommended in the EPA effluent guidelines for <i>C. dubia</i> .) Elsewhere in the study it states "Newly prepared test solution and 24-h-old test solution composited from three replicates from each treatment level were analyzed." The methods say they follow the guidelines, but the description isn't explicit about how many animals were actually used.
	Metric 16: Adequacy of Test Conditions	Medium	× 1	2	Only minor uncertainties about housing. "The standard, short-term, chronic toxicity test method developed for U.S. EPA's Whole Effluent Testing Program (U.S. EPA, 1994) was followed with modifications to minimize volatilization of test chemicals. Instead of 30-ml beakers, individual organisms were tested in 25-ml borosilicate glass vials filled to capacity and closed tightly using teflon PTFE-lined silicon septa held in place by polypropylene screw-on caps. These vials are sold by scientific suppliers as "EPA vials" for storage of water samples. Masten et al. (1994) found that static-renewal tests with these vials maintained concentrations of volatile chemicals more successfully than flowthrough test designs. Tests were conducted in artificial moderately hard water (U.S. EPA, 1994; Table 2). Light was provided by full spectrum fluorescent bulbs with a color rendering index >90 at an intensity of 20 mE/m ² /S and a photoperiod of 16L: 8D. Daphnids were fed an algae and cereal leaf mix containing equal numbers of cells of <i>Scenedesmus capricornutum</i> and <i>Chlorella</i> sp. mixed with a rye grass infusion (ASTM, 1994). This mixture was added to diluted stock solutions to yield a final concentration of 3 x 10 ⁵ algal cells/ml and 0.03 mg/ml solids from cereal grass in each test vial. Component algae were cultured individually in modified Bold's basal medium (ASTM, 1994). Solutions were renewed daily. Dissolved oxygen was monitored on 24-h-old solutions and always remained above 7.0 ppm."

Domain 5: Outcome Assessment

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Study Citation:	Niederlehner, B., Cairns, J., Smith, E., 1998. Modeling acute and chronic toxicity of nonpolar narcotic chemicals and mixtures to <i>Ceriodaphnia dubia</i> . <i>Ecotoxicology and Environmental Safety</i> 39:136-146			
Data Type:	Other; Aquatic; Invertebrates			
Hero ID:	707209			
Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
Metric 17:	Outcome Assessment Methodology	High	× 2	2
Metric 18:	Consistency of Outcome Assessment	High	× 1	1
Domain 6: Confounding / Variable Control				
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2
Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1
Domain 7: Data Presentation and Analysis				
Metric 21:	Statistical Methods	High	× 1	1
Metric 22:	Reporting of Data	High	× 2	2
Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1
Overall Quality Determination [‡]		High		1.4
Extracted		Yes		

* MWF = Metric Weighting Factor

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‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

<p>Study Citation: Labra, M.,Mattia, F.,Bernasconi, M.,Bertacchi, D.,Grassi, F.,Bruni, I.,Citterio, S., 2010. The Combined Toxic and Genotoxic Effects of Chromium and Volatile Organic Contaminants to Pseudokirchneriella subcapitata. Water, Air, and Soil Pollution 213:57-70</p> <p>Data Type: Acute (0-96 hour); Aquatic; Plants</p> <p>Hero ID: 1059985</p>					
Domain	Metric	Rating†	MWF* Score	Rating†	Comments††
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	Medium	× 2	4	Used as solvents, no product information provided
Metric 2:	Test Substance Source	Medium	× 1	2	Used as solvents, no product information provided
Metric 3:	Test Substance Purity	Medium	× 1	2	Used as solvents, no product information provided
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	nominal acute exposure
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	Low	× 1	3	nominal acute exposure
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	

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Study Citation: Labra, M., Mattia, F., Bernasconi, M., Bertacchi, D., Grassi, F., Bruni, I., Citterio, S., 2010. The Combined Toxic and Genotoxic Effects of Chromium and Volatile Organic Contaminants to Pseudokirchneriella subcapitata. Water, Air, and Soil Pollution 213:57-70
Data Type: Acute (0-96 hour); Aquatic; Plants
Hero ID: 1059985

Domain	Metric	Rating†	MWF*	Score	Comments††
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2	
Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					
Metric 21:	Statistical Methods	High	× 1	1	
Metric 22:	Reporting of Data	High	× 2	2	
Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination‡		High		1.3	

Extracted

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

<p>Study Citation: Specht, W. L., Klaine, S. J., Hook, D. D.. 1996. Rapid bioassessment methods for assessing vegetation toxicity at the Savannah River Site - germination tests and root elongation trials.</p> <p>Data Type: Other; Terrestrial;</p> <p>Hero ID: 1916722</p>					
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	Low	× 1	3	Source/information not reported
Metric 3:	Test Substance Purity	Low	× 1	3	Grade/purity not reported
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Not measured
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	Low	× 1	3	Acclimation not reported
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	

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Study Citation: Specht, W. L., Klaine, S. J., Hook, D. D., 1996. Rapid bioassessment methods for assessing vegetation toxicity at the Savannah River Site - germination tests and root elongation trials.
 Data Type: Other; Terrestrial;
 Hero ID: 1916722

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	High	× 2	2	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.3	

Extracted

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

<p>Study Citation: Bacsi, I., Toeroek, T., B-Beres, V., Toeroek, P., Tothmeresz, B., Nagy, A. S., Vasas, G., 2013. Laboratory and microcosm experiments testing the toxicity of chlorinated hydrocarbons on a cyanobacterium strain (Synechococcus PCC 6301) and on natural phytoplankton assemblages. <i>Hydrobiologia</i> 710:189-203</p> <p>Data Type: Acute (0-96 hour); Aquatic; Plants</p> <p>Hero ID: 2127844</p>					
Domain	Metric	Rating [†]	MWP*	Score	Comments ^{††}
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	Low	× 1	3	not reported
	Metric 3: Test Substance Purity	Low	× 1	3	not reported
Domain 2: Test Design	Metric 4: Negative Controls	Medium	× 2	4	controls were used but details about what exactly controls included were not given. Authors reported, "The growth of the control cultures (without addition of chlorinated hydrocarbons) and treated cultures was monitored by measuring chlorophyll-a content and by counting cell numbers."
	Metric 5: Negative Control Response	Low	× 1	3	control response was given but only until 25 hours.
Domain 3: Exposure Characterization	Metric 6: Randomized Allocation	Low	× 1	3	not reported
	Metric 7: Experimental System/Test Media Preparation	Unacceptable	× 2	8	the laboratory system was open and measurements were not taken, and flasks were open and aerated which can lead to rapid volatilization of TCE, however this was by design in order to better compare results in the lab to a microcosm experiment also performed.
	Metric 8: Consistency of Exposure Administration	Low	× 1	3	details not given about exposure administration for each exposure level.
Domain 3: Exposure Characterization	Metric 9: Measurement of Test Substance Concentration	Low	× 1	3	measured concentrations were not taken and cannot be expected to be close to nominal concentration due to the volatility of the chemical. However, this experiment measured effects in just the few hours after exposure.
	Metric 10: Exposure Duration and Frequency	Low	× 2	6	exposure happened once and was measured in the few hours after exposure. This is not in accordance with any guidelines, but was designed to mimic conditions that were carried out in microcosm experiment for comparison purposes.

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Study Citation: Bacsi, I., Toeroek, T., B-Beres, V., Toeroek, P., Tothmeresz, B., Nagy, A. S., Vasas, G.. 2013. Laboratory and microcosm experiments testing the toxicity of chlorinated hydrocarbons on a cyanobacterium strain (Synecococcus PCC 6301) and on natural phytoplankton assemblages. Hydrobiologia 710:189-203
 Data Type: Acute (0-96 hour); Aquatic; Plants
 Hero ID: 2127844

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	Unacceptable	× 1	4	it appears only one exposure group was used to mimic the conditions in the microcosm
	Metric 12: Testing at or Below Solubility Limit	Low	× 1	3	unsure what the actual exposure concentration was from the author's reporting.
Domain 4: Test Organism					
	Metric 13: Test Organism Characteristics	Medium	× 2	4	cyanobacterium Synecococcus elongatus (PCC 6301). not a recommended test species in OECD 201 but in the same genus as a recommended test species for cyanobacteria
	Metric 14: Acclimitization and Pretreatment Conditions	Low	× 1	3	not reported
	Metric 15: Number of Organisms and Replicates per Group	Medium	× 1	2	the initial cell density is outside the range for this genus in OECD201 (synecococcus leopolensis recommended cell density is 5x10 ⁴ -10 ⁵). This experiment starts at about 100x10 ⁶ . Each study was done in triplicate which is recommended.
	Metric 16: Adequacy of Test Conditions	Low	× 1	3	limited reporting of housing conditions
Domain 5: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	Low	× 2	6	Outcome assessment methodology is described for changes in growth and enzyme activity. Growth measures are appropriate but some uncertainties remain for how enzyme activity was measured (with incomplete methodology described). Uncertainties also exist for when measures were taken. Measurements were taken for growth every second hour, and for enzyme activity at hour 0, 4, 8, 12, 24.
	Metric 18: Consistency of Outcome Assessment	Low	× 1	3	details regarding execution of study protocol across study groups was not reported.
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	Medium	× 2	4	study did not provide enough information about env conditions across study groups.
	Metric 20: Outcomes Unrelated to Exposure	Low	× 1	3	authors did not report data on health outcomes unrelated to exposure

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Study Citation: Bacsi, L., Toeroek, T., B-Beres, V., Toeroek, P., Tothmeresz, B., Nagy, A. S., Vasas, G.. 2013. Laboratory and microcosm experiments testing the toxicity of chlorinated hydrocarbons on a cyanobacterium strain (*Synechococcus* PCC 6301) and on natural phytoplankton assemblages. *Hydrobiologia* 710:189-203
 Data Type: Acute (0-96 hour); Aquatic; Plants
 Hero ID: 2127844

Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
Domain 7: Data Presentation and Analysis				
Metric 21: Statistical Methods	High	× 1	1	
Metric 22: Reporting of Data	Low	× 2	6	data was reported in figures, but not very well in text and the exact concentrations at which algae was exposed is not reported.
Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	

Overall Quality Determination[‡] Unacceptable 4.0 Metric mean score^{**}: 2.6.

Extracted No

** Consistent with our *Application of Systematic Review in TSCA Risk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, two of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

<p>Study Citation: Smith, A. D.,Bharath, A.,Mallard, C.,Orr, D.,Smith, K.,Sutton, J. A.,Vukmanich, J.,McCarty, L. S.,Ozburn, G. W.. 1991. The acute and chronic toxicity of 10 chlorinated organic-compounds to the american flagfish (<i>Jordanella-floridae</i>). Archives of Environmental Contamination and Toxicology 20:94-102</p> <p>Data Type: Acute (0-96 hour); Aquatic; Fish</p> <p>Hero ID: 2298399</p>					
Domain	Metric	Rating†	MWP*	Score	Comments††
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	Medium	× 1	2	The source of Perc was not reported, but gas chromatography was used to verify identity of chemical. "The determination of the test compounds in water samples was accomplished by solvent extraction followed by gas chromatography analysis."
Metric 3:	Test Substance Purity	Low	× 1	3	Purity of the test substance was not reported.
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	Low	× 1	3	Control response was not reported
Metric 6:	Randomized Allocation	Low	× 1	3	Researchers did not report the method for how organisms were allocated to study groups, or their deficiencies regarding allocation method.
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	Low	× 1	3	Exposure concentrations were not reported in the flow-through test. Five or six duplicate, logarithmically distributed concentrations of the test solutions were used in 30-L aquaria.
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Medium	× 1	2	Concentrations were prepared in a logarithmic series but the method used to determine an appropriate range was not mentioned.
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					

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Study Citation:	Smith, A. D., Bharath, A., Mallard, C., Orr, D., Smith, K., Sutton, J. A., Vukmanich, J., McCarty, L. S., Ozburn, G. W., 1991. The acute and chronic toxicity of 10 chlorinated organic-compounds to the american flagfish (<i>Jordanella-floridae</i>). Archives of Environmental Contamination and Toxicology 20:94-102				
Data Type:	Acute (0-96 hour); Aquatic; Fish				
Hero ID:	2298399				
Domain	Metric	Rating [†]	MWF* [*]	Score	Comments ^{††}
Metric 13:	Test Organism Characteristics	Medium	× 2	4	Juvenile flagfish (2-4 months) were used, and were laboratory raised. Not an OECD or EPA recommended species. Also had minor uncertainties about where the fish were obtained.
Metric 14:	Acclimitization and Pretreatment Conditions	Medium	× 1	2	Minor uncertainties about details provided. Authors report, "Laboratory-reared juvenile (2-4 month) flagfish were used. Fish were raised in the diluent water and fed freshly-hatched and adult brine shrimp. Fish were not fed during the tests."
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	10 juvenile flagfish were used per aquarium, and OECD recommends at least 7.
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2	
Metric 20:	Outcomes Unrelated to Exposure	Low	× 1	3	No adverse outcomes were reported for Perc, and control response was not reported.
Domain 7: Data Presentation and Analysis					
Metric 21:	Statistical Methods	High	× 1	1	
Metric 22:	Reporting of Data	Low	× 2	6	The data for the static test were not presented in full, and no information was reported for controls.
Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [†]		High		1.6	
Extracted		Yes			
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Study Citation: Smith, A. D., Bharath, A., Mallard, C., Orr, D., Smith, K., Sutton, J. A., Vukmanich, J., McCarty, L. S., Ozburn, G. W., 1991. The acute and chronic toxicity of 10 chlorinated organic-compounds to the american flagfish (*Jordanella-floridae*). Archives of Environmental Contamination and Toxicology 20:94-102

Data Type: Acute (0-96 hour); Aquatic; Fish

Hero ID: 2298399

Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
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* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:	Smith, A. D., Bharath, A., Mallard, C., Orr, D., Smith, K., Sutton, J. A., Vukmanich, J., McCarty, L. S., Ozburn, G. W.. 1991. The acute and chronic toxicity of 10 chlorinated organic-compounds to the american flagfish (<i>Jordanella-floridae</i>). Archives of Environmental Contamination and Toxicology 20:94-102			
Data Type:	Chronic (>21 days); Aquatic; Fish			
Hero ID:	2298399			
Domain	Metric	Rating [†]	MWP* Score	Comments ^{††}
Domain 1: Test Substance				
Metric 1:	Test Substance Identity	High	× 2	2
Metric 2:	Test Substance Source	Medium	× 1	2
Metric 3:	Test Substance Purity	Low	× 1	3
Domain 2: Test Design				
Metric 4:	Negative Controls	High	× 2	2
Metric 5:	Negative Control Response	High	× 1	1
Metric 6:	Randomized Allocation	Medium	× 1	2
Domain 3: Exposure Characterization				
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2
Metric 8:	Consistency of Exposure Administration	High	× 1	1
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1
Metric 10:	Exposure Duration and Frequency	High	× 2	2
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Medium	× 1	2
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1
Domain 4: Test Organism				
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Study Citation:	Smith, A. D., Bharath, A., Mallard, C., Orr, D., Smith, K., Sutton, J. A., Vukmanich, J., McCarty, L. S., Ozburn, G. W., 1991. The acute and chronic toxicity of 10 chlorinated organic-compounds to the american flagfish (<i>Jordanella-floridae</i>). Archives of Environmental Contamination and Toxicology 20:94-102				
Data Type:	Chronic (>21 days); Aquatic; Fish				
Hero ID:	2298399				
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 5: Outcome Assessment	Metric 13: Test Organism Characteristics	Medium	× 2	4	Embryo/larval flagfish were used, and were laboratory raised. Not an OECD or EPA recommended species. Also had minor uncertainties about where the fish were obtained.
	Metric 14: Acclimitization and Pretreatment Conditions	Medium	× 1	2	Minor uncertainties about details provided. Authors report, "Laboratory-reared juvenile (2-4 month) flagfish were used. Fish were raised in the diluent water and fed freshly-hatched and adult brine shrimp. Fish were not fed during the tests."
	Metric 15: Number of Organisms and Replicates per Group	Medium	× 1	2	50 fry (one week old) per test level and the controls. Duplicate exposures were used, but OECD recommends 4 or 5.
	Metric 16: Adequacy of Test Conditions	High	× 1	1	
Domain 6: Confounding / Variable Control	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
Domain 7: Data Presentation and Analysis	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	High	× 2	2	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.3	
Extracted		Yes			
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Study Citation: Smith, A. D., Bharath, A., Mallard, C., Orr, D., Smith, K., Sutton, J. A., Vukmanich, J., McCarty, L. S., Ozburn, G. W., 1991. The acute and chronic toxicity of 10 chlorinated organic-compounds to the american flagfish (*Jordanella-floridae*). Archives of Environmental Contamination and Toxicology 20:94-102

Data Type: Chronic (>21 days); Aquatic; Fish

Hero ID: 2298399

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
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* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Bacsi, I., Gonda, S., B-Beres, V., Novak, Z., Nagy, S. A., Vasas, G., 2015. Alterations of phytoplankton assemblages treated with chlorinated hydrocarbons: effects of dominant species sensitivity and initial diversity. *Ecotoxicology* 24:823-834

Data Type: Acute (0-96 hour); Aquatic; Plants

Hero ID: 3298076

Domain	Metric	Rating†	MWF*	Score
Domain 1: Test Substance				
Metric 1:	Test Substance Identity	High	× 2	2
Metric 2:	Test Substance Source	Low	× 1	3
Metric 3:	Test Substance Purity	Low	× 1	3
Domain 2: Test Design				
Metric 4:	Negative Controls	Medium	× 2	4
Metric 5:	Negative Control Response	Medium	× 1	2
Metric 6:	Randomized Allocation		N/A	
Domain 3: Exposure Characterization				
Metric 7:	Experimental System/Test Media Preparation	Unacceptable	× 2	8
Metric 8:	Consistency of Exposure Administration	Low	× 1	3
Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3

† Not applicable to allocate individual algae to study groups

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

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Study Citation: Bacsi, I., Gonda, S., B-Beres, V., Novak, Z., Nagy, S. A., Vasas, G., 2015. Alterations of phytoplankton assemblages treated with chlorinated hydrocarbons: effects of dominant species sensitivity and initial diversity. *Ecotoxicology* 24:823-834
 Data Type: Acute (0-96 hour); Aquatic; Plants
 Hero ID: 3298076

Domain	Metric	Rating [†]	MWF*	Score
	Metric 10: Exposure Duration and Frequency	Low	× 2	6
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	N/A	N/A	It appears only one exposure group was used however, with a microcosm experiment
	Metric 12: Testing at or Below Solubility Limit	Low	× 1	3
Domain 4: Test Organism				
	Metric 13: Test Organism Characteristics	Medium	× 2	4
	Metric 14: Acclimatization and Pretreatment Conditions	Low	× 1	3
	Metric 15: Number of Organisms and Replicates per Group	Medium	× 1	2
	Metric 16: Adequacy of Test Conditions	Low	× 1	3
Domain 5: Outcome Assessment				
	Metric 17: Outcome Assessment Methodology	High	× 2	2
	Metric 18: Consistency of Outcome Assessment	Low	× 1	3
Domain 6: Confounding / Variable Control				

Continued on next page ...

Study Citation: Bacsı, I., Gonda, S., B-Beres, V., Novak, Z., Nagy, S. A., Vasas, G., 2015. Alterations of phytoplankton assemblages treated with chlorinated hydrocarbons: effects of dominant species sensitivity and initial diversity. *Ecotoxicology* 24:823-834
 Data Type: Acute (0-96 hour); Aquatic; Plants
 Hero ID: 3298076

Domain	Metric	Rating [†]	MWF*	Score
Domain 7: Data Presentation and Analysis	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2
	Metric 20: Outcomes Unrelated to Exposure	Low	× 1	3
Domain 21: Statistical Methods	Metric 21: Reporting of Data	High	× 1	1
	Metric 22: Reporting of Data	Low	× 2	6
Domain 23: Explanation of Unexpected Outcomes	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1

Overall Quality Determination[†]

Unacceptable

4.0

Extracted

No

** Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0,1} & \text{otherwise (round to the nearest tenth)} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the adjusted rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Study Citation: Steiman, R., Seiglemurandi, F., Guiraud, P., Benoitguyod, J. L.. 1995. TESTING OF CHLORINATED SOLVENTS ON MICROFUNGI. Environmental Toxicology and Water Quality 10:283-285 Data Type: Acute (0-96 hour); Aquatic; other soil fungi Hero ID: 3559784					
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	Medium	× 2	4	test substance was described as perchloroethylene
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	Low	× 1	3	Not indicated
Domain 2: Test Design					
Metric 4:	Negative Controls	Unacceptable	× 2	8	No control
Metric 5:	Negative Control Response	N/A		N/A	No information
Metric 6:	Randomized Allocation	Low	× 1	3	No randomization indicated
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Medium	× 1	2	However, it should be considered that due to differences in volatility, the atmospheric concentrations were not the same: 2.40 g L ⁻¹ for DCM, 1.90 g L ⁻¹ for Per, and 0.50 g L ⁻¹ for Tri.
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	N/A		N/A	Each solvent had one exposure concentration determined by the atmospheric pressure of the test vessel
Metric 12:	Testing at or Below Solubility Limit	N/A		N/A	No information
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	N/A		N/A	No information
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
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Study Citation: Steiman, R., Seiglemurandi, F., Guiraud, P., Benoitguyod, J. L.. 1995. TESTING OF CHLORINATED SOLVENTS ON MICROFUNGI. Environmental Toxicology and Water Quality 10:283-285

Data Type: Acute (0-96 hour); Aquatic; other soil fungi

Hero ID: 3559784

Domain	Metric	Rating [†]	MWF* [†]	Score	Comments ^{††}
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
Metric 19:	Confounding Variables in Test Design and Procedures	N/A		N/A	No information
Metric 20:	Outcomes Unrelated to Exposure	N/A		N/A	No information
Domain 7: Data Presentation and Analysis					
Metric 21:	Statistical Methods	N/A		N/A	Not provided
Metric 22:	Reporting of Data	Low	× 2	6	Results were reported but not raw data.
Metric 23:	Explanation of Unexpected Outcomes	N/A		N/A	No information
Overall Quality Determination [†]		Unacceptable	Low	4.0	Metric mean score ^{**} : 1.8. The Paper does not use a control, but does provide a decent comparison of the relative toxicities of the three solvents, DCM, PERC, and TCE over a 32 hour period. While this doesn't provide endpoints that should be used in any quantitative way in a risk evaluation, it does provide evidence that can be used for a qualitative comparison of the toxicities of these three solvents to these soil fungi.

Extracted

Yes

** Consistent with our *Application of Systematic Review in TSCA Risk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Steiman, R., Seiglemurandi, F., Guiraud, P., Benoitguyod, J. L., 1995. TESTING OF CHLORINATED SOLVENTS ON MICROFUNGII. Environmental Toxicology and Water Quality 10:283-285
 Data Type: Acute (0-96 hour); Aquatic; other fungi
 Hero ID: 3559784

Domain	Metric	Rating ^f	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	Low	× 1	3	Purity/Grade not reported
Domain 2: Test Design					
Metric 4:	Negative Controls	Unacceptable	× 2	8	no control
Metric 5:	Negative Control Response	Unacceptable	× 1	4	No control
Metric 6:	Randomized Allocation	Low	× 1	3	not reported
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	Medium	× 2	4	Limited description of system/media preparation
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Not measured
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	1 dose
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	nan	× 1	0	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	

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Study Citation:	Steiman, R., Seiglemurandi, F., Guiraud, P., Benoitguyod, J. L., 1995. TESTING OF CHLORINATED SOLVENTS ON MICROFUNGII. Environmental Toxicology and Water Quality 10:283-285			
Data Type:	Acute (0-96 hour); Aquatic; other fungi			
Hero ID:	3559784			
Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
Metric 18:	Consistency of Outcome Assessment	High	× 1	1
Domain 6: Confounding / Variable Control				
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2
Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1
Domain 7: Data Presentation and Analysis				
Metric 21:	Statistical Methods	Low	× 1	3 Not described
Metric 22:	Reporting of Data	High	× 2	2
Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1
Overall Quality Determination [‡]		Unacceptable		4.0 Metric mean score ^{**} : 1.7.

Extracted

Yes

** Consistent with our *Application of Systematic Review in TSCA Risk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, two of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Loekle, D. M., Schechter, A. J., Christian, J. J., 1983. Effects of Chloroform, Tetrachloroethylene, and Trichloroethylene on Survival, Growth, and Liver of *Poecilia sphenops*. 30:199-205
 Data Type: Chronic (>21 days); Aquatic; Fish
 Hero ID: 3616526

Domain	Metric	Rating ^f	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	Low	× 1	3	not provided
Metric 3:	Test Substance Purity	Low	× 1	3	Not provided
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	Low	× 2	6	Renewal exposure; nominal conc; no cover for test containers
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	nominal renewal test
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	Low	× 1	3	nominal renewal exposure
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	Low	× 2	6	No statistics used

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Study Citation: Loekle, D. M., Schechter, A. J., Christian, J. J., 1983. Effects of Chloroform, Tetrachloroethylene, and Trichloroethylene on Survival, Growth, and Liver of *Poecilia sphenops*. 30:199-205
 Data Type: Chronic (>21 days); Aquatic; Fish
 Hero ID: 3616526

Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
Metric 18:	Consistency of Outcome Assessment	High	× 1	1
Domain 6: Confounding / Variable Control				
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2
Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1
Domain 7: Data Presentation and Analysis				
Metric 21:	Statistical Methods	Unacceptable	× 1	4 No statistical analysis
Metric 22:	Reporting of Data	High	× 2	2
Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1
Overall Quality Determination [‡]		Unacceptable		4.0 Metric mean score ^{**} : 1.6.

Extracted

No

^{**} Consistent with our *Application of Systematic Review in TSCA Risk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Domain	Metric	Rating ⁱ	MWF* [*]	Score	Comments ^{††}
Study Citation: Horne, J. D., Swirsky, M. A., Hollister, T. A., Oblad, B. R., Kennedy, J. H., 1983. Aquatic Toxicity Studies of Five Priority Pollutants. Data Type: Acute (0-96 hour); Aquatic; Fish Hero ID: 3617731					
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Not measured
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	

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Study Citation: Horne, J. D., Swirsky, M. A., Hollister, T. A., Oblad, B. R., Kennedy, J. H., 1983. Aquatic Toxicity Studies of Five Priority Pollutants. Acute (0-96 hour); Aquatic; Fish
 Data Type: 3617731
 Hero ID:

Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
Domain 6: Confounding / Variable Control				
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2
Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1
Domain 7: Data Presentation and Analysis				
Metric 21:	Statistical Methods	High	× 1	1
Metric 22:	Reporting of Data	High	× 2	2
Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1

Overall Quality Determination[‡]

Extracted

Yes

High

1.1

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Domain	Metric	Rating ⁱ	MWF* [*]	Score	Comments ^{††}
Study Citation: Horne, J. D., Swirsky, M. A., Hollister, T. A., Oblad, B. R., Kennedy, J. H., 1983. Aquatic Toxicity Studies of Five Priority Pollutants. Data Type: Acute (0-96 hour); Aquatic; Invertebrates Hero ID: 3617731					
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Not measured
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	

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Study Citation: Horne, J. D., Swirsky, M. A., Hollister, T. A., Oblad, B. R., Kennedy, J. H., 1983. Aquatic Toxicity Studies of Five Priority Pollutants. Acute (0-96 hour); Aquatic; Invertebrates
 Data Type: 3617731
 Hero ID:

Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
Domain 6: Confounding / Variable Control				
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2
Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1
Domain 7: Data Presentation and Analysis				
Metric 21:	Statistical Methods	High	× 1	1
Metric 22:	Reporting of Data	High	× 2	2
Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1

Overall Quality Determination[‡]

Extracted

Yes

High

1.1

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Study Citation: Hollister, T. A., Parker, A. H., Jr., Parrish, P. R.. 1968. Acute and Chronic Toxicity of Five Chemicals to Mysid Shrimp (Mysidopsis bahia).					
Data Type: Acute (0-96 hour); Aquatic;					
Hero ID: 3617735					
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	Low	× 1	3	Purity/grade not reported
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	Low	× 1	3	Allocation not reported
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	

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Study Citation:	Hollister, T. A., Parker, A. H., Jr., Parrish, P. R.. 1968. Acute and Chronic Toxicity of Five Chemicals to Mysid Shrimp (<i>Mysidopsis bahia</i>).				
Data Type:	Acute (0-96 hour); Aquatic;				
Hero ID:	3617735				
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 6: Confounding / Variable Control	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Metric 19: Confounding Variables in Test Design and Procedures		High	× 2	2	
Metric 20: Outcomes Unrelated to Exposure		High	× 1	1	
Domain 7: Data Presentation and Analysis	Metric 21: Statistical Methods	High	× 1	1	
Metric 22: Reporting of Data		High	× 2	2	
Metric 23: Explanation of Unexpected Outcomes		High	× 1	1	
Overall Quality Determination [‡]		High		1.1	
Extracted		Yes			

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Hollister, T. A., Parker, A. H., Jr., Parrish, P. R.. 1968. Acute and Chronic Toxicity of Five Chemicals to Mysid Shrimp (Mysidopsis bahia).					
Data Type: Chronic (>21 days); Aquatic; Invertebrates					
Hero ID: 3617735					
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	Low	× 1	3	Info not provided
Metric 3:	Test Substance Purity	Low	× 1	3	info not provided
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
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Study Citation:	Hollister, T. A., Parker, A. H., Jr., Parrish, P. R.. 1968. Acute and Chronic Toxicity of Five Chemicals to Mysid Shrimp (<i>Mysidopsis bahia</i>).				
Data Type:	Chronic (>21 days); Aquatic; Invertebrates				
Hero ID:	3617735				
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 6: Confounding / Variable Control	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Metric 19: Confounding Variables in Test Design and Procedures		High	× 2	2	
Metric 20: Outcomes Unrelated to Exposure		High	× 1	1	
Domain 7: Data Presentation and Analysis	Metric 21: Statistical Methods	High	× 1	1	
Metric 22: Reporting of Data		High	× 2	2	
Metric 23: Explanation of Unexpected Outcomes		High	× 1	1	
Overall Quality Determination [‡]		High		1.1	
Extracted		Yes			

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Hollister, T. A., Parker, A. H., Jr., Parrish, P. R.. 1968. Acute and Chronic Toxicity of Five Chemicals to Mysid Shrimp (Mysidopsis bahia).					
Data Type: Other; Aquatic; Invertebrates					
Hero ID: 3617735					
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	Low	× 1	3	Info not provided
Metric 3:	Test Substance Purity	Low	× 1	3	info not provided
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
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Study Citation:	Hollister, T. A., Parker, A. H., Jr., Parrish, P. R.. 1968. Acute and Chronic Toxicity of Five Chemicals to Mysid Shrimp (<i>Mysidopsis bahia</i>).				
Data Type:	Other; Aquatic; Invertebrates				
Hero ID:	3617735				
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 6: Confounding / Variable Control	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Metric 19: Confounding Variables in Test Design and Procedures		High	× 2	2	
Metric 20: Outcomes Unrelated to Exposure		High	× 1	1	
Domain 7: Data Presentation and Analysis	Metric 21: Statistical Methods	High	× 1	1	
Metric 22: Reporting of Data		High	× 2	2	
Metric 23: Explanation of Unexpected Outcomes		High	× 1	1	
Overall Quality Determination [‡]		High		1.1	
Extracted		Yes			

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Yoshioka, Y., Ose, Y., Sato, T.. 1986. Correlation of the Five Test Methods to Assess Chemical Toxicity and Relation to Physical Properties. 12:15-21
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 3617749

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	Low	× 1	3	Source of Perc was not reported, but it was noted that analytical grade Perc was used.
Metric 3:	Test Substance Purity	Low	× 1	3	Purity not reported
Domain 2: Test Design					
Metric 4:	Negative Controls	Unacceptable	× 2	8	The study does not mention a control anywhere. The study refers to a blank for <i>Dugesia japonica</i> (planarian) but doesn't say what's in the blank, and doesn't mention a blank for <i>O. latipes</i> (red killifish).
Metric 5:	Negative Control Response		N/A	No control reported	
Metric 6:	Randomized Allocation	Low	× 1	3	It's not reported whether animals were randomly allocated.
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	Low	× 2	6	It is not reported whether the container was closed or open, and Perc is a volatile chemical.
Metric 8:	Consistency of Exposure Administration	Low	× 1	3	Exposure methods were not reported for each study group
Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	It was not reported whether nominal or measured conc were used.
Metric 10:	Exposure Duration and Frequency	Low	× 2	6	Exposure occurred over 4 hours, and OECD recommends 48 hours for invertebrate acute tests.
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Unacceptable	× 1	4	For Perc, it is unclear how many exposure groups were used for the LC50 determination.
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	Low	× 2	6	Test species is a saltwater invertebrate, and were used at 5 days old, but the source of the species is not reported.

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Study Citation: Yoshioka, Y., Ose, Y., Sato, T.. 1986. Correlation of the Five Test Methods to Assess Chemical Toxicity and Relation to Physical Properties. 12:15-21

Data Type: Acute (0-96 hour); Aquatic; Invertebrates

Hero ID: 3617749

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 14: Acclimitization and Pretreatment Conditions	Low	× 1	3	Study did not report acclimating water fleas.
	Metric 15: Number of Organisms and Replicates per Group	Low	× 1	3	10 organisms per exposure group. For freshwater invertebrates, OECD recommends at least 20.
	Metric 16: Adequacy of Test Conditions	Medium	× 1	2	"Ten M. macrocopa in 100 ml of test solution were put in a 250-ml vial vessel at 20 °C and the survivors were counted after 3 hr in order to determine LC50."
Domain 5: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	High	× 2	2	Determined an LC50
	Metric 18: Consistency of Outcome Assessment	Low	× 1	3	Details of outcome assessment were not reported.
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	Low	× 2	6	The study did not provide enough information to allow a comparison of environmental conditions or other non treatment related factors across study groups.
	Metric 20: Outcomes Unrelated to Exposure	Low	× 1	3	Data on health and attrition were not reported for each study group.
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	Medium	× 1	2	Methods not described clearly
	Metric 22: Reporting of Data	Low	× 2	6	Data for exposure related findings not reported for each study group
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		Unacceptable		4.0	Metric mean score ^{**} : 2.6.
Extracted		No			

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Study Citation: Yoshioka, Y., Ose, Y., Sato, T.. 1986. Correlation of the Five Test Methods to Assess Chemical Toxicity and Relation to Physical Properties. 12:15-21
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 3617749

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
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** Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, two of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

if any metric is Unacceptable

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0,1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

<p>Study Citation: Yoshioka, Y.,Ose, Y.,Sato, T.. 1986. Correlation of the Five Test Methods to Assess Chemical Toxicity and Relation to Physical Properties. 12:15-21</p> <p>Data Type: Other; Aquatic; Invertebrates</p> <p>Hero ID: 3617749</p>					
Domain	Metric	Rating [†]	MWF* [*]	Score	Comments ^{††}
<p>Domain 1: Test Substance</p>					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	Low	× 1	3	Source of Perc was not reported, but it was noted that analytical grade Perc was used.
Metric 3:	Test Substance Purity	Low	× 1	3	purity not reported
<p>Domain 2: Test Design</p>					
Metric 4:	Negative Controls	Low	× 2	6	the study refers to a blank but doesn't say what's in the blank. I assume this is the control for D. japonica (planarian)
Metric 5:	Negative Control Response	Low	× 1	3	the study reports that most of the planarian in the blank test regenerated heads normally, but a number isn't given and Perc isn't discussed specifically.
Metric 6:	Randomized Allocation	Low	× 1	3	it's not reported whether animals were randomly allocated.
<p>Domain 3: Exposure Characterization</p>					
<p>Continued on next page ...</p>					

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Study Citation:	Yoshioka, Y.,Ose, Y.,Sato, T.. 1986. Correlation of the Five Test Methods to Assess Chemical Toxicity and Relation to Physical Properties. 12:15-21				
Data Type:	Other; Aquatic; Invertebrates				
Hero ID:	3617749				
Domain	Metric	Rating [†]	MWP*	Score	Comments ^{††}
Metric 7:	Experimental System/Test Media Preparation	Low	× 2	6	It's unclear whether the experiment was conducted in a closed or open system using static or flow through methods. The study reports, "The breeding liquid for <i>Dugesia japonica</i> was prepared by dissolving 3.74 g of NaCl, 0.49 g of KCl, and 8.55 g of CaCl ₂ into distilled water to make 500 ml. This was diluted 100 times and neutralized by NaHC03 before use. <i>Dugesia japonica</i> were collected from a stream around which there was no source of pollution and left without food for over 7 days in the breeding liquid to excrete alimentary canal contents. Those of about .2 cm long were used. <i>Dugesia japonica</i> was cut into two parts (head and body part) at the nearest section to the eyes of the trisected part between pharynx and eyes. The body part was used for the head regeneration test. Ten body parts were put in 100 ml of a test solution, and this was left at 20 °C for 7 days. Observation for head regeneration was carried out with a stereomicroscope on Days 3, 4, 5, 6, and 7 after head cutting, and the test solution was replaced at every observation. The degree of regeneration was classified as normal, eye spot, tetratophthalmic, anophthalmic, acipthalmic, and death. The total number of eye spot, tetratophthalmic, anophthalmic, acipthalmic, and death was regarded as the abnormal regeneration number. The ratio of the number to 10 on Day 7 was defined as the abnormal regeneration rate. The concentration of the chemical, at which the abnormal regeneration rate reached 50 percent, was defined as EC50" LC50 of <i>D. japonica</i> was determined at the same time. LC50 and EC50 values of the test mentioned above were determined on semilogarithmic paper." exposure methods were not reported for each study group
Metric 8:	Consistency of Exposure Administration	Low	× 1	3	it was not reported whether nominal or measured conc were used.
Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	
Metric 10:	Exposure Duration and Frequency	Medium	× 2	4	Exposure occurred over 7 days, and observation was carried out on days 3, 4, 5, 6, and 7 after head cutting, and the test solution was replaced at every observation.

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<p>Study Citation: Yoshioka, Y., Ose, Y., Sato, T.. 1986. Correlation of the Five Test Methods to Assess Chemical Toxicity and Relation to Physical Properties. 12:15-21 Data Type: Other; Aquatic; Invertebrates Hero ID: 3617749</p>					
Domain	Metric	Rating [†]	MWP* [‡]	Score	Comments ^{††}
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	not reported for Perc, but for other chemicals it looks like 4 exposure groups were used plus control.
	Metric 12: Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism	Metric 13: Test Organism Characteristics	Medium	× 2	4	Minor uncertainties about the quality of the test organisms given they were collected from the field and no acclimation is mentioned. Study reports, "Dugesia japonica were collected from a stream around which there was no source of pollution and left without food for over 7 days in the breeding liquid to excrete alimentary canal contents. Those of about 2 cm long were used." did not report whether they were acclimatized and they were collected from the field.
	Metric 14: Acclimatization and Pretreatment Conditions	Low	× 1	3	number of animals in each solution was not clear, possibly ten? the study says "Ten body parts were put in 100 ml of a test solution, and this was left at 20 °C for 7 days." Is this 10 body parts from 10 different individuals?
	Metric 15: Number of Organisms and Replicates per Group	Medium	× 1	2	
	Metric 16: Adequacy of Test Conditions	Low	× 1	3	housing not mentioned for planarian
Domain 5: Outcome Assessment	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	Low	× 1	3	details of outcome assessment were not reported.
Domain 6: Confounding / Variable Control	Metric 19: Confounding Variables in Test Design and Procedures	Medium	× 2	4	confounding variables are discussed for planarian. the study says that confounding may occur due to the cutting of the head (stress of cutting of the head).
	Metric 20: Outcomes Unrelated to Exposure	Low	× 1	3	data on health and attrition were not reported for each study group.
Domain 7: Data Presentation and Analysis	Metric 21: Statistical Methods	Medium	× 1	2	methods not described clearly
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Study Citation: Yoshioka, Y., Ose, Y., Sato, T.. 1986. Correlation of the Five Test Methods to Assess Chemical Toxicity and Relation to Physical Properties. 12:15-21
 Data Type: Other; Aquatic; Invertebrates
 Hero ID: 3617749

Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
Metric 22:	Reporting of Data	Low	× 2	6 data for exposure related findings not reported for each study group
Metric 23:	Explanation of Unexpected Outcomes	Medium	× 1	2 they did report unexpected outcomes and explained relatively sufficiently, e.g. the planarian numbers being very different than the other two species.

Overall Quality Determination[†]

Low 2.4

Extracted

Yes

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

†† The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Yoshioka, Y., Ose, Y., Sato, T.. 1986. Correlation of the Five Test Methods to Assess Chemical Toxicity and Relation to Physical Properties. 12:15-21
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 3617749

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	Low	× 1	3	Source of Perc was not reported, but it was noted that analytical grade Perc was used.
Metric 3:	Test Substance Purity	Low	× 1	3	purity not reported
Domain 2: Test Design					
Metric 4:	Negative Controls	Unacceptable	× 2	8	The study does not mention a control anywhere. The study refers to a blank for <i>Dugesia japonica</i> (planarian) but doesn't say what's in the blank, and doesn't mention a blank for <i>O. latipes</i> (red killifish).
Metric 5:	Negative Control Response		N/A	No control reported	
Metric 6:	Randomized Allocation	Low	× 1	3	it's not reported whether animals were randomly allocated.
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	Medium	× 2	4	Test was completed in a closed container (sealed with an electrode), but there were some uncertainties about how much air space there was in the flask.
Metric 8:	Consistency of Exposure Administration	Low	× 1	3	exposure methods were not reported for each study group
Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	it was not reported whether nominal or measured conc were used.
Metric 10:	Exposure Duration and Frequency	Low	× 2	6	Exposure occurred over 48 hours, and it sounds like a static test but it is not clear. OECD recommends 96 hours for fish acute tests.
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	For Perc, it is unclear how many exposure groups were used for the LC50 determination. (For the oxygen uptake it looks like 5 exposure groups according to figure 2 but that was a different test.)
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					

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Study Citation: Yoshioka, Y., Ose, Y., Safo, T.. 1986. Correlation of the Five Test Methods to Assess Chemical Toxicity and Relation to Physical Properties. 12:15-21

Data Type: Acute (0-96 hour); Aquatic; Fish

Hero ID: 3617749

Domain	Metric	Rating [†]	MWPF*	Score	Comments ^{††}
	Metric 13: Test Organism Characteristics	Medium	× 2	4	Minor uncertainties about the quality of the test organisms given they were collected from the market. Study reports, "Orizias latipes (ca. J.cm, 0. 3 g) was obtained from the market and acclimated for at least 1 week in dechlorinated water at 20°C (total hardness was about 80 mg/liter). LC50 was determined by exposing 10 O. latipes to 2 liters of a chemical solution at 20 " 1 "C for 48 hr with the cycle 8 hr dark and 16 hr light. The oxygen uptake rate was determined by putting 10 0. latipes in an Erlenmeyer flask (3-liter) filled with test solution which was saturated with air, and the flask was sealed with an electrode. Then it was left with out aeration at 20°C for 4 hr. The concentration of dissolved oxygen (DO) was measured by a DO meter (Denkikagaku type 3) every 30 min. As the oxygen was not supplied by aeration during the test, the result was accepted only when DO concentration was over 3 mg/liter at the end of the test in order to avoid the influence of the lack of DO. IFDO decreased to under 3 mg/liter, the test was carried out anew with 5 0. latipes. After the test, the wet weight of 0. latipes was measured in order to calculate the oxygen uptake rate per wet weight."
	Metric 14: Acclimitization and Pretreatment Conditions	Medium	× 1	2	Fish were acclimated for 1 week and OECD recommends 12 days before they are used for testing.
	Metric 15: Number of Organisms and Replicates per Group	High	× 1	1	
	Metric 16: Adequacy of Test Conditions	Medium	× 1	2	10 fish in 2 liters of water which is a little more than what OECD would recommend. At 0.3 g each and 10 fish per container, it should be a 3 liter flask.
Domain 5: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	Low	× 1	3	details of outcome assessment were not reported.
Domain 6: Confounding / Variable Control					

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Study Citation: Yoshioka, Y., Ose, Y., Sato, T.. 1986. Correlation of the Five Test Methods to Assess Chemical Toxicity and Relation to Physical Properties. 12:15-21
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 3617749

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Metric 19:	Confounding Variables in Test Design and Procedures	Low	× 2	6	Study did not provide enough information to allow a comparison of environmental conditions or other non-treatment-related factors across study groups, and the omitted information is likely to have a substantial impact on study results.
Metric 20:	Outcomes Unrelated to Exposure	Low	× 1	3	data on health and attrition were not reported for each study group.
Domain 7: Data Presentation and Analysis					
Metric 21:	Statistical Methods	Medium	× 1	2	methods not described clearly
Metric 22:	Reporting of Data	Low	× 2	6	data for exposure related findings not reported for each study group
Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		Unacceptable	→ Low	4.0	Metric mean score ^{**} : 2.4.

Extracted

No

** Consistent with our *Application of Systematic Review in TSCA Risk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Tsai, K. P., Chen, C. Y.. 2007. An Algal Toxicity Database of Organic Toxicants Derived by a Closed-System Technique. Environmental Toxicology and Chemistry 26:1931-1939
 Data Type: Acute (0-96 hour); Aquatic; Plants
 Hero ID: 3617867

Domain	Metric	Rating [†]	MWF* [‡]	Score	Comments ^{††}
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	Low	× 1	3	Source was not provided
	Metric 3: Test Substance Purity	Medium	× 1	2	Purity was not provided. Authors described the chemical purity as "reagent grade"
Domain 2: Test Design	Metric 4: Negative Controls	Medium	× 2	4	Authors referred to a control when discussing how they calculated their EC50 value, but additional details were not reported. The authors indicated that the details of the test setup can be found at the following source: Lin JH, Kao WC, Tsai KP, Chen CY. 2005. A novel algal toxicity testing technique for assessing the toxicity of both metallic and organic toxicants. Water Res 39:1869-1877. This source indicates that inclusion of a negative control is a part of the testing procedure.
	Metric 5: Negative Control Response	Low	× 1	3	Negative Control response was not specifically reported in the study, but was incorporated into the calculation of the percent inhibition.
	Metric 6: Randomized Allocation	Low	× 1	3	Researchers did not report how organisms were allocated to study groups
Domain 3: Exposure Characterization	Metric 7: Experimental System/Test Media Preparation	High	× 2	2	
	Metric 8: Consistency of Exposure Administration	High	× 1	1	
	Metric 9: Measurement of Test Substance Concentration	Medium	× 1	2	Test concentrations were reported in terms of nominal concentrations, but analytical confirmation of the test concentrations was performed at the beginning and end of the test by HPLC. This was intended to quantify any potential degradation.

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Study Citation:	Tsai, K. P., Chen, C. Y., 2007. An Algal Toxicity Database of Organic Toxicants Derived by a Closed-System Technique. Environmental Toxicology and Chemistry 26:1931-1939				
Data Type:	Acute (0-96 hour); Aquatic; Plants				
Hero ID:	3617867				
Domain	Metric	Rating [†]	MWP* [‡]	Score	Comments ^{††}
Domain 4: Test Organism	Metric 10: Exposure Duration and Frequency	Medium	× 2	4	Authors reported, "All tests were conducted in triplicate, with a test duration of 48 h. The population density of the algae was determined using an electronic particle counter". 48 hours is acceptable, but 72 hours is recommended in OECD 201.
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	The study report indicated that both a range finding and definitive test were conducted but did not report the test concentrations.
	Metric 12: Testing at or Below Solubility Limit	Low	× 1	3	It is unclear what test conc were, but the solubility of TCE is very high (999-1472 mg/l), and the EC50 determined was relatively low in comparison 26.24 mg/l)
Domain 5: Outcome Assessment	Metric 13: Test Organism Characteristics	High	× 2	2	
	Metric 14: Acclimatization and Pretreatment Conditions	High	× 1	1	
	Metric 15: Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16: Adequacy of Test Conditions	High	× 1	1		
Domain 6: Confounding / Variable Control	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
Metric 20: Outcomes Unrelated to Exposure	Medium	× 1	2		Data on attrition was not reported for each study group, but is unlikely to have a substantial impact on results.
Domain 7: Data Presentation and Analysis	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	Medium	× 2	4	Results did not include effects at each concentration level
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Study Citation: Tsai, K. P., Chen, C. Y.. 2007. An Algal Toxicity Database of Organic Toxicants Derived by a Closed-System Technique. Environmental Toxicology and Chemistry 26:1931-1939
 Data Type: Acute (0-96 hour); Aquatic; Plants
 Hero ID: 3617867

Domain	Metric	Rating†	MWF* Score	Comments††
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1
Overall Quality Determination‡		High		1.6
Extracted		Yes		

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Study Citation: Shubat, P. J., Poirier, S. H., Knuth, M. L., Brooke, L. T., 1982. Acute Toxicity of Tetrachloroethylene and Tetrachloroethylene with Dimethylformamide to Rainbow Trout (Salmo gairdneri). 28 Data Type: Acute (0-96 hour); Aquatic; Fish Hero ID: 3625336					
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	Acute Toxicity of Tetrachloroethylene and Tetrachloroethylene with Dimethylformamide to Rainbow Trout (Salmo gairdneri)
Metric 2:	Test Substance Source	High	× 1	1	Exposure samples containing tetrachloroethylene (Aldrich Chemical Co., 99 percent pure)
Metric 3:	Test Substance Purity	High	× 1	1	Exposure samples containing tetrachloroethylene (Aldrich Chemical Co., 99 percent pure)
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	Five toxicant concentrations and a lake water control were tested in duplicate.
Metric 5:	Negative Control Response	High	× 1	1	one death occurred in a Tetrachloroethylene control chamber after 72 h of exposure.
Metric 6:	Randomized Allocation	High	× 1	1	Ten fish were randomly assigned to each exposure tank and observed for loss of equilibrium and mortality.
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	The recovery of Tetrachloroethylene from spiked Lake Superior water was 89.9 percent " 6.2 percent (n"23).
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	The recovery of Tetrachloroethylene from spiked Lake Superior water was 89.9 percent " 6.2 percent (n"23).
Metric 10:	Exposure Duration and Frequency	High	× 2	2	Observations were made at 1, 3, 6, 12, and 24 h, and at daily intervals thereafter until the test was terminated at 96 h.
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	<0.001, 2.41, 3.69, 6.39, 11.2, and 17.3 mg/L
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	LC 50= 4.99 mg/L
Domain 4: Test Organism					
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Study Citation: Shubat, P. J., Poirier, S. H., Knuth, M. L., Brooke, L. T., 1982. Acute Toxicity of Tetrachloroethylene and Tetrachloroethylene with Dimethylformamide to Rainbow Trout (Salmo gairdneri). 28
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 3625336

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 5: Outcome Assessment	Metric 13: Test Organism Characteristics	High	× 2	2	Rainbow trout (Salmo gairdneri Richardson) from Fattig Fish Hatchery, Brady, Nebraska, were held for 25 days before testing with Tetrachloroethylene.
	Metric 14: Acclimatization and Pretreatment Conditions	High	× 1	1	Rainbow trout (Salmo gairdneri Richardson) from Fattig Fish Hatchery, Brady, Nebraska, were held for 25 days before testing with Tetrachloroethylene.
	Metric 15: Number of Organisms and Replicates per Group	High	× 1	1	Five toxicant concentrations and a lake water control were tested in duplicate.
	Metric 16: Adequacy of Test Conditions	High	× 1	1	Fish were held in 12oc Lake Superior water and were fed trout pellets from Glencoe Mills, Inc. until 24 hours before testing. Average fish weights at the time of testing were 3.20 g for the TCE test.
Domain 6: Confounding / Variable Control	Metric 17: Outcome Assessment Methodology	High	× 2	2	LC 50= 4.99 mg/L
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
Domain 7: Data Presentation and Analysis	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	None reported
	Metric 21: Statistical Methods	High	× 1	1	LC50 values were calculated by the trimmed Spearman-Kärber method (HAMIL TON et al. 1977).
	Metric 22: Reporting of Data	High	× 2	2	
Overall Quality Determination [†]	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	One death occurred in a tetrachloroethylene control chamber after 72 h of exposure. No cause of death was determined.
	Extracted	High		1.0	Yes

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Study Citation: Shubat, P. J., Poirier, S. H., Knuth, M. L., Brooke, L. T., 1982. Acute Toxicity of Tetrachloroethylene and Tetrachloroethylene with Dimethylformamide to Rainbow Trout (Salmo gairdneri). 28
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 3625336

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
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* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

if any metric is Unacceptable

$$\text{Overall rating} = \begin{cases} 4 \\ \left[\frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right]_{0.1} \end{cases} \quad (\text{round to the nearest tenth) otherwise}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
<p>Study Citation: Schell, J. D. J., 1987. Interactions of Halogenated Hydrocarbon Mixtures in the Embryo of the Japanese Medaka (<i>Oryzias latipes</i>). Data Type: Other; Aquatic; Fish Hero ID: 3625489</p>					
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	Medium	× 2	4	Clean rearing solution was used as a control, with only minor uncertainties about formulation.
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	Low	× 1	3	did not report whether allocation to study groups was random.
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Nominal concentrations were used and were not measured. Perc is volatile. Rate of loss was determined for carbon tet and chloroform, but not Perc.
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	Low	× 1	3	10 embryos per dose group, which is good, but no mention of how many replicates.
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					

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Study Citation: Schell, J. D. J., 1987. Interactions of Halogenated Hydrocarbon Mixtures in the Embryo of the Japanese Medaka (*Oryzias latipes*).
 Data Type: Other; Aquatic; Fish
 Hero ID: 3625489

Domain	Metric	Rating†	MWF*	Score	Comments††
Domain 6: Confounding / Variable Control	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
Domain 7: Data Presentation and Analysis	Metric 20: Outcomes Unrelated to Exposure	Medium	× 1	2	Data on attrition was reported in each exposure group. Other health outcomes were not reported, but I consider these only minor uncertainties.
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	Medium	× 2	4	most but not all outcomes were reported. only minor uncertainties.
Overall Quality Determination‡	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
	Overall Quality Determination‡	High		1.4	
Extracted		Yes			

* MWF = Metric Weighting Factor

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‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: De Foe, D. L.. 1980. Tetrachloroethylene Bioassay Results.
 Data Type: Chronic (>21 days); Aquatic; Fish
 Hero ID: 3625621

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	Tetrachloroethylene
Metric 2:	Test Substance Source		N/A	Not identified	
Metric 3:	Test Substance Purity		N/A	Not identified	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation		N/A	Not identified	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation		N/A	No information	
Metric 8:	Consistency of Exposure Administration		N/A	No information	
Metric 9:	Measurement of Test Substance Concentration		N/A	No information	
Metric 10:	Exposure Duration and Frequency		N/A	No information	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels		N/A	No information	
Metric 12:	Testing at or Below Solubility Limit		N/A	No information	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	Medium	× 2	4	Identified as fathead minnow only
Metric 14:	Acclimitization and Pretreatment Conditions		N/A	No information	
Metric 15:	Number of Organisms and Replicates per Group		N/A	No information	
Metric 16:	Adequacy of Test Conditions		N/A	No information	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology		N/A	Bioaccumulation factor is 79	
Metric 18:	Consistency of Outcome Assessment		N/A	Bioaccumulation study	

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Study Citation: De Foe, D. L.. 1980. Tetrachloroethylene Bioassay Results.
 Data Type: Chronic (>21 days); Aquatic; Fish
 Hero ID: 3625621

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 6: Confounding / Variable Control					
Metric 19: Confounding Variables in Test Design and Procedures			N/A	No information	
Metric 20: Outcomes Unrelated to Exposure			N/A	No information	
Domain 7: Data Presentation and Analysis					
Metric 21: Statistical Methods			N/A	No information	
Metric 22: Reporting of Data			N/A	No information	
Metric 23: Explanation of Unexpected Outcomes			N/A	No information	
Overall Quality Determination [‡]		High →		1.3	bioaccumulation study

Extracted

No

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{10.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Richter, J. E., Peterson, S. F., Kleiner, C. F.. 1983. Acute and Chronic Toxicity of some Chlorinated Benzenes, Chlorinated Ethanes, and Tetrachloroethylene to *Daphnia magna*. 12:679-684 (OECDG Data File)
 Data Type: Chronic (>21 days); Aquatic; Invertebrates
 Hero ID: 3634174

Domain	Metric	Rating†	MWF*	Score
Domain 1: Test Substance				
Metric 1:	Test Substance Identity	High	× 2	2
Metric 2:	Test Substance Source	High	× 1	1
Metric 3:	Test Substance Purity	High	× 1	1
Domain 2: Test Design				
Metric 4:	Negative Controls	High	× 2	2
Metric 5:	Negative Control Response	High	× 1	1
Metric 6:	Randomized Allocation	N/A	N/A	No information. Four replicates with five animals each were
Domain 3: Exposure Characterization				
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2
Metric 8:	Consistency of Exposure Administration	N/A	N/A	No information. These concentrations were the mean effective exposure based on measured r
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1
Metric 10:	Exposure Duration and Frequency	High	× 2	2
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1
Domain 4: Test Organism				
Metric 13:	Test Organism Characteristics	High	× 2	2

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Study Citation: Richter, J. E., Peterson, S. F., Kleiner, C. F., 1983. Acute and Chronic Toxicity of some Chlorinated Benzenes, Chlorinated Ethanes, and Tetrachloroethylene to *Daphnia magna*. 12:679-684 (OECDG Data File)
 Data Type: Chronic (>21 days); Aquatic; Invertebrates
 Hero ID: 3634174

Domain	Metric	Rating [†]	MWF*	Score
	Metric 14: Acclimitization and Pretreatment Conditions	High	× 1	1
	Metric 15: Number of Organisms and Replicates per Group	High	× 1	1
	Metric 16: Adequacy of Test Conditions	High	× 1	1
Domain 5: Outcome Assessment				
	Metric 17: Outcome Assessment Methodology	High	× 2	2
	Metric 18: Consistency of Outcome Assessment	High	× 1	1
Domain 6: Confounding / Variable Control				
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1
Domain 7: Data Presentation and Analysis				
	Metric 21: Statistical Methods	High	× 1	1
	Metric 22: Reporting of Data	High	× 2	2
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1
Overall Quality Determination [†]		High		1.0

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Study Citation: Richter, J. E., Peterson, S. F., Kleiner, C. F., 1983. Acute and Chronic Toxicity of some Chlorinated Benzenes, Chlorinated Ethanes, and Tetrachloroethylene to *Daphnia magna*. 12:679-684 (OECDG Data File)
 Data Type: Chronic (>21 days); Aquatic; Invertebrates
 Hero ID: 3634174

Domain	Metric	Rating† MWF*	Score
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Extracted Yes

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is} \\ \left[\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j \right]_{0.1} & \text{(round to the nearest integer)} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the adjusted rating. Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation: Richter, J. E., Peterson, S. F., Kleiner, C. F., 1983. Acute and Chronic Toxicity of some Chlorinated Benzenes, Chlorinated Ethanes, and Tetrachloroethylene to *Daphnia magna*. 12:679-684 (OECDG Data File)
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 3634174

Domain	Metric	Rating†	MWF*	Score
Domain 1: Test Substance				
Metric 1:	Test Substance Identity	High	× 2	2
Metric 2:	Test Substance Source	High	× 1	1
Metric 3:	Test Substance Purity	High	× 1	1
Domain 2: Test Design				
Metric 4:	Negative Controls	High	× 2	2
Metric 5:	Negative Control Response	High	× 1	1
Metric 6:	Randomized Allocation	N/A	N/A	No information. Four replicates with five animals each were
Domain 3: Exposure Characterization				
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2
Metric 8:	Consistency of Exposure Administration	N/A	N/A	No information. These concentrations were the mean effective exposure based on measured r
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1
Metric 10:	Exposure Duration and Frequency	High	× 2	2
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1
Domain 4: Test Organism				
Metric 13:	Test Organism Characteristics	High	× 2	2

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Study Citation: Richter, J. E., Peterson, S. F., Kleiner, C. F., 1983. Acute and Chronic Toxicity of some Chlorinated Benzenes, Chlorinated Ethanes, and Tetrachloroethylene to *Daphnia magna*. 12:679-684 (OECDG Data File)
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 3634174

Domain	Metric	Rating [†]	MWF*	Score
	Metric 14: Acclimitization and Pretreatment Conditions	High	× 1	1
	Metric 15: Number of Organisms and Replicates per Group	High	× 1	1
	Metric 16: Adequacy of Test Conditions	High	× 1	1
Domain 5: Outcome Assessment				
	Metric 17: Outcome Assessment Methodology	High	× 2	2
	Metric 18: Consistency of Outcome Assessment	High	× 1	1
Domain 6: Confounding / Variable Control				
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1
Domain 7: Data Presentation and Analysis				
	Metric 21: Statistical Methods	High	× 1	1
	Metric 22: Reporting of Data	High	× 2	2
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1
Overall Quality Determination [†]		High		1.0

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Study Citation: Richter, J. E., Peterson, S. F., Kleiner, C. F., 1983. Acute and Chronic Toxicity of some Chlorinated Benzenes, Chlorinated Ethanes, and Tetrachloroethylene to *Daphnia magna*. 12:679-684 (OECDG Data File)
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 3634174

Domain	Metric	Rating† MWF*	Score
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Extracted Yes

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is} \\ \left[\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j \right]_{0.1} & \text{(round to the nearest integer)} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the adjusted rating. Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

<p>Study Citation: Call, D. J., Brooke, L. T., Ahmad, N., Richter, J. E., 1983. Toxicity and Metabolism Studies with EPA (Environmental Protection Agency) Priority Pollutants and Related Chemicals in Freshwater Organisms.</p> <p>Data Type: Acute (0-96 hour); Aquatic; Fish</p> <p>Hero ID: 3634370</p>					
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	Low	× 1	3	Allocation not reported
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
<p>Continued on next page ...</p>					

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Study Citation:	Call, D. J.,Brooke, L. T.,Ahmad, N.,Richter, J. E.. 1983. Toxicity and Metabolism Studies with EPA (Environmental Protection Agency) Priority Pollutants and Related Chemicals in Freshwater Organisms.				
Data Type:	Acute (0-96 hour); Aquatic; Fish				
Hero ID:	3634370				
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 6: Confounding / Variable Control	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	High	× 2	2	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.1	
Extracted		Yes			

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:	Call, D. J., Brooke, L. T., Ahmad, N., Richter, J. E., 1983. Toxicity and Metabolism Studies with EPA (Environmental Protection Agency) Priority Pollutants and Related Chemicals in Freshwater Organisms.				
Data Type:	Acute (0-96 hour); Aquatic; Invertebrates				
Hero ID:	3634370				
Domain	Metric	Rating ^f	MWF* ^g	Score	Comments ^h ⁱ
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
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Study Citation:	Call, D. J.,Brooke, L. T.,Ahmad, N.,Richter, J. E.. 1983. Toxicity and Metabolism Studies with EPA (Environmental Protection Agency) Priority Pollutants and Related Chemicals in Freshwater Organisms.				
Data Type:	Acute (0-96 hour); Aquatic; Invertebrates				
Hero ID:	3634370				
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 6: Confounding / Variable Control	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Metric 19: Confounding Variables in Test Design and Procedures		High	× 2	2	
Metric 20: Outcomes Unrelated to Exposure		High	× 1	1	
Domain 7: Data Presentation and Analysis	Metric 21: Statistical Methods	High	× 1	1	
Metric 22: Reporting of Data		High	× 2	2	
Metric 23: Explanation of Unexpected Outcomes		High	× 1	1	
Overall Quality Determination [‡]		High		1.0	
Extracted		Yes			

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:	Call, D. J., Brooke, L. T., Ahmad, N., Richter, J. E., 1983. Toxicity and Metabolism Studies with EPA (Environmental Protection Agency) Priority Pollutants and Related Chemicals in Freshwater Organisms.			
Data Type:	Acute (0-96 hour); Aquatic; other fish and invert			
Hero ID:	3634370			
Domain	Metric	Rating ^f	MWF* ^g	Score
Domain 1: Test Substance				
Metric 1:	Test Substance Identity	High	× 2	2
Metric 2:	Test Substance Source	High	× 1	1
Metric 3:	Test Substance Purity	High	× 1	1
Domain 2: Test Design				
Metric 4:	Negative Controls	High	× 2	2
Metric 5:	Negative Control Response	High	× 1	1
Metric 6:	Randomized Allocation	High	× 1	1
Domain 3: Exposure Characterization				
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2
Metric 8:	Consistency of Exposure Administration	High	× 1	1
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1
Metric 10:	Exposure Duration and Frequency	High	× 2	2
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1
Domain 4: Test Organism				
Metric 13:	Test Organism Characteristics	High	× 2	2
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1
Metric 16:	Adequacy of Test Conditions	High	× 1	1
Domain 5: Outcome Assessment				
Metric 17:	Outcome Assessment Methodology	High	× 2	2
Continued on next page ...				

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Study Citation:	Call, D. J.,Brooke, L. T.,Ahmad, N.,Richter, J. E.. 1983. Toxicity and Metabolism Studies with EPA (Environmental Protection Agency) Priority Pollutants and Related Chemicals in Freshwater Organisms.			
Data Type:	Acute (0-96 hour); Aquatic; other fish and invert			
Hero ID:	3634370			
Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
Domain 6: Confounding / Variable Control	Metric 18: Consistency of Outcome Assessment	High	× 1	1
Metric 19: Confounding Variables in Test Design and Procedures		High	× 2	2
Metric 20: Outcomes Unrelated to Exposure		High	× 1	1
Domain 7: Data Presentation and Analysis	Metric 21: Statistical Methods	High	× 1	1
Metric 22: Reporting of Data		High	× 2	2
Metric 23: Explanation of Unexpected Outcomes		High	× 1	1
Overall Quality Determination [‡]		High		1.0
Extracted		Yes		

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Domain	Metric	Rating ⁱ	MWF* [*]	Score	Comments ^{††}
Study Citation: Call, D. J., Brooke, L. T., Ahmad, N., 1980. Toxicity, Bioconcentration, and Metabolism of Selected Chemicals in Aquatic Organisms. Data Type: Chronic (>21 days); Aquatic; Invertebrates Hero ID: 3634375					
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	Low	× 1	3	Allocation not reported
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	

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Study Citation: Call, D. J., Brooke, L. T., Ahmad, N., 1980. Toxicity, Bioconcentration, and Metabolism of Selected Chemicals in Aquatic Organisms.
 Data Type: Chronic (>21 days); Aquatic; Invertebrates
 Hero ID: 3634375

Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
Domain 6: Confounding / Variable Control	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1
	Domain 7: Data Presentation and Analysis			
Metric 21: Statistical Methods	High	× 1	1	
Metric 22: Reporting of Data	High	× 2	2	
Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	

Overall Quality Determination[‡]

Extracted

High 1.1

Yes

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right] & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Call, D. J., Brooke, L. T., Ahmad, N.. 1980. Toxicity, Bioconcentration, and Metabolism of Selected Chemicals in Aquatic Organisms.
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 3634375

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	High	× 1	1	Analysis reported
	Metric 3: Test Substance Purity		N/A		Grade/Purity not reported
Domain 2: Test Design	Metric 4: Negative Controls	High	× 2	2	
	Metric 5: Negative Control Response	High	× 1	1	
	Metric 6: Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization	Metric 7: Experimental System/Test Media Preparation	High	× 2	2	
	Metric 8: Consistency of Exposure Administration	High	× 1	1	
	Metric 9: Measurement of Test Substance Concentration	High	× 1	1	
	Metric 10: Exposure Duration and Frequency	High	× 2	2	
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
	Metric 12: Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism	Metric 13: Test Organism Characteristics	High	× 2	2	
	Metric 14: Acclimatization and Pretreatment Conditions	High	× 1	1	
	Metric 15: Number of Organisms and Replicates per Group	High	× 1	1	
	Metric 16: Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	

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Study Citation: Call, D. J.,Brooke, L. T.,Ahmad, N.. 1980. Toxicity, Bioconcentration, and Metabolism of Selected Chemicals in Aquatic Organisms.
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 3634375

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 6: Confounding / Variable Control					
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2	
Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					
Metric 21:	Statistical Methods	High	× 1	1	
Metric 22:	Reporting of Data	High	× 2	2	
Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.0	
Extracted		Yes			

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Domain	Metric	Rating ⁱ	MWF* [*]	Score	Comments ^{††}
Study Citation: Call, D. J., Brooke, L. T., Ahmad, N., 1980. Toxicity, Bioconcentration, and Metabolism of Selected Chemicals in Aquatic Organisms. Data Type: Other; Aquatic; Invertebrates Hero ID: 3634375					
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	Low	× 1	3	info not provided
Metric 3:	Test Substance Purity	Low	× 1	3	info not provided
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	

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Study Citation: Call, D. J., Brooke, L. T., Ahmad, N., 1980. Toxicity, Bioconcentration, and Metabolism of Selected Chemicals in Aquatic Organisms.
 Data Type: Other; Aquatic; Invertebrates
 Hero ID: 3634375

Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
Domain 6: Confounding / Variable Control	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1
	Domain 7: Data Presentation and Analysis			
Metric 21: Statistical Methods	High	× 1	1	
Metric 22: Reporting of Data	High	× 2	2	
Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	

Overall Quality Determination[‡]

Extracted

High 1.1

Yes

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Call, D. J., Brooke, L. T., Ahmad, N., 1979. Toxicity, Bioconcentration and Metabolism of Selected Chemicals in Aquatic Organisms.
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 3634391

Domain	Metric	Rating ⁱ	MWF* [*]	Score	Comments ^{††}
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	Low	× 1	3	Source/Information not reported
	Metric 3: Test Substance Purity	Low	× 1	3	Purity/grade not reported
Domain 2: Test Design	Metric 4: Negative Controls	High	× 2	2	
	Metric 5: Negative Control Response	High	× 1	1	
	Metric 6: Randomized Allocation	Low	× 1	3	Allocation not reported
Domain 3: Exposure Characterization	Metric 7: Experimental System/Test Media Preparation	High	× 2	2	
	Metric 8: Consistency of Exposure Administration	High	× 1	1	
	Metric 9: Measurement of Test Substance Concentration	High	× 1	1	
	Metric 10: Exposure Duration and Frequency	High	× 2	2	
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
	Metric 12: Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism	Metric 13: Test Organism Characteristics	High	× 2	2	
	Metric 14: Acclimatization and Pretreatment Conditions	Low	× 1	3	Allocation not reported
	Metric 15: Number of Organisms and Replicates per Group	High	× 1	1	
	Metric 16: Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	

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Study Citation: Call, D. J.,Brooke, L. T.,Ahmad, N.. 1979. Toxicity, Bioconcentration and Metabolism of Selected Chemicals in Aquatic Organisms.
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 3634391

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 6: Confounding / Variable Control	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
	Domain 7: Data Presentation and Analysis				
Metric 21: Statistical Methods		Low	× 1	3	Statistical methods not reported
Metric 22: Reporting of Data		High	× 2	2	
Metric 23: Explanation of Unexpected Outcomes		High	× 1	1	

Overall Quality Determination[‡]

High 1.3

Extracted

Yes

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right] & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Domain	Metric	Rating ⁱ	MWF* [*]	Score	Comments ^{††}
Study Citation: Call, D. J., Brooke, L. T., Ahmad, N., 1979. Toxicity, Bioconcentration and Metabolism of Selected Chemicals in Aquatic Organisms. Data Type: Acute (0-96 hour); Aquatic; Invertebrates Hero ID: 3634391					
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	Low	× 1	3	The test substance source was not reported.
Metric 3:	Test Substance Purity	Low	× 1	3	The purity was not included.
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	Low	× 1	3	Allocation not reported
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	Low	× 1	3	Acclimation not reported
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	

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Study Citation: Call, D. J., Brooke, L. T., Ahmad, N., 1979. Toxicity, Bioconcentration and Metabolism of Selected Chemicals in Aquatic Organisms.
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 3634391

Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
Domain 6: Confounding / Variable Control	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1
	Domain 7: Data Presentation and Analysis			
Metric 21: Statistical Methods	Low	× 1	3	Statistical methods not reported
Metric 22: Reporting of Data	High	× 2	2	
Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	

Overall Quality Determination[‡]

High

Yes

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

if any metric is Unacceptable

$$\text{Overall rating} = \begin{cases} 4 & \left[\frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right] \text{ (round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Domain	Metric	Rating ⁱ	MWF* [*]	Score	Comments ^{††}
Study Citation: Call, D. J., Brooke, L. T., Ahmad, N., 1979. Toxicity, Bioconcentration and Metabolism of Selected Chemicals in Aquatic Organisms. Data Type: Acute (0-96 hour); Aquatic; other invert, fish, algae Hero ID: 3634391					
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	Low	× 1	3	info not provided
Metric 3:	Test Substance Purity	Low	× 1	3	info not provided
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	Low	× 1	3	not addressed, measured concs in all tests
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	

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Study Citation: Call, D. J.,Brooke, L. T.,Ahmad, N.. 1979. Toxicity, Bioconcentration and Metabolism of Selected Chemicals in Aquatic Organisms.
 Data Type: Acute (0-96 hour); Aquatic; other invert, fish, algae
 Hero ID: 3634391

Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
Domain 6: Confounding / Variable Control				
Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis				
Metric 21: Statistical Methods	High	× 1	1	
Metric 22: Reporting of Data	High	× 2	2	
Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	

Overall Quality Determination[‡]

High

Yes

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right] & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Domain	Metric	Rating ^f	MWF*	Score	Comments ^{f†}
Study Citation: Brooke, L.. 1987. Report of the Flow-Through and Static Acute Test Comparisons with Fathead Minnows and Acute Tests with an Amphipod and a Cladoceran.					
Data Type: Acute (0-96 hour); Aquatic; Fish					
Hero ID: 3634436					
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	High	× 1	1	
	Metric 3: Test Substance Purity	High	× 1	1	
Domain 2: Test Design	Metric 4: Negative Controls	High	× 2	2	
	Metric 5: Negative Control Response	High	× 1	1	
	Metric 6: Randomized Allocation	Low	× 1	3	Allocation was not reported
Domain 3: Exposure Characterization	Metric 7: Experimental System/Test Media Preparation	High	× 2	2	
	Metric 8: Consistency of Exposure Administration	High	× 1	1	
	Metric 9: Measurement of Test Substance Concentration	High	× 1	1	
	Metric 10: Exposure Duration and Frequency	High	× 2	2	
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
	Metric 12: Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism	Metric 13: Test Organism Characteristics	High	× 2	2	
	Metric 14: Acclimatization and Pretreatment Conditions	High	× 1	1	
	Metric 15: Number of Organisms and Replicates per Group	High	× 1	1	
	Metric 16: Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment	Metric 17: Outcome Assessment Methodology	High	× 2	2	

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Study Citation: Brooke, L.. 1987. Report of the Flow-Through and Static Acute Test Comparisons with Fathead Minnows and Acute Tests with an Amphipod and a Cladoceran.
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 3634436

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	High	× 2	2	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.1	

Extracted

Yes

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j}{0.1} \right\rfloor & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:	Ahmad, N., Benoit, D., Brooke, L., Call, D., Carlson, A., Defoe, D., Hnot, J., Moriarity, A., Richter, J., Shubat, P., Veith, G., Wallbridge, C., 1984. Aquatic Toxicity Tests to Characterize the Hazard of Volatile Organic Chemicals in Water: A Toxicity Data Summary—Parts I and II.				
Data Type:	Acute (0-96 hour); Aquatic; Fish				
Hero ID:	3689695				
Domain	Metric	Rating [†]	MWF* [†]	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
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Study Citation:	Ahmad, N., Benoit, D., Brooke, L., Call, D., Carlson, A., Defoe, D., Huot, J., Moriarty, A., Richter, J., Shubat, P., Veith, G., Wallbridge, C., 1984. Aquatic Toxicity Tests to Characterize the Hazard of Volatile Organic Chemicals in Water: A Toxicity Data Summary—Parts I and II.				
Data Type:	Acute (0-96 hour); Aquatic; Fish				
Hero ID:	3689695				
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 6: Confounding / Variable Control	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	High	× 2	2	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.0	
Extracted		Yes			

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0,1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:	Ahmad, N., Benoit, D., Brooke, L., Call, D., Carlson, A., Defoe, D., Hnot, J., Moriarity, A., Richter, J., Shubat, P., Veith, G., Wallbridge, C., 1984. Aquatic Toxicity Tests to Characterize the Hazard of Volatile Organic Chemicals in Water: A Toxicity Data Summary—Parts I and II.				
Data Type:	Chronic (>21 days); Aquatic; Fish				
Hero ID:	3689695				
Domain	Metric	Rating [†]	MWF* [‡]	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
Metric 10:	Exposure Duration and Frequency	High	× 2	2	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimatization and Pretreatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					

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Study Citation:	Ahmad, N., Benoit, D., Brooke, L., Call, D., Carlson, A., Defoe, D., Huot, J., Moriarty, A., Richter, J., Shubat, P., Veith, G., Wallbridge, C., 1984. Aquatic Toxicity Tests to Characterize the Hazard of Volatile Organic Chemicals in Water: A Toxicity Data Summary—Parts I and II.				
Data Type:	Chronic (>21 days); Aquatic; Fish				
Hero ID:	3689695				
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 6: Confounding / Variable Control	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	High	× 2	2	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.0	
Extracted		Yes			

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

<p>Study Citation: Ahmad, N., Benoit, D., Brooke, L., Call, D., Carlson, A., Defoe, D., Hnot, J., Moriarity, A., Richter, J., Shubat, P., Veith, G., Wallbridge, C., 1984. Aquatic Toxicity Tests to Characterize the Hazard of Volatile Organic Chemicals in Water: A Toxicity Data Summary—Parts I and II.</p> <p>Data Type: ; Aquatic; Fish</p> <p>Hero ID: 3689695</p>					
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	Low	× 1	3	info not provided
	Metric 3: Test Substance Purity	Low	× 1	3	info not provided
Domain 2: Test Design					
	Metric 4: Negative Controls	High	× 2	2	
	Metric 5: Negative Control Response	High	× 1	1	
	Metric 6: Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
	Metric 7: Experimental System/Test Media Preparation	High	× 2	2	
	Metric 8: Consistency of Exposure Administration	High	× 1	1	
	Metric 9: Measurement of Test Substance Concentration	High	× 1	1	
	Metric 10: Exposure Duration and Frequency	High	× 2	2	
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
	Metric 12: Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
	Metric 13: Test Organism Characteristics	High	× 2	2	
	Metric 14: Acclimatization and Pretreatment Conditions	High	× 1	1	
	Metric 15: Number of Organisms and Replicates per Group	High	× 1	1	
	Metric 16: Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
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Study Citation: Ahmad, N., Benoit, D., Brooke, L., Call, D., Carlson, A., Defoe, D., Huot, J., Moriarty, A., Richter, J., Shubat, P., Veith, G., Wallbridge, C., 1984. Aquatic Toxicity Tests to Characterize the Hazard of Volatile Organic Chemicals in Water: A Toxicity Data Summary—Parts I and II.
 Data Type: ; Aquatic; Fish
 Hero ID: 3689695

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 6: Confounding / Variable Control	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 19: Confounding Variables in Test Design and Procedures	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
	Domain 7: Data Presentation and Analysis				
Domain 21: Statistical Methods	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	High	× 2	2	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]	High			1.1	
Extracted	Yes				

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0,1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Dow Chem Co. 1979. TOXICITY OF PERCHLOROETHYLENE TO DAPHNIDS.

Data Type: Acute (0-96 hour); Aquatic; Invertebrates

Hero ID: 4214225

Domain	Metric	Rating ⁱ	MWF* [†]	Score	Comments ^{††}
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	× 2	2	Perchloroethylene
	Metric 2: Test Substance Source	High	× 1	1	Lot TA 10278XN 78 noted by Dow Chemical
	Metric 3: Test Substance Purity	Low	× 1	3	Not reported.
Domain 2: Test Design	Metric 4: Negative Controls	High	× 2	2	Control and solvent control were used.
	Metric 5: Negative Control Response	Low	× 1	3	Not reported.
	Metric 6: Randomized Allocation	Low	× 1	3	Not mentioned.
Domain 3: Exposure Characterization	Metric 7: Experimental System/Test Media Preparation	Low	× 2	6	Static test is not recommended for a volatile chemical like PERC.,
	Metric 8: Consistency of Exposure Administration	Low	× 1	3	It seems nominal concentrations were used.
	Metric 9: Measurement of Test Substance Concentration	Low	× 1	3	It seems nominal concentrations were used.
	Metric 10: Exposure Duration and Frequency	Medium	× 2	4	Only final was reported.
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	Done.
	Metric 12: Testing at or Below Solubility Limit	High	× 1	1	Tested below the water solubility.
Domain 4: Test Organism	Metric 13: Test Organism Characteristics	High	× 2	2	Described.
	Metric 14: Acclimatization and Pretreatment Conditions	Medium	× 1	2	Described only as instar daphnids.
	Metric 15: Number of Organisms and Replicates per Group	Medium	× 1	2	10/concentrations without replicate, but the tests were run 3 times.
	Metric 16: Adequacy of Test Conditions	High	× 1	1	Described.
Domain 5: Outcome Assessment	Metric 17: Outcome Assessment Methodology	Medium	× 2	4	From the three tests run, only one was valid and used.

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Study Citation: Dow Chem Co. 1979. TOXICITY OF PERCHLOROETHYLENE TO DAPHNIDS.

Data Type: Acute (0-96 hour); Aquatic; Invertebrates

Hero ID: 4214225

Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
Metric 18:	Consistency of Outcome Assessment	Unacceptable	× 1	4 Two test runs were not valid.
Domain 6: Confounding / Variable Control				
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2 Not listed.
Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1 The report states that two out of three test were invalid.
Domain 7: Data Presentation and Analysis				
Metric 21:	Statistical Methods	Low	× 1	3 Out of three tests, only one valid test was used for calculation.
Metric 22:	Reporting of Data	High	× 2	2 Reported.
Metric 23:	Explanation of Unexpected Outcomes	Medium	× 1	2 The cause of unexpected outcome was not explained.
Overall Quality Determination [‡]		Unacceptable		4.0 Metric mean score ^{**} : 1.8.

Extracted

** Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Ciba-Geigy Corp. 1980. 96 HOUR STATIC FISH BIOASSAY TEST WITH ATTACHMENTS (ATTACHMENT 59).
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 4214249

Domain	Metric	Rating ⁱ	MWF* [†]	Score	Comments ^{††}
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	× 2	2	CAS# 127-18-4
	Metric 2: Test Substance Source	High	× 1	1	Ciba-Geigy, Batch No. 253952A
	Metric 3: Test Substance Purity	Low	× 1	3	Not listed.
Domain 2: Test Design	Metric 4: Negative Controls	High	× 2	2	Used.
	Metric 5: Negative Control Response	High	× 1	1	Reported.
	Metric 6: Randomized Allocation	Low	× 1	3	Not reported.
Domain 3: Exposure Characterization	Metric 7: Experimental System/Test Media Preparation	Low	× 2	6	Static
	Metric 8: Consistency of Exposure Administration	High	× 1	1	Done
	Metric 9: Measurement of Test Substance Concentration	Unacceptable	× 1	4	The test substance is volatile, but the test was conducted in static system.
	Metric 10: Exposure Duration and Frequency	Low	× 2	6	Nominal used.
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	Based on the range finding.
	Metric 12: Testing at or Below Solubility Limit	High	× 1	1	Tested below and above the water solubility (206 mg/L) of PERC
Domain 4: Test Organism	Metric 13: Test Organism Characteristics	High	× 2	2	Described.
	Metric 14: Acclimatization and Pretreatment Conditions	High	× 1	1	Reported.
	Metric 15: Number of Organisms and Replicates per Group	Low	× 1	3	The main test did not report, only reported that 3-4 fish were used for range-finders.
Metric 16: Adequacy of Test Conditions	High	× 1	1	Reported.	
Domain 5: Outcome Assessment	Metric 17: Outcome Assessment Methodology	Medium	× 2	4	Reported graphically

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Study Citation: Ciba-Geigy Corp. 1980. 96 HOUR STATIC FISH BIOASSAY TEST WITH ATTACHMENTS (ATTACHMENT 59).
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 4214249

Domain	Metric	Rating [†]	MWF* Score	Comments ^{††}
Metric 18:	Consistency of Outcome Assessment	High	× 1 1	Reported.
Domain 6: Confounding / Variable Control				
Metric 19:	Confounding Variables in Test Design and Procedures	Low	× 2 6	Not included.
Metric 20:	Outcomes Unrelated to Exposure	Low	× 1 3	Not included.
Domain 7: Data Presentation and Analysis				
Metric 21:	Statistical Methods	Medium	× 1 2	Reported graphically.
Metric 22:	Reporting of Data	High	× 2 2	Reported.
Metric 23:	Explanation of Unexpected Outcomes	Low	× 1 3	None listed.

Overall Quality Determination[‡] Unacceptable 4.0 Metric mean score^{**}: 1.9.

Extracted No

^{**} Consistent with our *Application of Systematic Review in TSCA Risk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

* MWF = Metric Weighting Factor

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

where High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Table of Contents

HERO ID	Data Type	Reference	1
Monitoring			2
5405	Monitoring	Pellizzari, E. D.,Wallace, L. A.,Gordon, S. M.. 1992. Elimination kinetics of volatile organics in humans using breath measurements. Journal of Exposure Analysis and Environmental Epidemiology 2	2
14003	Monitoring	Clayton, C. A.,Pellizzari, E. D.,Whitmore, R. W.,Perritt, R. L.,Quackenboss, J. J.. 1999. National Human Exposure Assessment Survey (NHEXAS): Distributions and associations of lead, arsenic, and volatile organic compounds in EPA Region 5. Journal of Exposure Analysis and Environmental Epidemiology 9	3
21469	Monitoring	Wallace, L. A.,Pellizzari, E. D.,Hartwell, T. D.,Sparacino, C. M.,Sheldon, L. S.,Zelon, H.. 1985. Results from the first three seasons of the TEAM study: personal exposures, indoor-outdoor relationships, and breath levels of toxic air pollutants measured for 355 persons in New Jersey.	4
21778	Monitoring	Aggazzotti, G.,Fantuzzi, G.,Predieri, G.,Righi, E.,Moscardelli, S.. 1994. Indoor exposure to perchloroethylene (PCE) in individuals living with dry-cleaning workers. Science of the Total Environment 156	5
22045	Monitoring	Heavner, D. L.,Morgan, W. T.,Ogden, M. W.. 1995. Determination of volatile organic compounds and ETS apportionment in 49 homes. Environment International 21	6
22186	Monitoring	Lebret, E.,van de Wiel, H. J.,Bos, H. P.,Noij, D.,Boleij, J. S. M.. 1986. Volatile organic compounds in Dutch homes. Environment International 12	7
23081	Monitoring	Wallace, L. A.. 1986. Personal exposures, indoor and outdoor air concentrations, and exhaled breath concentrations of selected volatile organic compounds measured for 600 residents of New Jersey, North Dakota, North Carolina, and California. Toxicological and Environmental Chemistry 12	8
27974	Monitoring	Chan, C. C.,Vainer, L.,Martin, J. W.,Williams, D. T.. 1990. Determination of organic contaminants in residential indoor air using an adsorption-thermal desorption technique. Journal of the Air and Waste Management Association 40	9
28104	Monitoring	Hisham, M. W. M.,Grosjean, D.. 1991. Sulfur dioxide, hydrogen sulfide, total reduced sulfur, chlorinated hydrocarbons and photochemical oxidants in southern California museums. Atmospheric Environment 25	11

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

H:	28307	Monitoring	Thomas, K. W., Pellizzari, E. D., Perritt, R. L., Nelson, W. C.. 1991. Effect of dry-cleaned clothes on tetrachloroethylene levels in indoor air, personal air, and breath for residents of several New Jersey homes. <i>Journal of Exposure Analysis and Environmental Epidemiology</i> 1	14
	28993	Monitoring	Ferrario, J. B., Lawler, G. C., Deleon, I. R., Laseter, J. L.. 1985. Volatile organic pollutants in biota and sediments of Lake Pontchartrain. <i>Bulletin of Environmental Contamination and Toxicology</i> 34	15
	29192	Monitoring	Singh, H. B., Salas, L. J., Stiles, R. E.. 1983. Selected man-made halogenated chemicals in the air and oceanic environment. <i>Journal of Geophysical Research</i> 88	16
	31210	Monitoring	M. R. Van Winkle, P. A. Scheff. 2001. Volatile organic compounds, polycyclic aromatic hydrocarbons and elements in the air of ten urban homes. <i>Indoor Air</i> 11	17
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2535652	Experimental	W. R. Chan, S. Cohn, M. Sidheswaran, D. P. Sullivan, W. J. Fisk. 2014. Contaminant levels, source strengths, and ventilation rates in California retail stores. <i>Indoor Air</i> 25	148
2655630	Experimental	Kowalska, J.,Gierczak, T.. 2013. Qualitative and Quantitative Analyses of the Halogenated Volatile Organic Compounds Emitted from the Office Equipment Items. <i>Indoor and Built Environment</i> 22	149
2718034	Experimental	M. Nohr, W. Horn, O. Jann, M. Richter, W. Lorenz. 2015. Development of a multi-VOC reference material for quality assurance in materials emission testing. <i>Analytical and Bioanalytical Chemistry</i> 407	150
3559311	Experimental	Chao, C. Y. H.,Tung, T. C. W.,Niu, J. L.,Pang, S. W.,Lee, R. Y. M.. 1999. Indoor perchloroethylene accumulation from dry cleaned clothing on residential premises. <i>Building and Environment</i> 34	151
3587655	Experimental	Cheng, W. enHsi,Tsai, D. Y.,Lu, J. iaYu, Lee, J. enWei. 2016. Extracting Emissions from Air Fresheners Using Solid Phase Microextraction Devices. <i>Aerosol and Air Quality Research</i> 16	152
4440489	Experimental	UL Env. 2017. Floor Coating VOC Emissions Research Report.	153
4442460	Experimental	Wetzel, T. A.. 2014. Volatile Organic Compounds (VOCs) In Indoor Air: Emission From Consumer Products and the Use of Plants for Air Sampling.	156
4532343	Experimental	C. B. Keil, M. Nicas. 2003. Predicting room vapor concentrations due to spills of organic solvents. <i>AIHA Journal</i> 64	157
4663242	Experimental	Won, D. Yang W.. 2012. Material emission information from: 105 building materials and consumer products.	158
4683353	Experimental	C Solal, C. Rousselle, C. Mandin, J. Manel, F. Maupetit. 2008. VOCs and formaldehyde emissions from cleaning products and air fresheners. <i>International Conference on Indoor Air Quality and Climate (Indoor Air 2008)</i>	159
4683358	Experimental	A. T. Hodgson. 1999. Common indoor sources of volatile organic compounds: Emission rates and techniques for reducing consumer exposures.	160
4683360	Experimental	A. T. Hodgson. 2001. Predicted concentrations in new relocatable classrooms of volatile organic compounds emitted from standard and alternate interior finish materials.	161
4683366	Experimental	A. C. Ortiz. 2010. Identifying sources of volatile organic compounds and aldehydes in a high performance building.	162
Databases Not Unique to a Chemical			163
484177	Databases Not Unique to a Chemical	Jia, C. R.,D'Souza, J.,Batterman, S.. 2008. Distributions of personal VOC exposures: A population-based analysis. <i>Environment International</i> 34	163

729385	Databases Not Unique to a Chemical	Arif, A. A.,Shah, S. M.. 2007. Association between personal exposure to volatile organic compounds and asthma among US adult population. International Archives of Occupational and Environmental Health 80	164
1359400	Databases Not Unique to a Chemical	Staples, C. A.,Werner, A. F.,Hoogheem, T. J.. 1985. Assessment of priority pollutant concentrations in the United States using STORET database. Environmental Toxicology and Chemistry 4	165
3970117	Databases Not Unique to a Chemical	U.S, E. P. A.. 2017. Chemical data reporting: 1,1,2,2,-tetrachloroethene.	166
3970236	Databases Not Unique to a Chemical	Oppt Monitoring Database. 2017. Perchloroethylene.	167
3970251	Databases Not Unique to a Chemical	Pubchem,. 2017. PubChem: Tetrachloroethylene.	168
3970268	Databases Not Unique to a Chemical	Household Products, Database. 2017. Household products database: Chemical information: Tetrachloroethylene.	169
3981163	Databases Not Unique to a Chemical	Consumer Product Information, Database. 2017. What's in it? tetrachloroethylene.	170
4663145	Databases Not Unique to a Chemical	Bartzis, J.. 2018. Prioritization of building materials as indoor pollution sources (BUMA).	171
Completed Exposure Assessments			172
18169	Completed Exposure Assessment	Page, G. W.. 1981. Comparison of groundwater and surface water for patterns and levels of contamination by toxic substances. Environmental Science and Technology 15	172
22606	Completed Exposure Assessment	Ipcs,. 1984. Tetrachloroethylene. Environmental Health Criteria 31	173
23126	Completed Exposure Assessment	Wallace, L. A.,Pellizzari, E.,Leaderer, B.,Zelon, H.,Sheldon, L.. 1987. Emissions of volatile organic compounds from building materials and consumer products. Atmospheric Environment 21	174
35002	Completed Exposure Assessment	U.S, E. P. A.. 2001. Sources, emission and exposure for trichloroethylene (TCE) and related chemicals.	175
58062	Completed Exposure Assessment	Fuller, B. B.. 1976. Air pollution assessment of tetrachloroethylene.	176
58284	Completed Exposure Assessment	Zoeteman, B. C. J.,Harmsen, K.,Linders, J. B. H. J.,Morra, C. F. H.,Slooff, W.. 1980. Persistent organic pollutants in river water and ground water of the Netherlands. Chemosphere 9	177
192111	Completed Exposure Assessment	Atsdr,. 1997. Toxicological profile for tetrachloroethylene.	178

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200024	Completed Exposure Assessment	Fishbein, L.. 1992. Exposure from occupational versus other sources. Scandinavian Journal of Work, Environment and Health 18	179
380600	Completed Exposure Assessment	Duboudin, C.. 2010. Pollution inside the home: descriptive analyses Part II: Identification of groups of homogenous homes in terms of pollution. Environnement, Risques & Sante 9	180
630433	Completed Exposure Assessment	Chien, Y. C.. 1997. The influences of exposure pattern and duration on elimination kinetics and exposure assessment of tetrachloroethylene in humans [PhD].	181
630715	Completed Exposure Assessment	Letkiewicz, F.,Johnston, P.,Macaluso, C.,Elder, R.,Yu, W.. 1982. Occurrence in tetrachloroethylene (perchloroethylene) in drinking water, food and air.	182
630847	Completed Exposure Assessment	Nysdoh,. 2005. Improving human risk assessment for tetrachloroethylene by using biomarkers and neurobehavioral testing.	183
633141	Completed Exposure Assessment	Benignus, V. A.,Boyes, W. K.,Geller, A. M.,Bushnell, P. J.. 2009. Long-term perchloroethylene exposure: A meta-analysis of neurobehavioral deficits in occupationally and residentially exposed groups. Journal of Toxicology and Environmental Health, Part A: Current Issues 72	184
694628	Completed Exposure Assessment	Destailats, H.,Maddalena, R. L.,Singer, B. C.,Hodgson, A. T.,McKone, T. E.. 2008. Indoor pollutants emitted by office equipment: A review of reported data and information needs. Atmospheric Environment 42	185
695495	Completed Exposure Assessment	C. J. Weschler. 2009. Changes in indoor pollutants since the 1950s. Atmospheric Environment 43	186
732615	Completed Exposure Assessment	Gilbert, D.,Goyer, M.,Lyman, W.,Magil, G.,Walker, P.,Wallace, D.,Wechsler, A.,Yee, J.. 1982. An exposure and risk assessment for tetrachloroethylene.	187
735303	Completed Exposure Assessment	Dawson, H. E.,McAlary, T.. 2009. A compilation of statistics for VOCs from post-1990 indoor air concentration studies in North American residences unaffected by subsurface vapor intrusion. Ground Water Monitoring and Remediation 29	188
819974	Completed Exposure Assessment	Bogen, K. T.,McKone, T. E.. 1988. Linking indoor air and pharmacokinetic models to assess tetrachloroethylene risk. Risk Analysis 8	189
1265174	Completed Exposure Assessment	. 1988. Toxic Air Pollutant Emission Factors Compilation For Selected Air Toxic Compounds and Sources.	190
1788276	Completed Exposure Assessment	de Blas, M.,Navazo, M.,Alonso, L.,Durana, N.,Gomez, M. C.,Iza, J.. 2012. Simultaneous indoor and outdoor on-line hourly monitoring of atmospheric volatile organic compounds in an urban building. The role of inside and outside sources. Science of the Total Environment 426	191
2536230	Completed Exposure Assessment	Du, Z.,Mo, J.,Zhang, Y.. 2014. Risk assessment of population inhalation exposure to volatile organic compounds and carbonyls in urban China. Environment International 73	192

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	3537636	Completed Exposure Assessment	L. Golsteijn, D. Huizer, M. Hauck, R. van Zelm, M. A. Huijbregts. 2014. Including exposure variability in the life cycle impact assessment of indoor chemical emissions: the case of metal degreasing. Environment International 71	193
	3491017	Completed Exposure Assessment	. 2015. Health Assessment for Groundwater, Surface Water, Soil and Sediment Data Evaluation, Corozal Well Site, Corozal, Puerto Rico, July 29, 2015. EPA Facility ID: PRN000206452.	194
	3543741	Completed Exposure Assessment	McDonald, G. J.,Wertz, W. E.. 2007. PCE, TCE, and TCA vapors in subslab soil gas and indoor air: A case study in upstate New York. Ground Water Monitoring and Remediation 27	195
	3572966	Completed Exposure Assessment	Bauer, U.. 1991. OCCURRENCE OF TETRACHLOROETHYLENE IN THE FEDERAL-REPUBLIC-OF-GERMANY. Chemosphere 23	196
	3573238	Completed Exposure Assessment	De Rooij, C.,Boutonnet, J. C.,Garny, V.,Lecloux, A.,Papp, R.,Thompson, R. S.,Van Wijk, D.. 1998. Euro Chlor risk assessment for the marine environment OSPARCOM region: North sea - Tetrachloroethylene. Environmental Monitoring and Assessment 53	197
	3573428	Completed Exposure Assessment	Giger, W.,Molnarkubica, E.. 1978. TETRACHLOROETHYLENE IN CONTAMINATED GROUND AND DRINKING WATERS. Bulletin of Environmental Contamination and Toxicology 19	198
XX	3797979	Completed Exposure Assessment	Nicnas,. 2001. Tetrachloroethylene ” Priority existing chemical. Assessment Report No. 15.	199
	3827300	Completed Exposure Assessment	Oecd,. 2013. Emission scenario document on the industrial use of adhesives for substrate bonding.	200
	3827392	Completed Exposure Assessment	U.S, E. P. A.. 2011. Background indoor air concentrations of volatile organic compounds in North American residences (1990-2005): A compilation of statistics for assessment vapor intrusion.	201
	3839195	Completed Exposure Assessment	Ecb,. 2005. European Union risk assessment report: Tetrachloroethylene. Part 1 - Environment. 57	202
	3969286	Completed Exposure Assessment	Australian Government Department of, Health. 2016. Human health tier III assessment for 1-methyl-2-pyrrolidinone.	203
	3970109	Completed Exposure Assessment	U.S, E. P. A.. 2012. Toxicological review of tetrachloroethylene (perchloroethylene).	204
	3970186	Completed Exposure Assessment	U.S, E. P. A.. 1998. Cleaner technologies substitutes assessment for professional fabricare processes.	205
	3970279	Completed Exposure Assessment	ToxNet Hazardous Substances Data, Bank. 2017. HSDB: Tetrachloroethylene.	206
	3970790	Completed Exposure Assessment	Echa,. 2014. Substance evaluation report - Tetrachloroethylene.	207

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3970791	Completed Exposure Assessment	Echa,. 2008. Annex XV restriction report: Tetrachloroethylene.	208
3970807	Completed Exposure Assessment	Spolana, a s. 2014. Chemical safety report: Trichloroethylene.	209
3970809	Completed Exposure Assessment	Domo Caproleuna GmbH. 2014. Chemical safety report: Industrial use as an extractive solvent for the purification of caprolactam from caprolactam oil.	210
3970811	Completed Exposure Assessment	D. O. W. Deutschland. 2014. Chemical safety report: Industrial use as process chemical (enclosed systems) in Alcantara material production.	211
3970833	Completed Exposure Assessment	Vlisco Netherlands, B. V.. 2014. Chemical safety report Part A: Use of trichloroethylene as a solvent for the removal and recovery of resin from dyed cloth.	212
3970838	Completed Exposure Assessment	Parker Hannifin, Manufacturing. 2014. Chemical safety report: Use of trichloroethylene as a process solvent for the manufacturing of hollow fibre gas separation membranes out of polyphenylene oxide (PPO).	213
3970842	Completed Exposure Assessment	. 2014. Exposure assessment: Trichloroethylene, Part 3.	214
3970844	Completed Exposure Assessment	Iarc,. 2014. IARC Monographs on the evaluation of carcinogenic risks to humans: Trichloroethylene, tetrachloroethylene, and some other chlorinated agents. 106	215
3978056	Completed Exposure Assessment	Atsdr,. 2006. Health consultation: Evaluation of tetrachloroethylene vapor intrusion into buildings located above a contaminated aquifer: Schlage Lock Company Security, El Paso County, Colorado: EPA facility ID: COD082657420.	216
3978068	Completed Exposure Assessment	Atsdr,. 2005. Health consultation: Walden's Ridge utility district: Signal Mountain, Hamilton County, Tennessee.	217
3978081	Completed Exposure Assessment	Atsdr,. 2008. Health consultation: Public comment release: Indoor and outdoor air data evaluation for Chillum perc site: Chillum perc site (aka Chillum perchloroethylene): Chillum, Prince George County, Maryland: EPA facility ID: MDN000305887.	218
3978375	Completed Exposure Assessment	Carex, Canada. 2017. Tetrachloroethylene– Environmental estimate.	219
3978377	Completed Exposure Assessment	Carex, Canada. 2017. Tetrachloroethylene– Environmental estimate: Indoor air.	220
3978390	Completed Exposure Assessment	Who,. 2006. WHO IRIS: Tetrachloroethylene.	221
3980994	Completed Exposure Assessment	Atsdr,. 2011. Case studies in environmental medicine: tetrachloroethylene toxicity.	222
3981152	Completed Exposure Assessment	Environment Canada, Health Canada. 1993. Canadian Environmental protection act priority substances list assessment report tetrachloroethylene.	223

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3982134	Completed Exposure Assessment	European Chlorinated Solvents, Association. 2011. Health profile on perchloroethylene.	224
3982310	Completed Exposure Assessment	Oehha,. 2001. Public health goal for tetrachloroethylene in drinking water.	225
3982312	Completed Exposure Assessment	Arb,. 1991. Proposed identification of perchloroethylene as a toxic air contaminant.	226
3986480	Completed Exposure Assessment	Carb,. 1991. Technical support document part A: Proposed identification of perchloroethylene as a toxic air contaminant.	227
3986481	Completed Exposure Assessment	Carb,. 1991. Technical support document part B: Proposed identification of perchloroethylene as a toxic air contaminant.	228
4151966	Completed Exposure Assessment	P. E. I. Associates. 1985. Asbestos dust control in brake maintenance. Draft.	229
4152094	Completed Exposure Assessment	Ec,. 2004. European Union risk assessment report: Tetrachloroethylene.	230
4152270	Completed Exposure Assessment	Wu,,et al.,. 2001. Sources, emissions and exposures for trichloroethylene (TCE) and related chemicals.	231
4152304	Completed Exposure Assessment	Herbert, P.,Charbonnier, P.,Rivolta, L.,Servais, M.,Van Mensch, F.,Campbell, I.. 1986. The occurrence of chlorinated solvents in the environment. Prepared by a workshop of the European Chemical Industry Federation (CEFIC). Chemistry and Industry 24	232
4663189	Completed Exposure Assessment	Delmaar, J. E.. Emission of chemical substances from solid matrices: a method for consumer exposure assessment.	233
Survey			234
1005969	Survey	U.S, E. P. A.. 1987. Household solvent products: A national usage survey.	234
1065590	Survey	Abt. 1992. Methylene chloride consumer use study survey findings.	235
2331429	Survey	Wang, S.,Majeed, M. A.,Chu, P.,Lin, H.. 2009. Characterizing relationships between personal exposures to VOCs and socioeconomic, demographic, behavioral variables. Atmospheric Environment 43	236
2443306	Survey	Farrow, A.,Taylor, H.,Northstone, K.,Golding, J.,Avon Longitudinal, Study. 2003. Symptoms of mothers and infants related to total volatile organic compounds in household products. Archives of Environmental Health 58	237
Modeling			241
56224	Modeling	Serrano-Trespacios, P. I.,Ryan, L.,Spengler, J. D.. 2004. Ambient, indoor and personal exposure relationships of volatile organic compounds in Mexico City metropolitan area. Journal of Exposure Analysis and Environmental Epidemiology 1	241

85812	Modeling	Park, J. H.,Spengler, J. D.,Yoon, D. W.,Dumyahn, T.,Lee, K.,Ozkaynak, H.. 1998. Measurement of air exchange rate of stationary vehicles and estimation of in-vehicle exposure. Journal of Exposure Analysis and Environmental Epidemiology 8	242
2494965	Modeling	Akita, Y.,Carter, G.,Serre, M. L.. 2007. Spatiotemporal nonattainment assessment of surface water tetrachloroethylene in New Jersey. Journal of Environmental Quality 36	243
3001596	Modeling	Olie, J. D.,Bessems, J. G.,Clewell, H. J.,Meulenbelt, J.,Hunault, C. C.. 2015. Evaluation of semi-generic PBTK modeling for emergency risk assessment after acute inhalation exposure to volatile hazardous chemicals. Chemosphere 132	244
4440489	Modeling	UL Env. 2017. Floor Coating VOC Emissions Research Report.	245

Refer to Appendix E of '*Application of Systematic Review in TSCA Risk Evaluations*' at <https://www.epa.gov> for more information of evaluation procedures and parameters.

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Pellizzari, E. D.,Wallace, L. A.,Gordon, S. M.. 1992. Elimination kinetics of volatile organics in humans using breath measurements. Journal of Exposure Analysis and Environmental Epidemiology.				
Data Type	Monitoring				
Hero ID	5405				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Sampling methodology detailed in separate reference which we don't have. Upgradable upon examination of reference.	
	Metric 2: Analytical Methodology	High	1		
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	>20 years old	
	Metric 6: Spatial and Temporal Variability	Low	3	Only 4 subjects	
	Metric 7: Exposure Scenario	Medium	2	Provided consumer products used, but not names or active ingredients.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	High	1		
	Metric 9: Quality Assurance	High	1		
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	limited discussion	
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation:	Clayton, C. A., Pellizzari, E. D., Whitmore, R. W., Perritt, R. L., Quackenboss, J. J.. 1999. National Human Exposure Assessment Survey (NHEXAS): Distributions and associations of lead, arsenic, and volatile organic compounds in EPA Region 5. Journal of Exposure Analysis and Environmental Epidemiology.				
Data Type	Monitoring				
Hero ID	14003				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1	Sampling methodologies explained in detail in other papers	
	Metric 2: Analytical Methodology	High	1	Analytical methodologies explained in detail in other papers.	
	Metric 3: Biomarker Selection	N/A	N/A	air samples	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	> 15 years ago	
	Metric 6: Spatial and Temporal Variability	High	1	Large sample size	
	Metric 7: Exposure Scenario	Medium	2	Indoor air, but not directly related to consumer products.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	No raw, no minimum.	
	Metric 9: Quality Assurance	High	1	Supplemental articles on QA/QC activities of project..	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1		
Overall Quality Determination*		High	1.4		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Wallace, L. A., Pellizzari, E. D., Hartwell, T. D., Sparacino, C. M., Sheldon, L. S., Zelon, H.. 1985. Results from the first three seasons of the TEAM study: personal exposures, indoor-outdoor relationships, and breath levels of toxic air pollutants measured for 355 persons in New Jersey.					
Data Type	Monitoring					
Hero ID	21469					
Domain	Metric	Rating [†]	Score	Comments [‡]		
Domain 1: Reliability						
	Metric 1: Sampling Methodology	High	1	Standard sampling method not mentioned. Air - Tenax, pump flow rates, 12 hr period; Breath - spirometer; No info on sample storage, duration prior to analysis. Field blanks conducted. GC/MS/COMP. Only very limited details provided. Recoveries provided, but no other discussion on calibration.		
	Metric 2: Analytical Methodology	Medium	2			
	Metric 3: Biomarker Selection	N/A	N/A			
Domain 2: Representativeness						
	Metric 4: Geographic Area	High	1	Large sample size, duplicates Indoor air, but not specific to a product		
	Metric 5: Currency	Low	3			30 yrs old
	Metric 6: Spatial and Temporal Variability	High	1			
	Metric 7: Exposure Scenario	Medium	2			
Domain 3: Accessibility/Clarity						
	Metric 8: Reporting of Results	Medium	2	Only GM, mean, and max provided. No raw data.		
	Metric 9: Quality Assurance	High	1	Dups, field blanks, lab blanks, controls		
Domain 4: Variability and Uncertainty						
	Metric 10: Variability and Uncertainty	High	1			
Overall Quality Determination*		High	1.6			
Extracted						

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: = ≥ 1.7 to < 2.3; Low: = ≥ 2.3 to ≤ 3.

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Aggazzotti, G.,Fantuzzi, G.,Predieri, G.,Righi, E.,Moscardelli, S.. 1994. Indoor exposure to perchloroethylene (PCE) in individuals living with dry-cleaning workers. Science of the Total Environment.				
Data Type	Monitoring				
Hero ID	21778				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Sampling protocol is described in detail.	
	Metric 2: Analytical Methodology	High	1	Analytical methods are described, and calibration and detection limits are given.	
	Metric 3: Biomarker Selection	N/A	N/A	Biomarker not used for alveolar/breath sampling	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	Presumed to be Modena, Italy	
	Metric 5: Currency	Low	3	Data collected prior to publication in 1994 (15+ years)	
	Metric 6: Spatial and Temporal Variability	High	1	Breath samples from both exposed and control populations, replicate indoor air samples from 30 households	
	Metric 7: Exposure Scenario	High	1	Consumer indoor air exposure measured by indoor air concentrations and breath samples	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	Summary statistics only	
	Metric 9: Quality Assurance	Low	3	Quality assurance is not directly discussed	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	Some discussion of variability between different members of same household	
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Heavner, D. L.,Morgan, W. T.,Ogden, M. W.. 1995. Determination of volatile organic compounds and ETS apportionment in 49 homes. Environment International.			
Data Type	Monitoring			
Hero ID	22045			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	Medium	2	Flow rate provided. No calibration mentioned. Field blanks used.
	Metric 2: Analytical Methodology	Low	3	No LOD/LOQ.
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representativeness				
	Metric 4: Geographic Area	High	1	
	Metric 5: Currency	Low	3	Samples collected in 1991
	Metric 6: Spatial and Temporal Variability	High	1	
	Metric 7: Exposure Scenario	Medium	2	Indoor air in residence, but not directly tied to a consumer product, but list of potential products listed.
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	Medium	2	No raw data. No percent detected.
	Metric 9: Quality Assurance	Medium	2	field blanks. no recoveries
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	High	1	SD. compared results between smokers and non smokers.
Overall Quality Determination*		Medium	1.9	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Lebret, E.,van de Wiel, H. J.,Bos, H. P.,Noij, D.,Boleij, J. S. M.. 1986. Volatile organic compounds in Dutch homes. Environment International.				
Data Type	Monitoring				
Hero ID	22186				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	sampling method is well explained. but no discussion of storage conditions and calibration.	
	Metric 2: Analytical Methodology	Low	3	calibration, DT, recovery samples are not mentioned.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	>15 yrs old	
	Metric 6: Spatial and Temporal Variability	High	1		
	Metric 7: Exposure Scenario	Medium	2	Indoor air study. but not consumer products specific.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	range, mean, deta frequency are provided. but no raw data.	
	Metric 9: Quality Assurance	Low	3	no QA/QC is discussed.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Low	3	discussion of variability/uncertainty is quite limited.	
Overall Quality Determination*		Medium	2.2		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Wallace, L. A.. 1986. Personal exposures, indoor and outdoor air concentrations, and exhaled breath concentrations of selected volatile organic compounds measured for 600 residents of New Jersey, North Dakota, North Carolina, and California. Toxicological and Environmental Chemistry.				
Data Type	Monitoring				
Hero ID	23081				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1		
	Metric 2: Analytical Methodology	High	1		
	Metric 3: Biomarker Selection	High	1	breath	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	>15 yrs old	
	Metric 6: Spatial and Temporal Variability	High	1		
	Metric 7: Exposure Scenario	Medium	2	indoor air study. but not analysis for consumer products.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	no raw data	
	Metric 9: Quality Assurance	High	1		
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1		
Overall Quality Determination*		High	1.4		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Chan, C. C., Vainer, L., Martin, J. W., Williams, D. T.. 1990. Determination of organic contaminants in residential indoor air using an adsorption-thermal desorption technique. Journal of the Air and Waste Management Association.				
Data Type	Monitoring				
Hero ID	27974				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Sampling methodology discussed. At each of 12 homes the following samples were collected in November or December 1986: four indoor air samples, of varying volumes, using single sorbent tube and one indoor air sample using two sorbent tubes connected in series. Repeat samplings were carried out at six of these homes in February or March, 1987. The indoor air samples were collected on the main floor of the home, usually in the living or family room, where no obvious sources of contamination were present. Indoor air samples were collected at the same time, usually in the evening or late afternoon where a uniform 90-minute sampling time was used and pump flow rates were adjusted to sample the required volume of air. Air volumes sampled varied from 5 to 50 L. After sample collection the sorbent tubes were sealed in individual screw cap glass tubes and then stored in a tightly sealed container until analyzed.	
	Metric 2: Analytical Methodology	Medium	2	Analytical methodology discussed. Samples were analyzed using adsorption/Thermal Desorption coupled with Gas Chromatography/Mass Spectrometry (ATD/GS/MS). Method Detection Limit (ng/tube) provided in Table I; 6.0 ng/tube for DCM, TCE and PERC. Analysis was carried out within two days of sampling.	
	Metric 3: Biomarker Selection	N/A	N/A	Biomarker is not used.	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	Canada	
	Metric 5: Currency	Low	3	>15 years (1986, 1987)	
	Metric 6: Spatial and Temporal Variability	Medium	2	large sample (60 indoor air samples collected 1986: 4 samples using single sorbent tube and 1 sample using two sorbent tubes connected in a series and 12 homes, so 5x12=60 and 30 indoor air samples collected 1987 at 6 homes: 5x6=30).	
	Metric 7: Exposure Scenario	Medium	2	Some discussion of exposure scenario, samples collected on main floor of the home usually in living room or family room where no source of contamination was present.	
Domain 3: Accessibility/Clarity					
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Study Citation:	Chan, C. C., Vainer, L., Martin, J. W., Williams, D. T.. 1990. Determination of organic contaminants in residential indoor air using an adsorption-thermal desorption technique. Journal of the Air and Waste Management Association.				
Data Type	Monitoring				
Hero ID	27974				
Domain	Metric	Rating [†]	Score	Comments [‡]	
	Metric 8: Reporting of Results	Medium	2	No supplemental or raw data. Tables II and III report indoor air concentrations (range and mean) for 12 homes during 1986 and 6 homes during 1987, respectively.	
	Metric 9: Quality Assurance	Medium	2	A blank sorbent tube was carried to and from each home and handled and analyzed as a sample, except that no air was sampled through the tube. Each week, three tubes fortified at a low level (approx 70-80 ng) and three tubes fortified at a medium level (approx 700- 800 ng) with a standard mixture of target compounds, together with a blank tube, were transported to and from one sampling site and analyzed by ATD/GC/MS. To assess the stability of the organic target compounds during storage of the sampling tube, triplicate sorbent tubes fortified with the target compounds at low and medium levels (approx 70-80 and 700-800 ng, respectively), together with a blank tube, were stored for 0,1,3 and 7 days under normal storage conditions and then analyzed by ATD/GC/MS.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	Since concentrations of contaminants can vary greatly, effective use of the technique requires that several air samples of different volumes be collected at each location.	
Overall Quality Determination*		Medium	2.0		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Hisham, M. W. M., Grosjean, D.. 1991. Sulfur dioxide, hydrogen sulfide, total reduced sulfur, chlorinated hydrocarbons and photochemical oxidants in southern California museums. Atmospheric Environment.				
Data Type	Monitoring				
Hero ID	28104				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Sampling methodology discussed. Chlorinated hydrocarbons (e.g., PERC) were measured at one museum in the Los Angeles area: the Gene Autry Western Heritage Museum (located between Griffin Park and Burbank). Measurements were carried out over a period of 2 weeks. Indoor air quality was surveyed at several (typically five) locations within each museum including exhibit galleries, collection storage areas, and other settings such as a research library. Chlorinated hydrocarbons were measured on-line using calibrated continuous analyzers. All analyzers were outfitted with two 1/4 in diameter Teflon sampling lines. Data were acquired around-the-clock every 30 min, yielding alternatively indoor and outdoor air concentrations..	
	Metric 2: Analytical Methodology	Medium	2	Analytical methodology discussed. Chlorinated hydrocarbons were measured by electron capture gas chromatography (EC-GC) as described earlier (Hisham and Grosjean, 1989; Williams and Grosjean, 1989, 1990) using a SRI model 8610 gas chromatograph equipped with a Valco 140 BN EC detector. For the chlorinated hydrocarbons, precisely metered amounts of the pure liquids were injected in a 1.00 m ³ Teflonlined container. Our EC-GC calibration data for chlorinated hydrocarbons were independently verified by analyzing a standard mixture prepared and calibrated in the laboratory of Dr R. Rasmussen (Oregon Graduate Center, Beaverton, OR). This mixture, contained in a passivated stainless steel canister, included 0.5-1.1 ppb each of some 15 halogenated hydrocarbons. Analysis of this mixture in our laboratory gave excellent agreement for C2C14 (corresponding to nominal and measured response factors of 0.042 and 0.041 ppb mm ⁻¹ , respectively. Analysis of the 15-compound mixture also enabled us to verify that none of these compounds interfered with PAN, CH3CCI 3 or C2C14 under our experimental conditions (Hisham and Grosjean, 1990). Detection limit was 0.1 ppb for tetrachloroethylene (PERC)	
	Metric 3: Biomarker Selection	N/A	N/A	Biomarker is not used	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	California, Los Angeles area at the Gene Autry Western Heritage Museum.	

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Study Citation:	Hisham, M. W. M., Grosjean, D.. 1991. Sulfur dioxide, hydrogen sulfide, total reduced sulfur, chlorinated hydrocarbons and photochemical oxidants in southern California museums. Atmospheric Environment.				
Data Type	Monitoring				
Hero ID	28104				
Domain	Metric	Rating [†]	Score	Comments [‡]	
	Metric 5: Currency	Low	3	>15 years (1989)	
	Metric 6: Spatial and Temporal Variability	Medium	2	At the Gene Autry Museum, our survey yielded some 600 data points each for PAN, CH ₃ CC13 and C ₂ C1 , all from EC-GC measurements. These pollutants were ubiquitous and could be detected at all indoor locations. Summarized in Table ! are maximum concentrations and the corresponding range of 24-h averages.. Note: both indoor and outdoor samples were collected.	
	Metric 7: Exposure Scenario	Medium	2	At the Gene Autry Museum, measurement of indoor pollutants were made at three locations, one in the museum exhibit area (Trail View Window), one in a hallway connected to the outside by a large roll-up door for truck deliveries, (the 'buffer zone') and one in a working area, the Conservation Room, which was near the buffer zone and connected to it by a small hallway and swing doors. The exhibit area was connected to the museum main HVAC system, and the buffer zone and Conservation Room were both connected to a smaller HVAC system. Both HVAC units were equipped with 50: 50 carbon-Carusorb chemical filtration. Each indoor location exhibited a different pattern with respect to indoor pollutant concentrations.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	No supplemental or raw data provided. Table 1 summarizes maximum concentrations and ranges of 24-h average concentrations at the Gene Autry Museum. Indoor air concentrations reported for PERC (C ₂ C14). Also Table 4 reports twenty-four hour averaged PERC (C ₂ C14) at the Gene Autry Museum .	
	Metric 9: Quality Assurance	Medium	2	Calibration data for the EC-GC all exhibited linear behavior (R >0.998) in the range of concentrations tested, i.e. 0.7-9 ppb for C ₂ C14,. The corresponding detection limit was 0.1 ppb for tetrachloroethylene.	
Domain 4: Variability and Uncertainty					
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Study Citation:	Hisham, M. W. M.,Grosjean, D.. 1991. Sulfur dioxide, hydrogen sulfide, total reduced sulfur, chlorinated hydrocarbons and photochemical oxidants in southern California museums. Atmospheric Environment.				
Data Type	Monitoring				
Hero ID	28104				
Domain	Metric	Rating [†]	Score	Comments [‡]	
	Metric 10: Variability and Uncertainty	Medium	2	Indoor levels of ozone, NO ₂ and PAN were substantially lower than outdoor levels when the roll-up door was closed, see Fig. 1. The opposite was true of the chlorinated hydrocarbons, (also shown in Fig. 1), thus pointing out to indoor sources of methyl chloroform and tetrachloroethylene. Indoor sources of chlorinated hydrocarbons have also been identified at six of the nine institutions included in our previous study (Hisham and Grosjean, 1989).	
Overall Quality Determination*		Medium	2.0		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation: Thomas, K. W., Pellizzari, E. D., Perritt, R. L., Nelson, W. C.. 1991. Effect of dry-cleaned clothes on tetrachloroethylene levels in indoor air, personal air, and breath for residents of several New Jersey homes. Journal of Exposure Analysis and Environmental Epidemiology.					
Data Type	Monitoring				
Hero ID	28307				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Sampling methodology is described with some details; no mention of sample storage.	
	Metric 2: Analytical Methodology	Low	3	Analysis methods only briefly described	
	Metric 3: Biomarker Selection	N/A	N/A	No biomarker	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	Nine homes in New Jersey	
	Metric 5: Currency	Low	3	Study conducted prior to 1991 (15+ years ago)	
	Metric 6: Spatial and Temporal Variability	High	1	Replicate samples, appropriate timing for biomonitoring (breath) samples, repeated sampling over scenario time	
	Metric 7: Exposure Scenario	High	1	Consumer inhalation exposure via dry-cleaned clothes, measured by indoor air/breath concentrations	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	Results reported in summary/chart form, not raw data	
	Metric 9: Quality Assurance	High	1	Quality control and assurance discussed; field blanks, two independent labs for analysis	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1	Variability and uncertainty discussed with respect to garment types and other factors affecting emissions	
Overall Quality Determination*		Medium	1.7		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Ferrario, J. B., Lawler, G. C., Deleon, I. R., Laseter, J. L.. 1985. Volatile organic pollutants in biota and sediments of Lake Pontchartrain. Bulletin of Environmental Contamination and Toxicology.				
Data Type	Monitoring				
Hero ID	28993				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	sampling method is described well. calibration is not referred.	
	Metric 2: Analytical Methodology	Medium	2	Analysis method is based on National Bureau of Standards procedure though, modified ver. Older method (1976).	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	>15 yrs old	
	Metric 6: Spatial and Temporal Variability	Low	3	sample size is quite small.	
	Metric 7: Exposure Scenario	Low	3	study of oysters/clams is off PECO.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	No raw data.	
	Metric 9: Quality Assurance	Medium	2	Blanks and calibration standards used, in addition internal standards, however results not reported.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Low	3	No discussion for variability/uncertainty.	
Overall Quality Determination*		Low	2.3		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Singh, H. B.,Salas, L. J.,Stiles, R. E.. 1983. Selected man-made halogenated chemicals in the air and oceanic environment. Journal of Geophysical Research.			
Data Type	Monitoring			
Hero ID	29192			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	High	1	
	Metric 2: Analytical Methodology	Low	3	sampling method, equipments are discribed. But there is time lag(3 - 6weeks) between sampling and analysis. experimental protocol is provided in another reference(singh 1982).
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representativeness				
	Metric 4: Geographic Area	High	1	
	Metric 5: Currency	Low	3	> 15 yrs old
	Metric 6: Spatial and Temporal Variability	Medium	2	Sufficient sample size(About 40). These samples are collected in various dates, sites, and depth. But no replicate samples.
	Metric 7: Exposure Scenario	High	1	
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	Medium	2	Dataset is well summarized. But no raw data is showed(just average value). The meaning of hyphen is not explained.
	Metric 9: Quality Assurance	Medium	2	QA is described a bit like calibration, standards though, discussion is quite limited.
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	Low	3	Comparison of measured values and predicted values is described though, limited discussion.
Overall Quality Determination*		Medium	2.0	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	M. R. Van Winkle, P. A. Scheff. 2001. Volatile organic compounds, polycyclic aromatic hydrocarbons and elements in the air of ten urban homes. Indoor Air.				
Data Type	Monitoring				
Hero ID	31210				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Sampling methodology discussed under Study Design.	
	Metric 2: Analytical Methodology	High	1	The canisters were analyzed in accordance with the U.S. EPA Compendium Method TO-14 by Gas Chromatography with Selected Ion Monitoring Mass Spectrometry (GC/MS).	
	Metric 3: Biomarker Selection	N/A	N/A	Biomarker is not used.	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	U.S., Southeast Chicago, IL	
	Metric 5: Currency	Low	3	>15 yrs (1994-1995)	
	Metric 6: Spatial and Temporal Variability	Medium	2	large sample size (48 samples see Table 1) no replicates?	
	Metric 7: Exposure Scenario	Medium	2	The questionnaire was designed to measure variables that may influence pollutant penetration, dispersion, and source strength. Potential influencing variables that were measured included household activity levels, household chemical sources, and factors that could affect ventilation. Specific variables included foods cooked, cleaners used during sampling, visitors during sampling, noticeable odors by occupant, chemicals used by occupant, window open status, and air-conditioning use.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	No supplemental or raw data. Summary stats for indoor air provided in Table 1.	
	Metric 9: Quality Assurance	Medium	2	Quality assurance was performed on the indoor data by the Illinois Department of Public Health. VOC, PAH, and elemental concentrations that were qualified as quantified (>10 times the mean blank concentration) and estimated (between 3 and 10 times the mean blank concentration) were included in the data analyses.	
Domain 4: Variability and Uncertainty					
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Study Citation:	M. R. Van Winkle, P. A. Scheff. 2001. Volatile organic compounds, polycyclic aromatic hydrocarbons and elements in the air of ten urban homes. Indoor Air.			
Data Type	Monitoring			
Hero ID	31210			
Domain	Metric	Rating [†]	Score	Comments [‡]
	Metric 10: Variability and Uncertainty	Medium	2	See Discussion section. Indoor VOC concentrations were highly variable. Similar to the TEAM study, the range of indoor VOC concentrations were within a factor of 10 to 1000. As indicated in Table 1, the indoor VOC concentrations, with the exception of methylene chloride, are generally comparable to the other studies
Overall Quality Determination*		Medium	1.9	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Lehmann, I.,Thoelke, A.,Rehwagen, M.,Rolle-Kampczyk, U.,Schlink, U.,Schulz, R.,Borte, M.,Diez, U.,Herbarth, O.. 2002. The influence of maternal exposure to volatile organic compounds on the cytokine secretion profile of neonatal T cells. Environmental Toxicology.				
Data Type	Monitoring				
Hero ID	34460				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Sampling methods and equipment are described.	
	Metric 2: Analytical Methodology	Medium	2	A GC-MS method was described with detection limits provided.	
	Metric 3: Biomarker Selection	High	1		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	Data collected >15 years old	
	Metric 6: Spatial and Temporal Variability	Medium	2	No replicates.	
	Metric 7: Exposure Scenario	Medium	2	Indoor air measured in children's bedrooms.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Low	3	Summary statistics provided with description of data set, range of concentrations, and number of samples in data set only.	
	Metric 9: Quality Assurance	Low	3	Quality assurance is not directly discussed	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Low	3	No discussion on variability but limitations were discussed.	
Overall Quality Determination*		Medium	2.2		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: ≥ 1.7 to < 2.3; Low: ≥ 2.3 to ≤ 3.

Study Citation:	Singh, H. B.,Salas, L. J.,Smith, A. J.,Shigeishi, H.. 1981. Measurements of some potentially hazardous organic chemicals in urban environments. Atmospheric Environment.				
Data Type	Monitoring				
Hero ID	39644				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Low	3	Sampling described in very general terms	
	Metric 2: Analytical Methodology	Low	3	Analysis done in field	
	Metric 3: Biomarker Selection	N/A	N/A	No biomarker	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	Three sites: Los Angeles, Phoenix, Oakland	
	Metric 5: Currency	Low	3	Data collected prior to 1980 (15+ years ago)	
	Metric 6: Spatial and Temporal Variability	Low	3	"Large amount of data", but number of samples not specified	
	Metric 7: Exposure Scenario	Low	3	Outdoor ambient air concentrations for various chemicals including PERC; not currently scenario of interest	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	Summary data only	
	Metric 9: Quality Assurance	Low	3	No specific discussion of quality control/assurance	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Low	3	No specific discussion of uncertainty/variability with regards to PERC	
Overall Quality Determination*		Low	2.7		

Extracted

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Ahlers, J.,Regelmann, J.,Riedhammer, C.. 2003. Environmental risk assessment of airborne trichloroacetic acid - a contribution to the discussion on the significance of anthropogenic and natural sources. Chemosphere.			
Data Type	Monitoring			
Hero ID	42715			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	Unacceptable	4	Sampling methods not described
	Metric 2: Analytical Methodology	N/A	N/A	Unacceptable for other metrics
	Metric 3: Biomarker Selection	N/A	N/A	Unacceptable for other metrics
Domain 2: Representativeness				
	Metric 4: Geographic Area	N/A	N/A	Unacceptable for other metrics
	Metric 5: Currency	N/A	N/A	Unacceptable for other metrics
	Metric 6: Spatial and Temporal Variability	N/A	N/A	Unacceptable for other metrics
	Metric 7: Exposure Scenario	Unacceptable	4	Study discussed concentrations in soil, rainwater, and plants - none of these are scenarios of interest
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	N/A	N/A	Unacceptable for other metrics
	Metric 9: Quality Assurance	N/A	N/A	Unacceptable for other metrics
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	N/A	N/A	Unacceptable for other metrics
Overall Quality Determination [*]		Unacceptable	4.0	Metric mean score ^{**} : 4.0.

Extracted

^{**} Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, two of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{*} If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation:	Austin, J.. 2003. Day-of-week patterns in toxic air contaminants in southern California. Journal of the Air and Waste Management Association.				
Data Type	Monitoring				
Hero ID	47782				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	N/A	N/A	Data taken from public database (CARB TAC)	
	Metric 2: Analytical Methodology	N/A	N/A	Data taken from public database (CARB TAC)	
	Metric 3: Biomarker Selection	N/A	N/A	No biomarker	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	TAC sites throughout California	
	Metric 5: Currency	Low	3	Data collected between 1989-2001 (15+ years ago)	
	Metric 6: Spatial and Temporal Variability	N/A	N/A	Data taken from public database (CARB TAC)	
	Metric 7: Exposure Scenario	Low	3	Study looks at weekly variations in ambient outdoor air concentration - not currently scenario of interest	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	Summary data included in document	
	Metric 9: Quality Assurance	N/A	N/A	Data taken from public database (CARB TAC)	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	Study examines temporal variability	
Overall Quality Determination*		Medium	2.2		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Ryan, T. J., Hart, E. M., Kappler, L. L.. 2002. VOC exposures in a mixed-use university art building. AIHA Journal.				
Data Type	Monitoring				
Hero ID	49414				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1	Gave sampling details. Samples refrigerated and analyzed within 2 weeks.	
	Metric 2: Analytical Methodology	Medium	2	Methods well described, but info such as calibration, blanks, and recoveries were not provided.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	>15 yrs	
	Metric 6: Spatial and Temporal Variability	High	1	18 to 90 samples	
	Metric 7: Exposure Scenario	High	1	personal monitoring in printing studio at university (relevant to high-end hobbyist)	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	No raw data. Missing the range, but has average, median and AD.	
	Metric 9: Quality Assurance	Low	3	Used the Qedit function for accuracy and precision, but was not described. Blanks not discussed.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1	Discussion different locations of building, compared to other studies, provided SD.	
Overall Quality Determination*		Medium	1.7		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Serrano-Trespalcacios, P. I., Ryan, L., Spengler, J. D.. 2004. Ambient, indoor and personal exposure relationships of volatile organic compounds in Mexico City metropolitan area. Journal of Exposure Analysis and Environmental Epidemiology.			
Data Type	Monitoring			
Hero ID	56224			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	Medium	2	Detailed sampling methodology, except no storage duration or calibration procedures reported.
	Metric 2: Analytical Methodology	High	1	
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representativeness				
	Metric 4: Geographic Area	High	1	
	Metric 5: Currency	Low	3	Over 15 years old
	Metric 6: Spatial and Temporal Variability	High	1	Over 90 individuals
	Metric 7: Exposure Scenario	Medium	2	Indoor air samples not linked to specific consumer products.
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	Medium	2	No raw, missing minimum
	Metric 9: Quality Assurance	High	1	
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	High	1	Comparison to other studies.
Overall Quality Determination*		High	1.6	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation: Dowty, B. J., Carlisle, D. R., Laseter, J. L.. 1975. New Orleans drinking water sources tested by gas chromatography-mass spectrometry: Occurrence and origin of aromatics and halogenated aliphatic hydrocarbons. Environmental Science and Technology.					
Data Type	Monitoring				
Hero ID	58056				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1		
	Metric 2: Analytical Methodology	High	1		
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3		
	Metric 6: Spatial and Temporal Variability	Unacceptable	4	Appears to be only a single sample	
	Metric 7: Exposure Scenario	Medium	2	source water is media of interest, but not finished water	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Low	3	No raw, data	
	Metric 9: Quality Assurance	Low	3	little discussion	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Low	3		
Overall Quality Determination*		Unacceptable	4.0	Metric mean score**: 2.3.	

Extracted

** Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Ewing, B. B.,Chian, E. S. K.,Cook, J. C.,Evans, C. A.,Hopke, P. K.,Perkins, E. G.. 1977. Monitoring to detect previously unrecognized pollutants in surface waters.			
Data Type	Monitoring			
Hero ID	58060			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	Medium	2	Government paper so assumed use of appropriate methods.
	Metric 2: Analytical Methodology	Medium	2	Analytical methodology is described and discussed.
	Metric 3: Biomarker Selection	N/A	N/A	sw samples
Domain 2: Representativeness				
	Metric 4: Geographic Area	High	1	
	Metric 5: Currency	Low	3	>15 years
	Metric 6: Spatial and Temporal Variability	Unacceptable	4	No concentrations; qualitative. Additional data in Progress Reports.
	Metric 7: Exposure Scenario	Medium	2	SW samples collected.
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	Unacceptable	4	No concentrations provided.
	Metric 9: Quality Assurance	Low	3	No discussion on QA.
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	Low	3	No variability or discussion on uncertainties.
Overall Quality Determination *		Unacceptable	4.0	Metric mean score ^{**} : 2.7.

Extracted

^{**} Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, two of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Ohta, T.,Morita, M.,Mizoguchi, I. 1976. Local distribution of chlorinated hydrocarbons in the ambient air in Tokyo. Atmospheric Environment.			
Data Type	Monitoring			
Hero ID	58091			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	Low	3	Sampling procedures are described very generally
	Metric 2: Analytical Methodology	Medium	2	Analytical methods and equipment are given
	Metric 3: Biomarker Selection	N/A	N/A	No biomarker
Domain 2: Representativeness				
	Metric 4: Geographic Area	High	1	Tokyo, Japan
	Metric 5: Currency	Low	3	Data collected in 1975 (40+ years ago)
	Metric 6: Spatial and Temporal Variability	Medium	2	Sampling at 26 locations monthly for 1 year; no replicate samples
	Metric 7: Exposure Scenario	Low	3	Study is looking at ambient outdoor air concentrations in urban environment; not current scenario of interest
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	Medium	2	Summary data only
	Metric 9: Quality Assurance	Low	3	No specific mention of quality control or assurance
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	Medium	2	Some discussion of variability due to sampling locations and changing weather conditions
Overall Quality Determination*		Low	2.3	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Singh, H. B., Salas, L. J., Cavanagh, L. A.. 1977. Distribution, sources and sinks of atmospheric halogenated compounds. Journal of the Air and Waste Management Association.				
Data Type	Monitoring				
Hero ID	58111				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Sampling procedures are given, though more detail for ambient air than surface water samples	
	Metric 2: Analytical Methodology	High	1	Analytical methods and equipment are given in detail	
	Metric 3: Biomarker Selection	N/A	N/A	No biomarker	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	Field studies conducted in California	
	Metric 5: Currency	Low	3	Article published in 1977 (40+ years ago)	
	Metric 6: Spatial and Temporal Variability	Medium	2	Sampling at two sites, one week each. Not clear how many samples were taken	
	Metric 7: Exposure Scenario	Medium	2	A concentration is given for PERC in ocean water	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	Summary data only	
	Metric 9: Quality Assurance	Medium	2	Some indications of quality control procedures in analysis description	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	Study examined variability between more and less urban locations	
Overall Quality Determination*		Medium	1.9		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Howie, S. J.. 1981. Ambient perchloroethylene levels inside coin-operated laundries with drycleaning machines on the premises.				
Data Type	Monitoring				
Hero ID	58127				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1		
	Metric 2: Analytical Methodology	High	1	Analytical methods discussed in Section 5	
	Metric 3: Biomarker Selection	N/A	N/A	No biomarker	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	Six laundries in Washington DC	
	Metric 5: Currency	Low	3	Data collected in 1980 (15+ years ago)	
	Metric 6: Spatial and Temporal Variability	High	1	Large number of replicate samples	
	Metric 7: Exposure Scenario	Medium	2	Consumer inhalation exposure via dry-cleaned clothes at laundry facilities, measured by indoor concentrations	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	High	1	Raw data provided in Appendix B as well as summary data	
	Metric 9: Quality Assurance	High	1	Quality assurance discussed in section 7	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1	Variability and uncertainty are discussed	
Overall Quality Determination*		High	1.3		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation:	Aggazzotti, G.,Fantuzzi, G.,Righi, E.,Predieri, G.,Gobba, F. M.,Paltrinieri, M.,Cavalleri, A.. 1994. Occupational and environmental exposure to perchloroethylene (PCE) in dry cleaners and their family members. Archives of Environmental and Occupational Health.				
Data Type	Monitoring				
Hero ID	74875				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Sampling protocol is described in detail.	
	Metric 2: Analytical Methodology	High	1	Analytical methods are described, and calibration and detection limits are given.	
	Metric 3: Biomarker Selection	N/A	N/A	Biomarker not used for alveolar/breath sampling	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	Modena, Italy	
	Metric 5: Currency	Low	3	Data collected prior to publication in 1994 (15+ years)	
	Metric 6: Spatial and Temporal Variability	High	1	Breath samples from both exposed and control populations, replicate indoor air samples from 30+ households	
	Metric 7: Exposure Scenario	High	1	Consumer indoor air exposure measured by indoor air concentrations and breath samples	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	Summary statistics only	
	Metric 9: Quality Assurance	Low	3	Quality assurance is not directly discussed	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1	Some discussion of variability between different times of day, control vs exposed groups	
Overall Quality Determination*		Medium	1.7		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Murray, A. J., Riley, J. P.. 1973. Occurrence of some chlorinated aliphatic hydrocarbons in the environment. Nature.			
Data Type	Monitoring			
Hero ID	75108			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	Unacceptable	4	sampling methods, equipments, and any other information are missed.
	Metric 2: Analytical Methodology	Low	3	GC-ECD is used. calibration, LOD, recovery samples are not described.
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representativeness				
	Metric 4: Geographic Area	High	1	
	Metric 5: Currency	Low	3	>15 yrs old
	Metric 6: Spatial and Temporal Variability	Medium	2	sample size is moderate(6 sample). no replicate samples.
	Metric 7: Exposure Scenario	Medium	2	samples are collected from the North East Atlantic.
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	Low	3	No raw data.
	Metric 9: Quality Assurance	Low	3	No description of QA/QC.
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	Low	3	no discussion of variability/Uncertainty
Overall Quality Determination*		Unacceptable	4.0	Metric mean score**: 2.7.

Extracted

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† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Kostiainen, R.. 1995. Volatile organic compounds in the indoor air of normal and sick houses. Atmospheric Environment.				
Data Type	Monitoring				
Hero ID	76241				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Sampling methods are described in detail	
	Metric 2: Analytical Methodology	High	1	Analytical methods are given in detail, including calibration and detection limits	
	Metric 3: Biomarker Selection	N/A	N/A	No biomarker	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	Not given, but assume Finland based on laboratory location	
	Metric 5: Currency	Low	3	Data collected prior to publication in 1994 (15+ years)	
	Metric 6: Spatial and Temporal Variability	Low	3	More than 10 locations selected as both normal and "sick" houses, but collection period not given and no mention of replicates	
	Metric 7: Exposure Scenario	High	1	Consumer exposure through indoor air concentration	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	Data mostly presented as summary statistics; some raw data given to illustrate particular cases	
	Metric 9: Quality Assurance	Low	3	Quality assurance is not directly discussed	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1	Discussion of how a variety of building and furnishing materials affects indoor air quality	
Overall Quality Determination*		Medium	1.9		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Lindstrom, A. B., Proffitt, D., Fortune, C. R.. 1995. Effects of modified residential construction on indoor air quality. Indoor Air.				
Data Type	Monitoring				
Hero ID	78782				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	tenax, stated followed epa guidelines. Described sampled homes.	
	Metric 2: Analytical Methodology	Low	3	HPLC and provided MDLs, but did not describe the HPLC.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	> 15 yrs	
	Metric 6: Spatial and Temporal Variability	Medium	2	10 homes	
	Metric 7: Exposure Scenario	Medium	2	testing conditions well described (housing characteristics). Only one geographic location.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Low	3	only geometric means provided. No SD, range.	
	Metric 9: Quality Assurance	Low	3		
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	No SD or CV. described differences between conventional and experimental homes. no discussion of uncertainty.	
Overall Quality Determination*		Low	2.3		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Schwarzenbach, R. P., Molnar-Kubica, E., Giger, W., Wakeham, S. G.. 1979. Distribution, residence time, and fluxes of tetra-chloroethylene and 1,4-dichlorobenzene in Lake Zurich, Switzerland. Environmental Science and Technology.				
Data Type	Monitoring				
Hero ID	94461				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1	Sampling information is provided.	
	Metric 2: Analytical Methodology	Medium	2	Analytical methods are described (gas stripping, chromatography) but instrument calibration not discussed	
	Metric 3: Biomarker Selection	N/A	N/A	Study looks at PERC levels in surface water; no biomarker	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	Lake Zurich, Switzerland	
	Metric 5: Currency	Low	3	Sampling done in 1977-78 (15+ years)	
	Metric 6: Spatial and Temporal Variability	Medium	2	Samples collected in different months throughout year to compare different lake conditions. Some replicate samples.	
	Metric 7: Exposure Scenario	High	1	Surface water in lake; sources identified as sewage treatment plants	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	Raw data not provided; summary of PERC concentration data in samples given as charts (Fig 2)	
	Metric 9: Quality Assurance	Low	3	Quality assurance implied through standard protocols	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	Variability is characterized for some but not all samples; uncertainties are identified	
Overall Quality Determination*		Medium	1.9		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Weissflog, L.,Elansky, N.,Putz, E.,Krueger, G.,Lange, C. A.,Lisitzina, L.,Pfennigsdorff, A.. 2004. Trichloroacetic acid in the vegetation of polluted and remote areas of both hemispheres - Part II: Salt lakes as novel sources of natural chlorohydrocarbons. Atmospheric Environment.				
Data Type	Monitoring				
Hero ID	104106				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Sampling methodology is described and discussed. besides, some information of equipments or sampling strage conditions are missed.	
	Metric 2: Analytical Methodology	Medium	2	Analytical methodology is described and discussed. besides, some information of instruments or recovery samples are missed.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	>15yrs	
	Metric 6: Spatial and Temporal Variability	Medium	2	less discuss an use of replicate samples.	
	Metric 7: Exposure Scenario	Medium	2	The information of surface water is discribed.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	raw data. less information of summary of data	
	Metric 9: Quality Assurance	Low	3	no discussion	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	uncertainty is discussed.	
Overall Quality Determination*		Medium	2.1		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation:	Sexton, K., Adgate, J. L., Church, T. R., Ashley, D. L., Needham, L. L., Ramachandran, G., Fredrickson, A. L., Ryan, A. D.. 2005. Children's exposure to volatile organic compounds as determined by longitudinal measurements in blood. Environmental Health Perspectives.				
Data Type	Monitoring				
Hero ID	632064				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1	collected by trained phlebotomist	
	Metric 2: Analytical Methodology	Medium	2	analyzed at CDC using GS MS. Few details provided.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	Samples in 2000	
	Metric 6: Spatial and Temporal Variability	High	1	Large sample size	
	Metric 7: Exposure Scenario	Medium	2	Not directly related to consumer products.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	No raw data. Missing SD	
	Metric 9: Quality Assurance	Medium	2	Quality control was established by using two separate quality control materials, of which at least one was analyzed daily. Blood levels for the control pools were compared with previously established 99 percent confidence limits. Among the additional data validity checks were examination of gas chromatography retention time, analyte accurate mass, and instrument sensitivity, as well as comparison of mass ratios with known standards.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1		
Overall Quality Determination*		Medium	1.7		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Adgate, J. L., Church, T. R., Ryan, A. D., Ramachandran, G., Fredrickson, A. L., Stock, T. H., Morandi, M. T., Sexton, K.. 2004. Outdoor, indoor, and personal exposure to VOCs in children. Environmental Health Perspectives.				
Data Type	Monitoring				
Hero ID	632310				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	storage conditions and durations not provided	
	Metric 2: Analytical Methodology	Low	3	Did not actually provide the detection limit, although the did discuss how they handled LOD values.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	>15 years old	
	Metric 6: Spatial and Temporal Variability	High	1		
	Metric 7: Exposure Scenario	High	1		
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	High	1		
	Metric 9: Quality Assurance	Medium	2	no recoveries	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	No CV	
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Ohura, T.,Amagai, T.,Senga, Y.,Fusaya, M.. 2006. Organic air pollutants inside and outside residences in Shimizu, Japan: Levels, sources and risks. Science of the Total Environment.				
Data Type	Monitoring				
Hero ID	632484				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	no storage duration, passive samplers	
	Metric 2: Analytical Methodology	Medium	2	passive sampling were linearly correlated with the concentrations measured by active sampling, calibration not discussed. Good recoveries.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	japan	
	Metric 5: Currency	Low	3	>15 yrs	
	Metric 6: Spatial and Temporal Variability	High	1	24 hr samples, large sample size	
	Metric 7: Exposure Scenario	High	1	Questionnaire on Selected sociodemographic characteristics and exposure- related attributes	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	No individual samples.	
	Metric 9: Quality Assurance	High	1	lab and field blanks, recoveries	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1	Assessed factors influences exposures	
Overall Quality Determination*		High	1.6		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Zuraimi, M. S.,Tham, K. W.. 2008. Effects of child care center ventilation strategies on volatile organic compounds of indoor and outdoor origins. Environmental Science and Technology.				
Data Type	Monitoring				
Hero ID	632758				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
Metric 1:	Sampling Methodology	High	1	Sampling methodology discussed. For each CCC, an indoor (main classroom) and an outdoor sampling point were randomly selected for simultaneous air sampling. Indoor samplings were performed in the middle of the classroom near the breathing zone of children (approximately 0.5*0.7 m). Designed to evaluate the "typical" levels of VOCs to which the preschool children in each CCC are exposed, samplings were conducted in the middle of the week and during the day from 8 am to 5 pm (sampling interval of 9 h). For noncarbonyls, VOCs were actively sampled using a sampling pump (AP Buck Inc.) onto preconditioned Tenax TA sorbent tubes. Duplicate flow rates were set at 5 and 10 mLmin-1. For carbonyls, duplicate air samples were pumped through DNPH cartridges (Supelco) using another sampling pump at flow rates of 0.5 and 1 L min-1. Flow rates were measured before and after sampling using the mini Buck airflow calibrator (AP Buck Inc.). Details of the sample collection, analysis and QA/QC can be found in the Supporting Information.	
Metric 2:	Analytical Methodology	Medium	2	Analytical methodology discussed. The sampled VOCs on Tenax tubes were desorbed using an automated thermal desorber (Perkin-Elmer), separated using a gas chromatograph (Agilent) and analyzed using a mass selective detector (Agilent). For carbonyls, the analytes were eluted using acetonitrile and analyzed using a high performance liquid chromatography equipped with a diode array detector (Agilent). For every CCC, a field and laboratory blank is employed. VOCs with measured values lower than their method detection limit (MDL) were assigned to a value half of the MDL. Details of the sample collection, analysis and QA/QC can be found in the Supporting Information.	
Metric 3:	Biomarker Selection	N/A	N/A	Biomarker is not used.	
Domain 2: Representativeness					
Metric 4:	Geographic Area	High	1	Singapore	
Metric 5:	Currency	Medium	2	>5 to 15 years (2007 pub date)	
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Study Citation:	Zuraimi, M. S.,Tham, K. W.. 2008. Effects of child care center ventilation strategies on volatile organic compounds of indoor and outdoor origins. Environmental Science and Technology.
Data Type	Monitoring
Hero ID	632758

Domain	Metric	Rating ^t	Score	Comments [‡]
	Metric 6: Spatial and Temporal Variability	High	1	High number of samples, duplicates. Sampling numbers provided for each ventilation strategy. In this study, ACMV CCCs (N=5) are defined as those with a dedicated or shared air handling unit, filtration and fresh air provision (typically about 10 percent of total air change), HB CCCs (N=21), those that incorporate air conditioning for a portion of the day (typically 2 h) and relying on natural ventilation at other times, NV CCCs (N=59), those that rely on open windows only for ventilation and AC CCCs (N=19), those that incorporate split unit air-conditioners without any provision of fresh air. During inspections, it was found that there were rooms in some NV CCCs which were air conditioned. For these CCCs (N=19), an indoor air location in the NV room and another in the AC room were measured simultaneously making it a total of 123 samples. Supporting Information (SI) Table S1 provides a descriptive summary of the CCCs characteristics.
	Metric 7: Exposure Scenario	Medium	2	Singapore is a tropical city, where the ventilation strategies adopted by the child care centers (CCCs) can be classified as naturally ventilated (NV), hybrid (combination of natural ventilation and air conditioning) ventilated (HB), air-conditioned and mechanically ventilated (ACMV), and air-conditioned but without ventilation (AC). In this article, we present the exposures and risk of indoor VOCs, their sources, and the impact of ventilation strategies in a nationwide study involving 104 representative CCCs in Singapore.
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	Medium	2	Supplementary Info available but not provided; requested for extraction. Table 1 reports indoor air concentrations of TCE and PERC in CCCs with different ventilation strategies.
	Metric 9: Quality Assurance	Medium	2	For every CCC, a field and laboratory blank is employed. VOCs with measured values lower than their method detection limit (MDL) were assigned to a value half of the MDL. Details of the sample collection, analysis and QA/QC can be found in the Supporting Information.

Domain 4: Variability and Uncertainty

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Study Citation:	Zuraimi, M. S.,Tham, K. W.. 2008. Effects of child care center ventilation strategies on volatile organic compounds of indoor and outdoor origins. Environmental Science and Technology.				
Data Type	Monitoring				
Hero ID	632758				
Domain	Metric	Rating [†]	Score	Comments [‡]	
	Metric 10: Variability and Uncertainty	Medium	2	Because regulatory decisions are based on risk evaluations, it is important to know how CCC ventilation strategies give rise to differing risks estimates of VOC exposures. However, given the large uncertainties in risk calculations, it is difficult to ascertain significant differences between estimated cancer risks. Assumptions used by the U.S. Environmental Protection Agency and the Office of Environmental Health Hazard Assessment such as standard body weight and average breathing rate may not reflect the variability of the population at large and specific differences between adults and children and between Caucasians and Asians. Also, toxicity information obtained from studies using animals have uncertainty related to extrapolations from high doses for animals to low human exposures. Indeed, information providing confidence intervals for cancer potency estimates are still not available. Despite these assumptions which may bias the estimates, the median values provide a good indication of the relative risk levels among attending children in CCCs with different ventilation strategies. Also, analyses of risk assessment used in this study can provide insight not only about the high-risk VOCs, but also about the dominant sources of their exposures, which can allow proper mitigation strategies for more effective means of exposure reduction.	
Overall Quality Determination*		Medium	1.7		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation: Dewulf, J. P., Van Langenhove, H. R., Der Auwera, L. F.. 1998. Air/water exchange dynamics of 13 volatile chlorinated C1- and C2-hydrocarbons and monocyclic aromatic hydrocarbons in the southern North Sea and the Scheldt estuary. Environmental Science and Technology.				
Data Type	Monitoring			
Hero ID	644857			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	High	1	Sampling equipment, procedures and storage are given
	Metric 2: Analytical Methodology	Medium	2	Analytical procedure and equipment described, including detection limit but not calibration.
	Metric 3: Biomarker Selection	N/A	N/A	No biomarker
Domain 2: Representativeness				
	Metric 4: Geographic Area	High	1	Map is given with North Sea sampling locations
	Metric 5: Currency	Low	3	Data collected in 1995-1996 (15+ years ago)
	Metric 6: Spatial and Temporal Variability	High	1	38 total samples in duplicate from six locations
	Metric 7: Exposure Scenario	Medium	2	Surface water inc. from oceans is a scenario of interest, ambient air is not
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	Medium	2	Data summarized in Table 1
	Metric 9: Quality Assurance	High	1	Quality control charts and standard addition tests
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	Medium	2	Some discussion of variability with regards to sources of PERC in water samples
Overall Quality Determination*		Medium	1.7	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Yamamoto, K.,Fukushima, M.,Kakutani, N.,Kuroda, K.. 1997. Volatile organic compounds in urban rivers and their estuaries in Osaka, Japan. Environmental Pollution.				
Data Type	Monitoring				
Hero ID	645789				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Sampling method discussed, but does not indicate if it is a standard method. Samples stored refrigerated until analysis.	
	Metric 2: Analytical Methodology	High	1	GC/MS. EPA Method 524.2 Mean accuracy, the precision & method detection limits	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	>20 years (1993-1995)	
	Metric 6: Spatial and Temporal Variability	High	1	Large sample size; 30 water samples collected from 30 sites; sampled different months & years	
	Metric 7: Exposure Scenario	High	1	Site description and sampling sites provided	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Low	3	No supplemental or raw data reported; levels are reported in Figure 1	
	Metric 9: Quality Assurance	Medium	2	Mean accuracy, precision and method detection limits cited. No control samples?	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	Discussion on reasons for distribution patterns of DCM. TCE and PERC have similar distribution patterns.	
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Abrahamsson, K.,Dyrssen, D.,Jogebrant, G.,Krysell, M.. 1989. Halocarbon concentrations in Askerofjorden related to the water exchange and inputs from the petrochemical site at Stenungsund. Vatten.				
Data Type	Monitoring				
Hero ID	658636				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	sampling method is well described. but no calibration, storage conditions.	
	Metric 2: Analytical Methodology	Medium	2	analytical method is well discussed and recovery is provided. but no calibration is provided.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	> 15 yrs old	
	Metric 6: Spatial and Temporal Variability	Medium	2	13 stations. no discussion of replicates.	
	Metric 7: Exposure Scenario	Medium	2	media interest. but not US.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Low	3	no raw data. only mean and SD. and no data for each depth (5 - 10m).	
	Metric 9: Quality Assurance	Medium	2	recoveries in the 90s for PERC. Not well discussed.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	SD is provided. Not well discussed.	
Overall Quality Determination*		Medium	2.1		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Amaral, O. C., Otero, R., Grimalt, J. O., Albaiges, J.. 1996. Volatile and semi-volatile organochlorine compounds in tap and riverine waters in the area of influence of a chlorinated organic solvent factory. Water Research.			
Data Type	Monitoring			
Hero ID	658643			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	High	1	
	Metric 2: Analytical Methodology	High	1	
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representativeness				
	Metric 4: Geographic Area	High	1	
	Metric 5: Currency	Low	3	>15yrs
	Metric 6: Spatial and Temporal Variability	Unacceptable	4	sample size of SW is not discribed.
	Metric 7: Exposure Scenario	Medium	2	The scenario of surface water is discribed.
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	Medium	2	not raw data, and some detailed information of statistics are missed.
	Metric 9: Quality Assurance	High	1	
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	Low	3	uncertainty and variability are not discussed.
Overall Quality Determination*		Unacceptable	4.0	Metric mean score**: 2.0.

Extracted

** Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Martinez, E.,Llobet, I.,Lacorte, S.,Viana, P.,Barcelo, D.. 2002. Patterns and levels of halogenated volatile compounds in Portuguese surface waters. Journal of Environmental Monitoring.				
Data Type	Monitoring				
Hero ID	659075				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1	glass vials, portable freezer, analyzed within 15 days of collection. Used analytical method EPA Method 502 so assumed used a preservative.	
	Metric 2: Analytical Methodology	High	1	EPA Method 502	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	1999-2000	
	Metric 6: Spatial and Temporal Variability	High	1	644 samples	
	Metric 7: Exposure Scenario	Medium	2	surface water in scope - sea, estuarine, river water and industrial effluents - however not in US and older.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Low	3	no standard deviation . Mean in figure only. No raw data.	
	Metric 9: Quality Assurance	High	1	Recovery of 93-95 percent, R2 = 0.99.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Low	3	No SD, did not discuss any uncertainties.	
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Huybrechts, T.,Dewulf, J.,Van Langenhove, H.. 2005. Priority volatile organic compounds in surface waters of the southern North Sea. Environmental Pollution.				
Data Type	Monitoring				
Hero ID	660096				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1	storage temp and duration provided,	
	Metric 2: Analytical Methodology	Medium	2	Previously described elsewhere., but robust description provided. GC-MS. detection limit provided. Recoveries for surrogates provided.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	1998-2000	
	Metric 6: Spatial and Temporal Variability	High	1	47 samples. Replicate samples used.	
	Metric 7: Exposure Scenario	Medium	2	appropriate medium, but older data and not US	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	no raw data or supplemental data, but they provided robust statistics	
	Metric 9: Quality Assurance	High	1	Followed QUASI-MEME guidelines. detailed measures described elsewhere. This is a European standard, so the assumption is that if appropriate measures were adopted in all steps of the process, then the QA should be at a high level.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	discussed possible reasons for variation. No standard deviation provided.	
Overall Quality Determination*		Medium	1.7		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Gulyas, H., Hemmerling, L.. 1990. Tetrachloroethene air pollution originating from coin-operated dry cleaning establishments. Environmental Research.				
Data Type	Monitoring				
Hero ID	713690				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Sampling equipment and procedures described, but no mention of sample storage.	
	Metric 2: Analytical Methodology	Medium	2	Analytical methods described	
	Metric 3: Biomarker Selection	N/A	N/A	No biomarker	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	Hamburg, Germany	
	Metric 5: Currency	Low	3	Data collected in 1987 and 1989 (15+ years ago)	
	Metric 6: Spatial and Temporal Variability	Low	3	One sample at multiple intervals in only one car.	
	Metric 7: Exposure Scenario	High	1	Only the dry cleaned clothes in vehicle is applicable.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	High	1	Raw data given in Table 1	
	Metric 9: Quality Assurance	Low	3	Quality control and assurance not specifically discussed	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	Variability and uncertainty regarding different types of dry cleaning equipment discussed	
Overall Quality Determination*		Medium	2.0		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Sexton, K.,Mongin, S. J.,Adgate, J. L.,Pratt, G. C.,Ramachandran, G.,Stock, T. H.,Morandi, M. T.. 2007. Estimating volatile organic compound concentrations in selected microenvironments using time-activity and personal exposure data. Journal of Toxicology and Environmental Health, Part A: Current Issues.				
Data Type	Monitoring				
Hero ID	730121				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1	3M model 3500 organic vapor monitors (3500 OVMs), which are charcoal-based passive air samplers.A more detailed description of the study design and results was published previously (Sexton et al., 2004a, 2004b; Pratt et al., 2004, 2005).	
	Metric 2: Analytical Methodology	Medium	2	GC with an HP 5972 MS detector, Analytical and internal standards were prepared, and VOC concentrations were calculated as described previously	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	1999	
	Metric 6: Spatial and Temporal Variability	High	1	333 samples, some dups	
	Metric 7: Exposure Scenario	Medium	2	Inddor air, but not consumer specific	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	Good summary statistics; however, no raw/supplementary data available.	
	Metric 9: Quality Assurance	Medium	2	Duplicate O, I, and P badges were collected periodically during the study (total n = 80), and correlation coefficients were >.94 for all individual VOC.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1	Not random sample, one area, are has known low VOC outdoors	
Overall Quality Determination*		Medium	1.7		
Extracted		Yes			

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Study Citation: Sexton, K.,Mongin, S. J.,Adgate, J. L.,Pratt, G. C.,Ramachandran, G.,Stock, T. H.,Morandi, M. T.. 2007. Estimating volatile organic compound concentrations in selected microenvironments using time-activity and personal exposure data. Journal of Toxicology and Environmental Health, Part A: Current Issues.

Data Type Monitoring

Hero ID 730121

Domain	Metric	Rating [†]	Score	Comments [#]
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[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[#] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Billionnet, C.,Gay, E.,Kirchner, S.,Leynaert, B.,Annesi-Maesano, I.. 2011. Quantitative assessments of indoor air pollution and respiratory health in a population-based sample of French dwellings. Environmental Research.				
Data Type	Monitoring				
Hero ID	733119				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Passive samplers. Only limited details provided, but more info in companion doc (Ramalho etal.,2006).	
	Metric 2: Analytical Methodology	Medium	2	GC with FID/MS.. Few details provided. but more info in companion doc (Ramalho etal.,2006). LOD is provided.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Medium	2	2003-2005	
	Metric 6: Spatial and Temporal Variability	High	1	490 samples	
	Metric 7: Exposure Scenario	Medium	2	Indoor air of households, not specific to a consumer product.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	no raw data. no SD/CV.	
	Metric 9: Quality Assurance	Low	3	Implied, no details provided.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1	Limitations reported, characteristics of population reported.	
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Su, F. C., Mukherjee, B., Batterman, S.. 2011. Trends of VOC exposures among a nationally representative sample: Analysis of the NHANES 1988 through 2004 data sets. Atmospheric Environment.				
Data Type	Monitoring				
Hero ID	784280				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Only brief description of blood samples in the article, but documented thoroughly here: https://www.cdc.gov/nchs/data/nhanes/nhanes.09-10/lab.pdf	
	Metric 2: Analytical Methodology	High	1	Analyses used purge and trap extraction or headspace solid phase microextraction (SPME), and capillary gas chromatography/mass spectrometry. Consistent quality control and quality assurance protocols were maintained (NCHS, 2010e). https://www.cdc.gov/nchs/data/nhanes/nhanes.09-10/lab.pdf	
	Metric 3: Biomarker Selection	Medium	2	approximate nature of these biomarkers was indicated by only modest correlation with air samples and the rapid clearance in the blood	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Medium	2	1998-2004	
	Metric 6: Spatial and Temporal Variability	High	1	Participants were selected to be nationally representative using a stratified, multistage, probability-based sampling design, e.g., elderly and minorities were oversampled. VOCs were measured for a subsample of adults aged 20-59 years for each cohort studied between 1988 and 2004, with sample sizes from 605 to 1489	
	Metric 7: Exposure Scenario	Medium	2	US population but multiple exposures	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	No access to raw data, but summary stats available.	
	Metric 9: Quality Assurance	Medium	2	Consistent quality control and quality assurance protocols were maintained (NCHS, 2010e). However, results such as chemical recoveries and blanks were not provided in the article to access the quality.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1	Limitations mentioned throughout article. SE provided in supp materials. Multiple years compared.	

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Study Citation:	Su, F. C., Mukherjee, B., Batterman, S.. 2011. Trends of VOC exposures among a nationally representative sample: Analysis of the NHANES 1988 through 2004 data sets. Atmospheric Environment.			
Data Type	Monitoring			
Hero ID	784280			
Domain	Metric	Rating [†]	Score	Comments [‡]
Overall Quality Determination*		High	1.6	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Chao, C. Y., Chan, G. Y.. 2001. Quantification of indoor VOCs in twenty mechanically ventilated buildings in Hong Kong. Atmospheric Environment.				
Data Type	Monitoring				
Hero ID	824555				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1		
	Metric 2: Analytical Methodology	Medium	2	no recoveries, EPA method	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	> 15 yrs	
	Metric 6: Spatial and Temporal Variability	Medium	2	10 samples, 4 hr samples	
	Metric 7: Exposure Scenario	Medium	2	foreign country, not directly linked to consumer products	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	No raw data	
	Metric 9: Quality Assurance	Low	3	Didn't discuss QC, but used standard methods	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	SD provided, compared results between locations	
Overall Quality Determination*		Medium	2.0		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Wang, T., Wong, C. H., Cheung, T. F., Blake, D. R., Arimoto, R., Baumann, K., Tang, J., Ding, G. A., Yu, X. M., Li, Y. S., Streets, D. G., Simpson, I. J.. 2004. Relationships of trace gases and aerosols and the emission characteristics at Lin'an, a rural site in eastern China, during spring 2001. Journal of Geophysical Research: Atmospheres.				
Data Type	Monitoring				
Hero ID	1014392				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Sampling equipment and procedures are described. but calibration, DT are not described.	
	Metric 2: Analytical Methodology	Medium	2	calibration, DT, replicates are not described	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	Data collected in 2001 (>15 yrs old)	
	Metric 6: Spatial and Temporal Variability	Medium	2	sample size is 30. but no replicates.	
	Metric 7: Exposure Scenario	Low	3	ambient air	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	no raw data	
	Metric 9: Quality Assurance	Low	3	No discussion of quality assurance	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	Some discussion of uncertainty in correlation between presence of different gases	
Overall Quality Determination*		Medium	2.2		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Kostopoulou, M. N.,Golfinopoulos, S. K.,Nikolaou, A. D.,Xilourgidis, N. K.,Lekkas, T. D.. 2000. Volatile organic compounds in the surface waters of northern Greece. Chemosphere.			
Data Type	Monitoring			
Hero ID	1024859			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	High	1	
	Metric 2: Analytical Methodology	High	1	
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representativeness				
	Metric 4: Geographic Area	High	1	
	Metric 5: Currency	Low	3	Samples collected >15 years ago
	Metric 6: Spatial and Temporal Variability	High	1	Water samples were collected from four rivers and five lakes in the region of Northern Greece, seasonally, four times per year.
	Metric 7: Exposure Scenario	Medium	2	Closely represents relevant exposure scenario, except it's not the US population.
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	Medium	2	Summary data reported with statistics; raw data not reported
	Metric 9: Quality Assurance	High	1	
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	Medium	2	Limited discussion of uncertainty
Overall Quality Determination*		High	1.6	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	X. M. Wu, M. G. Apte, R. Maddalena, D. H. Bennett. 2011. Volatile organic compounds in small- and medium-sized commercial buildings in California. Environmental Science and Technology.				
Data Type	Monitoring				
Hero ID	1062239				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1		
	Metric 2: Analytical Methodology	High	1	EPA method TO-17; GC-MS Concentrations below MDL were replaced with 1/2 MDL, while for samples between the MDL and the analytical limit of quantification (LOQ), determined as 10 times the standard deviation of low-level spikes, were reported as the value determined in the laboratory.	
	Metric 3: Biomarker Selection	N/A	N/A	Biomarker is not used.	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Medium	2	>5yrs old (2011 pub)	
	Metric 6: Spatial and Temporal Variability	High	1		
	Metric 7: Exposure Scenario	Medium	2	indoor air study. but not consumer products.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	the result of concentration for each chemicals is summarized. But no raw data.	
	Metric 9: Quality Assurance	High	1		
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	discussion of variability is limited.	
Overall Quality Determination*		High	1.4		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Batterman, S.,Jia, C.,Hatzivasilis, G.. 2007. Migration of volatile organic compounds from attached garages to residences: A major exposure source. Environmental Research.				
Data Type	Monitoring				
Hero ID	1065558				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1	passive samplers. tenax absorbant. samples stored 1-3 days before analysis.	
	Metric 2: Analytical Methodology	High	1	analytical details reported in another paper, but recoveries, blanks, methods, etc. discussed.	
	Metric 3: Biomarker Selection	N/A	N/A	indoor air	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Medium	2	around 2007	
	Metric 6: Spatial and Temporal Variability	Medium	2	15 samples, but sample is not random or necessarily representative, although it may capture much of the variation in the sampled communities.	
	Metric 7: Exposure Scenario	Medium	2	indoor air, but directly related to consumer products.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	No raw data. Mean, SD. Max, DF	
	Metric 9: Quality Assurance	Medium	2	recoveries, blanks discussed, although not specific to chemical.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1	SD provided. Investigated various variables.	
Overall Quality Determination*		High	1.6		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Dodson, R. E., Levy, J. I., Spengler, J. D., Shine, J. P., Bennett, D. H.. 2008. Influence of basements, garages, and common hallways on indoor residential volatile organic compound concentrations. Atmospheric Environment.				
Data Type	Monitoring				
Hero ID	1065844				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
Metric 1:	Sampling Methodology	Medium	2	Storage conditions and calibration not discussed, but did use a published method. BEAM study.	
Metric 2:	Analytical Methodology	High	1	Standard TO 17 method was used.	
Metric 3:	Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
Metric 4:	Geographic Area	High	1		
Metric 5:	Currency	Medium	2	2005	
Metric 6:	Spatial and Temporal Variability	High	1	Large sample size.	
Metric 7:	Exposure Scenario	Medium	2	Indoor air, but not ties to a specific consumer product.	
Domain 3: Accessibility/Clarity					
Metric 8:	Reporting of Results	Medium	2	No raw data. Mean and SD in the main report. Other stats may be in supplemental.	
Metric 9:	Quality Assurance	Medium	2	Average recovery of 65 percent. Additional info in supp materials.	
Domain 4: Variability and Uncertainty					
Metric 10:	Variability and Uncertainty	High	1		
Overall Quality Determination*		High	1.6		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	S. N. Sax, D. H. Bennett, S. N. Chillrud, P. L. Kinney, J. D. Spengler. 2004. Differences in source emission rates of volatile organic compounds in inner-city residences of New York City and Los Angeles. Journal of Exposure Analysis and Environmental Epidemiology.				
Data Type	Monitoring				
Hero ID	1066049				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
Metric 1:	Sampling Methodology	High	1	The sampling and analytical methods are described in US EPA's Compendium Method TO-17. Sampling methodology discussed. See Study Design.	
Metric 2:	Analytical Methodology	High	1	The sampling and analytical methods are described in US EPA's Compendium Method TO-17. GC-MSD. LODs reported.	
Metric 3:	Biomarker Selection	N/A	N/A	Biomarker is not used.	
Domain 2: Representativeness					
Metric 4:	Geographic Area	High	1	NYC , NY (Harlem) and Los Angeles, CA (South Central, LA)	
Metric 5:	Currency	Low	3	>15 years (NYC: winter and summer 1999 and Los Angeles: fall and winter 2000)	
Metric 6:	Spatial and Temporal Variability	High	1	large sample size (36 samples); duplicate samples	
Metric 7:	Exposure Scenario	Medium	2	Measurements were conducted in about 40 homes in each of the two cities across two seasons.	
Domain 3: Accessibility/Clarity					
Metric 8:	Reporting of Results	Medium	2	No supplemental or raw data. Summary stats for indoor air provided in Table 3.	
Metric 9:	Quality Assurance	Medium	2	Field and laboratory blanks were collected, with each totaling at least 10 percent of the number of samples. Field blanks were transported and handled like regular samples, but were not attached to pumps . Field blanks were used to determine background contamination and for calculation of method limits of detection (LODs).	
Domain 4: Variability and Uncertainty					
Continued on next page					

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Study Citation: S. N. Sax, D. H. Bennett, S. N. Chillrud, P. L. Kinney, J. D. Spengler. 2004. Differences in source emission rates of volatile organic compounds in inner-city residences of New York City and Los Angeles. Journal of Exposure Analysis and Environmental Epidemiology.				
Data Type	Monitoring			
Hero ID	1066049			
Domain	Metric	Rating [†]	Score	Comments [‡]
	Metric 10: Variability and Uncertainty	High	1	Indoor ^o outdoor relationships as well as SERs were calculated for each home and sources of variability in the data were examined. Between homes, variability may be due to differences in housing characteristics, building materials, use and storage of household products, and AERs. Between cities, variability can be associated with differences in ambient emission sources and meteorological patterns. Also, seasonal variability within each city can be due to different meteorological patterns in different seasons, which in turn affect AER, environmental chemistry, emission rates, and environmental dispersion rates. By determining the variability in both indoor ^o outdoor relationships and SERs, we can gain a better understanding of indoor contributions to human exposures. The degree of uncertainty associated with measurement error was also calculated for the estimated emission rates and this uncertainty was compared to the inherent variability. We discuss the implication of this uncertainty on predicting emission rates of VOCs in homes.
Overall Quality Determination [*]		High	1.6	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{*} If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Roose, P., Van Thuyne, G., Belpaire, C., Raemaekers, M., Brinkman, U. A.. 2003. Determination of VOCs in yellow eel from various inland water bodies in Flanders (Belgium). Journal of Environmental Monitoring.				
Data Type	Monitoring				
Hero ID	1066543				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1	Sample collection and storage are described. Sampling locations are given and characterized.	
	Metric 2: Analytical Methodology	High	1	Extraction methods and analytical instrumentation and procedures are given. Detection limit calculation method is described.	
	Metric 3: Biomarker Selection	N/A	N/A	Study looks at VOC levels (inc PERC) in eel tissue; no biomarker	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	Sampling locations are listed (Belgium)	
	Metric 5: Currency	Low	3	Sampling done prior to 2003 (15 years ago)	
	Metric 6: Spatial and Temporal Variability	Medium	2	Twenty samples collected from variety of locations (river/pond/canal) throughout Belgium. No replicates mentioned	
	Metric 7: Exposure Scenario	Medium	2	Surface water through fish tissue samples. Not in US waters	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	High	1	Raw data is given for the 20 eels sampled	
	Metric 9: Quality Assurance	Low	3	No discussion of quality assurance methods	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	Some discussion of variation in PERC levels and connection with water concentration	
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Rule, K. L.,Comber, S. D.,Ross, D.,Thornton, A.,Makropoulos, C. K.,Rautiu, R.. 2006. Sources of priority substances entering an urban wastewater catchment–trace organic chemicals. Chemosphere.			
Data Type	Monitoring			
Hero ID	1250702			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
Metric 1:	Sampling Methodology	Medium	2	sampling method, instrument is described. but calibration and storage condition and not mentioned.
Metric 2:	Analytical Methodology	Medium	2	Analysis methods and LODs are given. but calibration and recovery are not described.
Metric 3:	Biomarker Selection	N/A	N/A	No biomarker
Domain 2: Representativeness				
Metric 4:	Geographic Area	High	1	
Metric 5:	Currency	Medium	2	Samples were collected in 2005 (>5 yrs old)
Metric 6:	Spatial and Temporal Variability	Medium	2	no replicates is mentioned
Metric 7:	Exposure Scenario	High	1	
Domain 3: Accessibility/Clarity				
Metric 8:	Reporting of Results	Unacceptable	4	no exact result of PERC in any figures or tables. it's just mentioned too simply in 3.1.2.
Metric 9:	Quality Assurance	High	1	
Domain 4: Variability and Uncertainty				
Metric 10:	Variability and Uncertainty	Medium	2	variability is discussed between VOC levels in residential vs. commercial and industrial samples. uncertainty is not discussed.
Overall Quality Determination*		Unacceptable	4.0	Metric mean score**: 1.9.
Extracted				

** Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Robinson, K. W., Flanagan, S. M., Ayotte, J. D., Campo, K. W., Chalmers, A.. 2004. Water Quality in the New England Coastal Basins, Maine, New Hampshire, Massachusetts, and Rhode Island, 1999-2001.				
Data Type	Monitoring				
Hero ID	1391354				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1	NAWQA protocols for fixed-site sampling are designed to assess the spatial and temporal distribution of water quality in relation to various streamflow conditions and consist of water-quality sample collection at each fixed site monthly or more frequently (Gilliom and others, 1995).	
	Metric 2: Analytical Methodology	Low	3	USGS lab, but no details in this report on the instruments. "All other water-quality samples were shipped to the USGS National Water-Quality Laboratory (NWQL) in Denver, Colo., for analysis."	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	Samples collected >15 years ago	
	Metric 6: Spatial and Temporal Variability	High	1		
	Metric 7: Exposure Scenario	High	1		
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Low	3	TCE and PERC measured and median concentrations presented in graphs (Fig 14, 19); so, difficult to extract. Raw data may be available in referenced reports, or appendix 3.	
	Metric 9: Quality Assurance	High	1		
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	Limited discussion of uncertainty	
Overall Quality Determination*		Medium	1.8		
Extracted					

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	van de Meent, D.,Den Hollander, H. A.,Pool, W. G.,Vredembregt, M. J.,van Oers, H. A. M.,de Greef, E.,Luijten, J. a. 1986. Organic micropollutants in Dutch coastal waters. Water Science and Technology.			
Data Type	Monitoring			
Hero ID	1441544			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	Medium	2	calibration, storage conditions are missed.
	Metric 2: Analytical Methodology	Unacceptable	4	The analytical method for PERC and TCE is not provided.
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representativeness				
	Metric 4: Geographic Area	High	1	
	Metric 5: Currency	Low	3	1986, >15 yrs old
	Metric 6: Spatial and Temporal Variability	High	1	
	Metric 7: Exposure Scenario	Medium	2	study of Dutch coastal water. not US.
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	Medium	2	no raw data, detection frequency not reported.
	Metric 9: Quality Assurance	Low	3	QA/QC is not discussed.
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	Medium	2	uncertainty is few discussed.
Overall Quality Determination*		Unacceptable	4.0	Metric mean score**: 2.2.

Extracted

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† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	James, K. J., Stack, M. A.. 1997. The impact of leachate collection on air quality in landfills. Chemosphere.				
Data Type	Monitoring				
Hero ID	1486815				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1		
	Metric 2: Analytical Methodology	High	1		
	Metric 3: Biomarker Selection	N/A	N/A	No biomarker	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	1996 (>15 yrs old)	
	Metric 6: Spatial and Temporal Variability	High	1		
	Metric 7: Exposure Scenario	Unacceptable	4	study of ambient air concentration from landfill leaching. off-PECO.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	no raw data	
	Metric 9: Quality Assurance	High	1		
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	uncertainty is not discussed.	
Overall Quality Determination*		Unacceptable	4.0	Metric mean score**: 1.8.	

Extracted

** Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7; Medium: = ≥ 1.7 to < 2.3; Low: = ≥ 2.3 to ≤ 3.

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Jia, C., Batterman, S., Godwin, C.. 2008. VOCs in industrial, urban and suburban neighborhoods, Part 1: Indoor and outdoor concentrations, variation, and risk drivers. Atmospheric Environment.				
Data Type	Monitoring				
Hero ID	1488206				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	sampling sites and methods are well described. but sampler calibration is not described.	
	Metric 2: Analytical Methodology	Medium	2	instrument calibration is not described.	
	Metric 3: Biomarker Selection	N/A	N/A	not biomarker study	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Medium	2	Samples were collected in 2004 and 2005(>5yrs old)	
	Metric 6: Spatial and Temporal Variability	High	1		
	Metric 7: Exposure Scenario	Medium	2	indoor air study. but no description of consumer products.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	no raw data for TCE or perc.	
	Metric 9: Quality Assurance	Low	3	QA/QC is not discussed.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1		
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Duboudin, C.. 2009. Pollution inside the home: descriptive analyses Part I: Analysis of the statistical correlations between pollutants inside homes. Environnement, Risques & Sante.			
Data Type	Monitoring			
Hero ID	1657000			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	High	1	sampling methodology points to 3 references (one is "Measurement protocols and Quality Control").
	Metric 2: Analytical Methodology	High	1	Sampling analysis points to 3 references. Assumes it's a nationally recognized standard used in France.
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representativeness				
	Metric 4: Geographic Area	High	1	
	Metric 5: Currency	Medium	2	October 2003 - December 2005
	Metric 6: Spatial and Temporal Variability	Medium	2	567 Total Participants, representing a 74 municipalities in 55 departments and 19 regions of France. Although there's a comment in the text about misrepresenting the seasonality.
	Metric 7: Exposure Scenario	High	1	
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	Medium	2	Supplemental data are clearly referenced.; however, summary statistics aren't fully reported.
	Metric 9: Quality Assurance	Low	3	Quality Assurance wasn't directly discussed.
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	High	1	
Overall Quality Determination*		High	1.6	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Bouhamra, W. S.,Elkilani, A. S.. 1999. Investigation and modeling of surface sorption-desorption behavior of volatile organic compounds for indoor air quality analysis. Environmental Technology.			
Data Type	Monitoring			
Hero ID	1744157			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	High	1	
	Metric 2: Analytical Methodology	High	1	
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representativeness				
	Metric 4: Geographic Area	High	1	
	Metric 5: Currency	Low	3	Samples assumed to have been collected prior to 1999 (date of publication)
	Metric 6: Spatial and Temporal Variability	Medium	2	12 samples taken per house (20 houses sampled); it doesn't seem that replicates were used.
	Metric 7: Exposure Scenario	Medium	2	Indoor concentrations not associated with a specific consumer product
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	Low	3	No raw data; only minimum values and percent frequency reported in tables. Mean conc presented in graphical form (not extractable)
	Metric 9: Quality Assurance	Low	3	Minimal discussion of QC/QA measures; only the use of standards before and after each set of samples is mentioned.
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	Medium	2	Limited discussion of variability in indoor concentrations
Overall Quality Determination*		Medium	2.0	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	He, Z., Yang, G. P., Lu, X. L.. 2013. Distributions and sea-to-air fluxes of volatile halocarbons in the East China Sea in early winter. Chemosphere.			
Data Type	Monitoring			
Hero ID	1940132			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	High	1	Sample collection method, bottle type, storage conditions, and storage duration provided.
	Metric 2: Analytical Methodology	High	1	GC-ECD. retention times, detection limits provided, calibration standards discussed.
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representativeness				
	Metric 4: Geographic Area	High	1	
	Metric 5: Currency	Medium	2	Cruise was in 2010.
	Metric 6: Spatial and Temporal Variability	High	1	About 40 sampling stations.
	Metric 7: Exposure Scenario	Medium	2	China, not US. Location on map provided. Other parameters collected such as surface seawater temperature and salinity, were obtained
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	Medium	2	no raw data. range and mean reported, but no SD.
	Metric 9: Quality Assurance	Medium	2	Storage stability assessed. Use of blanks for LOQ determination. No recovery results provided.
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	High	1	Described reasons for variability, but no SD provided,
Overall Quality Determination*		High	1.4	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	McDonald, T. J., Kennicutt M C, I. I., Brooks, J. M.. 1988. VOLATILE ORGANIC COMPOUNDS AT A COASTAL GULF OF MEXICO SITE. Chemosphere.				
Data Type	Monitoring				
Hero ID	1946098				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
Metric 1:	Sampling Methodology	Low	3	sampling equipment is described(Glass containers). description of storage duration, sampling method, and calibration is limited.	
Metric 2:	Analytical Methodology	Low	3	analytical conditions are described. No information of recovery or calibration is served.	
Metric 3:	Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
Metric 4:	Geographic Area	High	1		
Metric 5:	Currency	Low	3	>15yrs old	
Metric 6:	Spatial and Temporal Variability	Low	3	single sample	
Metric 7:	Exposure Scenario	High	1		
Domain 3: Accessibility/Clarity					
Metric 8:	Reporting of Results	Medium	2	the meaning of dash in table 3 is unclear.	
Metric 9:	Quality Assurance	Low	3	QA/QC is not discussed.	
Domain 4: Variability and Uncertainty					
Metric 10:	Variability and Uncertainty	Low	3	Valuability/Uncertainty is not discussed.	
Overall Quality Determination*		Low	2.4		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Stefaniak, A. B.,Breyse, P. N.,Murray, M. P. M.,Rooney, B. C.,Schaefer, J.. 2000. An evaluation of employee exposure to volatile organic compounds in three photocopy centers. Environmental Research.				
Data Type	Monitoring				
Hero ID	1953674				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1		
	Metric 2: Analytical Methodology	High	1	Analytical method is stated as TO-14.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	Study was conducted on a university campus (assumed to be Johns Hopkins University)	
	Metric 5: Currency	Low	3	Assumed to have taken place before 2000 (year of publication)	
	Metric 6: Spatial and Temporal Variability	High	1	Replicate sample used at Center 3 on Day 1, near the high-speed photocopier.	
	Metric 7: Exposure Scenario	Medium	2	The purpose of the study was to determine worker exposure in photocopy centers; data may be used as surrogate of consumer exposure to printshop emissions.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	Individual data points reported; summary statistics not reported.	
	Metric 9: Quality Assurance	Medium	2	QA/QC not discussed; background samples collected and analyzed.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	Limited discussion of variability in area samples; only one personal samples was collected per printing shop	
Overall Quality Determination*		Medium	1.7		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	He, Z.,Yang, G.,Lu, X.,Zhang, H.. 2013. Distributions and sea-to-air fluxes of chloroform, trichloroethylene, tetrachloroethylene, chlorodibromomethane and bromoform in the Yellow Sea and the East China Sea during spring. Environmental Pollution.				
Data Type	Monitoring				
Hero ID	2128010				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	No standard method, but details provided. Samples analyzed immediately after collection.	
	Metric 2: Analytical Methodology	Medium	2	samples analyzed on board ship- not at a standard laboratory. no standard method, but details provided.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Medium	2	2011	
	Metric 6: Spatial and Temporal Variability	High	1	53 grid sampling stations	
	Metric 7: Exposure Scenario	High	1	location characterized.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	No raw data. Range and mean provided in text. No SD.	
	Metric 9: Quality Assurance	High	1	Accuracy of 5 of 18 percent, blanks, calibration of equipment discussed.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	discussed correlations with ocean parameters. No SD provided.	
Overall Quality Determination*		High	1.6		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Su, F. C., Mukherjee, B., Batterman, S.. 2013. Determinants of personal, indoor and outdoor VOC concentrations: An analysis of the RIOPA data. Environmental Research.				
Data Type	Monitoring				
Hero ID	2128575				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Samples collected as part of RIOPA study. Passive samplers, 48 hr collection periods, Details described elsewhere. Medium because only few details provided.	
	Metric 2: Analytical Methodology	Medium	2	Method described elsewhere. GC/MS used. LOD provided. Medium because details not provided to verify.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	>15 yrs (1999 to 2001)	
	Metric 6: Spatial and Temporal Variability	High	1	310 households	
	Metric 7: Exposure Scenario	Medium	2	Indoor air, but not directly related to consumer product use. convenience sample may have over samples outdoor emission sources. 3 US cities	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	no raw data provided	
	Metric 9: Quality Assurance	Medium	2	calibration, blanks etc not mentioned. But they did indicate which chemicals had low recoveries, and TCE and PERC were not mentioned.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1	robust strengths, limitations	
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Roda, C.,Kousignian, I.,Ramond, A.,Momas, I.. 2013. Indoor tetrachloroethylene levels and determinants in Paris dwellings. Environmental Research.				
Data Type	Monitoring				
Hero ID	2128839				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Sampling procedures only summarized, but appear to be standard (section 2.2)	
	Metric 2: Analytical Methodology	Medium	2	Analytical procedures only summarized, but appear to be standard (section 2.2)	
	Metric 3: Biomarker Selection	N/A	N/A	No biomarker	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	Paris, France	
	Metric 5: Currency	Medium	2	Data collected 2003-2007 (5-15 years ago)	
	Metric 6: Spatial and Temporal Variability	High	1	Large sample (177 households), data collected for 1 year, some mention of duplicate samples	
	Metric 7: Exposure Scenario	High	1	Consumer inhalation exposure measured by indoor air concentration	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Low	3	Concentration results as summary only	
	Metric 9: Quality Assurance	Low	3		
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1	Section 4.3 discusses determinants of domestic PERC levels	
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Zoccolillo, L., Abete, C., Amendola, L., Ruocco, R., Sbrilli, A., Termine, M.. 2004. Halocarbons in aqueous matrices from the Rennick Glacier and the Ross Sea (Antarctica). International Journal of Environmental Analytical Chemistry.			
Data Type	Monitoring			
Hero ID	2189687			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	High	1	
	Metric 2: Analytical Methodology	Medium	2	New method that uses large volume of water. Analyzed under "extreme" conditions in Antarctica.
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representativeness				
	Metric 4: Geographic Area	High	1	
	Metric 5: Currency	Low	3	1997-1998
	Metric 6: Spatial and Temporal Variability	Medium	2	multiple stations and samples from multiple depths. replicate samples not collected. Samples were generally collected at multiple time periods.
	Metric 7: Exposure Scenario	Medium	2	Not US, not linked to a source.
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	Medium	2	No summary provided, need to calculate the stats.
	Metric 9: Quality Assurance	Low	3	TCE had low extraction recoveries (50-60 percent). Study did not discuss if they corrected the concentrations for the low recoveries. PERC recoveries were acceptable.
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	Medium	2	variations due to microclimates.
Overall Quality Determination*		Medium	2.0	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Jia, C.,Batterman, S.,Godwin, C.,Charles, S.,Chin, J. Y.. 2010. Sources and migration of volatile organic compounds in mixed-use buildings. Indoor Air.				
Data Type	Monitoring				
Hero ID	2214330				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	sampling method is simply described. but calibration, storage condition are not provided. they might be in reference articles.	
	Metric 2: Analytical Methodology	Medium	2	analytical method is simply described. but calibration,detection limits, recovery are not provided. they might be in reference articles..	
	Metric 3: Biomarker Selection	N/A	N/A	indoor air study	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Medium	2	Samples collected in 2005-2006 and 2008 (>5yrs old)	
	Metric 6: Spatial and Temporal Variability	High	1		
	Metric 7: Exposure Scenario	Medium	2	indoor air study. but not consumer products.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	data is summarized as a table. but no raw data.	
	Metric 9: Quality Assurance	Medium	2	Some discussion of QA/QC measures and issues.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1		
Overall Quality Determination*		Medium	1.7		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Bravo-Linares, C. M., Mudge, S. M., Loyola-Sepulveda, R. H.. 2007. Occurrence of volatile organic compounds (VOCs) in Liverpool Bay, Irish Sea. Marine Pollution Bulletin.				
Data Type	Monitoring				
Hero ID	2277377				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1		
	Metric 2: Analytical Methodology	High	1		
	Metric 3: Biomarker Selection	N/A	N/A	sw samples	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Medium	2	2006 (>10 years)	
	Metric 6: Spatial and Temporal Variability	High	1		
	Metric 7: Exposure Scenario	Medium	2	Source of exposure was not discussed.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Low	3	Range of data provided only.(no raw data)	
	Metric 9: Quality Assurance	Low	3	Some QA discussion with regards to sampling.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	There are some discussion on uncertainties and variability.	
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Yamamoto, K.,Fukushima, M.,Kakutani, N.,Tsuruho, K.. 2001. Contamination of vinyl chloride in shallow urban rivers in Osaka, Japan. Water Research.				
Data Type	Monitoring				
Hero ID	2310570				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Sampling methodology is described and discussed simply.	
	Metric 2: Analytical Methodology	Medium	2	Analytical methodology is described and discussed simply.	
	Metric 3: Biomarker Selection	N/A	N/A	sw samples	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	>15 years	
	Metric 6: Spatial and Temporal Variability	Medium	2	Unknown if replicate sampling was done.	
	Metric 7: Exposure Scenario	Medium	2	SW samples collected.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	Raw data not provided; summary of PERC and TCE concentration data in samples given as charts (Fig 3)	
	Metric 9: Quality Assurance	Low	3	Quality assurance implied through standard protocols	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Low	3	No variability; some discussion on uncertainty.	
Overall Quality Determination*		Medium	2.2		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	D'Souza, J. C.,Jia, C.,Mukherjee, B.,Batterman, S.. 2009. Ethnicity, housing and personal factors as determinants of VOC exposures. Atmospheric Environment.				
Data Type	Monitoring				
Hero ID	2331366				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1	NHANES is well documented. passive exposure monitors	
	Metric 2: Analytical Methodology	High	1	NHANES is well documented. Used a standard method.. GC/MS and selected-ion-monitoring mode (CDC,2006b), a second laboratory used GC/MS in scan mode (Weisel et al., 2005b). http://www.nber.org/nhanes/1999_2000/downloads/lab21.doc.pdf	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	1999-2000 data.	
	Metric 6: Spatial and Temporal Variability	High	1	over 600 samples	
	Metric 7: Exposure Scenario	Medium	2	Indoor air in homes, but not directly related to a specific consumer product.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	range, percentiles, det freq. missing SD . no raw data.	
	Metric 9: Quality Assurance	High	1	NHANES.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	No SD provided	
Overall Quality Determination*		High	1.6		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Loh, M. M.,Houseman, E. A.,Gray, G. M.,Levy, J. I.,Spengler, J. D.,Bennett, D. H.. 2006. Measured concentrations of VOCs in several non-residential microenvironments in the United States. Environmental Science and Technology.				
Data Type	Monitoring				
Hero ID	2442846				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1	Personal samplers, VOC sorbent. Sample volume of 10L or 2.5L Samples stored 1 week in refrigerator..	
	Metric 2: Analytical Methodology	High	1	EPA Method TO17	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Medium	2	2003-2005	
	Metric 6: Spatial and Temporal Variability	High	1	3 to 17 stores per store type, 5 to 28 samples per store type. Table 1	
	Metric 7: Exposure Scenario	Medium	2	Indoor air, but not for a particular product.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	No raw data. Range, mean, CV reported in supp and summaries match the limited stats in main text.	
	Metric 9: Quality Assurance	High	1	Pilot testing, storage stability, 15 percent duplicate samples, field blanks on 11 percent of samples, correction for blanks if significantly above the mean,	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1	Considered in sample collection and analysis. Range of store types.	
Overall Quality Determination*		High	1.3		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Chin, J. Y., Godwin, C., Parker, E., Robins, T., Lewis, T., Harbin, P., Batterman, S.. 2014. Levels and sources of volatile organic compounds in homes of children with asthma. Indoor Air.				
Data Type	Monitoring				
Hero ID	2443355				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1		
	Metric 2: Analytical Methodology	High	1		
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Medium	2	2010	
	Metric 6: Spatial and Temporal Variability	High	1	7 day samples, large sample size	
	Metric 7: Exposure Scenario	High	1	Source identification using factor analysis	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	No raw data	
	Metric 9: Quality Assurance	High	1		
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1		
Overall Quality Determination*		High	1.2		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Quack, B.,Suess, E.. 1999. Volatile halogenated hydrocarbons over the western Pacific between 43 degrees and 4 degrees N. Journal of Geophysical Research: Atmospheres.			
Data Type	Monitoring			
Hero ID	2468900			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	N/A	N/A	
	Metric 2: Analytical Methodology	N/A	N/A	
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representativeness				
	Metric 4: Geographic Area	N/A	N/A	
	Metric 5: Currency	N/A	N/A	
	Metric 6: Spatial and Temporal Variability	N/A	N/A	
	Metric 7: Exposure Scenario	Unacceptable	4	Ambient air from western Pacific Ocean; no relevance to consumer exposure.
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	N/A	N/A	
	Metric 9: Quality Assurance	N/A	N/A	
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	N/A	N/A	
Overall Quality Determination *		Unacceptable	4.0	Metric mean score**: 4.0.

Extracted

** Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation:	Plummer, L. N., Sibrell, P. L., Casile, G. C., Busenberg, E., Hunt, A. G., Schlosser, P.. 2013. Tracing groundwater with low-level detections of halogenated VOCs in a fractured carbonate-rock aquifer, Leetown Science Center, West Virginia, USA. Applied Geochemistry.				
Data Type	Monitoring				
Hero ID	2532571				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1	Sampling equipment, procedures and storage are given	
	Metric 2: Analytical Methodology	High	1	Analytical methods and equipment are given, including detection limits and calibration	
	Metric 3: Biomarker Selection	N/A	N/A	No biomarker	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	West Virginia	
	Metric 5: Currency	Medium	2	Samples collected in 2008-2010 (5-15 years ago)	
	Metric 6: Spatial and Temporal Variability	Medium	2	Samples collected at 47 sites, some have replicate samples	
	Metric 7: Exposure Scenario	Medium	2	Surface water and spring water (relevant) and groundwater (not currently of interest)	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	High	1	Raw data given in Table 1	
	Metric 9: Quality Assurance	Low	3	No specific discussion of quality control/assurance	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1	Uncertainties are discussed; variability between different water sources	
Overall Quality Determination*		High	1.6		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	W. R. Chan, S. Cohn, M. Sidheswaran, D. P. Sullivan, W. J. Fisk. 2014. Contaminant levels, source strengths, and ventilation rates in California retail stores. Indoor Air.			
Data Type	Monitoring			
Hero ID	2535652			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	Medium	2	No info on sample storage and duration conditions.
	Metric 2: Analytical Methodology	High	1	EPA method. LOQ provided in supp materials. No recoveries.
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representativeness				
	Metric 4: Geographic Area	High	1	California
	Metric 5: Currency	Medium	2	2011-2013
	Metric 6: Spatial and Temporal Variability	High	1	over 20 samples were store type, at least 5 stores per type.
	Metric 7: Exposure Scenario	Medium	2	indoor air, but not directly linked to a consumer product.
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	Medium	2	raw provided in supp.
	Metric 9: Quality Assurance	Medium	2	standard methods used, but calibration and recovery results not provided.
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	Medium	2	variability discussed, but no CV provided.
Overall Quality Determination*		Medium	1.7	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Insogna, S., Frison, S., Marconi, E., Bacaloni, A.. 2014. Trends of volatile chlorinated hydrocarbons and trihalomethanes in Antarctica. International Journal of Environmental Analytical Chemistry.				
Data Type	Monitoring				
Hero ID	2800175				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1	Clean glass bottles, no headspace, stored at 4C until analysis within one year.	
	Metric 2: Analytical Methodology	High	1	Purge and trap with GC-MS. operating conditions provided, standards provided, calibration described.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	High	1	2011-2012	
	Metric 6: Spatial and Temporal Variability	Medium	2	triplicate samples, at only nine sites.	
	Metric 7: Exposure Scenario	Medium	2	surface water on scope, but not US study	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	no raw data	
	Metric 9: Quality Assurance	High	1	analysis performed in triplicate. R2 >0.998. Recoveries from 75 to 95 percent. Samples stored for up to a year and no mention of storage stability.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1	compared results to past cruises, No discussion of uncertainty.	
Overall Quality Determination*		High	1.3		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Ofstad, E. B., Drangsholt, H., Carlberg, G. E.. 1981. Analysis of volatile halogenated organic compounds in fish. Science of the Total Environment.				
Data Type	Monitoring				
Hero ID	2801663				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Low	3	no details for sampling methods.	
	Metric 2: Analytical Methodology	High	1		
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	> 15 yrs old	
	Metric 6: Spatial and Temporal Variability	Medium	2	Pooled samples of 3-5 fish.	
	Metric 7: Exposure Scenario	Medium	2	media and organisms interest. but not US.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	No raw data.	
	Metric 9: Quality Assurance	High	1		
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	No range of data is shown.	
Overall Quality Determination*		Medium	1.9		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Rogers, H. R., Crathorne, B., Watts, C. D.. 1992. Sources and fate of organic contaminants in the Mersey estuary: Volatile organohalogen compounds. Marine Pollution Bulletin.				
Data Type	Monitoring				
Hero ID	2802879				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1	Samples collected without headspace. Stored cool until analysis within 24 hours. Extracted and analyzed within 24 hrs.	
	Metric 2: Analytical Methodology	Medium	2	GC-ECD. HMSO 1995 (british standard method), however lacked many details actually used. internal standards,	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	1987-89	
	Metric 6: Spatial and Temporal Variability	Medium	2	Single samples on 4 sampling dates for each of 4 waterbodies.	
	Metric 7: Exposure Scenario	Medium	2	surface water on topic, but not in US	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Low	3	missing range., SD no raw data.	
	Metric 9: Quality Assurance	Low	3	used a standard analytical method, but no discussion of methods used or recoveries.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2		
Overall Quality Determination*		Medium	2.1		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Dawes, V. J.,Waldock, M. J.. 1994. Measurement of Volatile Organic Compounds at UK National Monitoring Plan Stations. Marine Pollution Bulletin.				
Data Type	Monitoring				
Hero ID	2803418				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1	UK National monitoring program	
	Metric 2: Analytical Methodology	Medium	2	purge and trap with gc-MS.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	1992	
	Metric 6: Spatial and Temporal Variability	High	1	about 70 samples overall	
	Metric 7: Exposure Scenario	Medium	2	surface water, but not in US	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Low	3	individual values, but no overall stats	
	Metric 9: Quality Assurance	Medium	2	Precision assessed.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	variation reflects amounts of industrial activity.	
Overall Quality Determination*		Medium	1.9		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

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 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Brown, T.,Dassonville, C.,Derbez, M.,Ramalho, O.,Kirchner, S.,Crump, D.,Mandin, C.. 2015. Relationships between socioeconomic and lifestyle factors and indoor air quality in French dwellings. Environmental Research.				
Data Type	Monitoring				
Hero ID	2855333				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
Metric 1:	Sampling Methodology	Medium	2	Sampling methodology discussed briefly. Volatile organic compounds (VOCs) were measured in the main bedroom over seven days with passive radial samplers(Radiellos, Sigma-AldrichCo.) (Ramalho et al.,2006). VOCs were adsorbed on Carbograph 4 sorbent then thermally desorbed and analyzed by gas phase chromatography equipped with a flame ionization detector and/or mass spectro- meter. VOCs were adsorbed on Carbograph 4 sorbent then thermally desorbed.	
Metric 2:	Analytical Methodology	Medium	2	Analytical methodology discussed briefly. VOCs were analyzed by gas phase chromatography equipped with a flame ionization detector and/or mass spectrometer. Statistical analysis: For any measurement below the limit of detection (LOD) a value equal to the LOD/2 was assigned. For measurements below the limit of quantification (LOQ)a value equal to the LOQ/2 was assigned.	
Metric 3:	Biomarker Selection	N/A	N/A	Biomarker is not used.	
Domain 2: Representativeness					
Metric 4:	Geographic Area	High	1	France	
Metric 5:	Currency	Medium	2	>5 to 15 years (September 2003 and December 2005)	
Metric 6:	Spatial and Temporal Variability	High	1	Indoor air concentration were measured one week in a sample of 567 dwellings representative of the French housing stock between September 2003 and December 2005. Sample size dependent on socioeconomic factors and by selected occupant activities/building characteristics.	
Metric 7:	Exposure Scenario	Medium	2	The pollutants measured were selected on the basis of a classification of indoor air pollutants developed by the Observatory on IAQ that applied criteria for short and long-term toxicity as well as the frequency of their presence in dwellings reported in the scientific literature (Mosqueronetal.,2003). The sources of these pollutants include building materials and furniture, heating and cooking systems, stored solvents, attached garages, and various human activities including cleaning, painting, use of consumer products, and smoking. Microenvironments, indoor climate of the dwellings was also considered	
Domain 3: Accessibility/Clarity					
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Study Citation:	Brown, T.,Dassonville, C.,Derbez, M.,Ramalho, O.,Kirchner, S.,Crump, D.,Mandin, C.. 2015. Relationships between socioeconomic and lifestyle factors and indoor air quality in French dwellings. Environmental Research.				
Data Type	Monitoring				
Hero ID	2855333				
Domain	Metric	Rating [†]	Score	Comments [‡]	
	Metric 8: Reporting of Results	Medium	2	Supplementary materials provided. Tables 3 and 4 report concentrations for PERC in dwellings by selected socioeconomic status factors and occupant activities/building characteristics, respectively.	
	Metric 9: Quality Assurance	Low	3	Quality assurance/quality control techniques and results were not directly discussed.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	Strengths and limitations of the study discussed under Section 4.4. Week-long samples (averages for the week) take away the ability to see peak exposures, and to relate those peak exposures to certain activities.	
Overall Quality Determination*		Medium	1.9		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Wallace, L. A.. 1987. The total exposure assessment methodology (TEAM) study: Summary and analysis: Volume I.				
Data Type	Monitoring				
Hero ID	3004792				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
Metric 1:	Sampling Methodology	High	1	A lot of detail is given, refer to companion source for full details.	
Metric 2:	Analytical Methodology	High	1	A lot of detail is given, refer to companion source for full details.	
Metric 3:	Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
Metric 4:	Geographic Area	High	1		
Metric 5:	Currency	Low	3	1984	
Metric 6:	Spatial and Temporal Variability	High	1	use of replicate samples, large sample size.	
Metric 7:	Exposure Scenario	High	1		
Domain 3: Accessibility/Clarity					
Metric 8:	Reporting of Results	Medium	2	Summary statistics of phases of the study are presented. No/limited supplemental data available.	
Metric 9:	Quality Assurance	High	1	Recoveries and control samples are discussed	
Domain 4: Variability and Uncertainty					
Metric 10:	Variability and Uncertainty	Medium	2	Limited characterization of variability.	
Overall Quality Determination*		High	1.4		
Extracted		Yes			

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High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Jain, R. B.. 2015. Levels of selected urinary metabolites of volatile organic compounds among children aged 6-11 years. Environmental Research.
Data Type	Monitoring
Hero ID	3042164

Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
Metric 1:	Sampling Methodology	High	1	NHANES sampling. Detailed description at https://wwwn.cdc.gov/nchs/nhanes/ContinuousNhanes/Default.aspx?BeginYear=2011
Metric 2:	Analytical Methodology	High	1	The laboratory methods used to measure VOCs in urine, as previously mentioned are provided in Alwis et al. (2012) and at https://wwwn.cdc.gov/nchs/nhanes/ContinuousNhanes/Default.aspx?BeginYear=2011 .
Metric 3:	Biomarker Selection	Medium	2	According to the ATSDR Toxicological Profile for 1-Bromopropane, dated August 2011, "Biological exposure to the general population and workers can be assessed by measurement of bromide ion, 1-bromopropane, and its metabolite, N-acetyl-S-(n-propyl)-L-cysteine (AcPrCys) in urine or blood (NTP 2013). N-Acetyl-S-(n-propyl)-L-cysteine is expected to be more specific to 1-bromopropane than bromide due to the presence of the bromide ion in foods; however, there have also been concerns regarding the specificity of N-acetyl-S-(n-propyl)-L-cysteine. The ubiquitous nature of N-acetylS-(n-propyl)-L-cysteine in the urine of the general population suggests that it may not be a specific biomarker for 1-bromopropane, as general population exposure is expected to be limited. It is unknown if other chemicals and/or endogenous metabolism contributed to the observed urinary levels of N-acetylS-(n-propyl)-L-cysteine in biomonitoring studies". The document is available at: https://www.atsdr.cdc.gov/ToxProfiles/tp.asp?id=1471&tid=285 . NTP. 2013. Report on carcinogens. Monograph on 1-bromopropane. National Toxicology Program, U.S. Department of Health and Human Services.
Domain 2: Representativeness				
Metric 4:	Geographic Area	High	1	
Metric 5:	Currency	Medium	2	2011-2012 samples
Metric 6:	Spatial and Temporal Variability	Medium	2	Large sample size, but appears to be spot samples collected (vs 24 hr or first morning voids)
Metric 7:	Exposure Scenario	Medium	2	

Domain 3: Accessibility/Clarity

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Study Citation:	Jain, R. B.. 2015. Levels of selected urinary metabolites of volatile organic compounds among children aged 6-11 years. Environmental Research.				
Data Type	Monitoring				
Hero ID	3042164				
Domain	Metric	Rating [†]	Score	Comments [‡]	
	Metric 8: Reporting of Results	Medium	2	No raw data, but raw data are available from NHANES. Mean and 95 percent Confidence Interval (CI) provided. No Standard Deviation (SD).	
	Metric 9: Quality Assurance	Medium	2	Study provided creatinine levels to assess completeness of urine samples.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	No SD, but discussed age,gender,race/ethnicity,and exposure-toenvironmentaltobaccosmoke.	
Overall Quality Determination*		Medium	1.7		
Extracted		Yes			

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INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Hartwell, T. D., Pellizzari, E. D., Perritt, R. L., Whitmore, R. W., Zelon, H. S., Wallace, L.. 1987. Comparison of volatile organic levels between sites and seasons for the total exposure assessment methodology (team) study. Atmospheric Environment.			
Data Type	Monitoring			
Hero ID	3052900			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	High	1	
	Metric 2: Analytical Methodology	High	1	
	Metric 3: Biomarker Selection	High	1	breath
Domain 2: Representativeness				
	Metric 4: Geographic Area	High	1	
	Metric 5: Currency	Low	3	80s
	Metric 6: Spatial and Temporal Variability	High	1	
	Metric 7: Exposure Scenario	Medium	2	not consumer specific
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	Low	3	no raw, no range or sd
	Metric 9: Quality Assurance	Medium	2	
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	High	1	
Overall Quality Determination*		High	1.6	
Extracted		Yes		

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Christof, O., Seifert, R., Michaelis, W.. 2002. Volatile halogenated organic compounds in European estuaries. Biogeochemistry.			
Data Type	Monitoring			
Hero ID	3242836			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	High	1	niskan sampler, glass bottles, stored cool and dark, until purging, purged with 12 hours.
	Metric 2: Analytical Methodology	Medium	2	purge and trap with gc-ms. Detailed operating conditions provided.. No authoritative method used.
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representativeness				
	Metric 4: Geographic Area	High	1	
	Metric 5: Currency	Low	3	1997-1999
	Metric 6: Spatial and Temporal Variability	High	1	14-15 samples per data set
	Metric 7: Exposure Scenario	Medium	2	surface water, but not US.
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	Medium	2	Only range. No mean, median, sd.
	Metric 9: Quality Assurance	High	1	Duplicate sample analysis in general. Purge efficiency = 90-93 percent
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	Medium	2	Mentioned that other studies said water traps can cause GC problems, but they said that diverse tests showed that their water traps worked.
Overall Quality Determination*		Medium	1.7	
Extracted		Yes		

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Wiedmann, T. O.,Guthner, B.,Class, T. J.,Ballschmiter, K.. 1994. GLOBAL DISTRIBUTION OF TETRA-CHLOROETHENE IN THE TROPOSPHERE - MEASUREMENTS AND MODELING. Environmental Science and Technology.			
Data Type	Monitoring			
Hero ID	3246559			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	N/A	N/A	
	Metric 2: Analytical Methodology	N/A	N/A	
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representativeness				
	Metric 4: Geographic Area	N/A	N/A	
	Metric 5: Currency	N/A	N/A	
	Metric 6: Spatial and Temporal Variability	N/A	N/A	
	Metric 7: Exposure Scenario	Unacceptable	4	Ambient air in troposphere, no relevance for consumer/indoor exposure
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	N/A	N/A	
	Metric 9: Quality Assurance	N/A	N/A	
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	N/A	N/A	
Overall Quality Determination *		Unacceptable	4.0	Metric mean score **: 4.0.

Extracted

** Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation:	Kiurski, J. S., Oros, I. B., Kecic, V. S., Kovacevic, I. M., Aksentijevic, S. M.. 2016. The temporal variation of indoor pollutants in photocopying shop. Stochastic Environmental Research and Risk Assessment.				
Data Type	Monitoring				
Hero ID	3371701				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
Metric 1:	Sampling Methodology	Low	3	Indoor concentrations were measured using gas sensitive semiconductor (GSS) sensor technology (with exchangeable sensor heads for each target gas). There was no discussion on instrument calibration or performance	
Metric 2:	Analytical Methodology	Low	3	Indoor concentrations were measured using gas sensitive semiconductor (GSS) sensor technology (with exchangeable sensor heads for each target gas). There was no discussion on validation, or instrument sensitivity or performance	
Metric 3:	Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
Metric 4:	Geographic Area	High	1		
Metric 5:	Currency	Low	3	Sampling assumed to have been conducted prior to 2016 (date of publication)	
Metric 6:	Spatial and Temporal Variability	High	1		
Metric 7:	Exposure Scenario	Medium	2	Study measured concentrations of PCE in a photocopying shop; data may be surrogate for consumer exposure to printshop emissions.	
Domain 3: Accessibility/Clarity					
Metric 8:	Reporting of Results	Medium	2	Individual data points reported; no summary statistics provided.	
Metric 9:	Quality Assurance	Low	3	No discussion of QA/QC measures	
Domain 4: Variability and Uncertainty					
Metric 10:	Variability and Uncertainty	Low	3	Limited discussion on temporal trends;; no discussion on data gaps, uncertainties, or limitations.	
Overall Quality Determination*		Low	2.3		
Extracted		Yes			

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Study Citation:	Kiurski, J. S., Oros, I. B., Kecic, V. S., Kovacevic, I. M., Aksentijevic, S. M.. 2016. The temporal variation of indoor pollutants in photocopying shop. Stochastic Environmental Research and Risk Assessment.			
Data Type	Monitoring			
Hero ID	3371701			

Domain	Metric	Rating [†]	Score	Comments [‡]
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[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	K. W. Tham, M. S. Zuraimi, S. C. Sekhar. 2004. Emission modelling and validation of VOCs' source strengths in air-conditioned office premises. Environment International.				
Data Type	Monitoring				
Hero ID	3393192				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Provided info on tubes, liters collected, range of flow rates, sample stored in cooler, analyzed on same day.	
	Metric 2: Analytical Methodology	Low	3	Did not mention a standard method. Used GC and described column, use of calibration. Did not provide operating conditions. Did not reference another article for more details.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	<2004. Exact date not mentioned.	
	Metric 6: Spatial and Temporal Variability	Low	3	Only one building. Duplicate samples collected.	
	Metric 7: Exposure Scenario	Low	3	No linkage to a source. Singapore.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	No raw data.	
	Metric 9: Quality Assurance	Low	3	Mentioned that quality control was conducted. 5 point calibration curve for each analyte. But no actual QC results provided.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2		
Overall Quality Determination*		Low	2.4		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	T. Hoang, R. Castorina, F. Gaspar, R. Maddalena, P.L. Jenkins, Q. Zhang, T. E. Mckone, E. Benfenati, A. Y. Shi, A. Bradman. 2016. VOC exposures in California early childhood education environments. Indoor Air.				
Data Type	Monitoring				
Hero ID	3453092				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Sampling methodology discussed though, calibration of sampler for indoor air is not described.	
	Metric 2: Analytical Methodology	High	1		
	Metric 3: Biomarker Selection	N/A	N/A	Biomarker is not used.	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Medium	2	>5 to 15 yrs old	
	Metric 6: Spatial and Temporal Variability	High	1		
	Metric 7: Exposure Scenario	Medium	2	lack of the information of emission source	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	the summary of results are well described. But no raw data.	
	Metric 9: Quality Assurance	High	1		
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	uncertainty for sampling is discussed simply.	
Overall Quality Determination*		High	1.6		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

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Study Citation:	Dai, H.,Jing, S.,Wang, H.,Ma, Y.,Li, L.,Song, W.,Kan, H.. 2017. VOC characteristics and inhalation health risks in newly renovated residences in Shanghai, China. Science of the Total Environment.				
Data Type	Monitoring				
Hero ID	3453725				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1		
	Metric 2: Analytical Methodology	Medium	2	Analytical methodology is described and discussed; MDL for DCM not listed.	
	Metric 3: Biomarker Selection	N/A	N/A	indoor air samples	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	High	1		
	Metric 6: Spatial and Temporal Variability	Medium	2	8 residences; three sampling sites at each residence: living room, bedroom, and study. No mention of replicate sampling.	
	Metric 7: Exposure Scenario	Medium	2	Indoor air samples; not specifically associated with a consumer product	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	Results reported in summary/chart form, not raw data. However, raw data may be provided in Supplementary Info.	
	Metric 9: Quality Assurance	Low	3	QA is implied.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1		
Overall Quality Determination*		Medium	1.7		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Ma, H.,Zhang, H.,Wang, L.,Wang, J.,Chen, J.. 2014. Comprehensive screening and priority ranking of volatile organic compounds in Daliao River, China. Environmental Monitoring and Assessment.				
Data Type	Monitoring				
Hero ID	3488897				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1	Sampling methods and storage are described.	
	Metric 2: Analytical Methodology	Medium	2	Analytical methods and instrumentation are given. Detection limits mentioned, but calibration not described.	
	Metric 3: Biomarker Selection	N/A	N/A	No biomarker	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	Map with sampling locations along Daliao River (China)	
	Metric 5: Currency	Medium	2	Samples collected in 2011 (5-15 years ago)	
	Metric 6: Spatial and Temporal Variability	High	1	Duplicate and triplicate samples taken from 20 locations.	
	Metric 7: Exposure Scenario	High	1	Surface water concentration for VOCs including PERC	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	Summary results only.	
	Metric 9: Quality Assurance	High	1	Quality assurance described in sampling/analytical procedures	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	Variability assessed with replicate samples	
Overall Quality Determination*		High	1.4		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Bianchi, E., Lessing, G., Brina, K. R., Angeli, L., Andriguetti, N. B., Peruzzo, J. R., Do Nascimento, C. A., Spilki, F. R., Ziulkoski, A. L., da Silva, L. B.. 2017. Monitoring the Genotoxic and Cytotoxic Potential and the Presence of Pesticides and Hydrocarbons in Water of the Sinos River Basin, Southern Brazil. Archives of Environmental Contamination and Toxicology.				
Data Type	Monitoring				
Hero ID	3489827				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1		
	Metric 2: Analytical Methodology	High	1		
	Metric 3: Biomarker Selection	N/A	N/A	sw samples	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Medium	2	>5 yrs.	
	Metric 6: Spatial and Temporal Variability	Medium	2	"60 samples during 9 collections"; no mention of replicate sampling.	
	Metric 7: Exposure Scenario	Medium	2	sw samples, not in the US.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	Raw data not provided; summary of PERC and DCM concentration data on page 325 (Table 1).	
	Metric 9: Quality Assurance	Low	3	QA is implied.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	Study provided some discussion on uncertainties; no variability.	
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Wittlingerová, Z.,Macháčková, J.,Petruželková, A.,Zimová, M.. 2016. Occurrence of perchloroethylene in surface water and fish in a river ecosystem affected by groundwater contamination. Environmental Science and Pollution Research.				
Data Type	Monitoring				
Hero ID	3489953				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1	Clear methodology for collecting fish samples	
	Metric 2: Analytical Methodology	High	1	Analytical methods based on EPA 601 & 624 standard methods	
	Metric 3: Biomarker Selection	N/A	N/A	PCE is concentrated in the fish tissues being sampled	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	Geographic location is clearly listed - SAP factory in Mimon, Czech Republic	
	Metric 5: Currency	Medium	2	Samples taken in two batches: 1998 and 2011/2012 (newest between 5-15 years)	
	Metric 6: Spatial and Temporal Variability	High	1	"1998: 7 samples, 1 fish species, 2 locations 2011/2012: 17 samples, 4 fish species, 2 locations"	
	Metric 7: Exposure Scenario	High	1	BCF - aquatic species are ecological population of interest	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	High	1	Raw data and summary are given, with discussion of outlier	
	Metric 9: Quality Assurance	Medium	2	Quality control for laboratory testing surface water samples	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1	Interspecies variability discussed	
Overall Quality Determination*		High	1.2		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Burton, W. C.,Harte, P. T.. 2013. Bedrock Geology and Outcrop Fracture Trends in the Vicinity of the Savage Municipal Well Superfund Site, Milford, New Hampshire.			
Data Type	Monitoring			
Hero ID	3490995			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	N/A	N/A	
	Metric 2: Analytical Methodology	N/A	N/A	
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representativeness				
	Metric 4: Geographic Area	N/A	N/A	
	Metric 5: Currency	N/A	N/A	
	Metric 6: Spatial and Temporal Variability	N/A	N/A	
	Metric 7: Exposure Scenario	Unacceptable	4	Study is focused on geological properties of an area with groundwater contamination by PCE. No PCE concentration data as part of this study, and groundwater intake is not currently of interest.
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	N/A	N/A	
	Metric 9: Quality Assurance	N/A	N/A	
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	N/A	N/A	
Overall Quality Determination*		Unacceptable	4.0	Metric mean score **: 4.0.

Extracted

** Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation:	Blanco, S.,Bécares, E.. 2010. Are biotic indices sensitive to river toxicants? A comparison of metrics based on diatoms and macro-invertebrates. Chemosphere.				
Data Type	Monitoring				
Hero ID	3501965				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Low	3	Little discussion of method	
	Metric 2: Analytical Methodology	Medium	2	Used standard method SM 6220 C., however few details provided to verify method properly executed.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Medium	2	2007	
	Metric 6: Spatial and Temporal Variability	Medium	2	only 11 samples	
	Metric 7: Exposure Scenario	Medium	2	surface water, but river in Spain.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Low	3	No raw data, no min or SD.	
	Metric 9: Quality Assurance	Low	3	QC assumed because used standard method.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2		
Overall Quality Determination*		Medium	2.2		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Sidonia, V.,Haydee, K. M.,Ristoiu, D.,Luminita, S. D.. 2009. Chlorinated solvents detection in soil and river water in the area along the paper factory from Dej Town, Romania. Studia Universitatis Babes-Bolyai. Chemia.			
Data Type	Monitoring			
Hero ID	3543217			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	High	1	
	Metric 2: Analytical Methodology	High	1	
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representativeness				
	Metric 4: Geographic Area	High	1	
	Metric 5: Currency	Medium	2	Samples collected <15 years ago
	Metric 6: Spatial and Temporal Variability	High	1	
	Metric 7: Exposure Scenario	Medium	2	Only one sample point; location relative to paper plant not specified; sampled when the plant was on- and off-line
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	High	1	
	Metric 9: Quality Assurance	Medium	2	Lab quality assumed from detail in process description; no control for water samples
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	High	1	
Overall Quality Determination*		High	1.3	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation:	Zoccolillo, L., Rellori, M.. 1994. Halocarbons in Antarctic surface waters. International Journal of Environmental Analytical Chemistry.				
Data Type	Monitoring				
Hero ID	3544414				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Sampling methodology briefly discussed.	
	Metric 2: Analytical Methodology	Medium	2	Analytical methodology briefly discussed	
	Metric 3: Biomarker Selection	N/A	N/A	Biomarker not used.	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	Antarctica, Italy	
	Metric 5: Currency	Low	3	>15 years	
	Metric 6: Spatial and Temporal Variability	Medium	2	moderate sample size. no replicate samples.	
	Metric 7: Exposure Scenario	Medium	2	Exposure scenario of interest: surface water.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	Concentration reported in Table 2.	
	Metric 9: Quality Assurance	Medium	2	Procedural recoveries provided, 50 percent for TCE and 75 percent for PERC. Controls not discussed.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Low	3	Not discussed. Authors suggest that the differences in the concentrations in various waters can be attributed to sampling site microclimate and to morphology.	
Overall Quality Determination*		Medium	2.1		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Amagai, T.,Olansandan,,Matsushita, H.,Ono, M.,Nakai, S.,Tamura, K.,Maeda, K.. 1999. A survey of indoor pollution by volatile organohalogen compounds in Katsushika, Tokyo, Japan. Indoor and Built Environment.				
Data Type	Monitoring				
Hero ID	3545469				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1	calibration, flow rates	
	Metric 2: Analytical Methodology	Low	3	LOQ not reported.	
	Metric 3: Biomarker Selection	N/A	N/A	No biomonitoring.	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	> 15 yrs ago	
	Metric 6: Spatial and Temporal Variability	High	1	>50 samples	
	Metric 7: Exposure Scenario	Medium	2	Indoor air, but no direct link to consumer product.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	No raw data.	
	Metric 9: Quality Assurance	Medium	2	Used field blanks. Recoveries not mentioned.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1		
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Focazio, M. J.,Kolpin, D. W.,Barnes, K. K.,Furlong, E. T.,Meyer, M. T.,Zaugg, S. D.,Barber, L. B.,Thurman, M. E.. 2008. A national reconnaissance for pharmaceuticals and other organic wastewater contaminants in the United States–II) untreated drinking water sources. Science of the Total Environment.			
Data Type	Monitoring			
Hero ID	3559503			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	High	1	
	Metric 2: Analytical Methodology	High	1	
	Metric 3: Biomarker Selection	N/A	N/A	not biomarker study
Domain 2: Representativeness				
	Metric 4: Geographic Area	High	1	
	Metric 5: Currency	Low	3	Samples were collected in 2001 (> 15 yrs old)
	Metric 6: Spatial and Temporal Variability	High	1	
	Metric 7: Exposure Scenario	Unacceptable	4	Reported concentrations do not distinguish between surface water and groundwater measurements.
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	Low	3	there is not raw data, mean value, and range of value.
	Metric 9: Quality Assurance	High	1	
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	Medium	2	variability is fewly discussed.
Overall Quality Determination *		Unacceptable	4.0	Metric mean score **: 1.9.

Extracted

** Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation: Begerow, J.,Jermann, E.,Keles, T.,Freier, I.,Ranft, U.,Dunemann, L.. 1996. Internal and external tetrachloroethene exposure of persons living in differently polluted areas of Northrhine-Westphalia (Germany). Zentralblatt fuer Hygiene und Umweltmedizin.					
Data Type	Monitoring				
Hero ID	3561656				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Sampling equipment and procedures given in detail for both blood and air samples	
	Metric 2: Analytical Methodology	Medium	2	Analytical equipment and procedures given in detail for both blood and air samples	
	Metric 3: Biomarker Selection	N/A	N/A	Blood samples tested for PCE and not any biomarkers	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	Essen and Borken, Nordrhein-Westfalens	
	Metric 5: Currency	Medium	2	Data collected prior to 1996 (15+ years ago)	
	Metric 6: Spatial and Temporal Variability	Medium	2	Large number of samples taken, but unclear if replicates were used.	
	Metric 7: Exposure Scenario	High	1	Consumer exposure through blood sample concentration and indoor air concentration	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	Both blood and air concentrations are given as summary statistics	
	Metric 9: Quality Assurance	Medium	2	Quality assurance/cleaning procedures were discussed in sample collection	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1	Variability examined in detail	
Overall Quality Determination*		Medium	1.7		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Kawauchi, T., Nishiyama, K.. 1989. Residual tetrachloroethylene in dry-cleaned clothes. Environmental Research.				
Data Type	Monitoring				
Hero ID	3563210				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Low	3	Sampling discussion is mostly focused on fabrics, with less discussion of room air samples. Did not indicate which room articles were placed, ventilation conditions, etc.	
	Metric 2: Analytical Methodology	Low	3	Analysis methods described. Recovery samples specifically mentioned. LOD not provided	
	Metric 3: Biomarker Selection	N/A	N/A	No biomarker	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	Assumed to be Japan	
	Metric 5: Currency	Low	3	Study conducted prior to 1988 (15+ years ago)	
	Metric 6: Spatial and Temporal Variability	Low	3	Air and breath samples collected only between 2-4pm on weekdays.	
	Metric 7: Exposure Scenario	High	1	Consumer inhalation exposure, measured by room air and expired air (breath) concentrations	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	Summary results only.	
	Metric 9: Quality Assurance	Low	3	No specific discussion of quality control/assurance	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1	Variability discussed with regards to differences between drycleaning establishments	
Overall Quality Determination*		Medium	2.2		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Fielding, M.,Gibson, T. M.,James, H. A.. 1981. Levels of trichloroethylene, tetrachloroethylene and para-dichlorobenzene in groundwaters. Environmental Technology Letters.			
Data Type	Monitoring			
Hero ID	3570809			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	Medium	2	sampling methods and equipments are described. but calibration is not described.
	Metric 2: Analytical Methodology	High	1	
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representativeness				
	Metric 4: Geographic Area	High	1	
	Metric 5: Currency	Low	3	1980s (>15yrs old)
	Metric 6: Spatial and Temporal Variability	Low	3	sample size is too small (duplicate sample at one site)
	Metric 7: Exposure Scenario	High	1	
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	Medium	2	No raw data for each sample.
	Metric 9: Quality Assurance	Low	3	QA/QC is not discussed.
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	Medium	2	uncertainty is not discussed.
Overall Quality Determination*		Medium	2.0	

Extracted

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Minsley, B.. 1983. Tetrachloroethylene contamination of groundwater in Kalamazoo. Journal of the American Water Works Association.				
Data Type	Monitoring				
Hero ID	3573107				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Low	3	Sampling procedures and equipment described in detail, but only for groundwater well sampling	
	Metric 2: Analytical Methodology	Low	3	Analysis for samples mentioned only briefly	
	Metric 3: Biomarker Selection	N/A	N/A	No biomarker	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	Kalamazoo, Michigan	
	Metric 5: Currency	Low	3	Data collected prior to 1983 (15+ years ago)	
	Metric 6: Spatial and Temporal Variability	Medium	2	Surface water sampled at eight locations, no mention of replicates	
	Metric 7: Exposure Scenario	Unacceptable	4	Study focused on groundwater contamination, only briefly touches on surface water concentration. This involved legacy contamination (1980) from groundwater and should not be used.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	Summary data only	
	Metric 9: Quality Assurance	Low	3	No specific discussion of quality control/assurance	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Low	3	Variability not discussed with regard to surface water results	
Overall Quality Determination*		Unacceptable	4.0	Metric mean score ^{**} : 2.7.	
Extracted					

^{**} Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation:	Coffin, R. R., Witherell, L. E., Novick, L. F., Stone, K. M.. 1987. ESTABLISHMENT OF AN EXPOSURE LEVEL TO TETRACHLOROETHYLENE IN AMBIENT AIR IN VERMONT. Public Health Reports.			
Data Type	Monitoring			
Hero ID	3573147			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	Unacceptable	4	Sampling methodology is not discussed.
	Metric 2: Analytical Methodology	N/A	N/A	
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representativeness				
	Metric 4: Geographic Area	N/A	N/A	
	Metric 5: Currency	N/A	N/A	
	Metric 6: Spatial and Temporal Variability	N/A	N/A	
	Metric 7: Exposure Scenario	N/A	N/A	
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	N/A	N/A	
	Metric 9: Quality Assurance	N/A	N/A	
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	N/A	N/A	
Overall Quality Determination*		Unacceptable	4.0	Metric mean score **: 4.0.

Extracted

** Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation:	Lee, W.,Park, S. H.,Kim, J.,Jung, J. Y.. 2015. Occurrence and removal of hazardous chemicals and toxic metals in 27 industrial wastewater treatment plants in Korea. Desalination and Water Treatment.				
Data Type	Monitoring				
Hero ID	3580141				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Low	3	No discussion , but assumed to be in the standard analytical method used.	
	Metric 2: Analytical Methodology	High	1	Purge and trap with GC. Standard Korean method.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	High	1		
	Metric 6: Spatial and Temporal Variability	High	1	27 facilities	
	Metric 7: Exposure Scenario	Medium	2	waste water effluent, but not in the US	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Low	3	No raw data, no SD. No detection frequency.	
	Metric 9: Quality Assurance	Low	3	No discussion, but assumed because used standard Korean method.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Low	3	No SD	
Overall Quality Determination*		Medium	2.0		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Duclos, Y.,Blanchard, M.,Chesterikoff, A.,Chevreuil, M.. 2000. Impact of paris waste upon the chlorinated solvent concentrations of the river Seine (France). Water, Air, and Soil Pollution.				
Data Type	Monitoring				
Hero ID	3587944				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Sampling methodology is described and discussed.	
	Metric 2: Analytical Methodology	Medium	2	Analytical methodology is described and discussed.	
	Metric 3: Biomarker Selection	N/A	N/A	sw samples	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	> 15 yrs	
	Metric 6: Spatial and Temporal Variability	Medium	2	3 sampling sessions; 14 stations	
	Metric 7: Exposure Scenario	Medium	2	sw samples collected, but not in the US.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	Data seems to be raw data.	
	Metric 9: Quality Assurance	Low	3	QA is implied.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	Limited discussion on uncertainty; no variability.	
Overall Quality Determination*		Medium	2.1		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Schwarzenbach, R. P., Giger, W., Hoehn, E., Schneider, J. K.. 1983. Behavior of organic compounds during infiltration of river water to groundwater. Field studies. Environmental Science and Technology.				
Data Type	Monitoring				
Hero ID	3797825				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Low	3	many details of sampling method is missing like storage duration, vial, calibration.	
	Metric 2: Analytical Methodology	Low	3	equipment and analytical conditions are described. but many details are missing like calibration, DT, replicates.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	>15yrs old	
	Metric 6: Spatial and Temporal Variability	High	1		
	Metric 7: Exposure Scenario	Medium	2	surface water study. but river is in Switzerland, not US.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	average and SD are shown. No raw data.	
	Metric 9: Quality Assurance	Low	3	discussion of QA/QC is quite limited.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Low	3	discussion of variability/uncertainty is quite limited..	
Overall Quality Determination*		Low	2.3		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Cdc., 2017. National report on human exposure to environmental chemicals.				
Data Type	Monitoring				
Hero ID	3827236				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1	Biomonitoring data for US population from NHANES; information on sampling methodology readily available.	
	Metric 2: Analytical Methodology	High	1	Biomonitoring data for US population from NHANES; information on analytical methodology readily available.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Medium	2	Blood concentrations for the period 2001-2008	
	Metric 6: Spatial and Temporal Variability	High	1		
	Metric 7: Exposure Scenario	Medium	2	Blood concentrations for general population	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	Raw data, measures of variation not reported.	
	Metric 9: Quality Assurance	High	1	Biomonitoring data for US population from NHANES; information on QA/QC methodology readily available.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1	Biomonitoring data for US population from NHANES; information on variability/uncertainty readily available.	
Overall Quality Determination*		High	1.3		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Atsdr., 2007. Public health assessment: Peninsula Boulevard groundwater plume town of Hempstead, Nassau County, New York: EPA facility ID: NYN000204407.			
Data Type	Monitoring			
Hero ID	3970464			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	Medium	2	Government paper so assumed use of appropriate methods.
	Metric 2: Analytical Methodology	Unacceptable	4	No method described.
	Metric 3: Biomarker Selection	N/A	N/A	sw samples
Domain 2: Representativeness				
	Metric 4: Geographic Area	High	1	
	Metric 5: Currency	Low	3	2007 (>10 years), data collected >15 years ago
	Metric 6: Spatial and Temporal Variability	Unacceptable	4	Sample size is not reported and assumptions cannot be made.
	Metric 7: Exposure Scenario	Medium	2	SW samples collected.
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	Low	3	Maximum value provided only.
	Metric 9: Quality Assurance	Low	3	No discussion on QA.
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	Low	3	No variability or discussion on uncertainties.
Overall Quality Determination*		Unacceptable	4.0	Metric mean score**: 2.8.

Extracted

** Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, two of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Usgs,. 2006. Recent (2003-05) water quality of Barton Springs, Austin, Texas, with emphasis on factors effecting variability.				
Data Type	Monitoring				
Hero ID	3975032				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Water sampling procedures only briefly described (pg 14). Sample storage is mentioned.	
	Metric 2: Analytical Methodology	Medium	2	"Done by NWQL using published USGS analytical methods"	
	Metric 3: Biomarker Selection	N/A	N/A	No biomarker	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	Barton Spring, TX	
	Metric 5: Currency	Medium	2	Data collected 2003-2005 (5-15 years ago)	
	Metric 6: Spatial and Temporal Variability	Medium	2	22 samples from each spring orifice over two phases of sample collection; uncertain if replicates were used	
	Metric 7: Exposure Scenario	Medium	2	Study of contaminants (inc. PERC) in surface springs from groundwater source	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	High	1	Raw data in Table 9; various summary statistics and figures throughout	
	Metric 9: Quality Assurance	Medium	2	Quality control and assurance data is supposed to be in Appendix 3, which was not included with this copy	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1	Variability of water quality factors was focus of this study	
Overall Quality Determination*		Medium	1.7		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Usgs,. 1994. Organic compounds downstream from a treated-wastewater discharge near Dalls, Texas, March 1987.				
Data Type	Monitoring				
Hero ID	3975036				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1	Water samples for nutrient, organic, and inorganic determinations were collected and preserved according to standard USGS procedures (Wells and others, 1990).	
	Metric 2: Analytical Methodology	Medium	2	Methods described and cited, but no indication of recoveries. Tentative compound identification from GC/MS analyses was based on computer matching of sample mass spectra with the National Bureau of Standards library. Identification of all compounds extracted by PT and other selected methods, and indicated with a (b) in the data tables, was confirmed by matching the mass spectrum and retention time of the sample with those of authentic standards.(1987).	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	March 9 and 10, 1987	
	Metric 6: Spatial and Temporal Variability	Low	3	4 sites, but appears to be one sample per site.	
	Metric 7: Exposure Scenario	High	1	Media of interest. Location well described.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Low	3	No summary stats or raw data.	
	Metric 9: Quality Assurance	Low	3	one upstream control site. QA assumed, but not discussed.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1	Discussed uncertainty of analysis methods	
Overall Quality Determination*		Medium	2.0		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Usgs., 2006. Water-quality conditions of Chester Creek, Anchorage, Alaska, 1998-2001.				
Data Type	Monitoring				
Hero ID	3975042				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1	Data collection and analysis described in pages 5-7	
	Metric 2: Analytical Methodology	High	1	Data collection and analysis described in pages 5-7	
	Metric 3: Biomarker Selection	N/A	N/A	No biomarker	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	Chester Creek, Alaska	
	Metric 5: Currency	Low	3	Data collected 1998-2001 (15+ years ago)	
	Metric 6: Spatial and Temporal Variability	Medium	2	11 samples analyzed for VOCs, including PERC	
	Metric 7: Exposure Scenario	High	1	For PCE, only concentration in surface water. Fish tissue analysis did not include VOCs.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	Summary data only; Table 3	
	Metric 9: Quality Assurance	Low	3	No specific discussion of quality control/assurance	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Low	3	No specific discussion of uncertainty/variability	
Overall Quality Determination*		Medium	1.9		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Usgs,. 2003. A national survey of methyl tert-butyl ether and other volatile organic compounds in drinking-water sources: Results of the random survey.				
Data Type	Monitoring				
Hero ID	3975046				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	Sampling equipment and procedures described; sampling performed by different community water systems personnel across country	
	Metric 2: Analytical Methodology	High	1	Analytical methods and equipment discussed including detection limits	
	Metric 3: Biomarker Selection	N/A	N/A	No biomarker used	
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1	United States	
	Metric 5: Currency	Low	3	Data collected between 1999-2000 (15+ years ago)	
	Metric 6: Spatial and Temporal Variability	Medium	2	954 samples submitted from across the US, with field blanks included	
	Metric 7: Exposure Scenario	Medium	2	Data collected on many different chemicals in drinking water sources; only PERC in surface water is of interest	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	Summary only; PERC is in Appendix 2 on pg 76	
	Metric 9: Quality Assurance	High	1	Quality control samples	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1	Uncertainty discussed extensively	
Overall Quality Determination*		Medium	1.7		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Ak, D. E. C.. 2012. Wendell Avenue (MC cleaners).			
Data Type	Monitoring			
Hero ID	3982325			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	Unacceptable	4	sampling method is not described.
	Metric 2: Analytical Methodology	Unacceptable	4	analytical method is not described.
	Metric 3: Biomarker Selection	N/A	N/A	not biomarker study
Domain 2: Representativeness				
	Metric 4: Geographic Area	High	1	
	Metric 5: Currency	Medium	2	measured in 2010(>5 yrs old)
	Metric 6: Spatial and Temporal Variability	Unacceptable	4	sample size is not clear
	Metric 7: Exposure Scenario	Unacceptable	4	Vapor intrusion, soil, and groundwater - not currently scenarios of interest.
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	Low	3	no raw data, and any other statistical values.
	Metric 9: Quality Assurance	N/A	N/A	no discussion
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	Unacceptable	4	no discussion
Overall Quality Determination*		Unacceptable	4.0	Metric mean score**: 3.2.

Extracted

** Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, five of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Usgs,. 2009. Organic wastewater compounds, pharmaceuticals, and coliphage in ground water receiving discharge from onsite wastewater treatment systems near La Pine, Oregon: Occurrence and implications for transport.			
Data Type	Monitoring			
Hero ID	3982442			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	High	1	Sample collection and storage are described. Sampling locations are given and characterized.
	Metric 2: Analytical Methodology	High	1	Detection limit and calibration standards discussed.
	Metric 3: Biomarker Selection	N/A	N/A	No biomarker
Domain 2: Representativeness				
	Metric 4: Geographic Area	High	1	La Pine, Oregon
	Metric 5: Currency	Medium	2	Samples collected in 2003 (5-15 years ago)
	Metric 6: Spatial and Temporal Variability	High	1	Replicate samples taken
	Metric 7: Exposure Scenario	Medium	2	PERC concentration in wastewater effluent is scenario of interest, though this effluent is being sent to groundwater
Domain 3: Accessibility/Clarity				
	Metric 8: Reporting of Results	High	1	Raw data in Table B1, B2
	Metric 9: Quality Assurance	High	1	Quality control data were collected
Domain 4: Variability and Uncertainty				
	Metric 10: Variability and Uncertainty	High	1	Variability discussed in Appendix B
Overall Quality Determination*		High	1.2	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Helz, G. R., Hsu, R. Y.. 1978. Volatile chloro- and bromocarbons in coastal waters. Limnology and Oceanography.				
Data Type	Monitoring				
Hero ID	4140523				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
Metric 1:	Sampling Methodology	Medium	2	Sampling methodology discussed. To obtain data on the character of volatile halocarbons in waste discharges, we collected a series of samples from Back River, Maryland (Fig. 1B). This is a shallow, 12 km long tributary estuary to the Chesapeake Bay, with a salinity range of about 04 g* kg-l. Its mean depth is about 1 m and it is well mixed vertically. Near its upper end, Back River receives 1.5- 1.9 x 10 ⁸ liter. d-r of wastewater from Baltimore's main sewage treatment plant; the waste discharges often exceed the freshwater flow from the watershed by a factor of two (Helz et al. 1975). The plant provides 100 percent secondary treatment, mostly by the trickling filter process, to wastes of both domestic and commercial origin. The effluent is chlorinated before discharge. The first series of samples from Back River (No. 8-12) was collected in early February 1977, after northern Chesapeake Bay had been covered with ice for more than a month. The only uncovered area was a 0.2-km-diameter patch of water immediately above the underwater diffusers at the discharge point in midriver. The second set of samples (No. 13-23) was collected in early May 1977, well after the spring thaw.	
Metric 2:	Analytical Methodology	Medium	2	Analytical methodology discussed. GC equipped with a Hall electrolytic conductivity detector (TRACOR). In early stages of the work, some identifications were checked by mass spectrometry, but the high selectivity of the method for only volatile chloro- and bromocarbons minimizes the danger of misidentification when only GC retention time is used. Limit of detection not specified.	
Metric 3:	Biomarker Selection	N/A	N/A	Biomarker not used.	
Domain 2: Representativeness					
Metric 4:	Geographic Area	High	1	Maryland (Back River estuary)	
Metric 5:	Currency	Low	3	>15 years (February and May 1977)	
Metric 6:	Spatial and Temporal Variability	Low	3	The first series of samples from Back River (No. 8-12; 5 samples) was collected in early February 1977, after northern Chesapeake Bay had been covered with ice for more than a month. The second set of samples (No. 13-23; 11 samples) was collected in early May 1977, well after the spring thaw (open water).	
Continued on next page					

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Study Citation:	Helz, G. R., Hsu, R. Y.. 1978. Volatile chloro- and bromocarbons in coastal waters. Limnology and Oceanography.				
Data Type	Monitoring				
Hero ID	4140523				
Domain	Metric	Rating [†]	Score	Comments [‡]	
	Metric 7: Exposure Scenario	Medium	2	Back River: This is a shallow, 12 km long tributary estuary to the Chesapeake Bay, with a salinity range of about 04 g* kg-1. Its mean depth is about 1 m and it is well mixed vertically. Near its upper end, Back River receives 1.5-1.9 x 10 ⁸ liter. d-r of wastewater from Baltimore's main sewage treatment plant; the waste discharges often exceed the freshwater flow from the watershed by a factor of two (Helz et al. 1975). The plant provides 100 percent secondary treatment, mostly by the trickling filter process, to wastes of both domestic and commercial origin. The effluent is chlorinated before discharge.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	No supplemental or raw data. Table 3 lists DCM, TCE, and PERC concentrations in NM for Back River samples collected in February 1977 (ice cover) and May 1977 (open water). Some values are ND, but LOD is not reported.	
	Metric 9: Quality Assurance	Low	3	QA/QC procedures not directly discussed.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	Some discussion of variability due to sampling times, February (ice cover) and May (open water), and concentration decrease seaward due to tidal mixing of the effluent. Some uncertainty regarding the factors causing volatilization and its influence on May samples.	
Overall Quality Determination*		Medium	2.2		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Aggazzotti, G.,Predieri, G.. 1986. SURVEY OF VOLATILE HALOGENATED ORGANICS (VHO) IN ITALY - LEVELS OF VHO IN DRINKING WATERS, SURFACE WATERS AND SWIMMING POOLS. Water Research.				
Data Type	Monitoring				
Hero ID	4149721				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Low	3	Minimal details for the surface water. collected from 31 stations	
	Metric 2: Analytical Methodology	Medium	2	No standard method, but GC-EC conditions described.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3		
	Metric 6: Spatial and Temporal Variability	Low	3	31 stations, collected multiples time per year. But exact number of samples not reported.	
	Metric 7: Exposure Scenario	Medium	2	a canal which collects the wastes of the city of Modena	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Low	3	no number of samples., no SD, no raw data	
	Metric 9: Quality Assurance	Low	3	Mentions calibration for VHO, but no mention of field blanks, lab blanks, recoveries	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2		
Overall Quality Determination*		Low	2.4		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Fytianos, K.,Vasilikiotis, G.,Weil, L.. 1985. Identification and determination of some trace organic compounds in coastal seawater of Northern Greece. Bulletin of Environmental Contamination and Toxicology.				
Data Type	Monitoring				
Hero ID	4149731				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Low	3	Described sample containers and filtration method. no info on sample storage or duration.	
	Metric 2: Analytical Methodology	Low	3	gc-ms-ecd. Standard method not used. Operating conditions not reported., although may be in Garrison et al. 1978;Shino-hara et ai.1981).	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	1980s	
	Metric 6: Spatial and Temporal Variability	Low	3	Not explicit. 2 rivers, samples collected twice a month for two years = 24 samples per station	
	Metric 7: Exposure Scenario	Medium	2	Not US, but sites described. The former is situated close to a large city, Thessaloniki, and a large industrial area, including a refinery unit. The latter is close to a smaller city, Kavala, which is rapidly developing due to off-shore oil wells.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Low	3	only mean values reported	
	Metric 9: Quality Assurance	Low	3	No recoveries, blanks discussed.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Low	3	No SD reported.	
Overall Quality Determination*		Low	2.7		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Hurford, N.,Law, R. J.,Payne, A. P.,Fileman, T. W.. 1989. Concentrations of chemicals in the North Sea arising from discharges from chemical tankers.				
Data Type	Monitoring				
Hero ID	4149734				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	sampling method is well described. but calibration is not mentioned.	
	Metric 2: Analytical Methodology	High	1		
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	>15yrs old	
	Metric 6: Spatial and Temporal Variability	High	1		
	Metric 7: Exposure Scenario	Medium	2	surface water study. but Samples are collected from the sea around UK.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	No raw data.	
	Metric 9: Quality Assurance	Medium	2	QC is described. no quantitative results for QA/QC.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Medium	2	no discussion of uncertainty.	
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Sauer, T. C.. 1981. Volatile organic compounds in open ocean and coastal surface waters. Organic Geochemistry.				
Data Type	Monitoring				
Hero ID	4152375				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	sampling equipments, storage conditions are described. but no information of calibration, storage duration.	
	Metric 2: Analytical Methodology	High	1		
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Low	3	>15yrs old	
	Metric 6: Spatial and Temporal Variability	Low	3	<10 samples for open ocean. <5 samples for coast.	
	Metric 7: Exposure Scenario	High	1		
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Low	3	no raw data. no mean or SD. no discussion of blanks.	
	Metric 9: Quality Assurance	Medium	2	discussed extraction efficiency.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Low	3	discussion of variability/uncertainty is limited.	
Overall Quality Determination*		Medium	2.1		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Ec., 2014. SINPHONIE: Schools Indoor Pollution and Health Observatory Network in Europe.				
Data Type	Monitoring				
Hero ID	4440449				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	calibration of sampler is not provided.	
	Metric 2: Analytical Methodology	Low	3	calibration of instrument ,detection limit are not provided	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	Medium	2	<15yrs old (2010-2011)	
	Metric 6: Spatial and Temporal Variability	High	1		
	Metric 7: Exposure Scenario	Medium	2	not directly related to consumer product.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Medium	2	raw data is not provided	
	Metric 9: Quality Assurance	High	1		
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	High	1		
Overall Quality Determination*		Medium	1.7		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Wetzel, T. A.. 2014. Volatile Organic Compounds (VOCs) In Indoor Air: Emission From Consumer Products and the Use of Plants for Air Sampling.				
Data Type	Monitoring				
Hero ID	4442460				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Low	3	Very few details provided on sampling such as where samples placed. Very unclear as to when the product was introduced to the house and when samples were collected. No internal conditions such as temp and RH provided.	
	Metric 2: Analytical Methodology	Low	3	Standard EPA method, but no LOQ.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representativeness					
	Metric 4: Geographic Area	High	1		
	Metric 5: Currency	High	1	current	
	Metric 6: Spatial and Temporal Variability	Low	3	only one sample per room per house. 4 houses.	
	Metric 7: Exposure Scenario	Low	3	Product chemical content use pattern within house not provided.	
Domain 3: Accessibility/Clarity					
	Metric 8: Reporting of Results	Low	3	Only one sample per location, but not averages across houses.	
	Metric 9: Quality Assurance	Low	3	Quality assurance only briefly discussed, but a standard method was used.	
Domain 4: Variability and Uncertainty					
	Metric 10: Variability and Uncertainty	Low	3	Variation across houses not discussed.	
Overall Quality Determination*		Low	2.6		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Won, D., Corsi, R. L., Rynes, M.. 2000. New indoor carpet as an adsorptive reservoir for volatile organic compounds. Environmental Science and Technology.				
Data Type	Experimental				
Hero ID	12793				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology and Conditions	High	1	No standard method mentioned, but methodology well described.	
	Metric 2: Analytical Methodology	Medium	2	method described, but information such as calibration and recoveries not provided.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representative					
	Metric 4: Testing Scenario	Medium	2	US sample. Different rh tested and different carpets tests.	
	Metric 5: Sample Size and Variability	Medium	2	3 carpet, with and without pads. Only 1 to 9 samples per type.	
	Metric 6: Temporality	Low	3	paper published in 2000 (>15 yrs)	
Domain 3: Accessibility/Clarity					
	Metric 7: Reporting of Results	Medium	2	avg and CV only. No raw.	
	Metric 8: Quality Assurance	N/A	N/A		
Domain 4: Variability and Uncertainty					
	Metric 9: Variability and Uncertainty	Medium	2	limited discussion of uncertainties	
Overall Quality Determination*		Medium	2.0		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Wallace, L. A., Pellizzari, E., Leaderer, B., Zelon, H., Sheldon, L.. 1987. Emissions of volatile organic compounds from building materials and consumer products. Atmospheric Environment.				
Data Type	Experimental				
Hero ID	23126				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology and Conditions	High	1		
	Metric 2: Analytical Methodology	Low	3	instrument calibration, detection limit, recovery samples are not discribed.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representative					
	Metric 4: Testing Scenario	High	1		
	Metric 5: Sample Size and Variability	Low	3	just 3 samples for each 4 products	
	Metric 6: Temporality	Low	3	> 15yrs old study	
Domain 3: Accessibility/Clarity					
	Metric 7: Reporting of Results	Medium	2	no raw data	
	Metric 8: Quality Assurance	N/A	N/A		
Domain 4: Variability and Uncertainty					
	Metric 9: Variability and Uncertainty	Low	3	The uncertainties are discussed. That's because equiribrium is assumed, the values might be underestimated.	
Overall Quality Determination*		Low	2.3		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Tichenor, B. A., Sparks, L. E., Jackson, M. D., Guo, Z., Mason, M. A., Plunket, C. M., Rasor, S. A.. 1990. Emissions of perchloroethylene from dry cleaned fabrics. Atmospheric Environment.				
Data Type	Experimental				
Hero ID	27401				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology and Conditions	High	1		
	Metric 2: Analytical Methodology	High	1	Contractor concerned that LOD/LOQ not given, but the authors do clearly state the lower end of their calibration curves, so we know the minimum concentration without regression. Authors provide details on methodology, instrumentation settings, and QA/QC processes.	
	Metric 3: Biomarker Selection	N/A	N/A		
testing on fabric					
Domain 2: Representative					
	Metric 4: Testing Scenario	High	1		
	Metric 5: Sample Size and Variability	Medium	2	Some samples less than 10 (emissions from fabrics one per article of clothing) Older study >15 yrs.	
	Metric 6: Temporality	Low	3		
Domain 3: Accessibility/Clarity					
	Metric 7: Reporting of Results	High	1		
	Metric 8: Quality Assurance	N/A	N/A		
Domain 4: Variability and Uncertainty					
	Metric 9: Variability and Uncertainty	High	1		
Overall Quality Determination*		High	1.4		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation:	Guo, Z. S., Tichenor, B. A., Mason, M. A., Plunket, C. M.. 1990. The temperature dependence of the emission of perchloroethylene from dry cleaned fabrics. Environmental Research.				
Data Type	Experimental				
Hero ID	27961				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology and Conditions	High	1	Upgraded to high. The sampling methodology and conditions are reported in detail. This study is old, but this question does not cover temporality. Further, these methodologies are still common practice (small environmental chambers, tenax sorptive tubes, GC analysis).	
	Metric 2: Analytical Methodology	High	1	Upgraded to high. The analytical methodology and conditions are reported in detail. This study is old, but this question does cover temporality. Further, these methodologies are still common practice (small environmental chambers, tenax sorptive tubes, GC analysis).	
	Metric 3: Biomarker Selection	N/A	N/A	No biomarker	
Domain 2: Representative					
	Metric 4: Testing Scenario	Medium	2	Scenarios tested for a range of conditions, including some corresponding to typical consumer exposure.	
	Metric 5: Sample Size and Variability	Medium	2	Multiple samples taken over period of up to five days.	
	Metric 6: Temporality	Low	3	Experiments took place > 15 years ago (published 1989)	
Domain 3: Accessibility/Clarity					
	Metric 7: Reporting of Results	Medium	2	Summary statistics are included but raw data is not.	
	Metric 8: Quality Assurance	N/A	N/A	Quality control was mentioned in experimental design, but not described in detail.	
Domain 4: Variability and Uncertainty					
	Metric 9: Variability and Uncertainty	Medium	2	Variability and uncertainty are touched on	
Overall Quality Determination*		Medium	1.9		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Sack, T. M.,Steele, D. H.,Hammerstrom, K.,Remmers, J.. 1992. A survey of household products for volatile organic compounds. Atmospheric Environment.			
Data Type	Experimental			
Hero ID	28339			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology and Conditions	High	1	
	Metric 2: Analytical Methodology	Low	3	detection limits, recovery samples are not discribed.
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representative				
	Metric 4: Testing Scenario	Medium	2	exposure control is not discussed.
	Metric 5: Sample Size and Variability	Medium	2	number of products per category varied. Replicates tests for some products, but not all.
	Metric 6: Temporality	Low	3	>15 yrs old
Domain 3: Accessibility/Clarity				
	Metric 7: Reporting of Results	Medium	2	no raw data. Only average is reported.
	Metric 8: Quality Assurance	N/A	N/A	
Domain 4: Variability and Uncertainty				
	Metric 9: Variability and Uncertainty	Low	3	uncertainties, limitations are not discussed.
Overall Quality Determination [*]		Low	2.3	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{*} If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Fernandez, J.,Guberan, E.,Caperos, J.. 1976. Experimental human exposures to tetrachloroethylene vapor and elimination in breath after inhalation. American Industrial Hygiene Association Journal.				
Data Type	Experimental				
Hero ID	58143				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology and Conditions	High	1	Sampling methods, protocol, and equipment are described	
	Metric 2: Analytical Methodology	Medium	2	Analytical methods are briefly discussed. Technique (gas chromatography) and instrumentation are given.	
	Metric 3: Biomarker Selection	Medium	2	tce in breath	
Domain 2: Representative					
	Metric 4: Testing Scenario	Medium	2	Experimental conditions in controlled environment rather than consumer exposure; biomonitoring	
	Metric 5: Sample Size and Variability	Low	3	Appropriate sample size, but no mention of replicates	
	Metric 6: Temporality	Low	3	Article published in March 1976 issue of journal, so results are 15+ years old.	
Domain 3: Accessibility/Clarity					
	Metric 7: Reporting of Results	Medium	2	Raw data points provided in figures only	
	Metric 8: Quality Assurance	N/A	N/A	No specific discussion of quality assurance/control	
Domain 4: Variability and Uncertainty					
	Metric 9: Variability and Uncertainty	Medium	2	Some discussion of variability/uncertainty particularly with regard to urine sampling	
Overall Quality Determination*		Medium	2.1		

Extracted

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Opdam, J. J., Smolders, J. F.. 1987. Alveolar sampling and fast kinetics of tetrachloroethene in man. II. Fast kinetics. Occupational and Environmental Medicine.				
Data Type	Experimental				
Hero ID	58314				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
Metric 1:	Sampling Methodology and Conditions	Medium	2	sampling described in detail elsewhere, but info such as sampling times, breath holding provided.	
Metric 2:	Analytical Methodology	Low	3	analysis described elsewhere. no details provided in report. could be upgraded upon examination of other report.	
Metric 3:	Biomarker Selection	N/A	N/A		
Domain 2: Representative					
Metric 4:	Testing Scenario	Low	3	testing conditions described elsewhere.	
Metric 5:	Sample Size and Variability	Medium	2	6 volunteers	
Metric 6:	Temporality	Low	3	1987 study, although the PERC was not a product, so timing not as important.	
Domain 3: Accessibility/Clarity					
Metric 7:	Reporting of Results	Medium	2	no raw data	
Metric 8:	Quality Assurance	N/A	N/A	limited QC discussed	
Domain 4: Variability and Uncertainty					
Metric 9:	Variability and Uncertainty	Medium	2	limited discussion of variability	
Overall Quality Determination*		Low	2.4		

Extracted

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Imbriani, M.,Ghittori, S.,Pezzagno, G.,Capodaglio, E.. 1988. Urinary excretion of tetrachloroethylene (perchloroethylene) in experimental and occupational exposure. Archives of Environmental and Occupational Health.			
Data Type	Experimental			
Hero ID	58324			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology and Conditions	High	1	Sampling method described in detail.
	Metric 2: Analytical Methodology	Medium	2	Method discussed, but not in detail. Recoveries provided.
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representative				
	Metric 4: Testing Scenario	Medium	2	different exposure activities used (rest, biking). Not exposed to a product, but to PERC.
	Metric 5: Sample Size and Variability	High	1	three groups of 5
	Metric 6: Temporality	Low	3	>15 yrs
Domain 3: Accessibility/Clarity				
	Metric 7: Reporting of Results	Medium	2	no raw data
	Metric 8: Quality Assurance	N/A	N/A	recoveries provided, calibration of equipment not discussed, or blanks.
Domain 4: Variability and Uncertainty				
	Metric 9: Variability and Uncertainty	Medium	2	
Overall Quality Determination*		Medium	1.9	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Kreiling, J. A., Stephens, R. E., Reinisch, C. L.. 2005. A mixture of environmental contaminants increases cAMP-dependent protein kinase in Spisula embryos. Environmental Toxicology and Pharmacology.				
Data Type	Experimental				
Hero ID	58563				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology and Conditions	High	1	Sampling procedures are given in detail	
	Metric 2: Analytical Methodology	High	1	Analytical methodology given in detail	
	Metric 3: Biomarker Selection	Medium	2	Biomarker (RII antigen) compared after exposure to PERC both individually and in combination with other studied chemicals	
Domain 2: Representative					
	Metric 4: Testing Scenario	Low	3	Study looks at Atlantic surf clams; these are sediment-dwelling and thus excluded from scenario of interest; study is not looking at concentration in body tissues	
	Metric 5: Sample Size and Variability	High	1	Large number of samples	
	Metric 6: Temporality	Medium	2	Experiments took place prior to publication in 2004 (5-15 years ago)	
Domain 3: Accessibility/Clarity					
	Metric 7: Reporting of Results	Medium	2	Summary only; data provided in figures	
	Metric 8: Quality Assurance	N/A	N/A	Quality Assurance not specifically discussed	
Domain 4: Variability and Uncertainty					
	Metric 9: Variability and Uncertainty	High	1	Variety of chemical concentrations tested	
Overall Quality Determination*		High	1.6		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	S. Kim, J. A. Kim, J. Y. An, H. J. Kim, S. D. Kim, J. C. Park. 2007. TVOC and formaldehyde emission behaviors from flooring materials bonded with environmental-friendly MF/PVAc hybrid resins. Indoor Air.				
Data Type	Experimental				
Hero ID	1512515				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology and Conditions	High	1	flooring prep discussed, chamber set up discussed	
	Metric 2: Analytical Methodology	Medium	2	GC/MS. conditions in table 5. no info on calibration or recoveries.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representative					
	Metric 4: Testing Scenario	Medium	2	one set of sampling conditions, table 2. Not sure if resin is considered an adhesive. Korean study. exact product not known.	
	Metric 5: Sample Size and Variability	Low	3	number of tests is uncertain.	
	Metric 6: Temporality	Medium	2	10 yrs old	
Domain 3: Accessibility/Clarity					
	Metric 7: Reporting of Results	Medium	2	no raw data. Uncertain if the EF is a mean or s	
	Metric 8: Quality Assurance	N/A	N/A	QC not explicitly discussed.	
Domain 4: Variability and Uncertainty					
	Metric 9: Variability and Uncertainty	Low	3	No SD	
Overall Quality Determination*		Medium	2.1		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation:	Kwon, K. iD,Jo, W.,Lim, H.,Jeong, W.. 2008. Volatile pollutants emitted from selected liquid household products. Environmental Science and Pollution Research.				
Data Type	Experimental				
Hero ID	1752751				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology and Conditions	Medium	2	Experimental protocol and equipment are described thoroughly.	
	Metric 2: Analytical Methodology	High	1	Analytical procedures given in detail, including mention of detection limits and recovery	
	Metric 3: Biomarker Selection	N/A	N/A	No biomarker	
Domain 2: Representative					
	Metric 4: Testing Scenario	Low	3	Household products tested, but under laboratory conditions. Goal was to determine composition of products	
	Metric 5: Sample Size and Variability	Medium	2	42 household products tested	
	Metric 6: Temporality	Medium	2	Tests conducted prior to article publication in 2008 (5-15 years ago)	
Domain 3: Accessibility/Clarity					
	Metric 7: Reporting of Results	Low	3	Summary data only, data is product compositions and not air concentration or consumer dose	
	Metric 8: Quality Assurance	N/A	N/A	No specific discussion of quality assurance/control	
Domain 4: Variability and Uncertainty					
	Metric 9: Variability and Uncertainty	Medium	2	Some discussion of limitations in section 6	
Overall Quality Determination*		Medium	2.1		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Kowalska, J.,Szewczyńska, M.,Pośniak, M.. 2014. Measurements of chlorinated volatile organic compounds emitted from office printers and photocopiers. Environmental Science and Pollution Research.				
Data Type	Experimental				
Hero ID	2534318				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
Metric 1:	Sampling Methodology and Conditions	Medium	2	No standard method method mentioned, but chamber size, temp, RH, air volume, duration reported.	
Metric 2:	Analytical Methodology	Medium	2	Discussed method, calibration curve. For substance identification, the mass spectrum library NIST 05 was available.	
Metric 3:	Biomarker Selection	N/A	N/A		
Domain 2: Representative					
Metric 4:	Testing Scenario	Medium	2	Office printers is on PECO for PERC.	
Metric 5:	Sample Size and Variability	Medium	2	7 different office equipment devices. Appears that replicates were conducted since mean and SD provided for each device.	
Metric 6:	Temporality	Low	3	Test date not specified, although assumed to be recent based on pub date.	
Domain 3: Accessibility/Clarity					
Metric 7:	Reporting of Results	Medium	2	No raw data, mean and SD provided for each device.	
Metric 8:	Quality Assurance	N/A	N/A	calibration provided. no discussion of controls.	
Domain 4: Variability and Uncertainty					
Metric 9:	Variability and Uncertainty	Medium	2	Discussed different equipment types.	
Overall Quality Determination*		Medium	2.1		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	W. R. Chan, S. Cohn, M. Sidheswaran, D. P. Sullivan, W. J. Fisk. 2014. Contaminant levels, source strengths, and ventilation rates in California retail stores. Indoor Air.			
Data Type	Experimental			
Hero ID	2535652			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology and Conditions	High	1	
	Metric 2: Analytical Methodology	High	1	
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representative				
	Metric 4: Testing Scenario	High	1	
	Metric 5: Sample Size and Variability	High	1	
	Metric 6: Temporality	High	1	
Domain 3: Accessibility/Clarity				
	Metric 7: Reporting of Results	High	1	
	Metric 8: Quality Assurance	N/A	N/A	
Domain 4: Variability and Uncertainty				
	Metric 9: Variability and Uncertainty	High	1	
Overall Quality Determination*		High	1.0	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Kowalska, J.,Gierczak, T.. 2013. Qualitative and Quantitative Analyses of the Halogenated Volatile Organic Compounds Emitted from the Office Equipment Items. Indoor and Built Environment.				
Data Type	Experimental				
Hero ID	2655630				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology and Conditions	Medium	2	Sampling equipment and methods are described.	
	Metric 2: Analytical Methodology	High	1	Analytical methods are given, including calibration and determination limits	
	Metric 3: Biomarker Selection	N/A	N/A	No biomarker	
Domain 2: Representative					
	Metric 4: Testing Scenario	Low	3	Agree that the testing scenario relevance is low- The office items were "disintegrated"(not clear how or to what degree), and heated to desorb VOCs. Cannot directly compare to emissions of intact articles at room temperature.	
	Metric 5: Sample Size and Variability	Low	3	16 different items tested; no mention of replicates	
	Metric 6: Temporality	Medium	2	Tests conducted prior to article publication in 2008 (5-15 years ago)	
Domain 3: Accessibility/Clarity					
	Metric 7: Reporting of Results	High	1	Raw data is given (chromatograms); numbers in summary data	
	Metric 8: Quality Assurance	N/A	N/A	No specific discussion of quality assurance/control	
Domain 4: Variability and Uncertainty					
	Metric 9: Variability and Uncertainty	Low	3	No specific discussions of variability/uncertainty	
Overall Quality Determination*		Medium	2.1		

Extracted

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	M. Nohr, W. Horn, O. Jann, M. Richter, W. Lorenz. 2015. Development of a multi-VOC reference material for quality assurance in materials emission testing. Analytical and Bioanalytical Chemistry.			
Data Type	Experimental			
Hero ID	2718034			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology and Conditions	Medium	2	Development of new method. micro chamber.
	Metric 2: Analytical Methodology	Low	3	No LOQ provided in article. Method described elsewhere.
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representative				
	Metric 4: Testing Scenario	Medium	2	The emissions is from volatility in a petri dish. The product was not "applied".
	Metric 5: Sample Size and Variability	Low	3	Three batches of same product.
	Metric 6: Temporality	High	1	
Domain 3: Accessibility/Clarity				
	Metric 7: Reporting of Results	Medium	2	No raw data.
	Metric 8: Quality Assurance	N/A	N/A	not discussed.
Domain 4: Variability and Uncertainty				
	Metric 9: Variability and Uncertainty	High	1	RSD provided. discussed influence on humidity, chamber flow.
Overall Quality Determination [*]		Medium	2.0	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{*} If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Chao, C. Y. H.,Tung, T. C. W.,Niu, J. L.,Pang, S. W.,Lee, R. Y. M.. 1999. Indoor perchloroethylene accumulation from dry cleaned clothing on residential premises. Building and Environment.				
Data Type	Experimental				
Hero ID	3559311				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
Metric 1:	Sampling Methodology and Conditions	High	1	Experimental protocol and sampling methodology are described thoroughly.	
Metric 2:	Analytical Methodology	Low	3	Analysis methods described broadly - gas chromatography/ mass spectroscopy	
Metric 3:	Biomarker Selection	N/A	N/A	No biomarker	
Domain 2: Representative					
Metric 4:	Testing Scenario	High	1	Test locations are actual homes, chosen from consumer survey; tests simulate typical drycleaning exposure	
Metric 5:	Sample Size and Variability	Medium	2	7 samples per test, duplicate samples at some test locations.	
Metric 6:	Temporality	Low	3	Study done in 1996 (15+ years ago)	
Domain 3: Accessibility/Clarity					
Metric 7:	Reporting of Results	High	1	Raw data reported in Tables 2-4	
Metric 8:	Quality Assurance	N/A	N/A	Quality control measures mentioned.	
Domain 4: Variability and Uncertainty					
Metric 9:	Variability and Uncertainty	High	1	Environmental conditions and results of duplicate tests are provided.	
Overall Quality Determination*		Medium	1.7		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Cheng, W. enHsi, Tsai, D. Y., Lu, J. iaYu, Lee, J. enWei. 2016. Extracting Emissions from Air Fresheners Using Solid Phase Microextraction Devices. Aerosol and Air Quality Research.				
Data Type	Experimental				
Hero ID	3587655				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology and Conditions	Medium	2	new sampling method; qualification tests conducted on the samplers used.	
	Metric 2: Analytical Methodology	Medium	2	Missing some details, method SOP not reported.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representative					
	Metric 4: Testing Scenario	Low	3	One test condition. No detailed description of product.	
	Metric 5: Sample Size and Variability	Low	3	No replicate. Single samples of three products.	
	Metric 6: Temporality	High	1	current (2016; publication date)	
Domain 3: Accessibility/Clarity					
	Metric 7: Reporting of Results	Medium	2	No raw data. No summary across fresheners, although not as applicable.	
	Metric 8: Quality Assurance	N/A	N/A	Minimal QC. RSD (flow rates) in supp files.	
Domain 4: Variability and Uncertainty					
	Metric 9: Variability and Uncertainty	Medium	2	some discussion of variability between emissions.	
Overall Quality Determination*		Medium	2.1		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:		UL Env. 2017. Floor Coating VOC Emissions Research Report.			
Data Type		Experimental			
Hero ID		4440489			
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology and Conditions	Medium	2	Environmental chamber and chemical emissions were analytically measured. Sampling conditions reported (temperature, RH, and air change per hour throughout each test).	
	Metric 2: Analytical Methodology	Medium	2	VOC measurements were made using gas chromatography with mass spectrometric detection (GC-MS). Measurements are reported to a quantifiable level of 0.04 µg based on a standard air volume collection of 18 L. Calibrated.	
	Metric 3: Biomarker Selection	N/A	N/A	Biomarker is not used.	
Domain 2: Representative					
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Study Citation:	UL Env. 2017. Floor Coating VOC Emissions Research Report.
Data Type	Experimental
Hero ID	4440489

Domain	Metric	Rating [†]	Score	Comments [‡]
	Metric 4: Testing Scenario	Medium	2	<p>Small chamber screening phase: Screening tests were conducted to determine the type and amount of VOCs emitted from each floor coating. The coatings were applied to solid wood substrates according to the manufacturers recommended instructions. Then the samples were immediately placed in a 90 L test chamber that is supplied with purified air at standard conditions of 23°C, 50 percent relative humidity, and 1 air change per hour. Air samples were collected after a 24-hr equilibrium period to determine the emission rate of VOCs.</p> <p>Full scale large chamber application phase: Based on the small chamber screening data, 3 formulations, a low-emitting coating (Water Based 7), a high-emitting water-based coating (Water Based 3), and a solvent based coating (Solvent Based 2) were identified for more comprehensive testing. The comprehensive testing was conducted in a room sized environmental chamber (32 m³) and each test included an application phase (where an installer entered the chamber and applied the coating) and an early occupancy phase (where the floor was allowed to equilibrate normally and air samples were collected over a 7-day period in the chamber). The chamber was supplied with purified air at standard conditions of 23°C, 50 percent relative humidity, and 1 air change per hour throughout the test. Prior to testing, an 8" x 12" wood floor was assembled in the chamber to serve as the finish substrate. Background samples were collected to identify potential contaminants from the wood floor substrate. At the start of the application phase, the technician (a professional flooring contractor) entered the chamber with a small container of finish and a standard synthetic lambs wool applicator. The finish was poured onto small sections of the flooring and spread evenly over the entire surface, then the technician opened the door and quickly exited the chamber. Each coating was applied with the recommended number of coats (2 or 3) and using the recommended dry time between coats (2-hrs to 24-hrs). Air samples were collected during the application of each coat (to capture the maximum breathing concentration) and over the coating plus drying time (to determine the average breathing concentration during application). After the door was closed following application of the final coat, the early occupancy phase of the test was started. Data from the application phase is compared to occupational exposure guidelines.</p>
	Metric 5: Sample Size and Variability	Medium	2	<p>small sample size; air samples were collected during application of each coat (to capture the maximum breathing concentration) and over the coating plus drying time (to determine average breathing concentration during application).</p>

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Study Citation:	UL Env. 2017. Floor Coating VOC Emissions Research Report.				
Data Type	Experimental				
Hero ID	4440489				
Domain	Metric	Rating [†]	Score	Comments [‡]	
	Metric 6: Temporality	High	1	<5 years (2017 pub date)	
Domain 3: Accessibility/Clarity					
	Metric 7: Reporting of Results	Medium	2	No supplemental or raw data. Table 4 reports measured chamber concentrations during full-scale large chamber application phase results.	
	Metric 8: Quality Assurance	N/A	N/A	Measured concentrations from the application phase were compared to occupational exposure guidelines	
Domain 4: Variability and Uncertainty					
	Metric 9: Variability and Uncertainty	Low	3		
Overall Quality Determination *		Medium	2.0		
Extracted		Yes			

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 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Wetzel, T. A.. 2014. Volatile Organic Compounds (VOCs) In Indoor Air: Emission From Consumer Products and the Use of Plants for Air Sampling.				
Data Type	Experimental				
Hero ID	4442460				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology and Conditions	Low	3	Some info is described in another report. But missing key pieces of information such as the exact times samples were collected from the chamber.	
	Metric 2: Analytical Methodology	Medium	2	Analytical method described, but no limits reported.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representative					
	Metric 4: Testing Scenario	Low	3	Chemical content or weight fraction of product not reported.	
	Metric 5: Sample Size and Variability	Low	3	<5 samples	
	Metric 6: Temporality	High	1	current	
Domain 3: Accessibility/Clarity					
	Metric 7: Reporting of Results	Low	3	The report lacked a lot of information and organization. no raw data, no results per sampling interval.	
	Metric 8: Quality Assurance	N/A	N/A		
Domain 4: Variability and Uncertainty					
	Metric 9: Variability and Uncertainty	Medium	2	Discussed calibration. Assessed reproducibility and accuracy of the emission rates generated from the chamber. No recoveries mentioned.	
Overall Quality Determination*		Low	2.4		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	C. B. Keil, M. Nicas. 2003. Predicting room vapor concentrations due to spills of organic solvents. AIHA Journal.				
Data Type	Experimental				
Hero ID	4532343				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology and Conditions	High	1	Sampling method well described.	
	Metric 2: Analytical Methodology	Medium	2	chemical not analyzed. evaporation determined by mass, as logged by a computer. No calibration was discussed.	
	Metric 3: Biomarker Selection	N/A	N/A		
Domain 2: Representative					
	Metric 4: Testing Scenario	Low	3	Spill of chemical, not of formulated product. One set of conditions however the article states that other studies show that evap rates don't vary much with different conditions.	
	Metric 5: Sample Size and Variability	Low	3	range and avg provided, but could not find the number of samples.	
	Metric 6: Temporality	Low	3	2003, > 15 yrs old, but tested using a chemical so not as relevant.	
Domain 3: Accessibility/Clarity					
	Metric 7: Reporting of Results	Low	3	no raw data and no number of samples.	
	Metric 8: Quality Assurance	N/A	N/A	Did not discuss QC measures.	
Domain 4: Variability and Uncertainty					
	Metric 9: Variability and Uncertainty	Low	3	Conducted a study in a test house with one chemical (not DCM) to compare lab results.	
Overall Quality Determination*		Low	2.6		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Won, D. Yang W.. 2012. Material emission information from: 105 building materials and consumer products.			
Data Type	Experimental			
Hero ID	4663242			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology and Conditions	High	1	
	Metric 2: Analytical Methodology	Medium	2	analytical method is well described, but no recovery samples.
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representative				
	Metric 4: Testing Scenario	Low	3	Consumer uses(subcategory in table 2) don't match for use of interest of EPA very much.
	Metric 5: Sample Size and Variability	Low	3	only one sample collected per test
	Metric 6: Temporality	Medium	2	2010 and 2011(>5 yrs old)
Domain 3: Accessibility/Clarity				
	Metric 7: Reporting of Results	High	1	
	Metric 8: Quality Assurance	N/A	N/A	calibration, comparison to past data are described, but recoveries is not discussed.
Domain 4: Variability and Uncertainty				
	Metric 9: Variability and Uncertainty	High	1	
Overall Quality Determination*		Medium	1.9	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	C Solal, C. Rousselle, C. Mandin, J. Manel, F. Maupetit. 2008. VOCs and formaldehyde emissions from cleaning products and air fresheners. International Conference on Indoor Air Quality and Climate (Indoor Air 2008).			
Data Type	Experimental			
Hero ID	4683353			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology and Conditions	Medium	2	Although it appears that standard methods were used, not many details were provided. The emission test chamber method is described in EN ISO 16000-9 (Determination of the emission of volatile organic compounds from building products and furnishing ” Emission test chamber method). VOCs were sampled on Tenax-TA and analysed using TD/GC/MSD/FID according to ISO 16000-6.
	Metric 2: Analytical Methodology	Medium	2	Although it appears that standard methods were used, not many details were provided. Samples were analysed using TD/GC/MSD/FID according to ISO 16000-6.
	Metric 3: Biomarker Selection	N/A	N/A	no biomarkers
Domain 2: Representative				
	Metric 4: Testing Scenario	Low	3	Not US products. Don't know weight fractions of products.
	Metric 5: Sample Size and Variability	Low	3	Only two samples per product type.
	Metric 6: Temporality	Medium	2	10 years
Domain 3: Accessibility/Clarity				
	Metric 7: Reporting of Results	Low	3	Only the maximum concentration provided.
	Metric 8: Quality Assurance	N/A	N/A	Implied through the use of standard methods.
Domain 4: Variability and Uncertainty				
	Metric 9: Variability and Uncertainty	Medium	2	only limited discussion of variability.
Overall Quality Determination*		Low	2.4	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	A. T. Hodgson. 1999. Common indoor sources of volatile organic compounds: Emission rates and techniques for reducing consumer exposures.			
Data Type	Experimental			
Hero ID	4683358			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology and Conditions	High	1	robust sampling method description GC-MS; previously been described (Hodgson and Girman, 1989). This method is a modification of U.S. EPA Method TO-1 (Winberry et al., 1988a).
	Metric 2: Analytical Methodology	High	1	
	Metric 3: Biomarker Selection	N/A	N/A	
Domain 2: Representative				
	Metric 4: Testing Scenario	Low	3	Tested products not an exact match to scenarios of interest. 3 experiments: latex paint, vinyl flooring, carpet >15 yrs old
	Metric 5: Sample Size and Variability	Low	3	
	Metric 6: Temporality	Low	3	
Domain 3: Accessibility/Clarity				
	Metric 7: Reporting of Results	Medium	2	No raw data
	Metric 8: Quality Assurance	N/A	N/A	
Domain 4: Variability and Uncertainty				
	Metric 9: Variability and Uncertainty	Medium	2	Some discussion of uncertainty and variability
Overall Quality Determination*		Medium	2.1	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	A. T. Hodgson. 2001. Predicted concentrations in new relocatable classrooms of volatile organic compounds emitted from standard and alternate interior finish materials.			
Data Type	Experimental			
Hero ID	4683360			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology and Conditions	High	1	
	Metric 2: Analytical Methodology	High	1	
	Metric 3: Biomarker Selection	N/A	N/A	no biomarkers
Domain 2: Representative				
	Metric 4: Testing Scenario	Medium	2	kind of products, test substance, testing methods are described. But exposure control is not discussed, and temperature/pressure are assumed value for estimation of concentration.
	Metric 5: Sample Size and Variability	Low	3	2 - 4 products samples per product type.
	Metric 6: Temporality	Low	3	>15 yrs old
Domain 3: Accessibility/Clarity				
	Metric 7: Reporting of Results	Medium	2	Each results are summarized in each tables. The value in each tables are not raw data though, raw values of concentration are possibly calculated by equation(1). Statistical discussion is missed.
	Metric 8: Quality Assurance	N/A	N/A	QC discussion is quite limited.
Domain 4: Variability and Uncertainty				
	Metric 9: Variability and Uncertainty	Low	3	Variability/Uncertainty discussion is quite limited.
Overall Quality Determination*		Medium	2.1	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	A. C. Ortiz. 2010. Identifying sources of volatile organic compounds and aldehydes in a high performance building.			
Data Type	Experimental			
Hero ID	4683366			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology and Conditions	High	1	testing generally followed California Specification 01350 [15] and ASTM Standard Guide D-6007-02 [16] using small emission chambers.
	Metric 2: Analytical Methodology	Medium	2	USEPA Method TO-17. standard method and LOQ provided, but not details on recovery or calibration.
	Metric 3: Biomarker Selection	N/A	N/A	no biomarker
Domain 2: Representative				
	Metric 4: Testing Scenario	Medium	2	only one testing condition. did not vary temp, airflow, etc.
	Metric 5: Sample Size and Variability	Low	3	one test per product.
	Metric 6: Temporality	Medium	2	8 years old
Domain 3: Accessibility/Clarity				
	Metric 7: Reporting of Results	Medium	2	
	Metric 8: Quality Assurance	N/A	N/A	quality assurance implied but not discussed.
Domain 4: Variability and Uncertainty				
	Metric 9: Variability and Uncertainty	Low	3	no discussion of limitations
Overall Quality Determination *		Medium	2.1	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Jia, C. R.,D'Souza, J.,Batterman, S.. 2008. Distributions of personal VOC exposures: A population-based analysis. Environ-ment International.			
Data Type	Databases Not Unique to a Chemical			
Hero ID	484177			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	High	1	NHANES
	Metric 2: Analytical Methodology	High	1	NHANES
Domain 2: Representative				
	Metric 3: Geographic Area	High	1	
	Metric 4: Temporal	Low	3	Over 15 years old
	Metric 5: Exposure Scenario	Medium	2	Indoor air, but not specifically linked to a consumer use.
Domain 3: Accessibility/Clarity				
	Metric 6: Availability of DB and Supporting Documents	High	1	
	Metric 7: Reporting Results	Medium	2	No raw data, but complete summary stats
Domain 4: Variability and Uncertainty				
	Metric 8: Variability and Uncertainty	N/A	N/A	Discussed exposure factors.
Overall Quality Determination*		High	1.6	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Arif, A. A., Shah, S. M.. 2007. Association between personal exposure to volatile organic compounds and asthma among US adult population. International Archives of Occupational and Environmental Health.			
Data Type	Databases Not Unique to a Chemical			
Hero ID	729385			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Sampling Methodology	High	1	NHANES
	Metric 2: Analytical Methodology	High	1	NHANES. Detailed description of laboratory protocols is available from the NCHS web site.
Domain 2: Representative				
	Metric 3: Geographic Area	High	1	US
	Metric 4: Temporal	Low	3	>15 yrs
	Metric 5: Exposure Scenario	Low	3	Sample collected for 24-48 hrs. Not specific to indoors or to a consumer product. Personal activities were investigated.
Domain 3: Accessibility/Clarity				
	Metric 6: Availability of DB and Supporting Documents	High	1	NHANES
	Metric 7: Reporting Results	Medium	2	no min or max (but 95th CI provided)
Domain 4: Variability and Uncertainty				
	Metric 8: Variability and Uncertainty	N/A	N/A	
Overall Quality Determination*		Medium	1.7	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation:	Staples, C. A., Werner, A. F., Hoogheem, T. J.. 1985. Assessment of priority pollutant concentrations in the United States using STORET database. Environmental Toxicology and Chemistry.				
Data Type	Databases Not Unique to a Chemical				
Hero ID	1359400				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1	STORET refers overall to "STORage and RETrieval", an electronic data system for water quality monitoring data; developed and approved source by EPA	
	Metric 2: Analytical Methodology	High	1	STORET refers overall to "STORage and RETrieval", an electronic data system for water quality monitoring data; developed and approved source by EPA	
Domain 2: Representative					
	Metric 3: Geographic Area	High	1		
	Metric 4: Temporal	Low	3	>15 yrs	
	Metric 5: Exposure Scenario	High	1	STORET refers overall to "STORage and RETrieval", an electronic data system for water quality monitoring data; developed and approved source by EPA	
Domain 3: Accessibility/Clarity					
	Metric 6: Availability of DB and Supporting Documents	High	1		
	Metric 7: Reporting Results	Medium	2	only median and number of samples	
Domain 4: Variability and Uncertainty					
	Metric 8: Variability and Uncertainty	N/A	N/A		
Overall Quality Determination*		High	1.4		
Extracted					

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[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	U.S. E. P. A.. 2017. Chemical data reporting: 1,1,2,2,-tetrachloroethene.				
Data Type	Databases Not Unique to a Chemical				
Hero ID	3970117				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	High	1	Data submitted to EPA by manufacturers.	
	Metric 2: Analytical Methodology	N/A	N/A		
Domain 2: Representative					
	Metric 3: Geographic Area	High	1	US database.	
	Metric 4: Temporal	High	1	Data appears to be for 2010-2011 production volumes. 2016 data now available.	
	Metric 5: Exposure Scenario	High	1	Indicates if a consumer use product.	
Domain 3: Accessibility/Clarity					
	Metric 6: Availability of DB and Supporting Documents	High	1	Widely accepted. Users Guide.	
	Metric 7: Reporting Results	Medium	2	Data is organized. Typically only provides range or max concentration for product category.	
Domain 4: Variability and Uncertainty					
	Metric 8: Variability and Uncertainty	N/A	N/A		
Overall Quality Determination*		High	1.2		
Extracted					

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[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7; Medium: = ≥ 1.7 to < 2.3; Low: = ≥ 2.3 to ≤ 3.

Study Citation:	Oppt Monitoring Database. 2017. Perchloroethylene.				
Data Type	Databases Not Unique to a Chemical				
Hero ID	3970236				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2		
	Metric 2: Analytical Methodology	Medium	2		
Domain 2: Representative					
	Metric 3: Geographic Area	High	1		
	Metric 4: Temporal	Medium	2		
	Metric 5: Exposure Scenario	Low	3		
Domain 3: Accessibility/Clarity					
	Metric 6: Availability of DB and Supporting Documents	Medium	2		
	Metric 7: Reporting Results	Low	3		
Domain 4: Variability and Uncertainty					
	Metric 8: Variability and Uncertainty	N/A	N/A		
Overall Quality Determination*		Medium	2.1		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Pubchem., 2017. PubChem: Tetrachloroethylene.				
Data Type	Databases Not Unique to a Chemical				
Hero ID	3970251				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Low	3	Sampling methodologies were not reported.	
	Metric 2: Analytical Methodology	N/A	N/A	no samples were analyzed	
Domain 2: Representative					
	Metric 3: Geographic Area	N/A	N/A	no sample analysis	
	Metric 4: Temporal	Low	3	Many sources are older >15 yrs.	
	Metric 5: Exposure Scenario	High	1		
Domain 3: Accessibility/Clarity					
	Metric 6: Availability of DB and Supporting Documents	Low	3	No info on how data was compiled or level of QC provided.	
	Metric 7: Reporting Results	High	1		
Domain 4: Variability and Uncertainty					
	Metric 8: Variability and Uncertainty	N/A	N/A	none discussed	
Overall Quality Determination*		Medium	2.2		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:

High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Household Products, Database. 2017. Household products database: Chemical information: Tetrachloroethylene.				
Data Type	Databases Not Unique to a Chemical				
Hero ID	3970268				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Medium	2	About Database webpage describes some info on how data was collected, but not detailed.	
	Metric 2: Analytical Methodology	N/A	N/A		
Domain 2: Representative					
	Metric 3: Geographic Area	High	1	US database.	
	Metric 4: Temporal	High	1	Products have range of dates including <5 yrs.	
	Metric 5: Exposure Scenario	High	1	Weight fractions in 18,000 various consumer products.	
Domain 3: Accessibility/Clarity					
	Metric 6: Availability of DB and Supporting Documents	High	1	Widely accepted US govt database.	
	Metric 7: Reporting Results	High	1	Data is organized. No summary provided, so summary stats not applicable	
Domain 4: Variability and Uncertainty					
	Metric 8: Variability and Uncertainty	N/A	N/A		
Overall Quality Determination*		High	1.2		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Consumer Product Information, Database. 2017. What's in it? tetrachloroethylene.				
Data Type	Databases Not Unique to a Chemical				
Hero ID	3981163				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	Low	3	Webpage provides only very limited info. Brands selected based on market share.	
	Metric 2: Analytical Methodology	N/A	N/A	Shelf survey.	
Domain 2: Representative					
	Metric 3: Geographic Area	High	1	USA and canada database	
	Metric 4: Temporal	High	1	"Date verified" provided, come <5 yrs old.	
	Metric 5: Exposure Scenario	High	1	Weight fractions of consumer products.	
Domain 3: Accessibility/Clarity					
	Metric 6: Availability of DB and Supporting Documents	Low	3	No info how data collected or QC provided.	
	Metric 7: Reporting Results	High	1	Data is organized. No summary provided, so summary stats not applicable	
Domain 4: Variability and Uncertainty					
	Metric 8: Variability and Uncertainty	N/A	N/A		
Overall Quality Determination*		Medium	1.7		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation:	Bartzis, J.. 2018. Prioritization of building materials as indoor pollution sources (BUMA).				
Data Type	Databases Not Unique to a Chemical				
Hero ID	4663145				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Sampling Methodology	N/A	N/A		
	Metric 2: Analytical Methodology	N/A	N/A		
Domain 2: Representative					
	Metric 3: Geographic Area	High	1		
	Metric 4: Temporal	Medium	2		
	Metric 5: Exposure Scenario	Medium	2		
Domain 3: Accessibility/Clarity					
	Metric 6: Availability of DB and Supporting Documents	High	1		
	Metric 7: Reporting Results	High	1		
Domain 4: Variability and Uncertainty					
	Metric 8: Variability and Uncertainty	N/A	N/A		
Overall Quality Determination*		High	1.4		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation:	Page, G. W.. 1981. Comparison of groundwater and surface water for patterns and levels of contamination by toxic substances. Environmental Science and Technology.				
Data Type	Completed Exposure Assessment				
Hero ID	18169				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability	Metric 1: Methodology	Medium	2	measurements, approaches are described briefly. But not in detail.	
Domain 2: Representative	Metric 2: Exposure Scenario	Medium	2	surface water study. geography of area is described. but it's quite old study.(data collected in 1979)	
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	High	1		
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	Low	3	variability/uncertainty is not discussed.	
Overall Quality Determination*		Medium	2.0		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Ipcs., 1984. Tetrachloroethylene. Environmental Health Criteria.			
Data Type	Completed Exposure Assessment			
Hero ID	22606			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability	Metric 1: Methodology	Medium	2	Govt report of secondary exposure data. Medium score since the paper does not describe lit search.
Domain 2: Representative	Metric 2: Exposure Scenario	Medium	2	SW and aquatic species of interest. Geographical info most likely found within the secondary sources.
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	Low	3	Various secondary sources cited for data. However, limited discussion on data gaps.
Overall Quality Determination*		Medium	2.0	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Wallace, L. A., Pellizzari, E., Leaderer, B., Zelon, H., Sheldon, L.. 1987. Emissions of volatile organic compounds from building materials and consumer products. Atmospheric Environment.			
Data Type	Completed Exposure Assessment			
Hero ID	23126			

Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	Medium	2	Did not describe why selected the one study to compare vs others.
Domain 2: Representative				
	Metric 2: Exposure Scenario	Medium	2	Indoor air concentrations, but not specific to a product.
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	Medium	2	secondary data - only the average concentration was reported for comparison.
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	Medium	2	No SD provided for indoor concentrations. They did explain why chamber vs indoor air concentrations may differ.
Overall Quality Determination*		Medium	2.0	

Extracted

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	U.S. E. P. A.. 2001. Sources, emission and exposure for trichloroethylene (TCE) and related chemicals.			
Data Type	Completed Exposure Assessment			
Hero ID	35002			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	Medium	2	Government report, but did not describe lit search methods
Domain 2: Representative				
	Metric 2: Exposure Scenario	Medium	2	For surface water secondary data, does not provide location within US.
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	High	1	
Overall Quality Determination*		High	1.5	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Fuller, B. B.. 1976. Air pollution assessment of tetrachloroethylene.			
Data Type	Completed Exposure Assessment			
Hero ID	58062			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	Low	3	No description of literature search method.
Domain 2: Representative				
	Metric 2: Exposure Scenario	Medium	2	US study and media of interest (water, biota on pg 64), but the secondary data is from 1975.
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	Low	3	no discussion related to the concentrations in the environment
Overall Quality Determination*		Medium	2.2	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Zoeteman, B. C. J.,Harmsen, K.,Linders, J. B. H. J.,Morra, C. F. H.,Slooff, W.. 1980. Persistent organic pollutants in river water and ground water of the Netherlands. Chemosphere.			
Data Type	Completed Exposure Assessment			
Hero ID	58284			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability	Metric 1: Methodology	Low	3	persistence is mainly discussed. basically secondary references are quoted.
Domain 2: Representative	Metric 2: Exposure Scenario	Low	3	US study. but quite old study (1980) and not much data.
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	Medium	2	Some discussion of uncertainties.
Overall Quality Determination*		Medium	2.2	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Atsdr,. 1997. Toxicological profile for tetrachloroethylene.			
Data Type	Completed Exposure Assessment			
Hero ID	192111			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	Medium	2	
Domain 2: Representative				
	Metric 2: Exposure Scenario	High	1	
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	High	1	
Overall Quality Determination [*]		High	1.2	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{*} If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Fishbein, L.. 1992. Exposure from occupational versus other sources. Scandinavian Journal of Work, Environment and Health.			
Data Type	Completed Exposure Assessment			
Hero ID	200024			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	Low	3	Few assumption provided. Literature search methods not discussed.
Domain 2: Representative				
	Metric 2: Exposure Scenario	Low	3	Over 15 years old. Intakes not specific to indoors.
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	Low	3	A reference section is provided. But the range provided for indoor air concentrations was not specifically stated in the text.
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	Low	3	No discussion.
Overall Quality Determination*		Low	3.0	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Duboudin, C.. 2010. Pollution inside the home: descriptive analyses Part II: Identification of groups of homogenous homes in terms of pollution. Environnement, Risques & Sante.			
Data Type	Completed Exposure Assessment			
Hero ID	380600			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability	Metric 1: Methodology	Medium	2	Limited discussion of methods, but references provided for sampling and analytical methodology.
Domain 2: Representative	Metric 2: Exposure Scenario	Medium	2	survey from 2003-2005
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	Medium	2	Some references that would be useful to review are in French.
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	Medium	2	Conducted statistical analysis to group comparable homes. No CV of concentrations provided.
Overall Quality Determination *		Medium	2.0	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Chien, Y. C.. 1997. The influences of exposure pattern and duration on elimination kinetics and exposure assessment of tetrachloroethylene in humans [PhD].			
Data Type	Completed Exposure Assessment			
Hero ID	630433			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	Medium	2	
Domain 2: Representative				
	Metric 2: Exposure Scenario	Medium	2	
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	Medium	2	
Overall Quality Determination*		Medium	1.8	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation:	Letkiewicz, F.,Johnston, P.,Macaluso, C.,Elder, R.,Yu, W.. 1982. Occurrence in tetrachloroethylene (perchloroethylene) in drinking water, food and air.			
Data Type	Completed Exposure Assessment			
Hero ID	630715			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability	Metric 1: Methodology	High	1	Draws on data from previous federal surveys, as well as some state data
Domain 2: Representative	Metric 2: Exposure Scenario	High	1	PERC concentrations in drinking water
Domain 3: Accessibility/Clarity	Metric 3: Documentation ofReferences	High	1	References are documented and appear to be reliable
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	High	1	Study looks at variability in exposure throughout United States
Overall Quality Determination*		High	1.0	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Nysdoh., 2005. Improving human risk assessment for tetrachloroethylene by using biomarkers and neurobehavioral testing.			
Data Type	Completed Exposure Assessment			
Hero ID	630847			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability	Metric 1: Methodology	High	1	Technical approach appears reliable, much discussion of methods and techniques
Domain 2: Representative	Metric 2: Exposure Scenario	High	1	Assessment of data collected in NYC between 2001-2003; Consumer inhalation exposure through both air concentrations and blood/breath levels
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	High	1	References and reported data are provided in appendix
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	High	1	Variability characterized for blood/breath perc levels
Overall Quality Determination*		High	1.0	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation: Benignus, V. A., Boyes, W. K., Geller, A. M., Bushnell, P. J.. 2009. Long-term perchloroethylene exposure: A meta-analysis of neurobehavioral deficits in occupationally and residentially exposed groups. Journal of Toxicology and Environmental Health, Part A: Current Issues.					
Data Type	Completed Exposure Assessment				
Hero ID	633141				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Methodology	High	1	Assessment techniques appear to be accepted and reliable.	
Domain 2: Representative					
	Metric 2: Exposure Scenario	High	1	All studies included are of consumer inhalation exposure measured by indoor air quality	
Domain 3: Accessibility/Clarity					
	Metric 3: Documentation of References	High	1	Studies referenced all appear in peer-reviewed publications	
Domain 4: Variability and Uncertainty					
	Metric 4: Variability and Uncertainty	Medium	2	Variability in population/media is explored	
Overall Quality Determination*		High	1.2		
Extracted					

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[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: = ≥ 1.7 to < 2.3; Low: = ≥ 2.3 to ≤ 3.

Study Citation:	Destallats, H.,Maddalena, R. L.,Singer, B. C.,Hodgson, A. T.,McKone, T. E.. 2008. Indoor pollutants emitted by office equipment: A review of reported data and information needs. Atmospheric Environment.				
Data Type	Completed Exposure Assessment				
Hero ID	694628				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Methodology	Unacceptable	4	just Literature review.	
Domain 2: Representative					
	Metric 2: Exposure Scenario	Medium	2	The release of PERC from office equipments is described. US study. HBCD is not mentioned in document. published In 2008.	
Domain 3: Accessibility/Clarity					
	Metric 3: Documentation of References	High	1		
Domain 4: Variability and Uncertainty					
	Metric 4: Variability and Uncertainty	N/A	N/A	no discussion - all secondary data.	
Overall Quality Determination*		Unacceptable	4.0	Metric mean score ^{**} : 2.3.	
Extracted					

^{**} Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation:	C. J. Weschler. 2009. Changes in indoor pollutants since the 1950s. Atmospheric Environment.				
Data Type	Completed Exposure Assessment				
Hero ID	695495				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability	Metric 1: Methodology	Low	3	Little discussion on methodology. Table 1 provides a sense of how and why an indoor environment in 2008 is so different from its counterpart in the early 1950s.	
Domain 2: Representative	Metric 2: Exposure Scenario	Medium	2	Article discusses trends in indoor pollutants. Table 2 reports selected pollutants (includes DCM, Carbon Tet, TCE, and PERC) and trends in their indoor concentrations since the 1950s. There are no concentration measurement; trends are broadly summarized by up and down arrows. Figure 4(a) reports median indoor concentrations of Carbon Tet, PERC, and TCE, but these data are derived from 1981-1984 TEAM Study and the 1999-2001 RIOPA study (secondary studies will not be extracted)	
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	Medium	2	References are listed	
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	Medium	2	The study has limited discussion of key uncertainties and limitations.	
Overall Quality Determination*		Medium	2.2		
Extracted					

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Gilbert, D.,Goyer, M.,Lyman, W.,Magil, G.,Walker, P.,Wallace, D.,Wechsler, A.,Yee, J.. 1982. An exposure and risk assessment for tetrachloroethylene.			
Data Type	Completed Exposure Assessment			
Hero ID	732615			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	High	1	
Domain 2: Representative				
	Metric 2: Exposure Scenario	High	1	
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	High	1	
Overall Quality Determination*		High	1.0	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Dawson, H. E.,McAlary, T.. 2009. A compilation of statistics for VOCs from post-1990 indoor air concentration studies in North American residences unaffected by subsurface vapor intrusion. Ground Water Monitoring and Remediation.			
Data Type	Completed Exposure Assessment			
Hero ID	735303			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability	Metric 1: Methodology	High	1	Detailed description of literature evaluated and statistical analysis.
Domain 2: Representative	Metric 2: Exposure Scenario	Low	3	Most studies are >15 yrs old, and not directly tied to consumer products.
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	High	1	robust discussion, discussed variability
Overall Quality Determination*		High	1.5	
Extracted				

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation:	Bogen, K. T.,McKone, T. E.. 1988. Linking indoor air and pharmacokinetic models to assess tetrachloroethylene risk. Risk Analysis.			
Data Type	Completed Exposure Assessment			
Hero ID	819974			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	High	1	
Domain 2: Representative				
	Metric 2: Exposure Scenario	Low	3	model for inhalation from groundwater, but groundwater is off-PECO
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	High	1	compared to other studies
Overall Quality Determination*		High	1.5	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

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Study Citation:	. 1988. Toxic Air Pollutant Emission Factors Compilation For Selected Air Toxic Compounds and Sources.			
Data Type	Completed Exposure Assessment			
Hero ID	1265174			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability	Metric 1: Methodology	Low	3	mathematical approach is described very simply. But the discussion of the approach like validity is missed.
Domain 2: Representative	Metric 2: Exposure Scenario	Medium	2	there are tables of emission factors of TCE and perc for industrial process. But data is quite old (>15yrs).
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	Low	3	input data is missed. some of un-peer reviewed sources are cited.
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	Low	3	variability/uncertainty is a bit discussed.
Overall Quality Determination*		Low	2.8	
Extracted		Yes		

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	de Blas, M.,Navazo, M.,Alonso, L.,Durana, N.,Gomez, M. C.,Iza, J.. 2012. Simultaneous indoor and outdoor on-line hourly monitoring of atmospheric volatile organic compounds in an urban building. The role of inside and outside sources. Science of the Total Environment.			
Data Type	Completed Exposure Assessment			
Hero ID	1788276			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	High	1	
Domain 2: Representative				
	Metric 2: Exposure Scenario	High	1	The contractor comment downgraded the paper because it does not link directly to a consumer product, but that is not the purpose of the study. The indoor/outdoor mixing ration measurements can help inform background indoor air concentrations when considering risk due to use scenarios.
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	High	1	
Overall Quality Determination*		High	1.0	
Extracted				

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Du, Z.,Mo, J.,Zhang, Y.. 2014. Risk assessment of population inhalation exposure to volatile organic compounds and carbonyls in urban China. Environment International.			
Data Type	Completed Exposure Assessment			
Hero ID	2536230			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	High	1	
Domain 2: Representative				
	Metric 2: Exposure Scenario	Medium	2	
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	High	1	
Overall Quality Determination*		High	1.2	
Extracted				

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	L. Golsteijn, D. Huizer, M. Hauck, R. van Zelm, M. A. Huijbregts. 2014. Including exposure variability in the life cycle impact assessment of indoor chemical emissions: the case of metal degreasing. Environment International.			
Data Type	Completed Exposure Assessment			
Hero ID	2537636			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	High	1	
Domain 2: Representative				
	Metric 2: Exposure Scenario	High	1	
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	High	1	
Overall Quality Determination*		High	1.0	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	. 2015. Health Assessment for Groundwater, Surface Water, Soil and Sediment Data Evaluation, Corozal Well Site, Corozal, Puerto Rico, July 29, 2015. EPA Facility ID: PRN000206452.				
Data Type	Completed Exposure Assessment				
Hero ID	3491017				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Methodology	High	1	Assumptions for calculations are well-documented	
Domain 2: Representative					
	Metric 2: Exposure Scenario	Low	3	Surface water is discussed briefly, only to rule it out. Bulk of assessment is on groundwater, which is not currently of interest.	
Domain 3: Accessibility/Clarity					
	Metric 3: Documentation of References	High	1	Reference are well documented; data from EPA and PRDOH	
Domain 4: Variability and Uncertainty					
	Metric 4: Variability and Uncertainty	Medium	2	Some discussions of uncertainty related to dose calculations	
Overall Quality Determination*		Medium	1.8		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	McDonald, G. J., Wertz, W. E.. 2007. PCE, TCE, and TCA vapors in subslab soil gas and indoor air: A case study in upstate New York. Ground Water Monitoring and Remediation.			
Data Type	Completed Exposure Assessment			
Hero ID	3543741			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	High	1	
Domain 2: Representative				
	Metric 2: Exposure Scenario	Medium	2	Indoor air study. but not specialized as consumer products.
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	High	1	
Overall Quality Determination*		High	1.2	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Bauer, U.. 1991. OCCURRENCE OF TETRACHLOROETHYLENE IN THE FEDERAL-REPUBLIC-OF-GERMANY. Chemosphere.			
Data Type	Completed Exposure Assessment			
Hero ID	3572966			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	Low	3	No discussion on methodology.
Domain 2: Representative				
	Metric 2: Exposure Scenario	Low	3	Older (1991) German study citing data from 1976-1986.
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	High	1	Caution that many cited references could be in German.
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	Low	3	No variability and some uncertainties were addressed.
Overall Quality Determination*		Low	2.5	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation: De Rooij, C.,Boutonnet, J. C.,Garny, V.,Lecloux, A.,Papp, R.,Thompson, R. S.,Van Wijk, D.. 1998. Euro Chlor risk assessment for the marine environment OSPARCOM region: North sea - Tetrachloroethylene. Environmental Monitoring and Assessment.				
Data Type	Completed Exposure Assessment			
Hero ID	3573238			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	Low	3	No discussion on methodology.
Domain 2: Representative				
	Metric 2: Exposure Scenario	Low	3	Older (1998) risk assessment study utilizing data from 1975-1995 in European surface waters.
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	Low	3	No variability and some uncertainties were addressed.
Overall Quality Determination*		Low	2.5	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation:	Giger, W., Molnarkubica, E.. 1978. TETRACHLOROETHYLENE IN CONTAMINATED GROUND AND DRINKING WATERS. Bulletin of Environmental Contamination and Toxicology.			
Data Type	Completed Exposure Assessment			
Hero ID	3573428			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
Metric 1:	Methodology	Low	3	No discussion on methodology.
Domain 2: Representative				
Metric 2:	Exposure Scenario	Low	3	Study is regarding dw gw. Study cites conc of PERC up to 80 ug/L in sw.
Domain 3: Accessibility/Clarity				
Metric 3:	Documentation of References	High	1	
Domain 4: Variability and Uncertainty				
Metric 4:	Variability and Uncertainty	Low	3	No primary SW conc reported; up to 80 ug/L.
Overall Quality Determination*		Low	2.5	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation:	Nicnas,. 2001. Tetrachloroethylene ” Priority existing chemical. Assessment Report No. 15.			
Data Type	Completed Exposure Assessment			
Hero ID	3797979			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability	Metric 1: Methodology	High	1	
Domain 2: Representative	Metric 2: Exposure Scenario	Medium	2	Australia
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	Medium	2	Some variability and uncertainties were discussed.
Overall Quality Determination*		High	1.5	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Oecd,. 2013. Emission scenario document on the industrial use of adhesives for substrate bonding.			
Data Type	Completed Exposure Assessment			
Hero ID	3827300			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability	Metric 1: Methodology	High	1	
Domain 2: Representative	Metric 2: Exposure Scenario	Low	3	mostly occupational, not consumer
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	Medium	2	Some discussion of data gaps for release and exposure estimates (occupational)
Overall Quality Determination*		Medium	1.8	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	U.S, E. P. A.. 2011. Background indoor air concentrations of volatile organic compounds in North American residences (1990-2005): A compilation of statistics for assessment vapor intrusion.			
Data Type	Completed Exposure Assessment			
Hero ID	3827392			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	Medium	2	The assessment methods , assumptions are discribed simply for each studies which are collected by EPA.
Domain 2: Representative				
	Metric 2: Exposure Scenario	Medium	2	>10 yrs old
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	Medium	2	References are peer reviewed sources and compiled data are summarized. But no raw data.
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	High	1	
Overall Quality Determination*		Medium	1.8	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

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Study Citation:	Ecb., 2005. European Union risk assessment report: Tetrachloroethylene. Part 1 - Environment.				
Data Type	Completed Exposure Assessment				
Hero ID	3839195				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Methodology	High	1		
Domain 2: Representative					
	Metric 2: Exposure Scenario	Medium	2	media interest. but relatively old report (2005: >5yrs old). Not US study.	
Domain 3: Accessibility/Clarity					
	Metric 3: Documentation of References	Medium	2	Most references cited and seem to be available publicly. Others are personal communications.	
Domain 4: Variability and Uncertainty					
	Metric 4: Variability and Uncertainty	High	1		
Overall Quality Determination*		High	1.5		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Australian Government Department of, Health. 2016. Human health tier III assessment for 1-methyl-2-pyrrolidinone.			
Data Type	Completed Exposure Assessment			
Hero ID	3969286			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability	Metric 1: Methodology	High	1	Used Consexpo to model inhalation and dermal doses. Used all default parameters with 4 different weight fractions.
Domain 2: Representative	Metric 2: Exposure Scenario	High	1	
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	Medium	2	model;ed multiple weight fractions.
Overall Quality Determination*		High	1.2	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	U.S, E. P. A.. 2012. Toxicological review of tetrachloroethylene (perchloroethylene).			
Data Type	Completed Exposure Assessment			
Hero ID	3970109			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability	Metric 1: Methodology	High	1	Methodology (literature search strategy) discussed in detail and seems complete.
Domain 2: Representative	Metric 2: Exposure Scenario	Low	3	Many studies seem to correlate to occupational and animal studies, and less on indoor air within households or sw concentrations.
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	High	1	References cited and seem to be available publicly.
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	High	1	
Overall Quality Determination*		High	1.5	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	U.S, E. P. A.. 1998. Cleaner technologies substitutes assessment for professional fabricare processes.			
Data Type	Completed Exposure Assessment			
Hero ID	3970186			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability	Metric 1: Methodology	Medium	2	Govt report of secondary exposure data. Limited discussion on lit search methods, assumptions, extrapolations.
Domain 2: Representative	Metric 2: Exposure Scenario	Medium	2	Older report (1998). Consumer exposures and aquatic/surface water concentrations are provided.
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	Medium	2	Uncertainties discussed; limited characterization of variability
Overall Quality Determination*		Medium	1.8	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	ToxNet Hazardous Substances Data, Bank. 2017. HSDB: Tetrachloroethylene.				
Data Type	Completed Exposure Assessment				
Hero ID	3970279				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Methodology	Low	3	No discussion on methodology.	
Domain 2: Representative					
	Metric 2: Exposure Scenario	Medium	2	Relevant media, but almost all secondary articles are >15 years old.	
Domain 3: Accessibility/Clarity					
	Metric 3: Documentation of References	High	1		
Domain 4: Variability and Uncertainty					
	Metric 4: Variability and Uncertainty	Low	3	Variability is n/a; Uncertainties not identified.	
Overall Quality Determination*		Medium	2.2		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Echa,. 2014. Substance evaluation report - Tetrachloroethylene.			
Data Type	Completed Exposure Assessment			
Hero ID	3970790			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability	Metric 1: Methodology	Medium	2	lit search method is missed.
Domain 2: Representative	Metric 2: Exposure Scenario	Unacceptable	4	just occupational exposure is discussed. consumer, aquatic exposure is not described.
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	High	1	
Overall Quality Determination*		Unacceptable	4.0	Metric mean score ^{**} : 2.0.

Extracted

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† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Echa,. 2008. Annex XV restriction report: Tetrachloroethylene.				
Data Type	Completed Exposure Assessment				
Hero ID	3970791				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Methodology	High	1		
Domain 2: Representative					
	Metric 2: Exposure Scenario	Medium	2	Govt 2008 report. Consumer exposures (back-in-use materials).	
Domain 3: Accessibility/Clarity					
	Metric 3: Documentation of References	Low	3	Many references cited seem to be personal communications.	
Domain 4: Variability and Uncertainty					
	Metric 4: Variability and Uncertainty	Medium	2	Some variability, uncertainties were discussed.	
Overall Quality Determination*		Medium	2.0		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Spolana, a s. 2014. Chemical safety report: Trichloroethylene.			
Data Type	Completed Exposure Assessment			
Hero ID	3970807			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	High	1	EUSES. Annex 1 has assumptions
Domain 2: Representative				
	Metric 2: Exposure Scenario	Medium	2	EU, <5 yrs
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	Low	3	Multiple scenarios, but no discussion of uncertainty.
Overall Quality Determination*		Medium	1.8	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Domo Caproleuna GmbH. 2014. Chemical safety report: Industrial use as an extractive solvent for the purification of caprolactam from caprolactam oil.			
Data Type	Completed Exposure Assessment			
Hero ID	3970809			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability	Metric 1: Methodology	High	1	Used EUSES to model PECs. Assumptions provided.
Domain 2: Representative	Metric 2: Exposure Scenario	Medium	2	Industrial release, but not US.
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	Low	3	Only one reference ,assumed to be the source of the fate properties.
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	Low	3	not discussed
Overall Quality Determination*		Medium	2.2	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	D. O. W. Deutschland. 2014. Chemical safety report: Industrial use as process chemical (enclosed systems) in Alcantara material production.				
Data Type	Completed Exposure Assessment				
Hero ID	3970811				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Methodology	Medium	2	EUSES is an accepted model, not sure all inputs provided.	
Domain 2: Representative					
	Metric 2: Exposure Scenario	Medium	2	Applicable scenario, but not US	
Domain 3: Accessibility/Clarity					
	Metric 3: Documentation of References	High	1		
Domain 4: Variability and Uncertainty					
	Metric 4: Variability and Uncertainty	Medium	2		
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation:	Vlisco Netherlands, B. V.. 2014. Chemical safety report Part A: Use of trichloroethylene as a solvent for the removal and recovery of resin from dyed cloth.			
Data Type	Completed Exposure Assessment			
Hero ID	3970833			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	High	1	EUSES
Domain 2: Representative				
	Metric 2: Exposure Scenario	High	1	
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	Low	3	No discussion of uncertainty
Overall Quality Determination*		High	1.5	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Parker Hannifin, Manufacturing. 2014. Chemical safety report: Use of trichloroethylene as a process solvent for the manufacturing of hollow fibre gas separation membranes out of polyphenylene oxide (PPO).				
Data Type	Completed Exposure Assessment				
Hero ID	3970838				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability	Metric 1: Methodology	High	1	EUSES	
Domain 2: Representative	Metric 2: Exposure Scenario	Medium	2	EU. <5 yrs old	
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	Medium	2		
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	Medium	2	No direct discussion, but evaluated multiple scenarios.	
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	. 2014. Exposure assessment: Trichloroethylene, Part 3.			
Data Type	Completed Exposure Assessment			
Hero ID	3970842			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability	Metric 1: Methodology	Low	3	Used EUSES but didn't describe inputs
Domain 2: Representative	Metric 2: Exposure Scenario	Medium	2	based on industrial releases, but in EU
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	Low	3	this is just a chapter and no references included.
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	Low	3	No discussion of variability and uncertainty
Overall Quality Determination*		Low	2.8	
Extracted		Yes		

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* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Iarc., 2014. IARC Monographs on the evaluation of carcinogenic risks to humans: Trichloroethylene, tetrachloroethylene, and some other chlorinated agents.			
Data Type	Completed Exposure Assessment			
Hero ID	3970844			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	High	1	
Domain 2: Representative				
	Metric 2: Exposure Scenario	Medium	2	Some exposure data are quite old.
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	Medium	2	uncertainty of exposure data is not discussed
Overall Quality Determination*		High	1.5	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Atsdr,. 2006. Health consultation: Evaluation of tetrachloroethylene vapor intrusion into buildings located above a contaminated aquifer: Schlage Lock Company Security, El Paso County, Colorado: EPA facility ID: COD082657420.			
Data Type	Completed Exposure Assessment			
Hero ID	3978056			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	Medium	2	the concept of exposure assessment is described. but no details.
Domain 2: Representative				
	Metric 2: Exposure Scenario	Unacceptable	4	Indoor air study. However, source is not from consumer products, but vapor intrusion from soil contaminated by groundwater.
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	Low	3	Limited discussion
Overall Quality Determination*		Unacceptable	4.0	Metric mean score ^{**} : 2.5.
Extracted				

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[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

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INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Atsdr,. 2005. Health consultation: Walden’’s Ridge utility district: Signal Mountain, Hamilton County, Tennessee.			
Data Type	Completed Exposure Assessment			
Hero ID	3978068			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability	Metric 1: Methodology	Medium	2	exposure pathway is simply described though, no details are shown.
Domain 2: Representative	Metric 2: Exposure Scenario	Unacceptable	4	Human exposure for drinking water is discussed.
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	Low	3	discussion is quite limited.
Overall Quality Determination [*]		Unacceptable	4.0	Metric mean score ^{**} : 2.5.
Extracted				

^{**} Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{*} If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Atsdr,. 2008. Health consultation: Public comment release: Indoor and outdoor air data evaluation for Chillum perc site: Chillum perc site (aka Chillum perchloroethylene): Chillum, Prince George County, Maryland: EPA facility ID: MDN000305887.			
Data Type	Completed Exposure Assessment			
Hero ID	3978081			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	Medium	2	concept of exposure assessment is described. but no details.
Domain 2: Representative				
	Metric 2: Exposure Scenario	Unacceptable	4	Vapor intrusion study.
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	Low	3	no discussion.
Overall Quality Determination*		Unacceptable	4.0	Metric mean score **: 2.5.
Extracted				

** Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Carex, Canada. 2017. Tetrachloroethylene– Environmental estimate.			
Data Type	Completed Exposure Assessment			
Hero ID	3978375			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	Low	3	No discussion on methodology.
Domain 2: Representative				
	Metric 2: Exposure Scenario	Medium	2	Canadian and US sources >5 years.
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	Low	3	No variability; Uncertainties not identified.
Overall Quality Determination*		Medium	2.2	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Carex, Canada. 2017. Tetrachloroethylene– Environmental estimate: Indoor air.				
Data Type	Completed Exposure Assessment				
Hero ID	3978377				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Methodology	High	1		
Domain 2: Representative					
	Metric 2: Exposure Scenario	Medium	2	Studies >10 years old in US, Canada, Japan.	
Domain 3: Accessibility/Clarity					
	Metric 3: Documentation of References	High	1		
Domain 4: Variability and Uncertainty					
	Metric 4: Variability and Uncertainty	Low	3	No variability; Uncertainties not identified.	
Overall Quality Determination [*]		Medium	1.8		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{*} If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Who., 2006. WHO IRIS: Tetrachloroethylene.			
Data Type	Completed Exposure Assessment			
Hero ID	3978390			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	High	1	
Domain 2: Representative				
	Metric 2: Exposure Scenario	Low	3	references are old (>15 yrs old). not US study.
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	High	1	
Overall Quality Determination [*]		High	1.5	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{*} If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Atsdr, 2011. Case studies in environmental medicine: tetrachloroethylene toxicity.			
Data Type	Completed Exposure Assessment			
Hero ID	3980994			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability	Metric 1: Methodology	Unacceptable	4	no assessment is conducted. no concentration data.
Domain 2: Representative	Metric 2: Exposure Scenario	Low	3	consumer exposure is fewly refered. it's quite old (>15 yrs old).
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	Low	3	no discussion
Overall Quality Determination*		Unacceptable	4.0	Metric mean score ^{**} : 2.8.

Extracted

** Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

† High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

‡ The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation:	Environment Canada, Health Canada. 1993. Canadian Environmental protection act priority substances list assessment report tetrachloroethylene.			
Data Type	Completed Exposure Assessment			
Hero ID	3981152			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	High	1	
Domain 2: Representative				
	Metric 2: Exposure Scenario	Low	3	Govt study from 1993. Wastewater effluent, indoor air, aquatic species, sw.
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	Medium	2	Variability seems to have been met. Uncertainty has been discussed regarding some articles.
Overall Quality Determination*		Medium	1.8	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	European Chlorinated Solvents, Association. 2011. Health profile on perchloroethylene.			
Data Type	Completed Exposure Assessment			
Hero ID	3982134			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	Low	3	Not much discussion on the "available data."
Domain 2: Representative				
	Metric 2: Exposure Scenario	Low	3	Some data for indoor air and aquatic species but missing details.
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	Unacceptable	4	Secondary sources were not cited and the study did not provide a list of references.
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	Low	3	Limited variability and no discussion on uncertainty.
Overall Quality Determination*		Unacceptable	4.0	Metric mean score ^{**} : 3.2.
Extracted				

^{**} Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Oehha,. 2001. Public health goal for tetrachloroethylene in drinking water.			
Data Type	Completed Exposure Assessment			
Hero ID	3982310			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability	Metric 1: Methodology	Medium	2	Govt report of secondary exposure data. Medium score since does not describe lit search method.
Domain 2: Representative	Metric 2: Exposure Scenario	Low	3	Govt report from 2001. Indoor air concentrations and consumer (dry cleaned clothes).
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	Low	3	Some variability. Uncertainty was described for developed models.
Overall Quality Determination*		Medium	2.2	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Arb., 1991. Proposed identification of perchloroethylene as a toxic air contaminant.				
Data Type	Completed Exposure Assessment				
Hero ID	3982312				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability	Metric 1: Methodology	Medium	2	Techniques and facts are described, but description of details like method to calculate the concentration are limited.	
Domain 2: Representative	Metric 2: Exposure Scenario	Medium	2	indoor air concentration is shown, but consumer product is not mentioned. quite old study (>15 yrs old)	
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	Low	3	It's not clear that references are peer reviewed.	
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	Low	3	uncertainties and data gaps are discussed quite limitedly.	
Overall Quality Determination*		Low	2.5		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Carb., 1991. Technical support document part A: Proposed identification of perchloroethylene as a toxic air contaminant.			
Data Type	Completed Exposure Assessment			
Hero ID	3986480			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	Medium	2	Govt report of secondary exposure data. Medium score since does not describe lit search method.
Domain 2: Representative				
	Metric 2: Exposure Scenario	Low	3	Older study (1991). Building materials and consumer products. Indoor air conc.
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	High	1	
Overall Quality Determination*		Medium	1.8	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Carb., 1991. Technical support document part B: Proposed identification of perchloroethylene as a toxic air contaminant.			
Data Type	Completed Exposure Assessment			
Hero ID	3986481			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	Low	3	description of lit search method and exposure is missed.
Domain 2: Representative				
	Metric 2: Exposure Scenario	Unacceptable	4	no media interests.
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	Low	3	no discussion.
Overall Quality Determination*		Unacceptable	4.0	Metric mean score ^{**} : 2.8.
Extracted				

^{**} Consistent with our *Application of Systematic Review in TSCARisk Evaluations* document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	P. E. I. Associates. 1985. Asbestos dust control in brake maintenance. Draft.				
Data Type	Completed Exposure Assessment				
Hero ID	4151966				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability	Metric 1: Methodology	Low	3	Because this monitoring was done under a variety of sampling times and conditions, with variable amounts of brake drum dust, and variable asbestos concentrations in the dust, and by different test methods, the results should be viewed only as rough estimates of worker exposure.	
Domain 2: Representative	Metric 2: Exposure Scenario	High	1	very relevant: dust control for brake maintenance workers	
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	Low	3	A mix of old agency reports and publications, industry papers, and also some personal communications and workshops; but well documented	
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	Medium	2	Variability described and uncertainty addressed; ultimately a comparison of dust control methods relative to each other.	
Overall Quality Determination*		Medium	2.2		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Ec., 2004. European Union risk assessment report: Tetrachloroethylene.			
Data Type	Completed Exposure Assessment			
Hero ID	4152094			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	High	1	
Domain 2: Representative				
	Metric 2: Exposure Scenario	Medium	2	media interest. but in EU and a bit old (in 2004).
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	High	1	
Overall Quality Determination [*]		High	1.2	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{*} If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Wu.,et al.,. 2001. Sources, emissions and exposures for trichloroethylene (TCE) and related chemicals.			
Data Type	Completed Exposure Assessment			
Hero ID	4152270			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Methodology	High	1	
Domain 2: Representative				
	Metric 2: Exposure Scenario	Low	3	US study. but surface water or consumer exposure is described too simply. and quite old study (>15 yrs old)
Domain 3: Accessibility/Clarity				
	Metric 3: Documentation of References	High	1	
Domain 4: Variability and Uncertainty				
	Metric 4: Variability and Uncertainty	High	1	
Overall Quality Determination*		High	1.5	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Herbert, P.,Charbonnier, P.,Rivolta, L.,Servais, M.,Van Mensch, F.,Campbell, I.. 1986. The occurrence of chlorinated solvents in the environment. Prepared by a workshop of the European Chemical Industry Federation (CEFIC). Chemistry and Industry.				
Data Type	Completed Exposure Assessment				
Hero ID	4152304				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Methodology	Low	3	There is no actual description of assessment.	
Domain 2: Representative					
	Metric 2: Exposure Scenario	Low	3	The data of surface water is shown. but not US (Europe), and quite old (> 15 yrs)	
Domain 3: Accessibility/Clarity					
	Metric 3: Documentation of References	High	1		
Domain 4: Variability and Uncertainty					
	Metric 4: Variability and Uncertainty	Medium	2	several scenarios are shown. no discussion for uncertainty.	
Overall Quality Determination*		Medium	2.2		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

Study Citation:	Delmaar, J. E.. Emission of chemical substances from solid matrices: a method for consumer exposure assessment.			
Data Type	Completed Exposure Assessment			
Hero ID	4663189			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability	Metric 1: Methodology	Low	3	The report discusses the literature review, assumptions, and limitations of the model. The discussion on data and extrapolations from the model are limited due to data availability and lack of tested data.
Domain 2: Representative	Metric 2: Exposure Scenario	Low	3	The study models volatile substances using summarized data and does not specifically model 1-BP. Sample and surrogate data used may be similar, but the emphasis on building materials is not in alignment with 1BP uses.
Domain 3: Accessibility/Clarity	Metric 3: Documentation of References	Low	3	Numerous studies are referenced, but their use is not always clear or directly related to the text and/or data.
Domain 4: Variability and Uncertainty	Metric 4: Variability and Uncertainty	Low	3	Variabilities and uncertainties are addressed, but not as they apply to 1-BP or its specific exposure environments. Models are built on surrogate parameter values which introduces large degrees of uncertainty.
Overall Quality Determination*		Low	3.0	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	U.S, E. P. A.. 1987. Household solvent products: A national usage survey.			
Data Type	Survey			
Hero ID	1005969			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Data Collection Methodology	High	1	
	Metric 2: Data Analysis Methodology	High	1	
Domain 2: Representative				
	Metric 3: Geographic Area	High	1	Nationwide (U.S.A.) survey with outreach via random dialing and willingness to provide address and respond to survey.
	Metric 4: Sampling / Sampling Size	High	1	
	Metric 5: Response Rate	Medium	2	
Domain 3: Accessibility/Clarity				
	Metric 6: Reporting of Results	High	1	
	Metric 7: Quality Assurance	Medium	2	
Domain 4: Variability and Uncertainty				
	Metric 8: Variability and Uncertainty	N/A	N/A	
Overall Quality Determination*		High	1.3	
Extracted				

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

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Study Citation:	Abt. 1992. Methylene chloride consumer use study survey findings.				
Data Type	Survey				
Hero ID	1065590				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Data Collection Methodology	Medium	2	Data collection instrument was described. The protocols for field personnel was not.	
	Metric 2: Data Analysis Methodology	Medium	2	Weighted summary stats provided, and unweighted counts provided in appendix. Could not find a discussion on sampling and non sampling errors.	
Domain 2: Representative					
	Metric 3: Geographic Area	High	1		
	Metric 4: Sampling / Sampling Size	High	1		
	Metric 5: Response Rate	Medium	2	for the questionnaire, response rate was about 40 percent.	
Domain 3: Accessibility/Clarity					
	Metric 6: Reporting of Results	High	1		
	Metric 7: Quality Assurance	Low	3	No discussion of QC	
Domain 4: Variability and Uncertainty					
	Metric 8: Variability and Uncertainty	N/A	N/A	limited discussion	
Overall Quality Determination*		Medium	1.7		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Wang, S.,Majeed, M. A.,Chu, P.,Lin, H.. 2009. Characterizing relationships between personal exposures to VOCs and socioeconomic, demographic, behavioral variables. Atmospheric Environment.			
Data Type	Survey			
Hero ID	2331429			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Data Collection Methodology	High	1	Survey was not conducted by the authors, but was taken from a VOC study done as part of the 1999-2000 NHANES
	Metric 2: Data Analysis Methodology	High	1	Statistical methods for analyzing the NHANES data are discussed
Domain 2: Representative				
	Metric 3: Geographic Area	High	1	Survey conducted in the United States
	Metric 4: Sampling / Sampling Size	High	1	Samples seem large enough to represent the various populations of interest in this study
	Metric 5: Response Rate	Low	3	Response rate may be documented in original survey data
Domain 3: Accessibility/Clarity				
	Metric 6: Reporting of Results	Medium	2	Summary statistics only
	Metric 7: Quality Assurance	Low	3	Not discussed, but implied by use of NHANES survey data
Domain 4: Variability and Uncertainty				
	Metric 8: Variability and Uncertainty	N/A	N/A	Not discussed as part of this analysis of NHANES survey data
Overall Quality Determination*		Medium	1.7	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Farrow, A., Taylor, H., Northstone, K., Golding, J., Avon Longitudinal Study. 2003. Symptoms of mothers and infants related to total volatile organic compounds in household products. Archives of Environmental Health.
Data Type	Survey
Hero ID	2443306

Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Data Collection Methodology	Medium	2	Data collection methodology discussed. The Avon Longitudinal Study of Parents and Children (ALSPAC) is a population-based study of children born to women who resided in Avon (United Kingdom) during their pregnancy and who had an expected delivery date between April 1, 1991, and December 31, 1992. There were 14,541 pregnant women enrolled in this study, and a cohort of 13,971 of their children was still being followed at age 12 mo. The goal of the ALSPAC is to evaluate environmental, genetic, and social factors that can influence the health of infants and their mothers. Information was collected from mothers through self-report questionnaires at different times during their pregnancy, as well as after the infant's birth, to ascertain family and household characteristics, parental occupations, and other socioeconomic factors. The purpose of this study within the ALSPAC was (a) to determine indoor levels of VOCs relative to the use of specific household products and (b) to identify households in which total VOC (TVOC) levels were high. Investigation of the entire cohort of children and their parents further identified common health effects at different points of data collection. We asked subjects to complete a questionnaire that had questions about the frequency of use of 9 common household products that contain high proportions of VOCs. A total of 13,164 women completed the 1st questionnaire when they were 8 wk pregnant. Of these women, 10,976 completed a 2nd questionnaire 8 mo after birth, and 10,119 completed a 3rd questionnaire when their child was 21 mo of age. We assumed that information about household product use during early pregnancy reflected routine use of these products" rather than later uses which might include cleaning that occurred because the infant was now a member of the household (e.g., use of products to ensure special cleanliness in the infant's environment). The types of household products examined were window cleaners, carpet cleaners, dry-cleaning fluids, turpentine or white spirit, paint stripper, house paints or varnishes, pesticides, other aerosols or sprays, and air fresheners. The categories of use were (a) never or less than once per week, (b) once per week, and (c) daily on most days.

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Study Citation:	Farrow, A.,Taylor, H.,Northstone, K.,Golding, J.,Avon Longitudinal, Study. 2003. Symptoms of mothers and infants related to total volatile organic compounds in household products. Archives of Environmental Health.			
Data Type	Survey			
Hero ID	2443306			
Domain	Metric	Rating [†]	Score	Comments [‡]
	Metric 2: Data Analysis Methodology	Medium	2	Statistical analyses. Mean TVOC levels were calculated on the basis of the monthly values from the living rooms and main bedrooms of the homes monitored in the BRE indoor air study (N = 170). Households with less than 5 TVOC readings for the year were excluded from the analysis. TVOC levels were dichotomized into 2 percentiles: < 75th percentile and > 75th percentile. Use of each of the 9 household products during early pregnancy was dichotomized to < 1/wk and > 1/wk. We used Pearson's chi-square and Fisher's Exact test (crosstabs) to evaluate the relationships between VOC levels in the homes and product use during early pregnancy. We then used products that were statistically significantly associated with higher TVOC levels in the analysis of the entire cohort to determine if use of these products was associated with reporting of symptoms for infants or mothers. For the total cohort, we applied logistic-regression analysis to obtain adjusted odds ratios (ORs) for each symptom with use of a specific product for different frequencies of use, to determine if the odds of experiencing a symptom increased as use of the product increased. Adjustments were made for education, mother's age, housing tenure, number of children in the home, number of smokers in the home, paid job subsequent to birth of the child, dampness or condensation in the home, mold in the home, type of winter heating fuel, and month the questionnaire was completed. The first 6 variables controlled for socioeconomic status; the latter 4 controlled for seasonal ventilation differences that might have influenced the build-up of VOCs (from indoor sources).
Domain 2: Representative	Metric 3: Geographic Area	High	1	United Kingdom
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Study Citation:	Farrow, A., Taylor, H., Northstone, K., Golding, J., Avon Longitudinal Study. 2003. Symptoms of mothers and infants related to total volatile organic compounds in household products. Archives of Environmental Health.			
Data Type	Survey			
Hero ID	2443306			
Domain	Metric	Rating [†]	Score	Comments [‡]
	Metric 4: Sampling / Sampling Size	Medium	2	The Avon Longitudinal Study of Parents and Children (ALSPAC) is a population-based study of children born to women who resided in Avon (United Kingdom) during their pregnancy and who had an expected delivery date between April 1, 1991, and December 31, 1992. There were 14,541 pregnant women enrolled in this study, and a cohort of 13,971 of their children was still being followed at age 12 mo. The goal of the ALSPAC is to evaluate environmental, genetic, and social factors that can influence the health of infants and their mothers. Information was collected from mothers through self-report questionnaires at different times during their pregnancy, as well as after the infant's birth, to ascertain family and household characteristics, parental occupations, and other socioeconomic factors. We asked subjects to complete a questionnaire that had questions about the frequency of use of 9 common household products that contain high proportions of VOCs.
	Metric 5: Response Rate	Medium	2	We asked subjects to complete a questionnaire that had questions about the frequency of use of 9 common household products that contain high proportions of VOCs. A total of 13,164 women completed the 1st questionnaire when they were 8 wk pregnant. Of these women, 10,976 completed a 2nd questionnaire 8 mo after birth, and 10,119 completed a 3rd questionnaire when their child was 21 mo of age. Of the 170 total homes included in this focused study, at least 10 samples were returned from each of 109 households, and at least 5 samples were returned from each of 148 households. The 3,339 total samples represented 73 percent of the number of potential samples. The highest and lowest TVOC concentrations from individual samples were 11.4 mg/m ³ (in a living room) and 0.02 mg/m ³ (in a main bedroom), respectively. The highest and lowest geometric mean concentrations of TVOCs in the living room and bedroom, from a total of 12 samples from any house, were 1.559 mg/m ³ and 0.063 mg/m ³ , respectively. The percentiles of mean TVOC concentrations in the living rooms and bedrooms are contained in the Notes in Table 1.
Domain 3: Accessibility/Clarity	Metric 6: Reporting of Results	Medium	2	No supporting information or raw data available. Table 1 reports products used during pregnancy that were associated significantly with greater than/equal to 75th percentile geometric mean of measured Total Volatile Organic Compounds (TVOCs). No data reported specifically for TCE.

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Study Citation:	Farrow, A., Taylor, H., Northstone, K., Golding, J., Avon Longitudinal Study. 2003. Symptoms of mothers and infants related to total volatile organic compounds in household products. Archives of Environmental Health.			
Data Type	Survey			
Hero ID	2443306			
Domain	Metric	Rating [†]	Score	Comments [‡]
	Metric 7: Quality Assurance	Medium	2	No quality control issues were identified
Domain 4: Variability and Uncertainty	Metric 8: Variability and Uncertainty	N/A	N/A	For example, in 33 homes all readings in both the living room and the main bedroom were less than 0.4 mg/m ³ . In 5 homes, the TVOC concentrations for both rooms always exceeded the stated value. Caution is required when our data are compared with results reported by others and with recommended guidelines, which may be based on a different definition of TVOC.
Overall Quality Determination [*]		Medium	1.9	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{*} If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7; Medium: = ≥ 1.7 to < 2.3; Low: = ≥ 2.3 to ≤ 3.

Study Citation:	Serrano-Trespalacios, P. I., Ryan, L., Spengler, J. D.. 2004. Ambient, indoor and personal exposure relationships of volatile organic compounds in Mexico City metropolitan area. Journal of Exposure Analysis and Environmental Epidemiology.				
Data Type	Modeling				
Hero ID	56224				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Mathematical Equations	Low	3	Not provided in source. Provided in Hamlett, 2003.	
	Metric 2: Model Evaluation	Low	3	Model described in supplemental source Hamlett, 2003. Monitoring results also provided to compare.	
Domain 2: Representative					
	Metric 3: Exposure Scenario	Medium	2	Indoor air	
Domain 3: Accessibility/Clarity					
	Metric 4: Model and Model Documentation Availability	Low	3	Model described in supplemental source Hamlett, 2003.	
	Metric 5: Model Inputs and Defaults	Medium	2		
Domain 4: Variability and Uncertainty					
	Metric 6: Variability and Uncertainty	Medium	2	Monitoring results also provided.	
Overall Quality Determination*		Low	2.5		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7; Medium: =≥ 1.7 to < 2.3; Low: =≥ 2.3 to ≤ 3.

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Study Citation:	Park, J. H., Spengler, J. D., Yoon, D. W., Dumyahn, T., Lee, K., Ozkaynak, H.. 1998. Measurement of air exchange rate of stationary vehicles and estimation of in-vehicle exposure. Journal of Exposure Analysis and Environmental Epidemiology.				
Data Type	Modeling				
Hero ID	85812				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Mathematical Equations	Medium	2	IAQ model by EPA, but Beta version	
	Metric 2: Model Evaluation	Medium	2	Model has been validated, but unsure if specifically for indoor car scenarios.	
Domain 2: Representative					
	Metric 3: Exposure Scenario	High	1	Contractor comments were based on age of data (date of publication), however the exposure scenario is highly representative of a scenario of interest	
Domain 3: Accessibility/Clarity					
	Metric 4: Model and Model Documentation Availability	High	1	Model documentation available	
	Metric 5: Model Inputs and Defaults	High	1	Inputs provided	
Domain 4: Variability and Uncertainty					
	Metric 6: Variability and Uncertainty	Low	3	Compared to another study, but limited discussion of uncertainties.	
Overall Quality Determination*		Medium	1.7		
Extracted		Yes			

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

Study Citation:	Akita, Y.,Carter, G.,Serre, M. L.. 2007. Spatiotemporal nonattainment assessment of surface water tetrachloroethylene in New Jersey. Journal of Environmental Quality.				
Data Type	Modeling				
Hero ID	2494965				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Mathematical Equations	High	1	Model seems scientifically sound	
	Metric 2: Model Evaluation	High	1	Model is corroborated with relevant monitoring data (PCE concentration in surface water streams)	
Domain 2: Representative					
	Metric 3: Exposure Scenario	Low	3	Model is based on data collected from monitoring stations between 1999 and 2003 (15+ years)	
Domain 3: Accessibility/Clarity					
	Metric 4: Model and Model Documentation Availability	High	1	Model is based on equations that are given in the article.	
	Metric 5: Model Inputs and Defaults	High	1	Model inputs are PCE concentrations recorded at the locations of established monitoring stations	
Domain 4: Variability and Uncertainty					
	Metric 6: Variability and Uncertainty	Medium	2	Variability and impact of potential sampling error are discussed briefly	
Overall Quality Determination*		High	1.5		

Extracted

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:

High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	Olie, J. D., Bessems, J. G., Clewell, H. J., Meulenbelt, J., Hunault, C. C.. 2015. Evaluation of semi-generic PBTK modeling for emergency risk assessment after acute inhalation exposure to volatile hazardous chemicals. Chemosphere.				
Data Type	Modeling				
Hero ID	3001596				
Domain	Metric	Rating [†]	Score	Comments [‡]	
Domain 1: Reliability					
	Metric 1: Mathematical Equations	High	1		
	Metric 2: Model Evaluation	High	1	compared against monitoring data	
Domain 2: Representative					
	Metric 3: Exposure Scenario	Medium	2		
Domain 3: Accessibility/Clarity					
	Metric 4: Model and Model Documentation Availability	High	1	models freely available	
	Metric 5: Model Inputs and Defaults	High	1	available in supplement	
Domain 4: Variability and Uncertainty					
	Metric 6: Variability and Uncertainty	High	1		
Overall Quality Determination*		High	1.2		
Extracted					

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .

INTERAGENCY DRAFT. DO NOT CITE OR QUOTE

Study Citation:	UL Env. 2017. Floor Coating VOC Emissions Research Report.			
Data Type	Modeling			
Hero ID	4440489			
Domain	Metric	Rating [†]	Score	Comments [‡]
Domain 1: Reliability				
	Metric 1: Mathematical Equations	Medium	2	Emission rates of TVOC were used in a computer model to determine potential air concentrations of the pollutants. The computer model used the measured emission rate changes over the one-week time period to determine the change in air concentrations that would accordingly occur. The emission factor can be modeled according to a first-order decay.
	Metric 2: Model Evaluation	Medium	2	The emission rates calculated from these samples were used in a mathematical model to predict the concentration that would occur in an office environment. The model parameters were 11.1 m ² of flooring in a 30.6 m ³ room with an outdoor air change rate of 0.68/hr.
Domain 2: Representative				
	Metric 3: Exposure Scenario	High	1	<5 years (2017 pub date) Table 5 reports predicted concentrations of NMP from time of application to one week for floor coatings W7 and W3 (floor loading in office)
Domain 3: Accessibility/Clarity				
	Metric 4: Model and Model Documentation Availability	High	1	There is sufficient documentation in the data source
	Metric 5: Model Inputs and Defaults	Medium	2	Data quality acceptance criteria are not discussed but inputs appear appropriate. The emission factor can be modeled according to a first-order decay: $EF_m = EF_0 e^{-kt}$ where, EF_m = modeled emission factor ("g/m ² hr) or ("g/unit ² hr) EF_0 = initial emission factor ("g/m ² hr) or ("g/unit ² hr) k = rate constant (hr ⁻¹) t = time (hr)
Domain 4: Variability and Uncertainty				
	Metric 6: Variability and Uncertainty	Low	3	
Overall Quality Determination*		Medium	1.8	
Extracted		Yes		

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High: ≥ 1 to < 1.7 ; Medium: ≥ 1.7 to < 2.3 ; Low: ≥ 2.3 to ≤ 3 .